

Name of work : Maintenances and Repairs to Various Bridge Structure under Bharuch (R&B) Division, Bharuch.

APPLICABLE SPECIFICATIONS

Item No.	Item of work	Applicable specification of Government Technical Standard Building Specification Book Item No & Page No.
1	2	3
1	Diversion of water course, providing cofferdam and bund or island as may be necessary for foundation and maintaining the same for the period as may be necessary. (F) Abutment Left (including returns/ wing walls)	As per separate sheet attached
2	Providing flood gauge marks on substructure as per design including painting complete.	As per separate sheet attached
3	Providing masonry steps with Cement Pointing on approaches as directed.	As per separate sheet attached
4	Clearing and grubbing road land including uprooting rank vegetation, grass bushes, shrubs, sapling and trees girth up to 300 mm removal of stumps of trees cut earlier and disposal of unserviceable materials (C) By mechanical means in area of light jungle.	As per separate sheet attached
5	Excavation for foundation in sand, gravel, clay soft soils and murrum etc. including shoring, Strutting dewatering as necessary and disposing of the excavated stuff as directed.(A) Depth upto 3.0 M. and lead upto 100m for 10 Cum	As per separate sheet attached
6	Excavation for foundation in hard murrum and boulders and very stiff or sticky, clays and other similar strata including shoring and strutting and dewatering as necessary and disposing of the excavated stuff as directed .	As per separate sheet attached
7	Excavation in large boulders and soft rock by welding including shoring, strutting and dewatering as necessary and disposing of the excavated stuff as directed.	As per separate sheet attached
8	Excavation in hard rock by dry-wet blasting and chiselling including dewatering preparing foundation base by proper benching and stepping and disposing of the excavated stuff as directed.(B) prohibited Blasting. work.	As per separate sheet attached
9	Providing and laying boulders apron on riverbed for protection against scour with stone boulders weighing not less than 40 kg each complete as per drawing and Technical specification. A) Boulder laid dry without wire crates.	As per separate sheet attached

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10	Providing and casting in situ Ordinary cement concrete M-150 for RCC. Raft and cut-off walls including necessary shuttering laying, vibrating, ramming and curing complete.	As per separate sheet attached
11	Providing and casting in situ-controlled cement concrete M-300 for RCC. return as per drawings including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete. (B) Height from 0.0 to 5.0 M. (1) Piers (2) Abutment (3) RCC return	As per separate sheet attached
12	Providing and casting in situ-controlled cement concrete M-300 for RCC. return as per drawings including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete. (B) Height from 5.0 to 10.0 M. (1) Piers (2) Abutment (3) RCC return	As per separate sheet attached
13	Providing and casting in situ-controlled cement concrete M-300 for RCC. return as per drawings including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete. (B) Height from 10.0 to 15.0 M. (1) Piers (2) Abutment (3) RCC return	As per separate sheet attached
14	Scaffolding: - Providing, erecting and dismantling safe H frame and / pipe scaffolding including working platform for external area of bridge pier to facilitate all works etc. completed, Measurement for payment shall be considered as per detailed specification. (Property of contractor, and repetitions will be paid per pier) (for Every 1 m extra height, increase the rate by 50 rupees/ meter height) A) up to 5.0 mt	As per separate sheet attached
15	Portable Barricade in Construction Zone (Installation of a steel portable barricade with horizontal rail 300 mm wide, 2.5 m in length fitted on a 'A' frame made with 45 x 45 x 5 mm angle iron section, 1.5m in height, horizontal rail painted (2coats) with yellow and white stripes, 150 mm in width at an angle of 45°, 'A' frame painted with 2 coats of yellow paint, complete as per IRC:SP:55-2001)	As per separate sheet attached
16	Dismantling the existing structure including removing and stacking the dismantled materials as and where directed. (A) RCC. work	As per separate sheet attached

