MAHARASHTRA METRO RAIL CORPORATION LIMITED
(Nagpur Metro Rail Project)

Dt.18.07.2019

Corrigendum-II

NAME OF WORK: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBERS ELEVATED METRO STATIONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDING VIADUCT IN REACH-2. OF NAGPUR METRO RAIL PROJECT.

Tender No: N1C-39/2019 DT: 05/07/2019, Portal No.189

S.No	Tender Document	Replace as
1	Part-4 Financial Bid & Bill of Quantities: ABSTRACT OF AMOUNT FOR ALL SCHEDULES	Part-4 Financial Bid & Bill of Quantities: Refer REVISED ABSTRACT OF AMOUNT FOR ALL SCHEDULES
2	Part-4 Financial Bid & Bill of Quantities: - Schedule-F, E and M work (Electrical, Fire Fighting and Fire alarm System, HVAC System	Part-4 Financial Bid & Bill of Quantities: - Refer Revised Schedule-F, E and M work (Electrical, Fire Fighting and Fire alarm System, HVAC System

MAHARASHTRA METRO RAIL CORPORATION LIMITED NAGPUR METRO

ED/Procurement
Maha-Metro

Name of the work: Construction of balance work of Seven numbers Elevated Metro Stations (Automotive square, Nari road, Indora Chowk, Kadvi Chowk, Gaddi Godam Station, Kasturchand Park and Zero mile) including E&M works and PD area balance works excluding viaduct in Reach-2 of Nagpur Metro Rail Project.

REVISED ABSTRACT OF AMOUNT FOR ALL SCHEDULES
Tender No.N1C-39/2019

Item	Description	Description of Schedule	Estimated Amount (Rs.)	Percentage Above/Below/At Par	Amount in Indian Rs.(INR)
SCHEDULE- A to G					
1	SCHEDULE- A	General Works of Stations	165,12,059		
2	SCHEDULE- C	Structural Works of Stations	6727,06,473		
3	SCHEDULE- C1	Structural Works of Stations NDSR items	73,14,985		
4	SCHEDULE- D	NDSR items for the Architectural Finishing Works, Parking works, Site development works etc and other Miscellaneous work	3678,91,083		
5	SCHEDULE-D1	Architectural & Site Development Works	2167,00,953		
6	SCHEDULE- E	Item for the Architectural Finishing Works, Parking works, Site development works, etc and other Miscellaneous work	212,16,397		
7	SCHEDULE- F	E and M work (Electrical, fire fighting with fire alarm system, HVAC system)	8069,11,950		
8	SCHEDULE- F1	Public Health Engineering	451,19,649		
9	SCHEDULE- G	DSR-2018 items (with latest amendment / Directives to the DSR-2018). The contractor has to carryout the works as per DSR-2018 varrious clauses,chapters and schedules covered in the DSR-2018.	975,00,000		
GRAND TOTAL (Rs.)			**22518,73,548**		
Amount in Words:					

Note: The financial rate quoted by the bidder in which BOQ for Schedule "A" to "G" should be brought forward and mentioned in this summary sheet along with grand Total.

MAHA-METRO

Signature and Seal of Bidder

Name of the Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

Tender No.N1C-39/2019

REVISED SUMMARY OF SCHEDULE-F

ELECTRICAL,FIRE FIGHTING AND HVAC

Reach-2 Stations, Kasturchand Park PD, Gaddigodam PD & Zero Mile Station

Sl No	Section	Station	System	Description	Amount
1	E.01	R2,KCP PD & GGS PD	ELECTRICAL	LV Switchgear -E.01	1468,52,064.41
2	E.02	R2,KCP PD & GGS PD		Distribution Boards - E.02	95,94,548.20
3	E.03	R2,KCP PD & GGS PD		LV Power & Control Cables,Cable Trays And Steel Works- E.03	864,69,337.64
4	E.04	R2,KCP PD & GGS PD		Internal Wiring & Accessories - E.04	237,63,498.68
5	E.05	R2,KCP PD & GGS PD		Indoor Lighting And Fans - E.05	332,91,689.10
6	E.06	R2,KCP PD & GGS PD		Protective Earthing - E.06	199,75,520.40
7	E.07	R2,KCP PD & GGS PD		Lightning Protection - E.07	57,75,479.00
8	E.08	R2,KCP PD & GGS PD		External Lighting - E.08	720,89,326.00
9	E.09	R2,KCP PD & GGS PD		Uninturrupted Power Supply System - E.09	59,47,200.00
10	E.10	R2,KCP PD & GGS PD		Safety and Other accessories - E.10	4,72,000.00
11	E.11	R2,KCP PD & GGS PD		BMS/SCADA for all system parameter of the panel - E.11	424,80,000.00
12	E.12	R2,KCP PD & GGS PD		Via Duct Lighting - E.12	0.00
13	E.13	R2,KCP PD & GGS PD		Mandatary Operational Spares for the Panels And safety items - E.13	28,32,000.00
14	E.14	R2,KCP PD & GGS PD		Lighting Control System - E.14	163,84,717.72
15	F.01	R2,KCP PD & GGS PD	FIRE FIGHTING & FIRE ALARM	Fire Hydrant System - F.01	552,76,361.62
16	F.02	R2,KCP PD & GGS PD		Portable Fire Extinguishers - F.02	38,95,892.68
17	F.03	R2,KCP PD & GGS PD		Panel Flooding - CO2 Gas Based Fire Trace Tube System - F.03	113,28,000.00
18	F.04	R2,KCP PD & GGS PD		Fire Alarm And Detection System - F.04	157,10,070.21
19	H1	R2	HVAC	VRV Airconditioning System - H.01	340,07,489.25
20	H2	R2		Ventilation System - H.02	93,668.40
21	H3	R2		Air Distribution System - H.03	1,43,400.60
22	ZE.01	ZERO MILE STATION	ELECTRICAL	LV Switchboards - ZE.01	289,79,081.02
23	ZE.02			Distribution Boards - ZE.02	16,95,929.66
24	ZE.03			MV Cabling, Busduct And Tray - ZE.03	357,57,689.72
25	ZE.04			Internal Wiring & Accessories - ZE.04	140,85,888.05
26	ZE.05			Lighting Fixtures And Fans - ZE.05	158,57,938.62
27	ZE.06			Protective Earthing - ZE.06	25,41,100.00
28	ZE.07			Lightning Protection - ZE.07	12,83,665.20
29	ZE.08			External Lighting - ZE.08	29,14,180.00
30	ZE.09			Uninturrupted Power Supply System - ZE.09	24,88,136.00
31	ZE.10			Diesel Generator - ZE.10	38,01,570.00
32	ZE.11			BMS/SCADA for all system parameter of the panel - ZE.11	53,10,000.00
33	ZE.12			Safety and Other accessories - ZE.12	59,000.00
34	ZE.13			Mandatary Operational Spares for the Panels And safety items - ZE.13	3,54,000.00
35	ZE.14			Facade Lighting - ZE.14	321,91,384.00
36	ZF.01		FIRE FIGHTING & FIRE ALARM	Fire Hydrant System - ZF01	183,02,804.44
37	ZF.02			Fire Detection System- ZF.02	87,17,134.47
38	KA	KCP PD	HVAC	HVAC Equipment - KA	58,63,768.00
39	KB			Air Distribution - KB	45,98,065.00
40	KC			Thermal Insulation - KC	1,57,500.00
41	KD			Electrical Installation - KD	7,05,480.00
42	GA	GGS PD	HVAC	HVAC Equipment - GA	40,00,573.00
43	GB			Air Distribution - GB	28,35,780.00
44	GC			Thermal Insulation - GC	2,36,250.00
45	GD			Electrical Installation - GD	5,37,688.00
46	ZA	ZERO MILE	HVAC	HVAC Equipment & Piping - ZA	181,65,818.82
47	ZB			Air Distribution - ZB	70,66,985.00
48	ZC			Thermal Insulation - ZC	7,13,876.92
49	ZD			Electrical Installation - ZD	13,08,400.00
				Total for E&M (E+F+H)	**8069,11,950**
				Grand total of Schedule F	**80,69,11,950**

MAHA-METRO

Signature and Seal of Bidder

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
E	**General Notes for Electrical Works**													
1	The BOQ specified below include the latest relevent standards, specifications, **drawings (In conjuction with relevant Station drawings)** and the contractor is required to go through them as referred in tender document while quoting the rates. All the samples/ material intended to be used in the works shall be subject to approval before use as the Employer's representative may opt.													
2	The description as mentioned in BOQ, specifications, special conditions, GCC drawing and the conditions mentioned therein whichever is stringent shall be applicable, acceptable and complied with.													
3	Sub-letting of work by the contractor shall only be permitted in accordance with Special Conditions of Contract.													
4	The items indicating zero quantity can also be operated and variation clause shall be applicable as stipulated in GCC / SCC.													
5	Bus Bar Sizing calculations shall be submitted for approval of Employer or his representative.													
6	Contractor's shall quote resonably rates against each item of BOQ (both in word and figure)													
7	Auto,manual,bypass ,remote, local selector switch and interlocking arrangement shall be provided for the Panel boards wherever required.													
E.01	**L V SWITCHGEAR**													
E1.1	**Switch Boards/panels**													
	Supply, installation, testing & commissioning of front operated front access cubical type indoor duty floor / wall / recess/ surface mounting, totally enclosed dust and vermin proof (minimum protection IP 54) panels with neoprene gaskets, fabricated from 2 mm thick CRCA sheets with dip coat priming and epoxi powder coated finish (minimum thickness 50 micron) suitable for 415 volts 3 phase 4 wire 50 Hz system to withstand symmetrical fault level of 50 KA at 415 V including interconnections, bonding to earth etc. and flush doors conforming to relevant IEC/IS (viz. IEC 60439, IS 8623 etc.) standard including the earth leakage protection complete as per specification & drawings as required and as given below. All internal wiring in the panels shall be carried out using high temperature FRLS wires.													
a)	The Switchboards shall be provided with detachable gland plates for entry of cables from the top/bottom as required.													
b)	All live accessible parts shall be shrouded and all equipment shall be finger touch proof. The busbars shall be insulated with heat shrinkable sleeves. SMC/DMC shrouds and busbar supports suitably spaced shall be used. Hinged doors with padlocking facility shall be provided on all outgoing feeders with switch handles lockable in OFF position.													
c)	The panel shall have tinned copper busbars with bar type feeder connections, spacers etc.and neutral busbar shall be of 50% capacity for busbar of above 200A rating and 100% otherwise.													
d)	Earthing all components, frame etc. to a common internal earth bar of minimum size 50 x 6 mm Copper .													
e)	All accessories & supporting structures such as channels, ISMC base frame, mounting brackets, lifting lugs, panel heaters, ventilation arrangement etc as required.													
f)	Each incomer and outgoing feeder shall be provided with multiple LED/neon type status indication lamps suitable for 230 V, AC as approved.													
g)	Space provision @ 15% for future expansion													
h)	The makes of components and accessories shall, to the extent practically feasible, be same for panels and boards for uniformity, standardisation and replaceability and shall be applicable to all panels/ boards under the scope of work.													
i)	Switchboard including interconnections, labeling, earthing,associated foundation / masonary work & erection etc. complete as required.													
j)	All MCCBs shall be current limiting type microprocessor based, rated for requisite specified Service short circuit breaking capacity (Ics suitable for isolation conforming to latest IEC947-2/IS13947-2 duly marked on MCCB, at operating voltage (Ue) of 415 V, insulation voltage (Ui) 750 V and with trip free mechanism, handle indicating ON/OFF/tripped position. The breaking capacity as mentioned shall be Ics values.													
k)	MCCBs shall be compact (As the Engineer may decide), suitably designed to provide protection of motors, cables, busbars to suit rated current, unbalanced power distribution as required and with front adjustable overload and short circuit releases and minimum electrical endurance of the order of 7000-8000 operation cycles (higher shall be preferred) for capacity of 100-250 amps.													
l)	All the MCCBs shall be provided with potential free contacts for connectivity to PLC in ESR/Pump Room for ON/OFF status and control, as required, from BMS workstation.													

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
m)	MCBs shall conform to IEC898/IS 8828 (latest) and, with breaking capacity 9/10 kA at 415 V AC, current limiting type lower powerloss appx 40 -70% of the stipulated value and suitable for magnetic releases operating between 3 to 5 times rated current for normal power distribution application and 5 to 10 times rated current for moter application duty, with minimum Electrical endurance of the order of 20000 operation cycles.													
n)	Panel/board design shall be compact and components / accessories of compact sizes be used to economies the room space available. Employer reserve the right to seek compact items inplace of larger ones													
o)	All incomer ACB's shall be provided with minimum 2 NO + 2 NC auxiliary contacts and all MCCBs shall be provided with 2 NO+ 2NC auxiliary contacts, and there should be provision to add min. 6 Auxlary contacts.													
p)	All 4-pole ACBs shall have fully rated neutral pole													
q)	The panels shall be fitted with fire trace tube system. Payment for fire trace tube system shall be made under separate item. Scheme of fire trace tube system shall be got approved by Engineer before proceeding with manufacturing and assembly.													
r)	Various panels/boards as given below:													
1.1	**Main Distribution Board (MDB1 and MDB 2)**													
	Main Distribution Board (MDB)as per specifications & as per following details:	Nos	1	1	1	1	1	1				6	2066220.12	12397320.72
A	TRANSFORMER - I INCOMING													
	1 no. 800 A, 415V, 50kA, 4P draw out Electrically operated ACB complete with:													
a)	1- set Red/Green ON/OFF indicating lamps													
b)	1- set of three phase (red, yellow, blue) indicating lamps													
c)	Amber healthy trip indicating lamps													
d)	3 nos. cast resin current transformers of 1000/5 ratio with 15 VA Burden & Class 5P10 for protection and metering													
e)	3 nos. cast resin current transformers of 1000/5 ratio with 15VA burden and Class 1.0 for measurement													
f)	Microprocessor based release having variable range of overcurrent, short circuit and earth fault protection with time log facility for each of the fault for achieving discrimination along with distinct fault indication through LED's.													
g)	230V AC or 24 V DC shunt trip coil													
h)	230V, AC Motor wound spring closing mechanism													
i)	Terminals to receive aluminium XLPE armoured cables													
j)	RS-485 port for display of ON/OFF status of ACB on BMS workstation through MODBUS protocol													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
B	TRANSFORMER - II INCOMING													
	1 no. 800 A, 415V, 50kA, 4P draw out Electrically operated ACB complete with:													
a)	1- set Red/Green ON/OFF indicating lamps													
b)	1- set of three phase (red, yellow, blue) indicating lamps													
c)	Amber healthy trip indicating lamps													
d)	3 nos. cast resin current transformers of 1000/5 ratio with 15 VA Burden & Class 5P10 for protection													
e)	3 nos. cast resin current transformers of 1000/5 ratio with 15VA burden and Class 1.0 for measurement													
f)	Microprocessor based release having variable range of overcurrent, short circuit and earth fault protection with time lag facility for each of the fault for achieving discrimination along with distinct fault indication through LED's.													
g)	230V AC or 24 V DC shunt trip coil													
h)	230V, AC Motor wound spring closing mechanism													
i)	Terminals to receive aluminium XLPE armoured cables													
j)	RS-485 port for display of ON/OFF status of ACB on BMS workstation through MODBUS protocol													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.BMS interface terminal shall be separate													
	Auto,manual,bypass ,remote and local selector switch and interlocking arrangement													
C	**BUS COUPLER**													
	1 no. 800 A, 415V, 50kA, 4P draw out Electrically operated ACB complete with:													
a)	1- set Red/Green ON/OFF indicating lamps													
b)	1- set of three phase (red, yellow, blue) indicating lamps													
c)	Amber healthy trip indicating lamps													
d)	RS-485 port for display of ON/OFF status of ACB on BMS workstation through MODBUS protocol.													
D	**BUSBAR**													
a)	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 800 A having a maximum current density of 1.2 A per sqmm suitable to with stand symmetrical fault level of 50 kA. at 415 V with necessary high temp PVC sleeving. The neutral busbar shall be of 50% capacity.													
b)	Two incomers & Bus coupler shall be electrically & mechanically interlocked such that only two breakers shall be switched ON at a time.													
E	**Metering**													
a)	2 sets (4 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Volt meter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size summation CTs connections as required for both incoming feeders.													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
b)	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size summating CTs for above two incomer metering supporting SCADA/BMS connectivity													
F	**MDB1 OUTGOINGS (TYPE 1)**													
a)	2 no. 125 A, 415V, Ics = 50 kA, TP MCCB's with variable overcurrent and short circuit releases, UVR & shunt trip each having 1 set of 3nos. phase indicating lamps (red, yellow, blue) & with heavy duty solid neutral link.													
b)	4 no. 63 A, 415V, Ics= 35 kA, TP MCCB's with variable overcurrent and short circuit releases, UVR & shunt trip each having 1 set of 3nos. phase indicating lamps (red, yellow, blue) & with heavy duty solid neutral link.													
c)	3 no. 200 A, 415V, Ics= 35 kA, TP MCCB's with variable overcurrent and short circuit releases, UVR & shunt trip each having 1 set of 3nos. phase indicating lamps (red, yellow, blue) & with heavy duty solid neutral link.													
d)	1 no. 100 A, 415V, Ics=35 kA, TP MCCB's and with variable overcurrent and short circuit releases, UVR & shunt trip each having 1 set of 3nos. phase indicating lamps (red, yellow, blue) & with heavy duty solid neutral link.													
G	**MDB1 OUTGOINGS (TYPE 2)**													
a)	3 no. 125 A, 415V, Ics = 50 kA, TP MCCB's with variable overcurrent and short circuit releases, UVR & shunt trip each having 1 set of 3nos. phase indicating lamps (red, yellow, blue) & with heavy duty solid neutral link.													
b)	3 no. 63 A, 415V, Ics= 35 kA, TP MCCB's with variable overcurrent and short circuit releases, UVR & shunt trip each having 1 set of 3nos. phase indicating lamps (red, yellow, blue) & with heavy duty solid neutral link.													
c)	1 no. 400 A, 415V, Ics = 50 kA, TP MCCB's with variable overcurrent and short circuit releases, UVR & shunt trip each having 1 set of 3nos. phase indicating lamps (red, yellow, blue) & with heavy duty solid neutral link.													
H	**MDB2 OUTGOINGS**													
a)	1 no. 400 A, 415V, Ics = 50 kA, TP MCCB's with variable overcurrent and short circuit releases, UVR & shunt trip each having 1 set of 3nos. phase indicating lamps (red, yellow, blue) & with heavy duty solid neutral link.													
b)	2 no. 125 A, 415V, Ics= 35 kA, TP MCCB's with variable overcurrent and short circuit releases, UVR & shunt trip each having 1 set of 3nos. phase indicating lamps (red, yellow, blue) & with heavy duty solid neutral link.													
c)	1 no. 100 A, 415V, Ics= 35 kA, TP MCCB's with variable overcurrent and short circuit releases, UVR & shunt trip each having 1 set of 3nos. phase indicating lamps (red, yellow, blue) & with heavy duty solid neutral link.													
d)	2 no. 63 A, 415V, Ics=35 kA, TP MCCB's and with variable overcurrent and short circuit releases, UVR & shunt trip each having 1 set of 3nos. phase indicating lamps (red, yellow, blue) & with heavy duty solid neutral link.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.BMS interface terminal shall be separate													
1.2	**Capacitor Panel**													
	Capacitor Bank Panel (75kVAR) as per specifications & as per following details:	Nos	2	2	2	2	2	2				12	305218.80	3662625.60
A	**INCOMING**													
	INCOMER													
	Incoming from MDB with 125 A, 415V, Ics=50 kA, 4P,MCCB complete with variable overcurrent and short circuit releases													
	2 – set Red/Green ON/OFF indicating lamps													
	2 set of three phase indicating lamps (red, yellow, blue)													
	Amber healthy/ trip indicating lamps for above feeders U/V relay with shunt trip.													
	Direct Cable incoming													
a)	1 – set Red/Green ON/OFF indicating lamps													
b)	1 set of three phase indicating lamps (red, yellow, blue)													
c)	5-step automatic power factor correction relay to sense and monitor the system power factor and provide impulses for operation of 5 capacitor circuits with automatic switching over facility with manual override.													
B	**BUSBAR**													
a)	Electrolytic high conductivity copper three phase and neutral busbars rated at 160 A having a maximum current density of 1.2 A per sq mm suitable to with stand symmetrical fault level of 50 kA at 415 V. The neutral busbar is to be of 50% capacity.													
C	**OUTGOING UNITS**													
a)	2 nos. 100 A, 415V, 35 kA TP MCCB with fixed neutral and 100A, 3 pole Contactor for automatic switching of capacitor													
b)	3 nos. 63 A, 415V, 35 kA TP MCCB with fixed neutral and 63A, 3 pole Contactor for automatic switching of capacitor													
c)	2 nos. 25 kVAR, 415 V hermetically sealed metalised polypropylene capacitors in well ventilated enclosures complete as per specifications , application duty and as required													
d)	2 nos. 10 kVAR, 415 V hermetically sealed metalised polypropylene capacitors in well ventilated enclosures complete as per specifications , application duty and as required													
e)	1 nos. 5 kVAR, 415 V hermetically sealed metalised polypropylene capacitors in well ventilated enclosures complete as per specifications , application duty and as required													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.BMS interface terminal shall be separate													

