

**Name of work :- RepairsTo Residential Quarters atTin Darvaja Type- C And
Category B-12 And B-18 Ta. Dharampur Dist- Valsad**

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

1.0 PREAMBLE:-

1.1 The Technical Specifications contained herein shall be read in conjunction with the other Bidding Documents as specified in this Volume.

1.2 Site Information:-

1.2.1 The information given here under provided elsewhere is given in good faith by the Employer but the Contractor shall satisfy himself regarding all aspects of site conditions and no claim will be entertained on the plea that the information supplied by the Employer is erroneous or insufficient.

2.0 GENERAL REQUIREMENTS:-

The technical specifications in accordance with which the entire work described herein after shall be constructed and completed by the Contractor shall comprise of the "SPECIFICATION"

2.1 Though "SPECIFICATION" for each item are attached with tender they are based on following.

(1) "SPECIFICATION FOR ROAD AND BRIDGE WORKS" (Fifth REVISION printed in year 2013) issued by the Ministry of Road Transport & Highways (MORT & H), Government of India and Published by the Indian Roads Congress, hereinafter to as MORT & H Specifications.

(2) The General Technical Specifications for Road works.

(3) The General Technical Specifications for Bridge works.

Note:- (2) To (3) are Conventional Specifications Booklets usually attached for (R&B) Works.

2.2 If, a particular clause (which is incorporated in "SPECIFICATION") of specification booklets (1) to (3) above is Amended / Modified/ Added upon then the Amendment/ Modification/Addition shall supersede the relevant clause incorporated in " SPECIFICATION"

2.3 In, so far as Amended / Modified / Added Clause may come in conflict or be inconsistent with any of the provisions of the MORT & H Specifications under reference, the Amended/Modified/ Added Clause and the additional specifications shall always prevail.

2.4 In the absence of any definite provisions on any particular issue in the aforesaid Specifications, reference may be made to the latest codes and specification, of IRC and BIS in that order. Where even these are silent, the construction and completion of the works shall conform to sound engineering practice as approved by the 'Engineer' and , in case of any dispute arising out of the interpretation of the above, the decision of the 'Engineer' shall be final and binding on the Contractor.

Quality Control for Road Works

GENERAL

901.1 All materials to be used, all methods to be adopted and all works to be performed shall be strictly in accordance with the requirements of these Specifications. The Contractor shall set up a field laboratory at locations approved by the Engineer and equip the same with adequate equipment and personnel in order to carry out Quality Control for works and all the required tests as per Specifications and/or as directed by the Engineer. The provision and maintenance of the laboratory shall be as per Clause 120 and/or as directed by the Engineer. The list of equipment and the facilities to be provided shall be got approved from the Engineer in advance.

901.2 The Contractor's laboratory shall be manned by a qualified Materials Engineer/Civil Engineer assisted by experienced technicians, and the set-up should be got approved by the Engineer.

901.3 The Contractor shall carry out quality control tests on the materials and work to the frequency stipulated in subsequent paragraphs. In the absence of clear indications about method and or frequency of tests for any item, the instructions of the Engineer shall be followed.

901.4 For satisfying himself about the quality of the materials and work, quality control tests will also be conducted by the Engineer (by himself, by his Quality Control Units or by any other agencies deemed fit by him), generally to the frequency set forth hereunder. Additional tests may also be conducted where, in the opinion of the Engineer, need for such tests exists.

901.5 The Contractor shall provide necessary co-operation and assistance in obtaining the samples for tests and carrying out the field tests as required by the Engineer from time to time. This shall include provision of laboratory equipment, transport, consumables, personnel including labour attendants, assistants in packing and dispatching and any other assistance considered necessary in connection with the tests.

901.6 For the work of embankment, subgrade and pavement, construction of subsequent layer of same or other material over the finished layer shall be done after obtaining permission from the Engineer. Similar permission from the Engineer shall be obtained in respect of all other items of works prior to proceeding with the next stage of construction.

901.7 The Contractor shall carry out modifications in the procedure of work, if found necessary, as directed by the Engineer. Works falling short of quality shall be rectified/ redone by the Contractor at his own cost, and defective work shall also be removed from the site of works by the Contractor at his own cost.

901.8 The cost of laboratory building including essential supplies like water, electricity, sanitary services and their maintenance and cost of all equipment, tools, materials, labour and incidentals to perform tests and other operations of quality control according to the Specification requirements shall be deemed to be incidental to the work and no payment

shall be made for the same. If, however, there is a separate item in the Bill of Quantities for setting up of a laboratory and installing testing equipment, such work shall be paid for separately.

901.9 For testing of soils/soil mixes, granular materials and mixes, bituminous materials and mixes, cement concrete materials and mixes, aggregates, cores etc., samples in the required quantity and form shall be supplied by the Contractor at his own cost.

901.10 For cement, bitumen, steel, emulsion, road marking paint, sign boards, geo-synthetics and similar other materials where essential tests are to be carried out in the presence of Engineer at the manufacturer's plants or at laboratories other than the site laboratory, the cost of samples, sampling, testing and furnishing of test certificates shall be borne by the Contractor.

Manufacturer's test certificate together with invoice or delivery challan shall be furnished for every lot of supply apart from tests to be conducted at site laboratory for prime properties of the material like cement, bitumen, etc. Where facilities for testing of materials are not available at site laboratory the same shall be tested at an outside laboratory in the presence of the Engineer. For specialized items such as sign boards, road marking paint, etc. the Engineer may order for third party test from an approved laboratory.

