

**JUNAGADH MUNICIPAL CORPORATION****PROJECT DIVISION**

**NAME OF WORK: PREPARATION OF PLAN, ESTIMATES AND DTP FOR BRIDGE ACROSS SONREKH RIVER NEAR SHAKKARBAUG ZOO, JUNAGADH**

**DETAILED TECHNICAL SPECIFICATION**

**(Each item covers: General, Materials, Mode of Measurement and Workmanship)**

*(Reference: MoRTH Specifications for Road & Bridge Works – 5th Revision, IRC Codes, relevant IS Codes and R&B Gujarat Standard Specifications for Road & Bridge Works)*

**INDEX OF SPECIFICATION**

Item No.	Description of Item (as per Schedule B / BOQ)	Applicable Specification / Clause Ref.
1	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	MoRTH Clause 305 (Excavation for Structures) r/w R&B Gujarat Standard Specifications for Road & Bridge Works, Section 300
2	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.	MoRTH Clause 305.3 (Excavation in Rock/Blasting) r/w R&B Gujarat Section 300
3	Providing and filling trenches of Labour charges - Excavator in rocky strata with ordinary cement concrete M-75	MoRTH Section 1500 (Plain Cement Concrete) r/w IS 456:2000
4	Providing and casting in situ Ordinary cement concrete M-150 for R.C.C. Raft and cut-off walls including necessary shuttering laying, vibrating, ramming and curing complete.	MoRTH Clause 1500 / IS 456:2000, Grade M-15
5	Providing and casting in situ controlled cement concrete M-350 for R.C.C. well cap / Pilecap/Footing including necessary formwork, vibrating, curing and finishing complete.	IRC:112-2020 & MoRTH Clause 1700 (Concrete for General Construction), Grade M-35
6	Providing and filling sand behind abutments and between returns in	MoRTH Clause

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	layers as directed	305/2504 (Backfilling behind Abutments)
7	Providing and filling sand behind abutments and between returns in layers as directed	MoRTH Clause 305/2504 (Backfilling behind Abutments)
8	Providing and laying - Fitter Media 600mm thick directed at the back of abutments, returns and wing walls as per detailed specifications.	MoRTH Clause 2504.3 (Filter Media)
9	Providing & laying weep hole in Abutments, and returns by using A.C. pipe of 100mm including laying in proper grede and jointing the completed as per detailed specification.	MoRTH Clause 2504.4 (Weep Holes)
10	Providing and placing in position FE 550D TMT Bar reinforcement including, cutting, bending hooking and tying complete as per detailed drawings & As per EIC	IS 1786:2008 (High Strength Deformed Bars) & MoRTH Clause 1600/1715 (Reinforced Cement Concrete)
11	Providing and casting in situ controlled cement concrete M-350 for R.C.C. return as per drawings including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete.	IRC:112-2020 & MoRTH Clause 1700, Grade M-35
12	Providing and casting in situ controlled cement concrete M-350 for R.C.C. return as per drawings including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete.	IRC:112-2020 & MoRTH Clause 1700, Grade M-35
13	Providing and casting in situ controlled cement concrete M-350 for R.C.C. return as per drawings including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete.	IRC:112-2020 & MoRTH Clause 1700, Grade M-35
14	Providing and casting in situ controlled cement concrete M-350 for R.C.C. return as per drawings including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete.	IRC:112-2020 & MoRTH Clause 1700, Grade M-35
15	Providing and placing in position FE 500D TMT Bar reinforcement including, cutting, bending hooking and tying complete as per detailed drawings & Engineer in Charge.	IS 1786:2008 & MoRTH Clause 1600
16	Providing and fixing in position fully moulded restrained elastometric Bearings as per detailed drawings & Engineer in Charge.	IRC:83 (Part II)-2018 (Elastomeric Bearings) & MoRTH

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		<i>Clause 2001-2005</i>
17	Providing and fixing in position fully moulded restrained elastometric Bearings as per detailed drawings & Engineer in Charge.	<i>IRC:83 (Part II)-2018 &amp; MoRTH Clause 2001-2005</i>
18	Providing and casting in situ or precast controlled Cement Concrete M-500 for prestressed concrete work in Super structure including centering, shuttering, curing, scaffolding, ramming, vibrating, finishing, launching or shifting complete.(I) Solid Slab.(II) Deck Slab.(III) Main Girders.(IV) Diaphragm or cross girder.	<i>IRC:112-2020, IRC:18 (Prestressed Concrete Bridges) &amp; MoRTH Section 1700/1800, Grade M-50</i>
19	Providing and casting in situ controlled cement concrete M-350 for Wearing coat including centering, scaffolding, curing and finishing complete.	<i>MoRTH Clause 2705 / IRC:SP:37, Grade M-35</i>
20	Providing, fabricating, and fixing in position single strip seal expansion joint consisting of edge beams, anchorages, and a chloroprene / neoprene rubber electronic sealing element. The system must be capable of accommodating movement up to 80 mm ( $\pm 40$ mm). The assembly includes alignment, fixing of anchor loops to the structural reinforcement steel, casting with high-grade concrete (M-40/M-50 grade) in the nosing area, complete with all materials, machinery, tools, labor, and testing. All works must be executed strictly in accordance with detailed design drawings, MoRTH Specification Clause 2607, and IRC guidelines	<i>MoRTH Clause 2607 (as specified in item), IRC:SP:69</i>
21	Providing C.I. 100mm diameter water spouts including necessary iron gratings as per drawings.	<i>MoRTH Clause 2702 (Drainage Spouts)</i>
22	Providing and casting in situ controlled cement concrete M-400 for R.C.C. solid slab including centering, scaffolding, curing and finishing complete.	<i>IRC:112-2020 &amp; MoRTH Clause 1700, Grade M-40</i>
23	Providing and casting in situ controlled cement concrete M-350 for R.C.C. Crash barrier including centering, scaffolding, curing and finishing complete.	<i>MoRTH Clause 810 &amp; IRC:5-2015, Grade M-35</i>
24	Providing and casting in situ Ordinary cement concrete M-150 for R.C.C. Raft and cut-off walls including necessary shuttering laying, vibrating, ramming and curing complete.	<i>MoRTH Clause 1500 / IS 456:2000, Grade M-15</i>
25	Providing and placing in position FE 500D TMT Bar reinforcement	<i>IS 1786:2008 &amp;</i>

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	including, cutting, bending hooking and tying complete as per detailed drawings	MoRTH Clause 1600
26	Providing and fixing in position to exact profile high tensile steel wires of required ultimate strength including bending, cutting, tying providing necessary standard and anchorages, sheathing, stressing, grouting, ducts as per detailed drawing including necessary plant and machinery complete.	IS 14268 (HTS Wires/Strands) & MoRTH Clause 1800 (Prestressing)
27	Carrying out load test of super structure as directed including all necessary materials plant equipment, instruments, labour and arrangements for test directed	IRC:SP:51 & MoRTH Clause 2704 (Load Testing)
28	Supplying & laying of bi-axial extruded high modulus polypropylene geogrid coforming to MORT&H specification for base/sub-base reinforcement having minimum tensile strength 40kN/m in the longitudinal and transverse direction, with 14kN/m and 28kN/m tensile strength at 2% and 5% strain respectively in the longitudinal and transverse direction, junction efficiency not less than 95% and with 38mm X 38mm mesh opening.	MoRTH Section 700 (Geosynthetics) & IRC:SP:59
29	Dismantling the existing structure including removing and stacking the dismantled materials as and where directed by Engineer in Charge of Junagadh Municipal Corporation (A) R.C.C. work	MoRTH Clause 202 (Dismantling and Demolition)
30	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 guidelines of IRC : SP 63-2018 etc. Complete.	IS 15658:2006 & IRC:SP:63-2018 (Concrete Block Paving)
31	Excavation for foundation upto 1.5 M. depth including sorting out and stacking of useful materials and disposing of excavated stuff up to 50M. lead. (A) Loose or Soft Soil	MoRTH Clause 305 (Excavation for Structures)
32	Providing and casting in situ Ordinary cement concrete M-150 for R.C.C. Raft and cut-off walls including necessary shuttering laying, vibrating, ramming and curing complete.	MoRTH Clause 1500 / IS 456:2000, Grade M-15
33	Providing and laying cement concrete 1:4:8 (1cement : 4coarse sand : 8 B.T.Crushed stone aggregates 40 mm. nominal size) and curing complete excluding cost of from work in : (a) Foundation and plinth	MoRTH Clause 2100/IS 456:2000 (Nominal Mix

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		<i>Concrete)</i>
34	Supplying and fixing reinforced concrete heavy duty non-pressure pipes with collars for culverts including setting and joining the pipes in cm. 1:2 watering and laying (to level or slopes) of I.S.458/1971 Class NP 4 Casted by vertically vibrated technology of following internal diameters. 1200mm dia	<i>IS 458:2003 (RCC Pipes) NP4 Class &amp; MoRTH Clause 2701 (Pipe Culverts)</i>
35	Providing and casting in situ controlled cement concrete M-200 for R.C.C. including necessary formwork, vibrating, curing and finishing complete.	<i>IRC:112-2020 &amp; MoRTH Clause 1700, Grade M-20</i>
36	Providing and filling sand behind abutments and between returns in layers as directed	<i>MoRTH Clause 305/2504 (Backfilling behind Abutments)</i>
37	Construction of embankment with approved material obtained from borrow pits with all lifts and leads, transporting to site spreading, grading to required slope and compacting to meet requirement to table 300-2 Construction of Embankment with Material Obtained from Borrowpits area within 3.0 Km Lead (CBR > 8)	<i>MoRTH Clause 305 &amp; Table 300-2 (Embankment Construction from Borrow Pits)</i>
38	Providing and placing in position FE 500D TMT Bar reinforcement including, cutting, bending hooking and tying complete as per detailed drawings	<i>IS 1786:2008 &amp; MoRTH Clause 1600</i>
39	Dismantling the existing structure including removing and stacking the dismantled materials as and where directed. (A) R.C.C. work	<i>MoRTH Clause 202 (Dismantling)</i>
40	Providing and placing in position FE 500D TMT Bar reinforcement including, cutting, bending hooking and tying complete as per detailed drawings (Credit of Dismantling)	<i>IS 1786:2008 &amp; MoRTH Clause 1600</i>
41	Supplying and fixing reinforced concrete heavy duty non-pressure pipes with collars for culverts including setting and joining the pipes in cm. 1:2 watering and laying (to level or slopes) of I.S.458/1971 Class NP 4 Casted by vertically vibrated technology of following internal diameters. 1200mm dia (Credit of Dismantling)	<i>IS 458:2003, MoRTH Clause 2701</i>
42	Providing and fixing post and pipe railing as per detailed drawing including 3 coats of painting to steel works complete.	<i>MoRTH Clause 810 (Handrail/Guardrail) &amp; IS 1477 (Painting)</i>
43	Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to	<i>MoRTH Clause 401</i>

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	work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 ((in 2 Layers Saperately, Grade I - Top Layer, Grade V - bottom Layer) As per Instruction by EIC (JMC))	<i>(Granular Sub-Base)</i>
44	Wet Mix Macadam (Plant Mix Method) : Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with grader in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.	<i>MoRTH Clause 406 (Wet Mix Macadam)</i>
45	Providing and applying primer coat with SS1 grade bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer at the rate of 0.70 to 1.00 kg/sqm using mechanical means.	<i>MoRTH Clause 502 (Prime Coat)</i>
46	Tack Coat on Bituminous surfaces : Providing and applying tack coat with VG 30 or RS1 Bitumen Emulsion as per intruction of Engineer -In - Charge of JMC using emulsion pressure distributor at the rate of 0.20 to 0.30 kg per sqm on the prepared bituminous surface cleaned with mechanical broom.	<i>MoRTH Clause 503 (Tack Coat)</i>
47	Dense Graded Bituminous Macadam Grading : 2 -Providing and laying dense graded bituminous macadam with higher capacity batch type HMP using crushed aggregates of specified grading, premixed with bituminous binder @ 4.5 per cent by weight of total 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. 505 complete in all respects.	<i>MoRTH Clause 505 (Dense Graded Bituminous Macadam), as specified in item</i>
48	Bituminous Concrete Grading 2: -Providing and laying bituminous concrete with higher capacity batch type hot mix plant using crushed aggregates of specified grading, premixed with bituminous binder @ 5.4 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	<i>MoRTH Clause 507 (Bituminous Concrete), as specified in item</i>

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	specification clause No. 507 complete in all respects	
49	Providing and erecting retro-reflectorized Cautionary, Mandatory and Informatory Sign Boards conforming to IRC:67-2022, manufactured using 2 mm thick Aluminium Alloy Sheet (IS 736, Grade 19000 or equivalent) with High Intensity Prismatic (HIP) / Type XI Retro-reflective Sheeting, including approved legends, symbols and borders as specified, fixed over hot dip galvanized mild steel tubular posts complete with RCC foundation, excavation, concrete, backfilling, all fittings, nuts, bolts, clamps and complete as directed by the Engineer. The item shall include fabrication, transportation, erection and maintenance during construction period	<i>IRC:67-2022 (Road Signs)</i>
50	Providing and fixing Hazard Marker (Object Marker) conforming to IRC:67 using retro-reflective micro-prismatic sheeting over Aluminium Composite Panel/Aluminium Sheet complete with hot dip galvanized support post, RCC foundation including excavation, PCC, backfilling, all fixtures, clamps, nuts and bolts complete. Complete as per specifications and direction of Engineer.	<i>IRC:67-2022 (Hazard/Object Markers)</i>
51	Providing and erecting Chevron Alignment Sign Boards conforming to IRC:67 fabricated using 2 mm thick aluminium sheet with High Intensity Prismatic Retro-reflective Sheeting fixed over galvanized tubular steel support including concrete foundation, excavation, erection and all incidental works complete.	<i>IRC:67-2022 (Chevron Signs)</i>
52	Providing and laying hot applied Thermoplastic Road Marking Compound of approved colour, 2.5 mm thick including reflectorising glass beads @ 250 gm/sqm over prepared road surface after cleaning, in accordance with IRC:35 and MoRTH Specifications Clause 803 complete including machinery, labour, protection and traffic control during execution.	<i>MoRTH Clause 803 (as specified) &amp; IRC:35</i>
53	Providing and fixing Raised Pavement Marker (Road Stud/Cat Eye) of approved make having high intensity retro-reflective lenses fixed with two component epoxy adhesive after cleaning the road surface complete in accordance with IRC:35 and manufacturer's specification.	<i>IRC:35 (Road Marking) &amp; manufacturer's specification</i>
54	Providing, supplying, erecting, maintaining and removing approved steel/water filled barricades of minimum 1.2 m height fitted with retro-reflective sheeting, flashing amber lamps, caution tape and warning boards including shifting during various stages of construction complete.	<i>IRC:SP:55 (Road Safety - Traffic Management during Construction)</i>

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55	Providing, supplying, installing, operating, maintaining and removing Solar Powered Flashing Amber Warning Beacon (Solar Blinker) conforming to IRC:SP:55, IRC:67 and MoRTH Specifications, comprising high-intensity amber LED flashing lamp of minimum 200 mm diameter, solar photovoltaic module, maintenance-free rechargeable battery, automatic dusk-to-dawn controller, weatherproof IP65 housing, corrosion-resistant mounting bracket suitable for fixing on barricades, sign posts or drums, complete with all accessories.	IRC:SP:55, IRC:67-2022 & MoRTH Specifications
56	Providing and fixing Flexible Median Marker made of UV stabilized engineering plastic fitted with High Intensity Prismatic Retro-reflective sheeting complete with stainless steel fixing arrangement and epoxy anchoring on concrete/bituminous surface complete.	IRC:SP:55 (Delineators/Median Markers)
57	Providing, supplying, fixing, maintaining, shifting during various stages of construction and removing after completion approved make Temporary Traffic Delineators (Flexible Delineator Posts/Lane Channelizers) conforming to IRC:SP:55, IRC:67 and relevant MoRTH Specifications, manufactured from UV stabilized high-density polyethylene (HDPE) or polyurethane material having minimum height of 750 mm above finished road level, fitted with two or more bands of High Intensity Prismatic Grade retro-reflective sheeting (HIP) visible from both directions. The delineator shall be provided with a heavy-duty rubber or polymer base of minimum 6 kg weight or approved anchor base, complete with galvanized base plate, anchor bolts/chemical fasteners, all fixtures, hardware and accessories. The item shall include transportation, erection, fixing on temporary diversion road, maintenance during the construction period, replacement of damaged units, cleaning of retro-reflective sheeting, shifting during different stages of traffic management and dismantling after completion of work complete as directed by the Engineer-in-Charge.	IRC:SP:55, IRC:67-2022 (Traffic Delineators)
58	Providing all labour, materials, plant & machinery, tools, tackles, temporary works and all incidental arrangements for joint survey, identification, locating, exposing, protection, dismantling, disconnecting, shifting, diversion, supporting, lowering, relaying, reconnecting, testing and commissioning of existing underground and overhead utilities affected due to construction of the proposed bridge, approaches and allied works, including but not limited to water supply pipelines, sewer lines, storm water drains, electrical HT/LT cables, street lighting system,	General Conditions of Contract r/w specifications of the respective Utility Owning Department

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	<p>telecom/OFC ducts, traffic signal cables and other public utility services. The item shall include excavation, temporary supports, cutting, welding, fabrication, specials, fittings, valves, thrust/anchor blocks, anti-corrosive treatment, bedding, jointing, temporary bypass arrangements, shutdown coordination with utility agencies, testing, chlorination wherever applicable, reinstatement of utility services, traffic management, barricading, safety measures, disposal of unserviceable materials and all other incidental works complete as directed by the Engineer-in-Charge and in accordance with the specifications of the respective Utility Owning Department. The quantities shown in the BOQ are tentative and are provided only for the purpose of bid evaluation. Payment shall be made only for the actual quantities of utility shifting executed at site, jointly measured and certified by the Engineer-in-Charge and the concerned Utility Owning Department. No payment shall be made for utilities not shifted, abandoned utilities, utilities shifted directly by the Utility Owning Department under separate demand note, or quantities not actually executed. The quoted rates shall be deemed to include all labour, materials, equipment, temporary works, testing, commissioning, traffic management, coordination with utility agencies, statutory approvals, contractor's overheads, profit and all incidental expenses required for satisfactory completion of the work. No additional payment or claim shall be admissible on any account beyond the measured quantities accepted by the Engineer-in-Charge. The Contractor shall satisfy himself regarding the location and extent of existing utilities by visiting the site before submission of the bid</p>	
59	Supplying and erecting Flexible PVC insulated multi strand multi core 1.1 kv grade ISI marked copper wires of following size to be erected as directed.(e) 1.50 Sq.mm 3 core round PVC sheathed	<i>IS 694 (PVC Insulated Cables)</i>
60	Supplying and erecting LED street light / Flood light fittings with High power White LEDs wattage of 3 Watt and above assembled on single MCPCB, efficiency more than 130 lm/w and corrosion free High pressure die cast aluminum housing with smooth finish powder coated and heat sink extruded aluminium with diffuser and Polycarbonate optics/ lenses, with toughened glass with company mark/name engraved or embossed 160 to 270 V,Power Factor more than 0.95, THD < 10 %, CCT 3000 K to 5700K,Uniformity ratio >0.45, Luminaire efficacy> 100 lumens/watt . LED driver efficiency > 85 %.( fittings	<i>IS 10322/IS 16107 (LED Luminaires), LM-79/LM-80</i>