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
1.3	**Essential Main distribution Board (EMDB) complete with automatic source transfer system as per specifications and as per following details**	Nos	1	1	1	1	1	1				6	1059205.76	6355234.56
	Automatic source transfer system suitable for the below													
A	INCOMER (Normal supply)													
a)	Incoming from MDB2 with 400 A, 415V, Ics=50 kA, 4P, motorised MCCB complete with variable overcurrent and short circuit releases for Normal supply													
b)	2 – set Red/Green ON/OFF indicating lamps													
c)	2 set of three phase indicating lamps (red, yellow, blue)													
d)	Amber healthy/ trip indicating lamps for above feeders U/V relay with shunt trip.													
B	**INCOMING FROM DG PANEL**													
	1 nos. 400 A, 415V, Ics= 50 kA, 4P, motorised MCCBs complete with variable overcurrent and short circuit releases													
a)	1- set Red/Green ON/OFF indicating lamps													
b)	1- set of three phase indicating lamps (red, yellow, blue)													
c)	Amber healthy trip indicating lamps for above feeders													
C	**BUSBAR**													
a)	Electrolytic high conductivity copper three phase and neutral busbars rated at 400 A having a maximum current density of 1.2 A per sq mm suitable to with stand symmetrical fault level of 50 kA at 415 V. The neutral busbar is to be of 50% capacity.													
b)	All incomers shall be interlocked electrically & mechanically with automatic source transfer system so that only one supply is switched on at a time and fail safe restoration.													
D	**Metering**													
a)	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size summating CTs for above two incomer metering supporting SCADA/BMS connectivity													
E	**OUTGOING UNITS**													
a)	1 no. 200A, 415V, Ics=35 kA, TP MCCB's with fixed neutral and with variable overcurrent and short circuit releases, UVR & shunt trip having indication lamps to give status													
b)	3 nos. 100A, 415V, Ics=35 kA, TP MCCB's with fixed neutral and with variable overcurrent and short circuit releases, UVR & shunt trip each having indication lamps to give status													
c)	5 nos. 63A, 415V, Ics=35 kA, TP MCCB's with fixed neutral and with variable overcurrent and short circuit releases UVR & shunt trip each having indication lamps to give status													
d)	9 no. 32A, 415V, Ics=35 kA, TP MCCB's with fixed neutral and with variable overcurrent and short circuit releases UVR & shunt trip each having indication lamps to give status													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
1.4	**Main lighting panel (MLP) complete as per specifications and as per following details:**	Nos	1	1	1	1	1	1				6	331074.96	1986449.76
A	**INCOMER**													
	1 no. 63A, 415V, Ics=35 kA, TP motorised MCCB with fixed neutral and with variable overcurrent and short circuit releases, UVR & shunt trip having indication lamps to give status													
a)	1- set Red/Green ON/OFF indicating lamps													
b)	1- set of three phase indicating lamps (red, yellow, blue)													
B	**BUSBAR**													
a)	Electrolytic high conductivity copper three phase and neutral busbars rated at 63 A having a maximum current density of 1.4 A per sq mm suitable to with stand symmetrical fault level of 35kA at 415 V. The neutral busbar is to be of same size as phases.													
C	**OUTGOING**													
	8 no. 32A, 415V, Ics=35 kA, TP MCCB's with fixed neutral and with variable overcurrent and short circuit releases UVR & shunt trip each having indicationlamps to give status													
D	**Metering**													
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size summating CTs for above two incomer metering supporting SCADA/BMS connectivity													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
1.5	**Emergency lighting panel (EMLP) as per specifications and as per following details:**	Nos	1	1	1	1	1	1				6	243973.26	1463839.56
A	**INCOMER**													
	1 no. 63A, 415V, Ics=25 kA, TP motorised MCCB with fixed neutral and with variable overcurrent and short circuit releases, UVR & shunt trip having indication lamps to give status													
a)	1- set Red/Green ON/OFF indicating lamps													
b)	1- set of three White phase indicating lamps													
B	**BUSBAR**													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
a)	Electrolytic high conductivity copper three phase and neutral busbars rated at 63A having a maximum current density of 1.4 A per sq mm suitable to with stand symmetrical fault level of 25kA at 415 V. The neutral busbar is to be of same size as phases.													
C	**OUTGOING**													
a)	6 nos. 32A, 415V, Ics=35 kA, TP MCCB's with fixed neutral and with variable overcurrent and short circuit releases UVR & shunt trip each having indication lamps to give status.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
1.6	**Power Panel as per specifications and as per following details:**	Nos	1	1	1	1	1	1				6	496860.24	2981161.44
A	**INCOMER**													
	1 no. 125A, 415V, Ics=35 kA, TP motorised MCCB with fixed neutral and with variable overcurrent and short circuit releases, UVR & shunt trip having indication lamps to give status													
a)	1- set Red/Green ON/OFF indicating lamps													
b)	1- set of three White phase indicating lamps													
B	**BUSBAR**													
	Electrolytic high conductivity copper three phase and neutral busbars rated at 125 A having a maximum current density of 1.4 A per sq mm suitable to with stand symmetrical fault level of 35kA at 415 V. The neutral busbar is to be of same size as phases.													
C	**OUTGOING**													
	1 nos. 63A, 415V, Ics=35 kA, TP MCCB's with fixed neutral and with variable overcurrent and short circuit releases, UVR & shunt trip each having indication lamps to give status													
	7 nos. 32A, 415V, Ics=35 kA, TP MCCB's with fixed neutral and with variable overcurrent and short circuit releases, UVR & shunt trip each having indication lamps to give status													
D	**Metering**													
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps, Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
1.7	**Water pump Panel (WPP) as per specifications and as per following details**	Nos	1	1	1	1	1	1				6	504163.26	3024979.56
	Internal wiring in the Starters shall be done with FRLS PVC insulated cables of adequate size. Internal wiring, contactors, relay contacts, push button contacts should be rated not less than 2.5 Sqmm.													
A	**INCOMER**													
a)	1 no. 63 A ,415V, Ics=35 KA , TP MCCB with variable over current and short circuit releases													
b)	1- set Red/Green ON/OFF indicating lamps													
c)	1- set of three phase indicating lamps (red, yellow, blue)													
B	**BUSBAR**													
	Electrolytic high conductivity copper three phase and neutral busbars rated at 63 A having a maximum current density of 1.4 A per sq mm suitable to with stand symmetrical fault level of 35kA. at 415 V. The neutral busbar is to be of same size as phases.													
C	**OUTGOING**													
a)	2 Nos. 32A, Ics = 35 KA, 415V, TP MCCB each with the following :													
a1)	2 nos. 7.5 HP/ 5.6 KW, Star Delta starter comprising 3 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.													
a2)	1 – set Red/Green ON/OFF indicating lamps													
a3)	1 – set start stop push buttons.													
a4)	Auto / Manual selector switch.													
a5)	Amber healthy trip indicating lamps													
a6)	AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCB, suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													
b)	6 Nos. 32A, Ics = 10KA, 415V, TP MCB each with following													
b1)	6 nos. 5.0 HP/ 3.75 KW, Star Delta starter comprising 3 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.													
b2)	1 - set Red / Green ON/OFF indicating lamp													
b3)	1 - set start / stop push buttons													
b4)	Auto / Manual selector switch.													
b5)	Amber healthy trip indicating lamps													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
b6)	AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCB,suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													
c)	2 Nos. 32A, Ics = 35KA, 230V, DP MCB each with following													
c1)	1 nos. 20 HP / 15 kW pump DOL starter with bimetallic over current relay with potential free contacts for remote monitoring and control.													
c2)	1 – set Red/Green ON/OFF indicating lamps													
c3)	1 – set start stop push buttons.													
c4)	Auto / Manual selector switch.													
c5)	Amber healthy trip indicating lamps													
c6)	AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCB,suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													
D	**Metering**													
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity													
E.	Presettable switching timer set for each pump													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
1.8	**Fire Pump Panel**													
	Fire pump panel (FPP) Type 1 as per specifications as per following details complete with automatic source changeover facility.	Nos	1	1	1	1	1	1				6	530467.82	3182806.92
	Internal wiring in the Starters shall be done with FRLS PVC insulated cables of adequate size. Internal wiring, contactors, relay contacts, push button contacts should be rated not less than 2.5 Sqmm.													
A	**INCOMER - I from EMDB (EMERGENCY supply)**													
	1 no. 200 A, 415 V, Ics=35kA, 4P, motorised MCCB with variable over current and short circuit releases having:													
a)	1- set Red/Green ON/OFF indicating lamps													
b)	1- set of three phase indicating lamps (red, yellow, blue)													
c)	Amber trip indicating lamps													
B	**INCOMER -II from DG set**													
	1 no. 200 A, 415 V, Ics=35 kA, 4P, motorised MCCB with variable over current and short circuit releases having:													
a)	1- set Red/Green ON/OFF indicating lamps													
b)	1- set of three phase indicating lamps (red, yellow, blue)													
c)	Amber trip indicating lamps													
C	**BUSBAR**													
a)	Electrolytic high conductivity copper three phase and neutral busbars rated at 200 A having a maximum current density of 1.4 A per sq mm suitable to with stand symmetrical fault level of 35kA at 415 V. The neutral busbar is to be of capacity as phases													
b)	Two incomers shall be interlocked electrically & mechanically with automatic source transfer system so that only one supply is switched on at a time.													
D	**OUTGOING**													
a)	1 no. 200 A, Ics=35 kA, 415 V, TP MCCB with fixed neutral and with variable overcurrent and short circuit releases													
a1)	1 no. 100 HP/74.50 KW, **Star Delta starter** comprising 1 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.													
a2)	1 – set Red/Green ON/OFF indicating lamps													
a3)	1 – set start stop push buttons.													
a4)	Auto / Manual selector switch.													
a5)	Amber healthy trip indicating lamps													
a6)	AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCB, suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													
b)	1 no. 32 A, Ics=35 kA, 415 V, TP MCCB with fixed neutral and with variable overcurrent and short circuit releases													
b1)	1 nos. 7.5 HP/5.6, **Star Delta starter** comprising 2 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.													
b2)	1 – set Red/Green ON/OFF indicating lamps													
b3)	1 – set start stop push buttons.													
b4)	Auto / Manual selector switch.													
b5)	1 no. of AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs, connections as required for incoming feeder and suitable selector for measuring other circuit current.													
E	**Metering**													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size summating CTs for above two incomer metering supporting SCADA/BMS connectivity													
F	Auxiliary relay shall be provided which shall be activated by pressure switch for remote monitoring.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
1.9	**Escalator Power Panel as per specifications & Drawing and as per following details:Type-1**	Nos	0	0	0	0	0	0				0	366031.28	0.00
A	**INCOMER**													
	1 nos. 160 A ,415V, Ics= 35 KA, TP motorised MCCB with variable over current and short circuit releases having:													
a)	1- set Red/Green ON/OFF indicating lamps													
b)	1- set of three phase indicating lamps (red, yellow, blue)													
B	**BUSBAR**													
	Electrolytic high conductivity copper three phase and neutral busbars rated at 160 A having a maximum current density of 1.4 A per sq mm suitable to with stand symmetrical fault level of 35kA at 415 V. The neutral busbar is to be of same capacity as phases.													
C	**OUTGOING**													
a)	5 nos. 40A Ics=35 kA, 415V, TP MCCB with fixed neutral and with variable overcurrent and short circuit releases each having indication lamps to give status													
b)	Space for providing variable KWHr meter with required CT's/PT's for each of the outgoing feeder with locking arrangement.													
D	**Metering**													
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
1.10	**Escalator Power Panel Type 2 as per specifications & Drawing and as per following details**	Nos	0	0	0	0	0	1				1	377600.00	377600.00
A	**INCOMER**													
	1 nos. 250 A ,415V, Ics= 35 KA, TP motorised MCCB with variable over current and short circuit releases having:													
a)	1- set Red/Green ON/OFF indicating lamps													
b)	1- set of three phase indicating lamps (red, yellow, blue)													
B	**BUSBAR**													
	Electrolytic high conductivity copper three phase and neutral busbars rated at 250 A having a maximum current density of 1.4 A per sq mm suitable to with stand symmetrical fault level of 35kA at 415 V. The neutral busbar is to be of same capacity as phases.													
C	**OUTGOING**													
a)	8 nos. 40A Ics=35 kA, 415V, TP MCCB with fixed neutral and with variable overcurrent and short circuit releases each having indication lamps to give status													
b)	Space for providing variable KWHr meter with required CT's/PT's for each of the outgoing feeder with locking arrangement.													
D	**Metering**													
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
1.11	**Escalator Power Panel Type 3 as per specifications & Drawing and as per following details**	Nos	1	1	1	1	1	0				5	528184.52	2640922.60
A	**INCOMER**													
	1 nos. 400 A ,415V, Ics= 35 KA, TP motorised MCCB with variable over current and short circuit releases having:													
a)	1- set Red/Green ON/OFF indicating lamps													
b)	1- set of three phase indicating lamps (red, yellow, blue)													
B	**BUSBAR**													
	Electrolytic high conductivity copper three phase and neutral busbars rated at 400 A having a maximum current density of 1.4 A													
C	**OUTGOING**													

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
a)	14 nos. 40 A Ics=35 kA, 415V, TP MCCB with fixed neutral and with variable overcurrent and short circuit releases each having indication lamps to give status													
b)	Space for providing variable KWHr meter with required CT's/PT's for each of the outgoing feeder with locking arrangement.													
D	**Metering**													
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
1.12	**UPS output Panel Type-1 as per specifications and as per following details:**	Nos	0	0	0	0	0	0	0	0		0	395781.44	0.00
A	**INCOMER**													
	1 no. 63A, 415V, Ics=25 kA, TP motorised MCCB with fixed neutral and with variable overcurrent and short circuit releases, UVR & shunt trip having indication lamps to give status													
a)	1- set Red/Green ON/OFF indicating lamps													
b)	1- set of three White phase indicating lamps													
B	**BUSBAR**													
	Electrolytic high conductivity copper three phase and neutral busbars rated at 63A having a maximum current density of 1.4 A per sq mm suitable to with stand symmetrical fault level of 25kA at 415 V. The neutral busbar is to be of same size as phases.													
C	**OUTGOING**													
a)	8 nos. 32A, 415V, Ics=35 kA, TP MCCB's with fixed neutral and with variable overcurrent and short circuit releases UVR & shunt trip each having indication lamps to give status.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
1.13	**UPS output Panel TYPE-2 as per specifications and as per following details:**	Set	1	1	1	1	1	1	1	1		8	203681.90	1629455.20
A	**INCOMER**													
	1 no. 100A Ics=25 kA, DP motorized MCCB with variable overcurrent and short circuit releases, UVR & shunt trip having indication lamps													
a)	1- set Red/Green ON/OFF indicating lamps													
b)	1- set of three White phase indicating lamps													
B	**BUSBAR**													
	Electrolytic high conductivity copper three phase and neutral busbars rated at 125A having a maximum current density of 1.4 A per sq mm suitable to with stand symmetrical fault level of 25kA at 415 V. The neutral busbar is to be of same size as phases.													
C	**OUTGOING**													
a)	12 nos. 32A, 240V, Ics=10 kA, DP MCB's													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	LT Panel - Gaddigodam PD													
	Design, fabrication, assembling, wiring, supply, installation, testing and commissioning of Main LT panel/Main distribution panels/sub- distribution panels fabricated out of 3 mm thick for structural members and 2 mm thick for door and covers CRCA sheet steel in cubicle compartmentalised free standing floor mounted, dust and vermin proof with reinforcement of suitable size angle iron, channel T irons and/or flats wherever necessary. 16 gauge CRCA sheet steel shall be used for final distribution panels. Cable gland plates shall be provided on top as well as at the bottom of the panels. Panels shall, be treated with all anticorrosive process before painting as per specifications with 2 coats of zinc chromate primer and final approved shade of enamelled paint. 2 Nos. earthing terminals shall be provided for all distribution panels. Panels shall be suitable for 415V, 3 phase, 4 wire, 50 HZ supply system and with 15% spare space, lifting hooks shall also be provided in case of large panels. Approval shall be taken (4) IEC 60364 : Electrical Installation of Buildings with zinc passivation shall be used in fabrication of panels.													
	The panels to confirm IP-43 for indoor & IP-55 for outdoor.													
Note:	RATING AND SWITCH BOARDS WILL BE DESIGNED AS PER ACTUAL													
	(NOTE: Unless not specified all incomers and outgoings ACBs/MCCBs of main LT panel shall be Microprocessor based with 485 communication port for BMS (Building Management system) connectivity through MODBUS protocol, as specified in Technical specification)													
1.14	**Main Distribution Board (MDB1) Type-2**													
	Incoming Air Circuit Breaker A' (Transformer-)													
	1600A, 4 pole electrically operated (motorised) fully draw out type air circuit breaker with built in micro processor based release unit for short circuit, over current and earth fault protection with adjustable setting and with the following accessories :													
	Electronic energy meter of accuracy class-1 with 3 Nos 1600/5A, 15VA CTs to measure and display the following electrical quantities:													
	Real time													
	Total active energy (KWH/MWH)													

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	Maximum Demand (KVA/MVA) (KW/MW)													
	Maximum Demand reset count													
	Instantaneous power factor													
	Eight time of a day energy													
	Current													
	Voltage													
	Frequency / Harmonics													
	0-500V digital voltmeter with selector switch with 6A MCB's - 1 Set													
	0-1600A digital ammeter with selector switch and 1600/5A, 15VA, CLASS 1, CT - 1 Set													
	Phase indicating lights and protected by 2A MCB's - 1 Sets													
	Breaker ON/OFF/TRIP indicating lights and push button -1 Set													
	230V or 24V, shunt trip coil - 1 Set													
	1 CT 1600/5A, 15VA, CL 5P10 consisting of													
	Undervoltage Relay (27) - 1 set													
	Over voltage relay (59)- 1 Set													
	Under Over Freq. Relay (81) - 1 set													
	Restricted Earth Fault Relay (64) - 1 set													
	2000/5A,15VA, CLASS-1, CT on Y Phase for APFCR.													
	Auxiliary contacts required for necessary interlocking of breakers.													
	Incoming MCCB' (SOLAR)													
	400 amps 4 Pole motorized MCCB, minimum Ics = 50 kA with microprocessor release unit of Over current, Short Circuit, Ground Fault - 1 Set													
	Electronic energy meter of accuracy class-1 with 3 Nos 400/5A, 15VA CTs to measure and display the following electrical quantities :													
	Real time													
	Total active energy (KWH/MWH)													
	Maximum Demand (KVA/MVA) (KW/MW)													
	Maximum Demand reset count													
	Instantaneous power factor													
	Eight time of a day energy													
	Current													
	Voltage													
	Frequency / Harmonics													
	0-500V digital voltmeter with selector switch with 6A MCB's - 1 Set													
	0-400A digital ammeter with selector switch and 400/5A, 15VA,CLASS 1, CTs - 1 Set													
	Phase indicating lights and protected by 2A MCB's - 1 Set													
	Breaker ON/OFF/TRIP indicating lights and push button - 1 Set													
	230 V or 24V shunt trip coil - 1 Set													
	1 Ct 400/5,15VA,CL5P10 consisting of													
	Undervoltage Relay (27) - 1 set													
	Over voltage relay (59)- 1 Set													
	Under Over Freq. Relay (81) - 1 set													
	Restricted Earth Fault Relay (64) - 1 set													
	400/5A, 15VA, CLASS-1, CT on Y Phase for APFCR.													
	Auxiliary contacts required for necessary interlocking of breakers.													
	Bus Bars													
	1600A, TPN tinned copper bus bars with heat shrinkable insulation sleeves 1Set													
	Outgoing													
	1000 amps TPN ACB draw out type (manually operated) 2 Nos													
	630 amps TPN (50 kA) MCCB 1 Nos													
	400 amps TPN(50 kA) MCCB 1 Nos													
	250 amps TPN (50 kA) MCCB 4 Nos													
	100 amps TPN (50 kA) MCCB 2 Nos													
	Red indicating light 230V (15 Nos.), Green indicating light 230V (15 Nos.), MCCB Aux. Contact Block T1-T6 (15 Nos.), MCB 6A SP 10KA (15 Nos.), CT 2000/5A CL-PS 15VA (08 Nos.)													
	Note -1. All outgoing feeders shall have suitable range of following (except capacitor feeders)													
	a. Digital electronic ammeter with selector swtich and CTs - 3 Nos													
	b. Phase indicating light protected by 2A MCB's - 3 Nos													
	2. All incoming / outgoing ACB and MCCB shall be 50 KA breaking capacity													
	3. The two incomer shall be interlocked elecrtically and mechanically operated ACBs with Automatic source transfer system. so that only one supply can be swithed ON at a time.													
	Main Distribution Board (MDB1) Type-2 as described above	Set								1		1	2898610.65	2898610.65
1.15	**Essential Main distribution board (EMDB)**													
	Incomer 1 No. comprising of(Normal Supply) :													
	1000 A, 4 pole electrically operated (motorised) fully draw out type air circuit breaker with built in micro processor based release unit for short circuit, over current and earth fault protection with adjustable setting and with the following accessories :													
	Electronic energy meter of accuracy class-1 with 3 Nos. 1000/5A, 15VA CTs to measure and display the following electrical quantities :													
	Real time													
	Total active energy (KWH/MWH)													
	Maximum Demand (KVA/MVA) (KW/MW)													
	Maximum Demand reset count													
	Instantaneous power factor													
	Eight time of a day energy.													
	Current													
	Voltage													
	Frequency / Harmonics													
	0-500V digital voltmeter with selector switch with 6A MCB's - 1 Set													
	0-1000A digital ammeter with selector switch and 1000/5A, 15VA, CLASS 1CT - 1 Set													
	Phase indicating lights and protected by 2A MCB's - 1 Sets													

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	Breaker ON /OFF /TRIP indicating lights and push button - 1 Set													
	Incomer 1 No. Comprising of(DG Panel) :													
	1000 A, 4 pole electrically operated (motorised) fully draw out type air circuit breaker with built in micro processor based release unit for short circuit, over current and earth fault protection with adjustable setting and with the following accessories :													
	Electronic energy meter of accuracy class-1 with 3 Nos. 1000/5A, 15VA CTs to measure and display the following electrical quantities :													
	Real time													
	Total active energy (KWH/MWH)													
	Maximum Demand (KVA/MVA) (KW/MW)													
	Maximum Demand reset count													
	Instantaneous power factor													
	Eight time of a day energy.													
	Current													
	Voltage													
	Frequency / Harmonics													
	0-500V digital voltmeter with selector switch with 6A MCB's - 1 Set													
	0-1000A digital ammeter with selector switch and 1000/5A, 15VA, CLASS 1CT - 1 Set													
	Phase indicating lights and protected by 2A MCB's - 1 Sets													
	Breaker ON /OFF /TRIP indicating lights and push button - 1 Set													
	Bus Bars													
	1000A, TPN tinned copper bus bars with heat shrinkable insulation sleeves 1 Set													
	Outgoings													
	250 amps TPN (50 kA) MCCB 4 Nos													
	100 amps TPN (50 kA) MCCB 5 Nos													
	63 amps TPN (10 kA) MCB 7 Nos													
	63 amps TPN (10 kA) MCB 7 Nos													
	a. Digital electronic ammeter with selector swtich and CTs - 3 Nos													
	b. Phase indicating light protected by 2A MCB's - 3 Nos													
	2. All incoming / outgoing ACB and MCCBs shall be 50 KA (1 sec) breaking capacity													
	Essential Main distribution board (EMDB) as described above	Set								1		1	1810504.80	1810504.80
1.16	**FIRE PUMP PANEL**													
A.	**Incomer 2 No. each comprising of :**													
a.	400 amps 4 Pole motorized MCCB, minimum Ics = 50 kA with microprocessor release unit of Over current, Short Circuit, Ground Fault - 1 Set													
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size summating CTs for above two incomer metering supporting SCADA/BMS connectivity													
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size summation CTs connections as required for both incoming feeders.													
d.	3 No. 400/5 amps cast resin current transformers with 15 VA Burden & Class 5P10 for protection and metering - 1 Set													
e.	3 No. 400/5 amps cast resin current transformers with 15 VA Burden & Class 1.0 for metering - 1 Set													
f.	Breaker ON / OFF / TRIP, Ready to close contact & indicating lights with control MCB - 2 Set													
g.	RYB Phase indicating light protected by 2 amps MCB's. - 2 Set													
h.	230 V or 24V AC Shunt trip coil. - 2 Set													
i.	RS-485 port for display of ON/OFF status of MCCB on BMS workstation through MODBUS protocol													
j.	Note: Contractor shall provide an earmarked terminal boards for SCADA and BMS signals as per specifications and requirements.													
k.	Amber healthy trip indicating lamps													
B.	**Bus Bar comprising of :**													
i	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 400 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 50 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													
C.	**Outgoing comprising of :**													
i.	4 No. 200A, 415V, TP MCCB (motor duty) each outgoing comprises with following													
a	3 no. 100 HP/ 74.5 KW, star Delta starter comprising 1 Nos. TP contactor AC-3 duty, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control + 3 level liquid controller with following													
b	1 – set Red/Green ON/OFF indicating lamps													
c	1 – set start stop push buttons.													
d	Auto / Manual selector switch.													
e	Amber healthy trip indicating lamps													
f	AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP•45 models of MECO or equivalent with necessary Circuit MCB, suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													
	Note: Contactor & overload relay shall be as per the type - 2 coordination chart													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
ii.	3 No. 40A, 415V, TP MCCB (motor duty) each outgoing comprises with following													
a	2 no. 7.5 HP/ 5.6 KW, Star Delta starter comprising 1 Nos. TP contactor AC-3 duty, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control + 3 level liquid controller with following													
b	1 – set Red/Green ON/OFF indicating lamps													
c	1 – set start stop push buttons.													
d	Auto / Manual selector switch.													
e	Amber healthy trip indicating lamps													
f	AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP•45 models of MECO or equivalent with necessary Circuit MCB, suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													
	Note: Contactor & overload relay shall be as per the type - 2 coordination chart													
	Notes:-													
a	All meters shall be wired at one point for BMS compatibility.													
b	Both incoming breakers shall be electrically/ mechanically interlocked													
c	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													
d	**SCADA / BMS CONNECTIVITY** All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
e	Internal wiring in the Starters shall be done with FRLS PVC insulated cables of adequate size. Internal wiring, contactors, relay contacts, push button contacts should be rated not less than 2.5 Sqmm.													
	FIRE PUMP PANEL described as above	Set								1		1	1049220.90	1049220.90
1.17	**Water pump Panel (WPP) as per specifications and as per following details**													
	Internal wiring in the Starters shall be done with FRLS PVC insulated cables of adequate size. Internal wiring, contactors, relay contacts, push button contacts should be rated not less than 2.5 Sqmm.													
A	**INCOMER**													
a)	2 no. 63A ,415V, Ics=25 KA , TP MCCB with variable over current and short circuit releases each Comparising of													
b)	1- set Red/Green ON/OFF indicating lamps													
c)	1- set of three phase indicating lamps (red, yellow, blue)													
d)	Amber healthy trip inicating lamps for above feeders													
B	**BUSBAR**													
	Electrolytic high conductivity copper three phase and neutral busbars rated at 100 A having a maximum current density of 1.4 A per sq mm suitable to with stand symmetrical fault level of 25 kA. at 415 V. The neutral busbar is to be of same size as phases.													
C	**OUTGOING**													
a)	4 no. 32A , Ics = 25 KA, 415V, TP MCB each with the following :													
a1)	1 nos. 5 HP/ 3.75 KW, Star Delta starter comprising 3 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control + 3 level liquid level controller													
a2)	1 – set Red/Green ON/OFF indicating lamps													
a3)	1 – set start stop push buttons.													
a4)	Auto / Manual selector switch.													
a5)	Healthy and trip indicating lamps													
a6)	1 no for each feeder AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCB, suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													
b)	11 Nos. 20 A, Ics = 10KA, 415V, TP MCB(Motor duty) each with following													
b1)	1 nos. 5 HP/ 3.75 KW,DOL starter Star with bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.													
b2)	1 - set Red / Green ON/OFF indicating lamp													
b3)	1 - set start / stop puch buttons													
b4)	Auto / Manual selector switch.													
b5)	Amber healthy trip indicating lamps													
b6)	1 no for each feeder AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCB,suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													
c)	2 Nos. 16 A, Ics = 10KA, 230V, DP MCB each with following													
c1)	1 nos. 2.5HP / 1.9 kW pump DOL starter with bimetallic over current relay with potential free contacts for remote monitoring and control.													
c2)	1 – set Red/Green ON/OFF indicating lamps													
c3)	1 – set start stop push buttons.													
c4)	Auto / Manual selector switch.													
c5)	Amber healthy trip indicating lamps													
c6)	1 no for each feeder AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCB,suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													
D	**Metering**													
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
E.	Presettable switching timer set for each pump													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	WATER PUMP PANEL described as above	Set								1		1	768953.25	768953.25
1.18	**MAIN LIGHTING PANEL (MLP)**													
A.	**Incomer comprising of :**													
a.	1 Nos. 100 amps TPN MCCB (35 kA) with release unit for SC and OL protection along with 1 Nos. 100 amps 4P AC3 duty Contactor - 2 Set													
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size summating CTs for above two incomer metering supporting SCADA/BMS connectivity													
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													
d.	ON / OFF / TRIP indicating lights with control MCB - 1 Set													
e.	Phase indicating light protected by 2 amps MCB's - 1 Set.													
f.	Amber healthy trip indicating lamps													
B.	**Bus Bar comprising of :**													
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 100 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 35 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													
C.	**Outgoing comprising of :**													
i.	40 Amps TPN MCCB with releases for SC and OL protection & shunt trip each having indication lamps to give status - 15 Set													
	Notes:-													
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													
b.	All Outgoing feeders shall be provided with earth fault release.													
c.	Both the Incomers shall be electrically & mechanically interlocked with contactor based automatics chngeover system so that only one supply is switched on at a time.													
d.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 2 amps SP MCBs.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	MAIN LIGHTING PANEL (MLP)described as above	Set								1		1	918303.75	918303.75
1.19	**EMERGENCY LIGHTING PANEL (EMLP)**													
A.	**Incomer comprising of :**													
a.	100 amps TPN MCCB (35 kA) with release for SC and OL protections - 2 Set													
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size CTs for above incomer metering supporting SCADA/BMS connectivity													
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													
d.	ON / OFF / TRIP indicating lights with control MCB - 1 Set													
e.	Phase indicating light protected by 2 amps MCB's - 1 Set.													
f.	Amber healthy trip indicating lamps													
B.	**Bus Bar comprising of :**													
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 100 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 35 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													
C.	**Outgoing comprising of :**													
i.	40 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 10 Set													
	Notes:-													
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													
b.	All Outgoing feeders shall be provided with earth fault release.													

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
c.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 2 amps SP MCBs.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	EMERGENCY LIGHTING PANEL (EMLP) described as above	Set								1		1	612202.50	612202.50
1.20	**LOWER BASEMENT VENTILATION PANEL**													
A.	**Incomer comprising of :**													
a.	100 amps TPN MCCB (25 kA) with release for SC and OL protections - 1 Set													
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size CTs for incomer metering supporting SCADA/BMS connectivity													
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													
d.	ON / OFF / TRIP indicating lights with control MCB - 1 Set													
e.	Phase indicating light protected by 2 amps MCB's - 1 Set.													
f.	Amber healthy trip indicating lamps													
B.	**Bus Bar comprising of :**													
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 100 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 25 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													
C.	**Outgoing comprising of :**													
i.	32 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 12 Set													
	Notes:-													
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													
b.	All Outgoing feeders shall be provided with earth fault release.													
c.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 2 amps SP MCBs.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	LOWER BASEMENT VENTILATION PANEL described as above	Set								1		1	630635.85	630635.85
1.21	**UPPER BASEMENT VENTILATION**													
A.	**Incomer comprising of :**													
a.	100 amps TPN MCCB (25 kA) with release for SC and OL protections - 1 Set													
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size CTs for incomer metering supporting SCADA/BMS connectivity													
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													
d.	ON / OFF / TRIP indicating lights with control MCB - 1 Set													
e.	Phase indicating light protected by 2 amps MCB's - 1 Set.													
f.	Amber healthy trip indicating lamps													
B.	**Bus Bar comprising of :**													
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 100 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 25 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													
C.	**Outgoing comprising of :**													
i.	32 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 7 Set													
ii.	25 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 3 Set													
	Notes:-													
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
b.	All Outgoing feeders shall be provided with earth fault release.													
c.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 2 amps SP MCBs.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	UPPER BASEMENT VENTILATION(LT PANEL ROOM UPPER BASEMENT) described as above	Set								1		1	565648.20	565648.20
1.22	**Lift Well & Lift Lobby Pressurization Panel**													
A.	**Incomer comprising of :**													
a.	100 amps TPN MCCB (25 kA) with release for SC and OL protections - 1 Set													
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size CTs for incomer metering supporting SCADA/BMS connectivity													
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													
d.	ON / OFF / TRIP indicating lights with control MCB - 1 Set													
e.	Phase indicating light protected by 2 amps MCB's - 1 Set.													
f.	Amber healthy trip indicating lamps													
B.	**Bus Bar comprising of :**													
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 100 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 25 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													
C.	**Outgoing comprising of :**													
i.	40 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 9 Set													
	Notes:-													
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													
b.	All Outgoing feeders shall be provided with earth fault release.													
c.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 2 amps SP MCBs.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	Lift Well & Lift Lobby Pressurization Panel described as above	Set								1		1	533221.65	533221.65
1.23	**METER BOARD PANEL(TYPICAL FOR 1,2,3 & 4)**													
A.	**Incomer comprising of :**													
a.	100 amps TPN MCCB (25 kA) with release for SC and OL protections - 1 Set													
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size CTs for incomer metering supporting SCADA/BMS connectivity													
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													
d.	ON / OFF / TRIP indicating lights with control MCB - 1 Set													
e.	Phase indicating light protected by 2 amps MCB's - 1 Set.													
f.	Amber healthy trip indicating lamps													
B.	**Bus Bar comprising of :**													
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 100 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 25 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													
C.	**Outgoing comprising of :**													
i.	32 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 17 Set													
ii.	Space for providing variable KWHr meter with required CT's/PT's for each of the outgoing feeder with locking arrangement.													
	Notes:-													
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													
b.	All Outgoing feeders shall be provided with earth fault release.													
c.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 2 amps SP MCBs.													

