

TENDER CONDITION AND SCHEDULE OF WORK

Name of work: Bhavnagar Division: Supply installation, Testing, Commissioning of Signalling gears and alteration in Medha make Electronics Interlocking system at Dhasa, Kukavav & Chital stations in connection of (i) Surendranagar - Dhasa Track machine siding at 06 stations. Signaling work for alteration in EI at DAS station. (ii) Dhasa - Jetalsar section - Creation of siding facilities for track machine siding at two stations. (Chital and Kukavav).

(i) Surendranagar - Dhasa Track machine siding at 06 stations. Signaling work for alteration in EI at DAS station.

SN	DESCRIPTION	QTY.	UNIT	RATE	AMOUNT
	SCHEDULE A1 (SUPPLY ITEMS - DAS)				
1	INPUT WFM CPU CARD for Medha make EI	1	No	43473.00	43473.00
2	OUTPUT WFM CPU CARD for Medha make EI	1	No	53501.00	53501.00
3	WFM RELAY DRIVER CARD for Medha make EI	1	No	36383.00	36383.00
4	Flexible cable (Power wire), multi-strand copper conductors cross section 1x6 Sq.mm. (85 conductor each diameter 0.30 +/- 0.01) as per IS 694/1990 with insulation thickness of 0.80 mm nominal conductor resistance 3.30 ohms/km and test parameters are as per IRS(S)76/89 or latest.	0.5	Kms.	33366.21	16683.11
5	Flexible cable (Power wire), multi-strand copper conductors cross section (1x16Sq.mm).101 Conductors each diameter 0.45 +/- 0.01 as per IS 694/2010 with insulation thickness of 1.2mm nominal conductor resistance 1.127 Ohms/Km and test parameters as per IRS(S) 76/89 or latest.	0.5	Kms.	136063.55	68031.78
6	Flexible cable (Power wire), multi-strand copper conductor's cross section 25 Sq. mm (0.4x196) as per specn. IS 694/2010 with latest amendment, and test parameters as per IRS(S) 76/89.	0.5	Kms.	132505.12	66252.56
7	Single core multi-strand wire 0.5 sq.mm. (16 conductor each dia. 0.2mm), as per IRS 76/89 (Amd3) or latest.	2	Kms.	5548.54	11097.08
8	Extinguisher CO2 type (capacity 4.5 kg. or above).	2	Nos	8524.96	17049.92
9	Fuse auto changeover system for use in Railway Signaling System as per RDSO/SPN/209/2012 rev.1 with latest amendments. One Automatic changeover Unit comprises 32 nos. of external Non-Deteriorating Type or 'G' type fuses from 0.6 Amp to 4 Amp capacities which are in Signaling circuits. The system shall have 8 cards with a monitoring arrangement of 4 fuses in one card.	2	Per Module	29743.63	59487.26
10	Fuse auto changeover system for use in Railway Signaling System as per RDSO/SPN/209/2012 rev.1 with latest amendments. One Automatic changeover Unit comprises 24 nos. of external Non-Deteriorating Type or 'G' type fuses from 4 Amp to 10 Amp capacities which are in signaling circuits. The system shall have 6 cards with a monitoring arrangement of 4 fuses in one card.	1	Per Module	51953.78	51953.78
11	Indicative type Fuse base/ holder with cap, suitable to G type fuse of capacity 0.63A - 3.0A. (System, Rapid, Malnad or RBCO make or similar).	100	Nos.	50.99	5099.00
12	Indicative type Fuse suitable to G type fuse base/holder of capacity 0.63 A - 3.0 A (System, Rapid, Malnad or RBCO make or similar).	300	Nos.	18.60	5580.00
13	Round head type non deteriorating type low voltage cartridge fuse as per Spec No IRS/S/78/92 with latest amendments 2A/4A/6A capacity.	50	Nos.	57.21	2860.50

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14	Miniature, Plug in Type, M to C, DC Neutral, Track relay, ACI, Style QTA2, 9 Ohm, 2F-1B contact, Code - FGHKX Spec: BRS :939-A & 966 (Appx-F2) & IRS: S-23, S-23, S-34 & 60.	2	Nos	4878.90	9757.80
15	Miniature, Plug in Type, DC Neutral, Line Relay QSPA1, 24V DC, Slow to Pick up AC Immunized, 12F-4B/8F-4B Contact, Code ABDEJ Spec: BRS:933A ; IRS S 34; IRS S 23; IRS S 60-78.	2	Nos	5421.40	10842.80
16	Track feed battery chargers, 110V AC input, 2 to 6/10 V DC Output; as per Specn. No. IRS.S 89/ 2013 with latest amendments. Charger shall be suitable for charging 80 AH battery.	2	Nos	3523.27	7046.54
17	Adjustable Track Feed Resistance disc type 30 ohms as per RDSO Drg. No. SA 20166/M (Adv.) with latest amendments (with Phenolic molded base).	2	Nos	978.46	1956.92
18	Track Lead Junction Boxes as per C. Rly Drg. No. RST 11509 made from fibre glass/SMC/FRP along with terminal blocks.	15	Nos	1120.65	16809.75
19	GI wire 8 SWG (4mm Dia) suitable for track circuit rail bonding.	1000	Kgs	68.17	68170.00
20	Point insulation Complete set as per RDSO Specification IRS: S-40/84 for Switch bracket, Split-Stretcher bar & Gauge tie plates (52 Kg/60Kg as per site requirement).	10	Set	1345.93	13459.30
21	Key Lock Relay working on 24V DC, AC immunize with different ward combinations (Three ward plates to be supplied with each relay). Key ward shall be specified by engineer incharge as per requirement.	1	Nos.	9743.97	9743.97
22	Apparatus Case Single NE Rly Type as per Drg. No. W. Rly/SW/47/68 Alt-A, fitted with two no.s of E Type lock (ward No will be specified by Engineer-in Charge) as per RDSO Drg. No. SA 3376/3473 and Key to Drg. No. 3377 Note: This item includes the supply & fixing of 2 No.s E Type Lock fitted on both doors, along with two Keys.	3	Nos.	15611.07	46833.21
23	Apparatus Case half NE Rly Type as per Drg. No. W. Rly/SW/47/68 Alt-A fitted two nos E Type lock of (ward No will be specified by Engineer-in Charge) as per RDSO Drg. No. SA 3376/3473 and Key to Drg. No. 3377. Note: This item includes the supply & fixing of 2 No.s E Type Lock fitted on both doors, along with two Keys.	1	Nos.	9893.99	9893.99
24	IS 13410: Glass Reinforced Polyester Sheet Moulding Compounds (SMC) Size of Sheet: 1000x1000x8	3	Nos	5388.67	16166.01
25	Disconnect Terminal Block, Screw less type, 4-wire front entry (Two in-put & Two out-put) The color will be decided by Engineer - in - Charge. (Preferably In Blue, Red & Grey Colors in the ratio of 1:2:3). as per RDSO Spec. No. RDSO/SPN/189/2004. With latest amendments. Note: Make to be approved by Railway before supply.	100	Nos	58.53	5853.00
26	ARA Terminal blocks with links made of PBT Spec Nos/75/2006 (Rev - 2) with latest amendments and RDSO Drg.No.SA-23741A Alt.4.	500	Nos	75.00	37500.00
27	Half Round RCC pipes & collars of 300 mm outer dia & 250 mm internal dia (1 meter long) along with collars as per IS No. 458/2003 of NP type	200	Nos.	435.52	87104.00

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28	Double Walled Corrugated (DWC) HDPE Pipe with associated collars etc. as per RDSO Specification No. RDSO/SPN/204/2011 or latest anti-rodent & anti-oxidant and non-flame propagating type in 6 meters straight length and of size 120 mm outer dia, & 103.5 mm inner dia. One of the following coupling arrangements should also be supplied with each pipe as per the site requirement. 1) Suitable snap fit coupler with rubber 'O-Ring 2) Spacers 3) Tees 4) Bend, 5) End-cap (The total quantity of above items is equal to no. of pipes supplied.) DWC pipe shall be marked at every 1 mtr length in such a way that manufacturer's name, vender name and year of manufacture can be easily identified. Color -Bright Orange; Min Weight = 4kg. Test Check by Consignee & Sample check by JAG officer.	10	Nos.	1912.20	19122.00
29	Medium Class G.I. Pipes to IS: 1239 (Pt.)-2004 or latest; 100mm dia. (int. Dia) 3.65 mm thick or above with coupling. G.I. pipes shall have ISI mark on it and contractor should submit manufacturer's test certificate of G.I. pipes.	24	Mtr	1170.28	28086.72
30	Position Light Shunt Signal Unit Complete with Post (made of GI Pipe of 80 mm Diameter Medium Class IS Spec. No. IS: 1239 Pt. 1/1990, Base, Hood, Cover etc as per Drg. No. SA-23840 suitable for LED Signal Lighting Unit.	2	No	4530.07	9060.14
31	Maintenance Free Earth Electrode of length 3m, including supply of 3 bags of Earth enhancement material for earthling (10KGs /bag) for each electrode & other accessories as per Drg. No. SDO / RDSO/ E&B/001 and RDSO Spec No. RDSO / SPN/197/2008.	6	Nos.	10403.08	62418.48
32	Earth Electrode as per Drg. No. CSTE / 6091.	5	Nos.	2798.99	13994.95
	TOTAL SCHEDULE A1				911271.57
	SCHEDULE B1 (EXECUTION ITEMS - DAS)				
1	Modification of EI System of Medha at DHASA Station of WR, as per RDSO spec no: RDSO/SPN/192/2019, in connection with the provision of track machine siding. Supply of EI additional Hardware as per the tentative SIP & including with 15% I/O bis as spares. Modification to the existing Application Logic circuits and Interface circuits. Alteration to the MT and VDU software. Up-gradation of Data-logger database at MEDHA end. FAT (Factory Acceptance Test), SAT and commissioning as per the Modified Application Logic. ASMADES.	1	LS	4750000.00	4750000.00
2	Design of Cable Route Plan submission of Three paper copies for approval.	1	Set	9873.00	9873.00
3	Supply of final Cable Route Plan as per laid cable duly measured at every 30m clearly indicating distance of laid cable from fixed point of reference & indicating all track crossings and tail cables in original tracing along with Auto CAD in Pen Drive and Six set copies after approval	1	per station	1580.00	1580.00
4	Design of Existing ST/LT/TOC/RCC (Alteration) & submission of Three paper copies for approval. Up to Four-Line Station	1	per station	2908.00	2908.00