901.11 The method of sampling and testing of materials shall be in accordance with the requirements of the relevant Indian Standards and these Specifications. Where they are contradicting, the provisions in these Specifications shall be followed. Where they are silent, sound engineering practices shall be adopted. The sampling and testing procedure to be used shall be as approved by the Engineer and his decision shall be final and binding on the Contractor. The cost of all tests shall be borne by the Contractor.

901.12 The materials for embankment construction shall be got approved from the Engineer. The responsibility for arranging and obtaining the land for borrowing or exploitation in any other way shall rest with the Contractor who shall ensure smooth and uninterrupted supply of materials in the required quantity during the construction period.

Similarly, the supply of aggregates and other materials for construction shall be from sources approved by the Engineer. Responsibility for arranging uninterrupted supply of materials from the source shall be that of the Contractor.

901.13 Defective Materials

All materials which the Engineer has determined as not conforming to the the Contract shall be rejected whether in place or not; they shall be removed immediately from the site as directed. Materials, which have been subsequently corrected, shall not be used in the work unless approval is accorded in writing by the Engineer. Upon failure of the Contractor to comply with any instruction of the Engineer, the Engineer shall have authority to cause the removal of rejected material and to deduct the removal cost thereof from any payments due to the Contractor.

901.14 Imported Materials

The Contractor shall furnish a list of materials/finished products manufactured, produced or fabricated outside India which he proposes to use in the work. The Contractor shall not be entitled to extension of time for acts or events occurring outside India and it shall be the Contractor's responsibility to make timely delivery to the job site of all such materials obtained from outside India.

The materials imported from outside India shall conform to the relevant Specifications of the Contract. In case where materials/finished products are not covered by the Specifications in the Contract, the details of laboratories/establishments where tests are to be carried out shall be specifically brought out and agreed to in the Contract.

The Contractor shall furnish to the Engineer a certificate of compliance of the tests carried out. In addition, certified mill test reports clearly identified in the lot of materials shall be furnished at the Contractor's cost.

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ITEM WISE SPECIFICATION

- Item No. 1 Providing and fixing to wall ceiling and floor 10.0 Kg. F/Cm² working pressure poluthene pipes of the following outside Dia. Low density, complete with special falnge compression type fittings, wall clipsetc. including making good the wall ceiling and floor.(G)110 mm
- The relevant specifications of Building Booklet It. No.23.8./ Page No.162 shall be followed expect use 110 mm Rain water pipe 10.00Kg F/CM² and other end socketed with rubber ring, & fittings conforming to ISI 14735-1999 of approved make for drainage system pipe line, pipe shall be jointed with each other with rubber lubricant, pipe shall be fixed shall be concealed instead of 50mm dia & 6 kgs/sq.cm. working pressure polythene pipes
- Item No. 2 Excavation for foundation upto 1.5 m depth including sorting out and stacking of useful materials and disposing off the excavated stuff upto 50 Meter lead.(A) Loose or soft soil
- The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.4.0.0.(A)/ P.No.29.
- Item No. 3 Providing and laying cement concrete 1:3:6 (1-Cement : 3- coarse sand : 6- hand broken stone aggregates 40 mm nominal size) and curing complete excluding cost of formwork in (A) Foundation and Plinth
- The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.5.3.2 (B)/ P.No.39.
- Item No. 4 Providing and fixing pre-cast Rubber Dye / steel Dye inter locking concrete block 60mm thick with grade of concrete M300 pneumatic compressed / vibrated mechanically and as per approved design Confirming to IS 15658 : 2006 including 35 mm Sand layer for levelling and filling the joint with sand in proper line and level as per guidlines of IRC : SP 63-2018 etc. Complete.
- The inter locking concrte block 60mm thick with locking concrete M 300 punmatic compressed by mechanically pressed and as per approved design including 35mm sand layer for levelling and filling the jointst with sand in proper line and level.
- The 60mm thick precast rubber dye inter locking concrete block shall be of approved quality having M 300 punmatic compressed by mechanically pressed shall be as approved by the Engineer in charge. The fixing of paver block shall be on 35mm thick sand layer, bedding including ramming and fitting with line and level shall be in proper manner including directed by Engineer in charge, as per specifications and sample of paver block shall be approved by the Engineer in charge of work.
- The item shall be measured and paid on Sq.m. basis.

- Item No. 5 Providing and Laying homogenous Grey cement based concrete kerbing of size 30 cm x 30 cm x 10 cm size as per detailed drawing having grade of concrete M25 grade, including necessary excavation, BBCC 1:5:10 7.5 cm as per detailed drawing fixing in line and level, filling joints in CM 1:3 with smooth finished, white washing three coats etc. complete as directed by Engineer in charge.

Precast concrete kerb stone shall be hard even sound, and regular in shape. Broken kerb stone or damaged one with cracks shall not be allowed for use.

The precast kerb stone shall be of size as specified or as approved by the Engineer. It shall be 30 cm x 30 cm x 10 cm size made from cement concrete M 250 grade. The precast kerb stone shall have flat plain surface. When brought on site, the precast kerb stone shall be in good condition.

WORKMANSHIP

Excavation for kerb block as required and as directed by the Engineer shall be carried out as per detailed relevant specifications of It. No. 1 of this contract. Bick bat cement concrete in proportion of 1:4:8 and 10 cm thick bedding shall be carried out as per the relevant specifications of general technical specification for building work booklet Item No.5.3.3/ page No. 39. The kerb stone shall be erected in position in true line and level. The Joints between two blocks shall be filled with cement slurry and joint shall be flushed.