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	METER BOARD PANEL(TYPICAL FOR 1,2,3 & 4) described as above	Set								4		4	866232.90	3464931.60
1.24	**250 KVAR CAPACITOR BANK TYPE-2**													
A.	**Incomer comprising of :**													
a.	630 amps TPN MCCB (50 kA) with release for SC and OL protections each having indication lamps to give status etc. - 1 Set													
b.	Microprocessor APFC controller relay to sense and monitor the system power factor and provide impulses for operation of 5 capacitor circuits with automatic switching over facility with manual override. It shall continuously monitor all three phases and displays various Electrical Parameters like voltage, input current, capacitive current, KVA demand, KW, Power Factor, self diagnostic error code indication with printout facility of the above with RS 485 port. Controller should mounted on the front side of the panel. It shall have data logging for minimum 2 months, it shall provide output for maximum 8 stages.													
c.	Multifunction meter for V, Hz & A with CT's - 1 Set													
d.	Breaker ON / OFF / TRIP indicating lights with control MCB - 1 Set													
e.	Phase indicating light protected by 2 amps MCB's. - 1 Set													
f.	Amber healthy trip indicating lamps													
B.	**Bus Bar comprising of :**													
	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 630 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 50 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													
C.	**Outgoing comprising of :**													
a.	100 kVAR Capacitor Bank - 1 Set each comprising of following:													
i)	250 Amps TPN MCCB - 1 Set													
ii)	250 amps or capacitor heavy duty 525 volts 50Hz contactors. - 1 Set													
iii)	"ON" /"OFF" push buttons and indicating lamps. - 1 Set													
iv)	100 kVAR, 525 volts hermetically sealed metalized polypropylene capacitors in well ventilated enclosures complete as per													
v)	7% Harmonic Filters, On/Off push button, Indicating lamps - 1 Set													
b.	50 kVAR Capacitor Bank - 2 Set each comprising of following:													
i)	125 Amps TPN MCCB - 1													
ii)	125 amps or capacitor heavy duty 525 volts 50Hz contactors. - 1 Set													
iii)	"ON" /"OFF" push buttons and indicating lamps. - 1 Set													
iv)	50 kVAR, 525 volts hermetically sealed metalized polypropylene capacitors in well ventilated enclosures complete as per specifications, application duty and as required - 1 Set													
v)	7% Harmonic Filters, On/Off push button, Indicating lamps - 1 Set													
c.	25 kVAR Capacitor Bank - 1 Set each comprising of following:													
i)	80 Amps TPN MCCB - 1 Set													
ii)	80 amps or capacitor duty 525 volts 50Hz contactors. - 1 Set													
iii)	"ON" /"OFF" push buttons and indicating lamps. - 1 Set													
iv)	25 kVAR, 525 volts hermetically sealed metalized polypropylene capacitors in well ventilated enclosures complete as per specifications, application duty and as required - 1 Set													
v)	7% Harmonic Filters, On/Off push button, Indicating lamps - 1 Set													
d.	12.5 kVAR Capacitor Bank - 2 Set each comprising of following:													
i)	40 Amps TPN MCCB - 1 Set													
ii)	40 amps or capacitor duty 525 volts 50Hz contactors. - 1 Set													
iii)	"ON" /"OFF" push buttons and indicating lamps. - 1 Set													
iv)	12.5 kVAR, 525 volts hermetically sealed metalized polypropylene capacitors in well ventilated enclosures complete as per specifications, application duty and as required - 1 Set													
v)	7% Harmonic Filters, On/Off push button, Indicating lamps - 1 Set													
	Notes:													
a.	All outgoing breakers shall be minimum 35 kA rating with Icu = Ics.													
b.	Heavy duty exhaust fans to be provided for cooling Capacitors & Filters.													
c.	LED indication for number of capacitor banks 'ON'.													
d.	LED indication of Power Factor lagging or leading.													
e.	APFC system shall comprise of following:													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	250 kVAR Capacitor Panel described as above	Set								1		1	904176.00	904176.00
	LT Panel for KCP PD													

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	Design, fabrication, assembling, wiring, supply, installation, testing and commissioning of Main LT panel/Main distribution panels/sub- distribution panels fabricated out of 3 mm thick for structural members and 2 mm thick for door and covers CRCA sheet steel in cubicle compartmentalised free standing floor mounted, dust and vermin proof with reinforcement of suitable size angle iron, channel T irons and/or flats wherever necessary. 16 gauge CRCA sheet steel shall be used for final distribution panels. Cable gland plates shall be provided on top as well as at the bottom of the panels. Panels shall, be treated with all anticorrosive process before painting as per specifications with 2 coats of zinc chromate primer and final approved shade of enamelled paint. 2 Nos. earthing terminals shall be provided for all distribution panels. Panels shall be suitable for 415V, 3 phase, 4 wire, 50 HZ supply system and with 15% spare space, lifting hooks shall also be provided in case of large panels. Approval shall be taken (4) IEC 60364 : Electrical Installation of Buildings with zinc passivation shall be used in fabrication of panels.													
	The panels to confirm IP-43 for indoor & IP-55 for outdoor.													
	RATING AND SWITCH BOARDS WILL BE DESIGNED AS PER ACTUAL													
	(NOTE: Unless not specified all incomers and outgoings ACBs/MCCBs of main LT panel shall be Microprocessor based with 485 communication port for BMS (Building Management system) connectivity through MODBUS protocol, as specified in Technical Specification)													
1.25	**MAIN LT PANEL**													
	SECTION - I													
	Incoming Air Circuit Breaker A' (Transformer-1)													
	2000A, 4 pole electrically operated (motorised) fully draw out type air circuit breaker with built in micro processor based release unit for short circuit, over current and earth fault protection with adjustable setting and with the following accessories :													
	Electronic energy meter of accuracy class-1 with 3 Nos 2000/5A, 15VA CTs to measure and display the following electrical quantities:													
	Real time													
	Total active energy (KWH/MWH)													
	Maximum Demand (KVA/MVA) (KW/MW)													
	Maximum Demand reset count													
	Instantaneous power factor													
	Eight time of a day energy													
	Current													
	Voltage													
	Frequency / Harmonics													
	0-500V digital voltmeter with selector switch with 6A MCB's - 1 Set													
	0-2000A digital ammeter with selector switch and 4000/5A, 15VA, CLASS 1, CT - 1 Set													
	Phase indicating lights and protected by 2A MCB's - 1 Sets													
	Breaker ON/OFF/TRIP indicating lights and push button -1 Set													
	230V or 24V, shunt trip coil - 1 Set													
	1 CT 2000/5A, 15VA, CL 5P10 consisting of													
	Undervoltage Relay (27) - 1 set													
	Over voltage relay (59)- 1 Set													
	Under Over Freq. Relay (81) - 1 set													
	Restricted Earth Fault Relay (64) - 1 set													
	2000/5A,15VA, CLASS-1, CT on Y Phase for APFCR.													
	Auxiliary contacts required for necessary interlocking of breakers.													
	Bus Bars													
	2000A, TPN copper bus bars with heat shrinkable insulation sleeves 1Set													
	Outgoing													
	2000 amps TPN ACB draw out type (manually operated) 1 No													
	1250 amps TPN ACB draw out type (manually operated) 2 No													
	630 amps TPN (50 kA) MCCB 2 Nos													
	100 amps TPN (50 kA) MCCB 3 Nos													
	Bus Coupler-: Breaker "C													
	2000A, 4 pole electrically operated (motorised) fully drawotd type air circuit breaker with ON/OFF/TRIP indicating lamps & auxiliary contacts required for necessary interlocking of breakers - 1 Set													
	SECTION= II													
	Incoming Air Circuit Breaker B' (Transformer-II)													
	2000A, 4 pole electrically operated (motorised) fully draw out type air circuit breaker, with built in micro processor based release unit for short circuit, over current and earth fault protection with adjustable setting and with the following accessories :													
	Electronic energy meter of accuracy class-1 with 3 Nos 2000/5A, 15VA CTs to measure and display the following electrical quantities :													
	Real time													
	Total active energy (KWH/MWH)													
	Maximum Demand (KVA/MVA) (KW/MW)													
	Maximum Demand reset count													
	Instantaneous power factor													
	Eight time of a day energy													
	Current													
	Voltage													
	Frequency / Harmonics													
	0-500V digital voltmeter with selector switch with 6A MCB's - 1 Set													
	0-2000A digital ammeter with selector switch and 4000/5A, 15VA,CLASS 1, CTs - 1 Set													
	Phase indicating lights and protected by 2A MCB's - 1 Set													
	Breaker ON/OFF/TRIP indicating lights and push button - 1 Set													
	230V or 24V shunt trip coil - 1 Set													
	1 Ct 4000/5,15VA,CL5P10 consisting of													
	Undervoltage Relay (27) - 1 set													
	Over voltage relay (59)- 1 Set													

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	Under Over Freq. Relay (81) - 1 set													
	Restricted Earth Fault Relay (64) - 1 set													
	2000/5A, 15VA, CLASS-1, CT on Y Phase for APFCR.													
	Auxiliary contacts required for necessary interlocking of breakers.													
	Bus Bars													
	2000A, TPN tinned copper bus bars with heat shrinkable insulation sleeves 1Set													
	Outgoing													
	2000 amps TPN ACB draw out type (manually operated) 1 No													
	1250 amps TPN ACB draw out type (manually operated) 2 No													
	630 amps TPN (50 kA) MCCB 2 Nos													
	250 amps TPN (50 kA) MCCB 1 Nos													
	100 amps TPN (50 kA) MCCB 4 Nos													
	63 amps TPN (50 kA) MCCB 1 Nos													
	Red indicating light 230V (19 Nos.), Green indicating light 230V (19 Nos.), MCCB Aux. Contact Block T1-T6 (19 Nos.), MCB 6A SP 10KA (19 Nos.), CT 2000/5A CL-PS 15VA (08 Nos.)													
	Note -1. All outgoing feeders shall have suitable range of following (except capacitor feeders)													
	a. Digital electronic ammeter with selector swtich and CTs - 3 Nos													
	b. Phase indicating light protected by 2A MCB's - 3 Nos													
	2. All incoming / outgoing ACB and MCCB shall be 50 KA breaking capacity													
	3. The two incomer shall be interlocked elecrtically and mechanically operated ACBs with Automatic source transfer system. so that only one supply can be swithed ON at a time.													
	4.MFM and indiacting lamp shall be provided as per SLD.													
	Main LT Panel as described above	Set							1			1	6910488.00	6910488.00
1.26	**Essential Power Panel (LT Panel Room Upper basement)**													
	SECTION - I													
	Incomer 2 Nos. each comprising of :													
	2000 A, 4 pole electrically operated (motorised) fully draw out type air circuit breaker with built in micro processor based release unit for short circuit, over current and earth fault protection with adjustable setting and with the following accessories :													
	Electronic energy meter of accuracy class-1 with 3 Nos. 2000/5A, 15VA CTs to measure and display the following electrical quantities :													
	Real time													
	Total active energy (KWH/MWH)													
	Maximum Demand (KVA/MVA) (KW/MW)													
	Maximum Demand reset count													
	Instantaneous power factor													
	Eight time of a day energy.													
	Current													
	Voltage													
	Frequency / Harmonics													
	0-500V digital voltmeter with selector switch with 6A MCB's - 1 Set													
	0-2000A digital ammeter with selector switch and 2000/5A, 15VA, CLASS 1CT - 1 Set													
	Phase indicating lights and protected by 2A MCB's - 1 Sets													
	Breaker ON /OFF /TRIP indicating lights and push button - 1 Set													
	Auto Manual selector switch - 1 Set													
	Bus Bars													
	2000A, TPN copper bus bars with heat shrinkable insulation sleeves 1 Set													
	Outgoings													
	1250 amps TPN ACB draw out type (manually operated) 2 No													
	1000 amps TPN ACB draw out type (manually operated) 1 No													
	160 amps TPN (50 kA) MCCB 2 Nos													
	125 amps TPN (50 kA) MCCB 2 Nos													
	100 amps TPN (50 kA) MCCB 4 Nos													
	63 amps TPN (50 kA) MCCB 6 Nos													
	Bus Coupler													
	1 No. 2000A, 4 Pole ACB electrically operated drawout type with necessary potential free contacts for inter lockings and with breaker control switch, ON/OFF/TRIP indicating lamps with control MCB/s The two incomer shall be interlocked elecrtically and mechanically operated ACBs with Automatic source transfermer system. so that only one supply can be swithed ON at a time.													
	SECTION - II													
	Incomer 2 No. each comprising of :													
	2000 A, 4 pole electrically operated (motorised) fully draw out type air circuit breaker with built in micro processor based release unit for short circuit, over current and earth fault protection with adjustable setting and with the following accessories :													
	Electronic energy meter of accuracy class-1 with 3 Nos. 2000/5A, 15VA CTs to measure and display the following electrical quantities :													
	Real time													
	Total active energy (KWH/MWH)													
	Maximum Demand (KVA/MVA) (KW/MW)													
	Maximum Demand reset count													
	Instantaneous power factor													
	Eight time of a day energy.													
	Current													
	Voltage													
	Frequency / Harmonics													
	0-500V digital voltmeter with selector switch with 6A MCB's - 1 Set													
	0-2000A digital ammeter with selector switch and 2000/5A, 15VA, CLASS 1CT - 1 Set													
	Phase indicating lights and protected by 2A MCB's - 1 Sets													
	Breaker ON /OFF /TRIP indicating lights and push button - 1 Set													
	Auto/ Manual/ Remote/ Local selector switch - 1 Set													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	Bus Bars													
	2000A, TPN tinned copper bus bars with heat shrinkable insulation sleeves 1 Set													
	Outgoings													
	1250 amps TPN ACB draw out type (manually operated) 2 No													
	1000 amps TPN ACB draw out type (manually operated) 2 No													
	630 amps TPN (50 kA) MCCB 2 Nos													
	400 amps TPN (50 kA) MCCB 2 Nos													
	32 amps DP (10 kA) MCB 4 Nos													
	Note -1. All outgoing feeders shall have suitable range of following													
	a. Digital electronic ammeter with selector swtich and CTs - 3 Nos													
	b. Phase indicating light protected by 2A MCB's - 3 Nos													
	2. All incoming / outgoing ACB and MCCBs shall be 50 KA (1 sec) breaking capacity													
	Essential Power Panel (LT Panel Room Upper basement) as described above	Set							1			1	8542579.50	8542579.50
1.27	**FIRE PUMP PANEL - FIRE PLANT ROOM**													
A.	**Incomer 2 No. each comprising of :**													
a.	630 amps 4 Pole motorized MCCB, minimum Ics = 50 kA with microprocessor release unit of Over current, Short Circuit, Ground Fault - 1 Set													
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size summating CTs for above two incomer metering supporting SCADA/BMS connectivity													
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size summation CTs connections as required for both incoming feeders.													
d.	3 No. 600/5 amps cast resin current transformers with 15 VA Burden & Class 5P10 for protection and metering - 1 Set													
e.	3 No. 600/5 amps cast resin current transformers with 15 VA Burden & Class 1.0 for metering - 1 Set													
f.	Breaker ON / OFF / TRIP, Ready to close contact & indicating lights with control MCB - 2 Set													
g.	RYB Phase indicating light protected by 2 amps MCB's. - 2 Set													
h.	230 V AC Shunt trip coil. - 2 Set													
i.	RS-485 port for display of ON/OFF status of MCCB on BMS workstation through MODBUS protocol													
j.	Note: Contractor shall provide an earmarked terminal boards for SCADA and BMS signals as per specifications and requirements.													
k.	Healthy and trip indicating lamps													
B.	**Bus Bar comprising of :**													
i	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 630 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 50 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													
C.	**Outgoing comprising of :**													
i.	3 No. 200A, 415V, TPN MCCB (motor duty) each outgoing comprises with following													
a	2 no. 160 HP/ 119.4 KW, star Delta starter comprising 1 Nos. TP contactor AC-3 duty, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control + 3 level liquid controller with following													
b	1 – set Red/Green ON/OFF indicating lamps													
c	1 – set start stop push buttons.													
d	Auto / Manual selector switch.													
e	Amber healthy trip indicating lamps													
f	AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP•45 models of MECO or equivalent with necessary Circuit MCB, suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													
	Note: Contactor & overload relay shall be as per the type - 2 coordination chart													
ii.	1 No. 63A, 415V, TPN MCCB (motor duty) each outgoing comprises with following													
a	1 no. 20 HP/ 15 KW, Star Delta starter comprising 1 Nos. TP contactor AC-3 duty, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control + 3 level liquid controller with following													
b	1 – set Red/Green ON/OFF indicating lamps													
c	1 – set start stop push buttons.													
d	Auto / Manual selector switch.													
e	Amber healthy trip indicating lamps													
f	AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP•45 models of MECO or equivalent with necessary Circuit MCB, suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													
	Note: Contactor & overload relay shall be as per the type - 2 coordination chart													
iii.	3 No. 40A, 415V, TPN MCCB (motor duty) each outgoing comprises with following													
a	2 no. 10 HP/ 7.5 KW, Star Delta starter comprising 1 Nos. TP contactor AC-3 duty, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control + 3 level liquid controller with following													
b	1 – set Red/Green ON/OFF indicating lamps													
c	1 – set start stop push buttons.													
d	Auto / Manual selector switch.													

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
e	Amber healthy trip indicating lamps													
f	AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP•45 models of MECO or equivalent with necessary Circuit MCB, suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													
	Note: Contactor & overload relay shall be as per the type - 2 coordination chart													
	Notes:-													
a	All meters shall be wired at one point for BMS compatibility.													
b	Both incoming breakers shall be electrically/ mechanically interlocked													
c	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													
d	**SCADA / BMS CONNECTIVITY** All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
e	Internal wiring in the Starters shall be done with FRLS PVC insulated cables of adequate size. Internal wiring, contactors, relay contacts, push button contacts should be rated not less than 2.5 Sqmm.													
	FIRE PUMP PANEL - FIRE PLANT ROOM described as above	Set							1			1	1274188.50	1274188.50
1.28	**Water pump Panel (PLUMBING PLANT ROOM) as per specifications and as per following details**													
	Internal wiring in the Starters shall be done with FRLSPVC insulated cables of adequate size. Internal wiring, contactors, relay contacts, push button contacts should be rated not less than 2.5 Sqmm.													
A	**INCOMER**													
a)	2 no. 250A ,415V, Ics=25 KA , TPN MCCB with variable over current and short circuit releases													
b)	1- set Red/Green ON/OFF indicating lamps													
c)	1- set of three phase indicating lamps (red, yellow, blue)													
d)	Amber healthy trip inicating lamps for above feeders													
B	**BUSBAR**													
	Electrolytic high conductivity copper three phase and neutral busbars rated at 250 A having a maximum current density of 1.4 A per sq mm suitable to with stand symmetrical fault level of 25 kA. at 415 V. The neutral busbar is to be of same size as phases.													
C	**OUTGOING**													
a)	5 no. 40A , Ics = 25 KA, 415V, TP MCCB(motor Duty) each with the following :													
a1)	4 nos. 10 HP/ 7.5 KW, Star Delta starter comprising 3 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control + 3 level liquid level controller													
a2)	1 – set Red/Green ON/OFF indicating lamps													
a3)	1 – set start stop push buttons.													
a4)	Auto / Manual selector switch.													
a5)	Amber healthy trip indicating lamps													
a6)	1 no for each feeder AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCB, suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													
b)	11 Nos. 20 A, Ics = 10KA, 415V, TP MCB(Motor duty) each with following													
b1)	10 nos. 5 HP/ 3.75 KW,DOL starter Star with bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.													
b2)	1 - set Red / Green ON/OFF indicating lamp													
b3)	1 - set start / stop puch buttons													
b4)	Auto / Manual selector switch.													
b5)	Amber healthy trip indicating lamps													
b6)	1 no for each feeder AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCB,suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													
c)	2 Nos. 16 A, Ics = 10KA, 230V, DP MCB each with following													
c1)	1 nos. 2.5HP / 1.9 kW pump DOL starter with bimetallic over current relay with potential free contacts for remote monitoring and control.													
c2)	1 – set Red/Green ON/OFF indicating lamps													
c3)	1 – set start stop push buttons.													
c4)	Auto / Manual selector switch.													
c5)	Amber healthy trip indicating lamps													
c6)	1 no for each feeder AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCB,suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													
D	**Metering**													
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity													
E.	Presettable switching timer set for each pump													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	WATER PUMP PANEL - PLUMBING PLANT ROOM described as above	Set							1			1	1001052.00	1001052.00
1.29	**MAIN LIGHTING PANEL (MAIN LT PANEL ROOM UPPER BASEMENT)**													

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
A.	**Incomer 2 No. each comprising of :**													
a.	1 Nos. 100 amps TPN MCCB (35 kA) with release unit for SC and OL protection along with 1 Nos. 100 amps 4P AC3 duty Contactor - 1 Set													
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size summating CTs for above two incomer metering supporting SCADA/BMS connectivity													
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													
d.	ON / OFF / TRIP indicating lights with control MCB - 1 Set													
e.	Phase indicating light protected by 2 amps MCB's - 1 Set.													
f.	Amber healthy trip indicating lamps													
B.	**Bus Bar comprising of :**													
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 100 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 35 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													
C.	**Outgoing comprising of :**													
i.	40 Amps TPN MCCB with releases for SC and OL protection & shunt trip each having indication lamps to give status - 15 Set													
	Notes:-													
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													
b.	All Outgoing feeders shall be provided with earth fault release.													
c.	Both the Incomers shall be electrically & mechanically interlocked with contactor based automatics chngeover system so that only one supply is switched on at a time.													
d.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 2 amps SP MCBs.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	MAIN LIGHTING PANEL AIN LIGHTING PANEL (MAIN LT PANEL ROOM UPPER BASEMENT) described as above	Set							1			1	1006434.00	1006434.00
1.30	**EMERGENCY LIGHTING PANEL (MAIN LT PANEL ROOM UPPER BASEMENT)**													
A.	**Incomer comprising of :**													
a.	100 amps TPN MCCB (35 kA) with release for SC and OL protections - 2 Set													
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size CTs for above incomer metering supporting SCADA/BMS connectivity													
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													
d.	ON / OFF / TRIP indicating lights with control MCB - 2 Sets													
e.	Phase indicating light protected by 2 amps MCB's - 2 Sets.													
f.	Healthy trip indicating lamps													
B.	**Bus Bar comprising of :**													
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 100 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 35 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													
C.	**Outgoing comprising of :**													
i.	40 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 10 Set													
	Notes:-													
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													
b.	All Outgoing feeders shall be provided with earth fault release.													
c.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 2 amps SP MCBs.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	EMERGENCY LIGHTING PANEL (MAIN LT PANEL ROOM UPPER BASEMENT) described as above	Set							1			1	605475.00	605475.00

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
1.31	**LOWER BASEMENT VENTILATION PANEL(ELEC. ROOM LOWER BASEMENT)**													
A.	**Incomer comprising of :**													
a.	125 amps TPN MCCB (25 kA) with release for SC and OL protections - 1 Set													
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size CTs for incomer metering supporting SCADA/BMS connectivity													
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													
d.	ON / OFF / TRIP indicating lights with control MCB - 1 Set													
e.	Phase indicating light protected by 2 amps MCB's - 1 Set.													
f.	Amber healthy trip indicating lamps													
B.	**Bus Bar comprising of :**													
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 125 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 25 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													
C.	**Outgoing comprising of :**													
i.	40 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 10 Set													
ii.	32 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 8 Set													
	Notes:-													
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													
b.	All Outgoing feeders shall be provided with earth fault release.													
c.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 2 amps SP MCBs.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	LOWER BASEMENT VENTILATION PANEL(ELEC. ROOM LOWER BASEMENT) described as above	Set							1			1	921667.50	921667.50
1.32	**UPPER BASEMENT VENTILATION(LT PANEL ROOM UPPER BASEMENT)**													
A.	**Incomer comprising of :**													
a.	100 amps TPN MCCB (25 kA) with release for SC and OL protections - 1 Set													
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size CTs for incomer metering supporting SCADA/BMS connectivity													
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													
d.	ON / OFF / TRIP indicating lights with control MCB - 1 Set													
e.	Phase indicating light protected by 2 amps MCB's - 1 Set.													
f.	Amber healthy trip indicating lamps													
B.	**Bus Bar comprising of :**													
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 100 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 25 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													
C.	**Outgoing comprising of :**													
i.	40 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 5 Set													
ii.	32 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 3 Set													
iii.	25 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 5 Set													
	Notes:-													
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													
b.	All Outgoing feeders shall be provided with earth fault release.													
c.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 2 amps SP MCBs.													