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17	Repair of crash barrier (Repair of concrete crash barrier with cement concrete of M-30 grade by cutting and trimming the damaged portion to a regular shape, cleaning the area to be repaired thoroughly, applying cement concrete after erection of proper form work.)	As per separate sheet attached
18	Repair RCC Railing (Carrying out repair of RCC M30 Railing to bring to the original shape)	As per separate sheet attached
19	Repair of steel Railing (Repair of steel railing to bring it to the original shape)	As per separate sheet attached
20	Construction of RCC railing of M30 Grade in-situ with 20 mm nominal size aggregate, true to line and grade, tolerance of vertical RCC post not to exceed 1 in 500, centre to centre spacing between vertical post not to exceed 2000 mm, leaving adequate space between vertical post for expansion, complete as per approved drawings and technical specifications.	As per separate sheet attached
21	Removal of defective concrete, cleaning the surface thoroughly, applying the shotcrete mixture mechanically with compressed air under pressure, comprising of cement, sand, coarse aggregates, water and quick setting compound in the proportion as per clause 2807.1., sand and coarse aggregates conforming to IS: 383 and table 1 of IS: 9012 respectively, water cement ratio ranging from 0.35 to 0.50, density of gunite not less than 2000 kg/cum, strength not less than 25 Mpa and workmanship conforming to clause 2807.6.	As per separate sheet attached
22	Removal of existing asphaltic wearing coat comprising of 50mm thick asphaltic concrete laid over 12 mm thick mastic asphalt including disposal with all lift and lead upto 1000m	As per separate sheet attached
23	Bituminous Concrete Grading (Providing and laying bituminous concrete with higher capacity batch type hot mix plant using crushed aggregates of specified grading, premixed with bituminous binder @ 5.2 per cent of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to- achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects)	As per separate sheet attached

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24	Dismantling the Existing Expansion Joint by Pneumatic Breaker without damaging to the existing reinforcement and removal by cutting with Gas Cutter and Breaking of Concrete up to 0.5 m on both side of joint by Mechanical means including Disposal of malba/ debris and Fixing of New Strip Seal Expansion Joint as per drawing including necessary welding, rebaring, fixing of Shuttering C centring and Providing, laying, mixing, vibrating, curing and roughening the surface of reinforced cement concrete (with ordinary Portland cement @ 500 kg/m ³) of grade 53 to required levels and shape at all height and depth using 20 mm max size graded aggregate as specified and directed in repair of expansion joints etc. with Ready Mixed (Automatic batch mix Plant) of M-50 grade(25Mpa minimum 1 day.) rapid hardening type concrete and self - flowable properties with minimum flow of 450 mm at the time of pouring with bonding coat between old and new concrete curing complete as per the direction of the Engineer -in-Charge.	As per separate sheet attached
25	Rust Removal C Steel Protection:- Cleaning as directed C specified all corrosion / rust / scales from reinforcement bars using rust remover Reebaklens RR of Fosroc make or Rust clean of BASF or equivalent of leaving to dry for 30 mins C washing surface with fresh water as required to exposed reinforcement bars complete as specified also providing C applying inhibition coats/system to exposed reinforcement bars after drying C also new bars after cleaning C removing scales and rust completely as specified. Two component inhibitors Concrese ZRI equivalent material of BASF make as approved by engineer shall be used as per manufacturers specification in two coats including all labour tools tackles, necessary surface preparation C necessary protection after C during repair work.	As per separate sheet attached
26	Epoxy bonding agent of new concrete to old concrete. The applied bond agent should possess min properties as below: Shear Strength - @ 7 days 20N/mm ² Flexural Strength - @ 7 days 35 N/mm ² Compressive Strength - @ 7 days 50N/mm ² (The new repair mortar/concrete should be applied within overlay time of epoxy bonding agent mentioned as per manufacturer's datasheets)	As per separate sheet attached

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27	Guniting concrete surface with cement mortar applied with compressor after cleaning surface and spraying with epoxy complete as per Technical specification. (Reference to MORTCH's specification 2807)	As per separate sheet attached
28	Providing and inserting nipples with approved fixing compound after drilling holes for grouting as per Technical specifications including subsequent cutting/removal and sealing of the hole as necessary of nipples after completion of grouting with Cement/Epoxy.	As per separate sheet attached
29	Sealing of cracks/porous concrete by injection process through nipples/Grouting complete as per Technical specification.	As per separate sheet attached
30	Providing Pre-moulded asphalt filler joints as per drawings. (A) 12mm	As per separate sheet attached
31	Strip Seal Expansion Joint (Providing and laying of a strip seal expansion joint catering to maximum horizontal movement upto 70 mm, complete as per approved drawings and standard specifications to be installed by the manufacturer/supplier or their authorised representative ensuring compliance to the manufacturer's instructions for installation.)	As per separate sheet attached
32	Providing and placing in position FE 500D TMT bar reinforcement including cutting, bending, hooking, and tying complete as per detailed drawing.(C) Balanced cantilever box type superstructure.(I) Deck slab (II) Webs, Bottom slabs and Diaphragms	As per separate sheet attached
33	Applying epoxy mortar over leached, honey combed and spalled concrete surface and exposed steel reinforcement complete as per Technical specification	As per separate sheet attached
34	Shear connectors:- Drilling holes into existing concrete substrate for anchoring of new anchoring rebars with 12/16 mm dia shear connectors at 1.5 m c/c as per drawing and for additional rebar provision in repair area and fixing with chemical anchor lokfix of Fosroc make / Master flow 935 of BASF make / Hilti Hy200 / Fischer. Drilling hole diameter: 4 mm larger to rebar dia drilling depth: min 10 times the rebar dia including cleaning, cutting, fabricating, chemical, tools, tackles etc. completed as directed by EIC. Material: - chemical anchor lokfix E77 of Fosroc make / Master flow 935 of BASF make / Hilti Hy200 / Fischer or equivalent.	As per separate sheet attached