MODE OF MEASUREMENT & PAYMENT:

The unit rate shall include the cost of all material, labour charges for excavation & fixing, cost of BBCC, tools and plant required, placing blocks in position and all other incidental expenses required to complete the work. The work shall be measured in running meter.

The payment will be made on **running meter** basis.

- Item No. 6 Providing laying (to level or slopes) and jointing reinforced concrete Light duty non-pressure pipes I.S. class NP2 of the following internal diameter with collars and butt ends prepared for collar joints including testing of joints complete.(D) 300mm

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.24.22.(D) P.No.177

- Item No. 7 Providing and laying controlled cement concrete M-250 and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in Footing and Mass concrete

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.5.8.3.(A) P.No.47 except that using for including the cost of form work for G.FLOOR instead of excluding the cost of form work.

For form work use the relevant specification shall be followed as per General Technical specification for Building work booklet It.No.9.1 (A) P.No.63

Consolidated item shall be measured and paid for actual size of RCC member casted on Cubic meter basis.

- Item No. 8 Compaction and finishing of cement concrete road by trimix M.250 process providing extra Labour charges for the trimix vacume dewatering service process on cement concrete road surface by using vacuum dewatering pump floater surface vibrator including making groves and rough finish to surface including leveling etc complete.

Specification No. 5.8.2 Page No.47 of Specification Booklet for Building work shall be applied for this work.

2.1 Proportioning of materials for the mix

The mix shall be proportioned with a maximum aggregate cement ratio of 15 1. The water content shall be adjusted to the optimum as per Clause 600.1.3.3 for facilitating compaction by Surface floater.

2.2 Moisture content

The right amount of water for the lean concrete in the main work shall be decided so as to ensure full compaction under rolling and shall be assessed at the time of rolling the trial strength. Too much water will cause the lean concrete to be heaving up before the wheels and picked up on the wheels of the roller and too little will lead inadequate compaction, a low in-situ and an open-textured surface.

2.3

The optimum water content shall be determined and demonstrated by floating the surface during trial length construction. While laying the mix in the main work, the lean concrete shall have a moisture content between the optimum and optimum +2 per cent, keeping in view the effectiveness of compaction achieved and to compensate for evaporation losses.

2.4 Cement content

The minimum cement content in the concrete shall not be less than 150 kg cum of concrete. If this minimum cement content is not sufficient to produce concrete of the specified strength, it shall be increased as necessary without additional cost compensation to the Contractor.

2.5 Concrete strength The average compressive strength of each consecutive group of 5 cubes

made in accordance with Clause 903.5.1.1 shall not be less than 10 MPa at 7 days. In addition, the minimum compressive strength of any individual cube shall not be less than 7.5 MPa at 7 days. The design mix complying with the above Clauses shall be got approved from the Engineer and demonstrated in the trial length construction.

3.0 Construction

3.1 General

The pace and programme of the lean concrete sub-base construction shall be matching suitable with the programme of construction of the cement concrete pavement only after 7 days after sub-base construction.

3.2

Plasticizer Conplast p 211 @ 100ml per bag of cement water reducing concrete admixture at 100ml per bag of cement and Recron 3 S fiber (reliance product) shall be mixed at the rate of 125 gram per bag of cement including making channel 100mm X 50mm required to level and slope and thickness of the concrete road levelling of placed concrete with surface vibrator and finishing

with power floater shall be done floater and trowel light booming the surface shall be done expansion joints shall be cut as directed

4. MIXING

- 4.1 Dry coarse and fine aggregate and cement shall then be mixed thoroughly by turning over to get a mixture of uniform colour.
- 4.2 Enough water shall then be added gradually and the mass turned over till a mix of required consistency is obtained. In case of hand mixing quantity of cement shall be increased by 10 per cent above the specified. The quantity of water shall be just sufficient to produce a dense concrete of required workability for the purpose.
- 4.3 The concrete shall be mixed in a mechanical mixer.at the site of work hand mixing may however be allowed for smaller quantity of work if approved by Engineer in charge. When hand mixing is permitted by the engineer in charge in case of breakdown of machineries and in the interest of the work. Mixers which have been out of use for more than 30 minutes shall be thoroughly cleaned before putting a new batch. Unless otherwise agreed to be the Engineer in charge the first batch of concrete from the mixer shall contain only two thirds of normal quantity of coarse aggregate. Mixing paint shall be thoroughly cleaned before changing from one type of cement to another.
- 4.4 The method of transporting and placing concrete shall be approved by the Engineer in charge. Concrete shall be so transported and placed so that contamination segregations or loss of its constituent material takes place.All formwork and reinforcement contained in it shall be cleaned and made free from standing water dust snow or ice immediately before placing of concrete.No concrete shall be placed in any part of the structure until the approval of the Engineer in charge has been obtained.
- 4.5 Mixing shall be done on a smooth watertight platform large enough to allow efficient turning over the ingredients of concrete before and after adding water .Mixing platform shall be so arranged so that no foreign material shall get mixed with concrete nor does the mixing water flow out.
- 4.6 Cement in required number of bags be placed in a uniform layer on top of the measured quantity of fine and coarse aggregate which shall also be spread in a layer of uniform thickness on the mixing platform.
- 4.7 Unless otherwise agreed to by the engineer in charge concrete shall be dropped into place from a height exceeding 2 meters.When chutes are used the shall be kept clean and used in such a way as to avoid segregation.When concreting has to be resumed on a surface which has hardened it shall be roughened kept clean thoroughly wetted and covered with a 13mm thick layer of mortar composed of cement and sand in the same ratio as in the concrete mix itself.This 13mm layer of mortar shall be freshly mixed and placed immediately before placing of new concrete. Where concrete has not fully hardened all laitance shall be removed scrubbing the wet surface with wire or bristle brushes care being taken to avoid dislodgement of any particles of coarse aggregate.the surface shall then be thoroughly wetted all free water removed and coated with neat cement grout.the first layer of concrete to be placed on this surface shall not exceed 150mm