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	UPPER BASEMENT VENTILATION(LT PANEL ROOM UPPER BASEMENT) described as above	Set							1			1	651222.00	651222.00
1.33	**Lift Well & Lift Lobby Pressurization Panel (Lift Machine Room Terrace)**													
A.	**Incomer comprising of :**													
a.	160 amps TPN MCCB (25 kA) with release for SC and OL protections - 1 Set													
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size CTs for incomer metering supporting SCADA/BMS connectivity													
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													
d.	ON / OFF / TRIP indicating lights with control MCB - 1 Set													
e.	Phase indicating light protected by 2 amps MCB's - 1 Set.													
f.	Amber healthy trip indicating lamps													
B.	**Bus Bar comprising of :**													
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 160 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 25 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													
C.	**Outgoing comprising of :**													
i.	63 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 6 Set													
ii.	40 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 5 Set													
	Notes:-													
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													
b.	All Outgoing feeders shall be provided with earth fault release.													
c.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 2 amps SP MCBs.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	Lift Well & Lift Lobby Pressurization Panel(Lift Machine Room Terrace) described as above	Set							1			1	583947.00	583947.00
1.34	**325 kVAR Capacitor Panel (DG Cum Transformer Change Over Panel Room)**													
A.	**Incomer comprising of :**													
a.	630 amps TPN MCCB (50 kA) with release for SC and OL protections each having indication lamps to give status etc. - 1 Set													
b.	Microprocessor APFC controller relay to sense and monitor the system power factor and provide impulses for operation of 5 capacitor circuits with automatic switching over facility with manual override. It shall continuously monitor all three phases and displays various Electrical Parameters like voltage, input current, capacitive current, KVA demand, KW, Power Factor, self diagnostic error code indication with printout facility of the above with RS 485 port. Controller should mounted on the front side of the panel. It shall have data logging for minimum 2 months, it shall provide output for maximum 8 stages.													
c.	Multifunction meter for V, Hz & A with CT's - 1 Set													
d.	Breaker ON / OFF / TRIP indicating lights with control MCB - 1 Set													
e.	Phase indicating light protected by 2 amps MCB's. - 1 Set													
f.	Amber healthy trip indicating lamps													
B.	**Bus Bar comprising of :**													
	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 630 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 50 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													
C.	**Outgoing comprising of :**													
a.	100 kVAR Capacitor Bank - 1 Set each comprising of following:													
i)	250 Amps TPN MCCB - 1 Set													
ii)	250 amps or capacitor heavy duty 525 volts 50Hz contactors. - 1 Set													
iii)	"ON" /"OFF" push buttons and indicating lamps. - 1 Set													
iv)	100 kVAR, 525 volts hermetically sealed metalized polypropylene capacitors in well ventilated enclosures complete as per specifications, application duty and as required - 1 Set													
v)	7% Harmonic Filters, On/Off push button, Indicating lamps - 1 Set													
b.	50 kVAR Capacitor Bank - 3 Set each comprising of following:													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
i)	125 Amps TPN MCCB - 1 Set													
ii)	125 amps or capacitor heavy duty 525 volts 50Hz contactors. - 1 Set													
iii)	"ON" /"OFF" push buttons and indicating lamps. - 1 Set													
iv)	50 kVAR, 525 volts hermetically sealed metalized polypropylene capacitors in well ventilated enclosures complete as per specifications, application duty and as required - 1 Set													
v)	7% Harmonic Filters, On/Off push button, Indicating lamps - 1 Set													
c.	25 kVAR Capacitor Bank - 2 Set each comprising of following:													
i)	80 Amps TPN MCCB - 1 Set													
ii)	80 amps or capacitor duty 525 volts 50Hz contactors. - 1 Set													
iii)	"ON" /"OFF" push buttons and indicating lamps. - 1 Set													
iv)	25 kVAR, 525 volts hermetically sealed metalized polypropylene capacitors in well ventilated enclosures complete as per specifications, application duty and as required - 1 Set													
v)	7% Harmonic Filters, On/Off push button, Indicating lamps - 1 Set													
d.	12.5 kVAR Capacitor Bank - 2 Set each comprising of following:													
i)	40 Amps TPN MCCB - 1 Set													
ii)	40 amps or capacitor duty 525 volts 50Hz contactors. - 1 Set													
iii)	"ON" /"OFF" push buttons and indicating lamps. - 1 Set													
iv)	12.5 kVAR, 525 volts hermetically sealed metalized polypropylene capacitors in well ventilated enclosures complete as per specifications, application duty and as required - 1 Set													
v)	7% Harmonic Filters, On/Off push button, Indicating lamps - 1 Set													
	Notes:													
a.	All outgoing breakers shall be minimum 35 kA rating with Icu = Ics.													
b.	Heavy duty exhaust fans to be provided for cooling Capacitors & Filters.													
c.	LED indication for number of capacitor banks 'ON'.													
d.	LED indication of Power Factor lagging or leading.													
e.	APFC system shall comprise of following:													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	325 kVAR Capacitor Panel (DG Cum Transformer Change Over Panel Room) described as above	Set							2			2	1509651.00	3019302.00
1.35	**DIESEL GENERATOR - R2 Stations**													
	Supply, installation, testing and commissioning a complete system of 250kVA Prime duty type diesel generator sets to meet the load requirements for all essential loads as mentioned in these Specifications/Contract. The DG set emissions shall cofirm to the latest regulation of the Central Pollution Control Board (CPCB). Installation Batteries with Stand, leads, cover and accessories. 990 Ltrs Day Tank fabricated out of 6mm thick sheet steel with secondary containment tank and with fitments and float level switches. Drip Tray for fuel tank ,Drip Tray below engine crank case The entire set shall be housed in soundproof enclosure mounted on suitable Rubber-in-shear type vibration mounts with 6mm static deflection for isolating the building floor. A nominal base concrete pad (if required) shall be provided over which the engine set with its own base frame and vibration mounts shall be mounted. Adopter Box for cable / bus duct termination with extension bus bars & 630 4P MCCB Isolator Any other item not specifically mentioned but required for proper performance and safe working of the system. The DG system shall be provided to interface with Station Management System (SMS)/Building Management system(BMS) for remote monitoring and management in Station Control Room and/or OCC room (if available) respectively. **AMF PANEL** The AMF Panel should therefore comprise: (i) 630A , 4 Pole MCCB with 4-pole contactor as main Incomer from AMF Panel, copper bus bar of adequate rating with one no. 4-pole ACBs as outgoing for Essential Power Panel 400A and Fire Pump Panel 250A, MCCB of adequate rating, duly interlocked. (ii) Battery charger with normal and trickle charging facility and an isolating switch. (iii) Over load and Earth Fault protection for the generator set.	Nos	1	1	1	1	1	1				6	2147600.00	12885600.00
	DG Exhaust Pipe													
	Exhaust piping shall be fabricated from class 'B' MS pipes upto 150 mm dia conforming to IS 1239 of size suitable to limit backpressure to within permissible limit.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
1.36	**DIESEL GENERATOR FOR Gaddigodam Square PD**													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	Supply, installation, testing and commissioning a complete system of 630kVA Prime duty type diesel generator sets to meet the load requirements for all essential loads as mentioned in these Specifications/Contract. The DG set emissions shall cofirm to the latest regulation of the Central Pollution Control Board (CPCB). Installation Batteries with Stand, leads, cover and accessories. 990 Ltrs Day Tank fabricated out of 6mm thick sheet steel with secondary containment tank and with fitments and float level switches. Drip Tray for fuel tank ,Drip Tray below engine crank case The entire set shall be housed in soundproof enclosure mounted on suitable Rubber-in-shear type vibration mounts with 6mm static deflection for isolating the building floor. A nominal base concrete pad (if required) shall be provided over which the engine set with its own base frame and vibration mounts shall be mounted. Adopter Box for cable / bus duct termination with extension bus bars. Any other item not specifically mentioned but required for proper performance and safe working of the system. The DG system shall be provided to interface with Station Management System (SMS)/Building Management system(BMS) for remote monitoring and management in Station Control Room and/or OCC room (if available) respectively.									1		1		
	AMF PANEL	Set											6122025.00	6122025.00
	The AMF Panel should therefore comprise: (i) 1000A , 4 Pole ACB as main Incomer from AMF Panel, copper bus bar of adequate rating with one no. 4-pole ACBs as outgoing for Essential Power Panel 1000A, ACB and Fire Pump Panel 400A, MCCB of adequate rating, duly interlocked. (ii) Battery charger with normal and trickle charging facility and an isolating switch. (iii) Over load and Earth Fault protection for the generator set.													
	DG Exhaust Pipe													
	Exhaust piping shall be fabricated from class 'B' MS pipes upto 150 mm dia conforming to IS 1239 of size suitable to limit backpressure to within permissible limit.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
1.37	**DIESEL GENERATOR FOR Kasturchand park PD**													
1	Supply, installation, testing and commissioning a complete system of 750kVA Prime duty type diesel generator sets to meet the load requirements for all essential loads as mentioned in these Specifications/Contract. The DG set emissions shall cofirm to the latest regulation of the Central Pollution Control Board (CPCB). Installation Batteries with Stand, leads, cover and accessories. 990 Ltrs Day Tank fabricated out of 6mm thick sheet steel with secondary containment tank and with fitments and float level switches. Drip Tray for fuel tank ,Drip Tray below engine crank case The entire set shall be housed in soundproof enclosure mounted on suitable Rubber-in-shear type vibration mounts with 6mm static deflection for isolating the building floor. A nominal base concrete pad (if required) shall be provided over which the engine set with its own base frame and vibration mounts shall be mounted. Adopter Box for cable / bus duct termination with extension bus bars. Any other item not specifically mentioned but required for proper performance and safe working of the system. The DG system shall be provided to interface with Station Management System (SMS)/Building Management system(BMS) for remote monitoring and management in Station Control Room and/or OCC room (if available) respectively.								1			1	27582750.00	27582750.00
2	Supply, installation, testing and commissioning a complete system of 1000kVA Prime duty type diesel generator sets to meet the load requirements for all essential loads as mentioned in these Specifications/Contract. The DG set emissions shall cofirm to the latest regulation of the Central Pollution Control Board (CPCB). Installation Batteries with Stand, leads, cover and accessories. 990 Ltrs Day Tank fabricated out of 6mm thick sheet steel with secondary containment tank and with fitments and float level switches. Drip Tray for fuel tank ,Drip Tray below engine crank case The entire set shall be housed in soundproof enclosure mounted on suitable Rubber-in-shear type vibration mounts with 6mm static deflection for isolating the building floor. A nominal base concrete pad (if required) shall be provided over which the engine set with its own base frame and vibration mounts shall be mounted. Adopter Box for cable / bus duct termination with extension bus bars. Any other item not specifically mentioned but required for proper performance and safe working of the system. The DG system shall be provided to interface with Station Management System (SMS)/Building Management system(BMS) for remote monitoring and management in Station Control Room and/or OCC room (if available) respectively.-2 Set													
3	**DG SYN PANEL**													
	INCOMER (DG-1 & 2)													
	2 nos. 1600 A, 415V, Ics= 50 KA, 4P,ACB complete with variable overcurrent,Earth Fault and short circuit releases													
	Each Incoming breaker shall comprise of following:													
	Multifunction meter for THD, V,A, KWHr, Hz, P, kVAR with CT's and RS 485 communication port - 1 Set													
	Breaker ON / OFF / TRIP, Ready to close contact & indicating lights with control MCB - 1 Set													
	RYB Phase indicating light protected by 2 amps MCB's. - 1 Set													
	Auto-manual / test selector / switch - 1 Set													
	230V or 24 V DC Shunt trip coil. - 1 Set													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	Under Voltage and over voltage relay (27 & 59) with timer - 1 Set													
	400 amps TP contactor (AC 3 duty) for neutral isolation with On/Off/Trip, Indication lamps complete with all accessories as required.													
	Excitor field DC voltmeter and ammeter.													
	Voltage resrained over current protection (50 V / 51 V) type CDV62 or equivalent with CT's - 1 Set													
	Engine cranking relay- 1 Set													
	Microprocessor based engine control automatic failure stand by relay including all accessories													
	Selector switch for engine control OFF/ON													
	Five push buttons – start, stop, reset, test and accept													
	Three indicating lamps "load on set', 'Load on Mains' and " Set fail to start'.													
	16 Window alarm annunciators panel with hooter, push buttons, aux. Contactors etc as required as per specification.													
	Battery charger with voltmeter of range 0-50 volts and ammeter of range 0-50 amps for trickle and boost charging.													
	Temperature scanner (Messi Bus/Procon)													
	Underpower Relay with Timer - 1 Set													
	Reverse Power Relay - 1 Set													
	Phase Sequence Relay - 1 Set	Set												
	Differential Protection Relay (87 G/N) - 1 Set													
	Under / Over Frequency Relay - 1 Set													
	INCOMER (DG-3)													
	1 nos. 1250 A, 415V, Ics= 50 KA, 4P,ACB complete with variable overcurrent,Earth Fault and short circuit releases													
	Incoming breaker shall comprise of following:													
	Multifunction meter for THD, V,A, KWHr, Hz, P, kVAR with CT's and RS 485 communication port - 1 Set													
	Breaker ON / OFF / TRIP, Ready to close contact & indicating lights with control MCB - 1 Set													
	RYB Phase indicating light protected by 2 amps MCB's. - 1 Set													
	Auto-manual / test selector / switch - 1 Set													
	230V or 24 V DC Shunt trip coil. - 1 Set													
	Under Voltage and over voltage relay (27 & 59) with timer - 1 Set													
	400 amps TP contactor (AC 3 duty) for neutral isolation with On/Off/Trip, Indication lamps complete with all accessories as required.													
	Excitor field DC voltmeter and ammeter.													
	Voltage resrained over current protection (50 V / 51 V) type CDV62 or equivalent with CT's - 1 Set													
	Engine cranking relay- 1 Set													
	Microprocessor based engine control automatic failure stand by relay including all accessories													
	Selector switch for engine control OFF/ON													
	Five push buttons – start, stop, reset, test and accept													
	Three indicating lamps "load on set', 'Load on Mains' and " Set fail to start'.													
	16 Window alarm annunciators panel with hooter, push buttons, aux. Contactors etc as required as per specification.													
	Battery charger with voltmeter of range 0-50 volts and ammeter of range 0-50 amps for trickle and boost charging.													
	Temperature scanner (Messi Bus/Procon)													
	Underpower Relay with Timer - 1 Set													
	Reverse Power Relay - 1 Set													
	Phase Sequence Relay - 1 Set													
	Differential Protection Relay (87 G/N) - 1 Set													
	Under / Over Frequency Relay - 1 Set													
	BUSBAR													
	Electrolytic high conductivity copper three phase and neutral busbars rated at 4000 A having a maximum current density of 1.2 A per sq mm suitable to with stand symmetrical fault level of 50 kA at 415 V. The neutral busbar is to be of 50% capacity.													
	Bus Coupler													
	1600 A, 415V, Ics=50 kA, 4P, ACB complete with variable overcurrent,Earth Fault and short circuit releases													
	Metering													
	The SYN Panel should therefore comprise: (i) Battery charger with normal and trickle charging facility and an isolating switch. (ii) Over load and Earth Fault protection for the generator set.													
	OUTGOING UNITS													
	2 no. 2000 A, 415V, Ics=50 kA, 4P, ACB complete with variable overcurrent,Earth Fault and short circuit releases, UVR & shunt trip having indication lamps to give status													
	1 no. 630 A, 415V, Ics=35 kA, TP, MCCB complete with variable overcurrent,Earth Fault and short circuit releases, UVR & shunt trip having indication lamps to give status													
	DG Exhaust Pipe													
	1. DG Exhaust Pipe as per CPCB and local authority norms. 2. Exhaust piping shall be fabricated from class 'B' MS pipes upto 150 mm dia conforming to IS 1239 of size suitable to limit backpressure to within permissible limit. Shall be complete with required cladding as per norms.													
	\													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
1.38	**Synchronizing Panel for Solar power Intake**													
	Supply,Installation,Testing and commissioning of synchronizing panel comparising of	Nos								1		1	613600.00	613600.00
	INCOMER (Normal supply)													
	Incoming from MDB2 with 400 A, 415V, Ics=50 kA, 4P, motorised MCCB complete with variable overcurrent and short circuit releases for Normal supply													
	2 – set Red/Green ON/OFF indicating lamps													
	2 set of three phase indicating lamps (red, yellow, blue)													
	Amber healthy/ trip indicating lamps for above feeders U/V relay with shunt trip.													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	INCOMING FROM Solar PANEL													
	1 nos. 400 A, 415V, Ics= 50 KA, 4P, motorised MCCBs complete with variable overcurrent and short circuit releases													
	1- set Red/Green ON/OFF indicating lamps													
	1- set of three phase indicating lamps (red, yellow, blue)													
	Amber healthy trip indicating lamps for above feeders													
	BUSBAR													
	Electrolytic high conductivity copper three phase and neutral busbars rated at 400 A having a maximum current density of 1.2 A per sq mm suitable to with stand symmetrical fault level of 50 kA at 415 V. The neutral busbar is to be of 50% capacity.													
	OUTGOING UNITS													
	1 no. 400A, 415V, Ics=35 kA, TP MCCB's with fixed neutral and with variable overcurrent and short circuit releases, UVR & shunt trip having indication lamps to give status													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	Addition/Deletion													
2.00	Adjustment rates for addition/deletion of supply & fixing of following including making of suitable holes/space in the panel/DBs and making good all external/internal finishes, terminations etc complete in all respect as required.													
a	Voltage Transduser	Set	0	0	0	0	0	0	1			1	8131.00	8131.00
b	Under & Over Voltage Relay	Set	0	0	0	0	0	0	1			1	34151.00	34151.00
c	Multifunction Meter with CTs	Set	1	1	0	1	1	1	1	5		11	25702.00	282722.00
d	Digital Load Manager with CTs	Set	0	0	0	0	0	0	1			1	25701.00	25701.00
e	Electrical, Mechanical Interlock	Set	0	0	0	0	0	0	1	2		3	12196.00	36588.00
f	Surge Protection Device	Set	0	0	0	0	0	0	1			1	36235.00	36235.00
g	Micom Relay P127 with CT	Set	0	0	0	0	0	0	1			1	90152.00	90152.00
h	Under & Over Voltage Release	Set	0	0	0	0	0	0	1			1	4309.00	4309.00
i	Motor Mechanism 100A/160A	Set	3	3	3	3	3	3	1	2		21	34964.00	734244.00
j	Motor Mechanism 250A	Set	2	2	2	2	2	2	1	2		15	31646.00	474690.00
k	Motor Mechanism 400A/630A	Set	3	3	3	3	3	3	1	2		21	49828.00	1046388.00
l	Integral Type Digital Energy Meter with CTs	Set	0	0	0	0	0	0	1			1	41390.00	41390.00
m	Copper Busbar	KG	0	0	0	0	0	0	1	10		11	764.00	8404.00
n	Multiple LED/neon type indications	Nos	0	0	0	0	0	0	1			1	127.30	127.30
o	Astronomical digital timer	Nos	0	0	0	0	0	0	1			1	7459.40	7459.40
n	Ammeter/Voltmeter (3.5 digit display)	Nos	0	0	0	0	0	0	1			1	1141.90	1141.90
q	TP Contactor - 40/32 Amps	Nos	0	0	0	0	0	0	1			1	2768.30	2768.30
r	Aux. Contact 1 NO + 1 NC for MCB	Nos	0	0	0	0	0	0	1			1	359.10	359.10
3	Adjustment rates for **addition/deletion** of compartmentalised switchgear in panels/switchboard of following rating including the supply, fabrication, extension, modification of the enclosure or in a separate enclosure, earthing ,basbar, other sub-systems, accessories etc complete as required and as per specifications and as specified in of item 1.0 above													
3.1	1 no. 4000 A, 415V, 65kA, 4P draw out Electrically operated ACB complete with:	Nos	0	0	0	0	0	0	1			1	450700.00	450700.00
a	1- set Red/Green ON/OFF indicating lamps													
b	1- set of three phase (red, yellow, blue) indicating lamps													
c	Amber healthy trip indicating lamps													
d	3 nos. cast resin current transformers of 4000/5 ratio with15 VA Burden & Class 5P10 for protection													
e	3 nos. cast resin current transformers of 4000/5 ratio with 15VA burden and Class 1.0 for measurement													
f	Microprocessor based release having variable range of overcurrent, short circuit and earth fault protection with time lag facility for each of the fault for achieving discrimination along with distinct fault indication through LED's.													
g	230V AC or 24 V DC shunt trip coil													
h	230V, AC Motor wound spring closing mechanism.													
i	Terminals to receive suitable rating bus duct/XLPE armoured cables													
j	RS-485 port for display of ON/OFF status of ACB on BMS workstation through MODBUS protocol													
3.2	1 no. 1600 A, 415V, 50kA, 4P draw out Electrically operated ACB complete with:	Nos	0	0	0	0	0	0	1			1	371000.00	371000.00
a	1- set Red/Green ON/OFF indicating lamps													
b	1- set of three phase (red, yellow, blue) indicating lamps													
c	Amber healthy trip indicating lamps													
d	3 nos. cast resin current transformers of 1600/5 ratio with15 VA Burden & Class 5P10 for protection													
e	3 nos. cast resin current transformers of 1600/5 ratio with 15VA burden and Class 1.0 for measurement													
f	Microprocessor based release having variable range of overcurrent, short circuit and earth fault protection with time lag facility for each of the fault for achieving discrimination along with distinct fault indication through LED's.													
g	230V AC or 24 V DC shunt trip coil													
h	230V, AC Motor wound spring closing mechanism.													
i	Terminals to receive suitable rating bus duct/XLPE armoured cables													
j	RS-485 port for display of ON/OFF status of ACB on BMS workstation through MODBUS protocol													
3.3	1 no. 1250 A, 415V, 50kA, 4P draw out Electrically operated ACB complete with:	Nos	0	0	0	0	0	0	1			1	322702.65	322702.65
a	1- set Red/Green ON/OFF indicating lamps													
b	1- set of three phase (red, yellow, blue) indicating lamps													
c	Amber healthy trip indicating lamps													
d	3 nos. cast resin current transformers of 1250/5 ratio with15 VA Burden & Class 5P10 for protection													
e	3 nos. cast resin current transformers of 1250/5 ratio with 15VA burden and Class 1.0 for measurement													
f	Microprocessor based release having variable range of overcurrent, short circuit and earth fault protection with time lag facility for each of the fault for achieving discrimination along with distinct fault indication through LED's.													
g	230V AC or 24 V DC shunt trip coil													
h	230V, AC Motor wound spring closing mechanism.													
i	Terminals to receive suitable rating bus duct/XLPE armoured cables													
j	RS-485 port for display of ON/OFF status of ACB on BMS workstation through MODBUS protocol													
3.4	1 no. 1000 A, 415V, 50kA, 4P draw out Electrically operated ACB complete with:	Nos	0	0	0	0	0	0	1			1	283617.75	283617.75
a	1- set Red/Green ON/OFF indicating lamps													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
b	1- set of three phase (red, yellow, blue) indicating lamps													
c	Amber healthy trip indicating lamps													
d	3 nos. cast resin current transformers of 1000/5 ratio with15 VA Burden & Class 5P10 for protection													
e	3 nos. cast resin current transformers of 1000/5 ratio with 15VA burden and Class 1.0 for measurement													
f	Microprocessor based release having variable range of overcurrent, short circuit and earth fault protection with time lag facility for each of the fault for achieving discrimination along with distinct fault indication through LED's.													
g	230V AC or 24 V DC shunt trip coil													
h	230V, AC Motor wound spring closing mechanism.													
i	Terminals to receive suitable rating bus duct/XLPE armoured cables													
j	RS-485 port for display of ON/OFF status of ACB on BMS workstation through MODBUS protocol													
3.5	1 no. 800 A, 415V, 50kA, 4P draw out Electrically operated ACB complete with:	Nos	1	0	0	0	0	0				1	261799.10	261799.10
a	1- set Red/Green ON/OFF indicating lamps													
b	1- set of three phase (red, yellow, blue) indicating lamps													
c	Amber healthy trip indicating lamps													
d	3 nos. cast resin current transformers of 800/5 ratio with15 VA Burden & Class 5P10 for protection													
e	3 nos. cast resin current transformers of 800/5 ratio with 15VA burden and Class 1.0 for measurement													
f	Microprocessor based release having variable range of overcurrent, short circuit and earth fault protection with time lag facility for each of the fault for achieving discrimination along with distinct fault indication through LED's.													
g	230V AC or 24 V DC shunt trip coil													
h	230V, AC Motor wound spring closing mechanism.													
i	Terminals to receive suitable rating bus duct/XLPE armoured cables													
j	RS-485 port for display of ON/OFF status of ACB on BMS workstation through MODBUS protocol													
3.6	630A, 415V, Ics=50 kA, 4P, MCCB with variable over current and short circuit releases and 1-set of three phase indicating lamps (red, yellow, blue)	Nos	0	0	0	0	0	0	1			1	60185.35	60185.35
3.7	630A, 415V, Ics=50 kA, TP, MCCB with variable over current and short circuit releases with heavy duty solid neutral link and 1-set of three phase indicating lamps (red, yellow, blue)	Nos	5	5	5	5	5	5	1			31	55102.85	1708188.35
3.8	400A, 415V, Ics=35 kA, 4P, MCCB with variable over current and short circuit releases and 1-set of three phase indicating lamps (red, yellow, blue)	Nos	9	9	9	9	9	9	1			55	47347.05	2604087.75
3.9	400A, 415V, Ics=35 kA, TP, MCCB with variable over current and short circuit releases with heavy duty solid link and 1-set of three phase indicating lamps (red, yellow, blue)	Nos	11	11	11	11	11	11	1			67	44198.75	2961316.25
3.10	250/200 A ,415V, Ics=35kA, 4P, MCCB with variable over current and short circuit releases and 1-set of three phase indicating lamps	Nos	0	0	0	0	0	0	1			1	41208.15	41208.15
3.11	250/200 A ,415V, Ics=35kA, TP, MCCB with variable over current and short circuit releases with heavy duty solid neutral link and 1-set of three phase indicating lamps	Nos	5	5	5	5	5	5	1			31	37446.15	1160830.65
3.12	100/63 A, 415V, Ics=35 kA ,TP, MCCB with variable over current and short circuit releases with heavy duty solid neutral link and 1-set of three phase indicating lamps	Nos	9	9	9	9	9	9	1			55	20634.95	1134922.25
3.13	Less than 63A to 40A, 415V, Ics=25 kA ,TP, MCCB with variable over current and short circuit releases with heavy duty solid neutral link and 1-set of three phase indicating lamps	Nos	11	11	11	11	11	11	1			67	20634.95	1382541.65
3.14	32A , 415V, Ics=35 kA ,TP, MCCB with variable over current and short circuit releases with heavy duty solid neutral link and 1-set of three phase indicating lamps	Nos	10	10	10	10	10	10	1			61	12392.00	755912.00
3.15	Electrical operating mechanism (Motorised mechanism) for all type of above MCCBs	Nos	0	0	0	0	0	0	1			1	11971.90	11971.90
3.16	40-63A FP MCB 9/10 kA	Nos	1	0	0	0	0	0	1			2	4289.25	8578.50
3.17	40-63A TP MCB 9/10 kA	Nos	1	0	0	0	0	0	1			2	4047.00	8094.00
3.18	40-63A DP MCB 9/10 kA	Nos	1	0	0	0	0	0	1			2	1380.00	2760.00
3.19	40-63A SP MCB 9/10 kA	Nos	1	0	0	0	0	0	1			2	730.00	1460.00
3.20	5-32A FP MCB 9/10 kA	Nos	14	19	14	14	14	14	1			90	1860.00	167400.00
3.21	5-32A TP MCB 9/10 kA	Nos	1	0	0	0	0	0	1			2	1380.00	2760.00
3.22	5-32A DP MCB 9/10 kA	Nos	12	12	12	12	12	12	1			73	900.00	65700.00
3.23	5-32A SP MCB 9/10 kA	Nos	1	0	0	0	0	0	1			2	410.00	820.00
3.24	16-32Amp DP RCCB, 30 mA	Nos	1	0	0	0	0	0	1			2	3480.00	6960.00
3.25	1000mA 4P RCCB/ELCB-MCB	Nos	4	4	4	4	4	4	1			25	17321.00	433025.00
3.26	Supply, installation and testing of 63/40 Amp adjustable, TP MCCB with fixed neutral in sheet steel enclosure with incoming & outgoing cable box and ON indication lamp complete as required.	Nos	1	0	0	0	0	0	10			11	13442.00	147862.00
3.27	Supplying installation testing and commissioning of 10/25/32A DP MCB in IP 54 rated surface/recessed box with the total unit having IP 54 ingress protection with incoming & outgoing cable box for AC indoor unit complete as required.	Nos	1	0	0	0	0	0	1			2	1829.00	3658.00
2.28	Supplying installation testing and commissioning of 63 A 4P isolator MCCB in IP 56 rated surface/recessed GI box with the total unit having IP 56 ingress protection for AC Outdoor Units/Lifts/Escalators etc.	Nos	12	17	12	12	12	12	1			78	2666.00	207948.00
3.29	Supplying installation testing and commissioning of 125 A 4P isolator MCCB in IP 56 rated surface/recessed GI box with the total unit having IP 56 ingress protection for Station UPS	Nos	2	2	2	2	2	2	1			13	4748.00	61724.00
3.30	Supply, installation and testing of 4 way TPN sheet steel enclosure with incoming and outgoing cable, distribution board complete as required.	Nos	1	0	0	0	0	0	1			2	16368.50	32737.00
3.31	Supply, installation and testing of 200 amps 4 Pole Isolator in sheet steel enclosure with incoming and outgoing cable box and indication lamps complete as required.	Nos	2	2	2	2	2	2	1			13	18107.00	235391.00

