# Master Document for Special conditons in Bridge Works


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## SPECIAL CONDITIONS FOR REBUILDING OF BRIDGES, CONSTRUCTION OF RUBs BY OPEN CUT METHOD, AND BRIDGE REPAIRS WORKS.

1.1 When it is required to operate machinery as per IRUSSOR or any other Plant in the Rly. Land, the contractor must take prior written permission from the Engineering Official concerned.

1.2 All the required RCC boxes should be cast either at bridge site or at suitablelocation as directed by Engineer-In-Charge and be shifted to the predetermined location at least one day in advance of the block. No separate payment will be made for transportation/shifting of RCC boxes/slabs to the Bridge/RUB location.

1.3 Casting of RCC boxes should be so planned that the RCC boxes can be lifted and transported to the predetermined location by contractor's cranes/ trailer without infringing the assembled track, released materials etc.

**2.0 Modus operandi for rebuilding of bridges, new RUBs by open cut method Pre-block activities:**

2.1 The existing rails in track should be suitably cut and fish plated under trafficcondition so that, during the block, track can be lifted with contractor's cranes and kept aside in one attempt to avoid time loss. Crib and shoulder ballast should be removed from track and filled in bags for using them during block.

2.2 All Cranes, equipment's, Breakers mentioned in corresponding item should be in good working condition along with spare operators, technician/mechanic,crane supervisor etc.

**During-block activities:**

2.3 Fish plates should be removed and secured at nominated locations.

2.4 Remove the isolated track panel, steel girders if any and stack them at nominated location.

2.5 Remove the ballast by Hitachi, up to the formation level and stack it at nominated location. Mild blasting of stone/concrete masonry should be done, if required, using the predrilled charged holes (necessary protection covering an area up to 50 sq.m with contractors planks etc should be arranged to avoid probable splashing of the splinters/broken pieces).

2.6 Remove the existing RCC pipe/slab/STC/masonry debris with the help of Hitachi up to the required level/depth. Keep debris away from the working area and bridge vent way. Provide the soling stone to the required level, if required as per drawing.

2.7 Place the precast RCC base slabs.

2.8 Using cranes, place the precast RCC boxes over precast RCC base slabs.

2.9 Fill the space between the RCC$_{00}$b$_2$oxes and the formation with soil and

ram it. Then dump ballast uniformly on the box top, place the released track panel, do kutcha packing to rectify cross levels/alignment.

**3.0** **Concrete / Masonry works:**

**3.1** **Cement**: The cement should conform to I.S. specification 12269 for 53 Grade & to IS 8112 in case of 43 grade. Before executing the work, the agency should submit a test certificate for Standard Properties as well as indicating the source of supply and brand of the cement. Contractor shall use only approved brands as per hq lr No.SCR-HQOENGG(SORy1r2O2o-Dy.CE,t ORKS/SC, 24.05.2022 (copy enclosed ). PPC should not be used.

**3.2** **Reinforcement Steel:** The reinforcement steel to be used shall be of gradeFe-500D or more of approved brands/makes. The agency shall produce necessary vouchers in original in support of the purchase of steel and cement from the suppliers along with certificates to relevant standards from the manufacturers before the commencement of work.The contractor is requiredto safe guard the steel brought to site and to use the same on the work in accordance with actual requirement as indicated in the relevant Drawings orspecifications.

**3.3** Water to be used should be IRUSSR &DSR -2021 (works & Materials). Water shall be got tested by the contractor at his own cost to ensure its suitability. Approval of Engineer in charge shall be obtained on the report before commencing the work. Approved test report should be kept at site office. The contractor should keep all relevant records required like cement test report, steel test report, cube test report etc., in the site office.

**3.4** The shuttering should be IRUSSR &DSR -2021 (works & Materials).

**3.5** Execution of all concrete works, supply of cement and steel, all ingredients ofconcrete shall be as per relevant specifications of Indian Railways Unified Standard Specifications (works & materials) – 2021. Before starting the work the agency shall indicate & get approval for the source of supply of materialsviz. coarse aggregate, fine aggregate. The agency shall submit samples of coarse/fine aggregate along with necessary cement required for mix design.The agency shall arrange for mix design as per the requirement of Railways, at their own cost including movement of materials to approved laboratory, as approved by Engineer-in-charge. The design shall be further checked by trial mixes at site as per relevant specifications. If the results of test cubes does not confirm to the required standard, Railways shall ask the contractor to get the mix designed again. During the course of the work, samples of concrete will be taken and tested at regular intervals from representative portions of the works. All costs of such testing shall be borne by the contractor.

**3.6** The work locations in this agreement come under '**moderate**' environment condition. The following are the extracts of IRS concrete bridge code 2014.

TABLE (a) Maximum water cement ratio:

| Environment | Plain concrete(PCC) | Reinforced concrete(RCC) |
|---|---|---|
| Moderate | 0.50 | 0.45 |
| Severe | 0.45 | 0.40 |
| Extreme | 0.40 | 0.35 |

TABLE (b) Minimum grade of concrete

| Environment | Plain concrete(PCC) | Reinforced concrete(RCC) |
|---|---|---|
| Moderate | M-15 | M-20 |
| Severe | M-20 | M-25 |
| Extreme | M-25 | M-30 |

TABLE ( c ) Minimum cementations material content

| Environment | Plain concrete(PCC) | Reinforced concrete(RCC) |
|---|---|---|
| Moderate | 240 | 300 |
| Severe | 250 | 350 |
| Extreme | 300 | 400 |

Max cementitious material content shall be limited to 500kg/cum.

*Note: For Underwater Concrete 10% extra cement should be added over andabove the normal cement content of the concrete mix specified above.*

**3.7** **Laboratory at site:** Site laboratory Establishment by contractor should be asper Hqs letter No W.496/Policy/Vol.IX Dated 28.12.2021 (copy enclosed)

| **Category** | **Value of work** | **Penalty per monthin Rs** |
|---|---|---|
| A | Works costing upto Rs 2.0 Crs | No penalty |
| B | Works costing above Rs 2.0 Crs and upto 5.0 Crs | 25,000/- |
| c | Works costing above Rs 5.0 Crs | 50,000/- |

**Works costing above Rs 2.0 Crs and upto 5.0 Crs**

| Sl.No | Details | Nos |
|---|---|---|

| | | |
|---|---|---|
| 1 | Full set of IS sieves for testing of materials for Coarse aggregate, Fine aggregate, soil and Blanket Materials as per IS code and as per RDSO guidelines with sieve shaker andbrushes | 1 Nos |
| 2 | Balance | |
| | a. Pan balance-10kg capacity (with 1.0gm least count) | 1 Nos |
| | b. Electronic/Digital balance 10 kg capacity (with 1.0gm least count) | 1 Nos |
| 3 | Concrete cube testing machine -200Tonne capacity | 1 Nos |
| 4 | Slump testing apparatus with tamping rod | 2 Nos |
| 5 | Concrete cube moulds 150X 150X150mm | 12 Nos |
| 6 | Leveling instrument with tripod & 2 Nos. of 4m high leveling staff | 1 Nos |
| 7 | Weigh batch mixing unit | 1 Nos |
| 8 | Screw gauge, Vernier caliper, Spirit level, Measuring tapes, etc | 1 Nos |

**Works costing above Rs 5.0 Crs**

| Sl.No | Details | Nos |
|---|---|---|
| 1 | Full set of IS sieves for testing of materials for Coarseaggregate, Fine aggregate, soil and Blanket Materials as per IS code and as per RDSO guidelines with sieveshaker and brushes | 1 Nos |
| 2 | Balance | |
| | a. Pan balance-10kg capacity (with 1.0gm least count) | 1 Nos |
| | b. Electronic/Digital balance 10 kg capacity (with 1.0gm least count) | 1 Nos |
| 3 | Concrete cube testing machine -200Tonne capacity | 1 Nos |
| 4 | Slump testing apparatus with tamping rod | 2 Nos |
| 5 | Concrete cube moulds 150X 150X150mm | 12 Nos |
| 6 | Leveling instrument with tripod & 2 Nos. of 6m high leveling staff | 1 Nos |
| 7 | Set of Soil testing equipment's as per IS codes | 1 Nos |
| 8 | Set of Cement testing equipment's as per IS codes | 1 Nos |
| 9 | Weigh batch mixing unit | 1 Nos |
| 10 | Screw gauge, Vernier caliper, Spirit level, Measuring tapes, etc | 1 Nos |
| 11 | Rebound hammer apparatus | 1 Nos |
| 12 | Digital Camera | 1 Nos |

**4.0** **<u>Supply of materials by Railways:</u>**

4.1 RH Girders, CC Cribs of size 600 x 600 x 1800mm will be supplied by the railways. Transportation of RH girder to the site will be paid separately underrelevant item.

4.2 The contractor has to make his own arrangements for making staging arrangements as required. In case the Railway materials are available and can be spared, the Railways may supply the following materials on hire charges subject to availability as per rules in force, on request. The Railway materials shall be supplied at nearest Stores depot or any depot within S.C.Railway and the tenderers/contractors shall transport these materials at theircost to the site of work and they shall be returned back to the same depot or as advised by the Engineer-in-charge after completion of work. The discretion of Railway with regard to sparing of Railway materials on hire charges is finaland the contractor shall have no further claim on this account. The contractor has to make his own arrangements for any other materials required other than those supplied by Railway on hire charges.

4.3 **The hire charges are as follows or as per revised rates**:

| | **Description of material** | | **Hire charges per day** |
|---|---|---|---|
| i) | Steel cribs of size 2'x2'x6' | -- | Rs. 5.55 per day per each crib |
| ii) | Second hand rails, RSJs etc. | -- | Rs.16.00 per day per MT |
| iii) | Dip lorries 15 MT capacity | -- | Rs. 40.00 per day per each |
| iv) | Wooden sleepers | -- | Rs.0.57 Ps. per day per each |

4.4 The hire charges will be levied for the period from the day of issue of Railway material to the handing over date of material at the Depot (both days inclusive).

4.5 Materials issued by the Railway shall be used solely and economically for the purpose of the work covered by this contract. Loss or damage of such materials in any manner shall be totally avoided. If any loss or damage is caused to the Railway materials, Recovery will be made as per extant rules in force.

4.6 It shall be the responsibility of the contractor to keep Railway materials, plant or equipment issued for the work in safe custody. The contractor shall at his own expenses provide suitable temporary shed/sheds for this purpose on the Railway land made available by the Railway free of rent and shall remove the shed/sheds when no longer required, in terms of Clause 30 of General Conditions of Contract.

4.7 If due to any reason the Railway is not in a position to make available the Railway land, the Railway Engineer-in-charge of the work may permit the contractor to erect at his own cost shed/sheds or secure private accommodation outside the Railway premises. In

such a case, the contractor may be permitted to take the Railway materials required for the work outside the Railway premises and to store them in the shed erected on private accommodation so secured. It shall be the responsibility of the contractor to keep the Railway materials in safe custody. The railway material should be kept entirely separate from the contractor's materials. The Railway shall have liberty to inspect the same from time to time.

**5.0 Service roads**:

**5.1** The contractor will be permitted to make use of existing service roads, if any, free of cost. New service roads required by the contractor in connection with the work either near the work site elsewhere whether within or outside Railway limits for carriage of materials or for any other purpose whatsoever will have to be constructed and maintained by the contractor at his cost. For the purpose of construction of Service Roads on Railway land, permission will be given to the contractor by Railways.

**5.2** If any land other than Railway land is necessary to be acquired or to be entered upon for the purpose such land acquisition or permission to enter upon the land have to be arranged for by the contractor at his cost. The contractor will, however, indemnify the Railway against all claims for all damages whatsoever in this account. Railway however reserves the right tomake use of such service roads without any charges.

**6.0 Jungle clearance:**

**6.1** Before the work is started the contractor shall clear the area of construction of all trees, grass, shrub, bushes etc., No extra payment will be made for the clearance of jungle shrubs, bushes, trees etc., The rates quoted for excavation are deemed to include the charges for the clearance of jungle, shrubs, trees etc.,

**7.0 Stage payment:**

**7.1** After RCC boxes are cast, 70% of the cost of RCC boxes (i.e. relevant USSR items of Steel, Concrete, cement) will be paid. Remaining 30% will be paidupon launching the boxes.

**8.0 Arrangement of traffic block & penalty clause:**

8.1 Information regarding the line block will be given to contractor three days in advance. Contractor should bring all the required machinery, in good working condition, to the site at least one day in advance of the block. Spare operator, technician/mechanic with spare parts should be available at site. Due to exigencies of traffic, if the programmed blocks are not granted, no compensation of any kind will be paid to the contractor

8.2 The work--removal of existing slab/masonry/earth work, placing

boxes, back filling, filling up ballast, assembling and linking track, through packing—should be completed within the permitted block period, failing which liquidated damages will be recovered @ Rs.500/-(rupees five hundred) per minute of block burst from on-account bills. The reason for bursting the block will be decided by an enquiry committee consisting of railway SSEs and contractor/his representative. Findings of the enquiry committee will be final and binding on the contractor.

8.3 The following machinery shall be arranged by the contractor in advance ( at least 1 day in advance) as per directions of Engineer-In-Charge at bridge site.

| | |
|---|---|
| Gas cutting equipment along with gas cylinder, gas cutter etc | 2 sets |
| Bernco jacks of 15MT capacity along with operators | 2nos |
| Crow bars, beaters, shovel, mortar pans etc | 30each |
| Masons along with Khalasis and required equipment must beavailable for preparing PCC bed without any delay for levelling | 6sets |
| Men mazdoor along with necessary tools for slewing the track asnecessary | 30men |
| Blacksmith with 2khalasis for removal of fish plates/bolts etc, for linking track | 2sets |

NOTE: Above list is indicative only. The contractor should ensure adequate manpower, tools, and machinery to complete the work within the allotted time.

# SPECIAL CONDITIONS FOR BOX PUSHING METHOD

1.0 SITE

## GENERAL FEATURES:

2.1 The Tender is for construction of a RCC box by box pushing method and the following works would form part of this contract as per the approved General arrangement drawings.

a. Procurement/Fabrication of necessary plant and equipment like jacking line jacks, hydraulic pumps and other plant and equipment required for execution of this work.

b. Casting of thrust bed and RCC box and box pushing including shoring or any other arrangement required to protect the earth slopes from sides or Railway embankment to the satisfaction of Engineer in charge and disposal of the excavated earth in the nearby available Railway land within maximum lead of 1 KM. The disposable earth will be utilized to improve cess work, widen the Railway embankment or to develop the circulating area.

c. Necessary provision of opening in the roof of boxes for bentonite pumping if required and pushing of boxes.

d. Manufacturing and fabrication of the front end frame/cutting shield and intermediate jacking stations.

e. Pre-casting and curing of RCC box units including fixing of front end frame/cutting Shield, fixing of drag sheet with all fabrication (cutting shield and drag sheet will remain as the property of contractor after completion of the work).

f. Jacking of pre-cast boxes to form the opening under running Railway traffic conditions. The maximum allowable deviation of the pre-cast boxes at any time from the theoretical alignment will be limited to 100 mm horizontal and 50 mm in vertical direction. Box pushing work shall be done in the presence of Railway's P. Way supervisor not below the rank of P. Way Mistry. The contractor will further ensure such rate of box pushing as that will not disturb the Railway tracks above and will be personally responsible for the safety of Railway traffic. Maintenance of track to the required geometry will be the responsibility of the contractor and the contractor is required to ensure this with labour trained in attending p-way with all tools and plant under the supervision of Railway supervisor.

g. Grouting of gaps with epoxy having adequate structural strength at intermediate Jacking stations after completion of pushing so that no leakage occur from the joints at intermediate jacking station during the service of the bridge.

h Providing 150mm thick M 25 C.C wearing coat on the floor of the box with design camber. Providing longitudinal drainage arrangements within the RCC boxes with minimum 100 mm depth and 200 mm wide drains with provision of catch water drains at the approaches to the boxes, with the arrangement to be approved by the Railway.

i Necessary provision of OHE/Portal/Signal foundation as directed by the Engineer-in on RCC boxes shall be provided, if necessary, as per site conditions.

j Drag sheet shall be provided by the Contractor to minimize drag and disturbance of the soil cushion on the boxes during box pushing operations. Maximum number of drag sheets as directed by Engineer-in charge shall be Provided based on structural safety of

box during pushing and all arrangements required in connection with drag sheet shall be provided free of cost and nothing extra will be paid. Drag sheet will remain as the property of the agency after completion of work.

k During the execution of work if any sub-soil water is met with, the contractor will make their own arrangements to bail out/pump out such water from the site, free of cost. Any unforeseen accumulated rainwater, during the progress of work, shall be bailed out/pumped out by the contractor free of cost and the rates quoted should include all these elements.

l This is an important project which shall be completed well within the stipulated periodas mentioned in tender booklet as it is related to safety ..

**SPECIAL CONDITIONS AND SPECIFICATIONS OF CONTRACT**:

NOTE: These special conditions supplement the condition of Tender and contracts, General conditions of contract and notes appearing under the relevant chapters and sub-chapters of the Standard Schedule of Rates of S.C.Railway & DSR 2021 and should be considered as part of the Tender papers wherever the provisions of the special conditions are at variance with the General Conditions of the contract and other documents mentioned above these special conditions shall prevail.

3.0 The scope of work covered by this Tender is defined in Para 2.0 of General features under particulars of work.

**4.0 CODE AND SPECIFICATIONS:**

4.1 The Design and Construction of the superstructures shall be carried out in terms of Specifications of latest editions of IRS (Indian Railway Standard), B.I.S. (Bureau of Indian Standard) and I.R.C. (Indian Road congress).When there is any conflict the agency should bring it to the notice of Engineer-in-charge for decision. The decision of Engineer in-charge shall be final and binding in the interpretation of the clauses of the codes of practice and specifications under the Special conditions regarding site, date and specifications of this tender. No claim whatsoever shall be entertained on this account by Railways. Any difference of opinion between Engineer's representative and contractor shall be referred to Engineer-in charge. The appeal against decision of Engineer-in charge shall lie with Chief Engineer whose decision shall be final and binding. Such items under this scope shall be deemed to be "Excepted Matters". Apart from the basic data specifications etc., all items of work shall be covered by the Following Codes as revised, corrected, and amended up to the time of submission of the price bids / revised price bids for acceptance.

I. S.C. Railway Engineering Department - General conditions of contract and regulation and instructions to tenderers.

II. Notes appearing under the relevant chapters and sub-chapters of Standard Schedule of Rates 2021 of S.C.Railway.

III. Indian Railways Unified Standard specification 2021.

IV. IS Code of practice for plain and reinforced concrete for general building construction (I.S. 456) - 2000 (Fourth revision).

V. IS Code of practice for use of structural steel in plain and reinforced concrete for general building construction (I.S.800 - 1984).

VI. IRS Code of practice for electric welding of mild steel structures

VII. IRS Code of practice for plain concrete construction, 2014

VIII. Indian Railway code of practice of Plain, reinforced and pre stressed concrete for general/bridge construction (Concrete bridge code adopted in 1935 revised 2014.)

IX. Design superstructure and substructure of bridges including Chapter-VII of the rule for the opening of Railway adopted 1941-Revised-August, 1982.

X. Indian Railways Standard (IIB) Bridge substructure and foundations code- code of practice for the design of the sub-structure and foundation of Bridges adopted 1936 -Revised-1985 (hereinafter referred to as sub-structure code).

XI. I.S. 226 specification for structural steel standard quantity

XII. IS.875-1994 code of practice for structural safety of building and loading (Part1 to 4).

XIII. I.S 1892 - 1975 Criteria to Earthquakes resistant design of structure ( 3rd revision 1976).

XIV. Indian Road Congress code for items not specifically covered by any code or provision mentioned in these documents.

XV. U.T.C.772 - Bearing for Railway Bridges.

XVI. Criteria for Design of OHE Mast provided on the superstructure.

XVII. Indian Railway Schedule of dimensions for Broad Gauge.

XVIII. I.S. Specifications for fine and coarse aggregates from natural source for concrete IS-383- and IS-515

XIX. IS Methods on testing of Soil I.S. 2720 (Part-II) of 1973.

XX. IS Methods on testing of soil I.S. 2720 (Part VIII) of 1983.

XXI. SP-33 of Indian Road Congress, New Delhi.

XXII. SP-36 - (Part-I & II of BIS).

Note: 1.The latest editions including all correction slips as up todate of submission of price 2. The list given above is by no means exhaustive. All B.I.S. and I.R.S. Codes pertaining to work shall be applicable. Copies of plans and additional information required may be had by tenderers from DRM (works) S.C. Railway/ Secunderabad on any working day during office hours.

5.0 Setting out of the work:

5.1 The center line of the proposed span of RCC box will be initially set out by the Engineer or his representative. The contractor shall thereafter set out the work and every part thereto fully. The contractor shall be responsible for the accuracy of the lines, levels and dimensions of work in accordance with the drawings, further drawings, directions or instructions supplied time to time to him and every facility shall be given to the Engineer for inspection of the same. The contractor shall also alter or amend any error in the dimensions, lines or levels or work set out or constructed by him to the specifications of the Engineer.

5.2 The work shall be set out to the satisfaction of the Engineer, but his approval there for shall not, nor shall his joining with the contractor in setting out the work relieve the contractor from his entire and sole responsibility therefor.

5.3 The contractor shall also provide, fix and be responsible for the maintenance of all stakes, templates, profiles, level marks, points etc., and must take all necessary precautions to prevent their being removed, altered or disturbed and

will be held responsible for the consequences of such removal, alterations or disturbance should the same take place and for their efficient reinstatement.

**6.0 EXECUTION OF WORK:**

6.1 Service Roads/Jungle Clearance:

i. The contractor will be permitted to make use of existing service roads if any free of cost. New service roads required by the contractor in connection with the work either near the work site or elsewhere whether within or outside Railway limits for carriage of materials or for any other purpose whatsoever will have to be constructed and maintained by the contractor at his cost. For the purpose of construction of service Roads on Railway land, permission will be given to the contractor at Railway's discretion. If any land other than Railway land is necessary to be acquired or to be entered upon for the purpose, such land acquisition or permission to enter upon the land has to be arranged for by the contractor at his cost. The contractor will however indemnify the Railway against all claims for all damages whatsoever in this account. Railway however reserves the right to make use of such service roads without any charges.

ii. Before the work is started the contractor shall clear the area of construction of all trees, grass, shrub, bushes etc., No extra payment will be made for the clearance of jungle shrubs, bushes, trees etc., The jungle and trees cleared thus shall be given to the contractor free of cost. The rates quoted for excavation are deemed to include the charges for the clearance of jungle, shrubs, trees etc.,

6.2 OPEN EXCAVATION:

i. Open excavation done for foundations may be executed with sloping sides with or without timbering or may be excavated with vertical sides properly timbered and shored from ground level up to the bottom of the excavation and the work should be efficiently carried out in such a way so as to ensure its own stability as well as the safety of adjoining lands, structures, moving rail/road traffic and labour working thereon and also in such a way as will prevent them from being in any way detrimentally effected. However temporary shoring with timbering is to be provided if necessary to protect the track and road embankment from slipping for which the contractor will have to use his timbers. No extra rate will be paid for and the rates quoted for excavation will include the same.

ii. The excavation must also be kept free from water at all times during the progress of the work by means of bailing or pumping out, leading water away from the excavation as well as diversion of water to prevent its increase in the foundations, or otherwise till the work below water level is completed in all respects. No extra rate will be paid for and the rates quoted for excavation will include the same.

iii. Any unforeseen, under lying cables, pipelines etc., if met with during execution, care should be taken to either safeguard or divert the same with the approval of departments Concerned. All necessary administrative help will be given in this matter. However, Escalation over the original agreement rates will not be entertained on account of delays in such clearances.

iv Payment for open excavation: The quantity for excavation will be determined by multiplying the plan area of the open foundations as per the approved plans with the depth from ground level to the excavated level. The quantity of

excavation if any done for side slopes of foundations will not be paid for. Any extra excavations made for provision of working space strutting and other supports also will not be paid for. The rates quoted for excavation of foundation shall include the cost of all such work.

v. The excavated soil should not be left out in heaps causing obstruction after the work is completed in all respects. All excavated soil should be lead out to the places indicated by the Engineer with a maximum lead of 1KM.

6.3 Concrete works with contractor's cement:

6.3.1 Concrete required for all works shall be machine mixed only. Hand mixing of concrete will not be permitted except at the discretion of the Engineer in charge. The Concrete must also be properly vibrated with mechanical vibrators. The materials proposed to be used for the work should pass tests/analysis as prescribed by the specifications. Any approval given by the Railway in consequence of such tests or analysis shall in no way limit or interfere with the absolute right of the Railway to reject the whole or portions of such materials supplied which in the judgement of the Railway do not comply with the specifications. The decision of the railway in this regard shall be final and conclusive for all purposes.

6.3.2 The contractor shall prepare nine C.C. Cubes per set at his own cost, standard test cubes of concrete at suitable intervals during concreting operations under the supervision of the Engineer or his authorized representatives and submit the same to the Railway for testing and approval.

6.3.3 While executing all concrete works below sub-soil water level, the foundation pit must be kept free of all water by bailing or pumping or in any other manner. The rates quoted for concrete items below bed/ground level shall include the charges for all such type works for which no extra payment will be made separately.

6.3.4 The contractor shall along with the bill of purchase of cement should also obtain a test certificate issued by the manufacturer and shall submit the copies of the same to the Railway for verification and record.

6.3.5 The contractor shall make his own arrangements for storage of cement and other materials and see that no damage take place during the storage. The contractor shall take all precautions to effectively use the cement between the period of procurement and the period of usage.

6.3.6 The concrete mix for the item of Schedule- 'C' shall be designed by conducting tests on raw materials such as aggregate, sand and cement on strength criteria only. The design concrete mix shall contain minimum quantity of cement specified in the schedule. These design mixes shall be approved by Engineer-in-charge before commencement of concrete works.

6.3.7 The Railway reserves the right to inspect the storage accommodation of the contractor where the cement is stored and to reject in the event of any clogged cement is noticed or any other cement which is not suitable for usage in works and not conforming to specifications.

6.4 STEEL REINFORCEMENT:

6.4.1 The steel to be used in reinforcement shall be TMT bars and shall conform to IS

Specifications No: IS-1786 (grade Fe 500 or more). The reinforcement steel to be used in work shall be from TISCO, SAIL, and VIZAG Steel plant

6.4.2 The Railway reserves the right to inspect the storage yard of the contractor, where the steel materials are stored and take samples wherever considered necessary, get them tested by any agency and the same if found unsuitable or not as per specifications as specified under Clause 6.4.1 shall be rejected. The contractor cannot claim in such event the losses, damages, expenditure incurred by him and Railway shall not entertain any claim on this account.

7.0 **SPECIFICATIONS FOR CONCRETE WORK:**

7.1 These specifications shall be read in conjunction with any other specifications for concreting work given also where in tender documents.

7.2 AGGREGATE FOR CONCRETING:

7.2.1 **COARSE AGGREGATE**:

Coarse aggregates shall be only crushed quarry rock and shall conform to requirement of IS 382, 1343, 456, and IS 515.

7.2.2 **FINE AGGREGATE:**

Fine aggregate shall be of approved quality and grading conforming to IS 383, IS 456 and IS 1343 standards. It shall be free from impurities/organic matter and deleterious substances.

The decision of Engineer-in charge shall be final regarding approval of the coarse and fine aggregates for the concreting works. The Contractor shall be required to carry out weighing and sieving of aggregates, if directed by Engineer-in charge and all costs for the same shall be borne by the contractor.

7.2.3 **STORAGE OF AGGREGATES**:

Coarse aggregates shall be delivered at site and stored in separate sizes as ordered by the Engineer-in charge. The Engineer-in charge shall decide and direct the contractor to bring, stack and store aggregates of different sizes separately as he deems necessary for proper quality control. Aggregates shall be stored or stock piled in such a manner that segregation of fine and coarse sizes will be avoided and also that the various sizes will not become intermixed before proportioning. They shall be stored, stock piled and handled in such a manner that will prevent contamination by foreign deleterious materials. In the case of fine aggregates they shall be deposited at the site for not less than 8 hours before use and should be got tested and approved by the Engineer.

7.2.4. WATER:

Clause 4.3 of IS: 456-1987 shall be applicable in place of clause 4.4 of IRS concrete Bridge Code. However, in case of pre stressed concrete work the permissible limits of solids must satisfy IS 1343.

7.2.5. STORAGE OF CEMENT:

Cement shall be stored above the ground level in perfectly dry and watertight sheds and shall be stacked not more than eight bags high. Wherever Bulk storage containers are used, their capacity should be sufficient to cater to the requirements at site and should be cleared at least once every 3 to 4 months.

7.3 FORMED SURFACES AND FINISH:

7.3.1 The formwork for RCC shall be of steel and be lined with a material approved by the Engineer-in- charge so as to provide a smooth finish and uniform texture and appearance. This material shall leave no stain on the concrete and joined and fixed to its backing so as not to impart any blemishes. It shall be of the same type and obtained from only one source throughout for construction of any one structure.

The thickness of steel plates for form work, their sizes and bracing shall be got approved by the Engineer-in charge and shall be such as to produce uniform texture and even surfaces and produce no local bulging or leakage of mortar at joints. The contractor shall make good any imperfections in the resulting finish as required by the Engineer. Internal ties and embedded metal parts will be allowed only with the specific approval of the Engineer.

7.3.2. Preparation of form work before concreting:

All form work shall conform to I.R.C. Guide lines for the design and erection of false work for Road Bridge (IRC-7-1984)

7.4 REINFORCEMENT:

7.4.1 The contractor will furnish a bar bending schedule on the basis of approved drawing and actual length of bar available including indicating the position of laps and splices and will get the same approved by the Engineer before commencing placing of reinforcement.

7.4.2 All reinforcing bars shall be accurately placed in exact position as shown on the drawings and shall be securely held in position during placing of concrete by binding wire not less than 1 mm on size and conforming to IS 200 and by using stays, blocks of metal chairs, spacers metal hangers, supporting wire of other approved devices at sufficiently close intervals. Bars will not be allowed to sag between supports nor displaced during concreting or any other operation over the work. All devices used for positioning shall be made of non-corrosive material. Metal supports will not extend to the surface of concrete, except where shown on the drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bad spacing will not be allowed. Pieces of broken stone, brick and wooden blocks shall not be used as cover to concrete or as separators for bars. Layers of bars shall be separated by spacer bars, pre-cast mortar blocks or other approved devices.

7.4.3. Reinforcement after being placed in position shall be maintained in a clean condition until completely embedded in concrete. Special care shall be exercised to prevent any displacement of reinforcement in the concrete already placed.

7.4.4 In case of columns and walls, vertical bars shall be kept in normal position with timber templates having slots accurately cut in for bar position, such templates shall be removed after the concreting has progressed up to a level just below them. Bars crossing each other, where required, shall be secured by binding wire of size not less than 1 mm and conforming to IS 280 in such a manner that bars do not slip over each other at the time of fixing and concreting.

7.4.5. As far as possible, overlapping of bars shall be done as directed by the Engineer. Over lapping bars shall be bound with annealed steel wire, not less than 1 mm diameter twisted tight. The overlaps shall be staggered for different bars and located at points along the span were neither shear not bending movement is maximum.

7.4.6. Placing bars on layers of fresh concrete as work progresses and major adjustment of bars during the placing of concrete will not be permitted.

7.4.7 The minimum spacing of parallel bars shall be 2 1/2 times the diameter of the bar but in no case shall the clear distance between the bars be less than 1 1/2 times the maximum size of the coarse aggregate used. Middle bars shall be tied together at not more than 2 meters centers.

7.4.8 Mesh reinforcement shall be rolled flat before placing concrete unless otherwise shown on the drawings or ordered by the Engineer. It shall be held firmly in place against vertical or horizontal movement by means of devices found satisfactory by the Engineer. Tack welding of mesh reinforcement to bar reinforcement will not be permitted.

7.4.9 Grouping of bars.

7.4.9.1 Splicing of reinforcing bars shall be by lapping or approved type couplings, which shall be arranged by contractor at his own cost.

7.4.9..2 Reinforcing bars may be continuous at locations where splices are shown on the drawings at the option of the Contractor. The location of splice except where shown on the drawings shall be determined by the Contractor as practicable subject to the approval by Engineer.

7.5 **ADMIXTURES:**

7.5.1 No admixtures shall in general be allowed. Railway may however permit or direct admixtures for specific purpose for which specifications will be drawn and approved in advance. Nothing extra shall be payable for the admixtures and the cost of the same shall be deemed to have been catered for lump sum quoted rates.

7.5.2 To improve the workability of concrete and cement grout, admixtures conforming to IS: 6925 and IS 9103 may be permitted/directed by Engineer-in-charge subject to satisfactory previous use. The decision of Engineer-in-charge shall be final in this case. Admixtures generating hydrogen, nitrogen etc., shall not be used.

7.6 Manufacture, placement and curing of concrete:

7.6.1 Mixing of concrete shall conform to requirements in Clause 9.3.1 of I.S: 456.

7.6.2 Mixing of concrete for controlled concrete and pre-stressed concrete works shall be done, unless otherwise agreed by Engineer-in charge, by batch type mixer, which shall comply with IS 1791, IS 4935 or other such type as Engineer-in charge may approve.

7.6.3 Batch mixers will be tested for their performance in accordance with IS 4634 or such other tests as the Engineer-in charge may require.

7.6.4 Mixer which has been put out of use for more than 30 minutes shall be thoroughly cleaned before putting the new batch. Unless otherwise agreed to

by the Engineer, the first batch of concrete from the mixer shall contain only two/thirds of the normal quantity. Coarse aggregate within the plant shall be thoroughly cleaned and removed before changing from one type of mix/cement to another.

7.6.5 During the hot weather the contractor shall ensure that the constituent materials are sufficiently cool to prevent the concrete from stiffening in the interval between its discharge from the mixer and its final position and compaction.

7.6.6 Concrete shall be mixed for a period neither less than 2 minutes nor more than 5 minutes from the time all constituents have been introduced into the mixer and till all materials are uniformly mixed.

7.6.2 PLACING

7.6.2.1 All concrete members shall be compacted by vibration. Generally internal vibrator shall be used on all sections that are sufficiently large to admit them. Vibrator shall have operating frequency of at least 380 impulses per minute. Vibrators having frequency up to twice the minimum are preferred.

7.6.2.2 The following technique shall be followed for the vibrations.

i Vibrator insertion points shall be distributed so that the concrete becomes uniformly dense and plastic mass.

ii. Vibrators shall be used for compaction only and not for moving concrete horizontally along the form.

iii. For horizontal and vertical operations of form vibrators, the spacing of points of vibration shall be such that the zone of influence overlaps.

iv. For concrete deposited in layers the vibrators shall be inserted vertically and allowed to sink due to its own weight to the bottom of the layer and be slowly with drawn. For next layer, the vibrator shall penetrate the surface of the previous layer. Compaction shall be according to clause 12.3 of IS 456.

7.6.3. CURING:

All concrete work in cement, mortar, plaster, pointing etc., shall be continuously cured for the prescribed period as per direction of the Engineer. Curing shall be done by covering the newly laid concrete with gunny bags and keeping them wet constantly. If it is found that the contractor is not properly observing these instructions, the Engineer may undertake the curing through another agency/labour without any notice to the contractor at the cost of the contractor. The cost incurred along with incidental charges @ 2% and along with supervision charges @ 12.5% of the cost will be debited to the contractor. Intimation of the employment of another agency for curing will be given to the contractor as soon as possible.

This intimation in writing to the contractor under the head or the Engineer-in-charge of the work shall be conclusive evidence of the employment of another agency.

**7.6.4 QUALITY CONTROL**:

7.6.4.1 The contractor laboratory shall be open for use and inspection by Railways at any time. The contractor shall be required to have the gauges and equipment calibrated from a reputed lab as and when directed by Engineer but at least once in six months. The laboratory shall be equipped with following minimum equipment.