in thickness and shall be well rammed against old work particular attention being given to corners and close spots.

4.58

If concreting is not started within 24 hours of the approval being given, it shall have to be obtained from the engineer in charge. Concreting being given it shall proceed continuously over the area between construction joints. Fresh concrete shall not be placed against concrete which has been in position for more than 30 minutes unless a proper construction joint is formed. Concrete shall be compacted in its final position within 30 minutes of its discharge from the mixer unless carried in properly design agitators operating continuously when this time shall be within 2 hours of the addition of cement to the mix and within 30 minutes of its discharge from the agitator. Except where otherwise agreed to be the engineer in charge concrete shall be deposited in horizontal layers to a compacted depth of not more than 0.4 S meter when internal vibrators are used and not exceeding 0.3 meter in all other cases

4.9

In the case of reinforced concrete work workability shall be such that the concrete surrounds and properly grips all reinforcement. The degree of consistency which shall depend upon the nature of work and methods of vibration of concrete shall be determined by regular slump tests. Following slump shall be adopted for different types of works. Type of work vibrators used slumps Where vibrators are used Where are not

Type of work vibrators used	slumps	
Mass concrete in RCC foundation s footings and retaining walls	10 25 mm	80mm
Beams slabs and columns simply reinforced	25 40mm	100 120mm
Thin RCC section or section with mm congested steel	40 50mm	120 150mm

5.1.

When concreting has to be resumed on a surface which has hardened, it shall be roughened, swept, clean, thoroughly wetted and covered with a 13 mm. thick layer of mortar shall be freshly mixed and placed immediately before placing of new concrete. Where concrete has not fully hardened, allegiance shall be removed by scrubbing the well surface with wire or bristle brushes, care being taken to avoid dislodgement of any particles of coarse aggregate. The surface shall then be thoroughly wetted, with neat cement grout. The first layer of concrete to be placed on the ls surface shall not exceed 150mm.in thickness, and shall be well rammed against old work particular attention being given to corners and close spots.

6.0 Transporting and Placing the Concrete

6.1

The concrete shall be handed from the place of mixing to the final position in not more than 15 minutes by the method as directed and shall be placed into its final position compacted and

finished within 30 minutes of mixing with water i.e. before the setting commences.

6.2 The concrete shall be laid in layers of 15 cms to 20 cms.

6.3 All concrete shall be compacted to produce a dense homogeneous mass with the assistance of vibrations, unless otherwise permitted by the Engineer in charge for exceptional cases, such as concreting under water, where vibrators can not be used. Sufficient vibrators in serviceable condition shall be kept at site so that spare equipment is always available in the event of break downs.

6.4 Placing Lean concrete shall be laid or placed by a paver with electronic sensor. The equipment shall be capable of laying the material in one layer in an even manner without segregation, so paving machine shall have high amplitude ramping bars to give good initial compaction to the sub-base.

At longitudinal or transverse construction joints, unless vertical forms are used, the edge of compacted material shall be cut back to a vertical face where the correct thickness of the properly compacted material has been obtained.

7.0 Curing

7.1 Immediately after compaction, concrete shall be protected against harmful effects of weather, including rain, running water, shocks vibrations traffic rapid temperature charges frost and driving out process shall be covered with wet jute bags or the similar absorbent material approved by the Engineer in charge soon after the initial set, and shall be kept continuously wet for a period of not less than 14 days from the date of placement. Masonry work over the foundation concrete may be started after 48 hours of its laying but the curing of concrete shall be continued for a minimum period of 14 days.

7.2 After the final set, the concrete shall be kept continuously wet if required by pounding for a period of not less than 7 days from the date of placement. Hard and bitter water shall not be used for curing.

7.3 Traffic

No heavy commercial vehicles like trucks and buses shall be permitted on the lean concrete sub base after its construction. Light vehicles if unavoidable may however be allowed after 7 days of its construction with prior approval of the engineer.

8.0 Contraction joints

8.1 Contraction joints shall consist of a mechanical sawn joint groove 3x20 mm and $\frac{1}{4}$ to 1 3 depth of the slab + 5 mm or -5 mm or as stipulated in the drawings and shall be cut by concrete cutter machine.

8.2 The contraction joint shall be cut as soon as the concrete has undergone initial hardening and is hard enough to take the load of joint sawing machine without causing damage to the slab.

8.3 The line of the joint within the tolerances given in clause 600.2.6.2.1 and at such depth below the surface as will not impede the passage of the finishing straight edges or oscillating beams of the paving machines. The adjacent slabs shall be completely separated from each other by providing joint filler board. Space around the dowel bars, between the sub base and the filler board shall be packed with a suitable compressible material to block the flow of cement slurry.