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
3.32	Overload relay													
a	4 - 6 A	Nos	1	0	0	0	0	0	1			2	740.05	1480.10
b	6 - 12A	Nos	1	0	0	0	0	0	1			2	740.05	1480.10
c	9 - 15 A	Nos	1	0	0	0	0	0	1			2	950.95	1901.90
d	30 - 40 A	Nos	1	0	0	0	0	0	1			2	2091.90	4183.80
e	40 - 65 A	Nos	1	0	0	0	0	0	1			2	2145.10	4290.20
f	63 - 100 A	Nos	1	0	0	0	0	0	1			2	3508.35	7016.70
												0		
3.33	100 HP, **Star Delta starter** comprising 3 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.	Nos	3	3	3	2	2	2	1	1		17	141045.00	2397765.00
3.34	75 HP, **Star Delta starter** comprising 3 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.	Nos	0	0	0	0	0	0	1	1		2	141045.00	282090.00
3.35	50 HP, **Star Delta starter** comprising 3 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.	Nos	2	2	2	1	1	1	1	1		11	42960.00	472560.00
3.36	10/7.5 HP, **Star Delta starter** comprising 3 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.	Nos	0	0	0	0	0	0	1	1		2	36774.00	73548.00
3.37	Upto 5HP, **DOL starter** comprising 3 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.	Nos	1	1	1	1	1	1	1	1		8	22823.68	182589.44
3.38	Adjustment rates for addition/deletion of Power Contactor of following rating including the supply, fabrication, extension, modification of the enclosure or in a separate enclosure, earthing ,basbar, other sub-systems, accessories etc complete as required and as per specifications													
a	400 Amps 4 P Power Contactor	Nos	1	0	0	0	0	0	1			2	21576.40	43152.80
b	300 Amps 4 P Power Contactor	Nos	1	0	0	0	0	0	1			2	16770.35	33540.70
c	250 Amps 4 P Power Contactor	Nos	1	0	0	0	0	0	1			2	9117.15	18234.30
d	200 Amps 4 P Power Contactor	Nos	1	0	0	0	0	0	1			2	8136.75	16273.50
	SUB TOTAL LV SWITCHGEAR - E.01													**1468,52,064.41**
E.02	**DISTRIBUTION BOARDS**													
	Supply, installation, testing & commissioning of front operated front access cubical type indoor duty dead front wall / recess/ surface mounting, totally enclosed dust and vermin proof (minimum protection IP 54) panels with foamed-in neoprene gasketted hinged doors, fabricated from 2 mm thick CRCA with powder coated finish suitable for 415 V, 3-phase, 4 wire, 50 Hz system including suitably rated insulated copper busbars, interconnections, neutral bar assembly, phase segregating barriers, LED indicating lamps for incoming and outgoing feeders,15% spare space for future expansion, knockouts and gland plates for entry of cables and conduits, all internal wiring using high temperature FRLS wires, independant terminals for each phase, earthing terminals and including the cost of providing Master key lock on the door and pad locking facility on door as well as at incomer, bonding to earth etc. complete as per specification, drawings as required and as under:													
a)	MCBs shall conform to IEC898/IS 8828 (latest) and, with breaking capacity 9/10 kA at 415 V AC, current limiting type lower powerloss appx 40 -70% of the stipulated value and suitable for magnetic releases operating between 3 to 5 times rated current for normal power distribution application and 5 to 10 times rated current for moter application duty, with minimum Electrical endurance of the order of 20000 operation cycles.													
b)	Residual current circuit breaker (RCCB) conforming to IS 12640 shall be provided with 30 mA sensitivity and electrically connected rated current capacity MCB for short circuit and over load protection as required													
c)	All incomer MCBs of boards /panels shall be provided with NO/NC contacts as specified in specifications and drawings													
d)	The LDBs may be required to accommodate Dimming Control equipment mountable on DIN rail. Contractor should refer to relevant specifications and drawings in this regard and submit his scheme for approval by Engineer.													
e)	All the contactors shall be provided with potential free contacts for remote monitoring and control.													
f)	Various distribution boards as given below:													
2.1	Lighting Distribution Boards (LDB) Type-1 as per specification and Drawing as per following details.													
	One lighting distribution board (LDB) unit consisting of 3 compartments with respective incoming TPN MCBs, DP MCB RCCBs/ELCBs, set of contactors and outgoing SP MCBs each having indications for incoming & outgoing feeder status e.g. LDB is combination of LDB /N, LDB /G, LDB /U connected to incoming Supplies from Normal, DG set & UPS respectively including a set of time switches as per specifications and as shown on Drawing and as under:	Nos	4	4	4	4	4	4	5	7		36	154964.00	5578704.00
A	Normal													
	INCOMER													
a)	1 no. 40A TPN Contactor with astronomical digital timer													
b)	1 no. 40A TPN MCB													
c)	1 set of (ON) indicating lamps for each													
	OUTGOINGS feeder													
a)	24 nos. 10A/20A SP MCB arranged in three rows and each row controlled by one no. 32A DP ELCB/RCCB with feeder ON indication lamps													
b)	3 nos. 32A DP MCB + ELCB/RCCB with feeder ON indication lamps tapped from above contactor (non timer -controlled feeders).													
B	DG													
	INCOMER													
a)	1 no. 40A TPN Contactor with astronomical digital timer													
b)	1 no. 40A TPN MCB													
c)	1 set of (ON) indicating lamps for each													
	OUTGOINGS feeder													

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
a)	24 nos. 10A/20A SP MCB arranged in three rows and each row controlled by one no. 32A DP ELCB/RCCB with feeder ON indication lamps													
b)	3 nos. 32A DP MCB + ELCB/RCCB with feeder ON indication lamps tapped from above contactor (non timer -controlled feeders).													
C	UPS													
	INCOMER													
a)	1 no. 25A DP Contactor with astronomical digital timer													
b)	1 no. 25A TP MCB + ELCB/RCCB													
c)	1 set of (ON) indicating lamps for each													
	OUTGOINGS feeder													
a)	10 nos. 10A/20A SP MCB arranged in a row and controlled by one no. 25A DP ELCB/RCCB with feeder ON indication lamps													
b)	4 nos. 10A/20A SP MCB arranged in a row and controlled by a 20A DP MCB + ELCB/RCCB with feeder ON indication lamps tapped from above contactor (non timer -controlled feeders).													
	SCADA / BMS CONNECTIVITY Contactor & Timer shall be provided with necessary NO/NC potential free contact & should provide single point to communicate with BMS/SCADA.													
2.2	**Lighting Distribution Boards (LDB) Type-2 as per specification and Drawing as per following details.**													
	One lighting distribution board (LDB) unit consisting of 2 compartments with respective incoming TPN MCBs, DP MCB RCCBs/ELCBs, set of contactors and outgoing SP MCBs each having indications for incoming & outgoing feeder status e.g. LDB is combination of LDB /N, LDB /G/LDB /U connected to incoming Supplies from Normal, DG set / UPS respectively including a set of time switches as per specifications and as shown on Drawing and as under:	Nos	2	2	2	2	2	2	6	4		22	50847.00	1118634.00
	SCADA / BMS CONNECTIVITY Contactor & Timer shall be provided with necessary NO/NC potential free contact & should provide single point to communicate with BMS/SCADA.													
A	Normal													
	INCOMER													
a)	1 no. 40A TPN MCB													
b)	1 set of (ON) indicating lamps for each													
	OUTGOINGS feeder													
a)	24 nos. 10A/20A SP MCB arranged in three rows and each row controlled by one no. 32A DP ELCB/RCCB with feeder ON indication lamps													
B	UPS													
	INCOMER													
a)	1 no. 25A DP MCB ELCB/RCCB													
b)	1 set of (ON) indicating lamps for each													
	OUTGOINGS feeder with feeder ON Indication LED Lamps													
a)	10 nos. 10A/20A SP MCB													
	SCADA / BMS CONNECTIVITY Contactor & Timer shall be provided with necessary NO/NC potential free contact & should provide single point to communicate with BMS/SCADA.													
2.3	**Lighting Distribution Boards (LDB) Type-3 as per specification and Drawing as per following details.**													
	One lighting distribution board (LDB) unit consisting of 2 compartments with respective incoming TPN MCBs, DP MCB RCCBs/ELCBs, set of contactors and outgoing SP MCBs each having indications for incoming & outgoing feeder status e.g. LDB is combination of LDB /N, LDB /G/LDB /U connected to incoming Supplies from Normal, DG set / UPS respectively including a set of time switches as per specifications and as shown on Drawing and as under:	Nos	1	1	1	1	1	1	2	2		10	117067.00	1170670.00
A	Normal													
	INCOMER													
a)	1 no. 40A TPN Contactor with astronomical digital timer													
b)	1 no. 40A TPN MCB													
c)	1 set of (ON) indicating lamps for each													
	OUTGOINGS feeder													
a)	18 nos. 10A/20A SP MCB arranged in three rows and each row controlled by one no. 32A DP ELCB/RCCB with feeder ON indication lamps													
b)	3 nos. 32A DP MCB + ELCB/RCCB with feeder ON indication lamps tapped with DP Contactor													
B	DG													
	INCOMER													
a)	1 no. 40A TPN Contactor with astronomical digital timer													
b)	1 no. 40A TPN MCB													
c)	1 set of (ON) indicating lamps for each													
	OUTGOINGS feeder													
a)	9 nos. 10A/20A SP MCB arranged in three rows and each row controlled by one no. 32A DP ELCB/RCCB with feeder ON indication lamps													
b)	3 nos. 32A DP MCB + ELCB/RCCB with feeder ON indication lamps tapped with DP Contactor													
2.4	**Vertical Power distribution boards (VDPN) TYPE-4 as per specification and as per following details.**	Nos	1	1	1	1	1	1				6	50,946.50	3,05,679.00
	One lighting/Power distribution board (LDB) unit with respective incoming TP MCCBs, outgoing TPN MCBs each having indications for incoming & outgoing feeder status as per specifications and as under:													
	INCOMER													
	1 no. 80 TP MCCB													
	1 set of (ON) indicating lamps.													
	OUTGOINGS with feeder ON Indication													
	8 Nos of 32 TPN MCB													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
2.5	**Lighting distribution boards (LDB/PDP) Type-5 as per specification and as per following details. (Adversement DB Concourse and Platform level)**	Nos	3	3	3	3	3	3				18	54693.40	9,84,481.20
	One lighting distribution board (LDB) unit with respective incoming TP MCBs, outgoing TP MCBs DP RCCB and outgoing SP MCBs each having indications for incoming & outgoing feeder status as per specifications and as under:													
A	INCOMER													
a.	1 no. 63A Ics =35kA TPN MCCB													
b.	1 set of (ON) indicating lamps.													
B	OUTGOINGS with feeder ON Indication LED Lamps													
	3 No. 32A TP MCBs													
a)	9 Nos of 10A/20A SPMCB arranged in three rows and each row controlled by one no. 32A DP ELCB with feeder (ON) indication lamps.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
2.6	**Lighting distribution boards (LDB/PDP) TYPE-6 as per specification and as per following details.**	Nos	2	2	2	2	2	2				12	36365.00	4,36,380.00
	One lighting distribution board (LDB) unit with respective incoming TP MCBs, DP RCCB and outgoing SP MCBs each having indications for incoming & outgoing feeder status as per specifications and as under:													
A	INCOMER													
a.	1 no. 40A TP MCB													
b.	1 set of (ON) indicating lamps.													
B	OUTGOINGS													
a)	18 Nos of 10A/20A SPMCB arranged in three rows and each row controlled by one no. 40A DP ELCB with feeder (ON) indication lamps.													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
	SUB TOTAL DISTRIBUTION BOARDS - E.02													**95,94,548.20**
														-
E.03	**LV POWER & CONTROL CABLES,CABLE TRAYS AND STEEL WORKS**													
3.1	**Cable Laying**													
3.1.1	Supply, laying, jointing, terminating, testing and commissioning of 1100 V grade, armoured, FRLSZH, **XLPE**, aluminium(AL) / Copper (CU) conductor cables on existing trays/walls/columns/ indoor/ trenches including the cost of supports with suitable clamps, saddles, hooks, bolts etc. and including the cost of proper dressing of cables, markers providing identification tags,earthing of glands armouring etc. complete as per specifications, as required and as below.													
	Note 1: All cables 25 sq.mm and above are AL conductor unless specified otherwise.													
a)	3.5 core 400 sq mm AL conductor	Mtrs	110	100	104	130	110	268				822	1,982.40	16,29,532.80
b)	3.5 core 300 sq mm AL conductor	Mtrs	375	375	375	375	375	375	4725	1170		8145	1,247.26	101,58,932.70
c)	3.5 core 240-sqmm AL conductor	Mtrs	70	70	70	70	70	63		200		613	814.15	4,99,073.95
d)	3.5 core 185-sqmm AL conductor	Mtrs	140	140	140	140	140	140				840	855.50	7,18,620.00
e)	3.5 core 150 sq mm AL. Conductor	Mtrs	70	70	70	70	70	70	465	305		1190	499.70	5,94,643.00
f)	3.5 core 120-sqmm AL conductor	Mtrs	280	150	205	410	158	371				1574	592.36	9,32,374.64
g)	3.5 core 95 sq mm AL. Conductor	Mtrs	0	0	0	0	0	0	95			95	563.35	53,518.25
h)	4 core 95 sq mm AL. Conductor	Mtrs	200	200	200	200	200	200				1200	408.50	4,90,200.00
i)	3.5 core 70-sqmm AL conductor	Mtrs	125	338	27	138	130	460	65			1283	429.52	5,51,074.16
l)	3.5 core 50 sq mm AL. Conductor	Mtrs	240	225	230	225	208	267	300	320		2015	354.00	7,13,310.00
k)	3.5 core 35-sqmm AL conductor	Mtrs	155	2720	1604	494	400	1625				6998	283.20	19,81,833.60
l)	3.5 core 25-sqmm AL conductor	Mtrs	1301	1500	465	150	697	225				4338	264.32	11,46,620.16
m)	4 core 16 sq mm CU Conductor	Mtrs	4000	4000	4000	4000	4000	4000	1265	380		25645	660.80	169,46,216.00
n)	4 core 10 sq mm CU Conductor	Mtrs	2000	2000	2000	2000	2000	2000	1630	1115		14745	538.08	79,33,989.60
o)	4 core 6 sq mm CU Conductor	Mtrs	400	600	440	476	270	135	490	2880		5691	365.80	20,81,767.80
p)	4 core 4 sq mm CU Conductor	Mtrs	350	350	350	350	350	350	245			2345	295.00	6,91,775.00
q)	3 core 6 sq mm CU Conductor	Mtrs	100	100	100	100	100	100	970	545		2115	226.10	4,78,201.50
r)	3 core 4 sq mm CU Conductor	Mtrs	100	100	100	100	100	100	70			670	133.00	89,110.00
s)	2 core 16 sq mm AL. Conductor	Mtrs	250	250	250	250	250	250				1500	95.95	1,43,925.00
t)	2 core 50 sq mm Cu. Conductor	Mtrs	20	20	20	20	20	20				120	732.45	87,894.00
3.1.2	Cable jointing and termination of cable as per item 1.1 -including cost of supplying and fixing, crimping lugs, double compression brass glands, insulation tape etc. complete as per specifications and as required.													
a)	3.5 core 400 sq mm AL conductor	Nos	10	10	10	10	10	10				60	3,508.44	2,10,506.10
b)	3.5 core 300 sq mm AL conductor	Nos	14	14	14	14	14	14	146	50		280	3,035.37	8,49,904.44
c)	3.5 core 240-sqmm AL conductor	Nos	3	3	3	3	3	3		12		30	2379.00	71,370.00
d)	3.5 core 185 sqmm AL conductor	Nos	8	8	8	8	8	8				48	1,752.39	84,114.93
e)	3.5 core 150 sq mm AL. Conductor	Nos	2	2	2	2	2	2	12	14		38	1268.00	48,184.00
f)	3.5 core 120 sqmm AL conductor	Nos	12	12	12	12	12	12				72	1,347.80	97,041.31
g)	3.5 core 95 sq mm AL. Conductor	Nos	0	0	0	0	0	0	2			2	821.00	1,642.00
h)	4 core 95 sq mm AL. Conductor	Nos	4	4	4	4	4	4				24	1542.80	37,027.20
i)	3.5 core 70 sqmm AL conductor	Nos	10	10	10	10	10	10	2			62	808.30	50,114.60
l)	3.5 core 50 sq mm AL. Conductor	Nos	18	18	18	18	18	18	12	20		140	690.30	96,642.00
k)	3.5 core 35 sqmm AL conductor	Nos	20	20	20	20	20	20				120	577.20	69,263.64
l)	3.5 core 25 sqmm AL conductor	Nos	20	20	20	20	20	20				120	413.00	49,560.00
m)	4 core 16 sq mm CU Conductor	Nos	50	50	50	50	50	50	38	24		362	401.20	1,45,234.40
n)	4 core 10 sq mm CU Conductor	Nos	30	30	30	30	30	30	56	108		344	334.29	1,14,997.14
o)	4 core 6 sq mm CU Conductor	Nos	10	10	10	10	10	10	18	150		228	283.20	64,569.60
p)	4 core 4 sq mm CU Conductor	Nos	34	34	34	34	34	34	8			212	236.00	50,032.00
q)	3 core 6 sq mm CU Conductor	Nos	12	12	12	12	12	12	42	46		160	1174.20	1,87,872.00
r)	3 core 4 sq mm CU Conductor	Nos	12	8	8	8	8	8	6			58	880.65	51,077.70

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
s)	2 core 16 sq mm AL. Conductor	Nos	24	24	24	24	24	24				144	853.10	1,22,846.40
t)	2 core 50 sq mm Cu. Conductor	Nos	2	2	2	2	2	2				12	940.50	11,286.00
3.1.3	Supply, laying testing and commissioning of 1.5 sqmm 1100 V grade, armoured, FRLSZ PVC insulated, FRLSZH PVC sheathed copper conductor cables on existing trays/walls/columns/ indoor/ trenches including the cost of supports with suitable clamps, saddles, hooks, bolts etc. and including the cost of proper dressing of cables and including the cost of providing identification tags etc. complete as per specifications, as required and as below.													
	Note : Termination of all control cables to be provided under the above item and as per schematic diagram including the cost of supplying and fixing crimping lugs, compression type brass glands, heavy duty ferrules, insulation tape etc. complete as per specifications and as required.													
a)	4 C x 1.5 sqmm	Mtrs							100			100	229.90	22,990.00
b)	4 C x 1.5 sqmm	Mtrs	10	0	0	0	0	0	100	148		258	140.29	36,194.87
c)	5 C x 1.5 sqmm	Mtrs	10	0	0	0	0	0	100	30		140	165.66	23,192.40
d)	7 C x 1.5 sqmm	Mtrs	10	0	0	0	0	0				10	197.00	1,970.00
e)	8 C x 1.5 sqmm	Mtrs	10	0	0	0	0	0	400	30		440	210.00	92,400.00
f)	10 C x 1.5 sqmm	Mtrs	10	0	0	0	0	0	300	30		340	268.00	91,120.00
g)	12 C x 1.5 sqmm	Mtrs							400	30		430	268.00	1,15,240.00
3.2	Lighting and Power Bus bar (Addition and deletion)													
	Ideal for all lighting and power demands up to 63 A Plug outlet covers (hinged and retained), cover tap-off outlets when not in use Feed units and end covers .													
a)	Lengths Rigid galvanised steel casing 3 m maximum distance between suspension brackets Conductors insulated with self-extinguishing plastic (IEC 60695-2-12 and V0 according to UL94) Standard tap-off outlets with captive IP 55 plug outlet covers Protection index IP 55 Impact resistance : IK 07 252	Mtrs	0	0	0	0	0	0				0	5985.96	-
b)	End feed units Allow electrical powering of the LB PLUS busbar With terminals for the connection of stranded or solid copper wire cables Delivered with corresponding cable glands	Nos	0	0	0	0	0	0				0	2530.91	-
c)	Centre feed units Centre feed units can be used to power the busbar from an intermediate point of the line, reducing the voltage drop at the end of the line and/or facilitating the installation when the power supply point is near the centre of the line Complete with all internal wiring One set of terminals feeds both left hand and right hand feed sections Supplied with both end caps	Nos	0	0	0	0	0	0				0	3105.75	-
d)	Flexible joints Consists of a right hand and left hand unit Used to change direction, change level or overcome obstructions	Nos	0	0	0	0	0	0				0	8863.17	-
3.3	Trunking made of roll-formed sheet steel in white polyster lacquer finish,11 conductors embeded in an integral conductor moulding. 5 mains power lines plus 2x2 conductors for integrating imergency lighting using two independently isolated circuits,plus 2 control-line conductors.Tool-free connection using electrical feed kit complete as required.Dimensions:4000x60x54 mm	Mtrs							10	10		20	3012.45	60,249.00
3.4	**BUS DUCTS**													
3.4.1	Design, manufacture, testing at works, supplying, Installtion, testing and Commissioning of sheet steel structure Sandwitch type TPN "AI" bus duct having neutral cross section equal to phase, 50% Integral earth which is part of housing itself and class F/H insulation and enclosure will be of minimum 1.6 mm GI sheet steel epoxy powder coated paint with approved shade as per specification including suitable earthing conductor through out the length of bus duct. The bus bar will be of Aluminium with radialised edges. Individual sections will not be more than 3 meters long uniblock. One section will be connected to adjacent section by joint system operating by single bolt. Sub assembly should be removable without disturbing the adjacent bus bars. Rates shall be inclusive of all accessories i.e. bends, expansion joint, end feed box, Fire barriers inccluding all required necessary supports etc. as required.(Phase sequence shall be matched at both ends)													
a	1000 amps Sandwich Busduct with short circuit withstand of 50kA for one Sec.	Mtrs							0			0	26251.00	-
b	1600 amps Sandwich Busduct with short circuit withstand of 50kA for one Sec.	Mtrs							0			0	24000.00	-
c	2000 amps Sandwich Busduct with short circuit withstand of 50kA for one Sec.	Mtrs							40			40	27738.00	11,09,520.00
d	2500 amps Sandwich Busduct with short circuit withstand of 50kA for one Sec.	Mtrs							0			0	36300.00	-
e	4000 amps Sandwich Busduct with short circuit withstand of 65kA for one Sec.	Mtrs							0			0	86180.00	-
3.4.2	Design, manufacture, testing at works, supplying, Installation, Testing and Commissioning of flanged end Bimetallic flexible Termination with all accessories as required for the following rating of bus duct. The Flange End should be suitable for the Transformers and Panels:													
a	1000 amps	Nos							0			0	49252.00	-
b	1600 Amps	Nos							0			0	25775.00	-
c	2000 Amps	Nos							4			4	31625.00	1,26,500.00
d	2500 Amps	Nos							0			0	41013.00	-
e	4000 Amps	Nos							0			0	169811.00	-
3.5	**Cable Trays**													
3.5.1	Supply, fabrication & installation of perforated hot dipped galvanised double bended cable trays from 2 mm thick GI sheets continuously connected including horizontal and vertical bends, reducers, tees, and other accessories and duly suspended from the ceiling with 12 mm dia vertical GI rods supported by 40mm x 40 mm 5 mm GI angle etc. (or installed on wall supported on suitable brackets as required) complete as per specifications, as required and as below. Coloured cable tray shall be provided as per Engineer In-charge.The Cable Tray shall be provided with perforated removable cover.													
	Note: Trays shall be supported adequately at minimum 1 m distance from the building structure/ ceiling by means of painted/galvanized (as specified) MS structural members secured to the structure by dash fasteners or by grouting. This support should be capable of withstanding the weight equivalent of 3m length of the cables that can be laid in the trays. At turns the support has to be double and at both ends of the bend.													
a)	600 mm wide x 50 mm deep x 2mm thick	Mtrs	500	500	500	500	500	500	150	30		3180	1651.00	52,50,180.00
b)	450 mm wide x 50 mm deep x 2mm thick	Mtrs	0	0	0	0	0	0	55	50		105	981.35	1,03,041.75

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
c)	300 mm wide x 50 mm deep x 2mm thick	Mtrs	737	1700	1900	1700	1145	1715	145	500		9542	1,062.00	101,33,604.00
d)	200mm wide x 50mm deep x 2mm thick	Mtrs	300	300	300	300	300	300		30		1830	708.00	12,95,640.00
e)	150mm wide x 50mm deep x 2mm thick	Mtrs	1752	1900	2150	1900	1410	2010	530	550		12202	649.00	79,19,098.00
f)	100mm wide x 50mm deep x 2mm thick	Mtrs	116	1450	700	300	565	217		30		3378	590.00	19,93,020.00
3.6	**CABLE LADDER**													
	Supply & installation of prefabricated, GI, ladder type cable tray conforming to M & E Specifications continuously connected including horizontal & vertical bends reducers, tees, coupling plate, nut bolts washers etc. The side runners shall be 100 x 20 x 2.5 mm and centre rungs shall be of size 30 x 15 x 2.5 mm with centre to centre distance of 250 mm, as required.													
a	900 mm wide	Mtrs	65	70	70	70	65	65	450	60		915	1,062.00	9,71,730.00
b	600 mm wide	Mtrs	60	60	60	60	60	60	50	50		460	885.00	4,07,100.00
c	450 mm wide	Mtrs	50	50	50	50	40	40		30		310	590.00	1,82,900.00
d	300 mm wide	Mtrs	0	0	0	0	0	0		50		50	1,030.00	51,500.00
3.7	**Raceways**													
	Supply, installation of sheet steel raceways /trunking , fabricated from 2.0 mm thick GI with minimum coating thickness 260 gm / sq. meter on both sides with removable cover plate complete with counter sunk cadmium plated brass screws, bends, tee-junctions, cross junction etc ,in floor and suspended from the ceiling with required support . Coloured Raceways shall be provided as per Engineer In-charge. Rendered electrially continous as approved and of following sizes.													
a)	100 x 100 MM	Mtrs	0	0	0	0	0	0		50		50	1009.00	50,450.00
b)	100 x 50 MM	Mtrs	120	375	200	165	100	165		50		1175	1,888.00	22,18,400.00
c)	150 X 100 MM	Mtrs	0	0	0	0	0	0		50		50	2,242.00	1,12,100.00
d)	150 x 150 MM	Mtrs	0	0	0	0	0	0		50		50	683.00	34,150.00
e)	200 x 50 MM Raceway	Mtrs	100	100	100	100	100	100		30		630	2935.00	18,49,050.00
3.8	STEEL WORK	kg	1500	1500	1500	1500	1500	1500	400	3360		12760	147.50	18,82,100.00
	Supply, fabrication & installation, of fabricated GI steel work conforming to M & E specification and tender doct, to support GI cable trays, bus duct, light fixtures, conduit wirings, Bracket ,& other electrical works, as required.													
	SUB TOTAL LV POWER & CONTROL CABLES,CABLE TRAYS AND STEEL WORKS- E03													**864,69,337.64**
E04	**INTERNAL WIRING & ACCESSARIES**													
	Whether explicitly stated in the schedules below or not, the following must be complied with:													
	For supply and installation, of conduits, cable trunking, raceway, flexible conduits and wiring,													
	Wires supplied must conform to relevant clauses of tender doct. And Specifications.													
	Wiring accessories must conform to relevant clauses of tender doct. And Specifications.													
	In case of any contradiction between BOQ and tender doct. And specifications, the strangest condition of the two will apply.													
4.1	Supply and laying of Lighitng Submains/circuit mains (3R x 2.5 Sqmm) in concealed or surface conduit system with GI conduits & 1100 V grade, multi strand copper conductor, FRLSZH-PVC insulated wires for phase, neutral & earth, shall include end termination. The conduits shall be complete with bends, JBs etc. The laying cost shall also include chipping works if necessary.													
a	Primary Point (30 meter)	Points	86	176	156	123	145	122	200	185		1193	6,079.36	72,52,676.48
b	Secondary Point	Points	324	734	597	458	450	620	376	275		3834	2,138.16	81,97,705.44
4.2	Supply and laying of circuit wiring along with earth wire with the following size of FRLSZH PVC insulated copper conductor single core cable in GI conduit as required. Compete in all respect to the entire satisfaction of engineer-in-charge													
a	3 R of 1 c x 2.5 Sqmm	Mtrs	100	100	100	100	100	100	1500	750		2850	153.40	4,37,190.00
b	3R of 1 c x 4 Sqmm	Mtrs	0	0	0	0	0	0	50	50		100	205.00	20,500.00
c	3c x 2.5 Sqmm	Mtrs	0	0	0	0	0	0	50	100		150	151.00	22,650.00
4.3	Supply and laying of Power Submains/circuit mains (3R x 4 Sqmm)in concealed or surface conduit system with GI conduits & 1100 V grade, multi strand copper conductor, FRLSZH-PVC insulated wires for phase, neutral & earth, shall include end termination. The conduits shall be complete with bends, JBs etc. The laying cost shall also include chipping works if necessary.													
a	Primary Point (30 meter)	Points	77	135	104	78	101	97	55	25		672	6,608.00	44,40,576.00
b	Secondary Point	Points	29	98	40	36	65	93	20	10		391	3,127.00	12,22,657.00
4.4	Supply and laying of circuit wiring along with earth wire with the following size of FRLSZH PVC insulated copper conductor single core cable in GI conduit as required. Compete in all respect to the entire satisfaction of engineer-in-charge													
a	3R of 1 c x 4 Sq sqmm	Mtrs	500	500	500	500	500	500	150	20		3170	206.50	6,54,605.00
b	4c x 6 SqMM	Mtrs	0	0	0	0	0	0	100	50		150	484.00	72,600.00
4.5	S&F suitable size GI box with modular plate and cover in front on surface or in recess including providing and fixing of 6/16A 1P+N+E water proof socket with switch as required.	Nos	0	0	0	0	0	0	2	20		22	2,190.08	48,181.76
4.6	S&F suitable size GI box with modular plate and cover in front on surface or in recess including providing and fixing of 6/16A 1P+N+E socket with switch as required.	Nos	90	106	87	71	75	82		35		546	649.00	3,54,354.00
4.7	S&F suitable size GI box with modular plate and cover in front on surface or in recess including providing and fixing of 32A 3P+N+E water proof socket with plug as required.	Nos	0	0	0	0	0	0	75	2		77	7,670.00	5,90,590.00
4.8	S&F suitable size GI box with modular plate and cover in front on surface or in recess including providing and fixing of 20A 1P+N+E socket as required for AC .	Nos	20	21	20	18	18	18	2	1		118	1,003.00	1,18,354.00
4.9	S&F of 32 A 4P isolators with box complete as required by the engineer	Nos	0	0	0	0	0	0	1	60		61	4,130.00	2,51,930.00
4.10	S&F of 63 A 4P isolators with box complete as required by the engineer	Nos	0	0	0	0	0	0	1	2		3	6,195.00	18,585.00