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	required LM-79 & LM-80 certificates)(NOTE: Below description have shown ranges of Wattage capacity of LED fittings.The Engineer incharge may select any wattage capacity between the ranges shown.) (A) Street Light (IP-65), Surge protection -4KV integral and ,Light must have 440VAC line supply with over-voltage protection. (v)above 120 to 160 watts (CAT III)	
61	providing and erecting Miniature circuit breaker single pole 0.5A to 2A system and having breaking capacity 10 KA to be erected in existing box. confirming to IS 8828/1996 with ISI Mark. Cat-iii	IS 8828:1996 (Miniature Circuit Breakers)
62	Providing and erecting HOT deep Galvanised iron strip/wire 4.064mm to 1.626mm.	IS 2062 (Structural Steel) / General galvanising practice
63	Providing and erecting Pipe type earthing having 150 cms.long and 2.5 cms. dia. galvanised iron pipe with coupling and buch buried in specially prepared earth pit complete with necessary 8 SWG earth wire.	IS 3043:2018 (Code of Practice for Earthing)
64	Providing and erecting XLPE (IS:7098)(I)-88 ISI armoured cable multistrand / Solid Aluminium conductor for 1.1 KV. to be laid on wall with necessary clamps or in existing trench / pipe of following size of cables (A) 4 core 4 Sq. mm	IS 7098 (Part 1) (XLPE Cables)
65	Providing & laying approved make Double walled corrugated pipes (DWC) of polyethylene(conforming to IS 14930 II )with necessary connecting accessories of same material at required depth in existing trench for laying of cable. below ground / road surface for enclosing cable (A)50 mm outer dia	IS 14930 (Part II) (HDPE Corrugated Pipes)
66	Supplying and erecting approved make Octagonal pole made from HR sheet steel. The pole should be made as per IS. and shall be coated with hot dip galvanizing as per IS 2629/2633/4759, suitable suspend local wind speed with integral Junction box consist of terminal plate of min 6mm Hylam sheet, standard profile 35mmX7.5mm Din-Rail for MCB Mounting, stud type terminal and arrangement for cable termination to be erected With Suitable foundation (Included) as per details given by manufacturer considering site requirement. ((I) 10 Mtr. Long 70 mm Top X 175 mm bottom dia, 4 mm thickness with 275mmX275mmX16mm base plate, 4-M24 Bolts and 750mm long with necessary G.I. J Bolts .Approx Pole weight 145 kg	IS 2629/2633/4759 (Galvanising) & relevant Electrical/Structural IS codes
67	Providing and erecting Street Light pole bracket comprising main B	Standard

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	Class GI pipe of 4.2 cm/require outside dia. complete with suitable B Class G.I. sleeve tubing of approx. 45cms.length and suitable for 76.5 mm /80mm / required size of pole top having sufficient fasteners for fixing the brackets and having spread of 1.5.mtr. length with 110 deg.with vertical plane & suitable welded stays, reducer and with check nuts complete painted with one coat of Red oxide / PU base primer and two coats of Aluminium / PU paint. paint with following nos of arms.	<i>Electrical/Structural fabrication practice, IS 4736 (galvanising)</i>
68	Smart 4G Timer, Supply of IoT based 4G Smart Streetlight Control & Monitoring System having a Smart Panel comprising of 1 Phase IoT Streetlight Smart 4G Timer with 16x2 LCD to display RSSI, relay status, RTC time & diagnostics., Controller with 8-hour battery backup during external power failure. External power failure alert immediately to cloud., 110-630 V AC @ 50-60 Hz – 1 phase operating range., Standby power consumption <3W., Smart 4G Timer with RS232 port for DLMS Energy meter & RS485/UART/RS232 port for any external device communication., Smart 4G Timer must be compatible with any make / brand of DLMS (RS232) Energy Meter., DI: 3 Nos. (1 Contactor / Latch detection, 1 for SPD, 1 for Door Sensor.), DO: 1 Relay for control with 1 extra spare relay., Highly Precise TCXO RTC with 10-year battery reserve., automatically syncs with internal, cellular, server & GPS clock; with logs stored in the CCMS Web Software., Smart 4G Timer with dual SIM functionality for connectivity backup., 4G M2M SIM 5-Year communication included., Local configuration via WiFi / BLE for maintenance or during force majeure., GPS chip inbuilt of Smart 4G Timer for auto location tracking & astronomic schedule location., 50 programmable schedules., Astronomic scheduling with monthly offsets., Smart 4G Timer has inbuilt timer stores schedules locally & also stores schedule execution logs locally, syncs to cloud whenever connected to cloud., Auto-scheduler overrides manual operations., Monitoring & alerts for MCB trips & SPD failure., Over/under voltage, current, overload, power factor & short circuit protections with alerts via Dashboard, App, SMS, WhatsApp & Email., Contactor / Latch chattering protection & alerts., Smart 4G Timer with neutral failure protection and alert., During earthing failure to Panel, it must generate alerts on CCMS Dashboard for safety., During earthing failure to Panel. it must generate alerts on CCMS Dashboard for safety., Built-in Watchdog for anti-jamming., Smart 4G Timer must send Regular "heartbeat" on software for CCMS status., Accelerometer for tamper & panel movement detection & alerts.,	<i>IEC 61000-4-2/-4/-5 (EMC), IS 8623 (LV Switchgear Panels), CEA/DISCOM metering norms (as detailed in item)</i>

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	<p>Smart 4G Timer must be tested from an NABL Lab for Surge Test @ 6 KV (IEC 61000-4-5), ESD Test @ 4 KV (IEC 61000-4-2), EFT @ 2 KV (IEC 61000-4-4), Conducted Emission @ 150 KHz-30 MHz (CISPR11), Damp Heat Test (40 Deg C @ 95% RH) 2 cycles of 12+12 hours (IS: 9000 (Part 5/Sec.2):1981 latest) with all test passing criteria as “Temporary degradation or loss of function or performance which is self-recoverable”. FOTA functionality required for upgrades., Smart 4G Timer sends &amp; stores online/offline data of controller &amp; load for lamp burn hours analysis., It stores &amp; syncs connectivity logs for configuration of network connections &amp; analytics., PANEL &amp; SWITCHGEAR, The panel includes a Class 1 DLMS energy meter NABL approved with 1-2 months of stored data of daily, hourly, monthly, load survey, instantaneous, events, tamper data &amp; with power events stored in meter memory for audit purpose., Must monitor V, I, KWH, KVA, PF, KVAH, etc., Panel made with 2 mm CRCA sheet with ground mountable stand complete with gland plate, waterproof glands, earthing bolt., Panel to have transparent window to view DISCOM Energy Meter display., IP55, weatherproof panel with RAL7035 powder-coated., Smart 4G Timer must be fitted on removable terminal blocks for easy maintenance., Switchgear includes 1 Nos. 3 pole Contactor / Latch having minimum 100 A Load carrying capacity per phase, all other switchgear &amp; wires: 60 A load carrying capacity., Contactor / Latch rating such that spare load like decorative lights can be operated., Spare 3 Pole Contactor / Latch (1 Nos.) also available in panel for replacement during failure., 1 Nos. 2P MCB 10 kA for Incomer &amp; 3 Nos. 1P MCBs 10 kA for Outgoing., Phase Bypass MCBs required., 2P RCCB 100 mA., 40kA, 335V smart SPD with feedback detection to send alert of SPD failure to CCMS web software., Suitable 1 Phase 415 V AC isolation transformer for control circuit stable feed., 1 Nos. Input &amp; 1 Nos. Output TPN connectors for reliable &amp; safe termination., 2 Nos. DIN Rail Type power line indicators for each TPN connector., 2 Door Panel. 1 in Front &amp; 1 at Back., door sensor. Also, provide lock &amp; key facility., High quality ISI/BIS, FR Cables to be used., Double lugging to be avoided for potential fire hazard., Minimum Dimensions of Panel: 700 x 500 x 550 mm &amp; stand height dimensions: 700 mm., Panel must have clear 20% spare space for future upgradation., Panel must be equipped with standard Indian type plug with 6 A 2 pole MCB &amp; including light indicator., Panel must contain min. 150 mm space at bottom (TPN connector end) for cable</p>	

Item No.	Description of Item (as per Schedule B / BOQ)	Applicable Specification / Clause Ref.
	<p>terminations. Automatic door sensor based light (with protection MCB) for viewing/maintenance., Thermostat &amp; Space heater (with protection MCB) for cold weather conditions with automatic on/off controller., Panel must have adequate provision to mount DISCOM Energy meter along with spare space around it. The switchgear compartment must have cover on top with protective transparent 4 mm acrylic sheet, with accessible window to operate switchgear components., Switch gear, energy meter &amp; Smart 4G Timer must be warranted for 5 years., Panel mount outdoor antenna for GSM, GPS., Canopy designed for draining down water., SOFTWARE, OAuth 2.0 APIs for sending data to Government clouds/software, etc., CCMS Web dashboard with secure password &amp; OTP login., Hosted on trusted cloud, data security, antivirus &amp; attack protection., HTTPS., AES256-bit encryption., Vulnerability Assessment and Penetration Testing (VAPT) certificate for CCMS Software., Streetlight management software for load status, live analytics &amp; reports., Energy meter data tables (kW, kWh, PF, I, V, etc.) available., Utility monthly bill reconciliation &amp; Class 1 accuracy reports for billing, energy monitoring &amp; auditing for streetlight load., Fault detection., Light fault 99% analysis on dashboard using energy monitoring., WhatsApp integration., Hierarchy-wise reporting &amp; alerts., GIS mapping of live connected streetlight control panels, poles &amp; streetlights., MQTT protocol., Smartphone app with local configuration &amp; navigation., Monitoring &amp; reporting of lighting parameters., Facility for media attachments for site photos/videos/work permits/checklists, etc. per Feeder Panel for remote verification., Asset management module for streetlight infrastructure data., Complaint/service task management with history &amp; escalation must be available., Android &amp; iOS App for dashboard analytics, graphs, energy data, alerts., 5 Years CCMS Web Software &amp; Cloud Server Hosting subscription included., Customizable, user-friendly dashboard.,</p>	
69	<p>Providing and constructing RCC foundation with pedestal for installation of Smart 4G Street Lighting Control Panel / Feeder Pillar, including setting out, excavation in all types of soil, dressing and ramming of bottom, 100 mm thick PCC 1:4:8, RCC M25 as per IS 456:2000, centering, shuttering, vibration, curing, finishing, minimum 150 mm clear plinth above finished ground level, fixing 4 Nos. M16 hot-dip galvanized foundation bolts with template, cable entry sleeve of 100 mm HDPE/GI pipe, earthing provision, non-shrink grouting after panel erection,</p>	<p>IS 456:2000, IS 875 (Part 3), IS 2062, CPWD/Gujarat PWD Specifications</p>

Item No.	Description of Item (as per Schedule B / BOQ)	Applicable Specification / Clause Ref.
	backfilling in 150 mm layers with watering and compaction, disposal of surplus earth within 50 m lead, and all labour, material, T&P and incidental works complete as per IS 456:2000, IS 875 Part 3, IS 2062, CPWD/Gujarat PWD specifications and as directed by Engineer-in-Charge.	
70	SITC of 14.2 mm dia 3 mtr long Earth electrode of High tensile steel electrode with 250 micron copper bonding & 1 bag of Carbon fill Based environment friendly backfill tested as per IEC 62561-7 in NABL accredited Laboratory and suitable stainless Steel double sided clamp. Eco Friendly rust proof heavy duty weather proof Polyethylene Earth Pit Chamber with following dimensions :254 mm dia (top), 330 mm dia (bottom) & 260 mm (height).	<i>IEC 62561-7 (as specified), IS 3043:2018 (Earthing)</i>
71	Rounding off / reconciliation adjustment to match sanctioned estimate total excluding GST	<i>Administrative Item - No Technical Specification Applicable</i>

**Item No. 1: 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**

**Quantity & Unit (as per BOQ): 1139 cum | Applicable Specification / Clause Reference: MoRTH Clause 305 (Excavation for Structures) r/w R&B Gujarat Standard Specifications for Road & Bridge Works, Section 300**

### 1. GENERAL

This item covers open excavation for foundations of the bridge sub-structure in sand, gravel, clay, soft soil and murrum, up to 3.0 m depth with lead up to 100 m, including all necessary shoring, strutting, dewatering and disposal of excavated material, in accordance with MoRTH Clause 305 and R&B Gujarat Section 300.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

No permanent materials are incorporated under this item; temporary materials used for shoring/strutting/staging (timber, steel sheeting, props) shall be of adequate strength and sound condition to ensure the safety of the excavation and adjoining works, and shall be removed on completion unless directed otherwise.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum), for the class of material (soil/murrum) actually encountered, limited to the net pay-lines/dimensions shown on the drawings or as directed; over-excavation for working space, slopes, shoring and planking shall be deemed for the Contractor's convenience unless specifically ordered, and back-filling, dewatering and disposal are deemed included in the rate.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all*

*materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

The excavation shall be set out true to line, level and dimensions shown on drawings; sides shall be adequately shored/battered for safety; water met with due to seepage, rain or stream flow shall be bailed/pumped out to keep the foundation dry, with no pumping during or within 24 hours after concreting except from an isolated sump; the base shall be properly leveled, benched/stepped and lightly watered and rammed before laying the foundation; trenches near habitation shall be securely fenced and marked with caution signs/lights.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 2: 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.**

**Quantity & Unit (as per BOQ): 2657 cum | Applicable Specification / Clause Reference: MoRTH Clause 305.3 (Excavation in Rock/Blasting) r/w R&B Gujarat Section 300**

### 1. GENERAL

This item covers excavation in hard rock for bridge foundations by controlled dry/wet blasting and chiselling (except where blasting is expressly prohibited, as noted in this item, in which case only mechanical/manual chiselling and rock-breaking methods shall be used), including dewatering, benching/stepping of the base, and disposal of excavated material, as per MoRTH Clause 305.3.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Where blasting is permitted elsewhere, only licensed explosives and detonators procured and stored as per the Explosives Act/Rules shall be used; where blasting is prohibited, mechanical rock breakers/splitters, wedges and chiselling tools of adequate capacity shall be deployed; no permanent material is incorporated in this item.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of net rock excavated within the pay-lines shown on drawings/as directed by the Engineer-in-Charge, classified separately as hard rock; the rate shall be deemed to include dewatering, benching, disposal and (where applicable) all controlled-blasting or mechanical-breaking operations.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and*

*testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Rock excavation shall proceed by pre-marking the pay lines and using controlled methods that avoid over-break and damage to adjoining structures/utilities; where blasting is prohibited, line-drilling, wedging or mechanical rock breakers shall be used with continuous monitoring for vibration/damage; the foundation base shall be properly benched/stepped, cleaned and dewatered before the foundation concrete is laid, all subject to the approval of the Engineer-in-Charge.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

### **Item No. 3: Providing and filling trenches of Labour charges - Excavator in rocky strata with ordinary cement concrete M-75**

**Quantity & Unit (as per BOQ):** 2080 cum | **Applicable Specification / Clause Reference:** MoRTH Section 1500 (Plain Cement Concrete) r/w IS 456:2000

#### **1. GENERAL**

This item covers labour charges for providing and filling trenches with ordinary cement concrete of grade M-7.5 (mass/leveling concrete), where the material component is measured/paid separately, complete as per MoRTH Clause 1500 and IS 456:2000.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

#### **2. MATERIALS**

Materials (cement, coarse/fine aggregate, water) shall conform to relevant IS codes as detailed under general concrete provisions; batching, where by volume for nominal mix, shall follow standard proportions for M-7.5 grade as per IS 456 Table 9/nominal mix tables applicable to lean/leveling concrete.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

#### **3. MODE OF MEASUREMENT**

Measurement of the labour component shall be in cubic metres (cum) as specified in the BOQ, for the net volume of concrete placed in the trenches to the dimensions shown on drawings/as directed, the rate covering all labour for mixing (where applicable), transporting, placing, compacting and curing, excluding cost of materials which is paid separately as noted in the BOQ description.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being*

*payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Concrete shall be placed in the excavated and dewatered trenches to the required line, level and thickness, compacted by ramming/vibration to avoid voids, and cured for a minimum of 7 days by water ponding/covering, with surface finished level to receive the superstructure/foundation work above.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 4: Providing and casting in situ Ordinary cement concrete M-150 for R.C.C. Raft and cut-off walls including necessary shuttering laying, vibrating, ramming and curing complete.**

**Quantity & Unit (as per BOQ): 104 cum | Applicable Specification / Clause Reference: MoRTH Clause 1500 / IS 456:2000, Grade M-15**

### 1. GENERAL

This item covers casting-in-situ (or precast, where specified) cement concrete of grade M-150 (M15) for R.C.C. raft and cut-off walls, including all centering, shuttering/formwork, laying, compacting, curing and finishing, complete as per the approved drawings and instructions of the Engineer-in-Charge, in accordance with MoRTH Section 1500/1700 & IS 456:2000.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Cement shall conform to IS 269/IS 8112/IS 12269 as applicable; coarse and fine aggregates shall conform to IS 383, clean, hard, well-graded and free from deleterious matter; water shall be clean and potable conforming to IS 456. Mix design (for controlled/design-mix concrete) shall be established through trial mixes to achieve the target mean strength for grade M-150 (M15), with maximum nominal aggregate size selected per the structural member as per IS 456. Reinforcement, if embedded, shall be as per the relevant reinforcement item.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of the net finished volume of concrete in the structure, as per the dimensions shown on the approved drawings, or as directed by the Engineer-in-Charge; no deduction/addition shall be made for chamfers, grooves, pipes/conduits up to 100 sq.cm cross-section, and reinforcement volume, as per standard practice. The rate shall be for finished work in position, inclusive of all materials, labour, formwork, curing, and testing.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this*

*specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Concrete shall be batched by weight, mixed in a mechanical mixer/batching plant, transported and placed without segregation or loss of materials within the permissible time limits, and compacted using needle/surface vibrators to achieve a dense, honeycomb-free finish. Construction/expansion joints shall be provided only at locations shown on drawings or approved by the Engineer-in-Charge. Curing shall be carried out by water ponding/wet hessian covering for a minimum of 14 days (7 days for OPC, longer for blended cements), and quality control (slump test, cube testing at 7 and 28 days) shall be carried out for each batch/pour as per IS 456 and MoRTH Clause 1715.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 5: Providing and casting in situ controlled cement concrete M-350 for R.C.C. well cap / Pilecap/Footing including necessary formwork, vibrating, curing and finishing complete.**