SN	DESCRIPTION	QTY.	UNIT	RATE	AMOUNT
5	Supply of completions ST/LT/TOC in original tracing along with Auto CAD copies in Pen Drive and six set copies after approval. Upto four line station.	1	No	790.00	790.00
6	Supply of ferrules of different colour, printing termination details / Functions in different colours as per Railway specification and installation in Relay room, Location Box and Power board etc, at various stations and LC gates as per instruction of Engg. in charge. All materials required for the work shall be supplied by the contractor.	1000	No	11.00	11000.00
7	Design and supply SWR Diagram on standard tracing paper of 95 grams for each station. Corrected version of SWR plans after checked & approved by Rly's 25 copies will be supply for each of the plans. For stations having up to 4 lines	1	No	24321.00	24321.00
8	Fabrication and supply of premium quality foam sheet 5mm thickness with vinyl printing of approximately size 2.5 feet x 4.5 feet with framing. This item also includes lettering/numbering of termination particulars, CTR contact details in relay room, relay hut, goomtys etc. This item also includes all material and resources required for fixing and transportation at stations & LC gates of Bhavnagar Division. Colour coding of CTR termination details will be as per WR/HQ policy letter, CTR termination details will be given by Railway. Work will be carried out as per western Railway practice. Sample of CTR to be provided before printing of all CTR of Division.	3	No	2450.00	7350.00
9	Preparation and fixing of location box board on 03 mm ACP sheet with size 12 x 18 size A3 for location box including pasting of printed/ painted vinyl sheet and lamination (printing/painting of location detail on vinyl sheet covered in schedule item separately).	5	No	239.73	1198.65
10	Function Description of location box at station and LC gates designed in Auto Cad full and half apparatus case. As per WR policy. Details provided by Railway.	5	No	240.00	1200.00
11	Design, supply, testing and commissioning of Remote Diagnostic and Predictive Maintenance System (RDPMs) as per Draft RDSO document No. RDSO/RDPM/FRS/2022; as per Signalling Plan Enclosed. (The Detailed break up of various modules/components are enclosed separately for annexure. The detailed of Design/schematic drawing, make and model of various product being proposed to be provided for RDPMS system.)	1	Station	3444494.34	3444494.34
12	Laying of S&T Cables of various cores/ pairs/ quads in trenches/ GI pipes/ RCC pipes/ DWC pipes/ Trucking. This also includes laying of cables in track crossings & road crossings. Item includes provision of labels of colored plastic adhesive tapes or any other identifiable material on each cable to give the cable number at each G.P. (Cables will be daggered before and after its laying by contractor under supervision of Railway Representative and he will submit the meggering report of each testing). Length of the cable laid includes the length of the cable coiled for termination purposes.	5000	RM	9.37	46850.00

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13	Installation wiring testing and commissioning of Fuse changeover system (FACS). This includes the provision of a common Buzzer & indication at the ASM Room & ESM Duty Room and the painting of fuse details. This also includes the fabrication of a frame for the installation of FACS at the Station/ LC gate where the installation of relay racks is not feasible.	3	Per Module	915.42	2746.26
14	Supply, Installation, Testing & commissioning of Earth Leakage Detector as per RDSO/SPN/256/2002 with latest amendments. The basic detector unit shall comprise of 12 channels, for use on signaling circuits of 110V AC/DC and/or 60V/24V/12V DC as ordered by purchaser. If the detector is required for less number of channels, dummy plates shall be provided. For additional requirement add-on/expandable cabinet may be used. The voltage specified shall be provided with +25 and -10% tolerance	1	Nos.	95580.00	95580.00
15	EARTH LEAKGE TRACKING UNIT (ELTU)-for 12 channel Earth Leakage Detector. Item includes supply, brief installation and site demonstration.	2	Nos.	36462.00	72924.00
16	Charging of Lead Acid Batteries (2V 80AH) with contractors' own battery grade sulphuric acid and distilled water with a minimum of two charge-discharge cycles, installation of charged batteries in groups & their connection & wiring. The work shall be done as per the extant practice of W. Rly & instruction of the Engineer-in-charge. Detailed measurements of initial charging shall be recorded jointly by the contractor & Rly's site-in-charge.	10	Nos	376.10	3761.00
17	Provision of bonding with GI wire 4mm Dia (8 SWG) for track jumper & fish plate joints bonds. This will include drilling of 7.0/7.1/7.2 mm Dia holes in rails (4 Nos.) and provision of two jumpers for each bond, clipping of bonds etc. with contractors own tools as per instruction of Rly. Engineer at site.	20	Set	185.47	3709.40
18	Fixing and wiring of DC track circuit equipments i.e. track feed charger, resistance, track relay, battery, PPTC fuses etc., in the Apparatus Case and battery box as per standard practice. Termination of tail cable on M 6 / Screw less terminals WAGO or FINOLEX or similar approved make terminals/ fuse blocks / HRC fuse. Item includes testing /commissioning of track circuit. Complete wiring material (including PPTC fuses) which are not covered in Schedule will be supplied by contractor. (Supply of Track feed battery charger, track feed battery, resistances & 'B' type choke & Track relays will be supplied by Railways / covered in Schedule separately).	2	Per Track Circuit	6667.03	13334.06
19	Installation of DC track circuits covering points zones also. The item includes provision of continuity bonds of seven strand PVC jacketed wire/ GI wire 8 SWG on rail joints after drilling bond-hole of 7.0/7.1/7.2mm Dia (double bond with sleeves and rail clips are to be provided at each rail joint), insertion of insulated block joint, fixing of Track lead Junction box on MS angle two numbers of size 40X40X5 mm 1200 mm length for track feed/ jumper / track relay ends of track CCTs (as per double TLJB arrangements) and also for fixing jumper cables as per insulation diagram WR Drg	2	Set	7328.72	14657.44

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	No. CSTE/6055 and standard practice, making rail connections through suitable insulated sleeves from Track lead Junction box at TF, jumper & TR end with seven strand PVC jacketed wire /GI wire 8 SWG, rail clips for fixing bond wire on the TLJB as per standard practice, termination of tail cables on bootleg terminals etc. TF/TR wiring shall be fixed on the suitable arrangement on PRC sleepers with the help of hooks. Hooks shall be provided on PRC sleepers with the help of suitable steel bracket. This item also includes fixing & supply of channel pins etc. The item also includes supply of MS angles/ trestles, GI wire 8 SWG / seven strand PVC jacketed wire, hooks, rail clips etc.				
20	Fixing of Electrical Point Machine on the extended sleepers at points as per std. practice and as per RDSO Drg No. SA 91 51-52 or 9710 or 9161 as per section of rails used. Item includes fixing switch extension bracket, providing insulation for switch extension bracket, fixing ground connection, adjusting opening of the switches and adjusting the point machine with crank handle. The item also includes: (i) Complete material for installation like ground-connections, switch extension brackets, point insulation material, I pipes, wiring materials, various fixing nuts & bolts including castle nuts, spring washers (ii) All smithy & fitting works required at site for complete installation. (iii) Installation of gauge tie plate & providing insulation for gauge tie plate (Insulation in William Stretcher Bar will be Provide by Railways). (iv) Wiring inside the point machine, insertion and termination of tail cable in point machine and junction boxes / location box /cable hut as per extent practice on WR and the instruction of Railway Engineer at site. (v) Supply and fixing of suitable size GI pipes with flange for taking cable into point machine. Note: The ground connections shall be suitable to the Point Machines as specified by Engineer-in-charge and shall be suitable to the point lay out i.e. 60 Kg. / 52 Kg / 90R as per yard layout. Electrical Point Machine and M-6 / Screw less terminals will be supplied by Railways / covered in Schedule separately.	1	Nos.	22354.53	22354.53
21	Refixing of electrical point machine, ground connection during phase working (No interlocked working) after removing the existing fitting if any, adjustment if necessary, cable termination, wiring, testing and commissioning of electrically operated point, fixing and connecting point indicator on derail switch if necessary. The work shall be done as per extant practice on WR & the instruction of Railway Engineer at site.	1	Turn-out	3120.46	3120.46
22	Supply and fixing of CH/KLCR boxes appropriate size in field / in location boxes / in SM office / at LC gate as per site condition. It should be made of Hylam /wooden (teak wood) of high quality as per requirement. Item includes supply of any minor bracket nuts, bolts and hole drilling MS angle, MS plate etc. It also includes fixing of KLCR relays in the boxes. Prior approval to be taken from Engg. In charge before supply of box.	1	Nos.	1536.49	1536.49

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23	Excavation and Casting of Apparatus Case foundation with contractor's own materials including cement and anchor bolts of standard size. The required scaffolding Ferma etc. for Casting of foundation will have to be brought by the contractor at his own cost. Single Case as per Drg No SK 748 or CSTE/5074 or SS Location	3	Nos.	7162.63	21487.89
24	Installation of Apparatus Cases with miniature 'E' type lock on CC foundation. This includes filling of location foundations with river bed sand and plastering on top of the sand. 'E' Type lock will be provided by Railway. Single Case.	3	Nos.	1076.29	3228.87
25	Excavation and Casting of Apparatus Case foundation with contractor's own materials including cement and anchor bolts of standard size. The required scaffolding Ferma etc. for Casting of foundation will have to be brought by the contractor at his own cost. Half Case as per Drg No SK 747 or CSTE/5074 or SS Location.	1	Nos.	5487.86	5487.86
26	Installation of Apparatus Cases with miniature 'E' type lock on CC foundation. This includes filling of location foundations with river bed sand and plastering on top of the sand. 'E' Type lock will be provided by Railway. Half Case	1	Nos.	657.15	657.15
27	Fabrication and fixing of SMC sheet in location box by providing all fixtures as per Railway Drawing including fixing of PVC coated string rods at the back side for cable support with contractor's own materials. The work shall be done as per Drg and arrangement similar to SK 783-1/2. With latest alterations & as per instructions of Rly engineer at site. Note: SMC sheet will be taken in place of phenolic laminated sheet.	3	Nos	2445.36	7336.08
28	Fabrication and fixing of SMC sheet in location box by providing all fixtures as per Railway Drawing including fixing of PVC coated string rods at the back side for cable support with contractor's own materials. The work shall be done as per Drg and arrangement similar to SK 783-1/2. With latest alterations & as per instructions of Rly engineer at site. Note: SMC sheet will be taken in place of phenolic laminated sheet.	1	Nos	777.78	777.78
29	Shifting of existing full location boxes coming in the alignment of new line. The work includes losing & removal of soil around location boxes by excavating soil around foundation, making of pit for shifting of location box horizontally opposite to railway track up to 0.5 to 1.0 mtr. This includes loosening of existing cable coils without any damage. The excavated soil shall be back filled after shifting of Location Boxes. Location box shall be shifted by push method with the help of jacks or by crane by contractors own expenditure under instructions of engineer in-charge at site. The work may affect train working hence the work shall be done as per margin only or during traffic block only.	2	Nos	4369.93	8739.86
30	Shifting of existing half location boxes coming in the alignment of new line. The work includes losing & removal of soil around location boxes by excavating soil around foundation, making of pit for shifting of location box	2	Nos	3379.72	6759.44