(1) Sieve analysis for coarse and fine aggregates with suitable weight balance.
(2) Slump test apparatus and compaction factor test apparatus.
(3) Cube testing machine.
(4) Concrete permeability testing apparatus.

7.6.4.2 The contractor shall submit concrete mix design for the concrete strength greater than M 20. The design shall be further checked by trial mixes as per relevant IS Code. Cement for trail mixes shall be issued on cost recovery basis. The mix design shall be as per IS code procedures and shall be subject to approval by the Railways.

8.0 Preliminary site testing:

8.1 Contractor will be required to carry out tests on cement and steel as per provision in the relevant IS Codes. Nothing extra shall be paid on this account. Preliminary work test cubes shall be made and tested for all classes of concrete to be used and for all proposed variations of quality of source of the aggregates, of cement and if either the 7 days or 28 days test cubes fall below the specified strength and the failure is confirmed by testing the balance cubes, the contractor shall make such changes to the mix design, aggregate source, aggregate grading, cement, water, method of mixing or type of mixer and shall produce a satisfactory concrete. All cubes shall be properly marked so that they can be easily identified.

8.2 Works strength tests for Controlled and ordinary concrete.

8.2.1 During the course of the work, samples of concrete will be taken and tested at regular intervals and from representative portions of the works. A sampling and testing programme will be established by the Engineer, in consultation with contractor before any concrete is placed. The establishment of this programme will not preclude the Engineer from obtaining samples and testing of any concrete at any time. The sampling and testing will be carried out in accordance with IS 516-1959. One set of six cubes will normally be taken from each batch to be sampled, but the Engineer may direct additional cubes to be taken. Three cubes will be tested at 7 days and three at 28 days.

8.3 Should any of the cubes fall below the specified strength the contractor shall on the Engineer's instructions, either alter the mix design, the method of making the concrete or carry out appropriate remedial measures. If in the opinion of the Engineer the results are such as to Joe paradise the stability function or durability of the structure, he may order all concrete be replaced at contractor's expenses. Where no 7 days concrete strength is specified it should be taken to be 65% of the 28 days strength in the case of ordinary cement and 75% in the case of rapid hardening cements. The Engineer may order the contractor to cut out defective concrete due to bad workmanship from the work even though the test cubes for that batch are satisfactory.

8.4 Pre-cast Box units will be allowed to be jacked in place after 14 days of casting only if 7 days test conforms to 2/3rd value of the specified 28 days test strength.

9.0 Earth Drilling on foundation trenches behind abutments:

9.1 Foundation trenches:

The space between the sides of the foundation trenches and the masonry is to be filled with sound material well framed, in not exceeding 15cm layers. Each layer should be watered, rammed and consolidated before the next layer is laid. Earth shall be rammed with iron rammers/plate vibrators where feasible. Earth used for filling shall be free from salts, organic or other foreign matter. All clods of earth shall be broken or removed.

9.2 Where there is likely hood of rain, the earth filling may closely follow the masonry until ground level is reached but the contractor shall only do this after obtaining the written permission of the Engineer.

9.3 Where concrete foundations are brought up in reducing off set it will be necessary to bring the earth filling up with the form walls but in such cases special care shall be taken that no earth is allowed to fall on the concrete surface, on which further concrete is to be laid.

**10.0 PLAIN CEMENT CONCRETE/ REINFORCED CEMENT CONCRETE IN FOUNDATION**:

10.1 All concrete works whether plain or R.C.C. should conform to IRS Code of practice for plain, reinforced and pre-stressed concrete for general bridge construction (concrete bridge code and/or the relevant Indian Standard Specifications as directed by the Engineer.)

10.2 The test for the strength of mix shall be conducted in accordance with IS 19262-1982 and SP36. In case, tests fail to show the strength required according to IS Code of reinforced concrete, the portion of the construction with that concrete shall be dismantled and no extra payment will be made for either dismantling or for the sub-standard work done. No extra payment shall be made for making the test cubes.

10.3 All concrete shall be mixed in an approved type of concrete mixing machine. Also such cement concrete should be vibrated by use of mechanical vibrators and nothing extra over and above the approved rates for mass concrete/RCC will be payable for these operations.

10.4 Butt joints are to be provided at places at the directions of the Engineer and 12 mm thick plaster shall be done on one of the surface of the concrete. Neither extra payment for this plaster nor any deduction in the quantities of concrete will be made nor will the rates for mass cement concrete be inclusive of this plastering.

10.5 Welding of reinforcement will not generally be permitted except in special circumstances under the written approval of the Engineer in accordance with the relevant IS Codes. The exposed surface of mass cement concrete and RCC work shall be rendered to leave the surface smooth and even. Nothing extra will be payable for rendering the exposed surface, the cost of which will be considered as having been included in the lump sum rates quoted in the schedule of items, quantities and rates.

**11.0 Setting up of field laboratory by contractors.**

11.1 The contractor shall set up a field laboratory of his own cost at work site, which should be opened for use and inspection by the Railway at any time. The laboratory shall be equipped with necessary equipment to carry out the various tests such as sieve analysis, cube testing, slump test, workability cost etc., on aggregate, cement, water and concrete required for ensuring the required quality and standard conforming to codal provisions and special specifications.

11.2 All the testing equipment of the laboratory shall be got checked/calibrated regularly as directed by the Engineer and the necessary certificates to be furnished to the Engineer by the contractor.

11.3 The contractor shall render all reasonable assistance and help in making the checks and test. All the equipment, machinery etc., shall be kept in good working condition.

11.4 The cost of setting up the laboratory, equipping the same, maintaining and conducting all tests on materials and cubes shall be borne by the contractor and shall be deemed to have been included in the lump sum rates.

11.5 All tests required, as per relevant IS Codes on cement and steel will be done by the contractor from Reputed Institutions/Test Houses. Nothing extra shall be paid for this.

**12.0 GENERAL RESPONSIBILITY OF CONTRACTOR:**

Contractor shall be responsible for all structural and decorative damage to property or injury caused by work or his workmen to persons, animals or things and shall indemnify the Railway in respect thereof and shall be held entire responsible for all works carried out by him until it is finally taken over by the Railways and he will be liable to be called to make good any damage or loss which may occur to the bridge work by inclement weather, floods etc., or due to any other cause during entire period until the work is taken over.

**13.0 SITE FACILITIES**:

13.1 The site of construction is adjacent to existing Road and land available by the sides of the track is limited. The contractors are advised to acquaint themselves well with the site conditions before quoting the rates.

14.0 LAND:

14.1 Limited land is available for the project. The same can be used for Construction of site offices etc., by the contractor subject to availability and approval by the Engineer-in-charge. However contractor should make his own arrangements for Private land for requirements in excess of the above for his workshops, construction equipment stacking yards and camps. No claim on this account shall be entertained by the Railways.

15.0 **CONSTRUCTION EQUIPMENTS:**

15.1 The contractor shall arrange and operate at his own cost, all necessary tools, plants, machinery and equipment necessary for successful and timely completion of the work.

15.2 If, in the opinion of the Engineer, equipment/plants brought by the contractor are not suitable for the work concerned, the Engineer shall have the right to order the contractor to replace them by suitable plants/equipment. In the

interest of public convenience, the Engineer may insist on a specific way of execution of this work.

15.3 The contractor shall be required to give a trial run of the equipment for establishing their capability to achieve the laid down specifications and tolerance to the entire satisfaction of the Engineer before commencement of any work.

15.4 All equipment provided shall be of proven efficiency and shall be operated and maintained at all times in a manner acceptable to Engineer-in-charge.

15.5 No equipment or personnel shall be removed from site without permission of Engineer- in-charge.

**16 .0 PROGRAMMES FOR COMPLETION OF WORK**:

a) The whole work shall be completed within the stipulated period as mentioned in the tender booklet from the date of issue of acceptance letter including finishing work.

b) The tenderer shall submit detailed programme for the execution of work within the specified period in the form of bar chart as well as CPM chart with details of all resources required for each important stages/milestone of the work. The necessary details of the plant and equipment, manpower and similar works carried out and tendered shall be given in annexures.

c) The time schedule will form a part of the contract and any deviation from the accepted time schedule shall be with the prior approval of the Railways. In the event of failure on the part of the contractor maintaining the through / commensurate progress with reference to time limit given in the contract. The Railway reserves the right to terminate the contract

**17.0 MAINTAINING RECORD OF CONSTRUCTION WORK:**

a) The contractor is required to make arrangements to maintain the progress of the work up to date and documental evidence to be produced as and when required for which necessary plants and tools such as Digital camera and maintained up to date at site of work.

## Additional Note for box pushing

1. The payment for this item shall be made for clear inner cross section area of the parent RCC Box/Boxes and barrel length"

2. The rate in this item includes excavation for main RCC Box within formation, thrust bed and approaches also''.

3. The unit per Sqm/RM is for cross sectional area of inner dimensions of the RCC box for single vent way and cross sectional area of inner dimensions between outer walls including central wall in case of Twin Box excluding thickness of wearing coat.

4. Maximum water cement ratio and minimum cementitious material content shall be as per correction slip. No 12 dt 2-6-2009 to IRC CBC clause 5.4.3 table 4(a) and clause 5.4.5.

Table 4(c) respectively.

5. Work shall be executed with least disturbance to the Railways tracks and without causing any infringements to running tracks.

6. The rate includes slewing of disturbed BG track to correct alignment, lifting/lowering of track under traffic condition if required arising out of pushing of RCC box and maintenance of track to required standards during the entire period of box pushing.

7. The rate is inclusive of necessary protection needed for safe passage of road traffic In case of Box pushing under road including provision of road traffic signals. If required, self-flickering solar charged traffic lights for guidance of road traffic shall be provided.

8. Necessary precautions to be taken to safeguard and avoid damage to signaling/communication/electrical/water pipeline or any other utility though the same will be shifted by the concerned authorities.

9. Proper safety precautions and if required corrective measures are to be taken in case of damage to embankments including slopes during the execution of works for both railway and Road formation as applicable. In specific cases, if required, CBE office guidance may be taken as per specific site condition.

10. In case of box pushing of twin RCC boxes without common monolithic web, and pushed independently, payment as per inside cross sectional area of each RCC box will be made excluding wearing coat thickness.

11. In case of Ready Mixed Concrete (RMC) is likely to be used for casting of RCC Box/boxes/thrust bed, the same to be approved by Divisional Engineer/Sr.Divisional Engineer/Dy. Chief Engineer, in-charge of work. No separate payment will be made for using RMC concrete.

12. Normally blasting is not permitted during box pushing. Rate is inclusive of using non-blasting methods like chiseling / rock breaking by expansive mortars etc. as required and/or as approved by Engineer-in -charge.

**Note: -1) before starting box pushing, kutcha drain excavation to be completed**

**2) Drag sheet must be provided before starting pushing work.**

## Special Conditions for Air pushing of the box

i.e., 1) designing, casting of thrust bed
2) Casting and air pushing of the box

Note: - RCC box should be casted as per designed grade of concrete

1. The unit per CUM is for cross sectional area multiplied by length of inner dimensions of the RCC box for single vent way and cross-sectional area multiplied by length of inner dimensions between outer walls including central wall in case of Twin Box excluding thickness of wearing coat.

2. Maximum water cement ratio and minimum cementitious material content shall be as per IRC CBC clause 5.4.3 table 4(a) and clause 5.4.5. Table 4(c) respectively.

3. Work shall be executed with least disturbance to the Railways tracks and without causing any infringements to running tracks.

4. The rate includes slewing of disturbed BG track to correct alignment, lifting/lowering of track under traffic condition if required arising out of Air pushing of RCC box and maintenance of track to required standards during the entire period of Air pushing.

5. The rate is inclusive of necessary protection needed for safe passage of road traffic in case of Air pushing under road including provision of road traffic signals. If required, self-flickering solar charged traffic lights for guidance of road traffic shall be provided.

6. Necessary precautions are to be taken to safeguard and avoid damage to signaling/communication/electrical/water pipeline or any other utility though the same will be shifted by the concerned authorities.

7. Proper safety precautions and if required corrective measures are to be taken in case of damage to embankments including slopes during the execution of works for both railway and Road formation as applicable. In specific cases, if required, CBE office guidance may be taken as per specific site condition.

2. In case of Air pushing of twin RCC boxes without common monolithic web, and pushed independently, payment as per inside cross-sectional area multiplied by length of each RCC box will bemade excluding wearing coat thickness.

9. Railways will supply RDSO structural design drawing for RCC box/boxes where ever required

10. The contractor has to submit detailed structural design and drawing of RCC thrust bed in soft and hard copies as per programme specified/approved by competent authority, forapproval of Railways. If required necessary corrections/re designs to be

done by contractor and resubmit both design and drawing for approval of railways .No separate payment will be made for the same as cost included in ' Air pushing method.

11. In case of Ready Mixed Concrete (RMC) is likely to be used for casting of RCC Box/boxes/thrust bed, the same to be approved by Divisional Engineer/Sr. Divisional Engineer/Dy. Chief Engineer, in-charge of work. No separate payment will be made for using RMC concrete.

12. Normally blasting is not permitted during Air pushing. Extra Rate will be paid for using non-blasting methods like chiseling / rock breaking by expansive mortars etc. as required and/or as approved by Engineer-in –charge under relevant USSOR-2021 items.

13. In case RH girder mentioned in the GAD is not available, the work will be done using appropriate RH girder or by using Rail cluster arrangement as detailed in SCR HQ work branch letter No W.71/BR/Bridge policy dt 16.03.2021 (OR) by using I section as detailedin Drawing No GM(W) SC/BR/STD/4393/2021 at the discretion of Engineer in charge forwhich contractor will not have any claim

14. The work should be carried out under Traffic and power Block where applicable. Due to any reasons if block is not granted or cancelled at a later stage, no extra payment will be paid. Speed restriction will be arranged as per the traffic movement, contractor will not be having any claim over it. The contractor has to keep his labour, machinery, equipment's etc at the site till the completion of work and as per the instructions of Engineer in charge.

**Note: -1) Before starting Air pushing, kutcha drain excavation to be completed**

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## PARTICULARS OF WORK

10 SITE

METHOD

GENERAL FEATURES:

2.1 The Tender is for construction of a RCC boxby Air pushing method and the following works would form part of this contract asper the approved General arrangement drawings.

a. Procurement/Fabrication of necessary plant and equipment like jacking line jacks, hydraulic pumps and other plant and equipment required for execution of this work.
b. Casting of thrust bed as per Railway approved design and RCC box as per Railway's design and Air pushing including shoring or any other arrangement required to protect the earth slopes from sides or Railway embankment to the satisfaction of Engineer in charge and disposal of the excavated earth in the nearby available Railway land within maximum lead of 1 KM. The disposable earth will be utilized to improve cess work, widen the Railway embankment or to develop the circulating area.
c. Necessary provision of opening in the roof of boxes for bentonite pumping if required and air pushing of boxes.
d. Pre-casting and curing of RCC box units.
e. Jacking of pre-cast boxes to form the opening under running Railway traffic conditions. The maximum allowable deviation of the pre-cast boxes at any time from the theoreticalalignment will be limited to 100 mm horizontal and 50 mm in vertical direction. Air pushing work shall be done in the presence of Railway's P.Way supervisor not below the rank of P.Way Mistry. The contractor will further ensure such rate of Air pushing as that will not disturb the Railway tracks above and will be personally responsible for the safety of Railway traffic. Maintenance of track to the required geometry will be the responsibility of the contractor and the contractor is required to ensure this with labour trained in attending p-way with all tools and plant under the supervision of Railway supervisor.
f. Providing 150mm thick M 25 C.C wearing coat on the floor of the box with design camber. Providing longitudinal drainage arrangements within the RCC boxes with minimum 100 mm depth and 200 mm wide drains with provision of catch water drains at the approaches to the boxes, with the arrangement to be approved by the Railway.
g. Necessary provision of OHE/Portal/Signal foundation as directed by the Engineer-in on RCC boxes shall be provided, if necessary, as per site conditions.
h. During the execution of work if any sub-soil water is met with, the contractor will make their own arrangements to bail out/pump out such water from the site, free of cost. Any unforeseen accumulated rainwater, during the progress of work, shall be bailed out/pumped out by the contractor free of cost and the rates quoted should include all these elements.
l. This is an important project which shall be completed well within the stipulated periodas mentioned in tender booklet as it is related to safety.

## SPECIAL CONDITIONS AND SPECIFICATIONS OF CONTRACT:

NOTE:- These special conditions supplement the condition of Tender and contracts, General conditions of contract and notes appearing under the relevant chapters and sub- chapters of the Standard Schedule of Rates of S.C.Railway 2021 and CPWD DSR - 2021 (Delhi Schedule of Rates) should be considered as part of the Tender papers wherever the provisions of the special conditions are at variance with the General Conditions of the contract and other documents mentioned above these special

conditions shall prevail.

**3.0 Scope of work:**

The scope of work covered by this Tender is defined in Para 2.0 of General featureunder particulars of work.

4.0 **CODE AND SPECIFICATIONS**:

4.1 The Design and Construction of the superstructures shall be carried out in terms of Specifications of latest editions of IRS (Indian Railway Standard), B.I.S. (Bureau of Indian Standard) and I.R.C. (Indian Road congress). When there is any conflict, the agency should bring it to the notice of Engineer-in-charge for decision. The decision of Engineer in-charge shall be final and binding in the interpretation of the clauses of the codes of practice and specifications under the Special conditions regarding site, date and specifications of this tender. No claim whatsoever shall be entertained on this account by Railways. Any difference of opinion between Engineer's representative and contractor shall be referred to Engineer-in charge. The appeal against decision of Engineer-in charge shall lie with Chief Engineer whose decision shall be final and binding. Such items under this scope shall be deemed to be "Excepted Matters". Apart from the basic data specifications etc., all items of work shall be covered by the Following Codes as revised, corrected, and amended up to the time of submission of the price bids / revised price bids for acceptance.

I. S.C.Railway Engineering Department - General conditions of contract and regulation and instructions to tenderers.

II. Notes appearing under the relevant chapters and sub-chapters of Standard Schedule of Rates 2021 of S.C.Railway and CPWD DSR.2021 (Delhi Schedule of Rates)

III. S.C. Railway Engineering dept. Standard Specifications for material and works 2021and CPWD specifications - 2021 (or latest)

IV. IS Code of practice for plain and reinforced concrete for general building construction (I.S. 456) - 2000 (Fourth revision).

V. IS Code of practice for use of structural steel in plain and reinforced concrete forgeneral building construction (I.S.800 - 1984).

VI. IRS Code of practice for electric welding of mild steel structures

VII. IRS Code of practice for plain concrete construction, 1982

VIII. Indian Railway code of practice of Plain, reinforced and pre stressed concrete forgeneral/bridge construction (Concrete bridge code adopted in 1935 revised 1997.)

IX. Design superstructure and substructure of bridges including Chapter-VII of therule for the opening of Railway adopted 1941-Revised-August, 1982.

X. Indian Railways Standard (IIB) Bridge substructure and foundations code- code ofpractice for the design of the sub-structure and foundation of Bridges adopted 1936
-Revised-1985 (hereinafter referred to as sub-structure code).

XI. I.S. 226 specification for structural steel standard quantity

XII. IS.875-1994 code of practice for structural safety of building and loading (Part 1to 4)

XIII. I.S 1892 - 1975 Criteria to Earthquakes resistant design of structure (3rd revision 1976).

XIV. Indian Road Congress code for items not specifically covered by any code or provision mentioned in these documents.

XV. U.T.C.772 - Bearing for Railway Bridges.

XVI. Criteria for Design of OHE Mast provided on the superstructure.

XVII. Indian Railway Schedule of dimensions for Broad Gauge.

XVIII. I.S. Specifications for fine and coarse aggregates from natural source for concreteIS-383- and IS-515

XIX. IS Methods on testing of Soil I.S. 2720 (Part-II) of 1973.

XX. IS Methods on testing of soil I.S. 2720 (Part VIII) of 1983.

XXI. SP-33 of Indian Road Congress, New Delhi.

XXII. SP-36 - (Part-I & II of BIS).

Note: 1. Latest editions including all correction slips as up to date of submission of price bid/revised bid, shall govern.

2. The list given above is by no means exhaustive. All B.I.S. and I.R.S. Codes pertaining to work shall be applicable. Copies of plans and additional information required may be obtained by tenderers from DRM (works) S.C.Railway/ Secunderabad on any working day during office hours.

5.0 Setting out of the work:

5.1 The center line of the proposed span of RCC box will be initially set out by the Engineer or his representative. The contractor shall thereafter set out the work and every part thereto fully. The contractor shall be responsible for the accuracy of the lines, levels and dimensions of work in accordance with the drawings, further drawings, directions or instructions supplied time to time to him and every facility shall be given to the Engineer for inspection of the same. The contractor shall also alter or amend any error in the dimensions, lines or levels or work set out or constructed by him to the specifications of the Engineer.

5.2 The work shall be set out to the satisfaction of the Engineer, but his approval there for shall not, nor shall his joining with the contractor in setting out the work relieve the contractor from his entire and sole responsibility therefor.

5.3 The contractor shall also provide, fix and be responsible for the maintenance of all stakes, templates, profiles, level marks, points etc., and must take all necessary precautions to prevent their being removed, altered or disturbed and will be held responsible for the consequences of such removal, alterations or disturbance should the same take place and for their efficient reinstatement.

## 6.0. EXECUTION OF WORK:

6.1 Service Roads/Jungle Clearance:

i. The contractor will be permitted to make use of existing service roads if any free of cost. New service roads required by the contractor in connection with the work either near the work site or elsewhere whether within or outside Railway limits for carriage of materials or for any other purpose whatsoever will have to be constructed and maintained by the contractor at his cost. For the purpose of construction of service Roads on Railway land, permission will be given to the contractor at Railway's discretion. If any land other than Railway land is necessary to be acquired or to be entered upon for the purpose, such land acquisition or permission to enter upon the land has to be arranged for by the contractor at his cost. The contractor will however indemnify the Railway against all claims for all damages whatsoever in this account. Railway however reserves the right to make use of such service roads without any charges.

ii. Before the work is started the contractor shall clear the area of construction of all trees, grass, shrub, bushes etc., No extra payment will be made for the clearance of jungle shrubs, bushes, trees etc., The jungle and trees cleared thus shall be given to the contractor free of cost. The rates quoted for excavation are deemedto include the charges for the clearance of jungle, shrubs, trees etc.,

**6.2 OPEN EXCAVATION:**

i. Open excavation done for foundations may be executed with sloping sides with or without timbering or may be excavated with vertical sides properly timbered and shored from ground level up to the bottom of the excavation and the work should be efficiently carried out in such a way so as to ensure its own stability as well as the safety of adjoining lands, structures, moving rail/road traffic and labour working thereon and also in such a way as will prevent them from being in any way detrimentally effected. However temporary shoring with timbering is to be provided if necessary to protect the track and road embankment from slipping for which the contractor will have to use his timbers. No extra rate will be paid for and the rates quoted for excavation will include the same.

ii. The excavation must also be kept free from water at all times during the progress of the work by means of bailing or pumping out, leading water away from the excavation as well as diversion of water to prevent its increase in the foundations, or otherwise till the work below water level is completed in all respects. No extra rate will be paid for and the rates quoted for excavation will include the same.

iii. Any unforeseen, under lying cables, pipelines etc., if met with during execution, care should be taken to either safeguard or divert the same with the approval of departments Concerned. All necessary administrative help will be given in this matter.However, Escalation over the original agreement rates will not be entertained on account of delays in such clearances.

Iv Payment for open excavation: The quantity for excavation will be determined by multiplying the plan area of the open foundations as per the approved plans with the depth from ground $^{0}l^{2}e^{8}$vel to the excavated level. The quantity

of excavation if any done for side slopes of foundations will not be paid for. Any extra excavations made for provision of working space strutting and other supports also will not be paid for. The rates quoted for excavation of foundation shall include the cost of all such work.

v. The excavated soil should not be left out in heaps causing obstruction after the work is completed in all respects. All excavated soil should be lead out to the places indicated by the Engineer with a maximum lead of 1KM.

6.3 Concrete works with contractor's cement:

6.3.1 Concrete required for all works shall be machine mixed only. Hand mixing of concrete will not be permitted except at the discretion of the Engineer in charge. The Concrete must also be properly vibrated with mechanical vibrators. The materials proposed to be used for the work should pass tests/analysis as prescribed by the specifications. Any approval given by the Railway in consequence of such tests or analysis shall in no way limit or interfere with the absolute right of the Railway to reject the whole or portions of such materials supplied which in the judgment of the Railway do not comply with the specifications. The decision of the railway in this regard shall be final and conclusive for all purposes.

6.3.2 The contractor shall prepare C.C. Cubes as per IS 456 clause 15.2 at his own cost, standard test cubes of concrete at suitable intervals during concreting operations under the supervision of the Engineer or his authorized representatives and submit the same to the Railway for testing and approval.

6.3.3 While executing all concrete works below sub-soil water level, the foundation pit must be kept free of all water by bailing or pumping or in any other manner. The rates quoted for concrete items below bed/ground level shall include the charges for all such type works for which no extra payment will be madeseparately.

6.3.4 All cement shall conform to the specifications of the ordinary Portland cementto I.S. 8112 of 1989 &12269.

6.3.5 The contractor shall along with the bill of purchase of cement should also obtain a test certificate issued by the manufacturer and shall submit the copies of the same to the Railway for verification and record.

6.3.6 The contractor shall make his own arrangements for storage of cement and other materials and see that no damage take place during the storage. The contractor shall take all precautions to effectively use the cement between the period of procurement and the period of usage.

6.3.7 The concrete mix shall be designed by conducting tests on raw materials such as aggregate, sand and cement on strength criteria only. The design concrete mix shall contain minimum quantity of cement specified in the schedule. These design mixes shall be approved by Engineer-in- charge before commencement of concrete works.

6.3.8 The Railway reserves the right to inspect the storage accommodation of the contractor where the cement is stored and to reject in the event of any clogged cement is noticed or any other cement which is not suitable for usage in works and not conforming02t9o specifications.

**6.4 STEEL REINFORCEMENT:**

6.4.1 The steel to be used in reinforcement shall be Tor/HYSD bars and shall conformto IS Specifications No: IS-1786 (grade Fe 500D). If mild steel is to be used for reinforcement it shall confirm to IS 432 Part-I (Grade-I).

6.4.2 The Railway reserves the right to inspect the storage yard of the contractor, where the steel materials are stored and take samples wherever considered necessary, get them tested by any agency and the same if found unsuitable or not as per specifications as specified under Clause 6.4.1 shall be rejected. The contractor cannot claim in such event the losses, damages, expenditure incurredby him and Railway shall not entertain any claim on this account.

**7.0 SPECIFICATIONS FOR CONCRETE WORK:**

7.1 These specifications shall be read in conjunction with any other specifications for concreting work given also where in tender documents.

7.2 AGGREGATE FOR CONCRETING:

**7.2.1 COARSE AGGREGATE:**

Coarse aggregates shall be only crushed quarry rock and shall conform to requirement of IS 382, 1343, 456, and IS 515.

**7.2.2 FINE AGGREGATE:**

Fine aggregate shall be of approved quality and grading conforming to IS 383, IS 456 and IS 1343 standards. It shall be free from impurities/organic matter and deleterious substances.

The decision of Engineer-in charge shall be final regarding approval of the coarse and fine aggregates for the concreting works. The Contractor shall be required to carry out weighing and sieving of aggregates, if directed by Engineer-in charge and all costs for the same shall be borne by the contractor.

**7.2.3 STORAGE OF AGGREGATES:**

Coarse aggregates shall be delivered at site and stored in separate sizes as ordered by the Engineer-in charge. The Engineer-in charge shall decide and direct the contractor to bring, stack and store aggregates of different sizes separately as he deems necessary for proper quality control. Aggregates shall be stored or stock piled in such a manner that segregation of fine and coarse sizes will be avoided and also that the various sizes will not become intermixed before proportioning. They shall be stored, stock piled and handled in such a manner that will prevent contamination by foreign deleterious materials. In the case of fine aggregates they shall be deposited at the site for not less than 8 hours before use and should be got tested and approved by the Engineer/Engineer representative.

7.2.4. WATER:

Clause 4.3 of IS: 456-1987 shall be applicable in place of clause 4.4 of IRS concrete Bridge Code. However, in case of pre stressed concrete work the permissible limits of solids must satisfy IS 1343.

7.2.5. STORAGE OF CEMENT:

Cement shall be stored above the ground level in perfectly dry and watertight sheds and shall be stacked not more than eight bags high. Wherever Bulk storage containers are used, their capacity should be sufficient to cater to the

requirements at site and should be cleared at least once every 3 to 4 months.

**7.3 FORMED SURFACES AND FINISH:**

7.3.1 The formwork for RCC shall be of steel and be lined with a material approved by the Engineer-in- charge so as to provide a smooth finish and uniform texture and appearance. This material shall leave no stain on the concrete and joinedand fixed to its backing so as not to impart any blemishes. It shall be of the same type and obtained from only one source throughout for construction of any one structure. The thickness of steel plates for form work, their sizes and bracing shall be got approved by the Engineer-in charge and shall be such as to produce uniform texture and even surfaces and produce no local bulging or leakage of mortar at joints. The contractor shall make good any imperfections in the resulting finish as required by the Engineer. Internal ties and embedded metal parts will be allowed only with the specific approval of the Engineer.

7.3.2. Preparation of form work before concreting:

All form work shall conform to I.R.C. Guide lines for the design and erection of false work for Road Bridge (IRC-7-1984)

7.4 REINFORCEMENT:

7.4.1 The contractor will furnish a bar bending schedule on the basis of approved drawing and actual length of bar available including indicating the position of laps and splices and will get the same approved by the Engineer/Engineer representative before commencing placing of reinforcement.

7.4.2 All reinforcing bars shall be accurately placed in exact position as shown on the drawings and shall be securely held in position during placing of concrete by binding wire (MS wire) not less than 1 mm on size and conforming to IS 280:2006 and by using stays, blocks of metal chairs, spacers metal hangers, supporting wire of other approved devices at sufficiently close intervals. Bars will not be allowed to sag between supports nor displaced during concreting or any other operation over the work. All devices used for positioning shall be made of non-corrosive material. Metal supports shall not extend to the surface of concrete, except where shown on the drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bad spacing will not be allowed. Pieces of broken stone, brick and wooden blocks shall not be used as cover to concrete or as separators for bars. Layers of bars shall be separated by spacer bars, pre-cast mortar blocks or other approved devices.

7.4.3. Reinforcement after being placed in position shall be maintained in a clean condition until completely embedded in concrete. Special care shall be exercised to prevent any displacement of reinforcement in the concrete already placed.

7.4.4 In case of columns and walls, vertical bars shall be kept in normal position with timber templates having slots accurately cut in for bar position, such templates shall be removed after the concreting has progressed up to a level just below them. Bars crossing each other, where required, shall be secured

by binding wire (MS wire) of size not less than 1 mm and conforming to IS 280; 2006 in sucha manner that bars do not slip over each other at the time of fixing and concreting.

7.4.5. As far as possible, overlapping of bars shall be done as directed by the Engineer.Over lapping bars shall be bound with annealed steel wire, not less than 1 mm diameter twisted tight. The overlaps shall be staggered for different bars and located at points along the span were neither shear not bending movement ismaximum.

7.4.6. Placing bars on layers of fresh concrete as work progresses and major adjustment of bars during the placing of concrete will not be permitted.

7.4.7 The minimum spacing of parallel bars shall be 2 1/2 times the diameter of the bar but in no case shall the clear distance between the bars be less than 1 1/2 times the maximum size of the coarse aggregate used. Middle bars shall be tiedtogether at not more than 2 meters centers.

7.4.8 Mesh reinforcement shall be rolled flat before placing concrete unless otherwise shown on the drawings or ordered by the Engineer. It shall be held firmly in place against vertical or horizontal movement by means of devices found satisfactory by the Engineer. Tack welding of mesh reinforcement to bar reinforcement will not be permitted.

7.4.9 Grouping of bars.

7.4.9.1 Splicing of reinforcing bars shall be by lapping or approved type couplings, which shall be arranged by contractor at his own cost.

7.4.9..2 Reinforcing bars may be continuous at locations where splices are shown on the drawings at the option of the Contractor. The location of splice except where shown on the drawings shall be determined by the Contractor as practicable subject to the approval by Engineer.

**7.5 <u>ADMIXTURES:</u>**

7.5.1 No admixtures shall in general be allowed. Railway may however permit or direct admixtures for specific purpose for which specifications will be drawn and approved in advance. Nothing extra shall be payable for the admixtures and the cost of the same shall be deemed to have been catered for lump sum quoted rates.

7.5.2 To improve the workability of concrete and cement grout, admixtures conforming to IS: 6925 and IS 9103 may be permitted/directed by Engineer-in- charge subject to satisfactory previous use. The decision of Engineer-in-charge shall be final in this case. Admixtures generating hydrogen, nitrogen etc., shall not be used.

7.6 Manufacture, placement and curing of concrete:

7.6 .1 Mixing of concrete shall conform to requirements in Clause 9.3.1 of I.S: 456.

7.6.2 Mixing of concrete for controlled concrete and pre-stressed concrete works shall be done, unless otherwise agreed by Engineer-in charge, by batch type mixer, which shall comply with IS 1791, IS 4935 or other such type as Engineer-in charge may approve.

7.6.3 Batch mixers will be tested for their performance in accordance with IS 4634 or

such other tests as the Engineer-in charge may require.

7.6.4 Mixer which has been put out of use for more than 30 minutes shall be thoroughly cleaned before putting the new batch. Unless otherwise agreed to by the Engineer, the first batch of concrete from the mixer shall contain only two/thirds of the normal quantity. Coarse aggregate within the plant shall be thoroughly cleaned and removed before changing from one type of mix/cementto another.

7.6.5 During the hot weather the contractor shall ensure that the constituent materials are sufficiently cool to prevent the concrete from stiffening in the interval between its discharge from the mixer and its final position and compaction.

7.6.6 Concrete shall be mixed for a period neither less than 2 minutes nor more than 5 minutes from the time all constituents have been introduced into the mixer andtill all materials are uniformly mixed.

**7.6.2 PLACING**

7.6.2.1 All concrete members shall be compacted by vibration. Generally internal vibrator shall be used on all sections that are sufficiently large to admit them. Vibrator shall have operating frequency of at least 380 impulses per minute. Vibrators having frequency up to twice the minimum are preferred.

7.6.2.2 The following technique shall be followed for the vibrations.

i Vibrator insertion points shall be distributed so that the concrete becomes uniformly dense and plastic mass.

ii. Vibrators shall be used for compaction only and not for moving concrete horizontally along the form.

iii. For horizontal and vertical operations of form vibrators, the spacing of points ofvibration shall be such that the zone of influence overlaps.

iv. For concrete deposited in layers the vibrators shall be inserted vertically and allowed to sink due to its own weight to the bottom of the layer and be slowly with drawn. For next layer, the vibrator shall penetrate the surface of the previous layer. Compaction shall be according to clause 12.3 of IS 456.

7.6.3. CURING:

All concrete work in cement, mortar, plaster, pointing etc., shall be continuously cured for the prescribed period as per direction of the Engineer. Curing shall be done by covering the newly laid concrete with gunny bags and keeping them wet constantly. If it is found that the contractor is not properly observing these instructions, the Engineer may undertake the curing through another agency/labour without any notice to the contractor at the cost of the contractor. The cost incurred along with incidental charges @ 2% and along with supervision charges @ 12.5% of the cost will be debited to the contractor. Intimation of the employment of another agency for curing will be given to the contractor as soon as possible. This intimation in writing to the contractor under the head or the Engineer-in-charge of the work shall be conclusive evidence of the employment of another agency.

**7.6.4 QUALITY CONTROL:**

7.6.4.1 The contractor laboratory shall be open for use and inspection by Railways at any time. The contractor shall be required to have the gauges and equipment calibrated from a reputed lab as and when directed by Engineer but at least once in six months. The laboratory shall be equipped with following minimum equipment.