**Quantity & Unit (as per BOQ):** 818 cum | **Applicable Specification / Clause Reference:** IRC:112-2020 & MoRTH Clause 1700 (Concrete for General Construction), Grade M-35

### 1. GENERAL

This item covers casting-in-situ (or precast, where specified) cement concrete of grade M-350 (M35, design mix) for R.C.C. well cap / pile cap / footing, including all centering, shuttering/formwork, laying, compacting, curing and finishing, complete as per the approved drawings and instructions of the Engineer-in-Charge, in accordance with IRC:112-2020, IS 456:2000 & MoRTH Clause 1700.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Cement shall conform to IS 269/IS 8112/IS 12269 as applicable; coarse and fine aggregates shall conform to IS 383, clean, hard, well-graded and free from deleterious matter; water shall be clean and potable conforming to IS 456. Mix design (for controlled/design-mix concrete) shall be established through trial mixes to achieve the target mean strength for grade M-350 (M35, design mix), with maximum nominal aggregate size selected per the structural member as per IS 456. Reinforcement, if embedded, shall be as per the relevant reinforcement item.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of the net finished volume of concrete in the structure, as per the dimensions shown on the approved drawings, or as directed by the Engineer-in-Charge; no deduction/addition shall be made for chamfers, grooves, pipes/conduits up to 100 sq.cm cross-section, and reinforcement volume, as per standard practice. The rate shall be for finished work in position, inclusive of all materials, labour, formwork, curing, and testing.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Concrete shall be batched by weight, mixed in a mechanical mixer/batching plant, transported and placed without segregation or loss of materials within the permissible time limits, and compacted using needle/surface vibrators to achieve a dense, honeycomb-free finish. Construction/expansion joints shall be provided only at locations shown on drawings or approved by the Engineer-in-Charge. Curing shall be carried out by water ponding/wet hessian covering for a minimum of 14 days (7 days for OPC, longer for blended cements), and quality control (slump test, cube testing at 7 and 28 days) shall be carried out for each batch/pour as per IS 456 and MoRTH Clause 1715.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

## **Item No. 6: Providing and filling sand behind abutments and between returns in layers as directed**

**Quantity & Unit (as per BOQ):** 875 cum | **Applicable Specification / Clause Reference:** MoRTH Clause 305/2504 (Backfilling behind Abutments)

### **1. GENERAL**

This item covers filling of clean coarse sand behind abutments, wing walls and between returns, in layers, watered and compacted as directed, to relieve/regulate earth pressure and to assist drainage behind the bridge sub-structure, in accordance with MoRTH Clause 2504 and R&B Gujarat specifications.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### **2. MATERIALS**

Sand shall be clean, coarse river/pit sand, free from clay lumps, organic matter, salts and other deleterious material, of gradation approved by the Engineer-in-Charge, and shall satisfy the filter/drainage requirements where used adjacent to weep holes/filter media.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### **3. MODE OF MEASUREMENT**

Measurement shall be in cubic metres (cum) of the net compacted volume of sand filled in position, as per the limits shown on the approved drawings, measured by taking cross sections before and after filling, or as directed by the Engineer-in-Charge.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Sand shall be filled in horizontal layers not exceeding 200 mm loose thickness, each layer watered adequately and compacted to the satisfaction of the Engineer-in-Charge using mechanical/manual compaction as appropriate for the confined location, taking care not to disturb or damage the adjoining masonry/concrete work, until the full section shown on drawings is achieved.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

## **Item No. 7: Providing and filling sand behind abutments and between returns in layers as directed**

**Quantity & Unit (as per BOQ):** 3103 cum | **Applicable Specification / Clause Reference:** MoRTH Clause 305/2504 (Backfilling behind Abutments)

### **1. GENERAL**

This item covers filling of clean coarse sand behind abutments, wing walls and between returns, in layers, watered and compacted as directed, to relieve/regulate earth pressure and to assist drainage behind the bridge sub-structure, in accordance with MoRTH Clause 2504 and R&B Gujarat specifications.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### **2. MATERIALS**

Sand shall be clean, coarse river/pit sand, free from clay lumps, organic matter, salts and other deleterious material, of gradation approved by the Engineer-in-Charge, and shall satisfy the filter/drainage requirements where used adjacent to weep holes/filter media.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### **3. MODE OF MEASUREMENT**

Measurement shall be in cubic metres (cum) of the net compacted volume of sand filled in position, as per the limits shown on the approved drawings, measured by taking cross sections before and after filling, or as directed by the Engineer-in-Charge.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Sand shall be filled in horizontal layers not exceeding 200 mm loose thickness, each layer watered adequately and compacted to the satisfaction of the Engineer-in-Charge using mechanical/manual compaction as appropriate for the confined location, taking care not to disturb or damage the adjoining masonry/concrete work, until the full section shown on drawings is achieved.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 8: Providing and laying - Fitter Media 600mm thick directed at the back of abutments, returns and wing walls as per detailed specifications.**

**Quantity & Unit (as per BOQ):** 566 sqm | **Applicable Specification / Clause Reference:** MoRTH Clause 2504.3 (Filter Media)

### 1. GENERAL

This item covers providing and laying filter media, 600 mm thick, at the back of abutments, returns and wing walls to permit free drainage of backfill water while retaining fines, as per MoRTH Clause 2504.3 and detailed drawings.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Filter material shall be well-graded granular material (sand/gravel/crushed stone as specified) satisfying the filter design criteria relative to the backfill and drainage system (weep holes), free from clay, silt and organic matter, as approved by the Engineer-in-Charge.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in square metres (sqm) of the filter face area as shown on the approved drawings, for the specified 600 mm thickness, or in cum if so specified in the BOQ.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Filter material shall be placed in layers against the back face of the abutment/return/wing wall in coordination with backfilling operations, each layer lightly compacted without damaging the graded filter structure or the weep-hole outlets, maintaining continuity and thickness as per drawings.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 9: Providing & laying weep hole in Abutments, and returns by using A.C. pipe of 100mm including laying in proper grade and jointing the completed as per detailed specification.**

**Quantity & Unit (as per BOQ):** 566 Nos | **Applicable Specification / Clause Reference:** MoRTH Clause 2504.4 (Weep Holes)

### 1. GENERAL

This item covers providing and laying weep holes in abutments and returns using 100 mm dia A.C. (or approved equivalent) pipes, at proper grade, to drain water accumulated behind the structure, complete as per MoRTH Clause 2504.4.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Pipes shall be 100 mm dia asbestos cement/uPVC/HDPE pipes (as approved), sound, free from cracks, with each length firmly jointed; a filter media/geotextile wrap shall be provided at the inlet end where specified to prevent choking by fines.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in numbers (Nos.) of weep holes provided and fixed complete, in the positions and at the spacing shown on the drawings or as directed by the Engineer-in-Charge.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Pipes shall be fixed at the specified outward gradient during construction of the abutment/return so as to project clear of the finished face, properly bedded and jointed to prevent displacement during concreting/backfilling, with the inlet end protected by filter media to prevent clogging and ensure a continuous drainage path.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 10: Providing and placing in position FE 550D TMT Bar reinforcement including, cutting, bending hooking and tying complete as per detailed drawings & As per EIC**

**Quantity & Unit (as per BOQ):** 115.44000000000001 T | **Applicable Specification / Clause Reference:** IS 1786:2008 (High Strength Deformed Bars) & MoRTH Clause 1600/1715 (Reinforced Cement Concrete)

### 1. GENERAL

This item covers supply (where included) and placing in position of Fe 550D TMT bar reinforcement for the R.C.C./P.S.C. members shown on the approved Bar Bending Schedule (BBS) and detailed drawings, including cutting, bending, hooking and tying complete, in accordance with MoRTH Clause 1600 and IS 1786:2008.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Reinforcement bars shall be High Strength Deformed (HSD) TMT bars of grade Fe 550D, conforming to IS 1786:2008, procured from a manufacturer holding a valid BIS licence, accompanied by mill test certificates for each lot verifying yield strength, tensile strength, elongation and bend/re-bend properties. Binding wire shall be soft annealed steel wire of 1.6 mm/1.2 mm dia conforming to IS 280. Bars shall be free from loose mill scale, rust, oil, paint or any coating that could impair bond.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be by theoretical weight computed from the length of bars actually incorporated in the work as per the approved BBS/drawings, multiplied by the unit weight per metre run given in IS 1786; no payment shall be made for overlaps/laps in excess of those shown on drawings, wastage, chairs, or binding wire, which are deemed included in the quoted rate, unless specified otherwise.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and*

*testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Bars shall be cut and bent cold to the shapes and dimensions shown on the BBS, free of cracks; placed accurately with the specified cover maintained using cover blocks/chairs of matching grade mortar or approved plastic spacers, and securely tied with binding wire at every intersection to prevent displacement during concreting. Laps/couplers shall be provided at locations and of length shown on drawings, staggered as specified, and mechanical couplers (if used) shall conform to IS 16172. Reinforcement shall be cleaned of loose rust/scale immediately before concreting and inspected/approved by the Engineer-in-Charge prior to pour.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 11: Providing and casting in situ controlled cement concrete M-350 for R.C.C. return as per drawings including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete.**

**Quantity & Unit (as per BOQ): 1289 cum | Applicable Specification / Clause Reference: IRC:112-2020 & MoRTH Clause 1700, Grade M-35**

### 1. GENERAL

This item covers casting-in-situ (or precast, where specified) cement concrete of grade M-350 (M35, design mix) for R.C.C. returns, including all centering, shuttering/formwork, laying, compacting, curing and finishing, complete as per the approved drawings and instructions of the Engineer-in-Charge, in accordance with IRC:112-2020, IS 456:2000 & MoRTH Clause 1700.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Cement shall conform to IS 269/IS 8112/IS 12269 as applicable; coarse and fine aggregates shall conform to IS 383, clean, hard, well-graded and free from deleterious matter; water shall be clean and potable conforming to IS 456. Mix design (for controlled/design-mix concrete) shall be established through trial mixes to achieve the target mean strength for grade M-350 (M35, design mix), with maximum nominal aggregate size selected per the structural member as per IS 456. Reinforcement, if embedded, shall be as per the relevant reinforcement item.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of the net finished volume of concrete in the structure, as per the dimensions shown on the approved drawings, or as directed by the Engineer-in-Charge; no deduction/addition shall be made for chamfers, grooves, pipes/conduits up to 100 sq.cm cross-section, and reinforcement volume, as per standard practice. The rate shall be for finished work in position, inclusive of all materials, labour, formwork, curing, and testing.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Concrete shall be batched by weight, mixed in a mechanical mixer/batching plant, transported and placed without segregation or loss of materials within the permissible time limits, and compacted using needle/surface vibrators to achieve a dense, honeycomb-free finish. Construction/expansion joints shall be provided only at locations shown on drawings or approved by the Engineer-in-Charge. Curing shall be carried out by water ponding/wet hessian covering for a minimum of 14 days (7 days for OPC, longer for blended cements), and quality control (slump test, cube testing at 7 and 28 days) shall be carried out for each batch/pour as per IS 456 and MoRTH Clause 1715.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 12: Providing and casting in situ controlled cement concrete M-350 for R.C.C. return as per drawings including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete.**

**Quantity & Unit (as per BOQ):** 321 cum | **Applicable Specification / Clause Reference:** IRC:112-2020 & MoRTH Clause 1700, Grade M-35

### 1. GENERAL

This item covers casting-in-situ (or precast, where specified) cement concrete of grade M-350 (M35, design mix) for R.C.C. returns, including all centering, shuttering/formwork, laying, compacting, curing and finishing, complete as per the approved drawings and instructions of the Engineer-in-Charge, in accordance with IRC:112-2020, IS 456:2000 & MoRTH Clause 1700.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Cement shall conform to IS 269/IS 8112/IS 12269 as applicable; coarse and fine aggregates shall conform to IS 383, clean, hard, well-graded and free from deleterious matter; water shall be clean and potable conforming to IS 456. Mix design (for controlled/design-mix concrete) shall be established through trial mixes to achieve the target mean strength for grade M-350 (M35, design mix), with maximum nominal aggregate size selected per the structural member as per IS 456. Reinforcement, if embedded, shall be as per the relevant reinforcement item.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of the net finished volume of concrete in the structure, as per the dimensions shown on the approved drawings, or as directed by the Engineer-in-Charge; no deduction/addition shall be made for chamfers, grooves, pipes/conduits up to 100 sq.cm cross-section, and reinforcement volume, as per standard practice. The rate shall be for finished work in position, inclusive of all materials, labour, formwork, curing, and testing.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Concrete shall be batched by weight, mixed in a mechanical mixer/batching plant, transported and placed without segregation or loss of materials within the permissible time limits, and compacted using needle/surface vibrators to achieve a dense, honeycomb-free finish. Construction/expansion joints shall be provided only at locations shown on drawings or approved by the Engineer-in-Charge. Curing shall be carried out by water ponding/wet hessian covering for a minimum of 14 days (7 days for OPC, longer for blended cements), and quality control (slump test, cube testing at 7 and 28 days) shall be carried out for each batch/pour as per IS 456 and MoRTH Clause 1715.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 13: Providing and casting in situ controlled cement concrete M-350 for R.C.C. return as per drawings including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete.**

**Quantity & Unit (as per BOQ):** 7 cum | **Applicable Specification / Clause Reference:** IRC:112-2020 & MoRTH Clause 1700, Grade M-35

### 1. GENERAL

This item covers casting-in-situ (or precast, where specified) cement concrete of grade M-350 (M35, design mix) for R.C.C. returns, including all centering, shuttering/formwork, laying, compacting, curing and finishing, complete as per the approved drawings and instructions of the Engineer-in-Charge, in accordance with IRC:112-2020, IS 456:2000 & MoRTH Clause 1700.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Cement shall conform to IS 269/IS 8112/IS 12269 as applicable; coarse and fine aggregates shall conform to IS 383, clean, hard, well-graded and free from deleterious matter; water shall be clean and potable conforming to IS 456. Mix design (for controlled/design-mix concrete) shall be established through trial mixes to achieve the target mean strength for grade M-350 (M35, design mix), with maximum nominal aggregate size selected per the structural member as per IS 456. Reinforcement, if embedded, shall be as per the relevant reinforcement item.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of the net finished volume of concrete in the structure, as per the dimensions shown on the approved drawings, or as directed by the Engineer-in-Charge; no deduction/addition shall be made for chamfers, grooves, pipes/conduits up to 100 sq.cm cross-section, and reinforcement volume, as per standard practice. The rate shall be for finished work in position, inclusive of all materials, labour, formwork, curing, and testing.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Concrete shall be batched by weight, mixed in a mechanical mixer/batching plant, transported and placed without segregation or loss of materials within the permissible time limits, and compacted using needle/surface vibrators to achieve a dense, honeycomb-free finish. Construction/expansion joints shall be provided only at locations shown on drawings or approved by the Engineer-in-Charge. Curing shall be carried out by water ponding/wet hessian covering for a minimum of 14 days (7 days for OPC, longer for blended cements), and quality control (slump test, cube testing at 7 and 28 days) shall be carried out for each batch/pour as per IS 456 and MoRTH Clause 1715.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 14: Providing and casting in situ controlled cement concrete M-350 for R.C.C. return as per drawings including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete.**

**Quantity & Unit (as per BOQ): 20 cum | Applicable Specification / Clause Reference: IRC:112-2020 & MoRTH Clause 1700, Grade M-35**

### 1. GENERAL

This item covers casting-in-situ (or precast, where specified) cement concrete of grade M-350 (M35, design mix) for R.C.C. returns, including all centering, shuttering/formwork, laying, compacting, curing and finishing, complete as per the approved drawings and instructions of the Engineer-in-Charge, in accordance with IRC:112-2020, IS 456:2000 & MoRTH Clause 1700.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Cement shall conform to IS 269/IS 8112/IS 12269 as applicable; coarse and fine aggregates shall conform to IS 383, clean, hard, well-graded and free from deleterious matter; water shall be clean and potable conforming to IS 456. Mix design (for controlled/design-mix concrete) shall be established through trial mixes to achieve the target mean strength for grade M-350 (M35, design mix), with maximum nominal aggregate size selected per the structural member as per IS 456. Reinforcement, if embedded, shall be as per the relevant reinforcement item.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of the net finished volume of concrete in the structure, as per the dimensions shown on the approved drawings, or as directed by the Engineer-in-Charge; no deduction/addition shall be made for chamfers, grooves, pipes/conduits up to 100 sq.cm cross-section, and reinforcement volume, as per standard practice. The rate shall be for finished work in position, inclusive of all materials, labour, formwork, curing, and testing.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Concrete shall be batched by weight, mixed in a mechanical mixer/batching plant, transported and placed without segregation or loss of materials within the permissible time limits, and compacted using needle/surface vibrators to achieve a dense, honeycomb-free finish. Construction/expansion joints shall be provided only at locations shown on drawings or approved by the Engineer-in-Charge. Curing shall be carried out by water ponding/wet hessian covering for a minimum of 14 days (7 days for OPC, longer for blended cements), and quality control (slump test, cube testing at 7 and 28 days) shall be carried out for each batch/pour as per IS 456 and MoRTH Clause 1715.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 15: Providing and placing in position FE 500D TMT Bar reinforcement including, cutting, bending hooking and tying complete as per detailed drawings & Engineer in Charge.**

**Quantity & Unit (as per BOQ):** 268.8476 T | **Applicable Specification / Clause Reference:** IS 1786:2008 & MoRTH Clause 1600

### 1. GENERAL

This item covers supply (where included) and placing in position of Fe 500D TMT bar reinforcement for the R.C.C./P.S.C. members shown on the approved Bar Bending Schedule (BBS) and detailed drawings, including cutting, bending, hooking and tying complete, in accordance with MoRTH Clause 1600 and IS 1786:2008.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Reinforcement bars shall be High Strength Deformed (HSD) TMT bars of grade Fe 500D, conforming to IS 1786:2008, procured from a manufacturer holding a valid BIS licence, accompanied by mill test certificates for each lot verifying yield strength, tensile strength, elongation and bend/re-bend properties. Binding wire shall be soft annealed steel wire of 1.6 mm/1.2 mm dia conforming to IS 280. Bars shall be free from loose mill scale, rust, oil, paint or any coating that could impair bond.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be by theoretical weight computed from the length of bars actually incorporated in the work as per the approved BBS/drawings, multiplied by the unit weight per metre run given in IS 1786; no payment shall be made for overlaps/laps in excess of those shown on drawings, wastage, chairs, or binding wire, which are deemed included in the quoted rate, unless specified otherwise.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all*

*materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Bars shall be cut and bent cold to the shapes and dimensions shown on the BBS, free of cracks; placed accurately with the specified cover maintained using cover blocks/chairs of matching grade mortar or approved plastic spacers, and securely tied with binding wire at every intersection to prevent displacement during concreting. Laps/couplers shall be provided at locations and of length shown on drawings, staggered as specified, and mechanical couplers (if used) shall conform to IS 16172. Reinforcement shall be cleaned of loose rust/scale immediately before concreting and inspected/approved by the Engineer-in-Charge prior to pour.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