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	horizontally opposite to railway This includes loosening of existing cable coils without any damage. The excavated soil shall be back filled after shifting of Location Boxes. Location box shall be shifted by push method with the help of jacks or by crane by contractors own expenditure under instructions of engineer in-charge at site. The work may affect train working hence the work shall be done as per margin only or during traffic block only.				
31	Termination of outdoor cables, main cables laid in location boxes, Cable termination rack etc at both ends on ARA terminal or on 8 way terminals or on screw less connectors. Both ends of a cable core terminated shall be counted as one terminal. This includes all associated works of pulling out the cable from underground, peeling off insulation, dressing of cable core supported on sting rod with contractor's own material. The work shall be done as per instructions of Rly engineer at site.	600	Per Termial	2.69	1614.00
32	Excavation of cable trench as per cable route plan, 1 Mtr. deep and of 0.3 Mtr. to 0.6 Mtrs wide advised by Engineer-in-charge alongside the track in normal (all type) soil/strata, conforming to distances as per cable route plan and refilling. This work includes clearing of route from bushes etc, covering of cable laid in trench by loose soil for a layer of 50mm thickness approximately before covering by bricks. The work shall be done as per the extant practice on Western Railway and instructions of Railway Engineer at site. In case 1m depth of trench is not achievable due to site conditions, specific approval of JA grade officer will be required for each site where trench depth of 1m is not possible. Without the approval of JA Grade officer, no payment for trenching will be made for trench depth less than 1m.	210	CUM	323.90	68019.00
33	Digging of trench 1.2 M deep from rail flange/ road level and, 0.3 Mtrs to 0.6 Mtrs wide and back filling after placing of DWC/ RCC/GI pipe. (Placing of DWC/RCC/GI pipe covered separately). The ballast disturbed be screened and dressed as required by Engineer-in-charge or his representatives and road tarred immediately. For track crossing, Drg. No. CSTE/3644 Pg.7 of 11 and for Road Crossing, Drg. No. CSTE/3644 Pg. 5 of 11 are to be followed.	18	CUM	323.90	5830.20
34	Digging of cable trench 0.3 Mtrs. Deep and 0.3 Mtrs. Wide on Asphalted Platform / Road / Hard rocky area. Refilling with earth levelling of trenches & restoring the original surface of trenches.	9	CUM	512.76	4614.84
35	Horizontal direction drilling/boring without damage of surface road using Auger Machine. The bore shall be 150 mm dia & shall be done at the depth of minimum 1200 mm from the ground level. The ground level shall be considered ignoring the bank height of the bank of the road. The length of the bore shall be minimum 4 Mtrs long. this include insertion of different dia DWC pipe/ GI pipes coupling etc. as per direction of Engineer In charge.	50	Mtr	1187.85	59392.50

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36	Cutting of Hard rock in trenches /Preparation of cable way/Chase 150mm wide at the bottom and 300 mm deep in hard rock (Drg prepared by contactor & approved by Engineer In charge) for laying of S&T cables where minimum required depth not possible & which is verified and agreed by Engineer In charge of the work or his representative shall be made as per Drg. No RE/S&T/ALD/SK/301/85. refilling of the same with concrete mixture of 1:3:6 from top of the cable way/ chase. Payment of concrete will be made separately through a separate item in the schedule of work.	50	Cum	438.73	21936.50
37	Digging of cable pit (min2x2x1m) as per instruction of Site Engineer, supplying and filling of sand before and after coiling the cables, covering top of the cable pit with stones and providing brick masonry on all four sides of the cable pit and plastering thereafter.	1	No	12567.83	12567.83
38	Cement concrete work for miscellaneous items in the ratio 1 : 3 : 6 . Item includes excavation, ramming, curing and plastering with cement & sand mixture (aggregate not exceeding 3.8 cm.) (Aggregate cement & sand to be supplied by the contractor).	50	Per Cu. Mtr.	4267.00	213350.00
39	Supply and installation of RCC cable route marker engraved and painted on both side along the route every 50mm and route diversion as per Drg. No 4014/00/CC4 or latest/ Stone marker.	18	Nos.	412.66	7427.88
40	Supply Polyolefin cable channel of size width 240/340 mm, height 155/230 internal/external, length 1meter produced of polyolefin with fire protection class K-1 in accordance with DIN 53438 Part-II for laying signaling/telecom cables, channel attachable to each other with male female swallow tail connectors and having a suitable detachable cover, as per RDSO STS/E/cable laying Precise Vol-IV and as per technical specifications.	300	No	4369.93	1310979.00
41	Laying of half round RCC pipe after laying the cables in the trenches. (Cable laying is covered separately)	200	RM	27.77	5554.00
42	Fixing of GI pipes for crossing the culverts, bridges etc. and concreting of ends with brick masonry at both ends as per the instruction of Rly engineer at site.	10	RM	200.82	2008.20
43	Placing of DWC/RCC/GI pipes along with collars in trenches at places of track and road crossings, platform cuttings etc.	84	RM	33.22	2790.48
44	Excavation and Casting of foundation for Shunt Signal as per Drg. No. CSTE/6090 with Contractor's own materials including Cement and Anchor Bolts of Standard Size. The required scaffolding, Ferma etc for Casting of foundation will have to be brought by the Contractor at his own cost.	2	No	6125.97	12251.94
45	Erection of Position Light Shunt signal with Base, Post, Signal unit and fixing of Number Plates. The work shall be done as per instructions of Rly engineer at site.	2	No	2102.02	4204.04
46	Transportation of S&T material leading up to 1 Km including Loading from Starting point, unloading & Stacking at destination.	100	MT	452.58	45258.00
47	Extra for each additional 1 Km or part thereof.	2000	Km	4.10	8200.00

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48	Dismantling of Concrete foundation/ Demolishing RCC/CC/Stone work /Cutting Tar/ carpentering/ CC Flooring / Precast concrete slab/ Brick work including leading the debris inside Railway limit or outside Railway limit as directed by site in charge. This work to be done by contactors with his own vehicle and labour.	10	Cum	605.41	6054.10
49	Miscellaneous arrangements during Pre-NI/Ni comprising of : 1. Temporary goomty tent of dimension at least 12' X 12' at two to four places, as per the need at site, in the station yard. Each goomtys to be furnished with two tables, Six chairs and emergency light. 2. Resting arrangement for at least 24 staff at night. 3. Vehicles for transportation arrangement for to and fro movement in the station as well as between the staff resting place during NI period. 4.Manning of station goomtys to be done by contractor. 5. Catering facility includes Breakfast, Lunch, Dinner and refreshment for staff involved during NI. Note: Quantity of each item, installation, capacity etc. decided by the Railway Engineer.	1	PerPI/EI/ RRI	130730.77	130730.77
50	Installation & Commissioning of maintenance free earth Consisting	6	Nos.	1456.79	8740.74
51	Painting of Point Machine with ground connections complete (Point Machine with Black enamel only outside and ground connections with Red Oxide)	2	Nos.	112.56	225.12
52	Painting Apparatus Case Full Size. (Outside & inside)	5	Nos.	276.86	1384.30
53	Painting of Apparatus case Half Size. (Outside &inside)	5	Nos.	251.05	1255.25
54	Shunt signal post with signal unit, surface base as per Western Railway's Standard Practice.	2	Nos.	231.00	462.00
55	Fabrication and fixing of 'A' Marker (Drg No. CSTE/6180), 'AG' Marker (Drg No. CSTE/6181), 'P' Marker (Drg No. CSTE/6182), Arrow Marker (Drg No. CSTE/6183), 'G' Marker (Drg No. CSTE/6184), 'C' Marker (Drg No. CSTE/6185). Marker disk on signals as per standard practice All material required for this work shall be supplied by Contractor.	5	Nos.	1280.82	6404.10
	TOTAL SCHEDULE B1				10531018.35
	GRAND TOTAL SCHEDULE A1 + B1				11442289.91

(ii) Dhasa - Jetalsar section - Creation of siding facilities for track machine siding at two stations. (Chital and Kukavav).

SN	Description	Qty.	Unit	RATE	AMOUNT
	SCHEDULE A (SUPPLY - Chital and Kukavav)				
1	INPUT WFM CPU CARD	7	Nos.	43473.00	304311.00
2	OUTPUT WFM CPU CARD	2	Nos.	53501.00	107002.00
3	WFM RELAY DRIVER CARD	2	Nos.	36383.00	72766.00
4	Supply of Relay Rack	2	Nos.	750000.00	1500000.00
5	Rubber Mat for Power Equipment room. (5mm thick).	100	Kg	121.63	12163.00
6	Supply of Surge protection device (SPD) 4- Pole, 5 V versions similar to model no MDP- 4 D-5-T of OBO make. Make OBO, Phoenix, ABB or DEHN	4.00	Nos.	4849.80	19399.20
7	Flexible cable (Power wire), multi-strand copper conductors cross section 1x6 Sq. mm.(85 conductor each diameter 0.30 +/- 0.01) as per IS 694/1990 with insulation thickness of 0.80 mm nominal conductor resistance 3.30 ohms/km and test parameters are as per IRS(S)76/89 or latest.	1	Kms.	33366.21	33366.21
8	Flexible cable (Power wire), multi-strand copper conductors cross section (1x16Sq.mm).101 Conductors each diameter 0.45 +/- 0.01 as per IS 694/2010 with insulation thickness of 1.2mm nominal conductor resistance 1.127 Ohms/Km and test parameters as per IRS(S) 76/89 or latest.	1	Kms.	136063.55	136063.55
9	Flexible cable (Power wire), multi-strand copper conductor's cross section 25 Sq. mm (0.4x196) as per specn. IS 694/2010 with latest amendment, and test parameters as per IRS(S) 76/89.	1	Kms.	132505.12	132505.12
10	Single core multi-strand wire 0.5 sq.mm. (16 conductor each dia. 0.2mm), as per IRS 76/89 (Amd3) or latest.	2	Kms.	5548.54	11097.08
11	Supply of 35 Sq. mm PVC insulated Single core Multistrands copper conductor (Red/Black/Green) as per IS:694/2010 or latest, as per Specification No. IRS:S-76/89 or latest. Colour of the wire which is required will be specified by the Engineer in charge.	1000	Mtr	247.74	247740.00
12	Supply of 10 Sq. mm PVC insulated Single core Multistrands copper conductor (Red/Black/Green) as per IS:694/2010 or latest, as per Specification No. IRS:S-76/89 or latest. Colour of the wire which is required will be specified by the Engineer in charge.	1000	Mtr	105.67	105670.00
13	Fuse auto changeover system for use in Railway Signaling System as per RDSO/SPN/209/2012 rev.1 with latest amendments. One Automatic changeover Unit comprises 32 nos. of external Non-Deteriorating Type or 'G' type fuses from 0.6 Amp to 4 Amp capacities which are in signaling circuits. The system shall have 8 cards with a monitoring arrangement of 4 fuses in one card.	4	Per Module	29743.63	118974.52
14	Fuse auto changeover system for use in Railway Signaling System as per RDSO/SPN/209/2012 rev.1 with latest amendments. One Automatic changeover Unit comprises 24 nos. of external Non-Deteriorating Type or 'G' type fuses from 4 Amp to 10 Amp capacities which are in signaling circuits. The system shall have 6	2	Per Module	51953.78	103907.56