(1) Sieve analysis for coarse and fine aggregates with suitable weight balance.
(2) Slump test apparatus and compaction factor test apparatus.
(3) Cube testing machine.
(4) Concrete permeability testing apparatus.

7.6.4.2 The contractor shall submit concrete mix design for the concrete strength greater than M 20. The design shall be further checked by trial mixes as per relevant IS Code. Cement for trail mixes shall be issued on cost recovery basis. The mix design shall be as per IS code procedures and shall be subject to approval by the Railways.

8.0 Preliminary site testing:

8.1 Contractor will be required to carry out tests on cement and steel as per provision in the relevant IS Codes. Nothing extra shall be paid on this account. Preliminary work test cubes shall be made and tested for all classes of concrete to be used and for all proposed variations of quality of source of the aggregates,of cement and if either the 7 days or 28 days test cubes fall below the specified strength and the failure is confirmed by testing the balance cubes, the contractor shall make such changes to the mix design, aggregate source, aggregate grading, cement, water, method of mixing or type of mixer and shall produce asatisfactory concrete.

All cubes shall be properly marked so that they can be easily identified.

8.2 Works strength tests for Controlled and ordinary concrete.

8.2.1 During the course of the work, samples of concrete will be taken and tested at regular intervals and from representative portions of the works. A sampling and testing programme will be established by the Engineer, in consultation with contractor before any concrete is placed. The establishment of this programme will not preclude the Engineer from obtaining samples and testing of any concrete at any time. The sampling and testing will be carried out in accordance with IS 516-1959.

8.3 Should any of the cubes fall below the specified strength the contractor shall on the Engineer's instructions, either alter the mix design, the method of making the concrete or carry out appropriate remedial measures. If in the opinion of the Engineer the results are such as to Joe paradise the stability function or durability of the structure, he may order all concrete be replaced at contractor's expenses. Where no 7 days concrete strength is specified it should be taken to be 65% of the 28 days strength in the case of ordinary cement and 75% in the case of rapid hardening cements. The Engineer may order the contractor to cut out defective concrete due to bad workmanship from the work even though thetest cubes for that batch are satisfactory.

8.4 Pre-cast Box units will be allowed to be jacked in place after 14 days of

casting only if 7 days test conforms to 2/3rd value of the specified 28 days test strength.

9.0 Earth Drilling on foundation trenches behind abutments:

9.1 Foundation trenches:

The space between the sides of the foundation trenches and the masonry is to be filled with sound material well framed, in not exceeding 15cm layers. Each layer should be watered, rammed and consolidated before the next layer is laid.Earth shall be rammed with iron rammers/plate vibrators where feasible. Earth used for filling shall be free from salts, organic or other foreign matter. All clodsof earth shall be broken or removed.

9.2 Where there is likely hood of rain, the earth filling may closely follow the masonry until ground level is reached but the contractor shall only do this afterobtaining the written permission of the Engineer.

9.3 Where concrete foundations are brought up in reducing off set it will be necessary to bring the earth filling up with the form walls but in such cases special care shall be taken that no earth is allowed to fall on the concrete surface,on which further concrete is to be laid.

10.0 PLAIN CEMENT CONCRETE/ REINFORCED CEMENT CONCRETE IN FOUNDATION:

10.1 All concrete works whether plain or R.C.C. should conform to IRS Code of practice for plain, reinforced and pre-stressed concrete for general bridge construction (concrete bridge code and/or the relevant Indian Standard Specifications as directed by the Engineer.)

10.2 The test for the strength of mix shall be conducted in accordance with IS 19262-1982 and SP36. In case, tests fail to show the strength required according to IS Code of reinforced concrete, the portion of the construction with that concrete shall be dismantled and no extra payment will be made for either dismantling or for the sub-standard work done. No extra payment shall be made for makingthe test cubes.

10.3 All concrete shall be mixed in an approved type of concrete mixing machine. Also such cement concrete should be vibrated by use of mechanical vibrators and nothing extra over and above the approved rates for mass concrete/RCC will be payable for these operations.

10.4 Butt joints are to be provided at places at the directions of the Engineer and 12 mm thick plaster shall be done on one of the surface of the concrete. Neither extra payment for this plaster nor any deduction in the quantities of concrete will be made nor will the rates for mass cement concrete be inclusive of this plastering.

10.5 Welding of reinforcement will not generally be permitted except in special circumstances under the written approval of the Engineer in accordance with the relevant IS Codes. The exposed surface of mass cement concrete and RCC work shall be rendered to leave the surface smooth and even. Nothing extra will be payable for rendering the exposed surface, the cost of which will be considered as having been included in the lump sum rates quoted in the schedule of items, quantities and rate$^{0}s^{3.5}$.

11.0 Setting up of field laboratory by contractors.

11.1 The contractor shall set up a field laboratory of his own cost at work site, which should be opened for use and inspection by the Railway at any time. The laboratory shall be equipped with necessary equipment to carry out the various tests such as sieve analysis, cube testing, slump test, workability cost etc., on aggregate, cement, water and concrete required for ensuring the required quality and standard conforming to codal provisions and special specifications.

11.2 All the testing equipment of the laboratory shall be got checked/calibrated regularly as directed by the Engineer and the necessary certificates to be furnished to the Engineer by the contractor.

11.3 The contractor shall render all reasonable assistance and help in making the checks and test. All the equipment, machinery etc., shall be kept in good working condition.

11.4 The cost of setting up the laboratory, equipping the same, maintaining and conducting all tests on materials and cubes shall be borne by the contractor andshall be deemed to have been included in the lump sum rates.

11.5 All tests required, as per relevant IS Codes on cement and steel will be done bythe Contractor from approved National Testing Laboratories as per CE/Br.Rehab/S.C.Rly lr No W.CE/Br. Rehab/2019 dated 14.08.2019, 25.09.209 (enclosed). Nothing extra shall be paid for this.

12.0 GENERAL RESPONSIBILITY OF CONTRACTOR:

Contractor shall be responsible for all structural and decorative damage to property or injury caused by work or his workmen to persons, animals or things and shall indemnify the Railway in respect thereof and shall be held entire responsible for all works carried out by him until it is finally taken over by the Railways and he will be liable to be called to make good any damage or loss which may occur to the bridge work by inclement weather, floods etc., or due to any other cause during entire period until the work is taken over.

13.0 SITE FACILITIES:

13.1 The site of construction is adjacent to existing Road and land available by the sides of the track is limited. The contractors are advised to acquaint themselves well with the site conditions before quoting the rates.

14.0 LAND:

14.1 Limited land is available for the project. The same can be used for Construction of site offices etc., by the contractor subject to availability and approval by the Engineer-in-charge. However contractor should make his own arrangements for Private land for requirements in excess of the above for his workshops, construction equipment stacking yards and camps. No claim on this account shall be entertained by the Railways.

15.0 CONSTRUCTION EQUIPMENTS:

15.1 The contractor shall arrange and operate at his own cost, all necessary tools, plants, machinery and equipment necessary for successful and timely completion of the work.

15.2 If, in the opinion of the Engineer, equipment/plants brought by the

contractor are not suitable for the work concerned, the Engineer shall have the right to order the contractor to replace them by suitable plants/equipment. In the interest of public convenience, the Engineer may insist on a specific way of execution of this work.

15.3 The contractor shall be required to give a trial run of the equipment for establishing their capability to achieve the laid down specifications and tolerance to the entire satisfaction of the Engineer before commencement of anywork.

15.4 All equipment provided shall be of proven efficiency and shall be operated and maintained at all times in a manner acceptable to Engineer-in-charge.

15.5 No equipment or personnel shall be removed from site without permission of Engineer- in-charge.

16 .0 PROGRAMMES FOR COMPLETION OF WORK:

a) The whole work shall be completed within the stipulated period as mentioned in the tender booklet from the date of issue of acceptance letter includingfinishing work.

b) The tenderer shall submit detailed programme for the execution of work within the specified period in the form of bar chart as well as CPM chart with details of all resources required for each important stages/milestone of the work. The necessary details of the plant and equipment, manpower and similar works carried out and tendered shall be given in annexures.

c) The time schedule will form a part of the contract and any deviation from the accepted time schedule shall be with the prior approval of the Railways. In the event of failure on the part of the contractor maintaining the through / commensurate progress with reference to time limit given in the contract. The Railway reserves the right to terminate the contract

17.0 MAINTAINING RECORD OF CONSTRUCTION WORK:

a) The contractor is required to make arrangements to maintain the progress of the work up to date and documental evidence to be produced as and when required for which necessary plants and tools such as Digital camera and maintained upto date at site of work.

**Special condition/Notes**:-

1. All construction material shall be used as per approved brands/makes as per CE/Works S.C.Rly Hqrts vide letter No. SCR – HQ/ENGG(SOR)/1/2020-Dy CE-WORKS-SCR of 24-05-2022 ( copy enclosed)

2. As per headquarters Approved Testing Laboratories .

3. All works should be maintained as per Defect liability clause as per Hqs lr No SCR-HQOENGG (WC)/38/2019 dated 24.09.20 (Enclosed)

4.Rates for all CPWD DSR - 2021 (Delhi Schedule of Rates) items of schedule J & K are inclusive of cost of cement

**Speciation's and conditions for supplying and fixing of Hot dip galvanized H Beam sleepers with zero toe load fastenings and ER /GR pads in connection with through renewal of channel sleepers with H-beam sleeper**

1) H beam sleeper shall be fabricated using ISHB 200X200 @ 37.3kg/mt procured from approved brands/makes as per CE/Works S.C.Rly lr No SCR-HQ ENGG (SOR)/1/2020-Dy CE/WORKS/SCR Dt 24.05.2022 ( copy enclosed) and fabrication as per drawing (No RDSO/1636/4/R (Alt-3) with steel base plate as per drawing No RDSO/T-8760 (Alt-1) with inner and outer shoulders duly fixed and seating arrangement as per Drawing No RDSO/B-1636/5 (Alt -3). No splice joint is allowed and the fabrication procedures to be followed as listed in BS code -45 as a reference. (Copy enclosed)

2) The agency has to deliver the fabricated H Beam sleepers with steel base plate riveted including inner and outer inserts as per above said drawings to nearby bridge approaches in neat manner without causing infringement to moving dimensions. And in case if there is no direct either/kuccha or pucca road available up to bridge site, it can be unloaded at nearby feasible locations (As decided by the Engineers representative) and later on transported to bridge site with contractors own dip lorries /Railway dip lories to bridge approaches and for which extra payment shall be made as admissible, as per schedule.

3) Steel to be used should be of grade E-250 Bo quality as mentioned under clause 8.2 (as provided in ACS No 5 dated 30-08-2013) of IRS; B1-2001, as corrected from time to time

Note: -Rolled steel sections like angles, channels, I-sections etc., confirming to IS 2062 Grade 'A' or 'BR' may be used in structure of riveted girder subjected to railway loading till such time rolled sections confirming to IS-2062 grade 'B0' are not available in market. For grade 'BR' steel impact test is optional at room temperature. Provision of high strength steel to E-450 of 'BR' quality may not be used for riveted girder. (The same to be proved by the contractor).

4) Galvanizing should be done after inspection and acceptance of the fabricated H beam sleepers (At your work shop) by the consignee/authorized representative from Railway side nominated by Sr.DEN/DEN and necessary testing equipment as desired by the consignee shall be arranged by the agency and for which no extra payment is admissible.

5) The galvanization should be done as per IS 2629-1966 and IS 4759-1984 of minimum thick shall be 100 microns and for which test certificate is to be furnished (Specifications enclosed)

6) For any material defects, welds, galvanization, the contractor will be held responsible in all respects.
7) The location where H-beam sleeper is to be seated is to be thoroughly cleaned and a thick coat of ready mixed red lead paint conforming to IS: 102 is to be given well in advance before providing H-beam sleeper

**8)** For the shop rivets (i.e. 20 mm dia.) 35 mm dia. Hole should be punched in the elastomeric pad whereas for field rivets (i.e. 22 mm dia.), it should be 38 mm dia, **these holes shall be filled with ready mixed red lead paint to IS:102 after placing the elastomeric pad in position to avoid accumulation of water.**

9) Maximum Centre to Centre sleeper spacing should not be more than 600mm, except at cross girders. The clear distance between two sleepers at cross girder location should not be more than 450 mm. The clear distance between joint sleepers should not be more than 200 mm (Any correction in IRPWM will apply)

10) The Zero toe load fastenings of H-Beam steel sleepers as per RDSO Drg No T-8759 to RDSO/T -8765 (Alt-1) for 60 kg (UIC) and 52 kg rail. shall be procured from RDSO approved vendors

11) The exact length of H beam sleepers, and size and thickness of MS plates welding to the H beam sleeper as per site conditions to make up level difference of cover plates to be decided as per site conditions (As per Engineers representative)

12) Supply and fabrication of Hook bolt as per specification and drawing No RDSO/B/1636/ 5 (Alt-3) with latest correction to suit to field conditions.

Note: -Length of hook bolts: - Hook bolts of various length are required to be assessed duly taking into consideration the thickness of pad plates required based on the curtailment of plates in top flanges of girder etc (as per engineer representative)

13) Supply of Elastomeric pads of 25/30 mm thick as per Drawing No. RDSO/B/1636/ 5 (Alt-3) with latest corrections issued time to time. The supply should confirm as per IRS specifications for 25 mm thick Nylon cord Reinforced elastomeric pad as per RDSO/M&C/RP-197/03. Cent percent of the material should be got inspected and certified by the RDSO and testing certificate to be enclosed for effecting payment. The testing charges should be borne by the contractor.

14) The work has to be executed during the traffic blocks besides continuation of SR30kmph in presence of Railway nominated supervisor.

15) SSE/P.Way/Bridges shall obtain prior approval of Sr.DEN/DEN through ADEN for operating agreement listed schedule item duly indicating bridge wise details. Duly obtaining the program from the contractor

16) All the released materials such as sleepers and its running and guard rails fittings/hook bolts separated and stacked in neat manner on bridge approaches/nearby PWI depot as directed by Engineer in charge duly handing over with his own labour, tools and plants and vehicles etc complete

17) Rail cutting should be done with disc cutter where ever required as instructed by the Engineer representative

18) Before starting the work, the site drawings showing longitudinal and cross section and first and second cover flange plate details of the girders required for determining the thickness of the MS packing plates to be welded to the bottom flange of H beam sleepers & centers of hook bolts length and its lip/ square neck length and length of H beam sleepers etc to be submitted for obtaining the technical approval before commencing fabrication of sleepers .The drawings to be submitted bridge wise separately in auto CAD.

19) The agency has to inform the Railway administration immediately after procuring steel raw materials from approved steel firms for inspection and certification in writing from authorized Railway representative (Consignee) for permission to use raw steel materials for fabrication of H beam sleepers after verification test certificates, steel bills invoices and heat rolling marks duly capturing in photos for office record.

20). Steel fittings (Guard rail) should be as per IS 226-1962/latest specification andsupply shall be made as per Drg No RDSO /T 5155 to 5164.(with latest correction)

21) Grooved rubber pad 6 mm thick as per Drawing No RDSO/T-5163 .(with latest correction shall be as per “IRS specification of 6 mm thick GR pads of 1997” (Provisional)

a) Linking of the track on H Beam sleepers to be done as per drawing No RDSO/1636/4/R,5 Alt-3 and zero toe load fastenings as per drawing No RDSO/T- 8759 to 8765.(Alt-1)

b) The released tie angles and released foot path plate be made best reutilization for refixing back in position and for which payment will be affected under DSR 15.22 for re-erection

22) It is the sole responsibility of the agency to safeguard all his supplied materials under various items at the site with his own men till fixing is completed in all respects. And in case any short falls or missing of the supplied materials is found or noticed the cost of which paid shall be deducted from subsequent or final bills

23) Agency has to provide work force such that work will be done simultaneously at least at two locations at a time preferably on two different lines ie UP and Dn lines

24) The contractor should note that sections are electrified

25) If track on bridge is in curve, measurements are to be taken in consultation with department and versine are to adjusted to hook bolts accordingly

**2.0 Scope of work.**

2.1. Manufacturing, supplying and fixing of Hot dip galvanized H beam sleepers with zero Toe load fastenings (ZTLF) for 60kg rail in lieu of existing steel channel sleepers over the bridges listed in separate Annexures. Fixing of H Beam sleepers to be carried out as per drawing No listed above with Railway supplied 60KG running and 52 kg guard rails duly drilling of holes as per spacing of H Beam sleepers provided and refixing back of released tie angles and chequred plates with modifications to make reuse of released chequered plates and for which payment will be made under D.S.R The fixing of H beam sleepers in lieu of existing steel channel sleepers shall be carried out under the traffic/power block asrequired

2.2 Two sets of dip Lorries required for transportation of rails/sleepers shall be procured by the agency and for which extra payment will be paid as admissible. Dip lorry working will be worked under the line blocks with departmental supervision ensuring safety protection as per rules in vogue.

2.3. The contractor has to arrange adequate number of skilled workers trained in this particular type of work. Competent supervisor for execution for this work shall also be employed and safety connected instructions of the Engineer – in Charge shall be strictly followed. Contractor's supervisor shall ensure safety during dismantling, transporting and linking of track (preferably he shall be a retired PWI/BRI from Railways.)

2.4 Contractors are advised to inspect all the bridge sites / locations to study site details before quoting the rates. No extra payment will be made either for formation or repair of service roads etc.

3.0 Supply of material by Railway

3.1 Railway will supply Rails, Fish plates, Fish bolts required for linking the track including guard rails at the bridge approach. All the other fittings required for fixing running rails/guard rails to the H beam sleepers shall be arranged by the contractor on his own to bridge site with his own men and vehicles

3.2 Contractor shall make his own arrangements for plant and machinery, equipment, tools including spare parts, consumables stores and labour required to ensure efficient and methodical execution of work including transportation. The rate quoted is inclusive of all above incidental charges.

3.3. Power supply will not be arranged by Railways. Contractor has to make his own arrangement for supply if required for the work during night hours and for which no extra payment will be made.

3.4 Contractor has to ensure that during the execution of work track parameters are not to be disturbed and track cross levels and alignment to be safe guarded for smooth and safe running of trains .No direct or indirect damages or losses to the Railway property or structures shall be allowed and in case any damages to the Railway property, the cost of the damages with penalty, will be imposed and same will be deducted from contractor bill and incase loss of public lives and his workmen involved criminal action will be initiated as per legal procedures.

**4.0. Payment for H-Beam sleepers**

Mode of payment for supplying of H Beam sleepers, Zero toe load fastenings, ER/GR pads, hook bolts and guard rail fittings under different heads of the schedule.

4.1 On receipt and acceptance of the consignee for the materials supplied by the agency (i.e. H beam sleepers and ER /GR pads, Zero toe load fastenings, hook bolts and guard rail fittings under different heads of the schedule as a first stage 70% payment will be effected and remaining 30% after fixing in track as per drawings and relaxing the imposed caution order to normal section speed. During the intervening period from the day of fixing to the day of relaxation of caution order any maintenance works involving cross level corrections and track misalignment if any found to be attended by the agency with his own men and materials and machinery, tools and plants and for which no extra payment will be admissible

4.2 Further All works should be maintained as per Defect liability clause as per Hqslr No SCR-HQOENGG (WC)/38/2019 dated 24.09.20 (Enclosed)

4.3. The rates are deemed to include all accessories work involving drilling, cutting,reaming, punching etc complete to facilitate complete job work. Charges for temporary packing, tools and plant, consumables stores etc., will have to be arranged by the contractor at his own cost.

4.4 Accepted rates are deemed to include all taxes direct or indirect liable under central, state or local bodies act or rules, octroie and royalties and similar imposts that may be prevailing from time to time in respect of land structures and all materials supply during performance of this contract.

4.5 Galvanization of steel fittings other than ZTLF will be paid separately underitem of schedule 'D'

5.0. Safe working methods.

5.1. The contractor shall at all times adopt such safety methods of work as will ensure safety of track, structures, equipment and labour. If the Railways found the safety arrangements are inadequate or unsafe, the contractor shall take immediate corrective action as directed by the Railways representative at site.

5.2. All precautions are to be taken by the contractor during the handling and transportation of the rails.

5.3. If due to negligence of the contractor or inadequate arrangements by the contractor, in case of bursting of block. The contractor will be liable to pay the loss of damage sustained by Railway

**6.0. Inspection.**

**6.1.** Fabrication of H beam hot dip galvanized sleepers shall be inspected by the consignee or any other supervisor/officer nominated by the Sr.DEN/DEN after the jigs are prepared to check its fabrication fixture arrangements for correctness of various dimensions including gauges, workmanship and to check receipt of the steel raw materials from approved venders and test certificates before commencing fabrication work. . Contractor shall make necessary arrangements for inspection of Railway officials to his work unit at his own cost.

6.2After the sleepers are fabricated and before they are galvanized 100% fabricated materials shall be offered for inspection at shop. It is the responsibility of the contractor to ensure the proper dimensions and workmanship.

6.3. After galvanization and before they are dispatched 100% material shall be offered for inspection to check the thickness of galvanization and its quality .

7.0. Maintenance and Guarantee period: Work done by the contractor will be guaranteed by him against any material defect / fabrication defect noticed during maintenance period of 36 months as per DLC. Any defects noticed during the period will be rectified by the contractor free of cost.

8.0 Annexures

8.1. ANNEXURE-1.

List of zero toe load fastening arrangement for each sleeper set for BG 60KG (UIC)/52KG Rail on H beam sleepers for girder bridges as per Drg No RDSO/T-8759-8765 (Alt-1)

8.2. ANNEXURE-1I

List of steel fittings other than zero toe load fittings galvanized (i.e. Hook bolt and guard rail assembly fastenings per each sleeper. (Note As a correction in guard rail assembly tapered washer as per Drg No .RDSO/T-8353 in place of RDSO/T-5162 ( with latest correction )to be provided to follow the tapered profile of H beam sleeper flange slopes.)

8.3. ANNEXURE
1II List of rubber
pads.)

8.4. Agency has to renew with H beam sleepers in lieu of existing steel channel sleepers to any other bridge/bridges of urgent and important nature as directed byADEN/Bridge/SC in SC Division

8.5. Some of the bridges may be dropped or added additionally as per site requirement, ensuring the total quantity is within the scope of the agreement quantity for which no claim shall be entertained from the agency for any addition or deletion of the bridges.

8.6. ANNEXURE-IV

List of drawings uploaded in the tender schedule in annexure IV. The same may be down loaded before quoting or placing tender. Latest alteration if any to be followed

**Special Notes**: -

1. All construction material shall be used as per approved brands/makes as per CE/Works S.C.Rly lr No SCR-HQ0ENGG(SOR)/1/2020-Dy CE/WORKS/SCR Dt
24.05.22 ( copy enclosed)

2. Approved National Testing Laboratories as per CE/Br.Rehab/S.C.Rly lr No W.CE/Br. Rehab/2019 dated 14.08.2019, 25.09.209 are enclosed

3. All works should be maintained as per Defect liability clause as per Hqs lr No SCR-HQOENGG (WC)/38/2019 dated 24.09.20 (Enclosed)

4. Recent updated RDSO approved vendor list s shall be followed for vendor, inspection agency (Uploaded RDSO vendor list to be obtained either from the Dept,or from RDSO web site directly)

5. All drawing shall be followed as per latest alteration/corrections

**SPECIFICATIONS FOR GALVANIZATION AND ITS TESTING.**

1. SCOPE:

1.1. This standard specifies the requirements for zinc coating applied by hot dip galvanizing and criteria for sampling and inspection of such galvanized members.

2.0. GENERAL REQUIREMENTS.

2.1. Quality of Zinc: Zinc conforming to at least grade Zn 99.5% specified in IS:2629-1966 (latest) shall be used for the purpose of galvanization.

2.2. Base metal: Requirement shall be in accordance with clause of IS 2629 1966. Shot or sand blasting may be used instead of pickling to avoid hydrogen embritlement.

2.3 Surface preparation: Surface preparation shall be as per clause of IS 2629 1966. Shot or sand blasting may be used instead of pickling to avoid hydrogen embrittlement.

2.4 .Galvanizing: The structures may be galvanized as per the IS 2629 – 1966 and IS: 4759 – 1984 unless otherwise specified in the succeeding paragraphs.

3. .COATING REQUIREMENTS.

3.1. Mass of Zinc coating: The requirement for the mass of zinc coating for all steel structural shall not be less than 705 g/sq.m and the galvanization thickness shall not be less than 100 microns.

3.2 Freedom from defects: The zinc coating shall be uniform adherent, reasonable smooth and free from imperfections such as flux, ash and dross inclusions, bare patches black spots, pimples, lumpiness and runs, rust stains bulky white deposits and blisters. These terms have been defined in IS: 2629 – 1966 which as amended isenclosed at APPENDIX 'A'

3.3 Steel embrittlement: The design of the product and the selection of steel for its suitability to withstand normal galvanizing operations without embrittlement or the method of fabrication shall be the responsibility of the fabricator. Recommended precautions to design, fabricate and prepare the material for galvanizing to prevent embrittlement shall be as per IS 6158 – 1971.

4 .0 SAMPLING AND CRITERIA FOR CONFORMITY.

4.1 The following sampling plan shall be followed for ascertaining the conformity ofgalvanized coating.

4.2 LOT: All rolled and fabricated sleepers galvanized in a coating bath and comprising of one complete day's turnover shall constitute a lot. For all others, materials of the same type in a coating bath whose coating characteristics are intended to be uniform shall form a lot.

4.3 Samples shall be taken from each lot and tested for conformity of coating. A test piece of mild steel plate of 6mm thick and of size 100 x 100 mm shall be used as sampling piece.

4.4 Scale of sampling: The number of units to be selected from a bath shall be inaccordance with column 1 and 2 of the table given.

TABLE - SCALE OF SAMPLING

| Lot size (No of units of In a bath ) | sample size | Permissible No of . defective units. |
|---|---|---|
| Up to 25 | 3 | 0 |
| 26 to 50 | 5 | 0 |
| 51 to 100 | 8 | 0 |
| 101 and above | 13 | 1 |

4.5 Tests for visual inspection.

4.6. Visual inspection of the material in a lot shall be made to determine the conformity with the requirements of 3.2. If the inspection warrants rejection if the lot the galvanizer may segregated the good pieces of the lot and submit it once again for inspection.

4.7. If the lot inspected for visual inspection passes, than the lot shall be declared as conforming to requirements of 25.2

4.8 Number of tests for coating characterizations

4.9 Actual products may be used as test specimen.

4.10 Each sample shall be tested by testing one test specimen. In case the first specimen representing a sample unit fails to conform to the requirements specifiedin 26.14 the second and the third specimen shall be tested. If any one of the second or third specimen fails to conform to the requirements, the sample unit shall be considered defective. If the number of the defective units in a lot exceeds permissible numbers specified in the above tables, the lot shall be rejected.

4.11 The materials in a lot which have been rejected may be stripped andregalvanized and again submitted for inspection and tests.

4.12 The lot shall be declared as conforming to the specification if 26.11. is satisfied

4.13 Test procedure for mass of galvanized coating:

4.14 . The mass of galvanized coating shall be determined by any of the method as mentioned below as mutually agreed between the Railway and galvanizer.

5.0 Stripping method:

5.1 Cleaning of test piece: The test pieces shall be washed with solvent naphtha, trihloro ethylene or any other suitable organic solvent followed by alcohol and finally dried thoroughly.

5.2 Stripping solution: Dissolve 20 gms of antimony trioxide (Sb2 O3) or 32gms of antimony tri chloride (Sb C13) in 1000 ml of concentrated Hydrochloric acid (Specific gravity 1.16)

5.3 Immediately before tests, prepared the stripping solution by adding 5 ml of the solution prepared under 5.1.1.2 to 100 ml of concentrated Hydrochloric acid (specific gravity 1.16) mix well.

5.4 Procedure: (IS:6745 – 1972) Weight and cleaned test specimen whose mass is less than 200 gms nearest to 1 gm (for test piece whose mass is between 300 to 1000 gm weight to the nearest 0.1 gm and for masses over 1000 gm, the accuracy of weighting shall be nearest to 0.5 gm. After weighing immerse each test piece

singly in test solution prepared in 5.1.1.2 and allow remaining there until the violent evolution of hydrogen ceases and only a few bubbles are being evolved. This required about 15 to 30 seconds.

5.5 The mass zinc coating in gm/m2 of surface may be calculated as per the following formula.

M = ( M1 – M2) x 3930 / t Grams per Sq.m per unit thickness of stripped test piece.

Where M = Mass of zinc coating in gm/m2 of surface.
M1 = Original mass of in gms of test piece.
M2 = mass in gms of stripped test piece
and t = thickness of the stripped test piece
in mm

5.6 Magnetic or microscopic method as per IS:3203 – 1965 or eddy current method as per IS:6012 – 1970 may be employed to determine the thickness of coating. The mass of coating in g/m2 shall be calculated by multiplying the thickness in mm bya factor 7047.

5.7 Determination of uniformity of galvanized coating: Where practicable the uniformity of galvanized coating shall be determined by the precee test as prescribed in IS: 2633 –1972. The article should withstand four 1 minute dip.

5.8 Adhesion of galvanized coating: A coating shall withstand the pivoted hammer and knife test as prescribed in IS: 2629 – 1966.

## 6.0 INSPECTION

6.1 Visual inspection of material shall be made to determine conformity with the requirement of 25.2 when partial inspection warrants rejection of a lot, the galvanizer may reject the lot and submit it once again for inspection.

6.2 Should one specimen or specimens failed to conform to the requirements specified in 26.14 for the mass of coating, the second and third specimen/specimens shall be tested failure of either the second or the third specimen or specimens to conform the requirements shall be the cause for rejection of the lot which the samples represents.

6.3 Materials that have been rejected may be stripped and re galvanized and resubmitted for inspection and test when they shall conform to the requirements ofthis specification, otherwise the entire lot shall be rejected.

## 7.0 RECTIFICATION OF DAMAGE.

7.1 Normally all fabrications work in the case of galvanized articles shall be completed prior to galvanizing. If for any reason, fabrication such as cutting, drilling or welding has to be undertaken after galvanizing, protection of metal exposed as result of fabrication, and rectification of damaged galvanized areas shall be done in accordance with either of the following methods or any other method approved by the Railway administration.(i) Sticks or rods, 5-10 mm dia, of high purity zinc shall be used for this purpose. The surface to be protected, of the surface where galvanizing has been damaged, shall be cleaned any oxides removed with a weak acid solution and wire brush. The surface shall be thoroughly washed with water to make it free from any traces of acid. The cleaned area may be heated with a welding torch and rubbed with white salamoniac. A piece of zinc stick or rod of high purity shall be melted on+ this area and spread out with a heated pierce

salamoniac. The area shall then be washed down by water and lightly wire brushed. The workmanship shall be such that the finished surface is smooth and non porous.

(ii) The damaged surface after cleaning, as mentioned in para (i) above, shall be painted with two or more coats of zinc rich primer followed by a finished coat, as per the painting schedule recommended by the supplier of zinc rich primer. It is to be ensured that the dry film thickness of zinc rich primer shall not be less than the average thickness of the galvanized coating. The complete painting system ie., Zinc rich primer with the finishing paint for this purpose shall be procured from the same source of repute and as approved by the Railway administration

ANNEXURE 'A' (Clause 3.2)

DEFECTS – THEIR CAUSES AND REMEDIAL MEASURES.

| Defects | Causes | Recommended action | Ground for rejection |
|---|---|---|---|
| **Bare Spots** | Paint, grease or oilResidues | Check cleaning practices | Yes. If bare spotsare bigger than 8mm dia |
| | Scale of rush residues | Check pickling practices | |
| | Residual welding Slag | Blast clean welds, avoid coating rods | |
| | Break dow npreflux Coating | Check preflux and drying conditions | |
| | Aluminum content of Bath too high | Regulate aluminum addition | |
| | Rolling defects i nBasic steel | Check steel supply | |
| | Articles in contact During Galvanising | Keep articles seperated | |
| **General roughness** | Analysis of original Surface Conditio n of steel | Check steel supply | NO |
| | Over pickling | Reduce pickling, useinhibitor. | |
| | High galvanizing temperature or `long immersion time or bath. | Adjust galvanising Conditions. | |

| | | | |
|---|---|---|---|
| **Pimples** | Entrapped dross | Avoid agitation of dross layer. Check carryover of | No. Unless Dross |
| | | pickle salts | contamination |
| | Withdrawal spee dtoo high | Remove. Work slowly | isheavy. |
| **Lumpiness and bath** | cold galvanizing | Increase temperature | |
| **Runs (uneven drainage)** | Delayed run-offfrom seams joints, bolts, holes etc., | Remove work slowly | **NO** |
| | Articles in contact during withdrawal | Keep articles separated | |
| | Stale flush burnt on during dipping | Refresh or renew flux blanket | |
| **Flux including** l | Surface residues on steel | | |
| | Flux picked upform top of bath | Check steel preparation skimbefore withdrawal | YES |
| **Ash inclusions** | Ash burnt on during dipping | Skim bath before dipping | Yes if gross lumps |
| | Ash picked up from top of bath | Skim bath before withdrawal | |
| **Black spots** | Includes flu xparticles from flux dusting dirt | Confine fluxing to top of bath. Check storage conditions | YES |
| **Dull grey coating (All alloy, no free** | Steel composition high silicon, phosphorous or carbon or severe cold work | Check steel supply for composition order to adjust for galvanizing | **NO** |
| | Slow cooling after galvanizing | Avoid hot stacking quench | |
| **zinc)** | Release of absorbed hydrogen during solidification of coating weeping' of acid etc.from seamsand floods | Avoid over pickling useinhibitor. | |
| **Rust stains** | Storage near rusty material | Check storage conditions | **NO** |

| | | | |
|---|---|---|---|
| **Bulky white deposit (wet storage stain white rust)** | Confinement of close packed articles under damp conditions | Store and ship in dry well ventilated conditions ,separated articles with space | NO |
| | Pickling of articles while damp | Dry before packing includes desiccant | |
| | Expansion of entrapped hydrogen an dmoisture in flaws | check steel quantity | |
| **Blisters** | Driving off of hydrogen absorbed | Use shot blast instead of pickle, check steel supply | Yes, if general |
| | Improper malleabilising (for malleable iron casting only) | Check malleabilising practice | |
| **Tiny blisters** | Effect sometimes observed on quenched work, notably malleable casting. May be caused by gas evolved from the work resulting from absorbed hydrogen or breakdown of combined carbon near surface. | Use shot blat instead of Pickle. Check melleablising treatment. Should have no combined carbon near surface of coating | Yes, if blistering is generally widespread . |

## SPECIAL CONDITION FOR SIDE PATHWAY

### 1.0 SPECIAL CONDITION OF CONTRACT

**1.** As per hq letter No W.496/Policy/Vol.IX dated 26.05.2022.Reimbursement of cost of steel on 75 % of invoice value or at the rate of 75% of the quoted rate of steel in the contract, whichever is less, can be done to the contractor on his request after steel is physically brought to the site and verified by engineer in charge at site. Proper accountal of the received quantity at site is to be made by engineer in charge'.

**2.0 Specification and Drawings**

**1.** The Existing members of the steel girder are to be strengthened before providingside pathway as per site condition during execution as directed by the Engineer representative

**2.** Side path way shall be fabricated and erected as per latest Standard drawing

**3.**Structural steel sections for side pathway work shall conform to IS 2062, Quality 'A" Grade Designation E 250, and chequred plate to IS 3502 specifications to be procured from approved list of steel manufacturing companies only and no rerolling and other non-listed manufacturing companies entertained. As a token of evidence for the material procured from the approved companies, bill invoice and Eway generated bill copy and test certificates issued form the companies of same heat mark listed in test certificate issued by manufacturing firm (The list of approved steel manufacturing firms or companies is enclosed in separate annexure issued as per CE/Works S.C.Rly lr No SCR-HQ ENGG (SOR)/1/2020-Dy CE/WORKS/SCR Dt 24.05.2022

**4.** All direct connections to main girder stiffeners to side path way truss bracket

shall be invariably to done with riveting only .Rivets should confirm to IS 1148 specifications and riveting to be carried out as per specifications listed in IRBM Para No 215 without damaging bridge girders (extract copy of Para No 215 of IRBM is enclosed).