## **Item No. 16: Providing and fixing in position fully moulded restrained elastomeric Bearings as per detailed drawings & Engineer in Charge.**

**Quantity & Unit (as per BOQ):** 742 cc | **Applicable Specification / Clause Reference:** IRC:83 (Part II)-2018 (Elastomeric Bearings) & MoRTH Clause 2001-2005

### **1. GENERAL**

This item covers providing and fixing fully-moulded, restrained elastomeric bearings between the superstructure and sub-structure, to accommodate the design rotations/translations, in accordance with IRC:83 (Part II)-2018/IS 13311 and MoRTH Clause 2001-2005.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### **2. MATERIALS**

Bearings shall be manufactured from chloroprene (or natural) rubber of the hardness, size, and load/movement capacity shown on the design drawings, reinforced with steel laminates (for laminated bearings), and shall be accompanied by the manufacturer's type-test and batch-test certificates as per IRC:83; bedding mortar/epoxy pads used for levelling shall be non-shrink and of the strength specified.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### **3. MODE OF MEASUREMENT**

Measurement shall be in numbers (Nos.) or by volume (cc, as adopted in the BOQ for elastomer content) of bearings supplied and fixed in position complete, as per the design/drawing requirement.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Pedestal/bearing seats shall be cast/finished true to level (using non-shrink mortar/epoxy pad as required) before placing bearings; bearings shall be centred and oriented as per drawings, checked for level and full, uniform bearing contact, and protected from damage until the superstructure is placed; installation shall be inspected and approved by the Engineer-in-Charge before load transfer.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

## **Item No. 17: Providing and fixing in position fully moulded restrained elastometric Bearings as per detailed drawings & Engineer in Charge.**

**Quantity & Unit (as per BOQ):** 1600 cc | **Applicable Specification / Clause Reference:** IRC:83 (Part II)-2018 & MoRTH Clause 2001-2005

### **1. GENERAL**

This item covers providing and fixing fully-moulded, restrained elastomeric bearings between the superstructure and sub-structure, to accommodate the design rotations/translations, in accordance with IRC:83 (Part II)-2018/IS 13311 and MoRTH Clause 2001-2005.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### **2. MATERIALS**

Bearings shall be manufactured from chloroprene (or natural) rubber of the hardness, size, and load/movement capacity shown on the design drawings, reinforced with steel laminates (for laminated bearings), and shall be accompanied by the manufacturer's type-test and batch-test certificates as per IRC:83; bedding mortar/epoxy pads used for levelling shall be non-shrink and of the strength specified.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### **3. MODE OF MEASUREMENT**

Measurement shall be in numbers (Nos.) or by volume (cc, as adopted in the BOQ for elastomer content) of bearings supplied and fixed in position complete, as per the design/drawing requirement.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Pedestal/bearing seats shall be cast/finished true to level (using non-shrink mortar/epoxy pad as required) before placing bearings; bearings shall be centred and oriented as per drawings, checked for level and full, uniform bearing contact, and protected from damage until the superstructure is placed; installation shall be inspected and approved by the Engineer-in-Charge before load transfer.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 18: Providing and casting in situ or precast controlled Cement Concrete M-500 for prestressed concrete work in Super structure including centering, shuttering, curing, scaffolding, ramming, vibrating, finishing, launching or shifting complete.(I) Solid Slab.(II) Deck Slab.(III) Main Girders.(IV) Diaphragm or cross girder.**

**Quantity & Unit (as per BOQ):** 480 cum | **Applicable Specification / Clause Reference:** IRC:112-2020, IRC:18 (Prestressed Concrete Bridges) & MoRTH Section 1700/1800, Grade M-50

### 1. GENERAL

This item covers casting in-situ or precast prestressed concrete of grade M-500 (M50) for the superstructure elements (solid slab/deck slab/main girders/diaphragm or cross girders), including centering, shuttering, curing, scaffolding, ramming, vibrating, finishing and launching/shifting, as per IRC:18, IRC:112-2020 and MoRTH Clause 1700/1800.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Cement, aggregates and water shall conform to relevant IS codes as for structural concrete; the mix shall be a design mix established by trial to achieve both the specified transfer strength (prior to stressing) and 28-day strength for grade M-50, using low-heat/appropriate cement and admixtures as approved, with high tensile steel per the prestressing item.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of the net finished volume of prestressed concrete in the members shown on drawings, measured separately for each structural element (slab/girder/diaphragm) as specified in the BOQ.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all*

*materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Formwork/moulds (for precast) shall be rigid, true to shape and camber, and capable of withstanding stressing forces; concrete shall be placed and compacted without segregation, with special attention to congested reinforcement/duct zones; curing (steam or water curing as approved) shall continue until the transfer strength is verified by cube tests before de-stressing/de-tensioning; launching or shifting of precast girders shall follow the approved method statement with all safety precautions.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 19: Providing and casting in situ controlled cement concrete M-350 for Wearing coat including centering, scaffolding, curing and finishing complete.**

**Quantity & Unit (as per BOQ):** 84 cum | **Applicable Specification / Clause Reference:** MoRTH Clause 2705 / IRC:SP:37, Grade M-35

**1. GENERAL**

This item covers casting in-situ controlled cement concrete M-350 for the wearing coat on the bridge deck, including centering, scaffolding, curing and finishing to the required camber/cross-fall, as per MoRTH Clause 2705.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

**2. MATERIALS**

Materials shall conform to relevant IS codes as for structural concrete of grade M-35; where applicable, an approved integral waterproofing admixture may be used as directed, and surface finishing tools/floats shall be maintained clean and true.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

**3. MODE OF MEASUREMENT**

Measurement shall be in cubic metres (cum) of the net volume of wearing coat concrete laid to the specified thickness and camber shown on drawings.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Concrete shall be laid to the correct camber and cross-fall for surface drainage, compacted with vibrators/screed, and finished to a true, even surface using a wood float or broom finish (as directed) to provide adequate skid resistance, followed by curing for a minimum of 14 days.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 20: Providing, fabricating, and fixing in position single strip seal expansion joint consisting of edge beams, anchorages, and a chloroprene / neoprene rubber electronic sealing element. The system must be capable of accommodating movement up to 80 mm ( $\pm 40$  mm). The assembly includes alignment, fixing of anchor loops to the structural reinforcement steel, casting with high-grade concrete (M-40/M-50 grade) in the nosing area, complete with all materials, machinery, tools, labor, and testing. All works must be executed strictly in accordance with detailed design drawings, MoRTH Specification Clause 2607, and IRC guidelines**

**Quantity & Unit (as per BOQ):** 65 m | **Applicable Specification / Clause Reference:** MoRTH Clause 2607 (as specified in item), IRC:SP:69

### 1. GENERAL

This item covers providing, fabricating and fixing a single strip-seal expansion joint (edge beams, anchorages, chloroprene/neoprene sealing element) capable of accommodating movement up to  $\pm 40$  mm, complete with nosing concrete, in strict accordance with MoRTH Specification Clause 2607, IRC:SP:69 and the detailed design drawings.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

The expansion joint assembly (edge beams, anchor loops, sealing element) shall be sourced from an approved manufacturer, accompanied by type-test certificates confirming movement capacity and durability; nosing concrete shall be high-grade M-40/M-50 grade concrete (or polymer-modified concrete as specified) capable of rapid strength gain where traffic opening time is critical.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in running metres (m) of expansion joint provided and fixed complete across the carriageway width, as per drawings.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

The joint gap shall be set out accurately as per the design movement range and installation temperature; anchor loops shall be securely fixed/welded to the reinforcement cage prior to casting; nosing concrete shall be placed and compacted around the edge beams without voids, cured, and the sealing element inserted/fixed as per manufacturer's method statement; the finished joint shall be tested for water-tightness and smooth rideability, all works executed strictly per the design drawings, MoRTH Clause 2607 and IRC guidelines.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 21: Providing C.I. 100mm diameter water spouts including necessary iron gratings as per drawings.**

**Quantity & Unit (as per BOQ):** 56 Nos | **Applicable Specification / Clause Reference:** MoRTH Clause 2702 (Drainage Spouts)

**1. GENERAL**

This item covers providing C.I. water spouts, 100 mm dia, with necessary iron gratings, to drain surface water from the bridge deck, complete as per MoRTH Clause 2702.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

**2. MATERIALS**

Spouts and gratings shall be of cast iron, sound and free from casting defects, of the size and pattern shown on the drawings, hot-dip galvanised/painted as specified for corrosion protection.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

**3. MODE OF MEASUREMENT**

Measurement shall be in numbers (Nos.) of water spouts supplied and fixed in position complete with gratings.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

**4. WORKMANSHIP**

Spouts shall be embedded/fixed at the locations and levels shown on drawings during casting of the wearing coat/deck slab, projecting clear of the structure to discharge water away from structural elements, with the grating set flush with the deck surface to avoid a trip hazard and to prevent choking by debris.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 22: Providing and casting in situ controlled cement concrete M-400 for R.C.C. solid slab including centering, scaffolding, curing and finishing complete.**

**Quantity & Unit (as per BOQ):** 82 cum | **Applicable Specification / Clause Reference:** IRC:112-2020 & MoRTH Clause 1700, Grade M-40

### 1. GENERAL

This item covers casting-in-situ (or precast, where specified) cement concrete of grade M-400 (M40) for R.C.C. solid slab, including all centering, shuttering/formwork, laying, compacting, curing and finishing, complete as per the approved drawings and instructions of the Engineer-in-Charge, in accordance with IRC:112-2020 & MoRTH Clause 1700.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Cement shall conform to IS 269/IS 8112/IS 12269 as applicable; coarse and fine aggregates shall conform to IS 383, clean, hard, well-graded and free from deleterious matter; water shall be clean and potable conforming to IS 456. Mix design (for controlled/design-mix concrete) shall be established through trial mixes to achieve the target mean strength for grade M-400 (M40), with maximum nominal aggregate size selected per the structural member as per IS 456. Reinforcement, if embedded, shall be as per the relevant reinforcement item.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of the net finished volume of concrete in the structure, as per the dimensions shown on the approved drawings, or as directed by the Engineer-in-Charge; no deduction/addition shall be made for chamfers, grooves, pipes/conduits up to 100 sq.cm cross-section, and reinforcement volume, as per standard practice. The rate shall be for finished work in position, inclusive of all materials, labour, formwork, curing, and testing.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified*

*and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Concrete shall be batched by weight, mixed in a mechanical mixer/batching plant, transported and placed without segregation or loss of materials within the permissible time limits, and compacted using needle/surface vibrators to achieve a dense, honeycomb-free finish. Construction/expansion joints shall be provided only at locations shown on drawings or approved by the Engineer-in-Charge. Curing shall be carried out by water ponding/wet hessian covering for a minimum of 14 days (7 days for OPC, longer for blended cements), and quality control (slump test, cube testing at 7 and 28 days) shall be carried out for each batch/pour as per IS 456 and MoRTH Clause 1715.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 23: Providing and casting in situ controlled cement concrete M-350 for R.C.C. Crash barrier including centering, scaffolding, curing and finishing complete.**

**Quantity & Unit (as per BOQ):** 182 cum | **Applicable Specification / Clause Reference:** MoRTH Clause 810 & IRC:5-2015, Grade M-35

### 1. GENERAL

This item covers casting in-situ controlled cement concrete M-350 for the R.C.C. crash barrier, including centering, scaffolding, curing and finishing, in accordance with IRC:5-2015 (dimensions/profile of crash barriers) and MoRTH Clause 810/1700.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Materials shall conform to relevant IS codes as for structural concrete grade M-35; reinforcement as per the associated reinforcement item; formwork shall be capable of producing the exact profile shown in IRC:5/design drawings.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of the net volume of crash barrier concrete cast to the profile and length shown on drawings.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Formwork shall be set out accurately to the crash-barrier profile with smooth internal faces for a fair-faced finish; concrete shall be placed and vibrated in lifts to avoid cold joints and honeycombing at the profile changes; exposed faces shall be finished smooth and true to line for both appearance and function as a vehicle-restraint system.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 24: Providing and casting in situ Ordinary cement concrete M-150 for R.C.C. Raft and cut-off walls including necessary shuttering laying, vibrating, ramming and curing complete.**

**Quantity & Unit (as per BOQ):** 29 cum | **Applicable Specification / Clause Reference:** MoRTH Clause 1500 / IS 456:2000, Grade M-15

### 1. GENERAL

This item covers casting-in-situ (or precast, where specified) cement concrete of grade M-150 (M15) for R.C.C. raft and cut-off walls, including all centering, shuttering/formwork, laying, compacting, curing and finishing, complete as per the approved drawings and instructions of the Engineer-in-Charge, in accordance with MoRTH Section 1500/1700 & IS 456:2000.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Cement shall conform to IS 269/IS 8112/IS 12269 as applicable; coarse and fine aggregates shall conform to IS 383, clean, hard, well-graded and free from deleterious matter; water shall be clean and potable conforming to IS 456. Mix design (for controlled/design-mix concrete) shall be established through trial mixes to achieve the target mean strength for grade M-150 (M15), with maximum nominal aggregate size selected per the structural member as per IS 456. Reinforcement, if embedded, shall be as per the relevant reinforcement item.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of the net finished volume of concrete in the structure, as per the dimensions shown on the approved drawings, or as directed by the Engineer-in-Charge; no deduction/addition shall be made for chamfers, grooves, pipes/conduits up to 100 sq.cm cross-section, and reinforcement volume, as per standard practice. The rate shall be for finished work in position, inclusive of all materials, labour, formwork, curing, and testing.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this*

*specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Concrete shall be batched by weight, mixed in a mechanical mixer/batching plant, transported and placed without segregation or loss of materials within the permissible time limits, and compacted using needle/surface vibrators to achieve a dense, honeycomb-free finish. Construction/expansion joints shall be provided only at locations shown on drawings or approved by the Engineer-in-Charge. Curing shall be carried out by water ponding/wet hessian covering for a minimum of 14 days (7 days for OPC, longer for blended cements), and quality control (slump test, cube testing at 7 and 28 days) shall be carried out for each batch/pour as per IS 456 and MoRTH Clause 1715.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 25: Providing and placing in position FE 500D TMT Bar reinforcement including, cutting, bending hooking and tying complete as per detailed drawings**

**Quantity & Unit (as per BOQ): 135.23 T | Applicable Specification / Clause Reference: IS 1786:2008 & MoRTH Clause 1600**

**1. GENERAL**

This item covers supply (where included) and placing in position of Fe 500D TMT bar reinforcement for the R.C.C./P.S.C. members shown on the approved Bar Bending Schedule (BBS) and detailed drawings, including cutting, bending, hooking and tying complete, in accordance with MoRTH Clause 1600 and IS 1786:2008.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

**2. MATERIALS**

Reinforcement bars shall be High Strength Deformed (HSD) TMT bars of grade Fe 500D, conforming to IS 1786:2008, procured from a manufacturer holding a valid BIS licence, accompanied by mill test certificates for each lot verifying yield strength, tensile strength, elongation and bend/re-bend properties. Binding wire shall be soft annealed steel wire of 1.6 mm/1.2 mm dia conforming to IS 280. Bars shall be free from loose mill scale, rust, oil, paint or any coating that could impair bond.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

**3. MODE OF MEASUREMENT**

Measurement shall be by theoretical weight computed from the length of bars actually incorporated in the work as per the approved BBS/drawings, multiplied by the unit weight per metre run given in IS 1786; no payment shall be made for overlaps/laps in excess of those shown on drawings, wastage, chairs, or binding wire, which are deemed included in the quoted rate, unless specified otherwise.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and*

*testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Bars shall be cut and bent cold to the shapes and dimensions shown on the BBS, free of cracks; placed accurately with the specified cover maintained using cover blocks/chairs of matching grade mortar or approved plastic spacers, and securely tied with binding wire at every intersection to prevent displacement during concreting. Laps/couplers shall be provided at locations and of length shown on drawings, staggered as specified, and mechanical couplers (if used) shall conform to IS 16172. Reinforcement shall be cleaned of loose rust/scale immediately before concreting and inspected/approved by the Engineer-in-Charge prior to pour.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 26: Providing and fixing in position to exact profile high tensile steel wires of required ultimate strength including bending, cutting, tying providing necessary standard and anchorages, sheathing, stressing, grouting, ducts as per detailed drawing including necessary plant and machinery complete.**

**Quantity & Unit (as per BOQ): 9.57 T | Applicable Specification / Clause Reference: IS 14268 (HTS Wires/Strands) & MoRTH Clause 1800 (Prestressing)**

### 1. GENERAL

This item covers providing and fixing high-tensile steel (HTS) prestressing wires/strands to the exact profile shown on drawings, including bending, cutting, tying, standards/anchorages, sheathing, stressing, grouting of ducts and all necessary plant/machinery, in accordance with MoRTH Clause 1800/IRC:18.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

HTS wires/strands shall conform to IS 14268 (or IS 6003 for wires, as applicable) with certified ultimate tensile strength; sheathing (corrugated HDPE/GI) shall conform to IRC:18 requirements; anchorages and couplers shall be of an approved system with valid test certificates; grout shall be neat cement grout (with approved admixture) of specified fluidity and strength.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in tonnes (T) of HTS steel actually incorporated in the finished work, computed from the theoretical unit weight and the length of tendons stressed, as per approved design.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being*

*payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Tendons shall be threaded through ducts without damage, anchorages fixed true to the design profile, and stressing carried out using calibrated hydraulic jacks to the force and elongation specified in the design, with both force and elongation records cross-checked and maintained; ducts shall be grouted completely (verified through vent outlets) soon after stressing, following an approved grouting procedure to prevent voids and corrosion of the prestressing steel.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 27: Carrying out load test of super structure as directed including all necessary materials plant equipment, instruments, labour and arrangements for test directed**

**Quantity & Unit (as per BOQ): 300 T | Applicable Specification / Clause Reference: IRC:SP:51 & MoRTH Clause 2704 (Load Testing)**

### **1. GENERAL**

This item covers carrying out load testing of the superstructure as directed, including all materials, plant, equipment, instruments, labour and arrangements, in accordance with IRC:SP:51-2015 and MoRTH Clause 2704.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### **2. MATERIALS**

Test loads (loaded trucks/kentledge, as approved) of the specified magnitude shall be used; instrumentation (dial gauges/deflectometers, levelling instruments) shall be calibrated and of adequate accuracy/range for the expected deflections.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### **3. MODE OF MEASUREMENT**

Measurement/payment shall be as per the unit specified in the BOQ (tonnage of test load applied/lump sum for the test), for satisfactory completion of the test and submission of the test report as approved by the Engineer-in-Charge.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

The test scheme (load positions, increments, holding periods, deflection-measurement points) shall be got approved prior to testing; loads shall be applied in stages with deflection and recovery readings recorded at each stage; the structure shall be observed for cracking/distress throughout; acceptance shall be based on the permissible deflection and recovery criteria of IRC:SP:51, with a detailed test report submitted for record.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 28: Supplying & laying of bi-axial extruded high modulus polypropylene geogrid conforming to MORT&H specification for base/sub-base reinforcement having minimum tensile strength 40kN/m in the longitudinal and transverse direction, with 14kN/m and 28kN/m tensile strength at 2% and 5% strain respectively in the longitudinal and transverse direction, junction efficiency not less than 95% and with 38mm X 38mm mesh opening.**

**Quantity & Unit (as per BOQ): 4285 SQM | Applicable Specification / Clause Reference: MoRTH Section 700 (Geosynthetics) & IRC:SP:59**

### 1. GENERAL

This item covers supplying and laying a bi-axial extruded, high-modulus polypropylene geogrid for base/sub-base reinforcement, conforming to the specified tensile-strength and junction-efficiency parameters, in accordance with MoRTH Section 700 (Geosynthetics) and IRC:SP:59 (use of Geosynthetics in Road Pavements).