SN	Description	Qty.	Unit	RATE	AMOUNT
	cards with a monitoring arrangement of 4 fuses in one card.				
15	Indicative type Fuse suitable to G type fuse base/holder of capacity 0.63 A - 3.0 A. (System, Rapid, Malnad or RBCO make or similar).	100	Nos.	18.60	1860.00
16	Indicative type Fuse base/ holder with cap, suitable to G type fuse of capacity 0.63A - 3.0A. (System, Rapid, Malnad or RBCO make or similar).	40	Nos.	50.99	2039.60
17	Indicative type Fuse Without holder 6A (System, Rapid or Malnad or RBCO make or similar) as per IRS: S-80/92.	40	Nos.	34.44	1377.60
18	Round head type non deteriorating type low voltage cartridge fuse as per Spec No IRS/S/78/92 with latest amendments 2A/4A/6A capacity.	40	Nos.	57.21	2288.40
19	Point insulation Complete set as per RDSO Specification IRS: S-40/84 for Switch bracket, Split-Stretcher bar & Gauge tie plates (52 Kg/60Kg as per site requirement).	20	Set	1345.93	26918.60
20	Gauge Tie plate nylon insulation as per RDSO Drg No: T- 10372Alt2, T- 10368, T- 10371Alt2, T- 15083/88/Alt2 & T-11690/Alt2 and to the spec. IRS: S-40/84 with latest amendments as applicable.	4	Set	1503.68	6014.72
21	Key Lock Relay working on 24V DC, AC immunize with different ward combinations (Three ward plates to be supplied with each relay). Key ward shall be specified by engineer incharge as per requirement.	2	Nos.	9743.97	19487.94
22	Apparatus Case Single NE Rly Type as per Drg. No. W. Rly/SW/47/68 Alt-A, fitted with two no.s of E Type lock (ward No will be specified by Engineer-in Charge) as per RDSO Drg. No. SA 3376/3473 and Key to Drg. No. 3377 Note: This item includes the supply & fixing of 2 No.s E Type Lock fitted on both doors, along with two Keys.	6	Nos.	15611.07	93666.42
23	Apparatus Case half NE Rly Type as per Drg. No. W. Rly/SW/47/68 Alt-A fitted two no.s E Type lock of (ward No will be specified by Engineer-in Charge) as per RDSO Drg. No. SA 3376/3473 and Key to Drg. No. 3377. Note: This item includes the supply & fixing of 2 No.s E Type Lock fitted on both doors, along with two Keys.	2	Nos.	9893.99	19787.98
24	IS 13410: Glass Reinforced Polyester Sheet Moulding Compounds (SMC) Size of Sheet: 1000x1000x8.	4	Nos	5388.67	21554.68
25	Disconnect Terminal Block, Screw less type, 4-wire front entry (Two in-put & Two out-put) The color will be decided by Engineer - in - Charge. (Preferably In Blue, Red & Grey Colors in the ratio of 1:2:3). as per RDSO Spec. No. RDSO/SPN/189/2004. With latest amendments. Note: Make to be approved by Railway before supply.	150	Nos	58.53	8779.50
26	ARA Terminal blocks with links made of PBT Spec Nos/75/2006 (Rev - 2) with latest amendments and RDSO Drg.No.SA-23741A Alt.4.	500	Nos	75.00	37500.00
27	Half Round RCC pipes & collars of 300 mm outer dia & 250 mm internal dia (1 meter long) along with collars as per IS No. 458/2003 of NP type	2000	Nos.	435.52	871040.00

SN	Description	Qty.	Unit	RATE	AMOUNT
28	Double Walled Corrugated (DWC) HDPE Pipe with associated collars etc. as per RDSO Specification No. RDSO/SPN/204/2011 or latest anti-rodent & anti-oxidant and non-flame propagating type in 6 meters straight length and of size 120 mm outer dia, & 103.5 mm inner dia. One of the following coupling arrangements should also be supplied with each pipe as per the site requirement. 1) Suitable snap fit coupler with rubber 'O-Ring 2) Spacers 3) Tees 4) Bend, 5) End-cap (The total quantity of above items is equal to no. of pipes supplied.) DWC pipe shall be marked at every 1 mtr length in such a way that manufacturer's name, vender name and year of manufacture can be easily identified. Color -Bright Orange; Min Weight = 4kg. Test Check by Consignee & Sample check by JAG officer.	14	Nos.	1912.20	26770.80
29	Medium Class G.I. Pipes to IS: 1239 (Pt.)-2004 or latest; 100mm dia. (int. Dia) 3.65 mm thick or above with coupling. G.I. pipes shall have ISI mark on it and contractor should submit manufacturer's test certificate of G.I. pipes.	48	Mtr	1170.28	56173.44
30	Position Light Shunt Signal Unit Complete with Post (made of GI Pipe of 80 mm Diameter Medium Class IS Spec. No. IS: 1239 Pt. 1/1990) Base, Hood, and Cover, etc. as per Drg. No. SA-23840, Signal Number Plate, suitable for LED Signal Lighting Unit	2	No	4530.07	9060.14
31	Position Light Shunt Signal Unit Complete, with offset bracket, hood, Cover etc. as per Drg. No. SA-23840 suitable for LED Signal Lighting Unit. (Supply of LED Unit is not covered in this item).	2	No	3359.74	6719.48
32	Maintenance Free Earth Electrode of length 3m, including supply of 3 bags of Earth enhancement material for earthing (10KGs /bag) for each electrode & other accessories as per Drg. No. SDO / RDSO/ E&B/001 and RDSO Spec No. RDSO / SPN/197/2008.	12	Nos.	10403.08	124836.96
33	Earth Electrode as per Drg. No. CSTE / 6091.	12	Nos.	2798.99	33587.88
34	Supply of copper strip for earthing (25mm x 3mm).	20	Mtr	573.16	11463.20
35	Supply of GI flat for earth (50 X 6 mm).	40	Mtr	206.67	8266.80
	TOTAL SCHEDULE A2				4294159.38
	SCHEDULE B2 (EXECUTION - Chital and Kukavav)				
1	Supply of Wiring & Installation Accessories	2	LS	200000.00	400000.00
2	Modification of EI System of Medha at CHITAL Stations of WR, as per RDSO spec no: RDSO/SPN/192/2019, in connection with the provision of Track Machine Siding. Supply of EI additional Hardware as per the tentative SIP provided. Supply of Relay Rack, wiring and installation accessories as mentioned. Modification to the existing Application Logic circuits and Interface circuits. Alteration to the MT and VDU software. Up-gradation of Data-logger database at MEDHA end.	1	LS	3847000.00	3847000.00

SN	Description	Qty.	Unit	RATE	AMOUNT
	FAT (Factory Acceptance Test), SAT and commissioning as per the Modified Application Logic. ASMADES				
3	Modification of EI System of Medha at KUNKAVAV Stations of WR, as per RDSO spec no: RDSO/SPN/192/2019, in connection with the provision of Track Machine Siding. Supply of EI additional Hardware as per the tentative SIP provided. Supply of Relay Rack, wiring and installation accessories as mentioned. Modification to the existing Application Logic circuits and Interface circuits. Alteration to the MT and VDU software. Up-gradation of Data-logger database at MEDHA end. FAT (Factory Acceptance Test), SAT and commissioning as per the Modified Application Logic. ASMADES.	1	LS	3847000.00	3847000.00
4	Design of Cable Route Plan submission of Three paper copies for approval.	2	Set	9873.00	19746.00
5	Supply of final Cable Route Plan as per laid cable duly measured at every 30m clearly indicating distance of laid cable from fixed point of reference & indicating all track crossings and tail cables in original tracing along with Auto CAD in Pen Drive and Six set copies after approval	2	Per station	1580.00	3160.00
6	Design of Existing ST/LT/TOC/RCC (Alteration) & submission of Three paper copies for approval. Upto Four-Line Station	2	Per station	2908.00	5816.00
7	Supply of completions ST/LT/TOC in original tracing along with Auto CAD copies in Pen Drive and six set copies after approval. Upto four line station	2	Nos	790.00	1580.00
8	Supply of ferrules of different colour, printing termination details / Functions in different colours as per Railway specification and installation in Relay room, Location Box and Power board etc, at various stations and LC gates as per instruction of Engg. in charge. All materials required for the work shall be supplied by the contractor.	2000	Nos	11.00	22000.00
9	Design and supply SWR Diagram on standard tracing paper of 95 grams for each station. Corrected version of SWR plans after checked & approved by Rly's 25 copies will be supply for each of the plans. For stations having up to 4 lines.	2	Nos	24321.00	48642.00
10	Fabrication and supply of premium quality foam sheet 5mm thickness with vinyl printing of approximately size 2.5 feet x 4.5 feet with framing. This item also includes lettering/numbering of termination particulars, CTR contact details in relay room, relay hut, goomtys etc. This item also includes all material and resources required for fixing and transportation at stations & LC gates of Bhavnagar Division. Colour coding of CTR termination details will be as per WR/HQ policy letter, CTR termination details will be given by Railway. Work will be carried out as per western Railway practice.	8	Nos	2450.00	19600.00

SN	Description	Qty.	Unit	RATE	AMOUNT
	Sample of CTR to be provided before printing of all CTR of Division.				
11	Preparation and fixing of location box board on 03 mm ACP sheet with size 12 x 18 size A3 for location box including pasting of printed/ painted vinyl sheet and lamination (printing/painting of location detail on vinyl sheet covered in schedule item separately).	8	Nos.	239.73	1917.84
12	Function Description of location box at station and LC gates designed in Auto Cad full and half apparatus case. As per WR policy. Details provided by Railway.	8	Nos.	240.00	1920.00
13	Laying of S&T Cables of various cores/ pairs/ quads in trenches/ GI pipes/ RCC pipes/ DWC pipes/ Trucking. This also includes laying of cables in track crossings & road crossings. Item includes provision of labels of colored plastic adhesive tapes or any other identifiable material on each cable to give the cable number at each G.P. (Cables will be daggered before and after its laying by contractor under supervision of Railway Representative and he will submit the meggering report of each testing). Length of the cable laid includes the length of the cable coiled for termination purposes.	1200 0.00	RM	9.37	112440.00
14	Installation wiring testing and commissioning of Fuse changeover system (FACS). This includes the provision of a common Buzzer & indication at the ASM Room & ESM Duty Room and the painting of fuse details. This also includes the fabrication of a frame for the installation of FACS at the Station/ LC gate where the installation of relay racks is not feasible.	6	Per Module	915.42	5492.52
15	Earth Leakage Detector as per RDSO/SPN/256/2002 or latest with latest amendments. The basic detector unit shall comprise of 8 channels, for use on signaling circuits of 110V AC/DC and/or 60V/24V/12V DC as ordered by purchaser. If the detector is required for less number of channels, dummy plates shall be provided. For additional requirement add on /expendable cabinet may be used. The voltage specified shall be provided with + 25% and - 10% tolerance. Installation as per instruction given by Engg in charge.	2	Nos.	95580.00	191160.00
16	Fixing of Electrical Point Machine on the extended sleepers at points as per std. practice and as per RDSO Drg No. SA 91 51-52 or 9710 or 9161 as per section of rails used. Item includes fixing switch extension bracket, providing insulation for switch extension bracket, fixing ground connection, adjusting opening of the switches and adjusting the point machine with crank handle. The item also includes : (i) Complete material for installation like ground-connections, switch extension brackets, point insulation material, I pipes, wiring materials, various fixing nuts & bolts including castle nuts, spring washers (ii) All smithy & fitting works required at site for complete installation. (iii) Installation of gauge tie plate & providing insulation for gauge tie plate (Insulation in William Stretcher Bar will be Provide by Railways). (iv) Wiring inside the point machine,	4	Nos.	22354.53	89418.12