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
4.11	Supply installation testing and commissioning of Occupancy sensor based movement detector with a build-in switch suitable for recessed mounting at a height of 3m with detection pattern of 6m X 8m. The sensor should have an operating voltage range of 230VAC +/10%; 50/60Hz and should be able to take upto 6A of electrical load and should be able to provide the switch off delay from 1 minute to 30 minutes range. The sensor should be in compliance with EN/IEC 60669-2-1, IEC (EN) 60669-2-1, IEC (EN) 61547, IEC (EN) 55015 and IEC (EN) 55022, class B.	Nos	0	0	0	0	0	0				0	3293.65	-
4.12	Supply and installation of G.I conduits complete with G.I junction box,pull box,other accessories with G.I fish wires as specified and as shown below													
a	25 mm dia,1.6 mm thick	Mtrs	10	10	10	10	10	10	20			80	182.40	14,592.00
b	32 mm dia,1.6 mm thick	Mtrs	10	10	10	10	10	10	20			80	255.55	20,444.00
c	50 mm dia,2.0 mm thick	Mtrs	10	10	10	10	10	10				60	421.80	25,308.00
													-	-
	SUB TOTAL INTERNAL WIRING & ACCESSARIES - E.04													**237,63,498.68**
E.05	**INDOOR LIGHTING AND FANS**													
	Supply, installation, testing & commissioning of light fittings including all accessories e.g. ballast, HPF condensors, lamps, holders, surface/recess mounting arrangement etc. including necessary supports, accessories and hardware as per specifications & as required at site and as below:													
A	Luminaire minimum specifications and requirements													
a.	Luminaires should operate at +/-6% voltage fluctuation for continuous use to comply to IEC. PF > 0.95 for HF ballasts; for EM circuits PF > 0.85 with capacitor.													
b.	All the components including the internal wiring of the luminaries to be used shall be manufactured of material, which are of low smoke and zero halogen type. All luminaires shall be manufactured to relevant sections of IEC60598 or other approved international standards and the type tests for all luminaries shall be provided.													
c.	All internal wiring within the lighting fixtures shall be heat-resisting cables.													
	REFERRED STANDARDS FOR LED LIGHTING FIXTURES													
	IS: 513 Cold-rolled low carbon steel sheets and strips													
	IEC 60529 Classification of degree of protections provided by enclosures.													
	EN 55015, CISPR15 Limits and methods of measurement of radio disturbance characteristic of electrical lighting and similar equipment.													
	IEC 62031 LED modules for general lighting-Safety requirements													
	EN 61547 Equipment for general lighting purposes – EMC iimunity requiement.													
	EN 60929 Performance, AC supplied electronics ballast for tubular flourescent lamps perormance requirement.													
	IEC 60598-2-1 Fixed general purpose luminaries													
	IEC 60598-1 Luminaires - General requirement and tests													
	IEC 61000-3-2 Electro Magnetic compatibility (EMC) -Limits for Harmonic current emission -– (equipment input current = 16 Amps. per phase.													
	IEC 60068-2-38 Environmental Testing :Test Z- AD: composite temperature/humidity cyclic test													
	IEC 61347-2-13 Lamp control gear : particular requirements for DC or AC supplied electronic control gear for LED modules.													
	IS 10322 Specification for the luminaries													
	IS 4905 Method for random sampling													
	LM 79 LED luminair photometry measurement.													
	LM 80 Lumen Maintenance													
	IEC 62384 DC or AC supplied electronic control gear for LED modules performance requirements													
	IEC/PAS 62612 Self-ballasted LED lamps for general lighting services- Performance													
5.1	Supply, Installation, Testing & Commissioning of 38W LED Recess mounted Luminaire with 6500K color temperature having 50000 burning hours life with minimum 70% lumen maintenance, CRI should be greater than 80, system lumen output should be minimum 3500 lumens and efficacy >92 lm/W. Housing should made of CRCA with opal diffuser. Electronic Driver should be in-built with life of 50000 hours, power factor >0.9 with THD <10%. LED make should be from CREE / Nichia /Philips Lumileds / LG. System Consumption should be less than 38W. Similar to PHILIPS CAT no: RC380B G2 LED35S-6500 PSU OD WH	Nos	100	232	100	100	150	100				782	7,198.00	56,28,836.00
5.2	Supply, Installation, testing and commissioning of Surface mounted LED luminaire with Mid flux LED using efficient optics , System lumen efficacy > 80Lumen/Watt , System Luminous flux of >=3200 lumens, System Wattage <=43W with 50,000 hours burning life. Color rendering index > 70 and Color temperature 4000K. CRCA housing with high efficieny opal diffuser. Luminarie sealed from bottom. Inbuilt gear . Zero maintenance, Zero mercury. Driver Surge protection > 1.5kV. Electronic In-Built PF > 0.9 , THD < 10% , IEC Compliant for Safety , Performance & EMI. The type shall be of 2'x2'. EQUIVALENT TO PHILIPS CAT. No. SM365C LED-34-4000 PSE-OD or as per the approved make list	Nos	10	10	10	10	10	10				60	5910.00	3,54,600.00

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
5.3	Supply, Installation, testing and commissioning of LED based luminaire enclosed in a CRCA housing with diffused optics. The luminaire shall be suitable for Wall / conduit/suspended/surface mounting. With a minimum system level lumen package of 3900 lumens should have a maximum system level wattage of 42W giving a system efficacy of >98 lm/W. The product is available in color temperatures of 6500K with CRI>80 and a system lifetime of 40,000 burning hours at 70 percent lumen maintenance. It has an electronicelectronic driver with a pf>0.95 and THD<=10%. The luminaire is IP 20 protected. Operating voltage range of 140-270 V AC. LED make should be from CREE/Nichia/Philips Lumileds/ LG. The diffuser shall be made of polycarbonate. The luminaire shall be with Short circuit and Over voltage cut off protection and Electrical Class I. Philips BN108C LED 40S PSU CDL WH	Nos	100	467	68	207	130	309	37	173		1491	3,776.00	56,30,016.00
5.4	Supply, Installation, testing and commissioning of LED highbay symmetric beam luminaire with housing made of die-cast aluminium of system wattage not more than 72W. The luminaire shall be with dedicated optics to provide precise light distribution of symmetric beam angle. The luminaire shall be designed to meet its specifications on performance & lifetime at a design ambient temperature of 45 deg C. A specially designed heat management system to ensure luminous efficacy >=102 lm/W for the system and ensure lumen depreciation upto 30% over 50k burning hours. The luminaire is designed to meet IP 65 classification and is compliant with relevant immunity, safety and performance and EMI standards. The system lumens shall not be less than 7200 lumens with 5700K CCT. The CRI shall be > 70. The luminaire shall be able operate from 190 - 270V AC, 50Hz with > 0.9 PF & THD <=20%. The luminaire shall have an in-built surge protection upto 3kV. The LEDs shall be of SMD type (not COB type). The luminaire shall be supplied with suitable suspended / surface mounting kit. Similar to Philips: BY400V LED72S CW SY PSU S2 FG WH – Surface.	Nos	30	45	30	30	30	30				195	21,240.00	41,41,800.00
5.5	LED based IP54 Light trunking system suitable for Suspended, surface-continuous or standalone mounting applications provided with slim extruded housing having width<75mm. With a minimum system level lumen package of 3900 lumens should have a maximum system level wattage of 42W. The LED used in the system shall be best in class ensuring system efficacy of at least 100 lumen/watt . Color rendering index (CRI) >80. The trunking system shall be available in single sections of up to 3M length to ensure continuity along the length of the platform. The electronic driver used in the fixture shall be a constant current type driver with power factor > 0.9 and THD < 10%.The CCT shall be 4000K. Similar to Philips: LL199X 1XDLED40-4000 PSE ODWH - IP54	Nos	125	128	125	125	125	125	354			1107	8,850.00	97,96,950.00
5.6	Supply and Installation of Trunking system suitabe for the above Trunking based Luminaire,Housing shall be made of extruded aluminium with white poweder coating,the length of the trunking system shall be 3.5 to 3.6m the trunking system shall be supplied with necessary suspenstion rods and end caps TTX 199/03LED	Nos	39	39	39	39	39	39				234	2,655.00	6,21,270.00
5.7	Supply, installation, testing and commissioning of LED round downlighter with > 1600 lumens with 4000K CCT. The optic shall be diffuser. The reflector shall be of polycarbonate and heat sink shall be of die-cast aluminium. The wattage of the luminaire shall be with not more than 18W. The efficacy of the downlighter shall be >88 lm / W. The luminaire shall be mounted using spring clip. The CRI of the luminaire shall be >80. The luminaire shall be with electronic driver with THD < 10% and PF > 0.9 . The driver shall comply to IEC 62384 , IEC 61347-2-13, IEC 61547, EMI- CISPR15 standards. Equivalent to Philips: DN394B LED16S-4000 PSU WH	Nos	18	37	16	20	12	23	69	226		421	3,776.00	15,89,696.00
5.8	Supply, installation, testing and commissioning of contemporary post top luminaire with system wattage not more than 36W and system lumens > 3400. The luminaire shall be with operating voltage 140-270V with PF > 0.9. The LED shall be of SMD type only with CCT 5700K CRI >70. The luminaire shall be with IP 66, IK 10 and Electrical protection Class I. The luminaire shall have an efficacy > 100 lm /W. The luminaire shall comply to IS 10322, IEC 60698. The light distribution shall be street lighting distribution. The housing shall be of die-cast aluminium with flat glass cover. The luminaire shall be with 0% ULOR. The pole height shall be 3m from FFL. The life of luminanire shall be > 50000 hours at L70. The luminaire manufacture shall submit LM79 and LM80 reports from NABL accredidated lab. The luminaire shall be supplied with square shaped pole of height > 3.0m. The base plate dimension shall be 300mm x 300mm with 4 nos of holes of dia 15mm. Equivalent to Philips BGP400 LED 35L CW MR FG S1 WITH BRACKET ZGP400 L TYPE LUMACUBE AND POLE ZGP400 3M POLE complete with pole & accessories	Nos	7	7	7	7	7	7				42	44,250.00	18,58,500.00
5.9	Supply, Installation, testing and commissioning of LED Flood light with system power not more than 70W High efficiency glass cover with Aesthetically Designed LM6 PDC housing with Black corrosion resistant polyester Powder coating, IP66 & IK≥07 with operating voltage from 140-270VAC, 50 Hz, with LED Life of 50000 Burning Hours @L70 with system efficacy not less than 95 Lumen/Watt for the light fixture. The system lumen shall be > 7000 lumens . The supplier shall provide LM80 and LM 79 test reports from NABL accredited LAB before supplying the luminaires . Equivalent to Philip: BVP120 LED70 CW FG S1 PSU GR	Nos	20	20	20	20	20	20				120	18,880.00	22,65,600.00
5.10	Supply, Installation, testing and commissioning of LED floodlight with LM6 Pressure die-cast aluminium Housing and High efficiency Glass cover. The system wattage shall be not more than 115W and system lumen output shall not be less than 10000 lumens.The Driver Efficiency : > 85% and Life L70, 50k Hrs. Color temp shall be 5700K. The luminaire shall be provided with Graduation disk for aiming and Suitable 'C' clamp mounting. The luminaire shall have an efficacy > 95lm /W. The luminaire shall be IP 65, Class I protected. The dimension of the luminaire shall not be more than 447 x 327 x 163mm (H x W x H). The luminaire shall not weigh more than 13kg. The supplier shall provide LM80 and LM 79 test reports from NABL accredited LAB before supplying the luminaires .PHILIPS: BVP410 LED 107 CW HE NB FG S3 XT	Nos	2	2	2	2	2	2				12	41,300.00	4,95,600.00
5.11	Supply, installation, testing and commissioning of LED round downlighter with > 1600 lumens with 4000K CCT. The optic shall be diffuser. The reflector shall be of polycarbonate and heat sink shall be of die-cast aluminium. The wattage of the luminaire shall be with not more than 18W. The efficacy of the downlighter shall be >88 lm / W. The luminaire shall be mounted using spring clip. The CRI of the luminaire shall be >80. The luminaire shall be with electronic driver with THD < 10% and PF > 0.9 . The driver shall comply to IEC 62384 , IEC 61347-2-13, IEC 61547, EMI- CISPR15 standards. Equivalent to Philips: SM251LED16S-6500PSUWH	Nos							64	33		97	1765.30	1,71,234.10
5.12	Supply, Installation, Testing & Commissionimg of Surface mounted Bulkhead LED with a system lumen output of 600 lumens and a system efficacy of 100 lumen/watt The luminarie shall be IP66 & IK09 rated and shall have a CRI of 70. The housing of luminarie is made of high pressure die cast aluminium with front cover made of polycarbonat diffuser. Similar to Philips WT202W LED 6S and must conform to ingress Protection Clasification of IP54	Nos	10	10	10	10	10	10	37	16		113	1479.15	1,67,143.95

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
5.13	Supply, Installation, Testing & Commissioning of LED Wall mounted linear batten fixture (1200mm length approx.), Aluminium housing, high optically efficient translucence diffuser complete with driver, PF>0.9, THD<20%, rated life of L-70@ 50,000 hours having minimum system lumen output of 2000 Lumens and system efficacy of minimum 100 Lumens / watt with CRI ≥ 80. **Similar to PHILIPS BN108C LED 20S PSU**	Nos							3	6		9	1049.00	9,441.00
5.14	Supply, Installation, Testing & Commissionimg of 10 Wall bracket LED light fixture with high optically effecient translucence diffuser complete with driver, PF>0.9, THD<20%, rated life of L-70@ 50,000 hours having minimum system lumen output of 1000 Lumens and system efficacy of minimum 100 Lumens / watt with CRI ≥ 80. **Similar to Philips: 34153**	Nos							12			12	3027.00	36,324.00
	FANS													
5.15	Supply and installations of 230 V, 1-phase, 1440 RPM, sweep of appx. 400mm Bracket fan including mounting bracket, blades, starters & other standard accessories complete as required.	Nos	5	5	5	5	5	5	1	1		32	1879.00	60,128.00
5.16	Supplying and installations of 230 V single phase, 1400 mm sweep ceiling fans with electronic regulators including all standard accessories complete, mounting of regulator on grid plate & MS BOX etc. and suitable length down rod, duly painted, not exceeding minimum fan height of 2.4 m from floor as required and as below.	Nos	10	10	10	10	10	10	1	1		62	2,360.00	1,46,320.00
5.17	Supply, installation, testing and commissioning of exhaust fan with fan guards on both sides, double ball bearings, class-E insulation, capacitor (pf 0.90 or better) complete with all other accessories as per IS 2312 and as required, of following sizes:													
a)	Size 450mm dia, 1400 rpm	Nos	7	7	7	7	7	7	1	10		53	3232.85	1,71,341.05
b)	Size 300 mm dia, 1400 rpm	Nos	3	3	3	3	3	3				18	8160.50	1,46,889.00
	SUB TOTAL INDOOR LIGHTING AND FANS - E05													**332,91,689.10**
E.06	**PROTECTIVE EARTHING**													
6.1	**Earthmat**													
6.1.1 6.1.2	Supply, laying, testing and commissioning of 30 mm dia MS rod for earth mat grid conductor (at 500mm or deeper as per the final approved design as per the site condition) as per specifications including lap (of not less than 150mm) & cross weld joints and providing bitumin coat at every joint as required. Risers from earth mat to be brought out as per approved drawings and specifications. (Cost of risers not included in this item). Supply, laying, testing and commissioning of vertical earth electrodes of 30 mm dia MS rod, 3 m deep from earth mat including weld joints with earth mat as per approved drawings and specifications. The weld joints to be provided with bitumin coats. Providing and making plate earthing station including the cost of 600 mm x 600 mm x 6.3 mm G. I. plate electrode, 15 mm dia G.I.watering pipe, CI funnel with wiremesh charcoal/coke , salt, all earth work, masonry enclosure with frame,hinged cover plate having locking arrangement,Disconnecting links, complete as per IS 3043:1987 for earthing.	Lumpsum	1	1	1	1	1	1	1	1		8	3,65,800.00	29,26,400.00
6.2	Note: In the above items description says the lump sum price however the contractor responsibility to arrive The resistance of the earth mat shall not be more than 1 Ohm													
6.3	Providing and making plate earthing station with 600mm x 600 mm x 3.15 mm **Cu** plate electrode , 15 mm dia G.I.watering pipe, CI funnel with wiremesh charcoal/coke , salt, all earth work, masonry enclosure with frame,hinged cover plate having locking arrangement,Disconnecting links, complete as required as per IS-3043-1987 for earthing.	Nos	10	10	10	10	10	10	10	20		90	35,400.00	31,86,000.00
6.4	Supply, Installing,Testing and commissioning of 50mm dia ,3m length ,pipe in pipe Chemical earth electrode complete as required as per IS-3043-1987 for earthing.	Nos	10	10	10	10	10	10	6	20		86	14,750.00	12,68,500.00
6.5	Supply and laying,Testing and commissioning of copper/GI Strips/wire for interconnecting the earthing stations ,panels,DBs etc. of the following sizes in built up trenches /surface/wall/ground complete with holes & fixing,jointing / terminating accessories as per specifications & drawing as required. (Quantity shall be paid as per the actual measurement as executed, however direct measurement shall not excced the quantity indicated in drawing approved .													
6.5.1	75 mm x 6 mm GI strip	Mtrs							1900	1886		3786	305.90	11,58,137.40
6.5.2	50 mm x 6 mm GI strip	Mtrs	4000	5000	4500	5500	4000	5500	600	600		29700	236.00	70,09,200.00
6.5.3	25 mm X 6 mm GI strip	Mtrs	2500	2500	2500	2500	2500	2500	2500	2500		20000	141.60	28,32,000.00
6.5.4	20 mm X 3 mm GI strip	Mtrs	0	0	0	0	0	0	250	250		500	123.90	61,950.00
6.5.5	50 x 6 mm Cu strip	Mtrs	0	0	0	0	0	0	200	200		400	2,419.00	9,67,600.00
6.5.6	8 SWG / 4 mm diameter, copper Wire	Mtrs	65	65	65	65	65	65	120	420		930	112.10	1,04,253.00
6.6	Supply, laying and testing of unarmoured, stranded copper conductor, Low Smoke Zero Halogen, green coloured cables of following sizes, conforming to BS 7211 and Section E02 of M & E Specifications, for earthing, including termination of the same by copper lugs at both ends.													
a	1 x 6 sq. mm	Mtrs	0	0	0	0	0	0	100	100		200	65.00	13,000.00
b	1 x 10 sq. mm	Mtrs	0	0	0	0	0	0	100	100		200	84.00	16,800.00
c	1 x 16 sq. mm	Mtrs	0	0	0	0	0	0	100	100		200	180.00	36,000.00
d	1 x 70 sq. mm	Mtrs	0	0	0	0	0	0	100	100		200	606.00	1,21,200.00
e	1 x 150 sq. mm	Mtrs	0	0	0	0	0	0	100	100		200	1247.00	2,49,400.00
	Note-1: In case of non availability of any of the sizes mentioned above, next higher size available in market shall be provided at the same rate.													
	Note-2: No additional payment will be made for providing Main Earth Terminals (made out of GI/Cu strips from within the above sizes). The METs will required to be fixed on walls as required and will be required to be provided with 12/16/20mm holes for connections of individual equipments including of other contractors'.													
6.7	Extra for bituminous coating and hessian tape wrap or polyethylene faced hessian complete for buried 50mm x 6mm or 75mm x 6mm strip as per specifications and drawings as required.	Mtrs	0	0	0	0	0	0	100	100		200	75.00	15,000.00

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
6.8	Extra for GI / Electrolytic Copper test links/ termination With building pier continuity conductor including termination plate, nut& bolts,fixing/welding etc as per specifications and as required.	Nos	0	0	0	0	0	0	20	20		40	252.00	10,080.00
	SUB TOTAL PROTECTIVE EARTHING - E06													**199,75,520.40**
E.07	**LIGHTNING PROTECTION**													-
														-
														-
7.1	Supplying and laying of the stainless steel SS-304 air terminations, base plate & clamping of down Conductor complete with base plate, concrete coping fixing accessories and clamping with down Conductor as per specifications & drawing as required	Set	12	12	12	12	12	12	15	12		99	1871.00	1,85,229.00
7.2	Supplying and laying of the stainless steel SS-304 strip down conductor size 25 x 3 on surface/wall / parapet/ shaft complete with joints, bimetallic connectors, testing links & other fixing accessories and clamping/ connection with earth terminations as per specifications & drawing as required.	Mtrs	1500	1500	1500	1500	1500	1500	50	1000		10050	354.00	35,57,700.00
7.3	Supplying and laying of the stainless steel SS-304 strip Earth terminations with burried conductor size 25 x 3 with bituminous coating and covered with PVC taping complete as per specifications & drawing as required.	Mtrs	500	500	500	500	500	500	100	1000		4100	265.50	10,88,550.00
7.4	Earth terminations with 50 mm dia GI perforated pipe complete with 15mm GI watering pipe with funnel with wire mesh etc. complete as per specification and drawing as required.	Nos	20	20	20	20	20	20	20	20		160	5,900.00	9,44,000.00
														-
	SUB TOTAL LIGHTNING PROTECTION - E07													**57,75,479.00**
E.08	**EXTERNAL LIGHTING**													-
														-
														-
8.1	**Poles**													-
														-
8.1.1	9m Octagonal pole hot dip galvanised with top bottom dia 70/155 mm , thickess 3 mm , base plate 260 mm X 260 mm X 16 mm , with single arm bracket 1.5 m with foundation bolts excluding cables and other electrical accessories	Nos	5	5	5	5	5	5	5	5		40	20701.00	8,28,040.00
8.1.2	9m Octagonal pole hot dip galvanised with top bottom dia 70/155 mm , thickess 3 mm , base plate 260 mm X 260 mm X 16 mm , with double arm bracket 1.5 m with foundation bolts excluding cables and other electrical accessories	Nos	1	1	1	1	1	1	10	10		26	21,830.00	5,67,580.00
8.1.3	7m Octagonal pole hot dip galvanised with top bottom dia 70/130 mm , thickess 3 mm , base plate 220 mm X 220 mm X 16 mm , with single arm bracket 1.5 m with foundation bolts excluding cables and other electrical accessories	Nos	5	5	5	5	5	5	5	5		40	17388.00	6,95,520.00
8.1.4	7m Octagonal pole hot dip galvanised with top bottom dia 70/130 mm , thickess 3 mm , base plate 220 mm X 220 mm X 16 mm , with double arm bracket 1.5 m with foundation bolts excluding cables and other electrical accessories	Nos	1	1	1	1	1	1	10	10		26	18493.00	4,80,818.00
8.2	**Luminaires**													
8.2.1	Supply, installation, testing and commissioning of LED Street light fixture - 70 watt with IP66 protected LM6 high pressure aluminium die cast housing capable of delivering a nominal system lumen output of 7200 lumens with a minimum system efficacy of 85 lumen/watt and a CRI greater than 70. The luminaire shall have a life class of 50,000 hours @ L70 and driver efficiency of >85%.(Similarto Philips Cat. No. BRP410 LED CW072 MR FG S1 PSU or equivalent)	Nos	20	20	20	20	20	20	20	20		160	15,045.00	24,07,200.00
8.2.2	Supply of 75mm dia HDPE pipe confirming to PN-4 boring of road channel area by using open trench method and laying of HDPE pipe properly continuously jointed restoring the surface where pitting is done ,to original position.	Mtrs	200	200	200	200	200	200	200	200		1600	212.00	3,39,200.00
8.2.3	Supply and laying of 6 SWG wire along with the cable	Mtrs	200	200	200	200	200	200	100	100		1400	17.00	23,800.00
8.2.4	Providing and fixing thermo plastic poly carbonate pole boxex confirming to IP-65 degree of protection, along with 16A MCB and 5 way connector and 2 No. cable gland suitable for 4x25 sq.mm cable.	Mtrs	10	10	10	10	10	10	20	20		100	6220.00	6,22,000.00
8.2.5	wiring for luminaries in existing poles with following sizes of unarmoured cu cables from pole box to each fittings.	Mtrs	200	200	200	200	200	200	200	200		1600	189.00	3,02,400.00
	3x2.5 sq mm													
8.3	**High Mast**													
8.3.1	Supply, installation, Testing and Commissioning 20 m high area lighting High Mast of Wipro/Philips/GE/Thorn, suitable for **06 nos. 250W LED luminaires** complete with all standard accessaries like winches, latern carriage etc. including the cost of providing supplying and fixing 6 nos of IP65 rated 250W LED flood light luminaires with High efficiency, long life, high power LED- Chip On Board(COB) Technology with luminaire Lumen output> 22900lm, Luminaire efficacy>92lm//W, CCT- 5000K, 50000 burning hours as per L70 Criteria. Housing: Extruded Aluminium, Highly efficient & specially designed glass lens optics, Constant current-Constant voltage isolated mutistage LED driver with operating voltage ranges from 90V-305V AC. Operating power factor>0.95, THD<10%, Driver efficiency > 85%, Complete assembly with LED, Driver and accessories pre wired in driver compartment, best efficient heat dissipation system similar to Wipro Cat num LF07-272-060-50-XX with beam angles 60degrees. System should include Lightning Arrestor and others accessaries like phosper Bronz Gear, double drum, stainless steel wire ropes, suitable MCB wires/cables as required with alongwith the folowing accessaries as required as under : -20 m High Mast suitable for 6 Nos LF07-582-XXX-50-XX with lantern carriage excluding lightening arrestor, panel, cables & other electrical accessories like MCB etc. **The supplier shall provide LM80 and LM 79 test reports from NABL accredited LAB before supplying the luminaires.**	Nos							1	1		2	7,20,000.00	14,40,000.00
a)	Suitable foundation for the Mast considering soil bearing capacity 10 Ton per Sqm, with base pedestal of approve design, incoporating a suitable cable looping box with terminal blocks MCB etc.													
b)	S.I.T.C. of Earth station of Pipe earthing as per IEEE 80 -2000, ans IS 3043 -1987, including duplicate earth connection to the mast with 25X3 mm size MS GI flate.													
c)	S.I.T.C. of suitable neon Aviation lights as required.													