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Geogrid shall be manufactured from high-modulus polypropylene, bi-axially extruded, with minimum tensile strength 40 kN/m in both longitudinal and transverse directions, 14 kN/m and 28 kN/m strength at 2% and 5% strain respectively, junction efficiency not less than 95%, and mesh opening 38 mm x 38 mm, supported by manufacturer's test certificates for each batch.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in square metres (sqm) of the net area of geogrid laid, as per the extent shown on drawings, with no separate payment for overlaps beyond the specified minimum unless directed otherwise.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all*

*materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

The sub-grade/sub-base surface shall be prepared, trimmed and free from sharp projections before laying; geogrid rolls shall be laid with the specified overlap (as per design/manufacture's recommendation), pinned/anchored to prevent movement, and kept taut and wrinkle-free during placement and compaction of the overlying granular layer, which shall be spread and compacted in a manner that does not displace or damage the geogrid.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 29: Dismantling the existing structure including removing and stacking the dismantled materials as and where directed by Engineer in Charge of Junagadh Municipal Corporation (A) R.C.C. work**

**Quantity & Unit (as per BOQ):** 6880 Cum | **Applicable Specification / Clause Reference:** MoRTH Clause 202 (Dismantling and Demolition)

### 1. GENERAL

This item covers dismantling of the existing R.C.C. structure, including removing and stacking the dismantled/serviceable materials, and disposing of unserviceable material, as directed by the Engineer-in-Charge, in accordance with MoRTH Clause 202.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

No new materials are supplied under this item. Serviceable materials recovered (reinforcement steel, aggregates, etc.) shall remain the property of the Employer and shall be sorted, cleaned and stacked separately as directed; unserviceable/waste material shall be disposed of at approved locations, complying with applicable environmental/local body regulations.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in the unit specified in the BOQ (cum of structure dismantled, or by weight for recovered reinforcement, as applicable) based on the actual quantity dismantled and jointly measured with the Engineer-in-Charge, before disposal/removal from site.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being*

*payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Dismantling shall be carried out using controlled methods (mechanical breakers/manual breaking as approved) that avoid damage to adjoining/retained structures and ensure safety of workmen and the public; necessary temporary supports, barricading and traffic control shall be provided. Recovered serviceable materials shall be handled carefully to prevent damage, sorted by type, and stacked at locations designated by the Engineer-in-Charge; debris shall be removed from site promptly to keep the working area clear.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 30: 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 guidelines of IRC : SP 63-2018 etc. Complete.**

**Quantity & Unit (as per BOQ): 189 SQM | Applicable Specification / Clause Reference: IS 15658:2006 & IRC:SP:63-2018 (Concrete Block Paving)**

### 1. GENERAL

This item covers providing and fixing precast rubber-die/steel-die interlocking concrete paver blocks, 60 mm thick, grade M-300, machine compacted/vibrated, on a sand bedding, complete as per IS 15658:2006 and IRC:SP:63-2018.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Paver blocks shall be factory-made, of approved shape/design, grade M-300 concrete, manufactured by hydraulic pressing/vibro-compaction, conforming to IS 15658:2006 (minimum compressive strength and water absorption limits); bedding sand shall be clean, coarse and well-graded, 35 mm thick after compaction; joint-filling sand shall be fine, dry sand.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in square metres (sqm) of the net paved area laid, complete with bedding and joint filling, as per the pattern and extent shown on drawings.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and*

*testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

The sub-grade/base shall be prepared, compacted and trimmed to level/camber; sand bedding of uniform 35 mm thickness shall be screeded; paver blocks shall be laid by hand/mechanically in the approved pattern with tight joints, compacted with a plate vibrator to seat the blocks and lock the joint sand, and joints filled with sand to refusal, in accordance with IRC:SP:63-2018.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 31: Excavation for foundation upto 1.5 M. depth including sorting out and stacking of useful materials and disposing of excavated stuff up to 50M. lead. (A) Loose or Soft Soil**

**Quantity & Unit (as per BOQ):** 990 cum | **Applicable Specification / Clause Reference:** MoRTH Clause 305 (Excavation for Structures)

### 1. GENERAL

This item covers open excavation for foundations up to 1.5 m depth in loose/soft soil for the diversion/approach works, including sorting and stacking of useful material and disposal of excavated stuff up to 50 m lead, as per MoRTH Clause 305.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

No permanent materials incorporated; excavated useful material shall be sorted and stacked for reuse (e.g., in embankment/backfill) as directed.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of net excavation carried out within the pay-lines shown on drawings/as directed, for material classified as loose/soft soil.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

### 4. WORKMANSHIP

Excavation shall be carried out to the lines, levels and dimensions shown on drawings; sides kept stable; excavated material sorted at the time of excavation into useful and surplus categories, with useful material stacked within 50 m lead and surplus disposed of as directed by the Engineer-in-Charge.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 32: Providing and casting in situ Ordinary cement concrete M-150 for R.C.C. Raft and cut-off walls including necessary shuttering laying, vibrating, ramming and curing complete.**

**Quantity & Unit (as per BOQ): 149 cum | Applicable Specification / Clause Reference: MoRTH Clause 1500 / IS 456:2000, Grade M-15**

### 1. GENERAL

This item covers casting-in-situ (or precast, where specified) cement concrete of grade M-150 (M15) for R.C.C. raft and cut-off walls, including all centering, shuttering/formwork, laying, compacting, curing and finishing, complete as per the approved drawings and instructions of the Engineer-in-Charge, in accordance with MoRTH Section 1500/1700 & IS 456:2000.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Cement shall conform to IS 269/IS 8112/IS 12269 as applicable; coarse and fine aggregates shall conform to IS 383, clean, hard, well-graded and free from deleterious matter; water shall be clean and potable conforming to IS 456. Mix design (for controlled/design-mix concrete) shall be established through trial mixes to achieve the target mean strength for grade M-150 (M15), with maximum nominal aggregate size selected per the structural member as per IS 456. Reinforcement, if embedded, shall be as per the relevant reinforcement item.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of the net finished volume of concrete in the structure, as per the dimensions shown on the approved drawings, or as directed by the Engineer-in-Charge; no deduction/addition shall be made for chamfers, grooves, pipes/conduits up to 100 sq.cm cross-section, and reinforcement volume, as per standard practice. The rate shall be for finished work in position, inclusive of all materials, labour, formwork, curing, and testing.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this*

*specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Concrete shall be batched by weight, mixed in a mechanical mixer/batching plant, transported and placed without segregation or loss of materials within the permissible time limits, and compacted using needle/surface vibrators to achieve a dense, honeycomb-free finish. Construction/expansion joints shall be provided only at locations shown on drawings or approved by the Engineer-in-Charge. Curing shall be carried out by water ponding/wet hessian covering for a minimum of 14 days (7 days for OPC, longer for blended cements), and quality control (slump test, cube testing at 7 and 28 days) shall be carried out for each batch/pour as per IS 456 and MoRTH Clause 1715.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 33: Providing and laying cement concrete 1:4:8 (1cement : 4coarse sand : 8 B.T.Crushed stone aggregates 40 mm. nominal size) and curing complete excluding cost of from work in : (a) Foundation and plinth**

**Quantity & Unit (as per BOQ):** 482 cum | **Applicable Specification / Clause Reference:** MoRTH Clause 2100/IS 456:2000 (Nominal Mix Concrete)

### 1. GENERAL

This item covers providing and laying nominal-mix cement concrete 1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate, 40 mm nominal size) for foundation and plinth, excluding formwork cost, as per IS 456:2000 and MoRTH Clause 2100.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Cement, sand and coarse aggregate shall conform to relevant IS codes; aggregate of 40 mm nominal size, graded and free from deleterious material; the mix shall be proportioned by volume as per the standard nominal-mix table, with due allowance for bulking of sand.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of the net volume of concrete laid in the foundation/plinth to the dimensions shown on drawings, formwork (if required) being paid separately.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Materials shall be mixed (mechanically, or by hand if permitted for small quantities) to a uniform consistency, placed in the excavated/prepared bed in layers not exceeding 150 mm compacted thickness, rammed/vibrated to eliminate voids, levelled to the required thickness, and cured for a minimum of 7 days by water ponding/covering.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 34: Supplying and fixing reinforced concrete heavy duty non-pressure pipes with collars for culverts including setting and joining the pipes in cm. 1:2 watering and laying (to level or slops) of I.S.458/1971 Class NP 4 Casted by vertically vibrated technology of following internal diameters. 1200mm dia**

**Quantity & Unit (as per BOQ): 625 rmt | Applicable Specification / Clause Reference: IS 458:2003 (RCC Pipes) NP4 Class & MoRTH Clause 2701 (Pipe Culverts)**

### 1. GENERAL

This item covers supplying and fixing heavy-duty, non-pressure RCC pipes with collars, Class NP4, 1200 mm internal dia, for culverts, including setting, jointing and laying to the designed level/slope, complete as per IS 458:2003 and MoRTH Clause 2701.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Pipes shall be RCC, vertically-cast, vibrated (spun) pipes conforming to IS 458:2003 Class NP4, free from cracks, honeycombing or manufacturing defects, each pipe accompanied by manufacturer's test certificate; collar joints shall be sealed with cement mortar 1:2 (or as specified) and, where required, rubber gaskets of approved quality.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in running metres (rmt) of pipe laid and jointed complete, along the pipeline centre-line as shown on drawings.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being*

*payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

The trench/bed shall be prepared and graded to the designed invert level and slope, with proper bedding (granular/concrete cradle as specified); pipes shall be lowered, aligned and jointed with collars, mortar-sealed and internally pointed smooth, laid true to line and gradient, and backfilled in layers with care to avoid displacement, followed by hydraulic/visual testing of joints as directed.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 35: Providing and casting in situ controlled cement concrete M-200 for R.C.C. including necessary formwork, vibrating, curing and finishing complete.**

**Quantity & Unit (as per BOQ):** 2219 cum | **Applicable Specification / Clause Reference:** IRC:112-2020 & MoRTH Clause 1700, Grade M-20

### 1. GENERAL

This item covers casting-in-situ (or precast, where specified) cement concrete of grade M-200 (M20) for R.C.C. works (culvert/box structure as per drawing), including all centering, shuttering/formwork, laying, compacting, curing and finishing, complete as per the approved drawings and instructions of the Engineer-in-Charge, in accordance with IRC:112-2020 & MoRTH Clause 1700.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Cement shall conform to IS 269/IS 8112/IS 12269 as applicable; coarse and fine aggregates shall conform to IS 383, clean, hard, well-graded and free from deleterious matter; water shall be clean and potable conforming to IS 456. Mix design (for controlled/design-mix concrete) shall be established through trial mixes to achieve the target mean strength for grade M-200 (M20), with maximum nominal aggregate size selected per the structural member as per IS 456. Reinforcement, if embedded, shall be as per the relevant reinforcement item.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of the net finished volume of concrete in the structure, as per the dimensions shown on the approved drawings, or as directed by the Engineer-in-Charge; no deduction/addition shall be made for chamfers, grooves, pipes/conduits up to 100 sq.cm cross-section, and reinforcement volume, as per standard practice. The rate shall be for finished work in position, inclusive of all materials, labour, formwork, curing, and testing.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified*

*and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Concrete shall be batched by weight, mixed in a mechanical mixer/batching plant, transported and placed without segregation or loss of materials within the permissible time limits, and compacted using needle/surface vibrators to achieve a dense, honeycomb-free finish. Construction/expansion joints shall be provided only at locations shown on drawings or approved by the Engineer-in-Charge. Curing shall be carried out by water ponding/wet hessian covering for a minimum of 14 days (7 days for OPC, longer for blended cements), and quality control (slump test, cube testing at 7 and 28 days) shall be carried out for each batch/pour as per IS 456 and MoRTH Clause 1715.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

### **Item No. 36: Providing and filling sand behind abutments and between returns in layers as directed**

**Quantity & Unit (as per BOQ):** 507 cum | **Applicable Specification / Clause Reference:** MoRTH Clause 305/2504 (Backfilling behind Abutments)

#### **1. GENERAL**

This item covers filling of clean coarse sand behind abutments, wing walls and between returns, in layers, watered and compacted as directed, to relieve/regulate earth pressure and to assist drainage behind the bridge sub-structure, in accordance with MoRTH Clause 2504 and R&B Gujarat specifications.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

#### **2. MATERIALS**

Sand shall be clean, coarse river/pit sand, free from clay lumps, organic matter, salts and other deleterious material, of gradation approved by the Engineer-in-Charge, and shall satisfy the filter/drainage requirements where used adjacent to weep holes/filter media.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

#### **3. MODE OF MEASUREMENT**

Measurement shall be in cubic metres (cum) of the net compacted volume of sand filled in position, as per the limits shown on the approved drawings, measured by taking cross sections before and after filling, or as directed by the Engineer-in-Charge.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Sand shall be filled in horizontal layers not exceeding 200 mm loose thickness, each layer watered adequately and compacted to the satisfaction of the Engineer-in-Charge using mechanical/manual compaction as appropriate for the confined location, taking care not to disturb or damage the adjoining masonry/concrete work, until the full section shown on drawings is achieved.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 37: Construction of embankment with approved material obtained from borrow pits with all lifts and leads, transporting to site spreading, grading to required slope and compacting to meet requirement to table 300-2 Construction of Embankment with Material Obtained from Borrowpits area within 3.0 Km Lead (CBR > 8)**

**Quantity & Unit (as per BOQ):** 3908 cum | **Applicable Specification / Clause Reference:** MoRTH Clause 305 & Table 300-2 (Embankment Construction from Borrow Pits)

### 1. GENERAL

This item covers construction of embankment using approved material obtained from borrow pits (CBR > 8), including all lifts and leads up to 3.0 km, transporting, spreading, grading to the required slope and compacting to the density/strength requirements of Table 300-2, as per MoRTH Clause 305.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Borrow material shall satisfy the physical requirements (gradation, plasticity, CBR>8, etc.) of MoRTH Table 300-1/300-2 as applicable, free from organic matter, logs, boulders larger than permissible size, and shall be approved by the Engineer-in-Charge prior to use.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of the compacted embankment volume constructed as per the cross-sections shown on drawings, measured by taking levels before and after construction, or as directed.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being*

*payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Embankment shall be constructed in horizontal layers not exceeding 200-300 mm loose thickness (as per the compaction plant used), each layer moisture-conditioned to near OMC, compacted with an appropriate roller to achieve the specified relative/field density, with field density tests carried out at the frequency specified in MoRTH Clause 902/905; benching shall be provided on sloping ground and side slopes trimmed to the design profile.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 38: Providing and placing in position FE 500D TMT Bar reinforcement including, cutting, bending hooking and tying complete as per detailed drawings**

**Quantity & Unit (as per BOQ):** 77.64 T | **Applicable Specification / Clause Reference:** IS 1786:2008 & MoRTH Clause 1600

### 1. GENERAL

This item covers supply (where included) and placing in position of Fe 500D TMT bar reinforcement for the R.C.C./P.S.C. members shown on the approved Bar Bending Schedule (BBS) and detailed drawings, including cutting, bending, hooking and tying complete, in accordance with MoRTH Clause 1600 and IS 1786:2008.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Reinforcement bars shall be High Strength Deformed (HSD) TMT bars of grade Fe 500D, conforming to IS 1786:2008, procured from a manufacturer holding a valid BIS licence, accompanied by mill test certificates for each lot verifying yield strength, tensile strength, elongation and bend/re-bend properties. Binding wire shall be soft annealed steel wire of 1.6 mm/1.2 mm dia conforming to IS 280. Bars shall be free from loose mill scale, rust, oil, paint or any coating that could impair bond.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be by theoretical weight computed from the length of bars actually incorporated in the work as per the approved BBS/drawings, multiplied by the unit weight per metre run given in IS 1786; no payment shall be made for overlaps/laps in excess of those shown on drawings, wastage, chairs, or binding wire, which are deemed included in the quoted rate, unless specified otherwise.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and*

*testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Bars shall be cut and bent cold to the shapes and dimensions shown on the BBS, free of cracks; placed accurately with the specified cover maintained using cover blocks/chairs of matching grade mortar or approved plastic spacers, and securely tied with binding wire at every intersection to prevent displacement during concreting. Laps/couplers shall be provided at locations and of length shown on drawings, staggered as specified, and mechanical couplers (if used) shall conform to IS 16172. Reinforcement shall be cleaned of loose rust/scale immediately before concreting and inspected/approved by the Engineer-in-Charge prior to pour.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 39: Dismantling the existing structure including removing and stacking the dismantled materials as and where directed. (A) R.C.C. work**

**Quantity & Unit (as per BOQ):** 2219 cum | **Applicable Specification / Clause Reference:** MoRTH Clause 202 (Dismantling)

**1. GENERAL**

This item covers dismantling of the existing R.C.C. structure, including removing and stacking the dismantled/serviceable materials, and disposing of unserviceable material, as directed by the Engineer-in-Charge, in accordance with MoRTH Clause 202.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

**2. MATERIALS**

No new materials are supplied under this item. Serviceable materials recovered (reinforcement steel, aggregates, etc.) shall remain the property of the Employer and shall be sorted, cleaned and stacked separately as directed; unserviceable/waste material shall be disposed of at approved locations, complying with applicable environmental/local body regulations.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

**3. MODE OF MEASUREMENT**

Measurement shall be in the unit specified in the BOQ (cum of structure dismantled, or by weight for recovered reinforcement, as applicable) based on the actual quantity dismantled and jointly measured with the Engineer-in-Charge, before disposal/removal from site.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being*

*payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Dismantling shall be carried out using controlled methods (mechanical breakers/manual breaking as approved) that avoid damage to adjoining/retained structures and ensure safety of workmen and the public; necessary temporary supports, barricading and traffic control shall be provided. Recovered serviceable materials shall be handled carefully to prevent damage, sorted by type, and stacked at locations designated by the Engineer-in-Charge; debris shall be removed from site promptly to keep the working area clear.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 40: Providing and placing in position FE 500D TMT Bar reinforcement including, cutting, bending hooking and tying complete as per detailed drawings (Credit of Dismantling)**

**Quantity & Unit (as per BOQ): -77.64 T | Applicable Specification / Clause Reference: IS 1786:2008 & MoRTH Clause 1600**

### 1. GENERAL

This is a credit item for Fe 500D TMT bar reinforcement recovered from dismantling under Item 39, to be assessed and credited (at a reduced/scrap-adjusted rate) against the Contract, in accordance with MoRTH Clause 202 (Salvage of Materials).