SN	Description	Qty.	Unit	RATE	AMOUNT
	insertion and termination of tail cable in point machine and junction boxes / location box /cable hut as per extent practice on WR and the instruction of Railway Engineer at site. (v) Supply and fixing of suitable size GI pipes with flange for taking cable into point machine. Note ; The ground connections shall be suitable to the Point Machines as specified by Engineer-in-charge and shall be suitable to the point lay out i.e. 60 Kg. / 52 Kg / 90R as per yard layout. Electrical Point Machine and M-6 / Screw less terminals will be supplied by Railways / covered in Schedule separately.				
17	Supply and fixing of CH/KLCR boxes appropriate size in field / in location boxes / in SM office / at LC gate as per site condition. It should be made of Hylam /wooden (teak wood) of high quality as per requirement. Item includes supply of any minor bracket nuts, bolts and hole drilling MS angle, MS plate etc. It also includes fixing of KLCR relays in the boxes. Prior approval to be taken from Engg. In charge before supply of box.	2	Nos.	1536.49	3072.98
18	Excavation and Casting of Apparatus Case foundation with contractor's own materials including cement and anchor bolts of standard size. The required scaffolding Ferma etc. for Casting of foundation will have to be brought by the contractor at his own cost. Single Case as per Drg No SK 748 or CSTE/5074 or SS Location	6	Nos.	7162.63	42975.78
19	Installation of Apparatus Cases with miniature 'E' type lock on CC foundation. This includes filling of location foundations with river bed sand and plastering on top of the sand. 'E' Type lock will be provided by Railway. Single Case	6	Nos.	1076.29	6457.74
20	Excavation and Casting of Apparatus Case foundation with contractor's own materials including cement and anchor bolts of standard size. The required scaffolding Ferma etc. for Casting of foundation will have to be brought by the contractor at his own cost. Half Case as per Drg No SK 747 or CSTE/5074 or SS Location.	2	Nos.	5487.86	10975.72
21	Installation of Apparatus Cases with miniature 'E' type lock on CC foundation. This includes filling of location foundations with river bed sand and plastering on top of the sand. 'E' Type lock will be provided by Railway. Half Case	2	Nos.	657.15	1314.30
22	Fabrication and fixing of SMC sheet in location box by providing all fixtures as per Railway Drawing including fixing of PVC coated string rods at the back side for cable support with contractor's own materials. The work shall be done as per Drg and arrangement similar to SK 783-1/2. With latest alterations & as per instructions of Rly engineer at site. Note: SMC sheet will be taken in place of phenolic laminated sheet. Single Case.	6	Nos	2445.36	14672.16

SN	Description	Qty.	Unit	RATE	AMOUNT
23	Fabrication and fixing of SMC sheet in location box by providing all fixtures as per Railway Drawing including fixing of PVC coated string rods at the back side for cable support with contractor's own materials. The work shall be done as per Drg and arrangement similar to SK 783-1/2. With latest alterations & as per instructions of Rly engineer at site. Note: SMC sheet will be taken in place of phenolic laminated sheet. Half Case.	2	Nos	777.78	1555.56
24	Shifting of existing full location boxes coming in the alignment of new line. The work includes losing & removal of soil around location boxes by excavating soil around foundation, making of pit for shifting of location box horizontally opposite to railway track up to 0.5 to 1.0 mtr. This includes loosening of existing cable coils without any damage. The excavated soil shall be back filled after shifting of Location Boxes. Location box shall be shifted by push method with the help of jacks or by crane by contractors own expenditure under instructions of engineer in-charge at site. The work may affect train working hence the work shall be done as per margin only or during traffic block only.	4	Nos	4369.93	17479.72
25	Shifting of existing half location boxes coming in the alignment of new line. The work includes losing & removal of soil around location boxes by excavating soil around foundation, making of pit for shifting of location box horizontally opposite to railway This includes loosening of existing cable coils without any damage. The excavated soil shall be back filled after shifting of Location Boxes. Location box shall be shifted by push method with the help of jacks or by crane by contractors own expenditure under instructions of engineer in-charge at site. The work may affect train working hence the work shall be done as per margin only or during traffic block only.	4	Nos	3379.72	13518.88
26	Termination of outdoor cables, main cables laid in location boxes, Cable termination rack etc. at both ends on ARA terminal or on 8 way terminals or on screw less connectors. Both ends of a cable core terminated shall be counted as one terminal. This includes all associated works of pulling out the cable from underground, peeling off insulation, dressing of cable core supported on sting rod with contractor's own material. The work shall be done as per instructions of Rly engineer at site.	700	Per Terminal	2.69	1883.00
27	Excavation of cable trench as per cable route plan, 1 Mtr. deep and of 0.3 Mtr. to 0.6 Mtrs wide advised by Engineer-in-charge alongside the track in normal (all type) soil/strata, conforming to distances as per cable route plan and refilling. This work includes clearing of route from bushes etc, covering of cable laid in trench by loose soil for a layer of 50mm thickness approximately before covering by bricks. The work shall be done as per the extant practice on Western Railway and instructions of Railway Engineer at site. In case 1m depth of trench is not achievable due to site conditions, specific approval	600	Cum	323.90	194340.00

SN	Description	Qty.	Unit	RATE	AMOUNT
	of JA grade officer will be required for each site where trench depth of 1m is not possible. Without the approval of JA Grade officer, no payment for trenching will be made for trench depth less than 1m.				
28	Digging of trench 1.2 M deep from rail flange/ road level and, 0.3 Mtr to 0.6 Mtr wide and back filling after placing of DWC/ RCC/GI pipe. (Placing of DWC/RCC/GI pipe covered separately). The ballast disturbed be screened and dressed as required by Engineer-in-charge or his representatives and road tarred immediately. For track crossing, Drg. No. CSTE/3644 Pg.7 of 11 and for Road Crossing, Drg. No. CSTE/3644 Pg. 5 of 11 are to be followed.	10	Cum	323.90	3239.00
29	Digging of cable trench 0.3 Mtrs. Deep and 0.3 Mtrs. Wide on Asphalted Platform / Road / Hard rocky area. Refilling with earth leveling of trenches & restoring the original surface of trenches.	20	CUM	512.76	10255.20
30	Horizontal direction drilling/boring without damage of surface road using Auger Machine. The bore shall be 150 mm dia & shall be done at the depth of minimum 1200 mm from the ground level. The ground level shall be considered ignoring the bank height of the bank of the road. The length of the bore shall be minimum 4 Mtrs long. this include insertion of different dia DWC pipe/ GI pipes coupling etc. as per direction of Engineer In charge.	20	Mtr	1187.85	23757.00
31	Cutting of Hard rock in trenches /Preparation of cable way/Chase 150mm wide at the bottom and 300 mm deep in hard rock (Drg prepared by contactor & approved by Engineer In charge) for laying of S&T cables where minimum required depth not possible & which is verified and agreed by Engineer In charge of the work or his representative shall be made as per Drg. No RE/S&T/ALD/SK/301/85. Refilling of the same with concrete mixture of 1:3:6 from top of the cable way/ chase. Payment of concrete will be made separately through a separate item in the schedule of work.	20	Cum	438.73	8774.60
32	Digging of cable pit (min2x2x1m) as per instruction of Site Engineer, supplying and filling of sand before and after coiling the cables, covering top of the cable pit with stones and providing brick masonry on all four sides of the cable pit and plastering thereafter.	2	No	12567.83	25135.66
33	Cement concrete work for miscellaneous items in the ratio 1: 3: 6. Item includes excavation, ramming, curing and plastering with cement & sand mixture (aggregate not exceeding 3.8 cm.) (Aggregate cement & sand to be supplied by the contractor).	40	Per Cu. Mtr.	4267.00	170680.00
34	Supply and installation of RCC cable route marker engraved and painted on both side along the route every 50mm and route diversion as per Drg. No 4014/00/CC4 or latest/ Stone marker.	40	Nos.	412.66	16506.40
35	Laying of half round RCC pipe after laying the cables in the trenches. (Cable laying is covered separately)	2000	RM	27.77	55540.00
36	Placing of DWC/RCC pipes along with collars in trenches at places of track and road crossings, platform	132	RM	33.22	4385.04

SN	Description	Qty.	Unit	RATE	AMOUNT
	cuttings etc. also for straight cable laying. (Cable laying is covered separately.)				
37	Excavation and Casting of foundation for Shunt Signal as per Drg. No. CSTE/6090 with Contractor's own materials including Cement and Anchor Bolts of Standard Size. The required scaffolding, Ferma etc. for Casting of foundation will have to be brought by the Contractor at his own cost.	2	No	6125.97	12251.94
38	Erection of Position Light Shunt signal with Base, Post, Signal unit and fixing of Number Plates. The work shall be done as per instructions of Rly engineer at site.	2	No	2102.02	4204.04
39	Erection of Position Light shunt signal on Offset bracket on main signal.	2	No	1930.03	3860.06
40	Transportation of S&T material leading up to 1 Km including Loading from Starting point, unloading & Stacking at destination.	400	MT	452.58	181032.00
41	Extra for each additional 1 Km or part thereof.	4000	Km	4.10	16400.00
42	Dismantling / Releasing of existing Signaling Gears. One Signalling gear will be all parts of one signal (consisting of CLS unit, Signal post along with base) or lever frame (5 levers set), or one point (consisting of all parts of a mechanical point, point machine, ground connections etc.) or one track circuits (consisting of battery box & other parts of DC Track circuit / AFTC /DAC) or one Block instruments or One Lifting Barrier or One Location Box etc. .This includes the cost of transportation of release materials to store depot or as decided by consignee in charge. This work to be done by contactors with his own vehicle and labour. (Per unit means Per Gear).	40	Per Gear	1062.82	42512.80
43	Dismantling of Concrete foundation/ Demolishing RCC/CC/Stone work /Cutting Tar/ carpentering/ CC Flooring / Precast concrete slab/ Brick work including leading the debris inside Railway limit or outside Railway limit as directed by site in charge. This work to be done by contactors with his own vehicle and labour.	10	Cum	605.41	6054.10
44	Miscellaneous arrangements during Pre-NI/NI comprising of : 1. Temporary goomty tent of dimension at least 12' X 12' at two to four places, as per the need at site, in the station yard. Each goomtys to be furnished with two tables, Six chairs and emergency light. 2. Resting arrangement for at least 24 staff at night. 3. Vehicles for transportation arrangement for to and fro movement in the station as well as between the staff resting place during NI period. 4. Manning of station goomtys to be done by contractor. 5. Catering facility includes Breakfast, Lunch, Dinner and refreshment for staff involved during NI. Note: Quantity of each item, installation, capacity etc. decided by the Railway Engineer.	2	Per PI/ EI/ RRI	130730.77	261461.54
45	Installation & Commissioning of maintenance free earth Consisting	12	Nos.	1456.79	17481.48
46	Installation of Earth Electrode including MS flat for clamp etc. and connection to signalling equipments,	12	Nos.	5579.77	66957.24