**5.** Galvanizing should be done after inspection and acceptance of the fabricatedSteel bythe consignee/authorized representative from Railway side nominated by Sr.DEN/DEN and necessary testing equipment as desired by the consignee shall be arranged by the agency and for which no extra payment is admissible. 6.The galvanization should be done as per IS 2629-1966 and IS 4759-1984 ofminimum thick shall be 100 microns and for which test certificate is to befurnished (Specifications enclosed)

7. Erection and fixing of side path way shall be carried out as per SOD in vogueshall be adhered

8. All works should be maintained as per Defect liability clause as per Hqs lr No

SCR-HQOENGG (WC)/38/2019 dated 24.09.20 (Enclosed)

9. Approved National Testing Laboratories as per CE/Br.Rehab/S.C.Rly lr .CE/Br. Rehab/2019 dated 14.08.2019, 25.09.2019 are enclosed.

The contractor should note that sections are electrified and work should be Carried out in traffic condition/block period.

10.As per hq letter No W.496/Policy/Vol.IX dated 28.12.21. Agency has to set up site laboratory within 45 days from the date of issue of letter of acceptance (LOA). Ifthe agency does not set up site laboratory then penalty will be imposed accordingly(copy enclosed)

**QUALITY CONTROL OF WELDING DURING FABRICATION OF STEEL WORK ( As per Head Quarters Lr. No. W.71/Br/P/9/Vol .VI dt 17-09-08)**

To ensure better quality control in welding during fabrication of steel structure,thefollowing tests to be conducted invariably by contractor in presence of inspector –in–charge

**2.0** After removing the slag and brushing with a stiff wire brush, the welds shall be visually inspected for size and profile (Acceptable and defective weld profiles of fillet welds are illustrated in ANNEXURE-I enclosed sketches separately in PDF file

**2.1** Confirming of fillet welds to size and contour shall be determined by use

of gauges (as per ANNEXURE –II enclosed sketches separately in PDF file

**2.2** Welds shall also be examined by the Dye Penetration test as per IS-3658 or by Magnetic particle Flaw Detection method as per IS-3703

Any deficiencies noticed to be corrected immediately by the contractor at his own cost.

**3. Other conditions**

1) Contractors should ensure no damage to the existing structures, if any damage occurs to existing structures, it has to be made good by contractor at their own cost and railway will not pay for it

2) Safety Precautions to be taken while carrying out the work. There should notbe any obstruction to train services.

3) The material should be stacked at nominated place after completion of days work and proper barricading to be done around working, fabrication site and released material should be handed over at SSE/Bridges office

4) No extra payment will be made either for formation or repair of service roads etc. and the contractor has to make his own arrangements to make it feasible for all operation as required at site till the completion of the work as per the scheduled items of work including for all heights and crossing of track.

5) Agency has to be self-sufficient with required skilled labour and Machinery to engage two batches to work form two opposite ends of the bridge besides to work at two different locations simultaneously in case of work combining other units of section. With the above planning bar chart to be submitted by the agency before commencing the work for planning of caution order in advance and if any delay in progress as per the bar chart as

per GCC conditions penalty will be imposed .

6) Contractor shall make his own arrangements for plant and machinery, equipment, tools including spare parts, consumables stores and labour required to ensure efficient and methodical execution of work including transportation. The rate quoted is inclusive of all above incidental charges.

## Special conditions for FOBs

1. As Rly Bd revised guide lines vide lr No 2017/50/CE-111/BR/FOB Dt 18.12.2018. Fabrication of FOBs can be done through firms other than RDSO approved firms. However, to ensure quality of fabrication, QAP has to be prepared in each case which is to be approved by officer not below rank of JAG
2. Complete fabrication and erection of FOB shall be carried out as per RDSO standard drawings and specifications mentioned in it and latest corrections up to date
3. Metallization should be done for steel work as per the RDSO stanadard drawing including grit blasting as per IRS-BI-2001 following by one coat of etch primer (as perIS: 5666).
4. This work is to be carried out on platforms in stations. Contractor must protect the work site with barricading (at least double layered green cloth) to avoid discomfort to passengers. During execution of work, train movements should not be hindered.
5. Dismantling/Erection of FOB and ancillary works should be carried out by cranes/hydras in Traffic and Power block during day/night time. Sometimes granted block may be cancelled in the last minute due to train operational constraints. No extra payment will be made.
6. If contractor‟s machinery such as cranes/hydras/tractors damage platform surface or any railway property, contractor should carry out repairs at His own cost.
7. The excavated earth and construction materials should be stacked properly at nominated place with barricading (at least double layered green cloth).
8. Contractors are advised to inspect the proposed site before participating in tenders to assess availability of approach road, crossing of tracks for transportation of construction materials and machinery, and to plan execution of the work accordingly.
9. If the new Escalator (civil work) is to be provided adjacent to an existing escalator, it should not damage any part of the existing escalator. Cost of repair for any damage should be borne by the contractor.
10. Reimbursement of cost of steel on 75% of invoice value or at the rate of 75% of the quoted rate of steel in the contract, whichever is less, can be done to the contractor on his request after steel is physically brought to the site and verified by engineer incharge at site. Proper accountable of the received quantity at site is to be made by engineer incharge.
11. Contractor at his own cost should deploy watchmen round the clock to prevent any untoward incident regarding safety of passengers moving on the platforms.
12. For structural steel works where quality “A” is mentioned in the drawing, payment will be restricted to the cost of only quality “A” steel even if steel of higher quality is used by the contractor.

**Working of Road Cranes**

1 No machine shall be selected to do any lifting on a specific job until its size and characteristics are considered against the weights, dimensions and lifts radii of the heaviest and largest loads.

2. The contractor shall ensure that a valid certificates of fitness is available before use of road cranes

3. Contractor can utilize the services of any competent person as defined in factories Act, 1948 and approved by Chief inspector of factories

4. The laminated photocopies of fitness certificate issued by competent person, the operator‟s photo, manufactures load chart and competency certificate shall always be either kept in the operation cabin or pasted on the visible surface of the lifting appliances

5. All lifting appliances including all parts and gears thereof, whether fixed or movable shall be thoroughly tested and examined by a competent authority person once at least in every six months or after it has undergone any alterations or repairs liable to effect its strength or stability

2.0 SPECIFICATIONS FOR STRUCTURAL STEEL

2.1 All rivet steel to comply with IS specification 1148/82.

2.2 Fabrication of steel work should comply with IRS specification B1/2001.

2.3 Welding should conform to codes as detailed in the approved drawing.

2.4 The steel used shall conform to specification as detailed in the approved drawing. And from Railway approved brands vide PCE/SC lr No SCR-HQOENGG(SOR)/1/2020 Dy.CE/Works/SCR Dated 24.05.2022, The necessary steel test certificate should be obtained and submitted to the above specifications for the materials to be used for this work.

2.5 The joints for main structural members such as ISMB/RSJ/Angles are not permitted. No two pieces shall be welded or otherwise jointed to make up required length of a member

3.0 QUALITY CONTROL OF WELDING DURING FABRICATION OF STEEL WORK (As per Head Quarters Lr.No. W.71/Br/P/9/Vol .VI dt 17-09-08)

To ensure better quality control in welding during fabrication of steel structure, the following tests to be conducted invariably by contractor in presence of inspector –in –charge

3.1 After removing the slag and brushing with a stiff wire brush, the welds shall be visually inspected for size and profile (Acceptable and defective weld profiles of fillet welds are illustrated in ANNEXURE-I) enclosed sketches .separately in PDF file

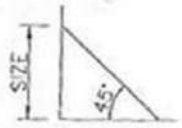
3.2 Confirming of fillet welds to size and contour shall be determined by use of gauges (as per ANNEXURE II) enclosed sketches .separately in PDF file

3.3 Welds shall also be examined by the Dye Penetration test as per IS-3658 or by Magnetic particle Flaw Detection method as per IS-3703

Any deficiencies noticed to be corrected immediately by the contractor at his own cost.

ANNEXURE 1

ACCEPTABLE AND DEFECTIVE WELD PROFILES



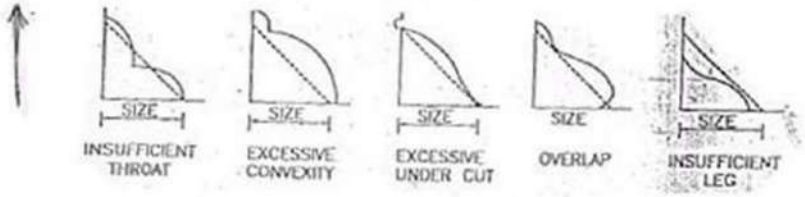

DESIRABLE FILLET WELD PROFILE

FIG.-24



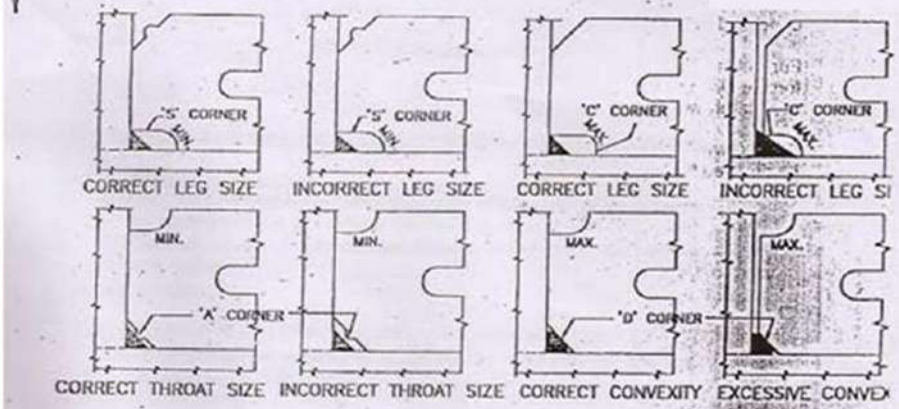

ACCEPTABLE FILLET WELD PROFILE

FIG.-25




ANNEXURE II

METHOD OF GAUGE APPLICATION




1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. GAUGE FOR EACH WELD SIZE TO BE MANUFACTURED TO THE DIMENSIONS GIVEN IN THE TABLE ABOVE
3. WELD GAUGE SIZE TO BE MARKED AT LOCATION 'S' IN 3mm LETTERS. OTHER MARKING IN 2mm LETTERS
4. ALL MARKINGS TO BE DONE ON BOTH FACES.
5. THESE GAUGES ARE SUITABLE FOR INSPECTION OF NORMAL FILLET WELD OF SIZES 25mm WITH ANGLE BETWEEN FUSION FACE OF 90° FOR DEEP PENETRATION WELD AND FOR ANY OTHER ANGLE BETWEEN FUSION FACES, SPECIAL GAUGES MAY BE MAI

**General Conditions for painting of steel structures**

***1.*** The paint supply shall be in the sealed tins with company labels indicating the manufacturing date and batch number in intact *preferably*

**2.** The paints procured by the agency should be preferably BE from one lot which has been certified by the CMTD/LGD or any other approved National Testing Laboratories whichever is convenient, at the cost of contractor till completion of work. If batch number of the paints differs again the samples shall be tested from CMTD/LGD or any other approved National Testing Laboratories for IS specification confirmation before utilization

**3.** The quantities shown in the tender schedule are approximate and will be operated in full or part at the discretion of the Engineer-in-charge. Payment will be made based onthe actual items operated.

4 All materials to be supplied and used by the contractor in connection with this work should have prior specific approval of the Engineer in charge and should be in accordance with the specifications for materials and works of SC Railway

5 Electrical energy that may be required will be supplied by the Railway wherever feasible at the discretion of the Railway on payment of the charges as reqd to the Electrical dept. The contractor will have to make his own arrangements for taking the connection from the nearest Railway electrical source of supply.

6 The contractor labour shall be provided with identity cards due to security reasons.

7 The damages done to the adjoining Railway assets to carry out the new work shall be made good at the cost of the contractor. And no payment will be made for them

8. The contractor should submit the work programmed chart/Bar chart before taking up the work.

9. The accepted rates should be deemed to include all taxes direct or indirect liable under Central, State or Local bodies Act or rules, Octroi, toll taxes, tools, royalties, seignorages, cess and similar imposts that may be prevailing from time to time.

10 The contractor has to make his own arrangement for Scaffolding/ Jula /staging/ plants with crew and consumable stores and other accessories like ladders, for carryingout the work for which no extra payment will be made.

11. The contractor shall be responsible to take all precautions to ensure the safety of the public wherein on public or Railway and shall post such look-out men as pertaining to the work.

12. No substandard work will be permitted. If any item of the work, at any stage, if found, will be rejected and that portion of the work will be removed at the cost of the contractor and has to be made good by the contractor without any extra payment. The decision of the Engineer In charge will be final in regard to quality and quantity of work. No claims will be entertained in this matter.

13 Railway administrations will not be responsible for the safety of labour engaged byThe contractor for his work and the contractor should indemnify the Railway for anyCompensation to be paid for the loss of human life or injury sustained by his Labour.

14 The contractor shall make his own arrangements for storage of materials to see

That no damage will take place during storage period. The contractor shall take all Precautions effectively to safe guard the material between the period of procurementand the period of use.

15 The rate quoted by the contractor will be inclusive of the cost of all the materials, labour, tools & plant etc. complete including transportation of the same at his own cost including loading and unloading.

16 Work is to be executed in the running conditions either under the traffic block or under arranged speed restriction as detailed in letter No W.506/ESO‟s dt 29.07.20 of SCR.Hqs work branch. The block will be made available as per the convenience of the Railway depending up on the position of the traffic .Railway shall not pay any extra amount for the contractor due to non availability of traffic block.

17. No service roads will be provided by railways. If required the contractor himself has to provide the same for smooth working and no extra payment will be made.

18. The contractor is responsible for safe passage of trains .All trains will be allowed with the specific approval of SSE/JE Bridges in charge in the portion of the bridge. Any variation in this regard the contractor will be held responsible for all damages caused out of negligence manipulated by his staff.

19. It is the responsibility of the contractor to see that there is no detention or interruption to the movement of the trains during the execution of the above work.

20. The general condition of the contract and Unified standard schedule of rates -2021 and its unified specifications of material and work of south central railway and all corrections up to date will be applicable.

21. The intending tenderers are advised to inspect the bridges to obtain first hand knowledge of working conditions, accessibility and weather conditions etc; and they shall take into account all the above factors before tendering.

22. Contractor shall make his own arrangements for safety of labour engaged for which no extra payment shall be made. The contractor shall comply all regulations of central, state, local govt and labour laws in respect of labour employed on his work including insurance cover. The contractor shall depute look out man with Hooters etc; to warn the workers. Necessary protective clothing safety equipment, goggles etc;

23. Necessary scaffolding, derrick, ladders etc: for painting the structure should not infringe Railway‟s moving dimensions and shall be arranged by contractor at his own cost and the arrangements shall be approved by the Engineer in charge.

24. Surface preparation shall be approved by Engineer in charge before commencement of the painting. Similarly successive coats of Paints shall be applied only after the approval of each completed paint coat by Engineer in charge.

25. First coat paint shall be done only after the surface preparation is approved by Engineer in charge.

26 The approved colour of strainer of desired colour in requisite proportion should be added in the paint to differentiate between the two successive coats of paint.

27. Mixing of thinner or any dilute in paint is not at all allowed in any condition during the execution of painting work.

28. The equipment (Elecometer) required for measuring dry film thickness should be arranged by contractor.

29. In case of rain within 24 hours of application of paint film, contractor should redo the coat at his own cost.

30 Painting work should be done under the supervision of competent Bridge Engineering staff only.

31 To carryout the painting/maintenance works on the girder bridges/Foot over bridges within the vicinity of OHE (ie less than 2 meters distance) a memo has to be sent to TRD supervisor of the jurisdiction by the SSE/ Br/ Works duly mentioning the time period required to arrange the „permit to work" Conditions enclosed vide **Annexure – A.** Before starting the work contractor has to ensure the same

.

**ANNEXURE –A**

Draft proceeding order to be followed by TRD and EngineeringSupervisors/Tenderer/Contractor with regard to maintenance works for the Bridges:

a) "No Work" shall be done above or within 2 meters from the live OHE without a "permit-to-work"
b) Use of steel measuring tapes or long metalizing wires is prohibited in electrified sections.
c) Painting work should be done under the supervision of competent Bridge engineering staff only
d) To carry out the painting maintenance works on the girder bridges i.e. within the vicinity of OHE (less than 2 meters distance) a memo has to be sent to TRD supervisor of the jurisdiction by the

SSE/ Br/ Works duly mentioning the time period required to arrange the „permit to work". No engineering SSE/ Br/ Works supervisor should allow the contractor staff or bridge staff to carry out the works on bridges (less than 2 meters from OHE) without obtaining "permit-to-work" from the authorized person

of TRD Official. Before starting the work contractor has to ensure the same

e) After obtaining power-block on OHE, the TRD supervisor will then arrange two discharge rods to OHE on either side of the Bridges work spot, and then issue permit to work to engineering supervisor.

f) After completion of the work, the Engineering supervisor should give a clearance memo to TRD supervisor and then only the two discharge rods will be removed from OHE and the OHE will be charged.

g) Care should be taken when labour were engaged by contractor to do the painting on the girder bridges i.e. they should be allowed to work after obtaining permit to work only.

h) While doing the painting/.maintenance works beyond 2 meters distance to OHE the staff must be counseled/watched not to come into the danger zone (i.e. below 2 meters distance to OHE) during the course of working by SSE/ Br/ Works . and to be ensured by the contractor

i) Responsible person from the SSE/ Br/ Works side should be available at the work spot of the Bridge maintenance/painting works) during the "power block" (permit to work) period to avoid any untoward incidents.Before starting the work contractor has to ensure the same

## SPECIFICATION FOR PAINTING OF GIRDER BRIDGES, FOBs AND STEEL STRUCTURES

### 33.0 SURFACE PREPARATION

**33.1** Scraping/cleaning/surface preparation of steel is one of the important pre- requisites for the painting to last long. Sufficient care should therefore be taken in preparing the surfaces two types of surface preparations are involved according to the condition of the existing paint/surface.

**33.2 Type I Preparation**: This should be used where the primary coat of paint is sufficiently in good condition, adhering to the metal firmly and there are no signs of rust. The existing primary coat of paint will not chip off when hit by the pointed end of the chipping hammer.

**33.3 Type II Preparation: -**This should be used where rust has appeared in many place and existing primary coat of paint has developed cracks, littering, peeling, brittleness, etc., and is in bad condition. Type II Preparation has to be resorted to if the primary coat of paint chips off when hit by the pointed end of the chipping hammer.

**33.4** Surface preparations of the above two types of finishes on the same girder may be prescribed if areas are sufficiently large and distinguishable and measured before work is commenced. For example, in many girders the top flanges particularly of stringers and cross girders develop corrosion, while the web portion remains in good condition. In such locations, it is possible for the whole web to be cleaned to type I preparation and the top flange to Type II preparation.

**33.5.** Prior decision by ADEN/BR in case of girders and structures maintained by SSE/ Br/ Works , and that of Sectional ADENs for other structures maintained by PWIs and IOWs, should be taken about the areas where Type I or Type II surface preparation has to be done after making detailed inspection of the condition of paint on girders and structures and these should be intimated to the Inspectors in case of departmental painting and incorporated in the Schedules/Tender Documents in case where painting is done through contracts.

**33.6.** Specification for Type I Preparation: The surface shall be made free from Oil, grease and dirt. The existing primary coat of paint which is firmly adhering shall not beremoved. Surface shall be rubbed with wire brushes and sand paper/emery paper. This is only for roughening the surface and not for removing the paint.

**33.7.** Specification for Type II Preparation: The surface shall be cleaned of oil, grease, dirt, rust, loose paint, mill scales and other foreign matter completely and at least 75% of each square inch (10sq.m) of surface are shall be free from visible residues and the remainder shall be limited to slight discoloration/stain. Such discoloration shall not exceed ¼ " (6mm) square. The tools used may be hand or power operated. These may include scrapers, chippers, hammers, knives, chisel, wire brushes, Emery/sand papers,pumice stones, brickbats etc. Grease, if any, should be removed before mechanical tools, are used. Wire brushing should invariably be done at the end so as to obtain a uniform rough surface.

The surface prepared by Type I & II methods may be checked by visual observations for uniformity of surface prescribed in the particular type of cleaning.

**33.8. Surface** preparation shall not be done unless the approved paints of sufficient quantity (both primer and finishing coat paints) are available in stock.
**33.9.** Special care should be taken in preparing corners, junctions, of members, head and nuts of bolts rivets holes, areas less accessible, hidden pockets etc. and uniformity of preparation at these locations shall be attained to that of rest of the surfaces.

**33.10** Surface preparation/painting shall not be done in the following conditions:-

i) When the ambient temperatures is below $10^{o}$ C or above 50 degreeC
ii) In rainy season
iii) Night
iv) In winter before 8 AM
v) In summer between 11 AM and 3 PM on areas that are likely to beexposed to direct sun light.
vi) When the moisture content in the atmosphere is more than 80%
vii) Extremely windy/misty/dust blowing conditions.

**33.11**. Chemicals shall not be used for surface preparation of both the types.

34.0**PAINTING**

34.1 **For Type I Preparation**s: All the steel work shall be painted with 2 coats of paint confirming to IS 13607 (smoke grey ) for spans up to 100 ft.(30.5m) or Paint aluminum to specification IS:2339 for spans 100 ft and above i.e. 2 finishing coats only)

34.2 In the case of paint confirming to IS 13607 (smoke grey), a little quantity of lamp black shall be added to the first coat to obtain a darker hue in order to distinguish the first coat from the second coat. Similarly, in the case of aluminum paint a little blue paint shall be added, instead of Lamp black to

the first coat of Aluminum Paint for distinguishing it from the second coat.

**34.2.1** **<u>For Type II of preparations</u>**: All steel work shall be painted with 3 coats ofpaint

**34.2.2** **<u>First Coat (Primer coat)</u>** For bridges (A) Applying coat of primer with Zinc chromite to specification IS:104 with all contractor's material, labour ,tools ,plant
,machinery ,scaffolding including all lead, lift etc. Complete and as directed by the Engineer-in-charge at site

(B) Applying coat of primer with Zinc chromites red oxide over zinc chromites to specification IS: 2074 with all contractor's material, labour, tools, plant, machinery, scaffolding including all lead, lift etc. complete and as directed by the Engineer-in- charge at site.
Note: - items A & B forms as one primer coat for bridges and structures.

(C) Applying coat of primer with Zinc chromites to micro wave towers to specification IS:104 with all contractor's material, labour, tools, plant, machinery, scaffolding including all lead, lift etc. Complete and as directed by the Engineer-in-charge at site

(D) Applying one coat of ETCH primer consisting polyring Butynal phosphetic acid catelist of approved quality to all the members of the tower as per the specifications confirm to civil aviation regulation to IS :5666 with all contractor's material, labour, tools, plant, machinery, scaffolding including all lead, lift etc. Complete and as directed by the Engineer-in-charge at site ( for microwave towers )

(E) Applying first finishing /protective coat with orange white/ required colour synthetic enamel of best quality and anticorrosive to with stand exposures to outside condition and of standard equivalent to synthetic enamel paint of Shalimar, British or Asian paint. The mast shall be painted in alternative band of international orange (ISI shed 592) and white terminating with orange at top and the bottom height of each band shall not exceed 6 meters and should not less than 0.50 meters as per the specifications confirm to civil aviation regulation to IS: 5666 with all contractor's material, labour, tools, plant, machinery, scaffolding including all lead, lift etc. Complete and as directed by the Engineer-in-charge at site (for microwave towers)

**34.2.3** Applying second finishing /protective coat of orange and white enamel/required colour of best quality and anticorrosive to with stand exposure to outside conditions and standard equivalent to synthetic enamel paint of shalimar, british or Asian paints

.The second coat of enamel paint as per the specifications and as directed by the Engineer -in-charge at site with all contractor's material, labour, tools, plant, machinery, scaffolding including all lead, lift etc. Complete and as directed by the Engineer-in- charge at site (second coat for microwave towers).

34.3 **Second Coat:** (Finishing/Protective coat) with paint confirming to IS 13607 (smoke grey) for spans up to 100 ft (30.5m) and above In the case of paint confirming to IS 13607 (smoke grey) , a little quantity of lamp black shall be added to the second coat to obtain a darker hue in order to distinguish the second coat from the third coat. Similarly, in the case of aluminum paint a little blue paint shall be added, instead of Lamp black

.

34.4 **Third Coat** (Finishing/Protective coat) with paint confirming to IS 13607 (smokegrey) for spans up to 100 ft (30.5m) and above

**34.5** Various defects in Painting, their causes and effects are furnished in **Annexure- B.**

34.6 In case material description is available in approved brands/makes as per CE/Works S.C.Rly lr No SCR-HQ0ENGG(SOR)/1/2020-Dy CE/WORKS/SCR Dt
06.03.20. Brand mentioned to be strictly followed. Otherwise the material needs to be tested as per clause mentioned in S. No 2 of General Conditions for painting of steel structures

34.7 Paints required for primer and finishing coats may preferably be procured from thesame firm for achieving better results.

34.8 If thinners are to be added to the Paint supplied by the Contractors/specifications. In all cases, the thinner shall be added wherever necessary only in the presence of SSE/ Br/ Works . The quantity of thinner should be decided after trial and only the required quantity added so that the specified dry film thickness is obtained foreach coat.

34.9 The viscosity of the paint at the time of application shall be checked by using „FORD Cup No.4" by the SSE/ Br/ Works at site as detailed in specification IS:101-64 in addition to the tests conducted by CMT/LGD or any other National Test House.

34.10 Paints should be used within the prescribed shelf life from the date of manufacture. The quantity of paint procured should be such that it is fully utilized before the prescribed period for its use.

**Shelf lift of Paints**

i) Paint Red Lead Ready mixed : 4 months
ii) Paint Red Oxide Ready mixed :1 year
iii) a) when paste and oil are not mixed: :1 year
b) When paste and oil are mixed :4 days
iv) Red lead dry pigment – : No time limit.
v) Oil Linseed Boiled.

34.11 The Contractor/Supplier shall furnish the Railway the date of manufacture of the Paint as certified by the Manufacturer. The labels on the containers should furnish information regarding the date of manufacture, batch No, etc.

34.12 First coat of Painting shall be done only after the surface preparation is approved by the SSE/ Br/ Works /AEN. Paint shall be applied on dry surface free from any type of moisture and shall not be done under the conditions mentioned earlier in para 33.10.

34.13 Paint shall be mixed well in the container before it is applied. Over mixing shall not be done. Visible air bubbles or foam formation shall totally be avoided.

34.14 Brush shall not be less than 2" (5cm) in width and should have good flexible bristles. If a new brush is used, the same should be soaked in Raw Linseed Oil for at least 24 hours. The brushed shall be cleaned at the end of each day"s work.

34.15 Dust settled after scraping shall be cleaned before applying paint.

34.16 When the paint is applied by brush, the brush shall be held at 45 Degress to the surface and paint applied with several light vertical/lateral strokes turning the brush frequently and transferring the paint and covering the whole surface. After this, the brush shall be used cross-wise for complete coverage and finally finish with vertical/lateral strokes to achieve uniform and even surface.

34.17 Rags, waste cotton, cloth or similar particles should not be used for applying paint. The coat of paint applied shall be such that the prescribed dry film thickness is achieved by actual trial for the particular brand of paint. The applied coat of paint shall be uniform and free from brush marks, sags, blemishes, scattering, crawling uneven thickness, holes, lap marks, lifting, peeling, staining, cracking, checking, scaling holidays and alegatoring.

34.18 Each coat of paint shall be left to dry till it sufficiently hardens before the subsequent coat is applied. The time lag between the completion of the primer coat and the commencement of the covering coat shall not exceed 7 days.

The drying time shall not be less than 3 days in the case of Red Lead Paint. Each coat of paint shall be inspected by SSE/ Br/ Works/AEN and certified as satisfactory before applying the subsequent coat.

The Paints/painting shall be tested with the help of the following instruments supplied by the contractor at his own cost and should be made available at the work sites during the execution of work for checking paint thickness and quality of the paints being utilized during the higher official inspection. After the completion of work in full respects before passing the final bill these equipments in good working condition shall be handed over to ADEN/Br/Sc office and acknowledgement to be produced. The following test is invariably to be conducted at site in the field by the SSE/ Br/ Works /ADEN in addition to the test conducted by the CMT/LGD or any National Test House.

i) Weight per litre cup 100 ML capacity Stainless steel.
ii) For Cup No.4.
iii) Scratch Hardness Tester Hand operated preferably with lightingarrangement.
iv) Flexibility and Adhesion Tester with ¼" (6.25mm) dia rod.
v) "ELCO" Meter: 0 to 5 Mils Range
vi) "ELCO" Meter: 5 to 20 Mils range.
vii) Digital coating thickness gauge ( F& NF Type) including all optional accessories as per the company instruction manual and along with cable and soft ware for RS 232C

**34.20** Representative samples from each Batch of Paint shall be got tested by either the Chemist & Metallurgist/Lallaguda (Secunderabad) or at any other National Testing Laboratories whichever is convenient at the cost of the Contractor. If the samples of paint tested, do not conform to the ISI **Specifications <u>the whole lot of paint pertainingto that Batch shall be rejected.</u>**

The thickness of the dry film shall not be less than the specified thickness. Engineer-in- charge should satisfy himself that the thickness obtained is not less than that specified.

35.0 The entire surface shall be painted however difficult it is to reach. Painted surfaceshall be smooth and uniform in colour. The thickness of each coat of paint shall be measured By ELCO meter.

35.10 The time lag between successive operations indicated below shall under nocircumstances be exceeded.

a) i)Between completion of surface preparation to Type II Standard and the application of Primer coat 24 hours
ii) Between Type-I preparation and 1st finishing coast 48 hours
b) Between the Primer coat and the 1st finishing coat 7 days

c) Between the 1st finishing coat & the 2nd finishing coat 7 days

**36.0 MAINTENANCE OF FIELD-CUM-SITE ORDER BOOKS:**

**36.1** Field-cum-site order books shall invariably be maintained for the painting work.Two separate Field Books shall be maintained for each Bridge, so that one Book can be with the Inspector concerned, while the other book accompanies the Bill and M.Book for check and passing of the Bill. All the field books shall accompany the Final Bill and they shall be finally filed in DEN‟s office.

**36.2** Inspector-in charge shall record certificates, in both Field Books and M.Books on completion of each stage of work i.e. surface preparation either Type I or Type II, Primer coats, 1st finishing coat and 2nd finishing coat in token of the completion of each stage of work confirming that each operation is done satisfactorily and completely. The minimum thickness of paint for each coat has to be recorded by the Inspectors and the AEN‟s shall test checks the same.

**36.3** The certificate to be forwarded by the Inspectors and AENs shall read as under:-“Certified that Primer coat of span No._____

1st Finishing coat. 2nd Finishing Coat

Bridge No._____is satisfactorily completed in full (except for_____).Thetotal quant

**36.4** Field-cum-site order book shall contain the following information:-

i) Section, KM Bridge No. Span details, Type of girders.

ii) Contractor‟ Name and address: Details of Agreement.\

iii) Name of Manufacturer of the Paint, specifications, Batch No Manufacturing Date, expiry date, Reference to Certificated by the Chemist and Metallurgist, Lallaguda, Secunderabad or certificate issued by National Test House.

iv) Date of commencement and completion of each of the following operations, for each span:

a) Surface preparation.
b) Painting Primer coat
c) Painting 1st Finishing coat
d) Painting 2nd Finishing coat

v) Measurement of thickness of paint as measured by “ELCO” Metre.

vi) If a particular portion of Girder namely Top

Boom, Bottom Boom Diagonal, vertical member, etc. is not required to be prepared to Type II preparation, advance intimation has to be given to contractor and clear acknowledgement obtained in the Field Book before the contractor commences the workon any Girder span.

**36.5** Results of tests conducted by SSE/ Br/ Works on paint shall also be recorded in the

Field/site Order Books. A minimum of two tests per batch of paint shallbe conducted at random.

**ANNEX URE-B**

**DEFECTS IN PAINTED SURFACE**

| Sl No | Nature of defect | Causes | Effects |
|---|---|---|---|
| 1 | Blistering | 1 Painting in hot sunlight<br>2 Excessively thick coating | Film surfaces dries too rapidly trapping solvent which later expands and blisters the paint |
| 2 | Brush marks | 1. Excessive working ofwet film.<br>2. Working in hightemperature.<br>3 Less material applied.<br>4Insufficient drying time for previous coat | 1 Reduces flow leaving marks.<br>2 Solvent evaporates before film is leveled<br>2 Insufficient body does not permitflow.<br>3 New coat softens previous coating<br>4 Which prevents normal flow of paint? |
| 3 | Cracking checking‟s scaling& Flanking. | Thick Paint film | Too thick a film applied and previouslayers brittle. |
| 4 | Bubbling<br><br>&crating | 1 Over shaking.<br><br>2 High Temperatures. | 1 Excessive foaming and bubblingof paint before applying.<br>2 Material dries quickly preventing Breaking of bubbles and flowing. |
| 5 | Crawling | 1 Improperly cleanedsurface<br><br>2 Moisture | 1 Contaminants like oil, grease, Residue etc. left on surface causing crawling.<br>2 Moisture present on surface causes crawling,(Particularly early in the day.) |

| | | | |
|---|---|---|---|
| 6 | Uneven gloss | 1 Porous surface<br>2 Uneven<br>3 thickness<br>4 Moisture<br>Overlaps | 1 Vehicle of new coat sinks into the Surface leaving excessive pigment without binder and loss of gloss.<br>2 Gloss increases with increasedFilm thickness.<br>3 Moisture on film during dryingFlattens the gloss.<br>4. Due to varying thickness. |
| 7 | Lap marks | 1Working too long in onearea<br>2 Too much heat<br>3 Improper thinner | 1 coasting begins to set<br>2 Solvent is lost rapidly givingthicker film<br>3 Quick evaporating thinner shortens Working time causing thicker film. |
| 8 | Lifting | 1 Application of new film on poorly adhering paints.<br>2 Applying next coat before drying of previouscoat.<br>3 Applying hard coat over & softer coat | 1 Shrinking of new film dislodgesthe old film<br>2 Final coat traps solvent of previouscoat<br>3 Contraction of new coat pulls upThe softer coat. |
| 9 | Peeling | 1 Inadequate surface cleaning<br>2Non-roughening o f glossy surface before applying new coat.<br>3 Long delay in applying Finishing coat.<br>4Failure to paint immediately after cleaning | Primers when exposed for long period may chalk or dust and grease contaminate the surface preventing bonding Rust which forms has unstablesurface. |
| 10 | Sagging & allegorating | 1 Failure to roughen the hard or glossy finish of previous coat.<br>2 Applying too much paint<br>3 Excessive thinning. | |

| | | | |
|---|---|---|---|
| 11 | Staining | Contaminants on the surface | They dissolve paint and cause instaining grease, e.goil pen/pencil marks. |
| 12 | Wrinkling. | 1 Applying too muchpaint<br>2 Applying 2nd coat before 1st coat is dried.<br>3 Painting in hot sun<br>4 Applying paint on coldsurface. | 1 Surface dries but inner layerRemains soft.<br>2 New coast shrinks and wrinkles theSofter inner coat.<br>3 Surface dries rapidly<br>4 Surface dries faster while innerPaint is still wet. |

**Special condition**:- The paints procured by the agency should be from one lot which has been certified by the CMTD/LGD or any other approved National Testing Laboratories

Approved National Testing Laboratories as per CE/Br.Rehab/S.C.Rly lr No W.CE/Br. Rehab/2019 dated 14.08.2019, 25.09.209 are enclosed

2. All works should be maintained as per Defect liability clause as per Hqs lr No SCR-HQOENGG (WC)/38/2019 dated 24.09.20 (Enclosed)

## SPECIFICATIONS AND SPECIAL CONDITIONS FOR CONCRETING, READY MIXED CONCRETE & STEEL REINFORCEMENT.

1.0. **MATERIAL & IS CODES.**

i) Concrete : 1S 456, IS 4926(Ready Mixed Concrete)
ii) Cement : IS 12269(53 grade OPC).
iii) Aggregates : IS 383-1970.
iv) Steel Reinforcement: IS 1786

2.0 **CEMENT**: Supply and usage of cement shall be as per the South Central Railway (Indian Railways) Unified standard specifications 2021& CPWD specifications 2021for DS R-2021.