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	10mm	As per separate sheet attached
	12mm	As per separate sheet attached
	16mm	As per separate sheet attached
35	Shuttering: Providing, erecting and removing proper, safe and leak proof shuttering using Plywood, steel plate to facilitate any type of concrete repair work etc. as directed by Engineer in charge.	As per separate sheet attached
36	Providing and fixing in position fully moulded restrained elastomeric Bearings as per detailed drawings.	As per separate sheet attached
37	Supplying, fitting and fixing in position true to line and level POT-PTFE bearing consisting of a metal piston supported by a disc or unreinforced elastomer confined within a metal cylinder, sealing rings, dust seals, PTFE surface sliding against stainless steel mating surface, completer assembly to be of cast steel/fabricated structural steel, metal and elastomer elements to be as per IRC: 83 part-I C II respectively and other parts conforming to BS: 5400, section 9.1 C 9.2 and clause 2006 of MoRTH Specifications complete asper drawing and approved technical specifications.	As per separate sheet attached
38	Painting Two Coats on New Concrete Surfaces (Painting two coats after filling the surface with synthetic enamel paint in all shades on new plastered concrete surfaces)	As per separate sheet attached
39	Painting on Steel Surfaces (Providing and applying two coats of ready mix paint of approved brand on steel surface after through cleaning of surface to give an even shade)	As per separate sheet attached
40	Steel work, welded In built up sections framed work including cutting, hoisting, fixing in position and applying a priming coat of red lead 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.	As per separate sheet attached

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41	Road marking with hot applied thermoplastic paints with reflectorizing glass beads on bituminous surface providing and laying a hot applied thermoplastic compound 2.5 mm thick including reflectorizing glass beads @ 250gms per sqm area, thickness of 2.5mm is excluding of surface applied glass beds as per IRC:35-2015. The finished surface to be level, uniform and free from streaks and holes. zebra patta /bump patta lane/centre line/ edge line/cut patta. The white colour marking should provide luminance coefficient on cement road shall be min 130 mcd/m ² /lux and Asphalt road shall be min 100 mcd/m ² /lux during the service life during the day time. The marking should meet the performance criteria for night time reflectivity, wet reflectivity and skid resistance as mentioned in the section-15 of IRC 35-2015. Warranty for the Retro reflectivity should be two years.	As per separate sheet attached
42	Supplying and fixing cat eye (Stimsonite) made out from Acrilo beaultile sterine injuction high compressed molding with reflector made of MMC (prismatic type of size 12cm x 6cm x 2.5cm) provided with bituminous adhesive 100g. with each unit for fixing. (High Intensity grade)	As per separate sheet attached
43	Metal Beem Crash Barrier A Type - A, "W" : Metal Beam Crash Barrier (Providing and erecting a "w" metal beam crash barrier comprising 3 mm thick corrugated sheet metal beam rail, 70 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2m centre to centre, 1.8 m high, 1.1 m below ground/road level, all steel parts and fitments to be galvanised by hot dip process, all fittings to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a spacer of channel section 150 x 75x5 mm, 330 mm long complete as per clause 811)	As per separate sheet attached

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44	Reinforced Cement Concrete Crash Barrier (Provision of an Reinforced cement concrete crash barrier at the edges of the road, approaches to bridge structures and medians, constructed with M-400 grade concrete with TMT Corrosive Reinforcement Steel (CRS) conforming to IRC:21 and dowel bars 25 mm dia, 450 mm long at expansion joints filled with pre-moulded asphalt filler board, keyed to the structure on which it is built and installed as per design given in the enclosure to MOST circular No. RW/NH - 33022/1/94-DO III dated 24 June 1994 as per dimensions in the approved drawing and at locations directed by the Engineer, all as specified).	As per separate sheet attached
45	Hazard Marker Sign :-Providing and fixing sign boards made out of 2.0 mm aluminium sheet/4 mm ACP (Aluminium composite Panel); size 90x30 cms. Rectangular as per design of IRC-67-2012.Pre treated with phosphating process C acid etching coated with one coat of epoxy primer and two coats of best quality epoxy paint; reflectorised with Micro Prismatic Grade retro reflective sheeting of Type-11 as per ASTM D-4956 and latest M.O.S.T. Specifications;1.8mtr long stand post of 75 x 75 x 6mm/65NB Circular MS Pipe as required and frame fabricated from suitable size iron angle of 35 x 35 x 3 mm; painted with best quality epoxy coatings in black and white bends. The details of symbol foreach board shall be as per the instruction of engineer in charge. The fixing at site shall be in 1:2:4 CC block of size 45 x 45 x 60 Cms. for each leg. including excavation, curing etc. complete under the supervision of engineer in charge. A warranty for 10 years for the Retro reflective sheeting from original manufacturer C a certified copy of 3 year outdoor exposure test report from third party test lab for the product offered shall be submitted by contractor.	As per separate sheet attached