SN	Description	Qty.	Unit	RATE	AMOUNT
	lever frames, apparatus cases, signal, relay rack, block instrument, etc. as per technical specification given. This item includes digging of pit in earth 3 M deep & fixing earth electrode pipe, casting of cement concrete enclosure & cover as per RDSO/SPN/197/2016. Soil treatment to be done as per std. practice. This item includes provision of MS Flat, Earth lead wires and Soldering of lead wires. The other end of the wire is to be connected to block equipment, power equipment, cable sheath, and signals etc. as per site requirements. 7strand GI wire shall be used as earth lead wire.				
47	Erection of copper strip for earthing. (25 x 3mm)	20	Each	22.47	449.40
48	Erection of MS flat for earth (50mmx6mm) laid in ground/exposed	40	Mtr	62.52	2500.80
49	Painting of Point Machine with ground connections complete (Point Machine with Black enamel only outside and ground connections with Red Oxide)	4	Nos.	112.56	450.24
50	Painting Apparatus Case Full Size. (Outside & inside)	10	Nos.	276.86	2768.60
51	Painting of Apparatus case Half Size. (Outside & inside)	10	Nos.	251.05	2510.50
52	Shunt signal post with signal unit, surface base as per Western Railway's Standard Practice.	4	Nos.	231.00	924.00
53	Fabrication and fixing of 'A' Marker (Drg No. CSTE/6180), 'AG' Marker (Drg No. CSTE/6181), 'P' Marker (Drg No. CSTE/6182), Arrow Marker (Drg No. CSTE/6183), 'G' Marker (Drg No. CSTE/6184), 'C' Marker (Drg No. CSTE/6185). Marker disk on signals as per standard practice All material required for this work shall be supplied by Contractor.	20	Nos.	1280.82	25616.40
	TOTAL SCHEDULE B2				9890846.36
	GRAND TOTAL SCHEDULE A + B				14185005.74

SUMMARY

SN	Name of work	Schedule	Cost
1	Surendranagar - Dhasa Track machine siding at 06 stations. Signaling work for alteration in EI at DAS station.	Schedule A1	911271.57
		Schedule B1	10531018.35
2	Dhasa - Jetalsar section - Creation of siding facilities for track machine siding at two stations. (Chital and Kukavav)	Schedule A2	4294159.38
		Schedule B2	9890846.36
	Grand Total	Schedule A1+B1+A2+B2	25627295.66

Note:

1. Tenderer's are requested to inspect the site before quoting the rates.
2. Although year of specification is given in the schedule, latest amendment issued before beginning of sale of tender document shall apply.
3. Includes supply of minor material & accessories, paints and the cost of which to be included in the labour charges of the concerned item of schedule.
4. Tenderer/s should sign the following certificate:
I/we offer and agree to execute the above work at % (in figures) i.e. percent (in words) above/below of the total estimated cost of schedule including all taxes.

SPECIAL CONDITIONS

NAME OF WORK: Bhavnagar Division: Supply installation, Testing, Commissioning of Signalling gears and alteration in Medha make Electronics Interlocking system at Dhasa, Kukavav & Chital stations in connection of (i) Surendranagar - Dhasa Track machine siding at 06 stations. Signaling work for alteration in EI at DAS station. (ii) Dhasa - Jetalsar section - Creation of siding facilities for track machine siding at two stations. (Chital and Kukavav).

1. LOCATION OF SITE:

The work is to be carried out at **Dhasa, Chital and Kukavav stations in Dhasa - Jetalsar Section** of Bhavnagar Division and as per instruction of Engineer In-charge in Bhavnagar Division.

2. SCOPE OF WORK

- i. Alteration in Electronic Interlocking (EI) system as per RDSO Specifications No. RDSO/SPN/192/2019 Ver.2.0 with latest amendment.
- ii. Design, supply, testing and commissioning of Remote Diagnostic and Predictive Maintenance System (RDPMS) as per RDSO/RDPMS/FRS /2025 at Dhasa station.
- iii. Supply, Installation, Testing and Commissioning of Maintenance Free Earth Electrode as per RDSO Spec No. RDSO / SPN/197 with latest Amd. Supply, Installation, Testing and Commissioning of Earth Electrode. TAN on Earthing, Bonding, Surge & Lightning Protection System for S&T Installation.
- iv. Excavation of cable trench, Digging of trench, laying cable as per RDSO guide line.
- v. Supply of Main signal post, Shunt signal post, excavation, foundation & installation with signal units.
- vi. Work to be carried out as per Western Railway policy No 03/2024 as per schedule of work.

Contractor will supply the material and do the work as detailed in Schedules of work. The work will be carried out invariably in presence of railway representative.

3. SYSTEM OF QUOTING RATES:

The entire work is divided into the following Schedule.

Schedule A – Supply of materials as per schedule of work.

Schedule B - Execution, testing & commissioning of indoor & outdoor work as per schedule of work.

The tenderer is required to quote **the percentage above/below the Railway's total estimated cost of the schedules.**

LOCAL CONDITIONS: It will be imperative on each tenderer to fully acquaint himself with all the local conditions and factors which would have any effect on the performance of the contract and cost of the work. The railway administration shall not entertain any request for clarifications from the tenderer regarding such local conditions. No request for change of price or time schedule of completion shall be entertained after the offer is accepted by the railway administration on account of any local condition or factor.

4. COMPLETION PERIOD

The entire work shall be completed within **12 months** from the date of issue of Letter of Acceptance.

5. ELIGIBILITY CONDITIONS:**(a) Similar Nature of Work**

Any RI or EI or CLS or ABS or IBS work involving indoor & outdoor work (cable laying & termination).

(b) Special Technical & Financial Criteria as per GCC

I. Technical Eligibility (GCC para 10.1):

The tenderer must have successfully completed or substantially completed any one of the following categories of work(s) during last 07 (seven) years, ending last day of month previous to the one in which tender is invited:

- (i) Three similar works each costing not less than the amount equal to 30% of advertised value of the tender, or
- (ii) Two similar works each costing not less than the amount equal to 40% of advertised value of the tender, or
- (iii) One similar work costing not less than the amount equal to 60% of advertised value of the tender.

II. Financial Eligibility Criteria (GCC Para No. 10.2):

The tenderer must have minimum average annual contractual turnover of V/N or 'V' whichever is less; where

V= Advertised value of the tender in crores of Rupees

N= Number of years prescribed for completion of work for which bids have been invited.

The average annual contractual turnover shall be calculated as an average of "total contractual payments" in the previous three financial years, as per the audited balance sheet. However, in case balance sheet of the previous year is yet to be prepared/ audited, the audited balance sheet of the fourth previous year shall be considered for calculating average annual contractual turnover.

The tenderers shall submit requisite information as per Annexure-VIB, along with copies of Audited Balance Sheets duly certified by the Chartered Accountant/ Certificate from Chartered Accountant duly supported by Audited Balance Sheet.

Annexure VIB is given in GCC.

III. Bid Capacity (GCC para 10.3) if Applicable.

(C) Technical Compliance:

While bidding, bidder should submit the MOU of RDSO approved source (OEM or his RDSO approved source) of existing MEDHA make EI at the time of bidding covering supply of the equipment of EI, installation, alteration, testing and commissioning of EI including after sales support required during the warranty period and beyond the warranty period, failing which tender/offer shall be summarily rejected.

5.1 Tenderer shall submit following documents along with offer dully self-attested / digitally signed.

- i. Tender form (First Sheet) - Annexure – I.
- ii. Format for certificate to be submitted / uploaded by tenderer along with the tender documents – Annexure – V / Annexure V (A).
- iii. Bid security – Annexure VIA, if EMD paid in Bank Guarantee Bond.
- iv. Sole Proprietorship Firm – Certificate by tenderer. If any
- v. Partnership Firm – Documents as per GCC clause 18. If any
- vi. Company registered under Companies Act 2013, if any – Documents as per GCC clause 14 (e). If any.
- vii. Limited Liability Partnership, if any - Documents as per GCC clause 14 (f). If any
- viii. Registered Society & Registered Trust, if any - Documents as per GCC clause 14 (g). If any
- ix. Notarized Power of Attorney, if any

- x. Bank details, GST detail.
- xi. PAN Card detail.

6. PAYMENT TERMS

As per HQ letter No. SG 32/1/1 dated 03.09.2014.

Work progress stage	Schedule - (Supply Part)			Schedule - (Execution Part)	
	Against supply	After Installation	After commissioning	On Measurement	After Commissioning
% Payment proposed	80%	10%	10%	90%	10%

For Supply & Installation Items:

- (i) 90% of the value of supply & Installation items shall be paid after installation on production of the following:
 - a) The materials as per Schedule of Materials supplied by contractor and accepted by the consignee.
 - b) Original Inspection certificate issued by inspecting Officer.
 - c) Challan/Invoice in duplicate.
 - d) Proof of purchase.
 - e) A certificate should be submitted by the contractor that the materials supplied are as per the contract and the amount claimed in the invoice is correct as per terms of the contract.
- (ii) 10 % after commissioning.

For Spares: 100% Payment on supply of spare items in the schedule.

All payments shall be made on the certificate of the Engineer within a reasonable time of the submission of the necessary bills by the contractor.

8. STORES & EXECUTION OF WORK

The consignee for the store work will be Senior Section Engineer (Signal- Store) Dhola or his representative.

The consignee for execution of work will be Sectional Senior Section Engineer (Signal) Dhola & Dhasa or his representative as per the jurisdiction of the section.

Engineer In-charge for the work is DSTE - Bhavnagar / ADSTE-Dhola.

9. LOADING/UNLOADING OF MATERIAL

The material shall be delivered by the Contractor at the depot of Consignee/site of work. Material supplied by Railways for execution of the work if any and the material delivered by the Contractor will be transported from the Store of **Senior Section Engineer (Signal-Store) Dhola or his representative** to site by the Contractor with his own labour and transport.

10. STORES - RECEIPT & ACCOUNTAL

Exchange of proper requisition and receipt shall be done on a suitable proforma between the Contractor and the Railway's authorized representative.

The Contractor shall issue a receipt along with the demand slip for material he requires for the work and obtain receipt when any material is returned to stores. These transactions shall be done with the consignee.

All stores drawn by the tenderer shall be accounted for either as installed as per site measurements recorded or as per surplus stores returned to the Site Engineer in-charge.

11. SECURITY OF MATERIAL

Once the material is handed over to the contractor, the contractor shall be responsible for the security of material irrespective of the fact that the material is kept in Railway premises. The contractor shall make adequate arrangements at site as deemed necessary for guarding the same from the thefts by outsiders or his labour or damage of any sort.

The cost of stores lost shall be realized by the Railway out of any payments due to the contractor in this contract or from any other contract executed by Govt. of India.

12. RETURN OF SURPLUS STORES

The stores found to be surplus shall be returned to Consignee by the Contractor with his own staff. The contractor shall account for all material that was issued to him. A register shall be maintained at site, which shall be signed by the Contractor as a token of receipt of material. All the issued material shall either be used in the installation or returned to **Consignee's depot**.

13. RETURN OF RELEASED STORES

Released material shall be handed over to Consignee at consignee's depot in systematic manner. Proper care should be taken while releasing & transporting the stores.

14. INSPECTING AUTHORITY

The Inspecting authority for the work shall be RDSO/RITES/Railway's representative.

As per Railway board No. 2022/RS(G) /779/8 dated 26/09/2025, Safety Critical Signalling items to be inspected by RDSO.

15. INSPECTION OF MATERIAL

All materials to be used on this installation shall be subject to inspection by RDSO / RITES / Railway's representative at the manufacturer's premises. For this purpose, the Contractor shall give sufficient notice of time to RDSO / RITES / Railway's representative when the material is ready for testing/inspection. All facilities as may be necessary shall be provided for carrying out the tests by the contractor.

Whether a product has or has not been accepted at the point of manufacture, if, upon arrival at destination, it does not meet the requirements of the specification, it may be rejected and the Contractor shall undertake disposal of the rejected products and shall bear all charges.