2.1. The cement shall confirm to the specifications of ordinary port land cement as per the site requirement and as approved by the Engineer-in-charge.

2.2 In addition to confirming to IS specifications as detailed above, the contractor(s)S hall procure Cement from the reputed cement companies/ brands but not cement manufactured by minor cement plants. The make should be approved by the Railways.

2.3. The contractor should submit the bill of purchase of cement to the Railways for Verification and record. Contractor shall also submit a test certificate issued by the manufacturer for standard properties of cement for verification & record.

2.4 Occasionally Cement has to be got tested from "**In house labs or site lab established under provisions of the contractor National Test House or Government Engineering Colleges/NITs/IITs. In exceptional cases when (i) there is no in –house facilities or site – lab for testing and National Test house near by and (ii) Govt. Engineering Colleges may take longer time causing undue delay in the progress of project, any nearest NABL accredited laboratory having scope and validity of accreditation may be used for period testing of cement during execution. However, Tests required for initial acceptance of material or design shall be done in any of the "In house labs or site lab established under provisions of the contract or National Test House or Government Engineering Colleges/NITs/IITs", and** as per the directions of Engineer-in-charge and submit the report. Charges for such tests shall be borne by the contractor. Further in this regard instructions issued by DyC E/Works/HQ vide letter no.SC R-HQOENGG(SOR)/21/2019 DATED 08.12.20 followed".

2.5. **Storage of cement:**

2.5.1. The contractor shall make his own arrangements for storage of cement and other materials and see that no damage takes place during storage. The storage of cement should confirm to standard height in a column to avoid damage during storage.

2.5.2. The Railway reserves the right to inspect the storage accommodation of the contractor and to reject in the event of any clotted cement is noticed or any other cement which is not suitable for usage of work and not confirming to the specifications and no compensation will be made for the loss if any sustained by contractor on this account. A ledger shall be maintained at site showing the quantities of cement procured, date wise consumption and balance available at site. These Ledgers are to be jointly signed by the JE/ SE/Works at site and contractor/his representative.

2.6. **CONSUMPTION/USAGE OF CEMENT**:

2.6.1. The contractor shall take all precaution for effective usage of cement between the period of procurement and period of usage without losing any strength of cement.

2.6.2. The contractor shall ensure the consumption of cement specified under each item of work correctly. In this connection CVC published an article in their web site and same circulated by PCE office vide lr no:- W.416/Unified/SS/SSR/Vol.IV Dt:-09.02.2022 on "Design mix concrete - Economy & Environmental issues". As per the above article, the range of cement content for various grades of concrete observed in all Govt./Semi Govt. bodies are as follows.

| Grade | Cement content in Kg per Cum | Avg. Cement content in Kg.per Cum |
|---|---|---|
| M15 | 250 to 300 | 275 |
| M20 | 300 to 330 | 315 |
| M25 | 310 to 360 | 335 |
| M30 | 340 to 390 | 365 |
| M35 | 360 to 420 | 390 |
| M40 | 380 to 450 | 415 |
| M45 to M55 | 400 to 450 | 425 |

It is to inform that increase in cement quantity more than required may have adverse effect on the durability of concrete apart from avoidable additional cost. Therefore, for Design mix concrete, efforts should be made to use minimum amount of cement in the above stated ranges at the time of approval of Design mix. In case Design mix contains cement quantity more than average shown above, design mix will be approved by SAG level i.e.(i) CPM/GSU/SC of the project in Gati Shakti unit. However, while approving all possibilities should be explored to reduce the cement content and it should not be a ritual without any technical

2.7 **PAYMENT FOR CONTRACTORS CEMENT:**

Payment for the supply of cement will be paid under relevant item of supply of cement under relevant schedule. Payment for above item will be made on the basis of actual consumption in the item/as per approved design mix and no advance payment will be made on procurement of cement. No extra payment will be made for wastage.

3.0 **AGGR EGATES** shall be as per the IRU standard specifications for formation works, Bridge works and P.Way works USSR 2021 & CPWD specifications 2021 for DSR 2021.

3.1. Aggregate shall consist of naturally occurring stones, gravel & sand. They shall be hard, strong, dense, durable, clear and free from injurious amounts of disintegrated pieces, alkali, vegetable matter and other deleterious substances.

3.2. Materials for concrete such as granite stone metal, sand, etc., should also be collected from outside Railways land and the Contractor shall pay all seigniorage charges.

3.3. Aggregate shall not contain any harmful mater ial such as pyrites, coal, lignite, mica, shale or similar laminated material.

4.0 **COARSE AGGREGATE** shall be as per the IRU standard specifications for formation works, Bridge works and P.Way works USSR 2021 & CPWD specifications 2021 for DSR-2021.

5.0 **FINE AGGREGATE** shall be as per the IRU standard specifications 2021 for formation works, Bridgeworks and P.Way works USS R 2021 & CPWD specifications 2021 for DSR-2021.

5.1 Fine aggregate shall be of approved quality and Grading to IS 383, IS 456 & IS 134 3 standards. It shall be free from impurities & deleterious substances. The

decision of Engineer in charge shall be final and binding on the contractor regarding the approval of the coarse and fine aggregate for concreting works. The contractor shall be required to carry out weighing and sieving aggregates, if directed by Engineer in charge and all costs shall be borne by the Contractor.

6.0 **CONCRETE WORKS** : shall be as per IRU Standard Specification-2021-for formation works, Bridge works and P.Way works USSR 2021 & CPWD specifications 2021 for DSR-2021.

**6.1 Supply of RMC**

i) "In case the total quantity of RCC/PSC/CC/MCC involved is significant (say 15,000 Cum or more) the Contractor shall preferably set up his own RMC plant at site or shall make suitable exclusive arrangement close to the site to ensure high quality RMC supply".

ii) "Use of RMC shall also be mandatory in the work where substantial quantity (say 500 Cum or more) of RCC/PSC/CC/MCC is involved and work site is located in Urban areas and RMC plants are readily available nearby".

iii) "The specification for RMC shall confirm to IS 4926-2003 as well as IRU Standard Specifications, for formation works, Bridge works and P.Way works USSR 2021& CPWD specifications 2021 for DSR 2021".

iv) "The RMC plant shall be inspected and approved by concerned Dy.CE/GS/SC. The accepted rates of items of RCC/PSC/CC/MCC shall be deemed to be for RMC. Nothing extra will be payable for RMC in the Contract of work. However, if RMC is not feasible in certain isolated portion of work, then conventional concreting can be allowed by Engineer- in-charge in such isolated locations/portions with the same rates".

6.2 Concrete required for all works shall be machine mixed using weigh batches. Hand mixing will not be permitted. The Contractor should keep vibrators of 25mm needle for jacketing work and 40mm needle for concrete work. Standby needles and vibrators should be kept. During the course of concrete work if vibrator is not working the work shall be stopped.

The materials proposed to be used for the work should pass tests/analysis as prescribed in relevant IS/ IRS codes & manuals. An approval given by the Railway in consequences of such tests or analysis shall limit or interfere with the absolute Right of the Railway to reject the whole or portions of such materials supplied which, in the judgment of the Railway do not comply with the specifications. The decision o f the Railway in this regard shall be final and conclusive for all purposes.

6.3 The contractor shall prepare at his own cost, standard cubes of concrete at specified intervals during concreting operations under the supervision of the Engineer or his authorized representatives and submit the same to the Railway for testing and approval. Contractor should arrange equipment for testing of concrete cubes at site. Based on the discretion of Engineer–in–charge certain cubes shall be got tested from **"In house labs or site lab established under provisions of the contract or National Test House or Government Engineering Colleges/NITs/IITs. In exceptional cases when (i)there is no in-house facilities or site – lab for testing and National Test house nearby and (ii) Govt. Engineering Colleges may take longer time causing undue delay in the progress of project, any nearest NABL accredited laboratory having scope and validity of accreditation may be used for period testing of concrete cubes during execution. However Tests required for initial acceptance of material or design shall be done in any of the "In house labs or site lab established under provisions of the contractor National Test House or Government Engineering Colleges/NITs/IITs"** and as per the directions of Engineer- in – charge. Charges

for such tests shall be borne by the agency Further in this regard instructions issued by Dy.CE/Works/HQ vide letter no.SCR-HQOENGG(SOR)/21 /2019 DATED 08.12.20 followed.

6.4 While executing all concrete works below sub-soil water level the foundation pit must be kept free of all seepage water by bailing or pumping or in any other manner. The rates adopted for concrete items below bed/ground level are inclusive of the charges.

6.5 As this work is located in "moderate" category of environment the minimum cementitious material content in concrete structures shall be as given below and the actual consumption of cement depends upon the requirement as per design mix.

Plain concrete – 300/250 Kgs. Cement/Cum. -- Max. W/C ratio 0.50

R.C.C. – 350/300 Kgs. Cement/Cum. -- Max. W/C ratio 0.45

**NOTE:** For under water concrete 10% extra cement should be added over and above the normal cement content of the concrete mix specified above. For SSR items the cement consumption shall be as specified in the USSR, 2021.

6.6 **DESIGN MIX:**

System improvement guidelines for Concrete mix design has been circulated vide PCE office vide lr no **W.416/Unified/SS/SSR/Vol.IV Dt:-21.03.2022.** In that connection, special tender conditions on concrete Mix Design along with the proforma has been framed as below:-

The Contractor shall be guarantor of quality of concrete used in construction. It shall be obligatory on the Contractor to carry out the mix design and obtain approval of the Engineer before use in permanent work. Without in any way limiting the generality of the foregoing, the procedure shall include the following:

a) The Engineer shall advise the Contractor the ruling design parameters for each grade of concrete. Contractor shall carry out the mix design (through Govt. Engg. Colleges/NITs/IITs only), following all appropriate codes (IS: 10262, IS: 456, IS: 383, IS: 9103, IRS Concrete Bridge Code and all other Codes referred therein) / specifications/guidelines in selection of suitable constituent material and it's proportioning for preparing design mix for prescribed strength and durability, and obtain approval of the Engineer. The mix proportion shall be prepared keeping in view the required strength, long term durability in the intended exposure condition and with sufficient workability to place in intended position of the structure uniformly in well compacted condition without any segregation or bleeding.

b) The mix proportion so designed shall be checked by means of trial batches. Workability of the 1st Trial Mix shall be measured and the mix shall be carefully observed for freedom from segregation and bleeding and its finishing properties.

c) If the workability of the 1°' trial mix is as stipulated, two more Trial Mixes shall be made with the water content same as initial Trial Mix and varying the free water- cement ratio by +/- 10 percent of the preselected value. From all three trial mixes, at least three test cubes shall be made, cured and tested at 28 days in accordance with IS: 516.

d) If the measured workability of 1st Trial Mix is different from the stipulated value, the water and/or admixture content shall be adjusted suitably. With this

adjustment, the mix proportion shall be recalculated keeping the free water-cement ratio at the pre-selected value and procedures in para no. “b” and “c” above may be followed.

e) If the test results of the samples at three variable water cement ratios are valid (for each sample, the individual strength of all specimen are within z 15% of average of three specimens) and more than target strength, Graph between three water-cement ratio and their corresponding strength shall be plotted and mix proportion for field trial should be worked out.

f) Above details of test and mix proportion duly authenticated by approved institution/lab should be submitted in a prescribed Proforma (Annexure — A) for approval of Engineer for field trial.

g) On receipt, the Engineer shall expeditiously scrutinize the proposed design mix for field trial. Apart from all other aspects, it should be specifically observed that the quantity of cement content should be minimum possible for meeting the due requirement and is within the limit prescribed vide letter no.W.416/Unified/ SS/SSR/Vol. IV dt.09.02.2022 for all types of works. If it is more, and there is possibility to bring it within limit by redesigning the proportion, the same should be returned to the Contractor with remarks to submit the mix design with reduced cement content. If the cement content is marginally on higher side and the Engineer is convinced that in the specific circumstances there is no possibility for further reduction even after use of plasticizer/super plasticizer, he will forward the mix design for approval of the Competent Authority.After review of the design mix received with recommendation of the Engineer, the Competent Authority shall either approve the Design Mix for field trial or return the same to Engineer to get fresh design mix for approval.

h) On approval of mix design in field tria!, again cube samples should be made with the concrete produced by method of actual concrete production.

i) Test cubes (specimens) will be tested for compressive strength at 28 days. The results are considered valid only if the average compressive strength of the sample (3 specimens make one sample) is not less than the Target mean strength and variation among individual specimens is within +/- 15°4 of average strength. The concrete mix design shall be allowed by Engineer for use in actual execution, if the test results of samples are valid.

j) Above approval by the Engineer shall not relieve the Contractor of any of his responsibilities under the Contract.

k) For Bridge works, concrete design mix shall be designed as per para no 5.5.1.2 and 5.5.2 of IRS Concrete Bridge Code: 1997. Minimum cementituous material and exposure condition shall be as per table 4(c) of IRS Concrete Bridge Code: 1997.
ln this connection, the proforma has been framed as shown below for authority sanction as shown in next page.

6.7 All the concrete works shall be done only in the presence of the SS E/JE/Work. The programme/ planning of the concrete works shall be submitted to XEN/AXEN/Dyce-GS-SC well in advance so as to direct SS E/JE/Works for witnessing the same.

**Annexure-A**

## CONCRETE DESIGN MIX

1. Name of the work: _____
2. Agency: _____
3. Agt. No./Acceptance letter details: _____
4. Type of work - ***Bridge** / Other than Bridge***** _____

*(** strike whichever is not applicable)*

| A. | Basic Data | |
|---|---|---|
| A-1 | To be specified by Engineer | |
| 1 | Concrete grade* (Min*/Max* cement content Kg/Cum) | |
| 2 | Workability (Slump)* | |
| 3 | Cement Grade* | |
| 4 | Exposure Condition* | |
| 5 | Nominal size of Coarse Aggregate (CA)* | |
| A-2 | Other Details | |
| 1 | Source of CA | |
| 2 | Results of sieve analysis of CA | |
| 3 | Specific Gravity of Coarse Aggregate | |
| 4 | Grading Zone of fine Aggregate | |
| 5 | Source of FA | |
| 6 | Results of sieve analysis of FA | |
| 7 | Plasticizer / Super Plasticizer *(brand name, qty used etc)* | |
| 8 | Water absorption of Fine aggregate | |
| 9 | Water absorption of Coarse aggregate | |
| B | MIX PROPORTION: | |
| 1 | Cement | Kg |
| 2 | Water | kg |
| 3 | FA | Kg |
| 4 | CA | Kg |
| 5 | Plasticizer/Super plasticizer | Kg |

| C | CUBES CASTING DETAILS: | |
|---|---|---|
| 1 | Date of casting of cubes | |
| 2 | Officials present at the time mixing & casting of cubes | |
| 3 | Workability of trial mix was as per design | |
| D | **CUBES TESTING DETAILS:** | |
| 1 | Date of testing of cubes | |
| 2 | Testing done at | |
| 3 | Officials present at the time of testing, | |
| 4 | Is test results and Strength vs. Water cement ratio enclosed? | |
| 5 | Does the test result comply with design requirements | |

* to be specified by Engineer depending upon the specific requirement.
** strike whichever is not applicable

Signature of the Designer: _____
Name of Designer: _____
Name of the Lab/Institute: _____
Stamp: _____

Signature of the Contractor: _____

Remarks of the Engineer: _____

**7.0** **Curing shall be executed as per IRU Standard specification-** for formation works, Bridge works and P.Way works USS R 2021 & CPWD specifications 2021 for DSR-2021.

7.1 All concrete work in cement, mortar/plaster pointing etc., shall be continuously cured for the prescribed period as per direction of the Engineer. Curing shall be done by covering the newly laid concrete with gunny bags and keeping them wet constantly. If it is found that the contractor is not properly observing these instructions, the Engineer may undertake the curing through another Agency/labour without any notice to the Contractor at the cost of the contractor. The cost incurred along with incidental charges @ 2% and along with supervision charges 12.5% of the cost will be debited to the Contractor. Intimation of the employment of another agency, for curing will be given to the Contractor as soon as possible. This intimation in writing to the Contractor under the head of the Engineer- in-charge of the work shall be conclusive evidence of the employment of another agency.

8.0 **STONE AGGREGATE shall be executed as per IRU Standard specification-** for formation works, Bridge works and P.Way works USS R 2021 & CPWD specifications 2021 for DSR 2021.

Lime stone, quartz and shale are not acceptable for concrete or masonry work. The contractor will have to use hard granite/ basalt stone aggregate for RCC, PSC works and other concrete items and quote the rates accordingly. Occasionally aggregate has to be got tested at reputed private/Govt. laboratories (or) Engineering colleges as per the directions of Engineer- in-charge for chloride, Sulphates, abrasion, impact value and water absorption and submit the report. Charges for such tests shall be borne by the contractor. The tests are to be conducted at every stage of change in quarry besides occasional tests as ordered by the engineer or his representative.

9.0 **USE OF SAND COLLECTED FROM THE WATER COURSES WITHIN THE RAILWAY LAND:**

If the sand available in the river bed water course with in the Railway land, and if it is found suitable for the works, the contractor can collect the sand from the area within the Railway boundary and utilize the same for the works. The Railway will not levy any charges for sand so collected for the work within the Railway boundary. However, seigniorages charges if any payable to state or local authorities shall be borne by the Contractor. The tenderer shall take these aspects in to account while quoting the rates. The location of the borrow pits for collection of sand within the Railway area should be approved by Engineer- in-charge.

10.0 **SHUTTERING ARRANGMENTS shall be executed as per IRU Standard specification-**for formation works, Bridge works and P.Way works USSR 2021 & CPWD specifications 2021 for DSR2021.

11.0 **SUPPLY, FABRICATION AND ERECTION OF STEEL WORK shall be executed as per IRU Standard specification -** for formation works, Bridge works and P.Way works USSR 2021 & CPWD specifications 2021 for DSR 2021.

11.1 For works the contractor is required to use own steel for reinforcement. Payment for supply of reinforcement steel in MCC / RCC/PSC items will be made under respective Schedule.

11.2 The Contractor is required to safeguard the steel and use the same on the work in accordance with the actual requirement as approved by the Engineer and as may be indicated in the relevant drawings or specifications.

11.3 The Railway reserves the right to inspect the storage yard of the contractor, where the steel materials are stored and take samples wherever considered necessary, got them tested by any agency for Physical & Mechanical properties, chemical composition as directed by the Engineer- in-charge form "In house labs or site lab established under provisions of the contract or National Test House or Government Engineering Colleges/NITs/IITs. In exceptional cases when (i) there is no in- house facilities or site lab for testing and National Test house nearby and (ii) Government Engineering Colleges may take longer time causing undue delay in the progress of project, any nearby NABL accredited laboratory having scope and validity of accreditation may be sued for period testing of steel during execution. However Tests required for initial acceptance of material or design shall be done in any of the "In house labs or site lab established under provisions of the contract or National Test House or Government Engineering Colleges/NITs/IITs" and as per the directions of the Engineer-in-charge and submit the report. Charges for such tests shall be borne by the Contractor. Further in this regard instructions issued by Dy.CE/Works/HQ vide letter no. SCR-HQOENGG (SCR)/21/2019 dated 08.12.2020 followed".

If the steel is found to be not confirming to relevant IS 1786 and IS 2062 provisions, the entire steel lot represented by the tested sample will be rejected. The contractor shall not use any such reinforcement and will lift them from site at his own expenses. The contractor cannot claim in such an event any losses, damages, expenditure incurred by him and Railway shall not entertain any claim on this account.

The payment for the steel reinforcement will be made on bar bending schedule and the quantity shall be arrived by converting the lengths into weight based on sectional weight. While working out the quantity consumed, the overlaps, hooks, bends, chains will be taken into account. If there is any wastage, it shall be to the contractor's account. The item for placement of reinforcement steel is provided with cost of binding wire.

a) Supply and placement of reinforcement steel and supply, fabrication & erection of structural steel shall be as per IRU Standard Specifications - for formation works, Bridge works and P-Way works USS R 2021 & CPWD specifications 2021 for DSR 2021.

b) All Reinforcement Steel (TMT bars) and Structural Steel shall be procured as per specifications mentioned in BIS"s documents– IS : 1786 and IS : 2062 respectively. Independent tests shall be conducted for physical & mechanical properties, chemical composition at reputed private/Govt. laboratories (or) Engineering colleges to ensure that the materials procured conform to the specifications. If the steel is found to be not confirming to relevant provisions, the entire steel lot represented by the tested sample shall be rejected. It shall be ensured that a bill copy along with manufacturer's test certificate is submitted at the time of supply of material.

c) The reinforcement steel and structural steel shall be procured from the following firms,
circulated as per sl. no. 4 & 39 vide PCE/SC"s office letter no. SC R-HQOENGG(SOR)/
1/2020-Dy.C E/Works/SC R dt.24.05.2020, which are Established, Reliable, Indigenous & Primary Producers of Steel, having Integrated Steel Plants (ISP) using iron ore as the basic raw material and having in- house iron rolling

facilities, followed by production of liquid steel and crude steel, as per Ministry of Steel guidelines.

| S.No. | Brand | Make |
|---|---|---|
| 1 | SAIL | Steel Authority of India Ltd |
| 2 | VIZAG | Rastriya Ispat Nigam Ltd |
| 3 | TISCO | TATA Steel Ltd |
| 4 | JSW | JSW Steel Ltd |
| 5 | JSPL | Jindal Steel & Power Limited |

However, only certain isolated sections of structural steel, not being rolled by ISPs, can be procured from the authorized re-rollers of ISPs or authorized licensee of BIS having traceability system and who use billets procured by ISPs. The traceability of the material shall be ensured by an Officer authorized by the CPM/GS/SC on case to case basis for this purpose.
The following note shall be applicable for the operat ion of IRUSSR items to avoid ambiguity at the time of execution.

**Note for Weep holes at Retaining walls:**

Weep holes wherever required to be provided and are considered as integral part of relevant item of concreting. Hence nothing extra will be paid on account of supply and fixing of weep holes and no deduction will be made for the concrete

i) Steel work for all members of the plate girders is made of mild steel only. The steel should be of Grade-E-350 A quality for Plate Girders and Tubular section of YST310 conforming to IS 2062 - 2006. For, COP steel Grade should be of E-250 A 0 quality. A copy of the approved general arrangements drawing and detailed standard RDSO drawings for fabrication showing the proposed FOBs, COPs and Lifts will be issued to the Contractor after accepting the tender. The contractor has to submit the scheme of erection to Railways for approval and erection shall be taken up on receipt of approval from Railways.

ii) All materials required for the work including raw steel, paints, welding materials, consumables, bolts and nuts, etc., shall be arranged by the contractor. The contractor shall be solely responsible for the procurement of the required materials.

## *1.0. FABRICATION ARRANGEMENTS:*

1.1 The tenderer shall clearly note that the fabrication of the steel work will have to be carried out at the site allotted by the Railway in the Railway land and transport the same to site of work at his cost. However, prior approval of Railway shall be taken if fabrication is proposed to be carried out at contractor"s workshop. The decision of Railways is final and binding on the contractor.

1.2 In case of fabrication proposed to be done at the contractor's workshop, the freight and other incidental charges in bringing fabricated steel from the fabricator's work shop to the site shall be borne by the contractor and rates provided deemed to be inclusive of all such charges including re handlings if any against respective items and the Railway do not undertake to pay on this account any extra rates over the above rates quoted. All fabricated materials will have to be brought to the site of erection at contractor's cost.

1.3 The land required for fabrication and stacking materials will be allotted by the Railway free of cost as per availability.

## 1.4 GUIDELINES ON FABRICATION OF STEEL STRUCTURE

1.4.1. The fabrication of steel girder is to be done at any work shop, which is approved by the Engineer- in- charge. The work shop/firm should have required facilities including stud welding machine.

1.4.2 The guidelines for steel fabrication specifications as given in IRS B1-2001 (Fabrication specifications) shall be followed as applicable.

## 1.5 Welding process and positions:

i) Welding shall be carried out in accordance with the approved welding procedure, specifications by approved welders, processes and positions. Only submerged arc welding should be used for all shop fabrication. Proforma for welding procedure specification and welding proc edure qualification records are enclosed as Annexures.

ii) All welding be preferably done in flat position (horizontal) welding should be done as per drawing ensuring proper size of weld. Over size may lead to excessive heat affected zone which may lead to failure of material. Welding should be carried out in a warm and dry place so that the rain water or other atmospheric elements may not come in contact while welding is in progress.

iii) Electrodes shall conform to C lass A2 of IRSM-28 and wire for CO2 welding shall conform to Class 1 of IRSM-46.

iv) All consumable shall be stored and handled with care and in accordance with the manufacturer's recommendations.

v) All tests to be carried out as per the notes mentioned in the drawing and got approved by competent authority.

**1.6** i) Since the length of plates of standard make are available upto 12.00 mts., where steel girders of length more than 12.00 mts., the length of girder be made by allowing spliced joint instead of field welding. The spliced joints shall be fabricated by using high strength friction grip bolts only.

ii) F ield connection shall preferably be done using HSFG bolts confirming to IS-4000-1967.

Where this is not feasible, riveting may be done with the approval of Engineer- in-charge in field.

**1.7** i) F inal cutting and finishing of components:

Final finishing of length, profile and notches etc., is accomplished by accurate marking with the help of templates, measurement and gauge wherever necessitates and then by gas cutting (Chipping, grinding) as the case may be. Excessive metal is normally chipped off or gas cut (more than 3mm) and the exact finishing or profiling is achieved by fine and accurate grinding.

ii) Stud welding, shear studs welded to top flange should be done by using automatic stud welding machines.

**1.8** Inspection stages:

a) Before fabrication b) During fabrication c) After fabrication

a) **Before fabrication:**

Quality assurance plan shall be prepared and got approved. Raw material such as C hannels and plates etc., to be inspected as per specification mentioned against each items and rolling mark certificates.

Lamination, piping, pitting, rolling defects and stra ightness of material to be checked before fabrication. Consumables such as rivets, welding electrodes and paints etc., are as per standard specification. Welding procedure specification needs to be approved. Welder's approval as per welding procedure specification.

b) **During fabrication:**

Layout, Jigs, Fixtures and profile to be checked. Welding by Qualified welder as per approved WPSS.

Welding parameters are to be set and checked during welding.

Riveting by qualified and skilled personnel with approved work instructions.

**c) After fabrication:**

Verify rolling mark number of steel section used for fabrication from certificate issued by manufacturer. Check the register maintained by them. Surface defects shall be checked visually. Quality of welds with respect to specified sizes, length and any visual defects. Quality of rivets to be checked visually and with the help of riveting hammer. Dye penetration tests Magnetic particle radio graphic test of welds as agreed to by Engineer-in- charge. Leading dimensions ie., overall length, hole dimensions, end finishing etc., shall be checked for tolerances as per IRC 24. For this purpose detail measurement sheet shall be prepared for.

## 2.0 ERECTION SCHEME:

2.1 The steel work shall be temporarily assembled in shop fully and checked for tolerance, camber etc., and necessary holes drilled for field assembly and approved by Engineer- in-charge.

2.2 The successful tenderer after awarding tender shall submit detailed scheme for erection of steel girders and casting of deck slab to make composite structure proposed to be adopted for the erection of the various members keeping in view of the movement of rail traffic, electrification, location etc., In finalising his scheme for actual execution the contractor shall take into account any objections/ directions that may be given by the Railway.

2.3 Any approval given by the Railway in this regard shall in no way absolve the contractor from full and sole responsibility for the soundness and safety of erection methods as may be finally adopted by him as well as for delivery of the finished structure in accordance with the approved drawings and as per the specifications.

2.4 The tenderers are advised to quote rates taking into consideration all the conditions stipulated in the tender document without quoting their own conditions as regards to methods of measurement, terms of payment, site facilities, wastage of steel. Tenders of those who quote their own conditions under the above heads are liable to be rejected.

2.5 Payment for steel work, supplied, fabricated and erected will be paid in terms of notes of the respective chapter-4 of IRU standard specifications for formation works, Bridge works and P.Way works and follow USSR 2021.

## 3.0 WEIGHT:

3.1 For steel work, payment will be made only for actual quantities to be calculated as per approved

Railway Drawing. The quoted rate for supply, fabrication and erection item shall be applied to the weight thus calculated. The standard drawings for fob will be supplied by the Railway.

3.2 The weight of plates and sections will be calculated from the approved rdso drawings using over all lengths and square dimensions and theoretical unit weight. No deductions being made for holes, notches and skew cuts. Gussets will be paid on the dimensions of the smallest enclosing rectangle. In addition, for all built up members welded, the calculated weight of the members shall be arrived as per Notes under Chapter-4 of Unified S tandard Specifications (formation works, Bridge works and P.Way works), 2021.

3.3 The payment for High Tensile Studs and HSF G bolts and nuts will be made only for actual weight irrespective of size/lengths under item No.1 of schedule – " E". No extra rate is payable to these categories.

3.4 Shear connectors/studs, HSFG bolts, HTS nuts are to be sourced from reputed fasteners only after approval of Engineer- in-charge.

## SPECIAL CONDITIONS OF CONTRACT FOR CIVIL / BUILDING WORKS

### A. Conditions for Building works.

1. The quantities shown in the tender schedule are approximate and will be operated in full or part at the discretion of the Engineer in charge. Payment will be made based on the actual itemsoperated.

2. All items included in the tender schedule should be carried out in accordance with the Standard Specifications.

   i). For materials and works, ( up to date corrections shall be followed along with) Delhi schedule of Rates DSR - 2021 and for Horticulture items DSR - 2020 of Railways.

   ii). All materials to be supplied and used by the contractor in connection with this work should have prior specific approval of the Engineer in charge and should be in accordance with the specifications for materials and works of SC Railway.

3. The tenderers are required to study all the drawings referred to in the tender thoroughly before quoting the rates. The Railway reserves the right to change their drawings during the execution of works and the contractor should execute the work as per the revised drawings. No extra payment or claim will be entertained on that account. Payment will be made to the contractor for the work actually done at the accepted rates of agreement.

4. Details of ducts, opening, grooves etc., that may be required to be provided for wiring, etc., will be indicated during progress of the work. Tenderers/Contractors will arrange to provide them in walls, floors, RCC slabs, etc., where ever necessary as directed by the engineer in charge without any extra claim.

5. Any pipes, conduct or hooks, required for electrical works shall be placed by the tenderer/ contractor at any position indicated without any extra claim. The pipe conduit, hooks, bends etc., to the required degree will be supplied by the Railway at the site of work.

6. The contractor is required to safe guard the steel brought to site and to use the same on the work in accordance with actual requirement as approved by the Engineer as may be indicated in the relevant drawings or specification.

7. Weigh batch plant shall be used in case of design mix.Concrete without fail.

8. The cement supplied should conform to I.S. specification 8112 for 43 Grade and as per approved list issued by Hqrts. (Authority : PCE/SC letter No. SCR – HQ/ENGG(SOR)/1/2020-Dy CE- WORKS-SCR of 24-05-2022). Annexure – I list of Brands is enclosed. Before executing the work, the agency should submit a test certificate for Standard Properties as well as indicating the source of supply and brand of the cement.

9. The reinforcement steel to be used in work shall be from TISCO, SAIL, VIZAG and JSW Steel plant and as per approved list issued by Hqrts vide letter No. SCR – HQ /ENGG(SOR)/1/2020-Dy CE-WORKS-SCR of 24-05-2022 is enclosed or Steel vendor approved by RDSO (list available in RDSO website) with the consultation of Engineer/in/charge. The steel shall not be rerolled variety. The agency shall produce necessary vouchers in original in support of the purchase of steel and cement from the suppliers along with certificates to relevant standards from the manufacturers before the commencement of work.

10. Approved list of Brands / Makes for use in works in SCR, all other construction materials shall be used as per approved brands / makes **of 160 items vide** (Authority : PCE/SC **letter No. SCR–HQ/ENGG(SOR)/1/2020 - Dy-CE/WORKS-SCR of 24-05-2022).** Annexure – I list of Brands is enclosed.

11. No contractor's vehicle will be allowed on PFs on crossing of track through pathways etc without prior permission from Engineer- in-charge of section. Such vehicles after obtaining permission should move under authorized supervision of Rly.only. Contractor has to take necessary precautions to safe guard his men, materials and safety of passengers.

12. The contractor labour shall be provided with identity cards due to security problems.

13. The damages done to the adjoining wards/items to carry out the new work shall be made good at the cost of the contractor.

14. When it is required to operate JCB/Proclainer or any other heavy machinery/Plant in the Rly.land, the contractor is reqd.to take written permission from the concerned engineering official.

15. The contractor should take care without causing any damage to the cables during execution of work, he will be fully be responsible for the act for which penalty will be imposed, can be arrested/prosecuted for the damages caused by him.

16. The Railway reserves the right to reject or alter any part of the work executed by the contractor which in the judgment of Rly. does not comply with the requirements of the specification. The decision of Railway shall be final on conclusive for all purposes.

17. Potable fresh water is only permitted for all concreting works and other machinery works.

18. Electrical energy that may be reqd. for operating the plant will be supplied by the Railway wherever feasible at the discretion of the Railway on payment of the charges as reqd. by the Electrical dept. The contractor will have to make his own arrangements for taking the connection from the nearest Railway electrical source of supply duly obtaining approval from theelectrical department.

19. The contractor is required to use power consumption judiciously, and to draw the current through "Meter" only and a "Circuit Breaker" is also fixed on it which prevents chances of fire in circuit of building. If any contractor is found to draw the current from any socket without meter, action will be initiated according to Railway Electrical Rules i.e. "Penalty of Rs.10,000/- or Imprisonment for 6 months" or both will be levied on the contractor.

20. Contractor shall adopt / choose material brands from this approved list only.

**i). There will no maintenance period for Zonal Works.**

**ii). For repair works maintenance will be 6 months.**

**iii). For New works maintenance will be 36 months.**

## **Defects Liability Clause:(** As per approval of PCE vide letter No.SCR-HQ0ENGG(WC)/38/2019, Dt.24.09.2020)

Contractor's primary obligation under this contract is to carry out and complete the works to the high quality standard set out in the contract i.e,. only new material of specified quality and high standard of workmanship shall be ensured during execution. The defects liability period is intended to complement this liability by remedying the defective work i.e., deficiency in quality of works including defects due to faulty material or workmanship which may become apparent during the defects liability period reckoned from the date of issue of completion certificate. The normal use based wear and tear or damage due to an act or omission not attributable to the contractor, shall be excluded from the liability of the contractor under this clause. The Defect Liability period (DLP) shall be **36 months** for the new works consisting of construction of (i) Buildings, Roads, RCC tanks, Platform walls/Surface, Concrete/Masonry Drains, Bridges including FOBs/ROBs or major repair/painting of important bridges, **6 Months** for the repair works of bridges /RUBs / ROBs /FOBs /lift and escalators/Painting works and liability of the contractor shall be as under :

1) If any defect is found during the defects liability period, the contractor must, promptly and at its own cost repair, replace or otherwise make good (in consultation with the Engineer) the defect as well as any damage to the facility caused by the defect. The Contractor will bear all incidental costs, including any costs of removal associated with the repair, replacement or making good of the defect or damage.