9.1 Longitudinal joint

The longitudinal joints shall be machine cut as per details of the joints shown in the drawing. The groove may be cut after the final set of the concrete. Joints should be sawn to at least 1/3 the depth of the table +5mm or – 5 mm as indicated in the drawing.

10.0 Mode of Measurement and Payment

10.1 The payment shall be made on **SQMT** basis of the finished work

10.2 The necessities labour material Equipments tools and plant conveyance including loading And unloading etc shall be provided by the contractor as directed by engineer in charge.

10.3 The item shall be measured for its **length and width** limiting damnation in this specified on this plan or as directed .

10.4 The rate shall be for a unit of one **SQMT** .

Item No. 9 Providing TMT Bar FE 500D reinforcement for R.C.C. work including bending, binding and placing in position complete upto floor two level

1.0. GENERAL

This work shall consist of furnishing and placing TMT Fe-500D Conforming to IS 1786 2008 reinforcement, bars (intentioned) of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer in charge.

2.0. MATERIAL

2.1. TMT Bars

Reinforcements may be either TMT Fe-500D tensile steel, high strength deformed bars. They may be uncoated or coated with epoxy or with approved protective coatings.

2.2. T.M.T. bars reinforcement for R C C work shall conform IS 432 (Part II) 1966 and shall be of tested quality. It shall also comply with relevant part of IS 456-1966

2.3. All reinforcement shall be clean and free from dirt, paint, grease or oil, all scale or loose or thick rust at the time of placing

2.4. All steel shall be procured from original producers no re-rolled steel shall be incorporated in the work

2.5. Only new steel shall be delivered to the site every bar shall be inspected before placing to its position and defective brittle or burnt bar shall be discarded cracked ends of bars shall be discarded

3.0. Pitch

3.1. Distance between bars shall be as specified in drawings and as directed by the Engineer in Charge all bars shall be placed at an accurate distance from each other and shall be bind tightly to maintain the desired pitch Suitable means shall be provided for holding bars securely in position

4.0. Binding wire

4.1. Mild steel binding wire shall be of 1.63 mm or 1.22 mm (16 to 18 gauge diameter and shall conform IS 280-1972

4.2. The use of black wire will be permitted for binding reinforcement bars. It shall be free from dirt, paint, grease or oil, oil scale or loose or thick rust and any other undesirable coating which may prevent adhesion of cement mortar at the time of binding

4.3. Only new binding wire shall be delivered to the site all binding wire shall be inspected before binding to its position and defective brittle, rusted, used wire, shall be discarded

5.0. PROTECTION OF REINFORCEMENT

5.1. Uncoated reinforcing steel shall be protected from rusting or chloride contamination. Reinforcements shall be free from rust, mortar, loose mill scale, grease, oil or paints. This may be ensured either by using reinforcement fresh from the factory or thoroughly cleaning all reinforcement to remove rust using any suitable method such as sand blasting, mechanical wire brushing, etc. as directed by the Engineer. Reinforcements shall be stored on bricks, racks or platforms and above the ground in a clean and dry condition and shall be suitably marked to facilitate inspection and identification.

5.2. Portions of uncoated reinforcing steel and dowels projecting from concrete shall be protected within one week after initial placing of concrete with a brush coat of neat cement mixed with water to a consistency, of thick paint. This coating shall be removed by lightly tapping with a hammer or other tool not more than one week before placing of the adjacent pour of concrete. Coated reinforcing steel shall be protected against damage to the coating. If the coating on the bars is damaged during transportation or handling and cannot be repaired, the same shall be rejected.

6.0. Workmanship

6.1. The work shall consist of furnishing and placing reinforcement to the shape and dimensions shown as on the drawings or as directed by The Engineer in charge.

6.2. Reinforcing steel shall conform accurate to the dimensions given in the bar bending schedules shown on relevant drawing

7.0. BENDING OF REINFORCEMENT

7.1. Bar bend g schedule shall be furnished by the Contractor and got approved by the Engineer before start of work.

7.2. Reinforcing steel shall conform to the dimensions and shapes given in the approved bar bending Schedules.

7.3. Bars shall be bent cold to the specified shape and dimensions or directed by the Engineer using a proper bar bender operated by hand power to obtain the correct radius of bends and shape.

Bars shall not be bent or straightened in a manner that will damage parent material or the coating bars bent during transport or handling shall, be straightened before being used on work and shall not be heated to facilitate straightening.

8.0. PLACING OF REINFORCEMENT

8.1. The reinforcement cage should generally be fabricated in the yard at ground level, and then shifted and placed in position. The reinforcement shall be placed strictly, in accordance with the drawings and shall be assembled in position, only when structure is otherwise ready for placing of concrete. Prolonged time gap, between assembling of reinforcements and casting of concrete, which may result in rust formation on the surface, shall not be permitted.

8.2. Reinforcement bars shall be placed accurately in position as shown on the drawings. The bars, crossing one another shall be tied together at every intersection with binding wire (annealed), conforming to IS 280 to make the skeleton of the reinforcement rigid such that the reinforcement does not get displaced during placing of concrete, or any other operation. The diameter of binding wire shall not be less than 1 mm.

8.3. Bars shall be kept in position usually by the following methods

In case of beam and slab construction, industrially produced polymer cover blocks of thickness equal to the specified cover shall be placed between the bars and formwork subject to Satisfactory evidence that the polymer composition is not

harmful to concrete and reinforcement. Cover blocks made of concrete may be permitted by the Engineer, provided they have the same strength and specification as those of the member.