The contractor shall make such tests as may be necessary to demonstrate to the satisfaction of the Railway that the apparatus and the system as installed are in accordance with the requirements of the specifications and contract. The Contractor shall provide such instruments and apparatus as may be necessary for making the tests.

16. INSPECTION CHARGES

The inspection charges for the inspection service rendered to the S&T contractors executing signalling works **shall be borne by the Railway**. Contractor must be present at site during measurement / inspection of Railway supervisor / officer.

17. MATERIALS AND WORKMANSHIP

All the items which are to be procured as per IRS / RDSO specifications shall be procured from RDSO approved firms. Any relaxation with respect to procurement / inspection shall be with the prior approval of the competent authority. The Railways' decision shall be final and binding on the contractor.

As per Railway board No. 2022/RS(G) /779/8 dated 26/09/2025, Safety Critical Signalling items to be inspected by RDSO.

Further items which do not have RDSO specification or which RDSO has not approved any suppliers, inspection shall be carried out by RITES / authorized Railway representatives.

Material shall be in accordance with specifications and drawings specified or approved by the Railway with latest amendments.

The Railway shall have full powers to reject any material that the Railway may consider to be defective or inferior in quality of material, workmanship, and design or otherwise, not in accordance with the specifications and drawings specified by the Railway.

The Contractor shall remove forthwith all rejected materials and replace such material at Contractor's expenses.

All material should be in properly packed condition and the consignee reserves the right to reject the material even though it was passed by RDSO.

All incidental / miscellaneous material required during the execution of the work as per the schedule, which is not covered elsewhere in the schedule of work, will be supplied by the contractor.

18. CONSIGNEE'S RIGHT OF REJECTION

Notwithstanding any approval which the Inspecting Officer may have given in respect of the stores or any materials or the work or workmanship involved in the performance of the contract (whether with or without any test carried out by the Contractor or the Inspecting Officer) and notwithstanding delivery of the stores where so provided to the interim consignee, it shall be lawful for the consignee, on behalf of the purchaser, to reject the stores or any part, portion of consignment thereof within a reasonable time after actual delivery thereof to him at the place or destination specified in the contract if such stores or part, portion of consignment thereof is not in all respects in conformity with the terms and conditions of the contract whether on account of any loss, deterioration or damage before dispatch or delivery or during transit or otherwise howsoever.

19. CONSEQUENCES OF REJECTION (Rejected stores)

When any stores delivery at the consignee's depots is rejected, this shall be removed by the contractor within 30 days from the date of rejection. Such rejected stores shall lie at the contractor's risk from the date of rejection. If the stores are not removed by the Contractor within this period, the purchaser or his nominee shall have the right to dispose of such stores, as though fit, at the contractor's risk and account.

The purchaser shall also be entitled to recover from the contractor, handling and ground rent/demurrage and any other charges for the period during the rejected stores are not removed after the period aforementioned.

20. SUPERVISION & LABOUR

The work shall be carried out as per Railway's extant practice. Digging of road for cable crossing should be done in night time if the road is very busy in daytime. Ramming and repairing of the road by asphaltting should be done immediately to restore the surface to originality. The laying of cable and track crossing should be done only in the presence of the authorized railway representative and safety of rail traffic should at no cost be endangered.

After laying of cable, contractor would have to conduct cable maggering and loop resistance test in presence of railway representative and the test report must be submitted along with measurement book duly signed by the consignee and contractor. Payment would be made on obtaining successful test results.

The field Supervisor shall receive instructions from the Engineer-in-charge of the work or his representative at site and comply with the instructions. The Contractor shall be responsible for the compliance of such instructions.

If the supervisor acting on behalf of the Contractor disobeys or does not regard the instructions of the Railway's supervisor/representative and does not execute the work to the satisfaction of this Railway supervisor, it shall be binding on the tenderer to replace his supervisor.

Contractor shall keep on the works sufficient and Competent/Qualified staff as per GCC. The work shall be carried out as per Railway's extant practice.

21. INSPECTION OF WORKS

The completed installation at all stages shall be subjected to checks and test as decided by Railways and the contractor shall be liable to remedy such defects as discovered during these checks and test and make good all deficiencies brought out. However, complete installation will be taken over finally on completion of the full system. It will be the responsibility of the contractor to rectify any discrepancy noticed within a period of one month from the date the complete system is taken over. For the purpose of taking over, joint inspection will be carried out by Sr. DSTE / DSTE / ADSTE and Engineer (Signal). The contractor should make himself or his representative available at the time of joint inspection. The decision of the Engineer shall be final in the matter.

The contractor will be called upon to pay all the expenses incurred by the Railway in respect of any work found to be defective or of inferior quality, adulterated or otherwise unacceptable.

During the execution of the contract, samples may be taken for the purpose of test and/or analysis under the conditions laid down in specification, such samples to be prepared for testing and forwarded free of all cost to the Railway.

A logbook will be kept at the work site by the contractor. The inspecting officer of the Railway may in addition to oral instruction to the representative of the contractor at the work site, enter such instruction as he deems fit in this logbook. The contractor will be responsible to note necessary action and remedy the defects and ensure that the instructions either oral or written are complied with. His non-noting the logbook entries shall not be considered sufficient grounds for non-compliance of the instructions.

If required by railway, the contractor will attend divisional / HQ office to hold discussion with railway officials.

The installations shall comply with the requirements as per the following manuals/books (With latest correction slip): -

- Signal Engineering manual
- Engineering code
- P way manual
- General and subsidiary rules
- Schedule of dimension.

These books are available with engineer in charge for this work, which can be given on loan for reference.

22. APPROVAL & MEASUREMENT OF WORK

The contractor should ensure that measurement has been made for such work, which is not possible to measure subsequently, and shall remain hidden.

Back filling of the trench shall be done only after the inspection and written confirmation from the Railway representative.

The contractor shall maintain record of cable laid as per proforma Drawing CSTE/3644.

23. WARRANTY:

All the items supplied by the contractor as well as installation shall carry **warranty as per specification of each item / 12 calendar months** from the date of completion of work.

If any equipment supplied by the contractor gets faulty during the warranty period, it shall be replaced immediately by the contractor free of cost. For this, contractor must have sufficient quantity of equipments as spare for replacement during the warranty period.

The contractor will submit a time schedule to show his planning to execute the work.

24. DRAWING & DOCUMENTATION:

(i) As per RDSO/Manufacturer specification:- Contractor shall prepared required drawings /circuits as per RDSO / WR policy guideline.

(ii) Tentative drawing of ESP / SIP may be obtained from S&T divisional office of Bhavnagar.

25. Tender Condition will be as per latest GCC.

26. JPO for undertaking digging work in the vicinity of underground Signalling, Electrical & Telecommunication cables is attached.

27. OEM' Site Installation Certificate shall be filled in given format for system prior to commissioning

OEM's Site Installation Certificate

To

PCSTE - CCG

This is to certify that verification of system installation (detail given below) has been completed by undersigned (OEM representative) and all necessary arrangement meets the required standards of engineering for trouble free working of installed system.

1. System being commissioned :-
2. Station/Section:-
3. Division:-
4. Date of commissioning:-

Name of RDSO approved Original Equipment manufacturer:

Name of OEM representative with Designation:

Signature of OEM representative with Date:

Sr. DSTE-BVP

TECHNICAL SPECIFICATION OF RDPMS

A. Parameters to be monitored

Signalling Gear	Sensing Parameter	Nominal Value/ Status
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Point	Point machine current	Normal operation voltage (At Location) Reverse operation voltage (At Location)
	Point machine operating Voltage at point location	
	Potential free contacts	
DC Track circuit	Feed End	Charger Input Voltage
	Feed End current	Charger output current
	Feed End Voltage	Track feed end voltage
	Track feed charger input voltage	Track feed end current
	Track feed charger potential free contact	Track relay end current
	Relay end:	Track relay end voltage
	Relay end current	TPR (from Relay room)
	Relay end 24 V DC Busbar voltage	
IPS Battery Bank	Each cell voltage	Monitored all voltages
	Load current	
	Battery bank current	
	Battery Bank voltage	
Signal lamp	Current	Each Aspect Current (At Location) Correspondence of lighting of aspect shall be checked as per the condition of concerned DR/HR in relay room
	Voltage	
	Potential free contacts	
Cable insulation – by ELD	Potential free contact of ELD	UP / DOWN

Note: Range of voltage & current will be decided as per site requirement by Engg in charge.

B. Field IoT device for Point Machine & DC Track circuit:

The IoT device shall be software embedded system works on 24 V DC and will do the basic function of capturing the parameters from the point and dc track devices using the required sensors and transmit the data to a Gateway system at the station. Overall quantity of IoT devices shall be based on the point and dc track devices and their parameters to be monitored in each location box.

The IoT device should be capable of monitoring 6 currents (DC), 8 voltage, 16 nos. of potential free contacts and ambient temperature & humidity.

The data of each Signalling gear at the location shall be collected on real time basis by the IoT device.

The sensors used for measuring the currents shall be non-intrusive.

The IoT device should have input and output isolation for every analog voltage. Each Channel of IoT device should also have channel-channel isolation as well.

The IoT device in location boxes shall be able to communicate to the station gate way system by using Zigbee communication. There shall be also provision to interface voice modem / 4G modem in the IoT device for communicating with station gateway system. The necessary copper cables should be provided by the railways. Selection of mode of communication is depending up on the site condition. The IoT device should have local storage at the device to store events up to thousand.

The IoT device should have local LCD display to display the real time information of analog and digital parameters. Local LCD should also display the Time.

Parameters to be monitored:

Signalling Gears	Sensing Parameter
Point	Current
	Operating Voltage
	Potential free contact
DC Track circuit	Feed End:
	Current
	Voltage
	Track feed charger input voltage
	Track feed charger
	Potential free contact
	Relay End:
	Current
	24 V DC Busbar voltage

The IoT device shall have time synchronization with the station gateway. All the events generated at IoT shall be time stamped.

Parameter	Range / Type
Power supply	24V [Operating range:18V - 32V DC]
Capacity	6 DC Currents, 8 Voltage, 16 Nos. of potential free contacts, Ambient temperature & humidity. Monitors / sensing Six currents of point machines / DC track circuit / Track feed charger elements Monitors / sensing Six Voltages of point machines / DC track circuit / Track feed charger elements 16 relay contacts / potential free contacts Temperature & Humidity
Measurement Range	Currents: Point machine: 0-15A DC, DC track circuit: 0-1 A DC Voltages: 8 Chaneels: configurable of any 110V DC / 24V DC /10V DC/110V AC as per the site requirement.
Communication	Zigbee Provision to connect Voice Modem Provision to connect 4G/LTE
Data Transfer	IoT device should send (Push Type) the created events immediately without any request from the station gateway. Polling type data transfer should be avoided to minimize latency and delay.
Data storage	Latest 1000 records
Accuracy of measurement	Currents - 2% Voltages - 2% in the range of +/- 40% of nominal values
Sampling rate	Current: 20 m Sec Voltage: 20 m Sec
Data and command format	Data-logger System Specification no. IRS S 99/2006 / MQTT/ SNMP/ MODBUS/ OPC-UA
Time synchronization	With Station Gateway system
Dimensions:	IoT should not exceed maximum length = 300mm, Width = 300mm, Height = 100mm

C. Field IoT device for Signal

The IoT device shall be software embedded system works on 24 V DC and will do the basic function of capturing the parameters from the signals using the required sensors and transmit the data to a Gateway system at the station. Overall quantity of IoT devices shall be based on the signals and their parameters to be monitored.