2) If the contractor fails to commence the work necessary to remedy the defect or any damage to the facility caused by the defect with in a period of 21 days of issue of such notice, the Railway may proceed to do the work, or engage any other agency to do the work and the costs, including incidental costs, incurred by the Railway as a result will be a debt due and payable to the Railway on demand and may be deducted from Security Deposit or from any payments otherwise due to the contractor in any other contract anywhere in Indian Railways.

3) Where the Railway, acting reasonably, considers that substantial repair, replacement or making good is done during last quarters of DLP or during 21days notice period which fails beyond original DLP, the defects liability period shall extend by a suitable period in such a manner that any repair, replacement or making good the works shall have cover of 3 months of extended DLP.

4) The acceptance at any time of Materials or Equipment by or on behalf of the Railway shall not be a bar to future rejection if they are subsequently found to be defective, inferior in quality, or uniformity to the Material or Equipment specified, or are not as represented to the Railway.

5) The decision of the Engineer for determination of the defects needing repair/replacement or the cost incurred by Railways in defect rectification or estimated cost of repair, if the contractor fails to do the work with in specified period shall be final and binding on the Contractor.

6) Only after successful completion of aforesaid liability by the Contractor, SD money shall be released after deductions, if any due to failure on the part of the Contractor. On submission of "Indemnity Bond " in the Format enclosed, SD money may be released after 12 months from the date of issue of Completion Certificate provided no defects have been observed in the work executed during 1st year of DLP.

7) The rights of the Railway under this clause are in addition to and do not limit any other rights which the Railway has under this contract or under any law of the land.

8) The "Defect Liability Clause" shall supplement the liability of the contractor during Maintenance Period "specified elsewhere in the contract" and the conditions under this Clause shall supersede such conditions of the contract to the extent of contradiction .

9) Any determination by the engineer under Defect Liability Clause shall be treated as "Excepted Matter" and shall not be arbitrable.

Format of "Indemnity Bond"

FORMAT OF INDEMNITY BOND FOR RELEASE OF SD BEFORE DEFECT LIABILITY PERIOD IS OVER (To be furnished in stamp paper as per stamp act) (Stamp paper should be purchased in the name of the Contractor)

This deed of indemnity executed on …… at …….. by M/s..... having its registered office at ……., through Mr.……as the authorized representative of M/s …….. hereinafter referred to as 'Indemnifier ' which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, representative and assignees in favour of ……, South Central Railway having its registered office at……..through Mr…….. …..... as the authorized representative, hereinafter referred to as the 'Indemnified' the expression which shall, unless repugnant to the context or meaning thereof, include its administrators, Successors, representative and assignees.

Whereas the indemnified herein has awarded to the indemnifier herein a contract for the work "……" on terms and conditions set out interalia in the Contract Agreement No. …… Dated …….. Valued at Rs…… (Rupees ..... only).

AND

Whereas, Defect Liability Clause (Clause no…… of special conditions of the above mentioned Contract Agreement) provides for guarantee (i.e.) for the works executed under the contract to be free from defect due to faulty material or workmanship identified during Defect Liability Period (DLP) of 36 calendar months from the date of issue of completion certificate of the work.

The indemnifier hereby irrevocably agrees to indemnify the indemnified that in the event of any specified liability during Defect Liability Period, original or extended as per the terms of the contract, the Indemnifier shall repair /replace the defective works at site or pay the amount on demand as debt due without any objection and in case of any non-compliance by the Indemnifier, the Indemnified may deduct the amount determined under the Defect Liability Clause from any payments due to the Indemnifier in any other contract anywhere in Indian Railways. The Indemnifier also irrevocably agrees that any determination of the Indemnified under Defect Liability Clause shall be final and binding upon Indemnifier and treated as "Excepted Matter " and shall not be arbitrable.

For ……
(Signature with Name and Designation)
Company seal

Station:
Date :
Witness :1…….
Signature with Name, Designation & Address

2……
Signature with Name, Designation & Address.

## SOUTH CENTRAL RAILWAY/ SECUNDERABAD DIVISION
## Safety precautions to be adopted while working in Electrified Area.

1. The attention of all workers is drawn to the fact that under 25kV ac 50 Hz single phase traction, there is heavy induction on all metallic structures and conductors in the vicinity of the track.

2. Don't carry out any work within a distance of 2 meters from live parts of overhead traction wires unless the traction wires are made dead and earthed and PERMIT TO WORK is obtained from an authorized traction staff of Railways.

3. Don't cut or trim a tree near the traction OHE without the presence of an authorized traction staff and without obtaining PERMIT TO WORK from authorized traction staff.

4. Don't touch any fallen / hanging wire under any circumstances until it is made dead and earthed by traction staff.

5. Don't disturb track bonding or bonding provided to OHE structures. In the electrified section nearby metallic structure/part such as platform shelter, fencing, rail, FOB, traction mast etc will be charged due to induction effect. This effect will increase according to the length of parallelism and when the distance between the OHE and metallic structures is reduced. To nullify the induction effect, all the metallic structures in the vicinity of electrified track will be earthed by providing traction bonds. These bonds should not be disturbed / disconnected on any circumstances without adopting standard procedures. If bonds need to be disconnected the same shall be done under the supervision of TRD officials only.

6. In a railway yard, voltage of the order of 200 volts may be induced on yard lighting mains situated 8m away from the Centre of a double line track, if it runs parallel to the 25kV lines for a distance of about 270m, it could be several thousand volts when parallelism is much longer. In such a case, a dangerous voltage due to induction will exist even after power supply to the line has been switched off. No one shall therefore attempt to work on any overhead line running alongside the electrified tracks without taking special precautions of earthing on both sides of the work. Before a section is electrified the necessary modifications to distribution lines in all stations and yards should be carried out, so as to limit the induced voltage within permissible values, but this by no means obviates the need of earthing the lines on both the sides of the working party. Earthing should be done individually by each working party as close to the work-spot as possible. The distance between the two earths shall not exceed 1km.

7. Such inductive effects occur on large metallic structures such as fencing, structural steelwork of platforms running parallel to the track. They will therefore have to be earthed suitably to afford safety.

8. Don't remove / loosen the fish plates without making a temporary connection with a jumper of approved design. To avoid electric shock due to return current through rail before starting any work in rail short jumper may be connected across the fishplate or fractured rail web by using rubber gloves. This jumper connection will provide path to the return current. Similarly long jumpers may be used for full length or long welded rails replacement. The jumper connection should be provided only on traction rail.

9. In track circuited area, for giving continuous path to the return current at glued / insulated joint polarity bonds / transverse bonds are connected. Insulation sleeve is provided above this bond where it crosses the signal rail. This is to avoid shorting of polarity bond with signal rail. Any damage / displacement/missing of insulation sleeve will lead to signal failure. Hence availability of the sleeve shall be ensured while doing any track work.

10. Don't have simultaneous contact with an insulated section of rail and non-insulated section of rail of the same or other track.

11. Don't use steel measuring tapes or long metallic wires / rods on the electrified track.

12. Don't use rails as foot path, a seat or for such other purposes.

13. Don't carry long pipes, poles, ladders, vertically which will come within the danger zone of 2 meters of live overhead traction equipment.

14. Don't allow loading and unloading of over wagon or hopper used for Material Trains in electrified tracks without the personal supervisions of P.W. Maistry or of OHE staff (who will ensure that no tool or part of body of worker will come within the danger zone of 2 meter from OHE).

15. During electrification, OHE foundation, mast erection, contact & catenary wire height, stagger of contact wire are adjusted and kept in position according to track alignment at site. Any change in the track alignment will affect the OHE and may lead to panto entanglement and subsequent OHE break down. As such any change in track parameters shall be done in the presence of an authorized TRD official.

16. During replacement of any insulation joint, before disconnecting the polarity bond, first provide continuity for the traction return current. This can be provided with the help of long jumper wires having ending clamps on either end. First connect one end of the jumper clamp to the traction rail near to the work spot and other end of the jumper wire clamps is to be connected to the adjacent traction rail. This will ensure / provide the traction return path. Remove the polarity bond and dismantle the insulation joint. After re-insertion of the insulation joint, connect the polarity bond; ensure the insulation sleeve on the polarity bond in place, where it crosses the signal rail. Then finally the temporary jumper can be removed.

17. In track circuited area, one rail is used for traction return current and other rail for signal circuit. The signal circuits are working on low voltage & current. Due to the induction effect & parallelism, high voltage can develop, which may cause damage or erratic functioning of the track circuited relays, thereby affecting the signaling system. To avoid such problems the total rail length between home signal to home signal has been divided into small lengths of track circuit and connected in zigzag manner (transposition to nullify the effect ofparallelism.) For separating signal & traction rail, insulated joints are used and polarity bonds are provided at these joints, for giving continuity path for traction current. One of the limb of the polarity bond may pass underneath of signal rail. To avoid shorting of this polarity bond with signal rail, insulation sleeve will be provided on the polarity bond. Theavailability of such sleeves shall be ensured while doing any track works.

18. From the safety point of view use of jumper wire, hand gloves are to be ensured. The insulated joints should not be shorted with any metallic tool or metallic part and also do not touch the joints with bare hand / foot as this may result in severe electric shock due to difference in potential.

19. If any work is being taken up under Power Block, duty of the supervisor at site to provide earth rods on OHE on either side of the work site. Depute staff with hand signal well in advance of the earth rod to protect the work site from the approaching trains.

20. No crane shall be worked on or near traction overhead equipment’s unless authorized by OHE representative. While working, care shall be taken to avoid hitting or damaging OHE structures.

**SOUTH CENTRAL RAILWAY**
OFFICE OF THE PRINCIPAL CHIEF ENGINEER,
'B' BLOCK – 4TH FLOOR, RAIL NILAYAM, **SECUNDERABAD – 500 003**.
e-mail: dyceworkshqscr@gmail.com Rly No: 86388 CUG: 9701370211

No.SCR-HQ0ENGG(SOR)/1/2020-DyCE/WORKS/SCR Date: 30.06.2025

**CAO/C/SC, CAO/C/RSP,**
**CPM/ GS/I/SC, II/SC, BZA, GTL,**
**Sr. DEN/Co-Ord/SC, BZA, GTL, GNT, HYB, NED,**
**Dy.CE/EWS/LGD, Sr.DEN/LGDS.**

**Sub**: Revised Approved list of Brands / Makes for 160 categories of materials for use in all Civil Engineering Works in SCR – Reg.
**Ref**: This office letter of even no. dated 11.09.2024.

* * *

In order to improve quality of Civil Engineering Works, it is necessary to use the materials of reputed brands, as in many cases specifications alone may not be sufficient to ensure appropriate standard of work.

Accordingly, Approved list of Makes and Brands for 162 categories of materials was communicated vide reference cited above.

Now, Revised approved list of Brands and Makes of materials is issued herewith for 160 categories of materials as Annexure-A to be used in all works duly incorporating the same as Special Condition in all related tenders with immediate effect.

In case the Brands/Makes from the approved list are not available, other reputed Brands/Makes confirming to BIS standards in all respects and having better aesthetic appearance and life expectancy may be used with the approval of Sr.DEN/Co-Ordination in divisions or Project in-charge in Construction organisation/Gati Shakti, as the case may be.

Material from Govt./Semi-Govt. subsidiaries amongst the approved Brands / Makes should be given 1st priority. Only in case of non-availability, other brand should be used if required for expeditious execution of the work.

This revised approved list supersedes the earlier list issued by this office letter of even no. dt 11.09.2024.

This is issued with the approval of PCE.

**Encl:** Annexure-A & A(1)

PEDDU MURALI KRISHNA
Digitally signed by PEDDU MURALI KRISHNA
Date: 2025.06.30 11:54:42 +05'30'

**(P.Muralikrishna)**
**Dy.CE/LM**

**Copy to:** Secy. to PCE for kind information of PCE
SDGM, PFA, DRM/SC, BZA, GTL, HYB, GNT & NED,
CPD/SD, CTE, CBE, CE/P&D, CGE, CE/TP, CE/TM,CE/TS, CE/SD,CE/RSW