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Reinforcement recovered shall be sorted for reusability; bars found bent, corroded or otherwise unfit for reuse shall be treated as scrap; all recovered steel remains the property of the Employer and shall be accounted for.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be by weight (tonnes) of TMT reinforcement actually recovered and credited, based on joint measurement/weighment with the Engineer-in-Charge at the time of dismantling, at the credit rate specified in the BOQ.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Reinforcement shall be carefully extracted during dismantling to minimise damage, cleaned of adhering concrete, sorted by diameter, bundled and stacked at the location directed by the Engineer-in-Charge, with due records maintained for the credit adjustment.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 41: Supplying and fixing reinforced concrete heavy duty non-pressure pipes with collars for culverts including setting and joining the pipes in cm. 1:2 watering and laying (to level or slops) of I.S.458/1971 Class NP 4 Casted by vertically vibrated technology of following internal diameters. 1200mm dia (Credit of Dismantling)**

**Quantity & Unit (as per BOQ): -625 Rmt | Applicable Specification / Clause Reference: IS 458:2003, MoRTH Clause 2701**

### 1. GENERAL

This is a credit item for RCC NP4 Hume pipes (1200 mm dia) recovered from dismantling of the existing culvert, to be assessed and credited against the Contract, in accordance with MoRTH Clause 202 (Salvage of Materials) and IS 458:2003.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Recovered pipes shall be inspected for cracks/damage to determine reusability; pipes found unfit for reuse shall be treated as scrap material; all recovered material remains the property of the Employer.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in running metres (Rmt) of pipe actually recovered and credited, based on joint measurement with the Engineer-in-Charge at the time of dismantling, at the credit rate specified in the BOQ.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Pipes shall be carefully extracted to avoid breakage, cleaned, inspected and stacked at the location directed by the Engineer-in-Charge, with records maintained to support the credit adjustment against the Contract.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 42: Providing and fixing post and pipe railing as per detailed drawing including 3 coats of painting to steel works complete.**

**Quantity & Unit (as per BOQ):** 320 Rmt | **Applicable Specification / Clause Reference:** MoRTH Clause 810 (Handrail/Guardrail) & IS 1477 (Painting)

**1. GENERAL**

This item covers providing and fixing post-and-pipe railing as per detailed drawings, including three coats of painting to the steel work, complete as per MoRTH Clause 810 and IS 1477 (surface preparation and painting of structural steel).

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

**2. MATERIALS**

Posts and rails shall be of mild steel tube/pipe of the size and spacing shown on drawings, conforming to IS 1161/IS 1239, free from defects; paint shall comprise one coat of primer (red-oxide/zinc chromate) and two coats of approved finish paint (synthetic enamel or as specified).

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

**3. MODE OF MEASUREMENT**

Measurement shall be in running metres (Rmt) of railing provided, fixed and painted complete, along the length shown on drawings.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Posts shall be fixed vertically true to line and level at the specified spacing, with rails welded/bolted securely; welded joints shall be ground smooth; steel surfaces shall be cleaned of rust/mill scale (wire-brushing or as specified) before applying one coat of primer followed by two coats of finish paint, each coat allowed to dry before the next is applied, to give a uniform, durable finish.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 43: Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 ((in 2 Layers Saperately, Grade I - Top Layer, Grade V - bottom Layer) As per Instruction by EIC (JMC))**

**Quantity & Unit (as per BOQ):** 696 cum | **Applicable Specification / Clause Reference:** MoRTH Clause 401 (Granular Sub-Base)

### 1. GENERAL

This item covers construction of granular sub-base (GSB) in two layers (Grade I top layer, Grade V bottom layer) by providing close-graded material, mixing at OMC in a mechanical mix plant, spreading with a motor grader and compacting with a vibratory power roller, as per MoRTH Clause 401.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Aggregates shall satisfy the grading (Grade I/Grade V as specified) and physical requirements (Aggregate Impact Value, Liquid Limit, Plasticity Index, CBR) of MoRTH Table 400-1/400-2, sourced from an approved quarry with test certificates for each source/lot.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of compacted GSB laid to the specified thickness (each layer) and width shown on drawings, computed from measured levels/cross-sections before and after construction.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being*

*payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Material shall be mixed in a mechanical plant at optimum moisture content (OMC), transported, spread in uniform layers of the specified compacted thickness with a motor grader on the prepared surface, and compacted with a vibratory roller (80-100 kN) to achieve at least 98% of maximum dry density (MDD) as per IS 2720 (Part 8), with field density and gradation tests carried out at the frequency specified in MoRTH Clause 401.6/903.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 44: Wet Mix Macadam (Plant Mix Method) : Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with grader in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.**

**Quantity & Unit (as per BOQ): 768 cum | Applicable Specification / Clause Reference: MoRTH Clause 406 (Wet Mix Macadam)**

### 1. GENERAL

This item covers Wet Mix Macadam (WMM) by the Plant Mix Method - providing, laying, spreading and compacting graded stone aggregate premixed with water at OMC, as per MoRTH Clause 406.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Aggregates shall be crushed stone/crushed slag/natural aggregate conforming to the grading and physical requirements (AIV, Flakiness Index, etc.) of MoRTH Table 400-6/400-7, from an approved source with test certificates.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of the compacted WMM laid to the specified thickness/width shown on drawings, computed from measured levels/cross-sections.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being*

*payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Aggregate shall be premixed with the specified quantity of water in a mechanical mix plant, transported by tipper, laid in uniform layers with a grader in the sub-base/base course on the prepared surface, and compacted with a vibratory roller to achieve the desired density (98% MDD), maintaining moisture content close to OMC during rolling, with surface finished true to camber and grade.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 45: Providing and applying primer coat with SS1 grade bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer at the rate of 0.70 to 1.00 kg/sqm using mechanical means.**

**Quantity & Unit (as per BOQ): 3315 Sqm | Applicable Specification / Clause Reference: MoRTH Clause 502 (Prime Coat)**

### 1. GENERAL

This item covers providing and applying a primer coat with SS1-grade bitumen emulsion on the prepared granular base surface, complete as per MoRTH Clause 502.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Bitumen emulsion shall conform to IS 8887 (SS1 grade for prime coat), of the quantity specified (0.70 to 1.00 kg/sqm) as per the absorption characteristics of the base course.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in square metres (sqm) of the primed surface, as per the extent shown on drawings.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

### 4. WORKMANSHIP

The granular base surface shall be cleaned of loose material/dust using a mechanical broom; primer shall be sprayed uniformly using a mechanical distributor at the specified rate, with the surface protected from traffic until the primer has cured/penetrated sufficiently, prior to laying the succeeding bituminous course.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 46: Tack Coat on Bituminous surfaces : Providing and applying tack coat with VG 30 or RS1 Bitumen Emulsion as per instruction of Engineer -In - Charge of JMC using emulsion pressure distributor at the rate of 0.20 to 0.30 kg per sqm on the prepared bituminous surface cleaned with mechanical broom.**

**Quantity & Unit (as per BOQ): 6630 Sqm | Applicable Specification / Clause Reference: MoRTH Clause 503 (Tack Coat)**

### 1. GENERAL

This item covers providing and applying a tack coat with VG-30 bitumen or RS-1 bitumen emulsion on the prepared bituminous surface, complete as per MoRTH Clause 503.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Binder shall be VG-30 paving bitumen or RS-1 bitumen emulsion conforming to relevant IS codes, applied at the specified rate (0.20 to 0.30 kg/sqm).

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in square metres (sqm) of the tack-coated surface, as per the extent shown on drawings.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

### 4. WORKMANSHIP

The existing bituminous surface shall be cleaned with a mechanical broom to remove dust/loose material; the binder shall be sprayed uniformly at a controlled rate using an emulsion pressure distributor, avoiding streaking or ponding, and the surface protected until it is ready to receive the succeeding bituminous layer.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 47: Dense Graded Bituminous Macadam Grading : 2 -Providing and laying dense graded bituminous macadam with higher capacity batch type HMP using crushed aggregates of specified grading, premixed with bituminous binder @ 4.5 per cent by weight of total 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. 505 complete in all respects.**

**Quantity & Unit (as per BOQ):** 249 Cum | **Applicable Specification / Clause Reference:** MoRTH Clause 505 (Dense Graded Bituminous Macadam), as specified in item

### 1. GENERAL

This item covers Dense Graded Bituminous Macadam (Grading 2) - providing and laying DBM using a higher-capacity batch-type hot-mix plant, with crushed aggregate and bituminous binder @ 4.5% by weight, as per MoRTH Clause 505.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Aggregate shall be crushed stone conforming to Grading 2 of MoRTH Table 500-10/500-17 (as applicable) with specified physical properties (AIV, Flakiness/Elongation Index, water absorption); binder shall be VG-30/VG-40 paving bitumen (as specified) conforming to IS 73; mineral filler as per Clause 505.2.6.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of compacted DBM laid to the specified thickness and width shown on drawings, or as computed from the weighbridge/plant records cross-checked with laid area and thickness.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified*

*and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Aggregate and binder shall be heated and mixed in the hot-mix plant to the specified temperature and binder content, transported to site in insulated tippers, laid using a hydrostatic sensor-controlled paver finisher to the required grade, level and camber, and compacted with smooth-wheeled, vibratory and tandem rollers in the breakdown, intermediate and finishing rolling sequence to achieve the specified density (as per MoRTH Clause 505.8), with quality control tests (Marshall stability, density, binder content/extraction) as specified.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 48: Bituminous Concrete Grading 2: -Providing and laying bituminous concrete with higher capacity batch type hot mix plant using crushed aggregates of specified grading, premixed with bituminous binder @ 5.4 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**

**Quantity & Unit (as per BOQ): 193 Cum | Applicable Specification / Clause Reference: MoRTH Clause 507 (Bituminous Concrete), as specified in item**

### 1. GENERAL

This item covers Bituminous Concrete (Grading 2) - providing and laying BC using a higher-capacity batch-type hot-mix plant, with crushed aggregate and bituminous binder @ 5.4% by weight, as per MoRTH Clause 507.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Aggregate shall be crushed stone conforming to Grading 2 of MoRTH Table 500-18/500-19 with specified physical properties; binder shall be VG-30/VG-40 (or as specified) paving bitumen; mineral filler as per Clause 507.2.7.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in cubic metres (cum) of compacted BC laid to the specified thickness and width shown on drawings.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and*

*testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Mixing, transporting, laying with a sensor-controlled paver, and rolling (breakdown, intermediate and finishing with smooth-wheeled, vibratory and tandem rollers) shall be carried out to achieve the specified density and a smooth, tight, skid-resistant riding surface, as per MoRTH Clause 507.7-507.8, with the required quality control tests carried out.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 49: Providing and erecting retro-reflectorized Cautionary, Mandatory and Informatory Sign Boards conforming to IRC:67-2022, manufactured using 2 mm thick Aluminium Alloy Sheet (IS 736, Grade 19000 or equivalent) with High Intensity Prismatic (HIP) / Type XI Retro-reflective Sheeting, including approved legends, symbols and borders as specified, fixed over hot dip galvanized mild steel tubular posts complete with RCC foundation, excavation, concrete, backfilling, all fittings, nuts, bolts, clamps and complete as directed by the Engineer. The item shall include fabrication, transportation, erection and maintenance during construction period**

**Quantity & Unit (as per BOQ): 16 Each | Applicable Specification / Clause Reference: IRC:67-2022 (Road Signs)**

### 1. GENERAL

This item covers providing and erecting retro-reflectorized Cautionary, Mandatory and Informatory Sign Boards conforming to IRC:67-2022, complete with support post and foundation, fixed at the location and orientation shown on drawings/as directed by the Engineer-in-Charge.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Sign face shall be fabricated from aluminium alloy sheet/ACP (2 mm thick, IS 736 Grade 19000), pre-treated (phosphating/acid etching), coated with epoxy primer and finish paint, and reflectorised with High Intensity Prismatic (HIP) retro-reflective sheeting conforming to ASTM D-4956/IRC:67-2022; the support post shall be hot-dip galvanised MS tube/angle of the section shown on drawings; a manufacturer's warranty (typically 7 years) for the retro-reflective sheeting shall be furnished.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in numbers (Nos.) of sign boards supplied, fabricated and erected complete with post and foundation, as per the schedule/drawing.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Sign panels shall be fabricated to the exact size, shape and legend/symbol layout specified, with the retro-reflective sheeting applied without air bubbles or wrinkles; posts shall be erected vertically, embedded in an RCC foundation of the size shown on drawings, at the height and offset from the carriageway edge specified in IRC:67-2022, and oriented for maximum visibility to approaching traffic.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 50: Providing and fixing Hazard Marker (Object Marker) conforming to IRC:67 using retro-reflective micro-prismatic sheeting over Aluminium Composite Panel/Aluminium Sheet complete with hot dip galvanized support post, RCC foundation including excavation, PCC, backfilling, all fixtures, clamps, nuts and bolts complete. Complete as per specifications and direction of Engineer.**

**Quantity & Unit (as per BOQ): 8 Each | Applicable Specification / Clause Reference: IRC:67-2022 (Hazard/Object Markers)**

### 1. GENERAL

This item covers providing and erecting Hazard Marker (Object Marker) sign conforming to IRC:67-2022, complete with support post and foundation, fixed at the location and orientation shown on drawings/as directed by the Engineer-in-Charge.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Sign face shall be fabricated from aluminium alloy sheet/ACP (micro-prismatic sheeting on ACP/aluminium sheet), pre-treated (phosphating/acid etching), coated with epoxy primer and finish paint, and reflectorised with High Intensity Prismatic (HIP) retro-reflective sheeting conforming to ASTM D-4956/IRC:67-2022; the support post shall be hot-dip galvanised MS tube/angle of the section shown on drawings; a manufacturer's warranty (typically 7 years) for the retro-reflective sheeting shall be furnished.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in numbers (Nos.) of sign boards supplied, fabricated and erected complete with post and foundation, as per the schedule/drawing.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all*

*materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Sign panels shall be fabricated to the exact size, shape and legend/symbol layout specified, with the retro-reflective sheeting applied without air bubbles or wrinkles; posts shall be erected vertically, embedded in an RCC foundation of the size shown on drawings, at the height and offset from the carriageway edge specified in IRC:67-2022, and oriented for maximum visibility to approaching traffic.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 51: Providing and erecting Chevron Alignment Sign Boards conforming to IRC:67 fabricated using 2 mm thick aluminium sheet with High Intensity Prismatic Retro-reflective Sheeting fixed over galvanized tubular steel support including concrete foundation, excavation, erection and all incidental works complete.**

**Quantity & Unit (as per BOQ): 18 Each | Applicable Specification / Clause Reference: IRC:67-2022 (Chevron Signs)**

### 1. GENERAL

This item covers providing and erecting Chevron Alignment Sign Boards conforming to IRC:67-2022, complete with support post and foundation, fixed at the location and orientation shown on drawings/as directed by the Engineer-in-Charge.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Sign face shall be fabricated from aluminium alloy sheet/ACP (2 mm thick aluminium sheet), pre-treated (phosphating/acid etching), coated with epoxy primer and finish paint, and reflectorised with High Intensity Prismatic (HIP) retro-reflective sheeting conforming to ASTM D-4956/IRC:67-2022; the support post shall be hot-dip galvanised MS tube/angle of the section shown on drawings; a manufacturer's warranty (typically 7 years) for the retro-reflective sheeting shall be furnished.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in numbers (Nos.) of sign boards supplied, fabricated and erected complete with post and foundation, as per the schedule/drawing.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and*

*testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Sign panels shall be fabricated to the exact size, shape and legend/symbol layout specified, with the retro-reflective sheeting applied without air bubbles or wrinkles; posts shall be erected vertically, embedded in an RCC foundation of the size shown on drawings, at the height and offset from the carriageway edge specified in IRC:67-2022, and oriented for maximum visibility to approaching traffic.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 52: Providing and laying hot applied Thermoplastic Road Marking Compound of approved colour, 2.5 mm thick including reflectorising glass beads @ 250 gm/sqm over prepared road surface after cleaning, in accordance with IRC:35 and MoRTH Specifications Clause 803 complete including machinery, labour, protection and traffic control during execution.**

**Quantity & Unit (as per BOQ): 50.4 Sqm | Applicable Specification / Clause Reference: MoRTH Clause 803 (as specified) & IRC:35**

### 1. GENERAL

This item covers providing and laying hot-applied thermoplastic road marking, 2.5 mm thick, with reflectorising glass beads, on the prepared road surface, in accordance with IRC:35 and MoRTH Specification Clause 803.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Thermoplastic compound shall conform to IS 15507/relevant MoRTH/IRC:35 requirements for composition, softening point and skid resistance; glass beads shall be applied at 250 gm/sqm, conforming to IS 5382, of the specified refractive index and gradation, drop-on/premix type as specified.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in square metres (sqm) of the actual road-marking area applied (converting linear marking width x length to area), as per the marking plan.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being*

*payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

The road surface shall be cleaned of dust, loose material and old/worn markings; thermoplastic compound shall be heated to the specified application temperature and applied by machine/hand-applicator to the specified thickness and line geometry, with glass beads broadcast onto the still-molten surface immediately after application to achieve retro-reflectivity, and traffic kept off until the marking has cooled and set.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 53: Providing and fixing Raised Pavement Marker (Road Stud/Cat Eye) of approved make having high intensity retro-reflective lenses fixed with two component epoxy adhesive after cleaning the road surface complete in accordance with IRC:35 and manufacturer's specification.**

**Quantity & Unit (as per BOQ): 120 Each | Applicable Specification / Clause Reference: IRC:35 (Road Marking) & manufacturer's specification**

### 1. GENERAL

This item covers providing and fixing Raised Pavement Markers (Road Studs/Cat Eyes) with high-intensity retro-reflective lenses, fixed with epoxy adhesive, in accordance with IRC:35 and manufacturer's specification.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Road studs shall be of ABS/polycarbonate body with acrylic retro-reflective lenses of the colour specified, of approved make, and two-component epoxy adhesive of the strength recommended by the manufacturer.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in numbers (Nos.) of road studs fixed complete, at the spacing shown on the marking plan.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