8.4. In case of dowels for Columns and walls the vertical reinforcement shall be kept in position by means of timber templates with slots in them accurately, or with cover blocks tied to the Reinforcement Timber templates shall be removed after the concreting has progressed up to a level just below their location.

8.5. Layers of reinforcements shall be separated by spacer bars at approximately One meter intervals. The minimum diameter of spacer bars shall be 12 mm or equal to maximum size of main reinforcement or maximum size of coarse aggregate, whichever is greater. Horizontal reinforcement shall not be, allowed to sag between supports.

8.6. Necessary stays, blocks, metal chairs, spacers, metal hangers supporting wires etc, or other subsidiary, reinforcement shall be provided to fix the reinforcements firmly in its correct position.

8.7. Use of pebbles, broken stone, metal pipe, brick, mortar or wooden blocks etc as devices for positioning reinforcement shall not be permitted.

8.8. Bars coated with epoxy or any other approved protective coating shall be placed on supports that do not damage the coating. Supports shall be installed in a manner such that planes of weakness are not created in hardened concrete. The coated reinforcing steel shall be held in place by use of plastic or plastic coated binding wires especially manufactured for the purpose.

8.9. Placing and fixing of reinforcement shall be inspected and approved by the Engineer before concrete is deposited.

9.0. Lapping

9.1. All reinforcement shall be furnished in full lengths as indicated on the drawing. No splicing of bars, except where shown on the drawing; will be permitted without approval of the Engineer. The lengths of the splice shall be as indicated on drawing or as approved by the Engineer. Where practicable, overlapping bars shall not touch each other, and shall be kept apart by 25 mm or 1 1 1 4 times the maximum size of coarse aggregate, whichever is greater, If this is not feasible, overlapping bars shall be bound with annealed steel binding wire, not less than 1 mm diameter and twisted tight in such a manner as to maintain minimum clear cover to the reinforcement from the concrete surface. Lapped splices shall be staggered or located at points, along the span where stresses are low.

10.0. Welding

10.1 Splicing by welding of reinforcement will be permitted only if detailed on the drawing or approved by the Engineer. Weld shall develop an ultimate strength equal to or greater than that of the bars connected.

10.2. While welding may be permitted for T.M.T. reinforcing bars conforming to IS 432, welding of deformed bars conforming to IS 1786 shall in general be prohibited. Welding may be permitted in case of bars of other than S 240 grade including special. Welding grade of S 415 grade bars conforming to IS 1786, for which necessary chemical analysis has been secured and the carbon equivalent (CE) calculated from the chemical composition using the formula

$$CE = \frac{C}{6} + \frac{Mn}{6} + \frac{Cr}{5} + \frac{Mg}{5} + \frac{V}{5} + \frac{Ni}{15} + \frac{Cu}{15}$$

is 0.4 or less.

10.3. The method of welding shall conform to IS 2751 and IS 9417 and to any supplemental specifications to the satisfaction of the Engineer

10.4. Bars shall be bent cold to the specified shape and dimensions or as directed by Engineer in charge using the proper bender tool, operated by hand or power to attain proper radius of bends. Bars shall not be bent or straightened in a manner that will injure the material. Bars bent during transport or handling shall be straightened before being used in the work. Bars shall not be heated to facilitate bending

10.5. Unless otherwise specified a 'U' type hook at the end of each bar shall invariably be provided to main reinforcement. The radius of the bend shall not be less than twice the diameter of the round bar and the length of the straight part of the bar beyond the end of the curve shall be at least four times of the diameter of the round bar. In case of bars which are not round and in case of deformed bars, the diameter shall be taken as the diameter of circle having an equivalent effective area. The hooks shall be suitably encased to prevent any spalling of the concrete

10.6. All reinforcement bars shall be accurately placed in exact position shown on the drawings and shall be securely held in position during placing of concrete by annealed binding wire not less than 1 mm in size and by using say blocks or metal chairs spacers, metal hangers, supporting wires or other approved devices at sufficiently close intervals. Bars shall not be allowed to sag between supports not displaced during concreting or any other operations of the work. All devices used for positioning shall be of non-corrodible material. Wooden and metal supports shall not extend to the surface of the concrete, except where shown in drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing shall not be allowed. Pieces of broken stone or brick and wooden blocks shall not be used. Layers of bars shall be separated by spacer bars, pre-cast mortar blocks or other approved devices. Reinforcement after bending 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 concrete already placed. To prevent reinforcement from corrosion, concrete cover shall be provided as indicated on drawings. All bars protruding from concrete and to which other bars are to be lapped and which are likely to be exposed for a period exceeding 10 days shall be protected by a thick coat of neat cement grout

10.7. Bars crossing each other where required shall be secured by binding wire (annealed) of size not less than 1 mm in such a manner that they do not slip over at the time of fixing and concreting.

As far as possible bars of full length shall be used. In case this is not possible, overlapping of bars shall be done as directed by the Engineer in charge. When practicable overlapping bars shall not touch each other, but be kept apart by 25 mm. Where no feasible overlapping bars shall be bound with annealed wires not less than 1 mm thick twisted tight. The overlaps shall be staggered for different bars and located at points along the span where neither shear nor bending moments is maximum.