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46	<p>Cautionary Warning Sign :-Providing and fixing sign boards made out of 2mm aluminium sheet / 4mm ACP (Aluminium composite Panel); size 90 x 90 x 90cms. equilateral triangle as per design of IRC-67- 2012. Pre treated with phosphating process C acid etching; coated with one coat of epoxy primer and two coats of best quality epoxy paint ;reflectorized with Micro Prismatic Grade retro reflective sheeting of Type-11 as per ASTM D-4956 and latest M.O.S.T. Specifications; 3.6mtr long stand post of 75 x 75 x 6mm / 65NB Circular MS Pipe as required and frame fabricated from suitable size iron angle of 35 x 35 x 3mm; painted with best quality epoxy coatings in black and white bends. The details of symbol for each board shall be as per the instruction of engineer in charge. The fixing at site shall be in 1:2:4 CC block of size 45 x 45 x 60 Cms. for each leg. including excavation, curing etc. complete under the supervision of engineer in charge. A warranty for 10 years for the Retro reflective sheeting from original manufacturer C a certified copy of 3 year outdoor exposure test report from third party test lab for the product offered shall be submitted by contractor. (A) Class-C Type-11 Retro Reflective sheeting</p>	As per separate sheet attached
47	Providing G.I. 100mm diameter waterspouts including necessary iron gratings as per drawings.	As per separate sheet attached
48	<p>Lifting of super structure (Girder slab type , Solid slab, Box type or any other) using jacks, power packs, packings and required equipment, tool, plants etc all. The lifting shall be done in such a manner that, proper workmanship for replacement of bearing and pedestals can be achieved. all safety measures for keeping the superstructure safe in lifted position must be ensured. the rate includes lowering the superstructure after completion of repair works for Piercap, Pedestals, Pier etc. The rate shall include all material , labour, jacks, power packs, equipment, DG set for electricity, packings, levelling the surface using structural steel plates etc. all complete as per satisfaction of engineer in charge.</p>	As per separate sheet attached

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49	Providing and laying precast RCC footpath slab in controlled cement concrete of M-200 grade (7.0Cm. thickness including necessary reinforcement and providing and setting cement chequered tiles in C.M. 1:5 as per drawing including necessary formwork, curing and finishing complete	As per separate sheet attached
50	Providing And lying of polymer modified micro concrete like Renderoc RO (L) of Fosroc) / Master emaco S346 / T 288 of BASF / or equivalent material of Krishna Conchem blended with washed saturated surface dry (SSD), graded, low absorption, high density, aggregates of size 5 mm to 12 mm at 50 percentage by weight of micro concrete and water at 4 lit. per 25 kg bag and pouring into the form work using suitable Arrangement or if required using pumping device for uniform low of micro concrete. The side shuttering can be removed after 3 days and bottom shuttering after 7 days ensuring proper bond between the micro concrete and the existing concrete sub strate. Item rate is inclusive of the materials all labour, supervision, tools and tackles and transportation including shuttering etc. complete as per specification and as directed by EIC. (Considering Avg. Thickness of 75 mm)	As per separate sheet attached
51	Concrete curing compound The acrylic emulsion and water based concrete curing Membrane (Such as Concure AB or equivalent) and applying immediately after repair/concrete gets finished. The membrane shall be sprayed over concrete finished are without any gap or pinhole. The cost of all materials, tools and all labour are included. Complete as specified and directed by EIC.	As per separate sheet attached
52	Providing and carrying out load test on bridge deck with simulated loading including provision, placing and removal of loading, supplying, fixing and removing deflection measuring instruments etc. complete with platforms for fixing the instruments etc. complete as per the details supplied and specification and as directed by Engineer and including submission of required results in triplicate after satisfactory completion of the load test.	As per separate sheet attached