**Annexure-A**

| LIST OF APPROVED BRANDS/MAKES | | | |
|---|---|---|---|
| **Sl No.** | **Material Description** | **Brand** | **Make** |
| 1 | Chloropyrifos(Pesticides) | Piramid | Amvac Agri Rasayan Pvt. Ltd. |
| | | Noban | Chemet Wets & Flows Pvt. Ltd. |
| | | Dursbantct | DE-NOCIL Ltd. |
| | | Premise Agenda | Bayer Ltd |
| | | Hilban | Hindustan Insecticides Ltd. |
| | | Sarups Pest Control | Sarups Pest Control Ltd. |
| 2 | Ordinary Portland Cement | ACC | ACC Cements Ltd |
| | | Ultra Tech | Ultra Tech Cement Ltd |
| | | Birla.A1 | Orient cement Ltd. |
| | | Dalmia | Dalmia Cement Bharat Ltd. |
| | | Zuari | Zuari Cement Limited |
| | | Jaypee Cement | Jaypee Cement Ltd. |
| | | J.K.Cement | J.K.Cement Pvt.Ltd. |
| | | Ambuja Cement | Ambuja Cements Ltd. |
| | | Coromondel OPC Cement | Coromandel Cements ltd |
| | | Ramco OPC 53 grade | Ramco Cements |
| | | Penna OPC cement | Penna Cement Industries Ltd |
| | | KCP OPC cement | The KCP Limited |
| | | Chettinad OPC cement | Chettinad Cement Corporation Pvt.Ltd |
| | | Bharathi OPC cement | Kalburgi Cement Private Limited |
| | | MAHA Cement | My Home Industries Private Limited |
| | | Sagar Cement | Sagar Cements limited |
| | | JSW Cement | JSW Cement Pvt.Limited |
| | | Nagarjuna cement | NCL Industries Limited |
| | | Deccan Cement | Deccan Cements Limited |
| | | CCI | Cement Corporation of India Ltd. |
| | | Bangur | Shree cement Limited |
| | | Sri Chakra | Sri Chakra Cement Limited |
| 3 | Damp Proof material | MAPEI | MAPEI Construction Products India P Ltd. |
| | | Ferrous Crete | Ferrous Crete (India) Pvt. Ltd. |
| | | Impermo | Snowcem Paints |
| | | Duraseal | Apurva India Pvt. Ltd. |
| | | ACCO Proof | ACC Cements Ltd |
| | | Dr.Fixit | Pidilite Industries |
| | | Fosroc | Fosroc Chemicals India Pvt. Ltd. |
| | | CICO | CICO Industries |
| | | SIKA | Sika Inida Pvt Ltd. |
| | | PIDILITE | Pidilite Industries Ltd |
| | | BASF | BASF India Ltd |
| | | MYK | MYK LATICRETE India Pvt. Ltd |
| 4 | TMT bars | Guidelines issued vide this office letter No.SCR-HQ0ENGG(SOR)/1/2020-Dy CE WORKS/SCR dt 28.08.2024 enclosed as **Annexure-A(1)** | |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 5 | Plasticiser & Super Plasticiser | BASF | BASF India Ltd |
| | | CICO | CICO Industries |
| | | Plastiment, Sikament | Sika Inida Pvt Ltd. |
| | | Contrament, Power flow | MC Bauchemie (India ) Pvt. Ltd |
| | | Conplast SP430 | FOSROC India |
| | | MYK Schomburg | MYK Arments Pvt. Ltd. |
| | | Chryso-HP / Delta / Optima | Chryso India Pvt. Ltd., |
| | | Sunanda Chemicals | Sunanda Chemicals Ltd. |
| | | Bond tuf | Bond tuf Construction Chemicals |
| | | CAC | Concrete additives & Chemicals Pvt.ltd |
| | | AP smart care | Asian paints Limited |
| 6 | Expansion Joint Bitumen board | Dura board HD100 | Supreme Industries |
| | | STP | Shalimar Tar Products |
| | | DURAFILL | Supreme industries |
| 7 | Post tensioning System | CRUX | Crux Processing systems Pvt Ltd., |
| | | VSL | VSL India Pvt Ltd. |
| | | Ultracon | Ultracon Structural Systems Pvt Ltd |
| | | BBR | BBR (India ) Pvt . Ltd |
| | | Dynamic | Dynamic Prestressing |
| | | Usha Martin | Usha Martin Ltd |
| | | JK Pre stressing | JK Pre stressing company,Hyd |
| 8 | PT Strands | DP wires | D.P Wires Ltd. |
| | | TATA wiron | TATA Steel Ltd |
| | | Usha Martin | Usha Martin Ltd |
| 9 | Adhesives | Dunlop | Dunlop India Tire and Rubber Co(India) Ltd. |
| | | Vamorganic | Vamorganic Ltd. |
| | | Sika | Sika India Pvt. Ltd. |
| | | Fevicol | Pidilite Industries |
| | | CICO | CICO Industries |
| | | Proofex of Adhesive | FOSROC India Ltd |
| 10 | Grout | Ardex | Ardex Endura Adhesive India Pvt. Ltd |
| | | Ferrous crete | Ferrous Crete (India) Pvt. Ltd. |
| | | LATA POXY | MYK LATICRETE India Pvt. Ltd |
| | | BASF | BASF India Ltd |
| | | Fosroc GP2 | Fosroc India Ltd |
| | | MYK Schomburg | MYK Arments Pvt. Ltd. |
| | | Fugabella, Porcelana | Kerakoil India Pvt. Ltd |
| | | Dr.Fixit | Pidilite Industries |
| | | Weber | Saint-Gobain India Pvt. Ltd |
| | | Asian Paints-Apcorep Repair range | Asian paints Ltd |
| | | Polyglaze | Evershine Build India Private limited |
| | | Bond tuf | Bond tuf Construction Chemicals |
| | | Berger | Berger Paints India Limited |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 11 | Ready Mix Concrete | Ultra Tech | Ultra Tech Concrete |
| | | ACC | ACC Ltd |
| | | RMC (India) | RMC (India) Pvt. Ltd. |
| | | Lafarge | Lafarge India Pvt. Ltd |
| | | Aparna(RMC) | M/S.Aparna Enterprises Limited |
| | | Nagrjuna RMC | NCL Industries Limited |
| | | Prism RMC | Prism Johnson Ltd |
| | | JAIDHAR Concrete | Jaidhar constructions |
| | | Infra Market Concrete | Hella Infra Market Pvt Ltd |
| | | R6 Infra | R6 Infra RMC |
| | | IJM Concrete Products | IJM Concrete Products Pvt Ltd |
| 12 | AAC Blocks | Xtralite | ULTRATECH Cement Ltd |
| | | Areocon | HIL |
| | | Siporex | SIPOREX |
| | | Nucon | Green way building materials India Pvt. Ltd |
| | | NCL | NCL VEKA Ltd |
| | | Renacon | Renaatus Procon Pvt. Ltd |
| | | Smart Brix | Bondada eco build Pvt.Ltd |
| 13 | Wooden Flush door shutters | Indian Timber Products | Indian Timber Products |
| | | Greenlam | Greenlam Ply Industries Ltd. |
| | | Mayur | Mayur Ply Industries |
| | | Kitply | Kitply Industries Ltd |
| | | Duro Flush doors | Duro Ply Industries Ltd. |
| | | Kenwood | Kenwood Ply & Board |
| | | Century | Century Flush Doors |
| 14 | Water Proof Plywood,Commercial ply, Fire retardant ply and Block boards | Green Ply | Green Ply Industries Ltd. |
| | | Kitply | Kitply Industries Ltd |
| | | Duroply | Duro Ply Industries Ltd. |
| | | Archidply | Archid ply industries Ltd. |
| | | Century ply | Century Flush Doors |
| 15 | Laminate | Green Lam | Green lam Industries Ltd. |
| | | Centuary | Centuray laminates |
| | | Merino | Merino laminates |
| | | Archidply | Archid ply industries Ltd. |
| | | Kitmica | Kitply Industries Ltd |
| | | Sunmica | Sunmica Industries |
| | | Formica | Formica Laminates (India) Pvt Ltd |
| | | Decolam | Decolam India Pvt Ltd. |
| 16 | Prelaminted particle board Exterior Grade | Novapan | GVK Novapan Industries Pvt Ltd., |
| | | Merino | Marino laminates |
| | | Kitlam | Kitply Industries Ltd |
| | | TESA Action Co. | TESA Action Co. |
| | | Ecoboard | Ecoboard Industries Ltd. |
| | | Associate | Associate Decor Limited |
| | | Archid ply | Archid ply industries Ltd. |
| | | Centuary | Centuary MDF |
| | | Green Lam | Green lam Industries Ltd. |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 17 | High Density (HDF) Prelaminated board | Pergo | Red Floor India |
| | | Green Ply | Green Ply Industries Ltd. |
| | | Green Lam | Green Lam Industries Ltd. |
| 18 | Gypsum board | Gyproc Saint Gobain | Saint Gobain Gyprock India Ltd., |
| | | Lafarge | Lafarge Gypsum India Pvt. Ltd |
| | | USG Boral Board | USG Board India (P) Ltd. |
| | | Armstrong | Armstrong World Industries |
| 19 | Glass door hardware | Dorma | Dorma India Pvt Ltd |
| | | Kich | Kich Architectural Products Ltd. |
| | | Classic | Classic hardware |
| | | Squash | Squash glass doors |
| | | Hafele | Hafele India Pvt. Ltd |
| | | Ozone | Ozone Hardware. |
| | | Geze | GEZE GmbH |
| | | Dorset | Dorset Industries Pvt Ltd |
| 20 | Hydraulic door closers/Floor springs | Godrej | Godrej locking solutions & systems |
| | | Hardwyn | Hardwyn hardware |
| | | MAGNUM KIT | Mukund Overseas |
| | | Dorma | Dorma India Pvt Ltd |
| | | Everite | Everite agencies |
| | | Dorset | Dorset Industries Pvt Ltd |
| 21 | Locks & Latches | Dorset | Dorset Industries Pvt Ltd |
| | | Godrej | Godrej locking solutions & systems |
| | | Hitech | Globe Locks India |
| | | Hafele | Hafele India Pvt. Ltd |
| | | Harrison | Harrison locks |
| | | Plaza | Bharat lock House |
| | | Yale | ASSA ABLOY India (P) Ltd. |
| | | Link | Link Locks |
| 22 | Metalic / Steel Fire Door | Shakthi Hormann | Shakthi Hormann Pvt Ltd |
| | | Promat | Promat fire & Insulation (P) Ltd |
| | | MPP Schodders | MPP Technology Pvt.Ltd. |
| | | NAVAIR | NAVAIR International Pvt Ltd |
| | | Signumfire Protection | Signumfire Protection Pvt. Ltd |
| | | Sukri | Sukri Fire doors Pvt.Ltd |
| | | Kenwood | Kenwood Ply & Board |
| | | Godrej | Godrej Security solutions |
| | | Tata pravesh | Tata steel |
| | | KROSS door | Kross Innovations Pvt Ltd |
| 23 | Fire Smoke Seal | Hilti | Hilti India Pvt Ltd |
| | | Promat | Promat fire & Insulation (P) Ltd |
| | | Atroflame | Atroflame Ltd. |
| | | Raven | Raven Global |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 24 | Fire rated hardware | Dorma | Dorma India Pvt Ltd |
| | | Ingersolrand | Ingersolrand (India) Ltd |
| | | Dorset | Dorset Industries Pvt Ltd |
| | | Backers FS | Backers FS |
| | | Geze | GEZE GmbH |
| 25 | Non Metalic Fire door | NAVAIR | NAVAIR International Pvt Ltd |
| | | Promat | Promat fire & Insulation (P) Ltd |
| | | Godrej | Godrej Security solutions |
| | | Kenwood | Kenwood Ply & Board |
| 26 | Stainless steel screws | Kundan | Kundan Industires Ltd |
| | | Alloy | Alloy Ltd |
| | | GKW | GKW Limited |
| | | Nettlefold | Nettlefold screws |
| | | Atul | Atul fasteners Ltd |
| 27 | Butt Hinges openable window shutters | Hafele | Hafele India Pvt. Ltd |
| | | Earl Bihari | Earl Bihari India Pvt Ltd. |
| | | Dorma | Dorma India Pvt Ltd |
| | | Dorset | Dorset Industries Pvt Ltd |
| | | Alu Alpha | Alu Alpha India |
| 28 | Mild Steel Butt Hinges | Jolly | Jolly Engineering works |
| | | Supreme | Supreme |
| | | Saswat | Saswat |
| | | Deepak | Deepak |
| | | Swift | Swift screws |
| | | Garg | D P Garg & Company |
| | | Amit | Lovely metal industries Pvt Ltd. |
| | | Jyoti | Jyoti Architectural Pvt Ltd. |
| 29 | Stainless steel Butt hinges | Prayag | Prayag Polymers (P) Ltd |
| | | Ozone | Ozone Hardware. |
| | | Dorma | Dorma India Pvt Ltd |
| 30 | Concealed tower bolt | Dorma | Dorma India Pvt Ltd |
| | | Ingersolrand | Ingersolrand (India) Ltd |
| | | DORSET | Dorset Industries Pvt Ltd |
| | | Alu Alpha | Alu Alpha India |
| 31 | UPVC doors, door frames and windows | Fenesta | Fenesta DCM Shriman |
| | | Encraft | Encraft India Pvt.Ltd. |
| | | LG | LG India Pvt. Ltd. |
| | | Rehau | Rehau Unlimited Polymer Solutions |
| | | Aluplast | Alu Alpha India |
| | | Komarling | Profile India Window Technology Pvt.Ltd. |
| | | Duroplast | Duroplast Extrusion Pvt Ltd |
| | | Aparna(venster) /Okotech | M/S.Aparna Enterprises Limited |
| | | NCL VEKA | NCL VEKA Ltd |
| | | Shinetech | Bondada eco build Pvt.Ltd |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 32 | PVC Doors and Frames | Accucel | Accura Polytech Pvt.Ltd |
| | | Sintex | Sintex plastic technology Ltd,. |
| | | Duroplast | Duroplast Extrusion Pvt Ltd |
| | | Polyline | Polyline extrusion Pvt Ltd |
| | | Rajshri | Rajshri Productions Pvt. ltd. |
| 33 | Stainless friction hinges | Hettich | Hettich India Pvt .Ltd. |
| | | Hafele | Hafele India Pvt. Ltd |
| | | Securistyle | Securistyle India Pvt .Ltd. |
| | | Earl Bihari | Earl Bihari India Pvt Ltd. |
| | | EBCO | EBCO |
| | | ROTO | ROTO Frank Asia |
| 34 | Float Glass | Saint Gobain | Saint Gobain India Pvt Ltd |
| | | Modiguard | Gujarat Guardian Ltd. |
| | | Asahi | Asahi India glass Ltd. |
| | | Pilkinton | Pilkinton India Pvt |
| 35 | Reflective glass | Saint Gobain | Saint Gobain India Pvt Ltd |
| | | Asahi | Asahi India glass Ltd. |
| | | Pilkinton | Pilkinton India |
| | | Modifloat | Gujarat Guardian Ltd. |
| | | Glaverbel | Glaverbel India |
| 36 | Tempered reflective/clear glass | Saint Gobain | Saint Gobain India Pvt Ltd |
| | | FUSO | FUSO Glass India Pvt .Ltd. |
| | | Gurind | Gurind India |
| | | Asahi | Asahi India glass Ltd. |
| | | Modiquard | Gujarat Guardian Ltd. |
| | | Impact safety | Impact safety glass works Pvt Ltd |
| 37 | Fire rated glass | Contra flam /Pyroswiss of Saint Gobain | Saint Gobain India Pvt Ltd |
| | | Promat | Promat fire & Insulation (P) Ltd |
| | | Pyran of Schott | Schott glass India Pvt Ltd. |
| | | Pilkinton | Pilkinton India |
| 38 | Anchor / SS Stone Cladding Clamps / Dash fasteners | Hilti | Hilti India Pvt Ltd |
| | | Fischer | Fischer India |
| | | Anchor | Anchor Ltd |
| | | Nutech | Nutech fasteners |
| | | Canon | Cannon |
| | | Wuerth | Wuerth India Pvt. Ltd |
| | | Trixel | Axel India Pvt.Ltd |
| | | Helfen | Helfen Gmbh |
| | | BOSCH | BOSCH Ltd |
| 39 | Structural Steel | SAIL | SAIL |
| | | VIZAG | RINL |
| | | TISCO | TATA STEEL |
| | | JSW | JSW |
| | | JSPL | Jindal Steel & Power Limited |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 40 | M.S.Pipe, Tubes | SAIL | SAIL |
| | | TISCO | TATA STEEL |
| | | JINDAL | JSW |
| | | MPL | Mahalakshmi profiles Private limited |
| 41 | Stainless steel / Stainless steel pipes | Salem | SAIL |
| | | Connect | Connect Ltd. |
| | | Jindal | JSW |
| | | SAIL | SAIL |
| | | KINGSTON | KINGSTON Brass |
| | | JSL | Jindal stainless limited |
| 42 | Stainless steel Bolts, washers, nuts | Kundan | Kundan Industires Ltd |
| | | Atul | Atul fasteners Ltd |
| | | Hilti | Hilti India Pvt Ltd |
| 43 | Stainless steel pressure plate screws | Kundan | Kundan Industires Ltd |
| | | Pooja | Pooja steel corporation |
| | | Atul | Atul fasteners Ltd |
| 44 | Welding rods | Advani | Advani oerlikon Ltd. |
| | | ESAB | ESAB India Pvt. Ltd |
| | | G-Weld | GEE Limited |
| | | Royal Ark | Royal Ark |
| | | Raaj Ratna | Raaj Ratna |
| | | Mailan | Mailan |
| 45 | Metal Deck Sheet | TATA | TATA STEEL |
| | | SAIL | SAIL |
| 46 | Shear Stud / Connector | KOCO | KOSTER & Co. |
| | | PE | PE |
| | | MNE | MNE |
| | | Stalwart | Stalwart Techno source India Pvt Ltd |
| 47 | Vitrified tiles | Jhonson | Prism Jhonson Ltd |
| | | Kajaria | Kajaria Ceramic Ltd |
| | | Somany | Somany Ceramic Ltd |
| | | NITCO | NITCO Ltd |
| | | RAK | RAK Ceramic India Pvt Ltd. |
| | | Varmora Granito | Varmora Granito Granite Pvt. Ltd |
| | | Aparna(Vitero) | M/S.Aparna Enterprises Limited |
| | | Exxaro | Exxaro Tiles |
| | | CERA | CERA Sanitaryware Limited. |
| | | Orient | Orient bell Ltd |
| 48 | Glazed Ceramic tiles (Also wall tiles) | Jhonson | Prism Jhonson Ltd |
| | | Kajaria | Kajaria Ceramic Ltd |
| | | Somany | Somany Ceramic Ltd |
| | | NITCO | NITCO Ltd |
| | | RAK | RAK Ceramic India Pvt Ltd. |
| | | Varmora Granito | Varmora Granito Granite Pvt. Ltd |
| | | Aparna(Vitero) | M/S.Aparna Enterprises Limited |
| | | Cera | Cera Ceramics limoted |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 49 | Synthetic Sports flooring | Armstrong | Armstrong flooring |
| | | LG | LG Hausys India |
| | | Wondorfloor | RMG Polyvinyl India Ltd. |
| 50 | Linoleum sports flooring | Armstrong | Armstrong flooring India Pvt Ltd. |
| | | Forbo | Forbo flooring India Pvt. Ltd. |
| | | Gerflor | Gerflor flooring |
| 51 | False floor | Hewetson | Hewetson India |
| | | Access floor system | Access Floor System |
| | | Unifloor | Unifloor India Ltd |
| | | Unitile | Unitile office systems Pvt. Ltd |
| | | PINNACLE | PINNACLE |
| | | Kebao | Inner Space (Distributors) |
| 52 | Engineered wood floor | Armstrong | Armstrong flooring |
| | | Mikasa Real wood floors | Green Lam Industries |
| | | New wood | New Wood India Ltd |
| | | Werner | Durafloor werner GmbH |
| | | Pergo | Red Floor India |
| 53 | Floor spring | Dorma | Dorma India Pvt Ltd |
| | | Ingersolrand | Ingersolrand (India) Ltd |
| | | OZONE | Ozone Hardware. |
| | | GEZE | GEZE GmbH |
| 54 | Cement concrete parking tiles | NITCO | NITCO Ltd |
| | | Ultra | Ultra tile Private Ltd |
| | | Eurocon | Eurocon tiles India |
| | | Dazzle | Dazzle Designer Tiles Pvt Ltd |
| | | NTC | NTC Parking tiles |
| | | Hindustan tiles | Hindustan tiles, Ranchi Pune |
| 55 | Synthetic Carpet tiles | TOLI | TOLI corporation |
| | | Hollitex | Hollitex carpet tiles |
| | | Standard Carpets | Standard Carpets |
| 56 | Vitrified paving tiles | PAVIT | PAVIT Ceramics Pvt Ltd |
| | | Johnson | Johnson |
| | | Nitco | Nitco |
| | | Kajaria | Kajaria Ceramics Pvt Ltd |
| 57 | Glass mosaic tiles | Italia | Tile Italia mosaics Pvt Ltd. |
| | | Coral | Coral tiles |
| | | Mridul | Mridul tiles |
| | | Palladio | Palladio Mosaics |
| | | Bisazza | Bisazza Italy |
| | | Birla White | Birla Corportion Ltd. |
| | | JK White | J. K. Cement Ltd |
| | | PAVIT (Eco Tile) | PAVIT Ceramics Pvt Ltd |
| 58 | Thermal Insulation | Pidilite | Pidilite Industries |
| | | Elastospray | BASF |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 59 | Acoustic Insulation | Twingerinsul | U.P.Twiga fiber glass Ltd |
| | | Lloyd Insulation | Lloyd Insulation (India ) Ltd |
| | | Saint Gobain Gyproc | Saint Gobain Gyproc India |
| | | Himalyan Acoustics | Himalyan Acoustics |
| | | Knauf | Knauf Gypsum India Pvt. Ltd. |
| | | Anutone | Anutone Accoustics Ltd. |
| 60 | UPVC Pipes and fittings (Rain water pipes) | Supreme | Superme Industries Ltd |
| | | Prince | Prince Pipes and finttings Ltd |
| | | Finolex | Finolex Industries Ltd. |
| | | Prepoly | Premier PVC Industry |
| | | Astral | Astral polytechnik Ltd |
| | | Ashirwad | Ashirwad PVC Pipes |
| | | Flow Guard | Flow Guard |
| | | Sudhakar | Sudhakar PVC Products Private Limited |
| 61 | Sandwich PUF panelled roofing sheets | Lloyd Insulation | Lloyd Insulation (India ) Ltd |
| | | JINDAL MECTEC | JINDAL Mectec Pvt. Ltd |
| | | Danpalon | Danpal Light architecture |
| | | GE Plastic | GE Silicones |
| | | LEXAN | LEXAN Ltd |
| 62 | Poly carbonate Sheet | MG Polyplast | MG Polyplast |
| | | GE Lexon | GE Silicones |
| | | Danpalon | Danpal Light architecture |
| | | Alcox | Hindeggan Alcox Ltd. |
| | | Polygal | Polygal India Pvt Ltd. |
| 63 | False ceiling | Saint Gobain Gyproc | Saint Gobain Gyproc India |
| | | Armstrong | Armstrong World Industries |
| | | USG Boral | USG Boral |
| | | Aerolite | Andhra Polymers Pvt. Ltd./Aerolite Industries Pvt.Ltd. |
| | | Hunter Dougals | Hunter Dougals |
| | | Gridsquare | Gridsquare Ceilings |
| | | Knauf | Knauf Gypsum India Pvt. Ltd. |
| | | Anutone | Anutone Accoustics Ltd. |
| | | Diamond | Diamond International Inex Pvt.Ltd |
| 64 | False Ceiling Members (Perimeter, Ceiling section, intermediates, angles etc.,) | Armstrong | Armstrong World Industries |
| | | Aerolite | Andhra Polymers Pvt. Ltd./Aerolite Industries Pvt.Ltd. |
| | | Gridsquare | Gridsquare Ceilings |
| | | Gypframe steel | British Gypsum |
| | | Knauf | Knauf Gypsum India Pvt. Ltd. |
| | | Lloyd | Lloyd Insulation (India ) Ltd |
| | | Saint Gobain | Saint Gobain Gyproc |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 65 | Synthetic enamel Paint | Premium glass enamel | Asian paints Ltd |
| | | Dulux | ICI dulux Ltd |
| | | Nerolac | Nerolac Paints Ltd |
| | | Berger | Berger Paints |
| | | Nippon | Nippon Paint India Ltd. |
| | | INDIGO | Indigo Paints |
| | | Shalimar Paints | Shalimar Paints Limited |
| | | JSW | JSW Paints |
| 66 | Pink primer | Wood primer | Asian Paints |
| | | Dulux | ICI Dulux |
| | | Nerolac | Nerolac Kansia Nerolac Paints Ltd., |
| | | Berger | Berger Paints |
| | | Nippon | Nippon |
| 67 | Red Oxide Zinc Chromate primer | High performance yellow metal primer | Asian Paints |
| | | Dulux | ICI Dulux |
| | | Nerolac | Nerolac |
| | | Berger | Berger Paints |
| | | Nippon | Nippon |
| | | Shalimar Paints | Shalimar Paints Limited |
| 68 | Oil Bound Distemper | Tractor Agalock | Asian Paints |
| | | Dulux (Maxilite) | Dulux |
| | | mG Polyplast | Nerolac |
| | | Berger (Bisom) | Berger Paints |
| 69 | Acrylic emulsion | Premium emulsion | Asian Paints |
| | | Dulux (Super Cover) | ICI Dulux |
| | | Nerolac (Beauty Gold) | Nerolac |
| | | Berger(BISM) | Berger Paints |
| | | Indigo Paints | Indigo Paints Pvt Ltd |
| | | JSW Paints | JSW Paints Pvt Ltd |
| | | Shalimar Paints | Shalimar Paints Limited |
| 70 | Water Proof Cement paint | Asian exterior wall primer | Asian Paints |
| | | Berger | Berger Paints |
| | | Surfa | Surfacoats (India) Pvt. Ltd. |
| | | ICI DULUX | ICI Dulux |
| | | Snowcem | Snowcem Paints |
| | | Birla Cements | Birla Cements |
| | | JK Cements | JK Cements Pvt Ltd |
| | | JSW Paints | JSW Paints Pvt Ltd |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 71 | Acrylic smooth exterior paint | Dulux | ICI Dulux |
| | | Apex | Asian Paints |
| | | Nerolac | Nerolac |
| | | Berger | Berger |
| | | Nippon | Nippon |
| | | Birla Cements | Birla Cements |
| | | JK Cements | JK Cements Pvt Ltd |
| | | JSW Paints | JSW Paints Pvt Ltd |
| | | Indigo Paints | Indigo Paints Pvt Ltd |
| | | Shalimar Paints | Shalimar Paints Limited |
| 72 | Premium Acrylic smooth exterior paint with silicon additives | ULTIMA | Asian Paints |
| | | Dulux | ICI Dulux |
| | | Nerolac | Nerolac |
| | | Berger | Berger |
| | | Royal Emulsion | Asian Paints |
| | | JSW Paints | JSW Paints Pvt Ltd |
| | | Shalimar Paints | Shalimar Paints Limited |
| 73 | Cement based wall putty | J.K.wall putty | J. K. Cement Ltd |
| | | Birla wall care | Birla Cements Ltd. |
| | | Asian paints | Asian paints Ltd |
| | | Altek | NCL Alltek & seccold Ltd. |
| | | Berger | Berger |
| | | Ardex Endura | Ardex Endura India Pvt. Ltd. |
| | | Ferrous Crete | Ferrous Crete (India) Pvt. Ltd. |
| | | Polyglaze | Evershine Build India Private limited |
| 74 | Acrylic textured plaster | Apex Duracast | Asian Paints |
| | | Spectrum paints | Spectrum paints Ltd. |
| | | Heritage | Heritage Rajkamal Group |
| | | Asian paints | Asian Paints |
| | | Nerolac | Nerolac |
| 75 | Ready mix cement plaster | Readi Plast | Ultra Tech Cement Ltd |
| | | Gyproc Plasters | Saint Gobain Gyproc India |
| | | Ultra tech | Ultra Tech Cement Ltd |
| | | Ferrous Crete | Ferrous Crete (India) Pvt. Ltd. |
| 76 | Melamine Polish | Asian paints | Asian Paints |
| | | Melamine Gold wudfin | Pidilite Industries |
| | | Polycure | Polycure Malaysia |
| 77 | Fire retardant paint | Jotun | Jotun paints |
| | | Hilti | Hilti India |
| | | Akzonobel | Dulux Akzonobel Paints |
| | | Asian Paints | Asian Paints |
| | | STPL | STPL Ltd. |
| 78 | Anticorrosive bitumastic paint | Berger | Berger Paints India Ltd |
| | | Shalimar | Shalimar paints India Ltd. |
| | | Bituminous black | Asian Paints |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 79 | Cement Primer | Asian paints | Asian Paints |
| | | JK Primaxx | J. K. Cement Ltd |
| | | Berger | Berger Paints India Ltd |
| | | Shalimar Paints | Shalimar Paints Limited |
| 80 | Epoxy paint | Asian epoxy | Asian Paints |
| | | Berger | Berger Paints India Ltd |
| | | Shalimar | Shalimar paints |
| | | STP | Shalimar Tar Products |
| | | Ardex Endura | Ardex Endura India Pvt. Ltd. |
| | | Nerolac | Nerolac |
| | | Asian Paints-Apcorep Repair range | Asian paints Ltd |
| 81 | Epoxy coating | BASF | BASF India Ltd |
| | | Fosroc | Fosroc India |
| | | Laticrete | MYK Laticrete India |
| | | Ardex Endura | Ardex Endura India Pvt. Ltd. |
| | | Ferrous Crete | Ferrous Crete (India) Pvt. Ltd. |
| | | Bond tuf | Bond tuf Construction Chemicals |
| 82 | Sililcon coating | Dow corning | Dow corning India |
| | | BASF | BASF India Ltd |
| | | GE | GE Silicones |
| | | Wacker | Wacker silicones. |
| 83 | Interlocking Concrete Paver Blocks | NITCO (ROCKARD) | NITCO |
| | | Ultra | Ultra tile Private Ltd |
| | | REGENCY | Regency |
| | | Hindustan tiles | Hindustan tiles, Ranchi , Pune |
| | | Vyara tiles | VYARA TILES Pvt Ltd./ Surat |
| | | BHARAT (NILSAN) | Bharat |
| | | Dazzle | Dazzle Designer Tiles Pvt Ltd |
| | | Shree | Shree Bharat Paver blocks |
| | | Basant Betons | Basant Betons,Hyd |
| 84 | Solar studs/ Median markers | 3M | 3M Science |
| | | Avery Dennison | Avery Dennison India Pvt Ltd. |
| | | Nikkalite | Nippon carbide Industires (USA) |
| 85 | Polycorbonate Convex mirrors, Rubberised road | Unique safety solutions | Unique safety solutions |
| 86 | Mirror | Modi Guard | Gujarat Guardian Ltd. |
| | | Saint Gobain | Saint Gobain Glass India Ltd. |
| | | AIS mirror | Asahi India glass Ltd. |
| | | Atul | Atul glass Industries Ltd., |
| 87 | Vitreous Commodes/ Wash basin | Hindware | HSIL Ltd |
| | | Roca | ROCA Bath room products |
| | | Parryware | ROCA Bath Pvt. Ltd. |
| | | Kohler | Kohler world wide |
| | | CERA | CERA Sanitaryware Ltd. |
| | | Jaquar | Jaquar Group |
| | | Johnson | Johnson |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 88 | Flushing Cistern | Parryware | ROCA Bath Pvt. Ltd. |
| | | Kohler | Kohler world wide |
| | | Hindware | HSIL Ltd. |
| | | CERA | CERA Sanitaryware Ltd. |
| | | Jaquar | Jaquar Group |
| | | Johnson | Johnson |
| | | Prayag | Prayag Polymer (Pvt.) Ltd. |
| 89 | SWR PVC Pipes & fittings | Supreme | Superme Industries Ltd |
| | | Astral | Astral polytechnik Ltd |
| | | Finolex | Finolex Industries Ltd. |
| | | Flowgard | Ashirwad PVC Pipes |
| | | Prince | Prince Pipes and fittings |
| 90 | Stainless Steel Kitchen Sink | Jhonson | Prism Jhonson Ltd |
| | | Diamond | Pheonix Appliances Pvt. Ltd. |
| | | Jindal | Centuary polytech |
| | | Nilkanth | Nilkanth |
| | | Nirali | Jyoti (India) metal Industries Pvt Ltd. |
| | | Hindware | HSIL Ltd |
| | | Silver shine | Blue stone sanitary Industries Pvt. Ltd. |
| | | Joyna | Joyna |
| | | Navkar | Shri Navkar Metals Ltd. |
| | | Franke | Franke India Ltd. |
| | | Futura | Futura Kitchen Sinks India Pvt. Ltd. |
| 91 | Centrifugally Caste (Spun) Iron Soil Pipes | Neco | Jayaswal Neco Ltd |
| | | SKF brand | SKF Industries |
| | | HEPCO | Hepco |
| | | Bengal Iron | Bengal Iron Corporation |
| | | RPMF | Raj Pattern Makers and Founders Pvt. Ltd. |
| 92 | PE-AL-PE Composite | Kitec | Kitec Industries (India) Pvt. Ltd. |
| 93 | G I Pipes | TATA | TATA Steel Ltd |
| | | Zenith | Zenith Birla (India) Ltd. |
| | | HISSAR | HISSAR |
| | | Jindal | Jindal Pipes Ltd. |
| 94 | G I Pipe fittings | Zoloto | Zoloto Industries |
| | | Unik | Unik malleables |
| | | HB | HB Industries |
| | | ICS | Shree samarth Engineers |
| 95 | Water supply Valves | Zoloto | Zoloto Industries |
| | | Leader | leader valves Ltd. |
| | | ARCO | Arco valves Pvt. Ltd. |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 96 | CPVC pipes and fittings | Supreme | Superme Industries Ltd |
| | | Finolex | Finolex Industries Ltd. |
| | | Astral | Astral polytechnik Ltd |
| | | Prince | Prince Pipes and fittings Ltd |
| | | Truflo | HIS Ltd. |
| | | Birla Aerocon | HIL Ltd. |
| | | Ashirwad | Ashirwad PVC Pipes |
| | | Flowgard | Flow Guard |
| | | Sudhakar | Sudhakar PVC Products Private Limited |
| 97 | PVC / HDPE water storage tanks | Sintex | Sintex plastic technology Ltd. |
| | | Vectus | Vectus Industries Ltd |
| | | Supreme | Superme Industries Ltd |
| | | Plasto water tank | RC plasto tanks & pipes Pvt Ltd |
| | | Storefit | Prince Pipes and fittings Ltd |
| 98 | DI (Ductile-Iron) Pipes | Electrosteel | Electrosteel |
| | | Jindal | Jindal |
| | | Tata Ductura | Tata Ductura |
| | | Electrosteel | Electro Steel Castings limited |
| 99 | DI Fittings | Electrosteel | Electrosteel |
| | | Jindal | Jindal |
| | | Tata Ductura | Tata Ductura |
| 100 | Water supply fixtures like bibcock, Shower panels | Jaquar | Jaquar Group |
| | | Parryware | Roca bath room products Pvt. Ltd. |
| | | Johnson | Prism Jhonson Ltd |
| | | MARC | MARK Showers |
| | | HINDWARE | HSIL Ltd |
| | | Prayag | Prayag Polymers (P) Ltd |
| | | CERA | CERA Sanitaryware Limited |
| 101 | Air release valve | Kirloskar | Kirloskar brothers Ltd |
| | | RBM | AFS Ltd. |
| | | Kartar | Kartar valves private Ltd. |
| 102 | Centrifugally (Spun) Cast Iron | Electrosteel | Electrosteel castings Ltd. |
| | | Lanco/Sripipes | Electrosteel castings Ltd. |
| | | Jindal | Jindal saw Ltd. |
| | | Kesoram | Kesoram Industries Ltd |
| 103 | Spun cast iron fittings | Neco | Jayaswal Neco Ltd |
| | | Kartar | Kartar Valves Private Ltd. |
| | | Electrosteel | Electrosteel castings Ltd. |
| | | Kapilansh Centrifugal | Kapilansh Dhatu Udyog(P)Ltd. |
| | | SKF brand | SINGHAL IRON FOUNDARY Pvt. Ltd |
| 104 | CI double flange sluice valve | Kirloskar | Kirloskar brothers Ltd |
| | | RBM | AFS Ltd. |
| | | Kartar | Kartar valves private Ltd. |
| | | IVS | Indian valves private Ltd. |
| | | Zoloto | Zoloto Industries |
| | | BURN | BURN |
| | | Leader | Leader valves Ltd. |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 105 | CI double flanged non return valve | Kirloskar | Kirloskar brothers Ltd |
| | | Fluidtech | Fluidtech |
| | | Zoloto | Zoloto Industries |
| 106 | Gun metal Valves | Zoloto | Zoloto Industries |
| | | Leader | Leader valves Ltd. |
| | | Sant | Sant valves Pvt Ltd |
| | | Audco | L&T Valves |
| 107 | PTMT/PVC water supply sanitary fittings, bib cocks, pillar cock | PEARL | Precision Products |
| | | Prayag | Prayag Polymers (P) Ltd |
| | | Supreme | Supreme Industries |
| 108 | RCC Pipes | Indian Hume Pipe | Indian Hume Pipe Ltd. |
| | | Madurai spun pipe | Madurai spun pipe company |
| | | Lakshmi Sood & Sood | Lakshmi Sood & Sood Pipe Co. |
| | | Jain & Co | Jain spun pipes Co. |
| | | Uday Indusrties | Uday Indusrties |
| 109 | CI/FRP/GRP Composite Manhole cover | Neco | Jayaswal Neco Ltd |
| | | HEPCO | Binay Udyog Pvt. Ltd. |
| | | BIC | Bengal iron corporation |
| | | Thermodrain | Thermoset Poly products (I) Pvt Ltd |
| 110 | SFRC/ FRP/GRP Composite Cover and grating | KK | KK Manhole and gratings Co Pvt Ltd. |
| | | Advent | Advent concrete vision |
| | | Kutty | Kutty Industries |
| | | Nu-TEC | Nu-Tech concrete products (P) Ltd. |
| | | Thermodrain | Thermoset Poly products (I) Pvt Ltd |
| 111 | Plastic Encapsulated Foot Rest | KK India | KK Manhole and gratings Co Pvt Ltd. |
| | | KGM | KGM Exports |
| | | Accurate Buildcon | Accurate Buildcon company. |
| 112 | Spun cast iron covers & gratings | Neco | Jayaswal Neco Ltd |
| | | Jagannath | Sri Jagannath Iron Foundry Pvt Ltd. |
| | | Kapilansh Centrifugal | Kapilansh Dhatu Udyog(P)Ltd. |
| | | SKF brand | SINGHAL IRON FOUNDARY Pvt. Ltd |
| 113 | Aluminium doors/windows sections | Hindalco | Hindalco Industries Ltd. |
| | | Jindal | Jindal Aluminium Ltd. |
| | | Padmavathi Extrusion | Padmavathi Extrusion Private Ltd. |
| | | Hyd | Hydro Extrusion |
| | | Omalco Extrusion | Omalco Extrusion Pvt. Ltd. |
| | | Bhoruka | Bhoruka Aluminium Ltd. |
| | | Indal | Indian Aluminium Ltd |
| | | ALTEZA | Aparna Craft Exteriors PVT Ltd |
| 114 | Aluminium systems/Anodised aluminium fittings for doors/windows | Define | Define Overseas Pvt. Ltd. |
| | | Schueco | Schueco India Pvt. Ltd. |
| | | Bhoruka | Bhoruka Aluminium Ltd. |
| | | Kawneer | Kawneer India |
| | | Hardima | Hardima sales corporation |
| | | Everite | Everite Agencies |
| | | Jyothi | Jyothi Industries |
| | | Sigma | Sigma Corporation |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 115 | Friction stay hinges | Earl Bihar | Earl Bihari Pvt. Ltd. |
| | | KINLONG | Kinlong Industries |
| 116 | EPDM Gaskets | Anand | Anand NVH products (P) Ltd. |
| | | Roop | Roop Polymers Ltd |
| | | Bohra | Bohra rubber Pvt Ltd. |
| | | Hanu | Hanu Industries |
| | | Amee Rubber | Amee Rubber Industries Pvt Ltd. |
| 117 | Silicon Gaskets | Sree Gaurav | Sree Gaurav Rubber products |
| 118 | Masking Tapes | 3M | 3M |
| | | Sun | Sun |
| | | Wonder polymer | Wonder Tape Industries |
| | | Roop | Roop Polymers Ltd |
| 119 | Water proofing compound | Fosroc | Fosroc India |
| | | Ferrous Crete | Ferrous Crete (India) Pvt. Ltd. |
| | | Sika | Sika India |
| | | MYK Schomburg | MYK Arments Pvt. Ltd. |
| | | Penetron | Penetron India Pvt Ltd |
| | | Dr. Fixit | Pidilite Industries |
| | | Accoproof | ACC Cements Ltd |
| | | Ardex Endura | Ardex Endura (India) Ltd |
| | | Alchemica | Alchemica Ltd. |
| | | Berger | Berger Paints India Limited |
| 120 | Membarane Water proofing system | BASF | BASF India Ltd |
| | | Ferrous Crete | Ferrous Crete (India) Pvt. Ltd. |
| | | STP Ltd | Shalimar Tar Products |
| | | MYK Schomburg | MYK Arments range of products |
| | | SmartCare Membranes | Asian paints |
| | | Dr Fixit | Pidilite Industries |
| | | Alchemica | Alchemica Ltd. |
| | | Ardex Endura | Ardex Endura Ltd |
| | | Hydro tech | Hydro tech Ltd |
| | | Membrane tech | Membrane tech Pvt Ltd |
| | | Asian Paints-Smart care Water proofing | Asian paints Ltd |
| | | Berger | Berger Paints India Limited |
| 121 | Chemical water proofing system | BASF | BASF India Ltd |
| | | Ferrous Crete | Ferrous Crete (India) Pvt. Ltd. |
| | | MC-Bauchemie | MC-Bauchemie India Ltd |
| | | Sika | Sika India |
| | | Sunanda speciality coating | Sunanda speciality coating Pvt Ltd. |
| | | Perma construction Aid | Perma construction Aid Pvt Ltd, |
| | | Fosroc | Fosroc India |
| | | Dr. Fixit | Pidilite Industries |
| | | Bond tuf | Bond tuf Construction Chemicals |
| | | Berger | Berger Paints India Limited |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 122 | Water stops | Hydrotite | Sika India |
| | | BASF | BASF India Ltd |
| | | Dr. Fixit | Pidilite Industries |
| | | Ardex Endura | Ardex Endura Ltd |
| | | Ferrous Crete | Ferrous Crete (India) Pvt. Ltd. |
| | | Hydroswell | Sika India |
| | | Berger | Berger Paints India Limited |
| 123 | Aluminium composite panels | Alucobond | 3A Composites India Pvt.Ltd. |
| | | Eurobond | M/S Euro panel products Pvt. Ltd |
| | | Aludecor | M/S Aludecor Lamination Pvt. Ltd |
| | | Reynobond | Reynobond |
| | | Alpolic | Alpolic |
| | | Alstrong | Alstrong |
| | | Hynadecor | Hynadecor |
| | | Alstone | Alstone |
| | | 4 Mann Aluminium composite panels | 4 Mann Industries Pvt.Ltd |
| 124 | PVC Perforated Pipes | Rex Polyextrusion | Rex Polyextrusion Ltd, |
| | | Akash Enterprises | Akash Enterprises |
| | | Zenplas Pipes | Zenplas Pipes Pvt. Ltd |
| | | Supreme | Supreme Industries |
| 125 | Play Equipements | Koochie Play | Koochie Play Systems Pvt. Ltd |
| | | Playworld Systems | Playworld Systems India |
| 126 | Structural Sealant | Dow corning | Dow corning India |
| | | Wacker | Wacker Silicones. |
| | | GE | GE Silicones |
| | | STP Ltd. | Shalimar Tar Products |
| | | Smart Care Sealant | Asian paints |
| | | Fosroc | Fosroc India |
| | | BASF | BASF India Ltd |
| 127 | Poly-sulphide sealant | Dr. Fixit | Pidilite Industries Ltd |
| | | Ferrous Crete | Ferrous Crete (India) Pvt. Ltd. |
| | | MYK Schomburg | MYK Arments Pvt. Ltd. |
| | | Pidilite | Pidilite Industries |
| | | STP | Shalimar Tar Products Limited |
| | | Fosroc | Fosroc India |
| | | Techseal | Choksey Chemical Pvt. Ltd |
| | | Tuff seal | Bondit construction Chemical |
| | | Berger | Berger Paints India Limited |
| 128 | Bitumen Impregnated Board | Shalitex | Shalimar Tar Products |
| 129 | Polyethylene backer rod | Supreme | Supreme industries |
| 130 | Weather Silicon makeand grade | Dow corning | Dow corning India |
| | | Momentive (GE) | GE Silicones |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 131 | GRC Jali | Terrafirma | Terrafirma GRC Industries |
| | | Ecovision | Ecovision Industries Pvt. Ltd. |
| | | Mahesh GRC | Mahesh Prefab Pvt Ltd. |
| 132 | Air transfer grills | Cool grills | Cool grills, Pune |
| | | Systemair India | Systemair India Pvt. Ltd.. |
| 133 | Ready made/ Gysum Plaster | Ferrous Crete | Ferrous Crete (India) Pvt. Ltd. |
| | | Gyproc Cute 100 | Gyproc India |
| | | Ultrtech | Ultra Tech Cement Ltd |
| | | Polyglaze | Evershine Build India Private limited |
| 134 | Steel Windows/Pressed Steel Frames | Madhu Industries | Madhu Industries |
| | | San Harvic | Sen-Harvic Windows Private Limited |
| | | NCL | NCL Industries |
| 135 | PVC Door Frames & Shutters | Rajshri | Rajshri Productions Pvt. Ltd. |
| | | Plastiwood | Plasiwood |
| | | Sintex | Sintex plastic technology Ltd. |
| | | Accucel | Accura Polytech Pvt.Ltd |
| 136 | PVC Flooring | LG Hausys | LG Hausys |
| | | Gerflor | Gerflor flooring |
| | | Armstrong | Armstrong World Industries |
| 137 | Grass Paver | Unistone | Unistone |
| | | Ultra | Ultra Ltd. |
| | | Basant Betons | Basant Betons Expirience Centre |
| | | Green Natural | Green Natural Products Pvt Ltd |
| 138 | FRP Door Frames & Shutter | Meena Fibre Glass. | Meena Fibre Glass |
| | | Duroplast | Duroplast Extrusion Pvt Ltd |
| | | Cactus | Cactus |
| | | Polyline. | Polyline |
| 139 | Non Metalic Floor Surface Hardners | Ironite | Ironite |
| | | Hardonite | Hardonite |
| | | FOSROC | Fosroc India |
| | | SIKA | SIKA India |
| | | BASF | BASF India Ltd |
| | | CICO | CICO Technologies Ltd. |
| | | Pidilite | Pidilite Industries Ltd |
| 140 | PU Enamel Metalic Paints on MS Structure & Epoxy paints (Premium Quality) | SKK | SKK Ltd |
| | | Akzonobel | Akzonobel |
| | | Asian | Asian Paints |
| | | Berger | Berger Paints India Ltd |
| | | MRF | MRF Paints |
| 141 | Rockwool/Glasswool insulation | Twigafiber | Twigafiber glass Ltd |
| | | Lloyd Insulation | Lloyd Insulation Ltd. |
| | | Supereme | Superme Industries Ltd |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 142 | Actactic Polypropylene (APP) Modfied Water proof Membrane | STP | Shalimar Tar Products |
| | | Ferrous Crete | Ferrous Crete (India) Pvt. Ltd. |
| | | Bitumat | Bitumat Co. Ltd |
| | | Pidititе | Pidilite Industries Ltd |
| | | Ardex Endura | Ardex Endura |
| | | Hydrotech Ltd. | Hydro tech Ltd |
| | | Berger | Berger Paints India Limited |
| 143 | Structural Glazing | Modi | Modi Guard |
| | | Saint Gobain | Saint Gobain Glass India Ltd. |
| | | Asahi | Asahi India glass Ltd. |
| | | Glaverbel | Glaverbel India |
| 144 | Sensor Based Auto flush Systems | AOS Systems | AOS Systems |
| | | TOTO | TOTO Ltd |
| | | Parryware | Parryware Sanitaryware |
| | | Hindware | HSIL Ltd |
| | | Grohe | Grohe |
| | | Jaquar | Jaquar Group |
| | | Kochier | Kochier |
| | | Cera | CERA Sanitaryware Limited |
| 145 | Float Valve (Ball Valve) | Prayag | Prayag Polymers (P) Ltd |
| | | Leader | Leader valves Ltd. |
| | | Zoloto | Zoloto Industries |
| | | IBP | IBP Industries |
| | | Arco | Arco valves Pvt. Ltd. |
| 146 | Spider Patch Fittings for Structural Glazzing | Dorma | Dormakaba |
| | | Sevax | Saint Gobain Glass India Ltd. |
| | | Kich | Kich India |
| | | Ozone | Ozone Ltd |
| | | Hafele | Hafele Ltd |
| 147 | Multi Walled Potycarbonate Roofing Sheets | Danpalon | Danpal Light architecture |
| | | Lexan GE | GE Lexan |
| 148 | Adhesive for AAC Block/Tiles | Ultratech | Ultra Tech Cement Ltd |
| | | Ardex Endura/Gold Star | Ardex Endura |
| | | Ferrous Crete | Ferrous Crete (India) Pvt. Ltd. |
| | | Bricklite | Bricklite Blocks Private limited |
| | | Polyglaze | Evershine Build India Private limited |
| | | Bond tuf | Bond tuf Construction Chemicals |
| | | Berger | Berger Paints India Limited |
| 149 | Aluminium Framework | MFE(MIVAN) | MIVAN |
| | | S-Form | S-Form |
| | | MFS | MFS |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 150 | EPDM Water Proofing Membrane | Smart Care | Asian Paints |
| | | Ferrous Crete | Ferrous Crete (India) Pvt. Ltd. |
| | | Pidilite | Pidilite Industries |
| | | STP | Shalimar Tar Products |
| | | Fosroc | Fosroc India |
| | | Berger | Berger Paints India Limited |
| 151 | PU Coating (UV Resistant Liquid Applied Coating) | Smart Care | Asian Paints |
| | | Pidilite | Pidilite Industries |
| | | BASF | BASF |
| | | Fosroc | Fosroc India |
| | | SIKA | SIKA India |
| | | Berger | Berger Paints India Limited |
| 152 | Polyurea Ultra | Smart Care/Ferrous Crete | Asian Paints |
| | | Ferrous Crete | Ferrous Crete (India) Pvt. Ltd. |
| | | BASF | BASF |
| | | SIKA | SIKA India |
| | | Pidilite | Pidilite Industries |
| | | Berger | Berger Paints India Limited |
| 153 | Modular Kitchen | Sleek | Asian Paints |
| | | Godrej | Godrej & Boyce Co. |
| | | Spacewood | Spacewood |
| | | Evoke | Evoke |
| 154 | High end Exterior Textures | Allura/Graniza Range | Asian Paints |
| | | SKK Brand | SKK Ltd |
| | | Berger | Berger Paints India Ltd |
| 155 | Acrylic Exterior Textures | Asian paints | Asian Paints |
| | | Berger | Berger Paints India Ltd |
| | | Akzonobel | Akzonobel |
| | | Ebco | Ebco |
| | | Nerolac | Nerolac Paints Ltd |
| 156 | Puff Insulations | Smart Care | Asian Paints |
| | | Lloyd Insulation | Lloyd Insulation (India ) Ltd |
| | | Fosroc | Fosroc India |
| | | BASF | BASF |
| | | Pidilite | Pidilite Industries Ltd |
| | | Supreme | Supreme Ltd |
| 157 | Galvolume sheet for roofing, cladding, Sandwitch panel | Lloyd Metal Craft | Lloyd Insulations. |
| | | Tata Blue Scope | Tata Bluescope |
| | | Bhushan | Bhushan steel |
| | | JSW | JSW |
| | | Essar | Essar group |

| Sl No. | Material Description | Brand | Make |
|---|---|---|---|
| 158 | Mechanical coupler for Reinforcement | Dextra | Dextra India Pvt. Ltd |
| | | Sanfield | Sanfield India Ltd |
| 159 | Stainless Steel bars | Sunflag Steel | Sunflag Iron & Steel Co.ltd |
| | | JSL | Jindal stainless limited |
| 160 | GRP Water tanks | Sintex | Sintex-BAPL Limited |
| | | Sovisy | Sovisy India Pvt.Ltd |
| | | Amitex | Amitex Enterprises |

PEDDU MURALI KRISHNA

Digitally signed by PEDDU MURALI KRISHNA
Date: 2025.06.30 11:52:36 +05'30'

**Dy.Chief Engineer / LM**

Annexure-A(1)

दक्षिण मध्य रेलवे
SOUTH CENTRAL RAILWAY
प्रमुख मुख्य इन्जिनीर कर्यालय/ PCE's Office
कार्य शाखा/ क / Works Branch
रेल निलयम / Rail Nilayam
सिकंदराबाद / Secunderabad
Ph.No. 040-27822004
Rly: 070- 86365
email:dyceworkshqscr@gmail.com

SCR-HQ0ENGG(SOR)/1/2020-Dy CE WORKS/SCR

दिनांक /Date. 28.08.2024

**CAO/C, CAO/RSP**
**CPM/ GS/ SC, BZA, GTL, HYB, GNT, NED,**
**Sr. DEN/Co-Ord/SC, BZA, GTL, HYB, GNT, NED,**
**Dy.CE/EWS/LGD, Sr.DEN/LGDS,**
**Dy.CE/TM/Lines/BZA, Dy.CE/CPOH/RYP.**

**Sub**: Guidelines for Procurement of TMT bars – Reg.

**Ref**: 1) RDSO letter no.WKS/67/VD/TMT dt 21.02.2022 (Copy enclosed).
2) Railway Board letter no. 2022/TK-II/22/7/1 dt 09.02.2022 (Copy enclosed)

****

RDSO Vide letter under **ref.2** above have **Decontrolled** the Vendor list for TMT bars stating that, these can be purchased from market based on the specifications. However RDSO shall continue to frame functional specifications, Schedule of Technical Requirements (STR) etc., for the all civil engineering items as per present practice and communicated the same to all Zonal railways vide **ref.1** above.

In this Connection, it is to mention that all Reinforcement steel (TMT bars) as per IS 1786 with latest amendments should be Procured from the following steel producers.

**1**. SAIL (Steel Authority of India ltd.)
**2.** VIZAG (Rastriya Ispat Nigam Ltd.)
**3**.TISCO (TATA Steel Ltd.)
**4.**JSW (JSW Steel Ltd.)
**5.**JSPL (Jindal Steel & Power Limited)
**6.** Any Other Steel Producer having Integrated Steel Plant (ISP), Using Iron Ore as basic raw material and having in-House Iron rolling facilities for production of steel through the process of **DRI-EAF, BF-BOF and Corex-BOF** only, duly following the RDSO guidelines issued Vide letter No.2022/TK-II/22/7/1 dt 09.02.2022 and **Schedule of technical requirements (STR) Doc.no. WK-G-8.1-1 Ver.1.3.**

This Issues with the approval of PCE

**Encl:** As above

28/08/2024

**(N.Anjaiah)**
**Dy.CE/Works**

**Copy to:** Dy.CVO/Engg for information & necessary action.

## H. Maintenance of Site records in contracts for ensuring quality of work :

**(Authority : PCE/SC Letter No. W.55/I/1/Quality control/Site records of dated : 26.05.2022.)**

List of registers required to be maintained commonly for **both building and bridge works** and **exclusively for Bridge works** is mentioned below.

**A. Common Registers to be maintained for both Buildings and Bridge works (18 registers).**

1. Site order book (E – 1123),
2. Field book (E – 1122),
3. Technical register,
4. Quality control register. {consists of (i) Tests for Cement Steel & Water, (ii) Sieve Analysis for CA & FA, (iii) Bulkage of sand, (iv) Bricks tests, (v) Compressive strength of Concrete cube register, (vi) Slump test and (vii) Timber test},
5. Cement register,
6. Steel register,
7. Wood work register,
8. Anti corrosive treatments register,
9. Other consumable items register,
10. Daily contractor's labour register,
11. Daily progress of work register,
12. Tools and plants of Contractor at site register,
13. Bill register (no annexure),
14. Hindrance Register,
15. Drawing issue register,
16. Piling Register,
17. Structural Steel Register,
18. RMC Register.

**B. Registers to be maintained exclusively for Bridge works (09 Registers).**

19. Grouting record register,
20. Cable profile register,
21. Permeability Concrete test register,
22. Pile passing register,
23. Well passing register,
24. Record of load testing of foundation,
25. Record of load testing of PSC Girders,
26. Camber Register,
27. Stressing cum Elongation register.

It shall be ensured that all registers duly completed and signed by both parties to the contract and should be submitted during passing of bills. A certificate mentioning that items for which payment is proposed are meeting the specifications passed the requisite tests and records thereof have been duly maintained.

**Encl:** Compiled list of site registers along with proformas :

**ANNEXURE - 6**

**SOUTH CENTRAL RAILWAY** DRM (W)'s Office,

(Division).....Location.....

**1.** 1st page shall be designated for General Information mentioned as under.

Register issued on :

Name of work :.....

Letter of Acceptance :.....

Contract Agreement No .....

Value of Work:.....

Revised Value of Work :.....

Date of Completion :.....

Extended date of Completion :.....

No. of Machine Numbered Pages :.....

**Railways Officials**

Senior Section Engineer.....Contact No.....

Asst. Divisional Engineer.....Contact No.....

Sr. Divisional Engineer.....Contact No.....

Divisional Engineer.....Contact No.....

**Contractor's Officials:**

Contractor's Authorised Representative : .....Contact No.....

Contract's Engineer.....Contact No.....

Signature of SSE/Works

Representative/Engineer

Signature of Contractor's Authorised

## I. Site Laboratory Establishment by Contractor :

**(Authority : PCE/SC letter No. W.496/Policy/Vol.IX of dated : 28.12.2021)**

The contractor should set up site laboratory within 45 days from the date of issue of letter of acceptance (LOA). If he/she does not setup site laboratory, the following penalty shall be imposed.

| Category | Value of Work | Penalty per Month in Rs. |
|---|---|---|
| a | Works costing upto Rs. 2.0 Crs. | No penalty |
| b | Works costing above Rs. 2.0 Crs and upto Rs. 5.0 Crs | 25,000/- |
| c | Works costing above Rs. 5.00 Crs | 50,000/- |

Equipment's required in site lab for above category of works is enclosed as Annexure – "7" & "8"

## J. Applicability of Stage payment for steel after receipt at site of work :-

**(Authority :- PCE/SC letter No. W.496/Policy/Vol.IX of Dt : 26.05.2022.)**

*******

Reimbursement of cost of steel on 75% of invoice value or at the rate of 75% of the quoted rate of steel in the contract, whichever is less, can be done to the contractor on his request, after steel is physically brought to the site and verified by engineer-in-charge at site. Proper accountal of the received quality at site is to be made by engineer-in-charge.