10.8. Whenever indicated on drawing or desired the Engineer in charge bars shall be jointed by coupling which shall have a cross section sufficient to transmit the full stresses of bars. The end of the bars that are jointed by coupling shall be upset for sufficient length so that the effective cross section at the base of threads is not less than the normal cross section of the bar. Threads shall be standard threads. Steel for coupling shall conform to IS 226

10.9. When permitted or specified on the drawings joints of reinforcement bars shall be butt-welded so as to transmit their full stresses. Welded joints shall preferably be located at points where steel will not be subject to more than 75 percent of the maximum permissible stresses and welds shall be staggered so that at any one section not more than 20 percent of the rods are welded. Only electric arc

welding using a process which excludes air from the molten metal and conforms to any or other special provisions for the work shall be accepted Suitable means shall be provided for holding bars securely in position during welding It shall be ensured that no voids are left in welding and when welding is done in two or three stages previous surface shall be cleaned properly Ends of bars shall be cleaned of all loose scale rust stages paint and other foreign matter before welding Only competent welders shall be employed on the work. The M S electrodes used for welding shall conform IS 814 Welded pieces of reinforcement shall be tested. Specimen shall be taken from the actual site and their number shall frequency to test shall be as directed by the Engineer in charge

11.0 MODE OF MEASUREMENTS and PAYMENT

For the purpose of payment the bar shall be measured correct up to 10 mm length and weight payable works out at the rate specified below

Sr. No	Diameter of steel	weight of steel per running meter	Sr.	No
	Diameter of steel	weight of steel per running meter		
1	6 mm	0.22 Kg Rmt 8	20 mm	2.47 Kg Rmt
2	8 mm	0.39 Kg Rmt 9	22 mm	2.98 Kg Rmt
3	10 mm	0.62 Kg Rmt 10	25 mm	3.85 Kg Rmt
4	12 mm	0.89 Kg Rmt 11	28 mm	4.83 Kg Rmt
5	14 mm	1.21 Kg Rmt 12	32 mm	6.31 Kg Rmt
6	16 mm	1.58 Kg Rmt 13	36 mm	7.99 Kg Rmt
7	18 mm	2.00 Kg Rmt 14	40mm	9.86 Kg Rmt

Excess consumption over 5% will be charged at penal rate.

Reinforcement shall be measured in length including hooks, if any, separately for different diameters as actually used in work, excluding overlaps. From the length so measured, the weight of reinforcement shall be calculated in tonnes on the basis of IS 1732. Wastage, overlaps, couplings, welded joints, spacer bars, chairs, stays, hangers and annealed steel wire or other methods for binding and placing shall not be measured and cost of these items shall be deemed to be included in the rates for reinforcement..

The contract unit rate for coated uncoated reinforcement shall cover the cost of material, fabricating, transporting, storing, bending, placing, binding and fixing in position as shown on the drawings as per these specifications and as directed by the Engineer, including all labour, equipment, supplies, incidentals, sampling, testing and supervision.

The unit Rate for coated reinforcement shall be deemed to also include cost of all material, labour, tools and plant, royalty, transportation and expertise required to carry out the work. The rate shall also cover sampling, testing and supervision required for the work. No Payment shall be given for Lap.

The rate shall be for a unit of One Kg.

- Item No. 10 Steel work, welded in built up sections framed work including cutting, hoisting, fixing in position and applying a priming coat of red lead paint & two coat oil paint. (A) In beams and joists, channels angles Tees, flats, with connecting plates or angle cleats as in main and cross beams. Hip and jack rafters, purlins connected to common rafters and the like..

The item shall be executed as per the relevant specification of General Technical Specification for Building Works It. No.11.4.(D) P.no 81+ It. No.19.7 P.no 138

- Item No. 11 Providing and fixing of Ridge flashing for roof panel shall be made out of 0.5 mm thick pre coated GI sheet . The Precoated sheet shall be of minimum 240 mpa steel grade confirming to IS 14246:1995 and shall have zinc coating of minimum 120 gsm as per IS:277:1992 , 5-7 microns epoxy primer on both side of the sheet and polyester top coat 15-18 micron. The PPGI Sheet shall have plastic protective guard film of minimum 25 microns to avoid scratches during transportation. The ridge shall be fixed to the steel members by pop rivet or self drilling/self stitching fastners @ maximum 450 mm c/c along length of capping/flashing etc complete .

The item shall be executed as per the relevant specification of General Technical Specification for Building Works It. No.15.1 P 104 except pre coated GI Sheet 0.50mm instead of 0.80mm Corrugated GI Sheet

Signature of the contractor

Deputy Executive Engineer,
Dharampur (R&B) Sub Division
Dharampur

Executive Engineer,
Valsad (R&B) Division
Valsad

- : SCHEDULE FOR TESTING OF MATERIALS :-

For ensuring quality control and workmanship Various tests prescribed below for materials shall be taken at periodical intervals as stipulated below. The materials shall be got tested at Government recognized Laboratory (R&B) or field Laboratory of GERI (R&B) for which 1% of the estimated amount put to tender shall be recovered from the contractor from the RA bills and final bills and the testing charges shall be paid to the GERI by the Government . However if the charges increase over 1% no excess recovery shall be made from the contractor as per resolution of B & C department dated 10th May 1985 vide TNC/ 1085/ (4)/