The road surface at each location shall be cleaned and dried; epoxy adhesive shall be mixed and applied as per manufacturer's instructions, and the stud bedded and pressed firmly to achieve full adhesive contact and correct orientation/inclination for maximum retro-reflectivity to approaching traffic; traffic shall be kept off until the adhesive has cured.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 54: Providing, supplying, erecting, maintaining and removing approved steel/water filled barricades of minimum 1.2 m height fitted with retro-reflective sheeting, flashing amber lamps, caution tape and warning boards including shifting during various stages of construction complete.**

**Quantity & Unit (as per BOQ): 80 Rmt | Applicable Specification / Clause Reference: IRC:SP:55**  
(Road Safety - Traffic Management during Construction)

### 1. GENERAL

This item covers providing, supplying, erecting, maintaining and removing steel/water-filled barricades (minimum 1.2 m height) with retro-reflective sheeting, flashing amber lamps, caution tape and warning boards, for traffic management during construction, as per IRC:SP:55.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Barricades shall be of steel/HDPE (water-fillable) construction, fitted with retro-reflective sheeting strips, battery-operated flashing amber lamps, and caution tape/warning boards of the type approved.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in running metres (Rmt) of barricading provided and maintained, as directed, for the duration of construction.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Barricades shall be positioned to safely delineate the works area/diversion, linked continuously without gaps, with lamps functioning and charged, and shifted progressively as construction proceeds through different stages, maintained in good condition (cleaned, repositioned, repaired/replaced if damaged) throughout the construction period.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 55: Providing, supplying, installing, operating, maintaining and removing Solar Powered Flashing Amber Warning Beacon (Solar Blinker) conforming to IRC:SP:55, IRC:67 and MoRTH Specifications, comprising high-intensity amber LED flashing lamp of minimum 200 mm diameter, solar photovoltaic module, maintenance-free rechargeable battery, automatic dusk-to-dawn controller, weatherproof IP65 housing, corrosion-resistant mounting bracket suitable for fixing on barricades, sign posts or drums, complete with all accessories.**

**Quantity & Unit (as per BOQ): 18 Each | Applicable Specification / Clause Reference: IRC:SP:55, IRC:67-2022 & MoRTH Specifications**

### 1. GENERAL

This item covers providing, supplying, installing, operating, maintaining and removing a Solar Powered Flashing Amber Warning Beacon (Solar Blinker), conforming to IRC:SP:55, IRC:67-2022 and MoRTH Specifications.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

The unit shall comprise a minimum 200 mm dia high-intensity amber LED flashing lamp, solar photovoltaic module, maintenance-free rechargeable battery, automatic dusk-to-dawn controller, IP65 weatherproof housing and a corrosion-resistant mounting bracket, complete with all accessories, of approved make.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in numbers (Nos.) of beacons supplied, installed, and maintained, as directed.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and*

*testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Beacons shall be mounted securely on barricades/sign posts/drums at locations of maximum hazard visibility as directed; the solar panel shall be oriented for optimum charging; the unit shall be tested for correct dusk-to-dawn operation prior to acceptance, and maintained (cleaned, battery/connections checked) through the construction/warranty period.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 56: Providing and fixing Flexible Median Marker made of UV stabilized engineering plastic fitted with High Intensity Prismatic Retro-reflective sheeting complete with stainless steel fixing arrangement and epoxy anchoring on concrete/bituminous surface complete.**

**Quantity & Unit (as per BOQ): 12 Each | Applicable Specification / Clause Reference: IRC:SP:55 (Delineators/Median Markers)**

## 1. GENERAL

This item covers providing and fixing a Flexible Median Marker of UV-stabilised engineering plastic with High Intensity Prismatic retro-reflective sheeting, fixed on the median/pavement surface, as per IRC:SP:55.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

## 2. MATERIALS

The marker shall be of UV-stabilised engineering plastic (polyurethane/thermoplastic elastomer), fitted with HIP retro-reflective sheeting, stainless steel fixing arrangement and epoxy anchoring compound.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

## 3. MODE OF MEASUREMENT

Measurement shall be in numbers (Nos.) of markers fixed complete, as per the marking/median plan.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

## 4. WORKMANSHIP

The fixing location shall be cleaned and drilled/prepared as required; the marker base shall be anchored using the stainless steel fixing arrangement and epoxy anchoring compound, ensuring the marker stands vertically and can flex under vehicle impact and return to position, in accordance with IRC:SP:55.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 57: Providing, supplying, fixing, maintaining, shifting during various stages of construction and removing after completion approved make Temporary Traffic Delineators (Flexible Delineator Posts/Lane Channelizers) conforming to IRC:SP:55, IRC:67 and relevant MoRTH Specifications, manufactured from UV stabilized high-density polyethylene (HDPE) or polyurethane material having minimum height of 750 mm above finished road level, fitted with two or more bands of High Intensity Prismatic Grade retro-reflective sheeting (HIP) visible from both directions. The delineator shall be provided with a heavy-duty rubber or polymer base of minimum 6 kg weight or approved anchor base, complete with galvanized base plate, anchor bolts/chemical fasteners, all fixtures, hardware and accessories. The item shall include transportation, erection, fixing on temporary diversion road, maintenance during the construction period, replacement of damaged units, cleaning of retro-reflective sheeting, shifting during different stages of traffic management and dismantling after completion of work complete as directed by the Engineer-in-Charge.**

**Quantity & Unit (as per BOQ): 60 Each | Applicable Specification / Clause Reference: IRC:SP:55, IRC:67-2022 (Traffic Delineators)**

## 1. GENERAL

This item covers providing, supplying, fixing, maintaining and removing Temporary Traffic Delineators (flexible delineator posts/lane channelizers), conforming to IRC:SP:55, IRC:67-2022 and relevant MoRTH Specifications.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

## 2. MATERIALS

Delineators shall be manufactured from UV-stabilised HDPE/polyurethane, minimum 750 mm height above finished road level, fitted with two or more bands of HIP-grade retro-reflective sheeting, with a heavy-duty rubber/polymer base (minimum 6 kg) or approved anchor base, complete with galvanised base plate and fasteners.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in numbers (Nos.) of delineators supplied, fixed, maintained and eventually removed, as directed.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

### 4. WORKMANSHIP

Delineators shall be positioned at the spacing and alignment shown on the traffic management plan to clearly channelize traffic through the diversion/work zone, secured against displacement by traffic-induced air currents, cleaned periodically to maintain retro-reflectivity, shifted as construction stages progress, with damaged units replaced promptly, and dismantled on completion of the work.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 58: Providing all labour, materials, plant & machinery, tools, tackles, temporary works and all incidental arrangements for joint survey, identification, locating, exposing, protection, dismantling, disconnecting, shifting, diversion, supporting, lowering, relaying, reconnecting, testing and commissioning of existing underground and overhead utilities affected due to construction of the proposed bridge, approaches and allied works, including but not limited to water supply pipelines, sewer lines, storm water drains, electrical HT/LT cables, street lighting system, telecom/OFC ducts, traffic signal cables and other public utility services. The item shall include excavation, temporary supports, cutting, welding, fabrication, specials, fittings, valves, thrust/anchor blocks, anti-corrosive treatment, bedding, jointing, temporary bypass arrangements, shutdown coordination with utility agencies, testing, chlorination wherever applicable, reinstatement of utility services, traffic management, barricading, safety measures, disposal of unserviceable materials and all other incidental works complete as directed by the Engineer-in-Charge and in accordance with the specifications of the respective Utility Owning Department. The quantities shown in the BOQ are tentative and are provided only for the purpose of bid evaluation. Payment shall be made only for the actual quantities of utility shifting executed at site, jointly measured and certified by the Engineer-in-Charge and the concerned Utility Owning Department. No payment shall be made for utilities not shifted, abandoned utilities, utilities shifted directly by the Utility Owning Department under separate demand note, or quantities not actually executed. The quoted rates shall be deemed to include all labour, materials, equipment, temporary works, testing, commissioning, traffic management, coordination with utility agencies, statutory approvals, contractor's overheads, profit and all incidental expenses required for satisfactory completion of the work. No additional payment or claim shall be admissible on any account beyond the measured quantities accepted by the Engineer-in-Charge. The Contractor shall satisfy himself regarding the location and extent of existing utilities by visiting the site before submission of the bid**

**Quantity & Unit (as per BOQ): 1 Lump sum | Applicable Specification / Clause Reference: General Conditions of Contract r/w specifications of the respective Utility Owning Department**

## **1. GENERAL**

This item covers all labour, materials, plant, machinery, tools, tackles, temporary works and incidental arrangements for survey, identification, protection, dismantling, shifting, relaying, reconnecting, testing and commissioning of existing utilities (water supply, sewer, storm water, HT/LT cables, street lighting, telecom/OFC, traffic signal cables) affected by the works, executed as per the specifications of the respective Utility Owning Department, read with the General Conditions of Contract.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall*

*be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

## **2. MATERIALS**

All pipes, cables, fittings, specials, valves, thrust/anchor blocks, jointing materials, etc., used for reinstatement of the shifted utility shall conform to the specifications, grade and standards prescribed by the concerned Utility Owning Department (e.g., Water/Sewerage Board, DISCOM, BSNL/telecom operators, Traffic Police), and shall be new, tested materials unless reuse of existing serviceable material is specifically approved.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

## **3. MODE OF MEASUREMENT**

Quantities in the BOQ are provisional, for bid evaluation only. Payment shall be made solely for actual utility-shifting works executed and jointly measured/certified by the Engineer-in-Charge and the concerned Utility Owning Department; no payment is admissible for utilities not shifted, abandoned utilities, utilities shifted directly by the Owning Department under a separate demand note, or quantities not actually executed.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

## **4. WORKMANSHIP**

Work shall commence only after joint survey and identification of affected utilities with the respective Owning Department, with utilities exposed carefully by hand/controlled excavation to avoid damage; temporary supports and bypass arrangements shall be provided to maintain service continuity where feasible, with shutdowns coordinated with the Owning Department; reinstated utilities shall be tested (pressure testing, insulation testing, chlorination for water lines, etc., as applicable) and commissioned to the satisfaction of the Owning Department before backfilling/handover, with all traffic management, barricading and safety measures maintained throughout.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due*

*regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 59: Supplying and erecting Flexible PVC insulated multi strand multi core 1.1 kv grade ISI marked copper wires of following size to be erected as directed.(e) 1.50 Sq.mm 3 core round PVC sheathed**

**Quantity & Unit (as per BOQ): 100 Mtrs | Applicable Specification / Clause Reference: IS 694 (PVC Insulated Cables)**

### 1. GENERAL

This item covers supplying and erecting flexible PVC-insulated, multi-strand, multi-core, 1.1 kV grade, ISI-marked copper wire (1.50 sq.mm, 3-core, round, PVC-sheathed), as directed, conforming to IS 694.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Cable shall be copper conductor, PVC insulated and PVC sheathed, 1.1 kV grade, ISI-marked, conforming to IS 694, of the core size and configuration specified.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in running metres (Mtrs) of cable/wire actually laid/erected.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

### 4. WORKMANSHIP

Cable shall be laid/erected along the route shown on drawings, without kinks or damage to insulation, properly supported/clamped at intervals, and terminated at both ends with appropriate lugs/glands, tested for continuity and insulation resistance before energising.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 60: Supplying and erecting LED street light / Flood light fittings with High power White LEDs wattage of 3 Watt and above assembled on single MCPCB, efficiency more than 130 lm/w and corrosion free High pressure die cast aluminum housing with smooth finish powder coated and heat sink extruded aluminium with diffuser and Polycarbonate optics/ lenses, with toughened glass with company mark/name engraved or embossed 160 to 270 V, Power Factor more than 0.95, THD < 10 %, CCT 3000 K to 5700K, Uniformity ratio >0.45, Luminaire efficacy > 100 lumens/watt . LED driver efficiency > 85 %.( fittings required LM-79 & LM-80 certificates)(NOTE: Below description have shown ranges of Wattage capacity of LED fittings. The Engineer incharge may select any wattage capacity between the ranges shown.)(A) Street Light (IP-65), Surge protection -4KV integral and ,Light must have 440VAC line supply with over-voltage protection. (v)above 120 to 160 watts (CAT III)**

**Quantity & Unit (as per BOQ): 8 Nos. | Applicable Specification / Clause Reference: IS 10322/IS 16107 (LED Luminaires), LM-79/LM-80**

## 1. GENERAL

This item covers supplying and erecting LED street/flood light fittings of the specified wattage range, meeting the photometric, electrical and IP-rating parameters listed in the item, as (A) Street Light IP-65 fittings for the specified wattage band (above 120 to 160 W, CAT-III), conforming to relevant BIS/IEC standards for LED luminaires.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

## 2. MATERIALS

Fittings shall use high-power white LEDs ( $\geq 3\text{W}$  each) on a single MCPCB, corrosion-free die-cast aluminium housing with heat-sink and powder coating, toughened glass/polycarbonate optics, operating voltage 160-270V, power factor  $>0.95$ , THD $<10\%$ , CCT 3000-5700K, uniformity ratio  $>0.45$ , luminaire efficacy  $>100\text{ lm/W}$ , LED driver efficiency  $>85\%$ , 4kV integral surge protection, with LM-79 and LM-80 test certificates furnished for each type/wattage offered.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in numbers (Nos.) of fittings supplied and erected complete, of the wattage selected by the Engineer-in-Charge within the specified range.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

### 4. WORKMANSHIP

Fittings shall be mounted on the pole bracket/mast arm at the height, tilt and spacing shown on the lighting design, wired and terminated correctly with all IP-65 gaskets/glands intact to maintain ingress protection, and tested for correct illumination levels and photocell/control operation before final acceptance.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 61: providing and erecting Miniature circuit breaker single pole 0.5A to 2A system and having breaking capacity 10 KA to be erected in existing box. confirming to IS 8828/1996 with ISI Mark. Cat-iii**

**Quantity & Unit (as per BOQ):** 8 Nos. | **Applicable Specification / Clause Reference:** IS 8828:1996 (Miniature Circuit Breakers)

### 1. GENERAL

This item covers providing and erecting a single-pole Miniature Circuit Breaker (MCB), 0.5A to 2A, 10kA breaking capacity, Cat-III, to be erected in the existing distribution box, conforming to IS 8828:1996.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

MCB shall be ISI-marked, single-pole, of the current rating and breaking capacity specified, conforming to IS 8828:1996, of approved make.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in numbers (Nos.) of MCBs supplied and erected complete.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

### 4. WORKMANSHIP

The MCB shall be mounted on the DIN rail within the existing distribution box, wired with correctly sized conductors and terminated securely, labelled for its circuit, and tested for correct tripping operation before commissioning.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

## **Item No. 62: Providing and erecting HOT deep Galvanised iron strip/wire 4.064mm to 1.626mm.**

**Quantity & Unit (as per BOQ): 4 Kgs | Applicable Specification / Clause Reference: IS 2062 (Structural Steel) / General galvanising practice**

### **1. GENERAL**

This item covers providing and erecting hot-dip galvanised iron strip/wire (4.064 mm to 1.626 mm) for stay-wire/bonding/earthing connections, as directed.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### **2. MATERIALS**

GI strip/wire shall be hot-dip galvanised as per IS 4759/IS 2629, of the gauge specified, free from rust, kinks or coating damage.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### **3. MODE OF MEASUREMENT**

Measurement shall be in kilograms (Kgs) of GI strip/wire actually used.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

### **4. WORKMANSHIP**

The strip/wire shall be fixed/routed as directed, securely clamped/bonded at connections to ensure electrical continuity, with all cut ends and damaged galvanising touched up with zinc-rich paint to prevent corrosion.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 63: Providing and erecting Pipe type earthing having 150 cms.long and 2.5 cms. dia. galvanised iron pipe with coupling and buch buried in specially prepared earth pit complete with necessary 8 SWG earth wire.**

**Quantity & Unit (as per BOQ): 4 Nos. | Applicable Specification / Clause Reference: IS 3043:2018 (Code of Practice for Earthing)**

### 1. GENERAL

This item covers providing and erecting pipe-type earthing, comprising a 150 cm long, 2.5 cm dia galvanised iron pipe with coupling, buried in a specially prepared earth pit, complete with 8 SWG earth wire, in accordance with IS 3043:2018 (Code of Practice for Earthing).

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

The earth electrode shall be a GI pipe of the specified length/diameter, galvanised as per IS 4736; earth wire shall be 8 SWG GI wire; the earth pit backfill (charcoal/salt or approved earthing compound) shall be as per IS 3043.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in numbers (Nos.) of earthing pits/electrodes provided and erected complete.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

The earth pit shall be excavated to the required depth, the GI pipe electrode installed vertically with the backfill compound placed around it as per IS 3043, the earth wire securely connected at the top with the coupling/terminal, and the pit constructed with a masonry/PVC chamber and cover for future maintenance and periodic watering; earth resistance shall be measured and recorded to confirm it meets the specified value.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 64: Providing and erecting XLPE (IS:7098)(I)-88 ISI armoured cable multistrand / Solid Aluminium conductor for 1.1 KV. to be laid on wall with necessary clamps or in existing trench / pipe of following size of cables (A) 4 core 4 Sq. mm**

**Quantity & Unit (as per BOQ): 120 Mtrs. | Applicable Specification / Clause Reference: IS 7098 (Part 1) (XLPE Cables)**

### **1. GENERAL**

This item covers providing and erecting XLPE (IS:7098) insulated, armoured cable, multi-strand/solid aluminium conductor, 1.1 kV grade, 4-core, 4 sq.mm, laid on wall with clamps or in existing trench/pipe, as per IS 7098 (Part 1).

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### **2. MATERIALS**

Cable shall be XLPE insulated, armoured, aluminium conductor, 1.1 kV grade, conforming to IS 7098 (Part 1), of the core configuration and size specified.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### **3. MODE OF MEASUREMENT**

Measurement shall be in running metres (Mtrs) of cable actually laid/erected.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

### **4. WORKMANSHIP**

Cable shall be laid along the route shown on drawings, on wall with clamps at regular intervals or drawn through the existing trench/pipe without exceeding the permissible bending radius, terminated with appropriate cable glands/lugs, and tested for insulation resistance/continuity before energising.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 65: Providing & laying approved make Double walled corrugated pipes (DWC) of polyethylene(conforming to IS 14930 II )with necessary connecting accessories of same material at required depth in existing trench for laying of cable. below ground / road surface for enclosing cable (A)50 mm outer dia**

**Quantity & Unit (as per BOQ): 120 Mtrs. | Applicable Specification / Clause Reference: IS 14930 (Part II) (HDPE Corrugated Pipes)**

### 1. GENERAL

This item covers providing and laying approved-make Double Walled Corrugated (DWC) HDPE pipes (50 mm outer dia) with connecting accessories, at required depth in the existing trench below the ground/road surface, for enclosing cable, conforming to IS 14930 (Part II).