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
8.4	**Façade Lighting - Design, Supply, installation, Testing and commission of following Items for Façade Light**													
8.4.1	12W PER METER 24V IP68 24v DC | 3.4 w/Ft | SMD 5050 Tri-chip | 160° Beam Angle LED Light SMD LED Chip Running Length Single feed: 10 meters / 32.81 feet Double feed: 20 meters / 65.62 feet Light Surface Square Profile 160° Lumen Maintenance 70,000 Hours L70 @ 25°C : 90,000 L50 @ 25° 50,000 Hours L70 @ 50° : 70,000 Hours L50 @ 50°C Electrical Input Voltage 24V DC Driver On Board Constant Current Power Consumption 7.2 watts per meter / 12 watts per meter / 2.19 watts per foot 3.66 watts per foot LED Count 108 per meter / 32.9 per foot Physical Materials Polyvinyl Chloride (PVC) LED Spacing 9.26 mm / .36 inches Cutting Length 83.3 mm / 3.28 inches (9 LEDs) 55.6 mm / 2.19 inches (6 LEDs) Package Size: 697 × 807 × 48 mm / 27.4 × 31.8 × 1.9 inches Weight/Meter: 325 grams / .72 pounds Thermal Management Cool to the Touch, Free Air Convection Fixture Connections Front & End Leader Cables Bend Tolerances IP Rated IP68 Factory Order / IP68 with Accessories. (MAKE: CONNECT - GREENLED, INSTAPOWER, OSRAM, Schreder)	Mtrs										0	24304.00	-
8.4.2	IP65 protected Channel Light DIFFUSE 5000K WITH BACK PROFILE with integrated cablle alley for cable management with integrated IP rated cable connectors hidden within profile for additional protection from weather. Cross section of profile Silver anodized surface mounted aluminium profile 25 mm (W) x 20 mm (D) approx , with opal semi translucent sealed encapsulation, protection grade IP67, DC 24 V, 1000 lm/m, 20 W/m, warm white 3000K or neutral white 4000K or cool white 5000K, CRI>80Ra (optional RGB, RGBW, other CCT, red, blue, green), 700 LED/m, standard length 2000 mm. Excl. converter and end caps (on request). The support is made of an anodized extruded aluminium frame which makes it possible to first fix AWP3 or AWM3 to the wall/ceiling. (MAKE: CONNECT-GREENLED, INSTAPOWER, OSRAM, Schreder)	Mtrs										0	18585.00	-
8.4.3	IP66 protected PATHFINDER IP66 3000K 10° Aluminium Die Cast 9W Body Hard anodized aluminium Finish Installation Housing box Power Supply Cables35 cm NS20N PCP 2x0,5 mm2 Power Supply24Vdc Power Consumption 9 Watt Lumen Output680lm Working Temperature-20°C +45°C Insulation ClassIII Weight535g. Choice of three colour emperatures as standard (2700K, 3000K and 4000K) and delivers 80CRI for excellent colour rendering, and with binning-free LEDs carefully selected from two-step Macadam's ellipse. PATHFINDER is Smart Shield protected against polarity inversion; an integrated super fast diode prevents accidental damage to the luminaire during installa on due to reverse polarity. Smart Shield protects against 'hot-plugging'. Fully integrated surge protection the constant- current driver and prevents damage to the LED die surface. **(MAKE: CONNECT, INSTAPOWER, OSRAM, Schreder)**	Nos										0	11437.00	-
8.4.4	Recessed ceiling compact downlight 55925. Mid beam light distribution. LED 50 W, connected wattage 50W, 5000 lm, half beam angle 45°, colour temperature 3000 K. Colour rendering index (Ra) > 80.Overheating protection and an expected service life of at least 50,000 operating hours. 3 years warranty of availability of LED module and wear parts. Without power supply unit. Protection class IP 55, safety class III. Luminaire made of cast aluminium, aluminium and stainless steel, colour graphite. Safety glass, clear. Reflector made of pure anodised aluminium. With fixed connecting cableA05VV-F 2 x 0,5 qmm, length 0,5 m, with connector. For installation in suspended ceilings having a material thickness of 10-45 mm. **(MAKE: CONNECT, INSTAPOWER, OSRAM, Schreder, BEGA, SILL, HOFFMEISTER)**	Nos										0	17156.00	-
8.4.5	SPIKE LED 24DEG beam angle IP rated 65 product fitted with Osram 700ma 18W 24DEG 3000/4000K CRI80+ NON DIM with led power supply built in Color tolerance: <MacAdam 4 SDCM. **(MAKE: CONNECT, INSTAPOWER, OSRAM, Schreder)**	Nos										0	14296.00	-
8.4.6	LINEAR HANGING LIGHT DIRECT + INDIRECT 100% recyclable, extruded Acrylic tubular White LINEAR LENS Extruded, twin-layered, high-impact acrylic white and extra diffuse with minimal-to-no source visibility. MOUNTING SIZE – Suspended 1.5m. LED MED Medium-output, high performance LED HI High-output, high-performance LED 3000K CRI >80 4 Step MacAdam binning FINISH AL Standard, natural "Ultimate" aluminium VOLTAGE UNV Universal voltage LED Driver. NON - DIM (MAKE: CONNECT, INSTAPOWER, OSRAM, Schreder)	Nos										0	18585.00	-
8.5	Supply, installation, testing & commissioning of Facade light fittings including all accessories e.g. ballast, HPF condensors, lamps, holders, surface/recess mounting arrangement etc. including necessary supports, accessories and hardware as per specifications & as required at site and as below:													
8.5.1	Surface mounted RGB direct view aluminum profile 25mm (approx) with snap in notch , to be installed together with aluminium bracket profiles for cable conduit, screws hidden. With opal semi translucent sealed encapsulation. 18w per meter with direct view led profile. .IP67. Approved Makes - Bharat Alurays-Connect/Instapower/Tulip	Mtrs							550	550		1100	28619.00	314,80,900.00
8.5.2	LPV-100/24V Qty to be confirm as per site requirement.	Nos							115	115		230	26131.00	60,10,130.00
8.5.3	Surface mounted linear grazer with adjustable mounting base 45mm with snap in notch , to be installed together with aluminium bracket profiles for cable conduit, screws hidden. With opal semi translucent sealed encapsulation. 18w per meter with direct view led profile. 48w/m .IP67. Approved Makes - Bharat Alurays-Connect/Instapower/Tulip	Mtrs							150	150		300	49773.00	149,31,900.00
8.5.4	LPV-100/24V Qty to be confirm as per site requirement.	Nos							35	35		70	26131.00	18,29,170.00
8.5.6	LED high-performance floodlight with very narrow beam light distribution.Floodlight made of aluminium alloy, aluminium and stainless steel. Clear safety glass. Silicone gasket. Reflector surface made of pure aluminium. with integral silicone lens and louvre. Swivel range -10°/+170°. Mounting bracket made of steel. 300w, 3000k, 10°,IP67. Approved Make - Bega 84540, Acuity, Simes, instapower	Nos							2	2		4	278112.00	11,12,448.00

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
8.5.7	Exterior projector for permanent outdoor installations to integrate textures, patterns and graphics for limitless creative exterior lighting designs. Flat field, high contrast image projection based on high power LED engine. 0-100% electronic dimming. Full CMY color mixing + additional color wheel with 7 interchangeable colors. 7 gobo slots for projecting graphic images (gobos included). Animation system for creating animated lighting effects (horizontal and vertical). Zoom range from 10° - 43° for exact projection on desired surfaceVariable frost for creating morphing effects and hybrid function as wash light. rotating prisms for creating abstract multi patterns. Intuitive setup, configuration and stand-alone programming via graphical OLED display. RDM and DMX control. Housing: Cast aluminum Finish: Hard anodized, white or metallic grey lacquered Front glass: 5 mm (0.2 in.) anti-reflection coated tempered glass Ingress protection: IP66. Approved Makes - Martin exterior projection 1000, Selecon/ Showline	Nos							1	1		2	933240.00	18,66,480.00
8.5.8	Surface floodlight with mounting box. Flat beam light distribution. LED 65 W, 8200 lm, half beam angle 28/92°, colour temperature 3000 K. Colour rendering index (Ra) > 90. With replaceable LED module with overheating protection and an expected service life of at least 50,000 operating hours. 2 years warranty of availability of LED module and wear parts. With LED power supply unit, 220-240 V, 0/50-60 Hz. Protection class IP 65. Luminaire made of cast aluminium, aluminium and stainless steel, colour silver. Safety glass with optical texture. Reflector made of pure anodised aluminium. Two cable entries for through-wiring power connecting cable up to 10.5 mm in diameter, max. 5 G 1.5 qmm. Approved Makes - Bega 77584AK3, Simes, Acuity, instapower	Nos							30	30		60	80881.00	48,52,860.00
8.5.9	LED pole-top luminaire with symmetrical light distribution. Luminaire made of aluminium alloy, aluminium and stainless steel Synthetic diffuser, clear Silicone gasket. Reflector made of pure anodised aluminium. 35w 3000K. IP65. Approved Makes - Bega 77175, Acuity, Simes, instapower	Nos							10	10		20	105767.00	21,15,340.00
8.5.10	3 mtr GI Pole as per requirement	Nos							10	10		20	9177.00	1,83,540.00
	SUB TOTAL EXTERNAL LIGHTING - E08													**720,89,326.00**
E.09	**UNINTERRUPTED POWER SUPPLY SYSTEM**													
9.1	Supply, Installation, Testing and Commissioning of **true parallel redundant 2 x 20 kVA, online, UPS** system suitable for providing power supply to emergency lighting at station & viaduct, Platform edge door and Computerised Control panel load of approved make, suitable for incoming 415 volts, 3 phase +10 % -20%, 50 Hz, supply and single phase output voltage, variation ± 1%, including transformer, rectifier/dual converter, static switch, inverter, filter, Bypass & static transfer switch for automatic switch over without giving any break of power, maintenance bypass switch, Micro processor/ software controlled annuncisation,protection(including against input phase reverssal), and menu run diagnostic module,associated cabling and connections/ terminations, complete as per specifications and as required. **Note-1:** The price of above item is inclusive of a manual chnageover switch suitable for terminating 2 nos. of 4-core aluminium conductor armoured cables on the incoming side of UPS. The manual change over switch may be wall mounted in the UPS room. RS 485 port for display of ON/OFF status of UPS on BMS work station through MODBUS protocol is also included in the price. **Supply,** Installation, Testing and Commissioning of valve regulated lead acid-sealed maintenance free suitable for 30-minute-battery backup to the each UPS of item 9.1, Battery shall comply with relevant regulations & Battery racks shall be made of acid resistant material complete as per specifications & as required.	Set	1	1	1	1	1	1	1	1		8	7,43,400.00	59,47,200.00
	SUB TOTAL UNINTERRUPTED POWER SUPPLY SYSTEM - E09													**59,47,200.00**
E.10	**Safety and Other accessories**													
10.1	Supply and fixing of the following safety equipments in Aux. Sub.Station/MDB room as per detailed descriptions given below and as per relevant IE rules & code of standard practice.													
a)	**1000 mm** wide rubber matting (complying with I.S.15652) and suitable to withstand 11 kV in front of all panels in ASS building & MDB room as required.													
b)	**Laminated** standard shock treatment charts in English & Hindi in ASS, ESR, DG room and Pump room in each station.													
c)	**Danger** plate as per approved Style & sample written in English & Hindi for MV installations as required as per IE rules, IES and IS 2551 (latest) - 8 nos. per station **2 nos.** per station First Aid Box Complete as approved by St. John ambulance or Indian Red Cross	Lumpsum	1	1	1	1	1	1	1	1		8	59,000.00	4,72,000.00
d)	**4 nos. per** station of 3-fire-buckets set each painted red with 'fire' written complete with sand filling, floor/wall mounting brackets/stand complete as per elevant IS and as required.													
e)	**One Tool** kit per station comprising 1 set of flat spanner (Taparia / Jalan), 1 set of box spanner, 1 no. Hacksaw frame with 10 No. blades, 1 no. large, medium, small screw drivers, 1 no. insulated plier, 1 no nose plier, 1 no. hand crimping tool upto 16 sq.mm, 1 no. digital multimeter, 1 no. test lamp and 1 no. tester. Screw driver set for all types of screw heads also to be provided.													
	SUB TOTAL Safety and Other accessories - E10													**4,72,000.00**
E.11	**BMS/SCADA for all system parameter of the panel**													
11.1	The Specifications shall be read in conjuction with Manual of specifications and standards and Technical Specifacations.		1	1	1	1	1	1	1	1		8		
	Supply, Installation, testing, commissioning, trainging and AMC of Biluding Management System PLC, Remote Processor, Siganl Interface wiring and cabling with field equipment interface and provision of supervisory control and monitoring for M&E SCADA contractor using standard protocol over Ethernet(Station LAN-Provided by Others(S&T Contractor)) as per specification and Tender clauses.													
11.2	SOFTWARE - RPU Programming and Configuration Software(Rate included in item 11.1)(Complies to SIL-2)													
	Programme software for RPU logic develolpment and debugging for use with													
	compatible Personal Computer with Licence to carry required engineering													
	and maintenance function with below marked minimum functions:													
	RPU Programming and Configuartion Functionality													
	RPU dignosis and data monitoring function locally.													
	RPU histroic data download function for record and fault segregation process.													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	RPU software interlock and logic development for process or data management													
	Communication and Integration management and configuration of I/Os fucntion													
a	The RPU shall be capable of fully stand-alone operation and shall be independent of any central computer for all specified control or communication applications. The software shall include all necessary routines and modules required to implement any control strategy and shall be user programmable. The programming language shall be English and shall use standard controls terminology.													
b	Input and Output point processing shall include:													
	(i) Continuous update of input and output values, conditions and status. All connected points are to be updated at a maximum of 5 second intervals, under worst conditions.													
	(ii) Analog to digital conversion of input values shall be carried out with at least 11 bit resolution with typically 40 dB series mode rejection @50 Hz. It shall be possible to calibrate the inputs by means of movable jumpers or links to suit the sensor type in use, to achieve a high accuracy reading.													
	(iii) Input reading shall be automatically checked to determine that the reading is within the sensor"s range and within the range of the input circuit, i.e. 0-10V or 4-20mA. Should this not be the case then an alarm status shall be indicated.													
	(iv) All sensor readings shall be in engineering or user-definable units. These units shall be calculated by the sensor scaling type assigned to each sensor.													
	(v) Each sensor shall have, in addition to the checks specified above, operator adjustable High and Low alarm limits. If the sensor reading is outside these limits then an alarm shall be generated. It shall be possible to delay these alarms by a user-defined amount so that spurious alarms are not reported.													
	(vi) All inputs shall be filtered to reject mains frequency interference. The mains frequency of 50 Hz shall be selectable in software.													
c	Each RPU is to be configured to run the control strategies called for in the sequence													
	of operation sections of this specification. Each RPU shall have the required software													
	modules available for arithmetic calculations, logical decisions and relational operators													
	necessary for the implementation of these control sequences.													
	(i) RPU data such as set points, sensor values, loop parameters etc., shall be available to													
	the operator for display and modification at the main supervisor, the portable													
	supervisor or the display panel.													
	(ii) The reschedule time of control loops shall be adjustable, in 5 second intervals.													
d	Each RPU shall provide five independent time zones, each of which shall have three													
	separate start and stop periods within each 24 hours.													
	(i) Unique time program shall be provided for each day of the week, plus a unique													
	holiday schedule. Each RPU time zone may be provided with unique time programs,													
	or they may be grouped and assigned a common time program as configured by													
	the operator.													
	(ii) For each time program, the main supervisor shall have a calendar available which													
	may be used to make simple modifications up to a year in advance. The calendar													
	shall allow these modifications to be permanent or to execute only once and then													
	return to the previous (permanent) schedule.													
	(iii) Calendar days which are intended to operate as Holidays shall also be definable													
	up to a year in advance.													
e	All control strategies shall be held in RAM, battery backed up for at least 2 years. All													
	data shall be available for review and modification from the main or portable supervisors.													
11.4	Remote Processor Unit (RPU), It's Sub-components and Mounting Panel													
	Remote Processor Unit (RPU) Modules should have (Digital Input, Digital Output,													
	Analog Input and Analog Output Modules integrated to CPU module along with													
	other required interface or system module for integration of field signals;													
	should capable of standalone monitoring and control function irrespective to													
	server communication interface; should fully equiped with Power Supply module,													
	device protection and intrface terminals and wiring and other devices as required to													
	meet tender specification & functional requirment.													
	The contractor shall cross reference the RPU Panel and others to Housing Type as required.													
	A by-pass switch/s shall be provided to completely by-pass the RPU in the event of a total													
	failure of the Processor and associates equipment to enable the normal operation of													
	the equipment controlled by the RPU. Panels shall be fitted with a suitable pocket to contain													
	circuit diagrams and other relevant Definitive Design Drawings. An "as installed" set shall be													
	having. All wiring and equipment tagging as per most acceptable inernational standards and													
	metro practice.													
	CPU with onboard RS485port for profibus/mpi/Modbus communication.													
	Data and program backup without external battery. CPU shall have scan time of													
	not less than 0.1ms per 1k bit instruction and 5ms per 1k floating point instructions.													
	Micro-Memory Card													
	Power Supply Module with AC/DC converter as required.													
	AI Module of 8 Channel as per Signal list with necessary spare and redundant I/O consideration.													
	DI Module of 16 / 32 /64 Channel as per Signal list with necessary spare and redundant I/O consideration.													

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	DO Module of 8 / 16 / 32 Channel as per Signal list with necessary spare and redundant I/O consideration.													
	AO Module of 8 Channel as per Signal list with necessary spare I/O consideration. (Minimum 1 Modules per panel)													
	Front Connector for Programming/console port (Serial RS232 / Ethernet) with portable computer communication BUS.													
	BMS Workstation / Server system interface provison in PLC communication Port (Ethernet TCP/IP RJ45 connector)													
	Field equipment serial RS485/Rs232 Port interface port (3 nos or as required to meet the functional and integration requirment													
	Active Bus Module for IO Modules (As applicable for DI module up to field cable interface TBs)													
	Active Bus Module for DO Modules (As applicable for DO module up to Relay control Board/ field cable interface TBs)													
	Active Bus Module for AI/AO Modules (As applicable for AI/AO module up to field cable interface TBs)													
	Mounting Rail and other cable containment for RPU panel different component mounting and Cable wiring.													
	RPU Required frameware, protocol and data point licence as required to meet the interface and programming requirement in ref to tender specification with provision of spare (i.e. spare of 50% of Total IO Point as future expansion requirement without any upgradation)													
	Bus cable for different module integration. Or as required for intermodule communication.													
	Interface Module and/ or integrator module with or without gateway for ethernet interface provision of M&E SCADA system.													
	Ethernet Module TCP/IP 10/100 MBPS													
	MODBUS/PROFIBUS/BACNET card as required													
	Terminal block 8 slots (as required for field cable interface and termnination)													
	16 channels Relay Board PCB Mounted type, plug in relays. (As per DO module)													
	Allowance for 30% Spare I/O Points Modules and expansion by 50% shall be possible by adding more I/O modules and software reconfiguration													
	Assorted connectors, pre-formed connecting cables, special terminal blocks, bus cables, taps, tap links, networking accessories consisting of patch Panels, Cat 5 patch cords etc.													
	Note:													
	All devices as required to meet tender specification & Operational requirment shall be provided for fully functioning of BMS system.													
	The RIO shall be designed in accordance with the IO signals given as per the IO													
	Summary Provided for stations.													
	All RPU Controller input modules served equipment from outside are													
	protected against voltage transients. All input/output modules are													
	galvanically separated from CPU & internal bus. It is protected against													
	short circuit and it is connected via separate terminal strip. PLCs shall													
	be designed by taking 20% of spares in I/O's signals with Mounting													
	cabinet.													
11.5	Marshalling Cabinets	Lumpsum											53,10,000.00	424,80,000.00
	Terminal blocks shall be designed and tested in complying with IEC 60947-7-1.													
	Terminal block shall have ability to receive unprepared conductors.													
	Terminal block shall be single terminal type. Each terminal shall be exchangeable													
	without dismounting adjacent terminals and also suitable for designative labeling.													
	Terminal blocks shall be of the rail-mounted type and shall be of screwless type													
	terminals 600V a.c. moulded block type with molded insulating barrier between terminals.													
	Terminal connections shall be such that the conductors shall be connected with the													
	necessary maintained contact pressure. Terminals shall be so constructed that the													
	conductors can be clamped between suitable surface without any significant damage													
	either to conductors or terminals.													
	Terminal blocks shall have test probe facilities for connections of test leads and an													
	integral disconnecting device to facilitate testing.													
	The rated cross-section of a terminal block shall be 0.5-2.5 mm2 of round copper													
	conductor. No terminal can carry more two conductors simultaneously connectable on													
	each incoming/outgoing side.													
	The spare terminating block in all MS shall be provided with capacity at least 20% of the													
	number of I/O points.													
	The Marshalling Cabinet shall be of 1.6 mm thick galvanized sheet steel with gray													
	colour epoxy and electrostatic powered coated. The protection class shall be IP 31.													
11.6	ETHERNET SWITCHES													
	Providing, Installing, Testing & Commissioning of industrial Ethernet Switches having the													
	following specifications to meet the functional and system requrment in a redundant													

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	system architechure													
	1. Ethernet 10/100MBPS Switch													
	2. Network Protocol - IEEE 802													
	3. Data Protocol - Modbus over TCP/IP													
	4. Full or half duplex operation with flow control supported on all the ports													
	5. Reverse polarity protection													
	6. Industrial surge and Spike protection													
	7. IP 30 protection													
	8. Operating temperature 0 to 60 deg C													
	9. Storage temperature -40 to +85 deg C													
	10. Relative Humidity 10 to 95 % non condensing													
	11. UL listed equipment													
	12. 24AWG Cat 6 RJ 45 port and 6 fiber optic port													
11.7	Integrators/ Modems/ Gateways/Protocol Converters													
	Supply, installation, testing and commissioning of Integrators/ Modems/ Gateways/													
	Protocol Converters for Integration of standalone Systems with BMS (All software,													
	hardware required for integration with the specific standalone system with BMS shall be													
	supplied by respective contractor). The following Equipments with necessary													
	Data Points as mentioned below shall be considered for integration with individual PLC.													
	Uninterrupted Power Supply													
	Digital Power Meter .													
	DG Set													
	Lifts													
	Escalators													
	Water Meter													
	Fire Alarm Panel													
	HV Panels													
	Fire Fighting systems and Panel flooding system													
	All the Panel boards incoming and out going breakaers													
	PHE systems													
	Systems not listed above but that requires BMS/SCADA to be considered.													
11.8	Field Devices													
	Pressure transmitters													
	Pressure transmitters shall have a linear output of 0-10V. Pressure transmitters shall be a													
	span of not greater than twice the s tatic pressure at maximum flow or differential													
	pressure at shutoff as applicable.													
	Water-Flow Meter													
	Water-flow measuring devices consisting of annular averaging pilot tube flow elements													
	having the following minimum Specifications. Select the Annular for the operating flow													
	range, pipe size and fluid temperature.													
	(i) Accuracy - 2%													
	(ii) Repeatability - 1.2%													
	(iii) Pressure Drop - 1.5 kPa maximum													
	(iv) Operating Temperature Range - 4°C to 95°C [140°F to 203°F]													
	(v) Operating Pressure Rating - 174 kPa [250 psig]													
	Level Switch													
	Wind Transmitter													
	Wind Speed & Direction Sensors													
	Temperature Sensors													
	Temprature and Humidity Sensors													
11.9	Control Cable													
	Supply and laying Control Cables with following specification including 25mm dia rigid													
	GI conduits as applicable for running cable from Cable try / Raceways to equipment panel or													
	required to be laid at open.													
	All control cable shall be suitable for installation in wet and dry locations. The conductor													
	shall be of soft or annealed strand uncoated copper wire.													
	The insulation shall be FRLS, PVC, insulated cables suitable for use on a copper													
	conductor with a maximum operating temperature not less than 70°C.													
	Fillers shall be used in the interstice of the multi-conductor cable where necessary to give													
	the complete cable a substantially circular cross section. Fillers shall be Polyvinyl													
	chloride (PVC) rod or Polyethylene (PE) materials.													
	The cable shall be helically wrapped over the filler and copper shielding with													
	non-hygroscopic Mylar or Polyester tape.													
	The shielding, for control cables, shall be annealed copper tape or suitable width and													
	shall be helically applied with a minimum 10% lap. The annealed copper tape shall be a													
	least 0.1mm thickness and substantially free from burrs.													
	For Analogue Signals and Data Communication													
	2 Twisted Pair 0.5 Sq mm copper Cable with Aluminium Schelding.													
	For Digital Signals													
	12 Core X 1.0 Sq. mm Copper, screened cable													