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53	Providing C applying CFRP Anchors of high strength carbon fiber RELinforce C Anchor of RIL or equivalent make of 4mm Dia and 200 mm long along with following fiber properties. Tensile strength of fiber >4900 Mpa E Modulus of fiber >230 Gpa Note: For all FRP materials, there has to be a certificate from the supplier for the quantities supplied during bill certification.	As per separate sheet attached
54	Providing C Application of U Wrap till L/4 from the edge of the Girder with 230 GSM Unidirectional Carbon Fiber Reinforce C Fab 230 of Reliance Industries Ltd or equivalent along with fiber anchors with following properties after necessary Surface Preparation C Putty Filling. Aerial Weight: 230 g/m ² Tensile Strength (Composite Laminate) : > 450 MPa E-Modulus (Composite Laminate): > 35 GPa	As per separate sheet attached
55	Carbon Fiber Laminates for structural strengthening - Providing and applying 5mm thick and 105 mm wide Carbon Fiber Pultruded Laminate strips RELinforce C Lam 105/5 of RIL make or equivalent to the prepared substrate using thixotropic epoxy adhesive. The FRP laminate used shall be of zero degree unidirectional fibres having (1) Volumetric fiber content of >65 percentage (2) Tensile strength of 1500 MPa (3) Tensile modulus of 160 GPa. (4) Compressive strain to failure percentage shall be 0.8. The thixotropic epoxy bonding adhesive shall be applied at 2-3 mm thickness for adhering the laminate to the substrate. (1) The adhesion of the entire system (Laminate and adhesive combined) with concrete shall be > 1.5 - 2 MPa with concrete failure as per ASTM D 4541. (2) The adhesive used shall have tensile modulus > 4100 Mpa (ASTM D638) (3) Tensile Strength > 50 MPa (ASTM D790). Note : Surface to be rendered using epoxy putty like RELinforce EP Putty of RIL or equivalent make. No site made.	As per separate sheet attached

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56	Carbon Fiber Grids for structural strengthening - Providing and applying High Strength Carbon Fiber Mesh RELinforce C Grid on wet mortar and application of second layer of mortar and float to finish followed by curing. The repair mortar used shall be single component and shall be mixed with water at water powder ratio of 0.18 and shall have drying shrinkage < 1000 micro strain as per ASTM C 157-93; compressive strength > 40 MPa; Flexural Strength > 7 Mpa as per ASTM C 348, bond strength > 6 MPa as per ASTM C 1042. Repair mortar used shall have CE (CE-29842) marking and compliance according to Construction Products Directive 89/106/EEC (CPD). Carbon Fiber Mesh shall have the following properties: (1) Grid size of 15 x 15 mm (2) Areal weight of 260 g/sqm 3) Tensile strength of 2400 N/mm ² (4) Elastic Modulus of >230000 MPa (5) Elongation at break >1.5 percentage (6) Bond strength > 1 MPa as per ASTM D4541 Note : For all FRP materials, there has to be a certificate from the supplier for the quantities supplied during bill certification.	As per separate sheet attached
57	Providing and applying Renderoc SP-40 or equivalent shrinkage compensated fiber reinforced polymer modified wet spray repair mortar on the prepared surface at thickness of 50mm and curing with curing compound. The repair mortar used shall be single component and shall be mixed with water at water powder ratio of 0.18. The cured product shall have following properties: (1) Drying shrinkage < 1000 micro strain as per ASTM C 157- 93 (2) Compressive strength > 20 Mpa at 1 Day 40 MPa at 28 Days as per BS1881 (3) Flexural Strength > 7 Mpa at 28 days as per ASTM C 348 (4) Bond strength > 6 MPa as per ASTM C 1042, etc complete. (5) Tensile strength > 2.5 MPa at 28 days as per BS6319 (5) Fire Rating - Class A1 (EN1504-3) (5) Product used shall have CE (CE-29842) marking and compliance according to Construction Products Directive 89/106/EEC (CPD)	As per separate sheet attached
58	Providing and laying Pitching on slopes laid over prepared filter media including boulder apron laid dry in front of toe of embankment complete as per drawing and Technical specifications	As per separate sheet attached

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59	Providing and laying Filter material underneath pitching in slopes complete as per drawing and Technical specification	As per separate sheet attached
60	Providing and laying - Fitter Media 600mm thick directed at the back of abutments, returns and wing walls as per detailed specifications.	As per separate sheet attached

Deputy Executive Engineer
Ank (R&B) Sub Division
Ankleshwar

Signature of the Contractor

Executive Engineer
Bharuch (R&B) Division
Bharuch