Annexure – "7"

List of Equipment to be provided by Contractor in site Laboratory
(For value of work costing above Rs. 2.0 Crs and upto Rs. 5.0 Crs.)

| Sl.No | Details | Nos. |
|---|---|---|
| 1 | Full set of IS sieves for testing of materials for Coarse aggregate, fine aggregate, soil and Blanket Materials as per IS code and as per RDSO guidelines along with sieve shaker and brushes. | 1 No. |
| 2 | Balance | |
| | a. Pan balance – upto 10kg capacity (with 1.0gm least count) | 1 No. |
| | b. Electronic/Digital balance upto 10 Kg capacity (with 1.0gm least count) | 1 No. |
| 3 | Concrete cube testing machine - 200 Tonne capacity | 1 No. |
| 4 | Slump testing apparatus with tamping rod | 2 Nos. |
| 5 | Concrete cube moulds 150 x 150 x 150mm | 12 Nos. |
| 6 | Levelling instrument with tripod & 2 Nos. of 4m high levelling staff | 1 No. |
| 7 | Weigh batch mixing unit | 1 No. |
| 8 | Screw gauge, Vernier caliper, Sprit level, Measuring tapes etc | 1 No. |

The above list is only tentative. Before commencement of work, the actual requirement will be given by the Engineer in charge depending on the nature of work. All equipment's and apparatus should be of IS approved brands and in case IS brand is not available these should be of well-known brands as per decision of the Engineer-in-charge.

Annexure – "8"

List of Equipment to be provided by Contractor in site Laboratory
(For value of work costing above Rs. 5.0 Crs)

| Sl.No | Details | Nos. |
|---|---|---|
| 1 | Full set of IS sieves for testing of materials for Coarse aggregate, fine aggregate, soil and Blanket Materials as per IS code and as per RDSO guidelines along with sieve shaker and brushes. | 1 No. |
| 2 | Balance | |
| | a. Pan balance – 10kg capacity (with 1.0gm least count) | 1 No. |
| | b. Electronic/Digital balance 10 Kg capacity (with 1.0gm least count) | 1 No. |
| 3 | Concrete cube testing machine - 200 Tonne capacity | 1 No. |
| 4 | Slump testing apparatus with tamping rod | 2 Nos. |
| 5 | Concrete cube moulds 150 x 150 x 150mm | 12 Nos. |
| 6 | Levelling instrument with tripod & 2 Nos. of 6m high levelling staff | 1 No. |
| 7 | Set of Soil testing equipment's as per IS codes | 1 No. |
| 8 | Set of Cement testing equipment's as per IS codes | 1 No. |
| 9 | Weigh batch mixing unit | 1 No. |
| 10 | Screw gauge, Vernier caliper, Sprit level, Measuring tapes etc | 1 No. |
| 11 | Rebound hammer apparatus | 1 No. |
| 12 | Digital Camera | 1 No. |

The above list is only tentative. Before commencement of work, the actual requirement will be given by the Engineer in charge depending on the nature of work. All equipment's and apparatus should be of IS approved brands and in case IS brand is not available these should be of well-known brands as per decision of the Engineer-in-charge.

## System improvements for maintaining Site records in contracts for ensuring quality of work -reg.

### A. Common Registers to be maintained for both Buildings and Bridge works (18 registers).

### SITE ORDER BOOK (E - 1123)

This book contains ….. Pages from page No……..to page No…….....

Sd
Sr.DEN/DEN

**Note:** 1. Site order book shall be opened for every agreement by Supervisor. The first entry should be of the date of mark out/commencement of work, which should be entered by Supervisor.

2. Pages should be machine numbered. The first page should indicate starting page and ending page and below which Sr.DEN/DEN will sign.

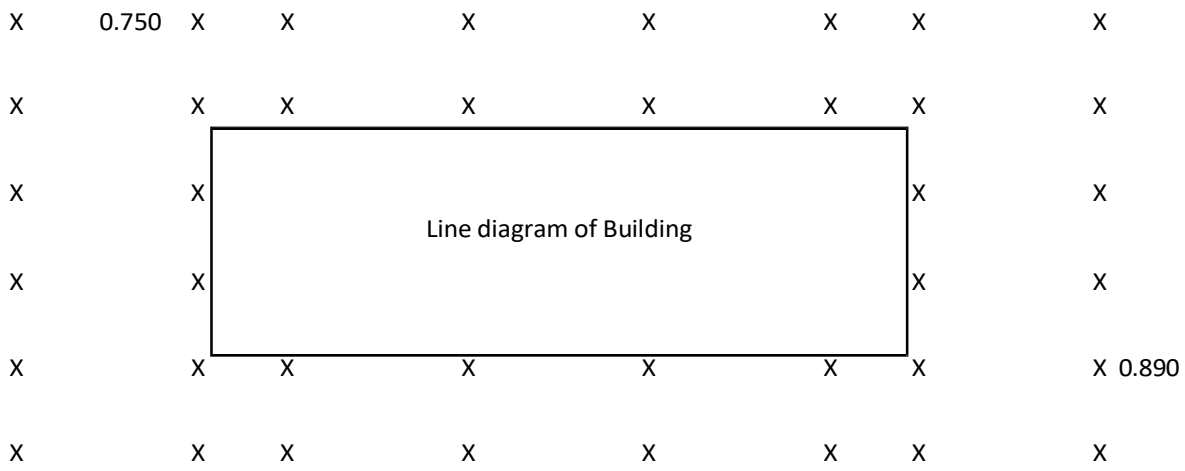
| Sl.No | Date | Instruction issued, with Signature and Designation of the inspection Official | Signature of the Executive subordinate | Signature of Contractor/Authorised Representative | Compliance Particulars |
|---|---|---|---|---|---|
| | | | | | |
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FIELD BOOK (E – 1122)

| S.No | Date | Particulars about quality of work, materials, workmanship and Qualification of assistance and helpers of Contractor | Signature of Site Engineer | Remarks |
|---|---|---|---|---|
| | | | | |
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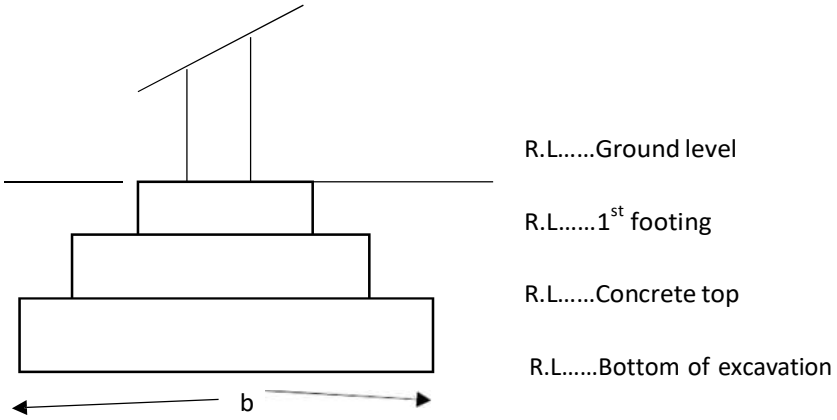
**TECHNICAL REGISTER**

1 Plan with initial ground levels shall be recorded in the register.




2. All initial ground levels, final levels after excavation and earth work calculations shall be recorded in technical register.

3. Foundation cross sections at every change of section shall be drawn with all details.



## TECHNICAL REGISTER

4. Bar bending schedule for all reinforcement work shall be recorded.

| S.No | Description | Shape of Bar | Dia. Of Bar | Cut length | No's Provided | Laps | Total Length | Total Weight | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
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| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

5. Any modifications from standard drawing or agreement shall be recorded in Technical register.

6. Any items or measurements which has no separate register, shall be entered in technical register.

**QUALITY CONROL REGISTER**

Note : 1. A separate page shall be opened for each test.

2. Date of testing shall be recorded for every test.

**Cement :**

| Date | Test | Value |
|---|---|---|
| | Fineness | |
| | Soundness | |
| | Initial Setting time | |
| | Final setting time | |
| | Compressive strength | |

**Steel :**

| Date of testing | S.No | Type and nominal Size of Bar | Carbon percent | Ultimate Tensile Stress | Yield Stress | Elongation Percent | Unit Weight |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
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**Quality Control Register**

Water :

| Date | S.No | Characteristics | Value |
|---|---|---|---|
| | 1 | Turbidity | |
| | 2 | Colour Haten units | |
| | 3 | Taste and odour | |
| | 4 | PH value | |
| | 5 | Total dissolved solids (mg/l) max. | |
| | 6 | Total hardness as CaCo3 (mg/l) max. | |
| | 7 | Chlorides as Cl2(mg/l) 250 | |
| | 8 | Sulphates as SO4(mg/l) max. | |
| | 9 | Fluorides as F(mg/l) max. | |
| | 10 | Nitrates as NO3(mg/l) max. | |
| | 11 | Calcium as Ca(mg/l) max. | |
| | 12 | Iron as Fe(mg/l) max. 0.3 | |
| | 13 | Zinc as Zn(mg/l) max. 5.0 | |
| | 14 | Mineral Oil(mg/l) max. 0.01 | |
| | 15 | Copper as Cu(mg/l) max. Toxic materials | |
| | 16 | Arsenic as As(mg/l) max. | |
| | 17 | Cadmium as Cd (mg/l) | |
| | 18 | Lead as Pb(mg/l) max 0.05 | |
| | 19 | Residual free chlorine | |

QUALITY CONTROL REGISTER

Coarse Aggregate :

| Date | Test | Value |
|---|---|---|
| | Deleterious materials & Organic impurities | |
| | Aggregate crushing value | |
| | Aggregate impact value | |
| | Aggregate abrasion value | |
| | Soundness | |

Sieve Analysis

| IS Sieve Designation | Percentage passing for single sized aggregate of nominal size. | | | | | | Percentage passing for graded aggregate of nominal size. | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 63 mm | 40 mm | 20 mm | 16 mm | 12.5 mm | 10 mm | 40 mm | 20 mm | 16 mm | 12.5 mm |
| 80 mm | | | | | | | | | | |
| 63 mm | | | | | | | | | | |
| 40 mm | | | | | | | | | | |
| 20 mm | | | | | | | | | | |
| 16 mm | | | | | | | | | | |
| 12.5 mm | | | | | | | | | | |
| 10 mm | | | | | | | | | | |
| 4.75 mm | | | | | | | | | | |
| 2.36 mm | | | | | | | | | | |

## Quality Control Register

Fine Aggregate :

Deleterious materials & Organic impurities:

Sieve Analysis

| Date | IS Sieve Designation | Percentage passing |
|---|---|---|
| | 10 mm | |
| | 4.75 mm | |
| | 2.36 mm | |
| | 1.18 mm | |
| | 600 microns | |
| | 300 microns | |
| | 150 microns | |

**Bulkage of sand** :

| Date of testing | Initial weight of Speciman | Weight after dried in oven | Difference in weight |
|---|---|---|---|
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Surface moisture content can be taken from IS 456 - 2000

**Quality Control Register**

Bricks :

| Date | Test | Value |
|---|---|---|
| | Compactness | |
| | Water absorption | |
| | Afforescences | |
| | Dimensions | |
| | Uniform colour (Yes / No) | |
| | Sharp, square corners and edges (Yes / No) | |
| | Free from cracks, chipped surfaces and broken corners (Yes / No) | |

Quality Control Register

Concrete

Compressive strength of Cubes :

| Sl.No | Date of Casting | Grade of Concrete | Description of Work | 07 Days Compressive Strength | | | | Average | Minimum Strength Required |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Due Date for 7 Days Strength | Test Results 07 Days | | | | |
| | | | | | a | b | c | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
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| 28 Days Compressive Strength | | | | Average | Minimum Strength Required | Sign of Rly. representative | Sign. Of Contractor | Remarks |
|---|---|---|---|---|---|---|---|---|
| Due Date for 28 Days Strength | Test Results 28 Days | | | | | | | |
| | a | b | c | | | | | |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
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Quality Control Register

Slump Test :

| Date of Testing | Location from Where Concrete Specimen collected | Slump value | | |
|---|---|---|---|---|
| | | Specimen 1 | Specimen 2 | Specimen 3 |
| | | | | |
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Timber :

| Date | Description of Door/Window/Ventilator | Well-seasoned (Yes/No) | Free from defects (Yes/No) | | | | |
|---|---|---|---|---|---|---|---|
| | | | Rots | Fungus attack | Split or twist | Dead knot | Sap wood |
| | | | | | | | |
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CEMENT REGISTER

| Sl.No. | Date | Cement Receipt Details | | | | Description of the item of work for which cement is consumed | Quantity consumed in bags | Balance quantity in bags | Signature of | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Brand | Date of Manufacturing | Bill No.& Date | Quantity received in bags | | | | Railway Engineer | Contractor/ Authorised Representative | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
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# STEEL REGISTER

NOTE:1. Separate page shall be opened for each diametre of bar.

| Sl.No. | Date | Reciepts | | | Issues | | Balance Quantity | Signature | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Brand Name | Bill No.& Date | Quantity received in Tonnes/Kgs. | Quantity consumed on date. | Reference Page No. of Bar-bending schedule. | | Railway Supervisor | Contractor/ Authorised Representative. | |
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WOOD WORK REGISTER

| Date of fixing | Description of Door/Window/ Ventilator | Numbers | Size | | Name of wood | Weather free from Defects (Yes/No) | Signature | | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | | | Frame | Shutter | | | Railway Engineer | Contractor/ Representative | |
| Example: | | | | | | | | | |
| 17/06/2005 | Main door | 1 | | | Neem | Yes | | | |
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Anti-corrossive Treatment Register.

| Date | Reciepts | | | Quantity consumed on date | Balance Quantity | Signature | | Description of the item of work for which Material is consumed | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | Brand Name | Bill No.& Date | Quantity received | | | Railway Engineer | Contractor/ Authorised Representative | | |
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# OTHER CONSUMABLE ITEMS REGISTER

Note :

1. A separate page shall be opened for each material.

| Date | Reciepts | | | Quantity consumed on date | Balance Quantity | Description of the item of work for which Material is consumed | Signature | | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | Brand Name | Bill No.& Date | Quantity received | | | | Railway Engineer | Contractor/ Authorised Representative | |
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## DAILY PROGRESS REPORT

| Date | Activity (1) | Activity (2) | Activity (3) | Activity (4) | Siganture | | Remarks |
|---|---|---|---|---|---|---|---|
| | | | | | Railway Engineer | Contractor/ Authorised Representative | |
| Example: 17/06/2005 | Earth work excavation at….location, approximate volume of work done…. | M20 RCC work at ….location, approximate volume of work done…… | …….. | | | | |
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NOTE: In major works number of items of work being operated at a time, in such cases each item of work shall be recorded in separate column with proper details.

DAILY CONTRACTOR's LABOUR REGISTER

| Date | Description of work | No. of Persons Engaged | | | Signature | | Remarks |
|---|---|---|---|---|---|---|---|
| | | Skilled | Semi - skilled | Unskilled | Contractor/ Authorised Representative | Railway Official | |
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TOOLS AND PLANTS OF CONTRACTOR - REGISTER

| Sl.No. | Date | Description of T&P | Quantity brought to site in Nos. | Date of deployment of T&P | Whether in working condition or not | Date on which T&P removed from site. | Signature | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Contractor | Railway Supervisor | ADEN | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
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Hindrance Register

| Sl. No. | Nature of Hindrance | Date of occurrence | Date of clearance | Period | Over Lapping Period if any | Weightage of Hindrance | Net Effective days of Hindrance | Remarks & References | Sign. of site Engineer with date | Contractor' s representative with Signature & Date |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
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Drawing issue Register

| Sl. No. | Drg. No. & Revision No. if any | Details of Drg. | Date of issue to the Contractor | Acknowledgement of Contractor/ Remarks | Signature of Railway Engineer |
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| 1 | 2 | 3 | 4 | 5 | 6 |
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Piling Register

| Sl. No. | Pile No. | Date of Boring | Date of Casting | Concrete Grade | Datum level | Depth from Datum | Socketing in Rocks | Level of Pile bottom | Cut off level | Payable Length | Liner top level | Liner bottom level | Payable length of liner | Sign. of site engineer with date | Contractor's representative with Signature & Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
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Structural Steel Register

| Sl.No. | Date of Receipt | Designation of Item | Source of Receipt & Chalan No./ Bill | Quantity Receipt (MT) | Cum. Qty Received (MT) | Details of MTC | Details of 3rd Party Test Report | Reference of Material passing Register | Item of work in which Consumed | Sign of Rly's Engineer with Date | Sign. of Contractor's Representative. with Date |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
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RMC Register

| Sl. No. | Date of Concreting | Location/ Structural/ | Estimated Quantity of Concreting | Transit Mixture No. & Qty. | Time of Loading | Time of arrival | Time of discharge Completion | Temperature | | Slump | | No. of Cubes/ Samples taken | Delivery Challan No. & its File Reference | Batch Report No. & its File Reference No. | Cement Content | | Type of Cement and Grade | Sign of Rly's Engineer with Date | Sign of Contractor's Representative with Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ambient | Concrete | Reqd. | Actual | | | | As per Approved Mix | As per Batch Report | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
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## B. Registers to be maintained exclusively for Bridge works (09 Registers).

| GROUTING RECORD | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bridge No: | | | | | | | | | | | | | | |
| Section: | | | | | | | | | | | | | | |
| Span No. | | | Grout Mixer No. | | | | Date of Casting | | | | | | | |
| Girder No. | | | Type of Grout Mixer | | | | Date of Pre-stressing | | | | | | | |
| Drawing No. | | | Pressure Gauge No. | | | | Date of Calibration | | | | | | | |
| Grout Pump No. | | | Temperature | | | | W/C Ratio | | | | | | | |
| Date of Grouting | | | | | | | | | | | | | | |
| Cable | | | Blockages - Yes/No | | | | Time | | Grouting OBS | | Cement Consumption | | Grouting Pressure | |
| No. | Length (M) | Duct Dia (mm) | Inlet | Outlet | Vents | Duct | Start | Finish | Vents | Outlets | Theo | Actual | Theo | Actual |
| 1 | | 75 | | | | | | | | | | | | |
| 2 | | 75 | | | | | | | | | | | | |
| 3 | | 75 | | | | | | | | | | | | |
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**CABLE PROFILE RECORDS**

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bridge No: | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Section: | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Span Details | | | | | | | | | | | | | Date of Casting | | | | | | | | | | | | | | |
| Girder No. | | | | | | | | | | | | | Date of Pre-stressing | | | | | | | | | | | | | | |
| Drawing No. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cable profile ordinates | DISTANCE (X) | X12= | X11= | X10= | X9= | X8= | X7= | X6= | X5= | X4= | X3= | X2= | X1= | X0= | X1= | X2= | X3= | X4= | X5= | X6= | X7= | X8= | X9= | X10= | X11= | X12= | |
| DATE | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CABLE NO:4 | As per GAD | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | As per Site | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CABLE NO:3 | As per GAD | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | As per Site | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CABLE NO:2 | As per GAD | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | As per SIte | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CABLE NO:1 | As per GAD | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | As per Site | | | | | | | | | | | | | | | | | | | | | | | | | | |

| PERMIABILITY TEST RECORD | | | | | | |
|---|---|---|---|---|---|---|
| Bridge No: | | | | | | |
| Section: | | | | | | |
| S.No. | Date of Casting | Grade of Concrete | Description of work | Date of test | Depth of permeabilty | Signature |
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Pile Passing Register

| Date of Casting | Location | Pile No. | Checking parameters | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Dia. of Shaft | Depth of Shaft from Bottom of Pile Cap | No. of bulbs if applicable | Dia. of Lower bulb if applicable | Dia. of Upper bulb if applicable | Horizontal Alignment | Vertical Alignment | Deviation | Direction |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
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| Remarks (Passed/ Failed) | Defects (If any) | Date of Rectification | Date of Re-Checking | Whether washed the bore to bring specific gravity of slush less than specified or not | Whether the Reinforcement is as per approved Drawings | Cover blocks and spacer rings are provided | Final Remaks (Passed/ Failed) | Sig. of Rly. Representative | Sig. of Contractor | Sig. of ADEN/ AXEN | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
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# Well Passing Register

PIER/ ABUTMENT NO: SHAPE OF WELL :

SIZE OF WELL: INITIAL CUTTING EDGE LEVEL :

**A) DURING DAILY SINKING:**

| Date | Tilt | Shift | Whether Tilt is within Permissible Limit | Whether Shift is within Permissible Limit | Correction Measures adopted for Tilt and Shift | After Correction | | Depth of Sinking from Bottom of Well Cap | Daily Progress of Well Sinking | | | Total Depth of Sinking | Signature of Railway Represenative | Signature of Contractor | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Tilt | Shift | | Starting Time | Ending Time | Depth of Sinking | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| | | | | | | | | | | | | | | | |

**B) PASSING OF WELL**

| Date | Final Tilt | Final Shift | Final Level of Cutting Edge | Actual Depth of Sinking from Bottom of Well Cap | Depth of Sinking as per Approved Drawing | Signature of Railway Represenative | Signature of Contractor | Remark s |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | | | | | | | |

C) BOTTOM PLUGGING

| Date | Final Level of Cutting Edge | Final Level of Bottom Plugging | Depth of Bottom Plugging below Cutting Edge | Final Level of top of Bottom Plugging | Approval of Chief Engineer before Bottom Plugging is obtained or Not |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| | | | | | |

## Record of Load Testing of Foundation

### C) General Load Test

| Date | Time | Initial Load in MT | Load added in MT | Total Load in MT | Settlement in MM (Dial Gauge Reading) | | | Remarks | Sig. of Rly. Representative | Sig. of Contractor |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | No.1 | No.2 | Average | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| | | | | | | | | | | |
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### D) Routine Vertical Load Test on Pile (IS: 2911- Part-4)

1) Date of Casting of Pile under test :
2) Date of Testing of Pile :
3) Diameter of Pile :
4) a) Safe load on Pile :
   b) Design load for testing of pile :
5) Driven depth of pile :
6) Pile No. :
7) Cement used :
8) Concrete Grade :
9) Cube Strength of :
   7 Days :
   28 Days :
10) Reinforcement used :
11) Type of Jack :
12) Pressure Gauge make :
13) Dial Gauge make and type :
14) Least count of Pressure Gauge :
15) Diameter of Jack Ram :
16) Area of Ram for 3 Jacks :
17) No. of Dial Gauges :
18) Least Count of Dial Gauge :
19) Duration of Stage Load increments :
20) Load Increment :
21) Maximum Settlement :
22) Rebound :
23) Net Settlement :

Record of Load Testing of PSC Girders

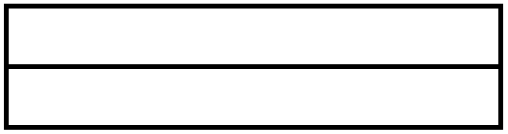
| Br. No. | Girders | | Least count of Dial Gauge | Load for Testing | Max Permitted Deflection | Max Observed Deflection |
|---|---|---|---|---|---|---|
| | Foot path side | Ballast retainer side | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | | | | |
| | | | | | | |

| Sl. No. | Day | Time | Loading/ Unloading | Dial Gauge Reading | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | End of Span Girders | | Middle of Span Girders | | End of Span Girders | |
| | | | | D1 | D2 | D3 | D4 | D5 | D6 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | | | | | | | | |
| | | | | | | | | | |

| Temperature Correction | Net Deflection | | | | | | % Recovery | Average % Recovery of Deflection for the Span |
|---|---|---|---|---|---|---|---|---|
| | End of Span Girders | | Middle of Span Girders | | End of Span Girders | | | |
| | D1 | D2 | D3 | D4 | D5 | D6 | | |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

# CAMBER REGISTER

| | |
|---|---|
| Bridge No: | |
| Section: | |




| SPAN | GIRDER NO. | A | B | C | CAMBER IN 'mm' {(A+B)/2} -C | Remarks |
|---|---|---|---|---|---|---|
| S1 | G1 | | | | | |
| | G2 | | | | | |
| | G3 | | | | | |
| S2 | G4 | | | | | |
| | G5 | | | | | |
| | G6 | | | | | |
| S3 | G7 | | | | | |
| | G8 | | | | | |
| | G9 | | | | | |
| S4 | G10 | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

## PRESTRESSING CUM ELONGATION RECORD

### GIRDER STRESSING REPORT

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bridge No: | | | | | | | | |
| Section: | | | | | | | | |
| Date of casting | | | | Date of Stressing | | | | |
| Girder No. | | | | Cable No. | | | | |
| Span Details | | | | Cube Strength | | | | |
| LRPC STRAND DETAILS | | | | DESIGN DATA (AS PER DRAWING) | | | | |
| S.No. | | | | GFC DWG No./Rev.No. | | | | |
| Actual MOE of strand | | | | Thea MOE of strand | | | | |
| Actual Area of C/s of Strand | | | | Thea Area of C/s. of Strand | | | | |
| Pre stressing Jack Details | | | | Design Elongation | | | | |
| Pre stressing Jack Ram Area | | | | Design Stressing Load | | | | |
| Jack Efficiency | | | | | | | | |
| Modified Elongation | | | = | Design Elongationx Theo Area of C/s Strand x Thea MOE of Strand | | | | |
| | | | | Actual area of Strand (A) X Actual Modulus of Elasticity € | | | | |
| Tolerance in Elongation | Max (+5%) | | | | | | | |
| | Min (-5%) | | | | | | | |
| | | | | | | | | |
| Modified Pressure (KG/CM2) | | | = | Stressing load in Ton x1000 | | | | |
| | | | | Ram Area x Jack eff. | | | | |
| Tolerance in Pressure | Max (+5%) | | | | | | | |
| | Min (-5%) | | | | | | | |
| | | | | | | | | |

| S.No. | Pressure (KG/CM2) | ELONGATION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Jack No . ( LHS End) | | | Jack No . ( RHS End) | | | Remarks |
| | | Piston Reading (MM) | Elongation (MM) | Cummulative Elongation (MM) | Piston Reading (MM) | Elongation (MM) | Cummulative Elongation (MM) | |
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| | | Lock Pressure = | | | | | | |
| A | | Zero correction in (MM) | | | Zero correction in (MM) | | | |
| B | | Slip after Locking (MM) | | | Slip after Locking (MM) | | | |
| | | Slip after 24 Hrs | | | Slip after 24 Hrs | | | |
| C | | Net Elongation each End | | | Net Elongation each End | | | |

## B. CONDITIONS FOR EXECUTION OF EARTH WORK

1. Specifications for earth works as per mentioned in IRUSS shall be followed Comprehensive guidelines & specifications for Rly formation as per specifications vide No. RDSO /2020/GE:IRS-0004,Sept.-2020 shall be followed.

2. Rate to be quoted by the contractors should be inclusive of Royalty, seignorages, taxes etc., complete as applicable is to the state concern.

3. Contractor required to quote the rate duly considering the royalty, seignorage charges as applicable in Telangana, Andhara Pradesh, Karnataka & Maharastra state and revision thereof from time to time.

4. B.C. Soil of any kind shall not be permitted. Tenderer should note that proper quality of earth may not be available at some locations. Hence, tenderer has to be careful and visit the location before quoting the tender.

5. The cess work will be carried out at the locations as indicated in the name of the works. If any change of quantity/location is required, prior approval of concerned Sr.DEN/ DEN before operation of this item and reasons for change of location shall be kept on record.

6. The Contractors are advised to inspect the site and availability of road facility / approaches before quoting their rate.

7. No extra payment will be made for jungle clearance and repairs to service road or for formation of road if required for leading/transporting of earth to cess location.

8. Payment for the earth work will be made to the quantity arrived based on cross sectional measurements duly making deductions as per specifications.

9. Before executing the work, concerned ADEN/SSE (Works/P.Way) should submit numbered level books from Divisional office and obtain numbering and signature of concerned Sr. DEN/ DEN, after that only initial levels should be recorded in level books and submitted to divisional office with Initial and proposed levels along with graph sheets duly signed by concerned SSE (Works/P.Way), ADEN and Contractor.

10. After completion of earth work, new level books should be collected from Divisional office and final levels should be recorded and the same should be submitted to Divisional office along with graph sheets duly signed by SSE(Works/P.Way), ADEN and Contractor.

11). The soft copy of graph sheets and calculations also submitted to Divisional office along with hard copy and shall be uploaded in IRWCMS along with running bills.

12). Concerned SSE (Works/P.Way) has to certify on each graph sheet that the slope provided is 2:1.

13). If level books not submitted vide above note No.1, 2 & 3, the bills cannot be considered by Divisional office.

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As per Hqrs letter No.W.CE/Br.Rehab/2019 dt 14.08.2019 and No.W.CE/Br.Rehab/2019 dt:25.09.2019 the field executives can avail the services from any of the below laboratories or NABL approved or ISO certified laboratories near by the locations.

| Sl.No | Name of the laboratory |
|---|---|
| 1 | Hyderabad test labs &Engineering Services ,Hyderabad |
| 2 | M/S Mangalam Consultancy Services Hyderabad |
| 3 | Ravi labs Hyderabad |
| 4 | Civil tech labs Hyderabad |
| 5 | S.K Consultancy and Laboratory Secunderabad |
| 6 | Amaravati labs ,Guntur |
| 7 | Sterdant Technoclinic Pvt Hyderabad |

भारत सरकार Government of India
रेल मंत्रालय Ministry of Railways
रेलवे बोर्ड (Railway Board)

आज़ादी का अमृत महोत्सव

G20 भारत 2023 INDIA

सं.2021/Tele/5(2)/3-Part(1)(3425647) नई दिल्ली, दिनांक: 12.06.2023

**The GM/CMD/MD/PCAO/CAO,**
**All Indian Railways, KRCL, PUs, CORE, COFMOW**
**(As per standard list)**

**The DGs/Directors**
**RDSO, NAIR, All CTIs**

**Sub.: Procedure for undertaking digging work in the vicinity of Signalling, Electrical and Telecommunication cables**

**Ref.: JPO issued vide Board's letter No.2003/Tele/RCIL/1Pt.IX dated 24.06.2013 (Telecom Circular No.17/2013)**

****

A Joint Procedure Order (JPO) for undertaking digging work in the vicinity of underground Signalling, Electrical and Telecommunication cables was issued last vide Board's letter No.2003/Tele/RCIL/1Pt.IX dated 24.06.2013 (Telecom Circular No.17/2013). Notwithstanding the provisions contained in the JPO for protection of cables, a significant number of cable-cut incidents and practical difficulties in implementation of certain provisions of the said JPO were reported.

Board, therefore, constituted a committee of SAG officers to revisit the JPO. Based on the recommendations of the committee, Board (MI) has approved broad guidelines for procedure to be adopted by Zonal Railways for protection of cables while undertaking digging work in their vicinity (**Annexure**). These guidelines are in supersession of JPO issued vide reference above.

Zonal Railways are requested to issue local instructions/guidelines/JPO implementing these broad guidelines within a month of issue of this letter. Zonal Railways may also ensure that these local instructions/guidelines/JPO are also made part of all tenders for works in the vicinity of cables in accordance with the instructions issued by Civil Engineering Dte of Railway Board vide letter No.2023/CE-I/EDCE(G)/Misc. Dated 18.04.2023.

DA: As above

12/6/23

(राकेश रंजन)
कार्यकारी निदेशक (दूरसंचार विकास)
दूरभाष: 011-47843012, 030-43012
ई.मेल: edtd@rb.railnet.gov.in

Copy to:

1. PSO to M(I) for kind information of Member/Infra
2. ED/SD, EDEE/M, EDCE/G, ED/GS/C-II for information & ensuring implementation of guidelines in letter & spirit
3. PCSTE, PCE & PCEE, All Indian Railways

**Annexure**

## Guidelines for protection of cables while doing work its vicinity

1. Cable route marking for all types of cable must be made available block section wise on Railnet.
2. Before allowing the contractor to work near the tracks, the work executing agency (like SrDSTE/SrDEN/SrDEE or DyCSTE/DyCEE/DyCE etc.) shall ensure that the permission has been granted by the division to the contractor in accordance with the local instructions / JPO to work in the vicinity of the cables. Zonal railways shall devise suitable mechanism and timelines for the obtaining/granting such permission.
3. In case of works being taken up by the State Government, National Highway Authority etc., zonal railways shall devise mechanism for shifting the cables or for proper protection of cables before granting permission to work.
4. The engineering control shall keep all the information regarding any works being done near the track. S&T and electrical control shall obtain this information from engineering control. These controls shall coordinate among themselves to ensure that no work is done in the vicinity of the track without proper permission.
5. The concerned SE/P.Way/SE/Works/SE/Sig/SE/Tele SE/Electrical (TRD or G) or RailTel supervisors supervising the work of the contractor shall ensure that the existing emergency sockets are not damaged due to their importance in providing communication during accident/emergency.
6. For all new works, cable shifting should be a mandatory part of DPR and estimate. For ongoing works, Zonal Railways may sanction works for cable shifting if necessary through contingency/supplementary/revised estimate where provision does not exist. However, in case zonal railways decide not to shift cables (due to any reason) then protection of cable shall be ensured by the zonal railways during execution of the work.
7. Penalty to be imposed for damages to cable shall be as under:

| **Cable damaged** | **Penalty per location** |
|---|---|
| Only Quad cable or Signaling cable | ₹ 1.0 Lakh |
| Only OFC | ₹ 1.25 Lakh |
| Both OFC & Quad | ₹ 1.5 Lakh |
| Electrical Cable | ₹ 1.0 Lakh |

8. Penalty should be levied on the contractor when they work without permission or resort to careless working without making arrangements for protecting cables and other utilities. Based upon the local conditions and practices, zonal railway shall devise its own conditions for examining and levying penalty. For each cable cut, a joint report at the level of supervisors should be prepared on the same day and it should become the basis for levying penalty and fixing responsibility. Joint note should be forwarded by SrDSTE/SrDEE to the executive in-charge of the work. The executive in-charge of the work shoud act and decide on the cable cut case within 15 days under information to SrDSTE/SrDEE as the case may be. There should be provision of appeal by contractors within one month of notice for levying penalty at ADRM level. Decision of ADRM shall be final and binding upon both parties.
9. Railways will not lodge FIR with RPF in cases of works being executed by authorized contractors of Railways who have been duly permitted to execute the works.
10. Zonal Railways shall issue local instructions/JPO for protection of cables while undertaking works in the vicinity of railway tracks in line with this guideline. Zonal Railways shall also ensure that such instructions become part of their tender document within one month of the issue of the local instructions. Suitable action against erring officials shall also be incorporated in these instructions if the same is not adhered to.

आज़ादी का अमृत महोत्सव

भारत सरकार Government of India
रेल मंत्रालय Ministry of Railways
(रेलवे बोर्ड Railway Board)

Azadi Ka Amrit Mahotsav

**No. 2023/CE-I/EDCE(G)/Misc.** **New Delhi, Dated: 18.04.2023**

**The General Managers,**
**All Zonal Railways.**

**Sub: Instructions for incorporating the JPO, Circular etc. provisions in the Tender Document for all Works requiring digging work close to Railway signaling, telecom, electrical etc. cables**

Ref: (i) No.2010/Tele/3(5)/1 Pt (3346793) New Delhi dated 29.09.22
(ii) Telecom Circular 17/2013 containing JPO for undertaking digging work in vicinity of Cables

Due to increase in cable cuts, a letter dated 29.09.22 under reference (i) above was written by Member (Infra) to all GMs advising the following:

i. Zonal Railways to take necessary steps to ensure strict compliance of JPO for undertaking any digging work in the vicinity of cables.
ii. Proper coordination among various departments undertaking any work near/along the track.
iii. Provision of utility relocation in the estimates and if the same is not existing, then the use of contingency provision for utility shifting/protection, apart from ensuring that the updated cable route plan are available and the marking of cable zone at sight is given before undertaking the work.

Further during Oral Evidence before PAC for one of the audit paras regarding recovery of penalty over SER and WCR for cable cut cases, PAC has taken a serious view of non implementation of JPO Provisions by Zonal Railways.

In view of above, it is advised that the provisions contained in circulars, JPOs regarding penalties should be included in all the Tender Documents for Works requiring digging close to Railway signaling, telecom, electrical etc. cables so as to bind them legally for ensuring recoveries from them.

18.04.2023
(गौरव)

निदेशक सिविल इंजी.(जी)/रेलवे बोर्ड
[Rly No. 030-47598, MTNL No. 011-23047598]
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