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Pipes shall be DWC HDPE, conforming to IS 14930 (Part II), of the outer diameter specified, with matching couplers/connecting accessories of the same material.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in running metres (Mtrs) of DWC pipe laid complete with accessories.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Pipes shall be laid at the specified depth in the existing/prepared trench, jointed with couplers to form a continuous conduit, laid to a smooth alignment without sharp bends that could damage the enclosed cable during pulling, and the trench reinstated as directed after the cable is drawn in.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 66: Supplying and erecting approved make Octagonal pole made from HR sheet steel. The pole should be made as per IS. and shall be coated with hot dip galvanizing as per IS 2629/2633/4759, suitable suspend local wind speed with integral Junction box consist of terminal plate of min 6mm Hylam sheet, standard profile 35mmX7.5mm Din-Rail for MCB Mounting, stud type terminal and arrangement for cable termination to be erected With Suitable foundation (Included) as per details given by manufacturer considering site requirement. ((I) 10 Mtr. Long 70 mm Top X 175 mm bottom dia, 4 mm thickness with 275mmX275mmX16mm base plate, 4-M24 Bolts and 750mm long with necessary G.I. J Bolts .Approx Pole weight 145 kg**

**Quantity & Unit (as per BOQ): 4 Nos. | Applicable Specification / Clause Reference: IS 2629/2633/4759 (Galvanising) & relevant Electrical/Structural IS codes**

### 1. GENERAL

This item covers supplying and erecting an approved-make octagonal pole made from HR sheet steel, hot-dip galvanised, with an integral junction box, erected with a suitable foundation, as per manufacturer's details and site requirement.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

The pole shall be fabricated from HR sheet steel to IS standards, tapering from the specified top to bottom dimensions (10 m long, 70 mm top x 175 mm bottom dia, 4 mm thickness), hot-dip galvanised as per IS 2629/2633/4759, with an integral junction box (min. 6 mm Hylam terminal plate, 35x7.5 mm DIN rail) and a base plate (275x275x16 mm) with 4-M24 foundation bolts.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in numbers (Nos.) of poles supplied and erected complete with foundation.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

An RCC foundation of the size/depth specified shall be cast with the foundation bolts template accurately positioned; the pole shall be erected plumb, connected to the foundation bolts with levelling nuts, grouted, and the junction box wired for cable termination as per the design, with the pole checked for verticality and structural stability before handover.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 67: Providing and erecting Street Light pole bracket comprising main B Class GI pipe of 4.2 cm/require outside dia. complete with suitable B Class G.I. sleeve tubing of approx. 45cms.length and suitable for 76.5 mm /80mm / required size of pole top having sufficient fasteners for fixing the brackets and having spread of 1.5.mtr. length with 110 deg.with vertical plane & suitable welded stays, reducer and with check nuts complete painted with one coat of Red oxide / PU base primer and two coats of Aluminium / PU paint. paint with following nos of arms.**

**Quantity & Unit (as per BOQ):** 4 Nos. | **Applicable Specification / Clause Reference:** Standard Electrical/Structural fabrication practice, IS 4736 (galvanising)

### 1. GENERAL

This item covers providing and erecting a street light pole bracket comprising a main B-Class GI pipe with a suitable GI sleeve, painted, of the specified arm configuration, complete with welded stays and check nuts.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

The bracket shall be fabricated from B-Class GI pipe (approx. 4.2 cm outside dia) with a GI sleeve tubing (approx. 45 cm length) sized to suit the pole-top diameter, with reducers and check nuts, painted with one coat of red-oxide/PU primer and two coats of aluminium/PU paint.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in numbers (Nos.) of brackets supplied and erected complete, as per the number of arms specified.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and*

*testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

The bracket shall be fabricated to the specified spread (1.5 m) and angle (110 degrees with vertical plane), welded joints ground smooth, painted as specified, and fixed securely to the pole top with the sleeve tubing and check nuts to prevent rotation or slippage under fitting load.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 68: Smart 4G Timer, Supply of IoT based 4G Smart Streetlight Control & Monitoring System having a Smart Panel comprising of 1 Phase IoT Streetlight Smart 4G Timer with 16x2 LCD to display RSSI, relay status, RTC time & diagnostics., Controller with 8-hour battery backup during external power failure. External power failure alert immediately to cloud., 110-630 V AC @ 50-60 Hz – 1 phase operating range., Standby power consumption <3W., Smart 4G Timer with RS232 port for DLMS Energy meter & RS485/UART/RS232 port for any external device communication., Smart 4G Timer must be compatible with any make / brand of DLMS (RS232) Energy Meter., DI: 3 Nos. (1 Contactor / Latch detection, 1 for SPD, 1 for Door Sensor.), DO: 1 Relay for control with 1 extra spare relay., Highly Precise TCXO RTC with 10-year battery reserve., automatically syncs with internal, cellular, server & GPS clock; with logs stored in the CCMS Web Software., Smart 4G Timer with dual SIM functionality for connectivity backup., 4G M2M SIM 5-Year communication included., Local configuration via WiFi / BLE for maintenance or during force majeure., GPS chip inbuilt of Smart 4G Timer for auto location tracking & astronomic schedule location., 50 programmable schedules., Astronomic scheduling with monthly offsets., Smart 4G Timer has inbuilt timer stores schedules locally & also stores schedule execution logs locally, syncs to cloud whenever connected to cloud., Auto-scheduler overrides manual operations., Monitoring & alerts for MCB trips & SPD failure., Over/under voltage, current, overload, power factor & short circuit protections with alerts via Dashboard, App, SMS, WhatsApp & Email., Contactor / Latch chattering protection & alerts., Smart 4G Timer with neutral failure protection and alert., During earthing failure to Panel, it must generate alerts on CCMS Dashboard for safety., During earthing failure to Panel. it must generate alerts on CCMS Dashboard for safety., Bulit-in Watchdog for anti-jamming., Smart 4G Timer must send Regular "heartbeat" on software for CCMS status., Accelerometer for tamper & panel movement detection & alerts., Smart 4G Timer must be tested from an NABL Lab for Surge Test @ 6 KV (IEC 61000-4-5), ESD Test @ 4 KV (IEC 61000-4-2), EFT @ 2 KV (IEC 61000-4-4), Conducted Emission @ 150 KHz-30 MHz (CISPR11), Damp Heat Test (40 Deg C @ 95% RH) 2 cycles of 12+12 hours (IS: 9000 (Part 5/Sec.2):1981 latest) with all test passing criteria as "Temporary degradation or loss of function or performance which is self-recoverable", FOTA functionality required for upgrades., Smart 4G Timer sends & stores online/offline data of controller & load for lamp burn hours analysis., It stores & syncs connectivity logs for configuration of network connections & analytics., PANEL & SWITCHGEAR, The panel includes a Class 1 DLMS energy meter NABL approved with 1-2 months of stored data of daily, hourly, monthly, load survey, instantaneous, events, tamper data & with power events stored in meter memory for audit purpose., Must monitor V, I, KWH, KVA, PF, KVAH, etc., Panel made with 2 mm CRCA sheet with ground mountable stand complete with gland plate, waterproof glands, earthing bolt., Panel to have transparent window to view DISCOM Energy Meter display., IP55, weatherproof panel with RAL7035 powder-coated., Smart 4G**

Timer must be fitted on removable terminal blocks for easy maintenance., Switchgear includes 1 Nos. 3 pole Contactor / Latch having minimum 100 A Load carrying capacity per phase, all other switchgear & wires: 60 A load carrying capacity., Contactor / Latch rating such that spare load like decorative lights can be operated., Spare 3 Pole Contactor / Latch (1 Nos.) also available in panel for replacement during failure., 1 Nos. 2P MCB 10 kA for Incomer & 3 Nos. 1P MCBs 10 kA for Outgoing., Phase Bypass MCBs required., 2P RCCB 100 mA., 40kA, 335V smart SPD with feedback detection to send alert of SPD failure to CCMS web software., Suitable 1 Phase 415 V AC isolation transformer for control circuit stable feed., 1 Nos. Input & 1 Nos. Output TPN connectors for reliable & safe termination., 2 Nos. DIN Rail Type power line indicators for each TPN connector., 2 Door Panel. 1 in Front & 1 at Back., door sensor. Also, provide lock & key facility., High quality ISI/BIS, FR Cables to be used., Double lugging to be avoided for potential fire hazard., Minimum Dimensions of Panel: 700 x 500 x 550 mm & stand height dimensions: 700 mm., Panel must have clear 20% spare space for future upgradation., Panel must be equipped with standard Indian type plug with 6 A 2 pole MCB & including light indicator., Panel must contain min. 150 mm space at bottom (TPN connector end) for cable terminations. Automatic door sensor based light (with protection MCB) for viewing/maintenance., Thermostat & Space heater (with protection MCB) for cold weather conditions with automatic on/off controller., Panel must have adequate provision to mount DISCOM Energy meter along with spare space around it. The switchgear compartment must have cover on top with protective transparent 4 mm acrylic sheet, with accessible window to operate switchgear components., Switch gear, energy meter & Smart 4G Timer must be warranted for 5 years., Panel mount outdoor antenna for GSM, GPS., Canopy designed for draining down water., SOFTWARE, OAuth 2.0 APIs for sending data to Government clouds/software, etc., CCMS Web dashboard with secure password & OTP login., Hosted on trusted cloud, data security, antivirus & attack protection., HTTPS., AES256-bit encryption., Vulnerability Assessment and Penetration Testing (VAPT) certificate for CCMS Software., Streetlight management software for load status, live analytics & reports., Energy meter data tables (kW, kWh, PF, I, V, etc.) available., Utility monthly bill reconciliation & Class 1 accuracy reports for billing, energy monitoring & auditing for streetlight load., Fault detection., Light fault 99% analysis on dashboard using energy monitoring., WhatsApp integration., Hierarchy-wise reporting & alerts., GIS mapping of live connected streetlight control panels, poles & streetlights., MQTT protocol., Smartphone app with local configuration & navigation., Monitoring & reporting of lighting parameters., Facility for media attachments for site photos/videos/work permits/checklists, etc. per Feeder Panel for remote verification., Asset management module for streetlight infrastructure data., Complaint/service task management with history & escalation must be available., Android & iOS App for dashboard analytics, graphs, energy data, alerts., 5 Years

**CCMS Web Software & Cloud Server Hosting subscription included., Customizable, user-friendly dashboard.,**

**Quantity & Unit (as per BOQ): 1 Nos. | Applicable Specification / Clause Reference: IEC 61000-4-2/-4/-5 (EMC), IS 8623 (LV Switchgear Panels), CEA/DISCOM metering norms (as detailed in item)**

### 1. GENERAL

This item covers supply of an IoT-based 4G Smart Streetlight Control & Monitoring System (CCMS), comprising a Smart 4G Timer/controller, energy meter, switchgear panel and cloud-based monitoring software, meeting the detailed technical, electrical, safety-test and warranty parameters specified in the item description.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

The Smart 4G Timer, Class-1 DLMS energy meter (NABL approved), contactors/MCBs/RCCB/SPD, and the IP55 RAL7035 powder-coated panel (min. 700x500x550 mm) shall be of the specifications, ratings and test compliance (surge/ESD/EFT/conducted-emission/damp-heat per IEC 61000 series and IS 9000) set out in the item; the CCMS software shall provide OAuth 2.0 APIs, HTTPS/AES-256 encryption and VAPT certification as specified.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in numbers (Nos.) of complete CCMS panels supplied, installed, commissioned and covered by the specified 5-year software/hosting subscription and warranty.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being*

*payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

The panel shall be assembled and wired by the manufacturer/approved integrator strictly per the technical schedule, factory-tested (including the specified type tests) before dispatch, installed on the RCC foundation (Item 69), connected to the DISCOM supply and street-light circuit, commissioned with the CCMS dashboard configured (schedules, alerts, GIS mapping), and demonstrated for correct automatic/manual operation, remote monitoring and fault-alert functionality prior to acceptance.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 69: Providing and constructing RCC foundation with pedestal for installation of Smart 4G Street Lighting Control Panel / Feeder Pillar, including setting out, excavation in all types of soil, dressing and ramming of bottom, 100 mm thick PCC 1:4:8, RCC M25 as per IS 456:2000, centering, shuttering, vibration, curing, finishing, minimum 150 mm clear plinth above finished ground level, fixing 4 Nos. M16 hot-dip galvanized foundation bolts with template, cable entry sleeve of 100 mm HDPE/GI pipe, earthing provision, non-shrink grouting after panel erection, backfilling in 150 mm layers with watering and compaction, disposal of surplus earth within 50 m lead, and all labour, material, T&P and incidental works complete as per IS 456:2000, IS 875 Part 3, IS 2062, CPWD/Gujarat PWD specifications and as directed by Engineer-in-Charge.**

**Quantity & Unit (as per BOQ): 1 L.S. | Applicable Specification / Clause Reference: IS 456:2000, IS 875 (Part 3), IS 2062, CPWD/Gujarat PWD Specifications**

### 1. GENERAL

This item covers providing and constructing an RCC (M25) foundation with pedestal for installation of the Smart 4G Street Lighting Control Panel/Feeder Pillar, including excavation, PCC, reinforced concrete, foundation bolts and backfilling, complete as per IS 456:2000, IS 875 (Part 3), IS 2062 and CPWD/Gujarat PWD Specifications.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### 2. MATERIALS

Concrete shall be M25 grade conforming to IS 456:2000; PCC (1:4:8) 100 mm thick as levelling course; foundation bolts shall be 4 Nos. M16, hot-dip galvanised, set with a template; a 100 mm HDPE/GI sleeve shall be provided for cable entry; structural steel inserts (if any) shall conform to IS 2062.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### 3. MODE OF MEASUREMENT

Measurement shall be in the unit specified in the BOQ (L.S./Nos.) for the foundation constructed complete with pedestal, bolts and backfilling, as per drawings.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

Excavation shall be carried out in all types of soil to the founding level, base dressed and rammed, PCC laid and cured; formwork erected for the pedestal with a minimum 150 mm clear plinth above finished ground level; reinforcement (if any) and foundation bolts fixed accurately using a template; concrete placed, vibrated, cured; after initial curing, non-shrink grout shall be used for finally bedding the panel base after erection; backfilling shall be done in 150 mm layers with watering and compaction, and surplus earth disposed of within 50 m lead.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

**Item No. 70: SITC of 14.2 mm dia 3 mtr long Earth electrode of High tensile steel electrode with 250 micron copper bonding & 1 bag of Carbon fill Based environment friendly backfill tested as per IEC 62561-7 in NABL accredited Laboratory and suitable stainless Steel double sided clamp. Eco Friendly rust proof heavy duty weather proof Polyethylene Earth Pit Chamber with following dimensions :254 mm dia (top), 330 mm dia (bottom) & 260 mm (height).**

**Quantity & Unit (as per BOQ):** 4 Nos. | **Applicable Specification / Clause Reference:** IEC 62561-7 (as specified), IS 3043:2018 (Earthing)

## 1. GENERAL

This item covers Supply, Installation, Testing and Commissioning (SITC) of a 14.2 mm dia, 3 m long, high-tensile steel earth electrode with copper bonding and chemical (carbon-fill) backfill, complete with a polyethylene earth-pit chamber, in accordance with IS 3043:2018 and the manufacturer's specification (tested per IEC 62561-7).

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

## 2. MATERIALS

The earth electrode shall be high-tensile steel, 14.2 mm dia, 3 m long, with 250-micron copper bonding; the backfill compound shall be carbon-based, environment-friendly, tested per IEC 62561-7 in an NABL-accredited laboratory; the clamp shall be stainless steel, double-sided; the earth-pit chamber shall be rust-proof, heavy-duty, weatherproof polyethylene of the dimensions specified (254 mm dia top, 330 mm dia bottom, 260 mm height).

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

## 3. MODE OF MEASUREMENT

Measurement shall be in numbers (Nos.) of chemical earth electrodes supplied, installed, tested and commissioned complete.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this*

*specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

#### **4. WORKMANSHIP**

A pit/bore of the required depth shall be prepared, the electrode installed vertically/as per manufacturer's method, surrounded by the specified backfill compound to ensure low, stable earth resistance, connected via the stainless-steel clamp to the earthing conductor, and covered with the polyethylene chamber for future maintenance; earth resistance shall be measured and recorded to confirm compliance before commissioning.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*

## **Item No. 71: Rounding off / reconciliation adjustment to match sanctioned estimate total excluding GST**

**Quantity & Unit (as per BOQ): 1 LS | Applicable Specification / Clause Reference:** Administrative Item - No Technical Specification Applicable

### **1. GENERAL**

This is an administrative/rounding-off item to reconcile the BOQ total with the sanctioned estimate and does not represent a physical item of work.

*This item shall be read in conjunction with the General Conditions of Contract, the Preamble to the BOQ, the relevant Standard Data Book / Standard Specifications of the Roads & Buildings Department, Government of Gujarat, and the General Technical Specifications forming part of this tender document. In case of any conflict or ambiguity between this specification, the drawings and the General Conditions of Contract, the matter shall be referred to the Engineer-in-Charge for clarification and decision prior to commencement of the work, and his decision shall be final and binding on the Contractor.*

### **2. MATERIALS**

Not applicable.

*All materials to be incorporated in the work shall be procured from approved sources/manufacturers of established repute, shall be brought to site sufficiently in advance of use, and shall be accompanied by manufacturer's test certificates/warranty documents wherever specified. Materials shall additionally be subject to sampling and testing at the frequency prescribed in the relevant IS/MoRTH/IRC clause, carried out at the Contractor's own cost in an NABL-accredited or Engineer-in-Charge approved laboratory. Materials that fail to meet the specified requirements, or are found damaged, deteriorated, or otherwise unsuitable, shall be rejected and removed from the site within 48 hours of such rejection, and shall not be used anywhere in the permanent works.*

### **3. MODE OF MEASUREMENT**

Lump sum (LS) adjustment as shown in the BOQ; no physical measurement is involved.

*Measurement shall be carried out jointly with the Contractor's authorised representative and duly recorded in the Measurement Book, based on actual work executed in accordance with the approved drawings and this specification; no payment shall be made for work not conforming to the specification unless specifically rectified and accepted by the Engineer-in-Charge. The quoted/accepted rate shall be deemed inclusive of the cost of all materials, labour, tools, plant and machinery, transportation, loading/unloading, wastage, sampling and testing, quality control, temporary works, protective and safety measures, royalties and cess (GST being payable extra as stated in the BOQ), and the Contractor's overheads and profit, unless the item is specifically shown as a separate pay item in the BOQ.*

### **4. WORKMANSHIP**

Not applicable.

*Work shall not be carried out during adverse weather conditions (heavy rain, dust storm, or extreme temperature) likely to impair the quality of the finished work, except with the specific written permission of the*

*Engineer-in-Charge and with all necessary precautions taken. All operations shall be carried out with due regard to the safety of workmen and the public, maintenance of traffic where applicable, and protection of adjoining structures, utilities and property from damage. Any work found defective, deficient, or not in accordance with this specification and the drawings, whether identified during execution or subsequently, shall be rectified, made good, or replaced by the Contractor entirely at his own cost, to the satisfaction of the Engineer-in-Charge, before the work is measured and passed for payment.*