The IoT device should be capable of monitoring 6 currents (AC), 8 voltage, 16 nos. of potential free contacts and ambient temperature & humidity.

The data of each signalling gear at the location shall be collected on real time basis by the IoT device. The sensors used for measuring the currents shall be non-intrusive.

The IoT device should have input and output isolation for every analog voltages. Each Channel of IoT device should also have channel-channel isolation as well.

The IoT device shall be able to communicate to the station gate way system by using Zigbee communication. There shall be also provision to interface voice modem / 4G modem in the IoT device for communicating with station gateway system. The necessary copper cables should be provided by the railways. Selection of mode of communication is depending up on the site condition.

The IoT device should have local storage at the device to store events up to thousand.

The IoT device should have local LCD display to display the real time information of analog and digital parameters. Local LCD should also display the Time.

Parameters to be monitored:

Signaling Gear	Sensing Parameter
Signal lamp	Current Operating Voltage Potential free contacts

The IoT device shall have time synchronization with the station gateway. All the events generated at IoT shall be time stamped.

Power Supply	24V [Operating range:18V - 32V DC]
Capacity	6 AC Currents, 8 Voltage, 16 Nos. of potential free contacts, Ambient temperature & humidity. Monitors / sensing Six currents of point machines / DC track circuit / Track feed charger elements Monitors / sensing Six Voltages of point machines / DC track circuit / Track feed charger elements 16 relay contacts / potential free contacts Temperature & Humidity
Measurement Range	Currents: Signal Current: 0-450 mA AC Voltages: 8 Channels: configurable of any 110V DC / 24V DC /10V DC/110V AC as per the site requirement.
Communication	Zigbee Provision to connect Voice Modem Provision to connect 4G/LTE
Data Transfer	IoT device should send (Push Type) the created events immediately without any request from the station gateway. Polling type data transfer should be avoided to minimize latency and delay.
Data Storage	Latest 1000 records
Accuracy of measurement	Currents - 2% Voltages - 2% in the range of +/- 40% of nominal values
Sampling rate	Current: 20mSec Voltage: 20mSec
Data and command format	Data-logger System Specification no. IRS S 99/2006 / MQTT/ SNMP/ MODBUS/ OPC-UA
Time synchronization	With Station Gateway system
Dimensions:	IoT should not exceed maximum length = 300mm, Width = 300mm, Height = 100mm

D. IoT device for IPS Battery Bank

IoT device in Battery room: The IoT device shall be software embedded system works on 24 V DC and will capture the parameters from each cell of Battery bank and transmit the data to station gateway system. The IoT device should be capable of monitoring two DC currents, 56 voltages and ambient Temperature & Humidity.

The data shall be collected on real time basis by the IoT device. The sensors used for measuring the currents shall be non-intrusive sensors. The IoT device in the Battery room shall be able to connect with the station gate way system through copper cable or shielded indoor cable.

Parameters measurement:

Signalling Gear	Sensing Parameter
Battery Bank	Each cell voltage Load current Battery bank current Battery Bank voltage

The IoT device shall have time synchronization with the station gateway. All the events generated at IoT shall be time stamped.

Hardware Specification

Parameter	Type / Range
Power supply	24V [Operating range:18V - 32V DC]
Capacity	55 Cell voltages & 1 Bank Voltage 2 Current channels
Measurement Range	Cell Voltage_ 0 - 3V DC, Bank Voltage_ 0-165V DC Current 0 - 50A DC
Communication	RS485 /Ethernet
Sensing	Current – by nonintrusive sensor Voltage sensing – I/O isolation and channel to channel isolation
Accuracy of measurement	2%
Sampling rate	1sec time out for scanning all channels
Data & command format	Data-logger System Specification no. IRS S 99/2006 / MQTT/ SNMP/ MODBUS/ OPC-UA
Time synchronization	With Station gateway system

- E. This system will be capable of collecting the data from various IoT devices which filters and pre-processes the signaling gears data. It should be rugged system and work 24 x 7 without any glitch.

The Station Gateway should be capable of collecting data from various IoT devices through Zigbee (wireless) or copper media, store and transfer the data to the central control room. The received data transfers to the Central processing system located in the Division head quarter through the existing Railway OFC / Infra. There should be a provision to transfer data to by station gate way to central control room through E1 channels and to central cloud through Edge computing device using IP based network. The station gate way system time should be synchronized with GPS.

Specification: Station Gateway

Parameter	Type / Range
Power supply	24V [Operating range:18V - 32V DC]
Communication Ports	Provision for E1/RS 485/ Ethernet / Voice Modem to connect to the IoT devices RS232 Ports – 2 Nos Zigbee Ports – 2 Nos
Data & command format	Data-logger System Specification no. IRS S 99/2006 / MQTT/ SNMP/ MODBUS/ OPC-UA

F. Edge Computing device at station

The Edge computing device (Industrial grade 24x7 operation) will process the received data and generate the basic level faults diagnostics with some predefined failure models. Primary level information will be sent to the cloud. The specification is furnished below.

Specification: Edge Computing Device

Processor	Quad Core, 2.00 GHz or higher
RAM	8 GB
Storage	512 GB SSD
Serial Ports	2
Ethernet Port	2
USB Port	3
Operating System	Windows / Linux
Keyboard	Standard Keyboard (104 Keys)
Mouse	Scroll Mouse
Monitor	21.5" LED Monitor
UPS	1 hr backup
Make	ICTS or Nexcom or similar

G. Central processing and storage equipment at Divisional HQ:-

The Central place system at divisional HQ receives the data from the station gateways. At divisional HQ there shall be an interface unit to receive the data from the station gateways through E1 channels / Ethernet over VLAN. Central processing system processes the data and transfers to the central storage server. Server plays vital role in making the data available for multiple agencies simultaneously. Old data is stored in it for analysis.

Data can be accessed by the users through Firewall (to be provided by Railways).
The central processing and storage equipment time should be synchronized with GPS

A. Central Processing System:

Processor: Intel® Core™ i7 or higher

RAM: 16 GB

Memory: 1TB HDD

Display Ports: 2 Nos

Serial Ports: 2 Nos

Network: Dual ports of Gigabit Ethernet

Drive: DVD writer (optical)

Keyboard: Standard

Keyboard (104 Keys)

Mouse: Scroll Mouse

Monitor: 21.5" LED Monitor

Speakers: 2 No's (1 set)

Operating System: Window or Linux

Antivirus: Kaspersky antivirus (Licensed version) or Equivalent as applicable

System Make: HP/DELL or similar

UPS: 1KVA offline with 1 hours back up

B. Central Storage Server:

Intel Xeon E5 series, 2.6 GHz or Higher

16GB RDIMM, 2400MT/s, Dual Rank

4* 600GB 15K RPM SAS 2.5in Hot-plug Hard Drive

DVD+/-RW, SATA

PERC H730 RAID Controller, 1GB Cache

Dual, Hot-plug, Redundant Power Supply (1+1), 1100W
 Dual port Gigabit Ethernet
 Redundant Power Supply
 USB Keyboard
 USB Mouse
 Windows Server 2012 standard edition 64bit or Latest or Linux based
 Oracle 19c database software for 10 users or Equivalent database
 21.5" LED Monitor
 Kaspersky antivirus (Licensed version) or Equivalent as applicable
 Dell/HP/IBM or similar
 UPS: 1 KVA offline with one hour back up

H. Maintenance Monitoring System

Maintenance monitoring system disseminates the generated alarms to field staff. Which is also for viewing events, alarms, reports, online & offline simulation.

Processor: Intel® Core™ i7 or similar
 RAM: 16 GB
 Memory: 1TB HDD
 Display Ports: 2 Nos
 Serial Ports: 2 Nos
 Network: Dual ports of Gigabit Ethernet
 Drive: DVD writer (optical)
 Keyboard: Standard Keyboard (104 Keys)
 Mouse: Scroll Mouse
 Monitor: 21.5" LED Monitor
 Speakers: 2 No's (1 set)
 Operating System: Window or Linux
 Antivirus: Kaspersky antivirus (Licensed version) or Equivalent as applicable
 System Make: HP/DELL or similar
 UPS: 1KV offline with 30mins back up

I. Remote diagnostic and Predictive maintenance software

Central Application Software:

- It shall be able to collect and visualize data from various IoT devices / RTU / Data Loggers through Station Gateway
- The central software should support various protocols like MQTT, SNMP2, MODBUS or RDSO Datalogger protocol IRS :99 /2006
- Database: There shall be standard Database to store all the data securely. The database query shall not take long time to load the history data
- Backup and Archival of Data: There shall be provision to take backup or archive data for 1 years • Real Time Visualization: There shall be possible to draw the real time graph of various parameters like voltages, current, etc
- Simulation: It shall be possible to show the real time yard simulation along with the status of signalling assets in real time.
- User Management: There shall be possible to manage the user for accessing the software. There shall be possible to basic details of user like name, email, address, mobile, etc. Accessibility Management shall be there.
- The necessary software will be provided for crunching and correlating the data and providing necessary reports & generating fault alarms. Notifications to the designated persons as per hierarchy basis.
- There shall be an interface to send the Alarms/ Failures/ Warnings to the maintenance staff through Mobile App and SMS.

- Reporting: There shall be various reporting option available for all the data. Reports can be exported to Excel, csv
- Auto Mailing: There shall be auto/scheduled message system to send reports of day/week/month to a configured mail id.

Following Typical alarms shall be generated by the software

i) Point machine

Point failure A/ Bend (Cause not known)
 Point loose packing
 Point Sluggish Operation
 Point Emergency operation
 Point failed–point machine not operated
 Point failed–Point obstructed
 Point failed–Point machines correctly operated-Detection failed
 Point failed–Point operation(110VDC) circuit leakage
 Point failed–Point detection(24VDC) Circuit leakage
 Point failed–Point operation(110VDC) voltage low
 Point failed–Point detection(24VDC) Voltage low
 Point likely to fail–Point operation voltage low
 Point likely to fail –Point detection Voltage low

ii)DC Track Circuit

Relay end current beyond set limits
 Feed end current beyond limits
 Leakage current more than set limit
 Feed end voltage less than set limits
 110V AC supply failed for more than set limits
 110V AC voltage less than set limits
 24VDCvoltagelessthansetlimits

iii) Signal Aspect

Signal lamp not lit when control relay is up
 Signal lamp not lit when control relay is up –low EXT24VDC
 Signal lamp not lit when control relay is up –low110VAC
 Signal lamp not lit when control relay is up –leakage EXT24VDC
 Signal lamp not lit when control relay is up-leakage 110VAC
 Signal bobbing
 Signal blank
 Signal flying back to danger–even when control relay is UP
 Current drawn by signal lamp is beyond limit
 Signal lamp not drawing current but lamp checking relay picked up
 Signal in off aspect after train passing the signal
 Signal changed from red to yellow when conditions are not favourable [HR down]
 Signal changed to double yellow when conditions are not favourable [HHR down]
 Signal aspect changed to green when conditions are not favourable [DR down]
 Signal assumed green when route lamp is lit.

NOTE: All other requirements as per RDSO specifications & site requirements and as per SIP for RDPMS.

Sr. DSTE-BVP