It. No. as per schedule "B"	Brief description of materials to be tested	Qty of material	Prescription of test which shall be carried out	Frequency at which test shall be carried out	Total No of test to be taken.
1]	Coarse Aggregate		- Gradation test - Impact value - Flakiness and elongation	1 to 100 cm 1 test 100 to 500 cm 3 test 500 to 1500 cm 5 test 1500 to 5000 cm 7 test Minimum 1 test/ work	
2]	Grit		- Stripping value	As above	
3]	Granular materials		- Gradation - Atterbeg limits	As above	
4]	Murum		- P I Value	One test per 50 cum.	
5]	Sand/ quarry spall		- Silt content - Gradation - CBR test	One test per work/ season One test per 200 cmt. One test per work	
6]	Asphalt		1 Penetration test as per IS 1203 2 Ductility test as per IS 1208 3 Specific gravity test as per IS 1202 4 Softening point test as per IS 1204 5 Viscosity test as per IS 1206	1 to 10 tanker 1 11 to 20 tanker test 21 to 50 " 2 51 to 100 " test Remaining every 50" 3 test 4 test 1 test	

7]	Cement		<ul style="list-style-type: none"> - Consistency - Setting time - Compressive strength - Fineness - Chemical analysis - Soundness 	Up to 50 MT 100 MT 200 MT 300 MT 500 MT 800 MT 1300 MT	1 test 2 test 3 test 4 test 5 test 6 test 7 test and 8 test for larger consignment	
8]	CC Cubes		<ul style="list-style-type: none"> - Compressive Strength (I.S. 519 – 1959) 	1 to 5 cms 6 to 15 cms 16 to 20 cms 21 to 50 cms 51 and above	1 No 2 No 3 No 4 No 4 + 1 (For each additional 50 m ³ or part thereof)	
9]	Water		<ul style="list-style-type: none"> - Chemical test 	Once for approval of source of supply		
10]	Steel		<ul style="list-style-type: none"> - Tensile Strength - Yield Stress - Elongation - Size 	1 test/ 40 tonnes/ per category		
11]	Bricks		<ul style="list-style-type: none"> - Water absorption - Efflorence - Size - Compressive Strength 	1 test per 50,000 bricks		
12]	Prime coat/ Tack coat		<ul style="list-style-type: none"> - Quality of binder - Binder temperature for application - Rate of spread of binder 	Number of samples per lot and test as per IS:73 At regular close intervals Two test per 500 m ² and not less than two test per day		
13]	Carpet and Seal coat mix/ B.M/ M.S.S.		<ul style="list-style-type: none"> - Quality of binder - Grading - Temperature of binder 	Number of samples per lot and test as per IS:73 1 test on individual contents and mix aggregate from the dryer for each 100 tonns of mix subject to minimum of two test per plant per day At regular close intervals		

			<ul style="list-style-type: none"> - Binder content vide 45 IMD 2172 - Rate of spread of mix materials 	<p>One test for each 100 tonnes of mix subject to mini. of Two per day</p> <p>Regular control through checks on layer thickness</p>	
14]	Granular Sub-base	''''''	<ul style="list-style-type: none"> - Gradation - Atterberg limits - Moisture content prior to compaction - Density of compacted layer - Deleterious constituents - C.B.R. 	<p>As mentioned under serial number 3</p> <p>As mentioned under serial number 3</p> <p>As mentioned under serial number 3</p> <p>One test per 500 m²</p> <p>As required</p> <p>As required</p>	
15]	Wet Mix Macadam		<ul style="list-style-type: none"> - Aggregate Impact Value - Grading - Flakiness and Elongation Index - Atterberg limits of portion of aggregate passing 425 micron sieve - Density of compacted layer 	<p>As mentioned under serial number 1</p> <p>As mentioned under serial No.1</p> <p>As mentioned under serial number 1</p> <p>As mentioned under serial number 3</p> <p>One test per 500 m²</p>	
16]	Water Bound Macadam		<ul style="list-style-type: none"> - Aggregate Impact Value - Grading - Flakiness Index and Elongation index - Atterberg limits of binding material - Atterberg limits of portion of aggregate passing 425 micron sieve 	<p>As mentioned under serial number 1</p> <p>As mentioned under serial No.1 As mentioned under serial number 1</p> <p>As mentioned under serial number 1</p> <p>As mentioned under serial number 1</p>	
17]	Earthwork		<ul style="list-style-type: none"> - Sand Content [IS: 2720 (Part-4)] - Plasticity Test[IS:2720 (Part-5)] 	<p>2 tests per 3000 cubic metres of soil</p> <p>2 tests per 3000 cub. metres of soil.</p>	

			<ul style="list-style-type: none"> - Density Test [IS:2720 (Part-8)] - Moisture Content Test [IS :2720 (Part-2)] - CBR Test 	<p>2 tests per 3000 cubic metres of soil. One test for every 250 cubic metres of soil.</p> <p>One CBR test for every 3000 cum. at least or closer as and when required by the Engineer.</p>	
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The Number of tests will be as per Manual of quality control or latest Govt. G.R./Circular and it will be considered final

The contractor shall have to pay 1% of the estimated cost put to tender towards all testing of materials and the same shall be deducted from their bills for the works.

Testing charges of GERI shall be borne by Govt. No refund be made nor extra charges over 1% shall be recoverable from the contractor.

If directed by the Engineer in charge, the materials intended to be used for the work but not included in the above schedule shall also be got tested at Government recognized Laboratory or field Laboratory.

Signature of Contractor

Deputy Executive Engineer
Dharampur (R&B) Sub Division
Dharampur

Executive Engineer
Valsad (R&B) Division
Valsad