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	05 Core X 1.0 Sq. mm Copper, screened cable													
11.10	CAT5e CABLE - Data Cable													
	Supply, Installation, testing and commissioning of CAT 5e cable with													
	25mm GI conduit & complying to Class 1E type Communication with													
	MODBUS, BACnet, Lontalk, ARCNET on RS 232/485 port to match the control system													
	requirement, thick 20mm dia Conduit shall be supported at regular intervals not													
	exceeding 2.5 m. on horizontal runs and 1.5 m. on vertical runs. as required at site.													
	etc. (For RPU panel internal Data commuication, Station LAN interface, etc..)													
	OPTICAL FIBRE CABLE - Communication Cable													
	Supply, Installation, testing and commissioning of 6 core single mode													
	OFC with all accessories necessary such as listed below:													
	i) 12Port fiber Patch cord Loaded with adapter Plates & Splice tray													
	ii) 24Port fiber Patch cord Loaded with adapter Plates & Splice tray													
	iii) SC-LC, Duplex OFC patch cord, 3mtrs, OM3													
	iv) SC-Style Pigtail, 50/125, Multimode, OM3, 1.5 meter													
	v) Line interface unit for Fo cable termination, supply, installation and connection													
	as required to meet functional requirment.													
	Note: The items indicated above are probable and main items.													
	vendor to include all allied and implied items and required quantity													
	for station building management system as indicated in various areas of													
	BOQ.													
	Qunatity shall be as per detail design requirement or as to meet system operational and functional requirement as required by the client/cunsultant .													
	Make: Honeywell / Equivalent													
	SUB TOTAL BMS/SCADA for all system parameter of the panel - E11													**424,80,000.00**
E.12	**Via Duct Lighting**													
	Supply, Installation, Testing and commissioing of Via duct lighting with Light fitting, cable, BD, Cable tray and junction and all necessary accessories											0	232,06,658.80	
12.1	Light Fixtures													
	Supply, Installation, testing and commissioning of LED Via Duct Light with system power not more than 20W High efficiency glass cover with Aesthetically Designed LM6 PDC housing with corrosion resistant polyester Powder coating, IP66 & IK 10 with operating voltage from 220-240VAC, 50 Hz, with LED Life of 50000 Burning Hours @L70 with system efficacy not less than 80 Lumen/Watt for the light fixture. The system lumen shall be >= 1600 lumens . The supplier shall provide LM80 and LM 79 test reports from NABL accredited LAB before supplying the luminaires . Philips: Philips Via Duct LED Luminaire													
12.2	Distribution Board													
	Outdoor type Vertical Power distribution boards (VDPN) IP65 rated as per specification and as per following details.													
12.3	INCOMER													
	1 no. 63A TP Contactor with with astronomic digital timer													
	1 no. 63 TP MCCB													
	1 set of (ON) indicating lamps.													
12.4	OUTGOINGS													
	8 Nos of 20 TPN MCB													
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													
12.5	Cables	Lumpsum												-
	Supply, laying, jointing, terminating, testing and commissioning of 1100 V grade, armoured, FRLSZH, **XLPE**, aluminium(AL) / Copper (CU) conductor cables on existing trays/walls/columns/ indoor/ trenches including the cost of supports with suitable clamps, saddles, hooks, bolts etc. and including the cost of proper dressing of cables, markers providing identification tags,earthing of glands armouring etc. complete as per specifications, as required and as below.													
	5 core 2.5 sq mm CU Conductor													
	5 core 4 sq mm CU Conductor													
	3.5 core 50 sq mm AL. Conductor													
12.6	Cable Termination													
	Cable Joining and termination above cables including cost of supplying and fixing, crimping lugs, double compression brass glands, insulation tape etc. complete as per specifications and as required and any other Miscellaneous items required for to complete installation,testing and commissioning of Via duct lighting .													
12.7	Cable Trays													
	Supply, fabrication & installation of perforated hot dipped galvanised double bended cable trays from 2 mm thick GI sheets continuously connected including horizontal and vertical bends, reducers, tees, and other accessories and duly suspended from the ceiling with 12 mm dia vertical GI rods supported by 40mm x 40 mm 5 mm GI angle etc. (or installed on wall supported on suitable brackets as required) complete as per specifications, as required and as below. Coloured cable tray shall be provided as per Engineer In-charge													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
a)	150mm wide x 50mm deep x 2mm thick													
	SUB TOTAL Via Duct Lighting - E12													**-**
E.13	**Mandatary Operational Spares for the Panels And safety items**		1	1	1	1	1	1	1	1		8	3,54,000.00	28,32,000.00
	R,Y,B Phase Indication lamp Led Type													
	Red / Green On, Off Indication lamp Led Type ,On,Off,trip Indication lamp Led Type													
	Amber trip Indication lamp Led Type													
	3Phase Digital Amp/Volt. Meter 96mm*96mm with inbuilt Selector Switch													
	Electronic Multifunction Meter 3Phase Class1.0 EM6400													
	CTs 1000/5A Cl 1.0 15VA, cast resin for measurement													
	CTs 1000/5A Cl 5P10 15VA, cast resin for protection													
	CTs 100/5A Cl 1.0 5VA, tapewound													
	230V AC or 24V DC shunt trip coil													
	230V AC motor wound spring close mechanism													
	Control MCB 6A SP 10kA MCB, 'C' Curve	Lumpsum												
	CTTB+Neutral Link													
	Power terminals ,Control Terminal Block,Neutral Link,Spreader Terminals													
	Shunt release,UV release													
	RS-485 port for display of ON/OFF status of ACB on BMS workstation through MODBUS protocol													
	Exhaust Fan 8" with Filter and Switch													
	Rotary Operating Handle													
	Control MCB 6A SP 10kA MCB, 'C' Curve,													
	Power Contactor 3Pole 9A 220V AC-3 Duty,Auxiliary Contact Block 2No+2NC													
	On, Off Push Button,Auto Manual Selector Switch													
	Single phase Preventor													
	Over current Relay													
	And not limited to the above and any other items necessay shall also be considered.													
	SUB TOTAL Mandatary Operational Spares for the Panels And safety items - E13													**28,32,000.00**
E.14	**Lighting Control System**													
	Supply, Installation ,Testing and commissioning of Lighting control panel to achieve 33%,66% and 100% on/off the lighting. The Lighting Control System shall be integrated with the E& M SCADA . Each lighting circuit from the lighting control panels (LCP) shall be controlled by the SCADA between the LCP and RTU.The Schedule for control and monitoring of lighting circuits and graphic of lighting control floor plan shall be from the E & M SCADA work station in SCR and OCC . The lighting control system configuration such as graphic, layout, setting, etc., shall be adjusted to harmonize with Architectural finishes. This is also applied to third party vendors interfaces with the system. The lighting control system shall comply with the following codes and standards: (1) IEEE 802 : Standard for Information Technology – Telecommunications and Information exchange between systems (2) IEC 60529/1989 : Degree of protection provided by enclosures (IP Code) (3) IEC 60255 : Electrical Relay (4) IEC 60364 : Electrical Installation of Buildings													
a)	LX Lighting Control Panels with encloser,24 Relay Spaces, Relays Ratings : 120, 277, and 347VAC 20 Amp Single Pole Input: 120/277/347VAC multi-tap transformer.	Nos	5	5	5	4	4	4	1	1		29	3,42,058.40	99,19,693.60
b)	Power Supply for LX Panel	Nos	4	4	4	4	4	4	1	1		26	77,219.20	20,07,699.20
c)	LX Switches for Manual Override, 5 Switches, White Color	Nos	6	6	6	5	5	5	1	1		35	12,637.80	4,42,323.00
d)	Graphic User Interface for LX Panel for Local Control	Nos	1	1	1	1	1	1	1	1		8	39,598.44	3,16,787.52
e)	PC Integration Tool for remote controlling Panels Via IP Address Input: 120VAC	Nos	1	1	1	1	1	1	1	1		8	2,49,245.50	19,93,964.00
f)	Building Automation multi-protocol gateway (BACnet, Metasys N2 by JCI, and Modbus) for providing control and access to LX Network Lighting Control Panel system Input: 24VDC	Nos	1	1	1	1	1	1	1	1		8	1,77,350.46	14,18,803.68
g)	Power Supply for ProtoCessor Input: 100-240VAC, 1.5A Output: 24V, 1.5A	Nos	1	1	1	1	1	1	1	1		8	632.48	5,059.84
h)	Control Cable for LON Communication between Panels (100 Ft Reel)	Nos	1	1	1	1	1	1	1	1		8	13,704.52	1,09,636.16
i)	Surface Mounted Cabinet for LX Panel Accessories	Nos	7	7	7	5	5	5	1	1		38	4,493.44	1,70,750.72
	SUB TOTAL Lighting Control System - E14													**163,84,717.72**
	SCHEDULE-F-FIRE FIGHTING & FIRE ALARM SYSTEM													
F.01														
A	**Hydrant Main Fire Pumps**													
1.0	Supply, installation,testing and commissioning of fire pumps, electrically driven generally as specified and shown in equipment schedule complete with:													
i)	all accessories													
ii)	vibration mounts													
iii)	test connection excluding starter panel													
iv)	Civil foundation in R.C.C. 1:2:3 200 mm high and 150 mm projection allround base plate or as per pump manufacturer's recommendation.													
1.1	Hydrant Main Fire Pumps													
	Providing and fixing horizontal single stage, single outlet pumping set with bronze impeller, C.I. body and connected by a flexible coupling to a totally enclosed fan cooled induction motor mounted on a common M.S. structural base plate with RCC base (RCC by civil contractor) and with all pump accessories, including pressure switch, pressure guage (both with cut off ball valves) complete as per specifications. Motor to be suitable for 415V, 3-phase, 50 Hz AC supply (specifications as per fire fighting requirements and on the pattern of local authority approval) as per instruction and specifications.													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
a	Capacity : 2280 lpm App.head : 70 m App. HP :60 HP	Set						2				2	408000.00	8,16,000.00
b	Capacity : 2850 lpm App.head : 70 m App. HP :75 HP	Set										0	482344.00	-
c	Capacity : 2280 lpm App.head : 90 m App. HP :75 HP	Set		2	2	2	2					8	524001.00	41,92,008.00
d	Capacity : 2850 lpm App.head : 90 m App. HP : 100 HP	Nos	2							3		5	639999.00	31,99,995.00
e	Capacity : 1800 lpm App.head : 90 m App.HP : 100 HP	Nos										0	325952.00	-
f	Capacity : 1800 lpm App.head : 70 m App.HP : 50 HP	Nos										0	262126.00	-
g	Supplying, Installation, Testing and Commissioning of **Factory Assembled electrically driven centrifugal fire pump (For KCP PD)(Main Pump for hydrant and sprinkler system),** suitable for automatic / manual operation, consisting of the following:													
	(a) Horizontal split casing, multi stage multi outlet, centrifugal fire pump with operating speed not exceeding 1500 rpm, suitable for operation on 415 volts ± 10%, 3 phase, 50 HZ A.C supply. Fire pump shall have C.I. casing, bronze impeller (hard finished and dynamically balanced) and S.S. Shaft and Sleeve with Mechanical seal. The installation shall be complete with necessary strainers, 100 mm dia dial pressure gauge of calibration 0-20 kg/sq cm with gun metal shut off cock on delivery side including bypass arrangement for periodic testing of the working of pump set as well as testing of automation with required length and size of GI Pipe and Control Valves for proper completion of work.													
	Pump shall be capable of 150% of rated capacity at a head of 65% of the rated head. The shut off head should not exceed 120% of rated head.													
	(b) Squirrel cage induction motor, suitable for operation on 415 volts, 3 phase 50 HZ A.C supply, for the above pump conforming to IP 55 protection & class F insulation. The motor shall conform to IS 325-1978 (up to date) with flexible coupling and coupling guard, complete as required.													
	(c) The pump set shall be inclusive of base plate, coupling, coupling guard and foundation bolts, suitable vibration clamping arrangement as requried with anti vibration pads, washers etc. (Civil work shall be excluded from Vendor scope)													
	Discharge : 2850 liter per minute													
	Head : 120 meter (Low Zone), 150 meter (High Zone)	Set							3			3	717151.50	21,51,454.50
h	Supplying, Installation, Testing and Commissioning of **Factory Assembled electrically driven centrifugal fire pump (For KCP PD) (Water Curtain Pump),** suitable for automatic / manual operation, consisting of the following:													
	(a) Horizontal end suction, single stage, centrifugal fire pump with operating speed not exceeding 2900 rpm, suitable for operation on 415 volts ± 10%, 3 phase, 50 HZ A.C supply. Fire pump shall have C.I. casing, bronze impeller (hard finished and dynamically balanced) and S.S. Shaft and Sleeve with Mechanical seal. The installation shall be complete with necessary strainers, 100 mm dia dial pressure gauge of calibration 0-20 kg/sq cm with gun metal shut off cock on delivery side including bypass arrangement for periodic trsting of the working of pump set as well as testing of automation with required length and size of MS / GI Pipe and Control Valves for proper completion of work.													
	Pump shall be capable of 150% of rated capacity at a head of 65% of the rated head. The shut off head should not exceed 120% of rated head.													
	(b) Squirrel cage induction motor, suitable for operation on 415 volts, 3 phase 50 HZ A.C supply, for the above pump conforming to IP 55 protection & class F insulation. The motor shall conform to IS 325-1978 (up to date) with flexible coupling and coupling guard, complete as required.													
	(c) The pump set shall be inclusive of base plate, coupling, coupling guard and foundation bolts, suitable vibration clamping arrangement as requried with anti vibration pads, washers etc. (Civil work shall be excluded from Vendor scope)													
	Discharge : 900 liter per minute													
	Head : 35 meter	Set							1	1		2	188370.00	3,76,740.00
1.2	**Fire Jockey Pumps**													
	Supplying, installing, testing, & commissioning of electric driven automatic pressurisation pump set consisting of the following.													
i)	Vertical mounted multi stage centrifugal Jockey pump.													
ii)	Squirrel cage induction motor suitable for 415 V, 50Hz, AC supply of the above pump with synchronous speed of 2900 RPM T.E.F.C type such as confirming to IP:55 and flexible coupling and coupling guard with the pump.													
iii)	Common bed plate of fabricated mild steel channel or cast iron type.													
iv)	Suitable cement concrete pump foundation of 1:2:4 ratio (1 cement : 2 fine aggregate : 4 coarse aggregate) with MS bolts, washers or as per pumpmanufacturer's recommedation.													
a	Capacity : 180 lpm, App.head : 70 m, HP : 7.5 HP	Nos						1				1	1,61,034.60	1,61,034.60
b	Capacity : 180 lpm, App.head : 90 m, HP : 10 HP	Nos	1	1	1	1	1			2		7	2,01,292.66	14,09,048.62
c	Supply, Fixing, Testing & Commissioning of **fire authority approved** electrical motor driven **JOCKEY PUMP**, suitable for automatic operation consisting of following :													
	(a) **Horizontal** Multi stage multi oulet **centrifugal pump** with operating speed of 2900 rpm, suitable for operation on 415 volts ± 6%, 3 phase, 50 HZ A.C supply.													
	The pump shall be complete in S.S 304. The pump shall be provided with mechanical seal The system shall be complete with necessary pressure gauge with gun metal shut off cock on delivery side.													

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	(b) Squirrel cage TEFC induction motor TEFC type for operation on 415 V, 3 phase 50 HZ AC supply for the above pump with flexible coupling and coupling guard etc. as required, IP 55 protection and 'F' Class insulation, vaccume impregnated windings with heat and moisture resisting varnish for the above pump. **The motor shall be rated for continuous duty and shall have HP rating necessary to drive the pump at 150% of it's rated discharge at 65% of rated head.**													
	(c) The pump set shall be inclusive of base plate, coupling, coupling guard and foundation bolts, suitable vibration clamping arrangement as requried with anti vibration pads, washers etc. (Civil work shall be excluded from Vendor scope)													
	Head : 120 meter (Low Zone), 150 meter (High Zone)													
c	Discharge : 180 liter per minute	Nos							2			2	174915.00	3,49,830.00
1.3	Supply and installation of pressure gauge panel (manifold) as per the requirement & Comprising:	Set	1	1	1	1	1	1	1	1		8	20,665.34	1,65,322.72
	i) Pressure gauges													
	ii) Pressure switches with snubber ball valve and 2 x 1.5 sq mm copper conductor wiring to motor starter panel													
	iii) Water piping from system upto the gauge panel along with valves etc.and as required.													
	iv) Sheet metal enclosure with glass paneling etc. as approved													
1.4	Internal hydrants/landing valves generally as specified and all complete with:	Set	11	11	11	11	11	11	15	15		96	51812.00	49,73,952.00
	i) 63mm dia Single headed landing valve IS marked (Stainless steel)													
	ii) First aid hose reel with 25 mm dia, 45 m long thermoplastic hose as per IS 12585 rubber hose, ball valve, piping and 7-8mm nozzle as required													
	iii) 38mm synthetic hoses with 63mm instantaneous SS coupling, IS marked- 15 m x 2 lengths with suitable arrangement of connecting the hose pipe with coupling as required.													
	iv) branch pipe and nozzle IS marked (Stainless steel)													
1.5	Hose cabinet as approved or as per site conditions with universal locking arrangement. Glazed with 5.5mm clear glass Powder coated Aluminium shutter door as appropriate with universal locking arrangement with aluminium grill of following sizes and types :													
a	Size 1200 x 1500 in 2 mm thick stainless steel sheet	Set	0	0	0	0	0	2	12	15		29	27642.00	8,01,618.00
b	Size 1500 x 1850 in 2 mm thick stainless steel sheet	Set	7	7	7	7	7	7				42	31136.00	13,07,712.00
c	Size 2100 x 900 in 2 mm thick stainless steel sheet	Set	4	4	4	4	4	4				24	29073.00	6,97,752.00
1.6	Hose cabinet door as approved or as per site conditions with universal locking arrangement. Toughen Glass of following sizes and types :													
a	Size 1200 x 1500 in 2 mm thick stainless steel sheet	Set						0				0	29880.00	-
b	Size 1500 x 1850 in 2 mm thick stainless steel sheet	Set						0				0	34120.00	-
c	Size 2100 x 900 in 2 mm thick stainless steel sheet	Set						0				0	32057.00	-
1.7	Supply, installation, testing and commissioning of external (yard) hydrants inclusive of :	Nos	2	2	2	2	2	2	5	4		21	62,540.00	13,13,340.00
	i) MS Box cabinet of size 750 x 600 x 250 mm of 2mm thickness with 2 nos x 15M Length of 38mm dia synthetic hose with 1 no branch SS nozzle.													
	ii) 63 mm dia single headed landing valve IS marked.													
1.8	Providing and fixing in position the industrial type Pressure Gauges with gun metal / brass valves complete as required.	Nos							20	19		39	1038.00	40,482.00
2.0	**PIPING FOR FIRE FIGHTING SYSTEM**													
2.1.1	Supply, fabricating, laying, testing, painting and commissioning external piping (UNDERGROUND) generally as specified using heavy class G.I. conforming to IS : 1239 & BS : 1387 with all fittings and complete with one protection layer of 4mm thick Pypkote													
	i) All pipes and all heavy grade fittings conforming to IS 1239 together with suitable joints, flanges, gaskets, bolts & nuts, washers, fittings, adapter pieces etc.including the support arrangements.													
a	150 mm nominal bore	Mtrs	114	114	114	114	114	114	305	155		1144	2,447.08	27,99,464.10
b	100 mm nominal bore	Mtrs	87	87	87	87	87	87	30	10		562	1,643.80	9,23,815.04
c	80 mm nominal bore	Mtrs	70	70	70	70	70	70	35	10		465	1,190.74	5,53,693.17
2.1.2	Excavation upto hard murram as per general profiles and back filling	Cu.m	10	10	10	10	10	10	2	1		63	531.00	33,453.00
2.1.3	Making 1:2:4 cement concrete supports and thrust blocks generally as required and approved.	Cu.m	1	1	1	1	1	1	2	1		9	3,873.35	34,860.15
2.1.4	**Butterfly Valve (PN16)**													
	Supply and installation of Butterfly Valve with mating flanges generally as specified all complete.													
a	300 nominal bore	Nos							4	2		6	27500.00	1,65,000.00
b	250 nominal bore	Nos							2	0		2	21513.00	43,026.00
c	200 nominal bore	Nos	2	2	2	2	2	2	2	3		17	15489.00	2,63,313.00
d	150 nominal bore	Nos	12	9	12	8	12	8	17	7		85	15,133.06	12,86,310.39
e	100 nominal bore	Nos	31	19	12	17	20	17	4	2		122	9,317.43	11,36,726.87
f	80 nominal bore	Nos	7	11	4	14	7	14	20	15		92	7,583.72	6,97,702.09
g	65 nominal bore	Nos	4	4	4	4	4	4	1	0		25	4738.00	1,18,450.00
h	50 nominal bore	Nos							6	1		7	3226.00	22,582.00
2.1.5	**Non Return Valve(PN16)**													
	Supply and installation of Non Return Valve with mating flanges generally as specified all complete.													
a	250 mm dia	Nos								1		1	26200.00	26,200.00
b	200 mm dia	Nos							1	0		1	25500.00	25,500.00
c	150 mm dia	Nos	5	5	4	3	3	3	6	6		35	29,762.11	10,41,673.97
d	100 mm dia	Nos							1	1		2	6008.00	12,016.00
e	80 mm dia	Nos	2	2	2	2	2	2	5	2		19	9,705.06	1,84,396.20
f	50 mm dia	Nos							5	2		7	2400.00	16,800.00
2.1.6	Supply, installation testing and commissioning of **Flexible connectors (Expansion Bellow**) as per specification complete in all respect. PN16													
a	Size 80 mm	Nos	2	2	2	2	2	2	2	2		16	4474.00	71,584.00

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
b	Size 100 mm	Nos	2	2	2	2	2	2	2	2		16	5333.00	85,328.00
c	Size 150 mm	Nos	6	6	6	4	4	4	6	6		42	6768.00	2,84,256.00
d	Size 200 mm	Nos	2	2	2	2	2	2	3	3		18	9117.00	1,64,106.00
2.1.7	**Foot valve**													
	Supply and installation of Foot Valves with mating flanges generally as specified all complete.													
a	200 nominal bore	Nos	0	0	0	0	0	0				0	35,394.55	-
b	100 nominal bore	Nos	1	1	1	1	1	1	2	2		10	9,026.71	90,267.05
2.1.8	Providing, fixing, testing & commissioning of cast Iron double flanged type `Y' strainer with SS 304 perforated metal removable basket including all fittings complete as required and suitable for system pressure.													
a	Size 300 mm	Set								2		2	38200.00	76,400.00
b	Size 200 mm	Set	2	2	2	2	2	2	2			14	37787.00	5,29,018.00
c	Size 100/150 mm	Set	3	3	3	2	2	2	1	1		17	22615.00	3,84,455.00
2.2	**Internal Piping**													
	Supply, fabrication & laying heavy grade IS marked G.I piping conforming to IS : 1239 & BS : 1387 complete with fittings, pipe supports, clamps, painting of two coats of red enamel etc. including the support arrangements.													
a	300 mm nominal bore (6 mm wall thickness)	Mtrs							20	20		40	4000.00	1,60,000.00
b	250 mm nominal bore (6 mm wall thickness)	Mtrs							25	15		40	3200.00	1,28,000.00
c	200 mm nominal bore (6 mm wall thickness)	Mtrs	24	18	18	18	18	18	20	25		159	3,389.67	5,38,957.21
d	150 mm nominal bore	Mtrs	667	789	500	289	465	289	685	325		4009	2,330.38	93,42,501.44
e	100 mm nominal bore	Mtrs	350	231	662	250	291	250	55	135		2224	1,565.98	34,82,735.07
f	80 mm nominal bore	Mtrs	100	100	100	24	18	24	345	335		1046	1,134.81	11,87,007.08
g	65 mm nominal bore	Mtrs	20	20	20	20	20	20	230	165		515	915.77	4,71,620.81
h	50 mm nominal bore	Mtrs	0	0	0	0	0	0	130	170		300	754.49	2,26,347.60
i	40 mm nominal bore	Mtrs	0	0	0	0	0	0	350	225		575	532.71	3,06,308.83
j	32 mm nominal bore	Mtrs	0	0	0	0	0	0	230	195		425	485.04	2,06,141.58
k	25 mm nominal bore	Mtrs	0	0	0	0	0	0	2325	1700		4025	361.73	14,55,959.23
2.3	**Air vessel**													
	Supply, fabrication (as per code), installation, testing and commissioning of Air vessels 300mm diameter and 1000mm high with ball valve inlet/outlet valve drain, air release valve, valve air inlet etc. all complete.	Nos	2	2	2	1	1	1	2	2		13	73,204.25	9,51,655.25
2.4	**Pressure vessel**													
	Supply, fabrication (as per code), installation, testing and commissioning of Pressure vessels 450mm diameter and 1000mm high fabricated from 8-10mm M.S. plate with accessories inside painting with epoxy paint and outside with enamel.	Nos	0	0	0	0	0	0	2	1		3	81,501.13	2,44,503.38
2.5	**Fire Brigade Connection (2-way)**													
	Supply, installation, testing and commissioning fire brigade connection with 2 way 63mm valves inlets, stand post and 150 mm MS pipe for mounting the stand post etc. as specified all complete as approved on tank. The fire brigrade connection shall be provided in a suitable MS box having mesh doors with universal locking arrangement. ***Note:*** The drawings of the proposed arrangement shall be provided by the contractor for approval of employer's representative.	Nos	0	0	0	0	0	0				0	28,342.13	-
2.6	**Fire Brigade Connection (4-way)**													
	Supply, installation, testing and commissioning Siamese connection with 4-way 63-mm outlets with non-return valve and sluice valve etc. complete as required and approved including M.S. Cabinets with universal locking arrangement, M.S. welded mesh inside at road level cabinets. ***Note:*** The drawings of the proposed arrangement shall be provided by the contractor for approval of employer's representative.	Nos	3	3	3	3	3	3	3	3		24	66,205.38	15,88,929.00
2.7	100 mm dia stainless steel Draw Out connection with foot valve for Fire Brigade.	Set	1	1	1	1	1	1	2	2		10	6839.00	68,390.00
2.8	**Air Release valve**													
	Supply, installtion, testing and commissioning of 25 mm dia Air Release valve with Ball valve to be fixed on top of Risers.	Nos	4	4	4	4	4	4	5	5		34	8,145.68	2,76,953.17
3.0	**SPRINKLER SYSTEM**													
a	Providing, fixing, testing and commissioning of UL listed Pendant / Upright type Sprinkler Head rated at 68 degree centigrade	Nos	0	0	0	0	0	0	740	650		1390	179.00	2,48,810.00
b	Flexible dropper for sprinkler- 1000 mm length UL Approved	Nos	0	0	0	0	0	0	200	230		430	895.00	3,84,850.00
c	Side wall Sprinkler 68^{0}C in brass / chorme finish (K =80)	Nos							80	30		110	550.00	60,500.00
3.1	Providing & Fixing of installation control valve with turbine type automatic Alarm Gong to be connected with control valve, drain & test valve as per manufacturer's specifications complete as required.													
	a) 150 mm dia:	Nos	0	0	0	0	1	1	2			4	40,151.00	1,60,604.00
3.2	Providing and fixing UL listed Flow Switch of 65/ 80 / 100 / 150 mm dia on Sprinkler Header complete with flexible full bore paddle, U clamp and NO / NC contact terminals	Set	0	0	0	0	0	1	7			8	4893.00	39,144.00
3.3	Supply, fixing, testing & commissioning of Braided FM & VDS approved Annular Corrugation Stainless Steel flexible sprinkler pipe drop pressure rated upto 200 psi. The drop shall consist of a BRAIDED type 304 stainless steel flexible tube, zinc plated steel Male threaded nipple for connection to branch-line piping, and a zinc plated steel reducer with a female thread for connection to the sprinkler head and with a numbering on the reducer to ease the process for vertical positioning of the sprinklers with Bracket arrangement as per the Ceiling Profile. The bracket assembly shall be one piece open gate bracket complete in all respect.													
a	1200mm	Nos								70		70	1800.00	1,26,000.00
b	1500 mm	Nos								50		50	2200.00	1,10,000.00

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
3.4	Providing and fixing UL listed Flow Switch of 65/ 80 / 100 / 150 mm dia on Sprinkler Header complete with flexible full bore paddle, U clamp and NO / NC contact terminals	Set								8		8	8577.56	68,620.51
3.5	Supply, fixing, testing & commissioning of 25 mm dia **inspecting and testing assembly** with gun metal valve, sight glass, with 50 mm dia by pass valve and connection to the drain line as required to complete the system.	Set							1	1		2	8000.00	16,000.00
3.6	Supply, fixing, testing & commissioning of 25 mm dia **drain ball valve** (gun metal) at end of sprinkler branch line with connection to the nearest drain with all fittings, pipe and acessoreis complete in all respect.	Set							7	8		15	2500.00	37,500.00
3.7	Supply, fixing, testing & commissioning of UL / FM listed / approved 15 mm NB **water curtain nozzle** chrome plated complete including fixing in position on pipe complete in all respects with Teflon tape. (K=23)	Nos							26	4		30	2100.00	63,000.00
3.8	**Flow Meter**													
	Supply, installation, testing and commissioning of electronic type flow meter with all required aessoires complete in all respect	Nos							2			2	16819.00	33,638.00
	150 mm dia													
3.9	Providing and Fixing of UL/FM Approved **Deluge Valve** with Grooved Ends / Flange End low differential, latched clapper design, black enamel coated ductile iron body conforming to ASTM A-536, grade 65-45-12, aluminum bronze clapper, stainless steel spring and shaft, peroxide cured EPDM diaphragm, EPDM seal, brass seat, and Nitrile seat O-rings. & S.S Shaft complete with Electrical release trim, Hydraulic Release trim, Pressure Switch, Solenoid valve actuator and Control Panel, control wiring including necessary accessories, complete with tap off socket arrangement as required, with potential free contact with 2 Nos. NO/NC & ON/OFF arrangement and all other associated works of complete as required. Note: Cable for Integration of deluge valve / Drencher system with Fire Alarm System shall be included.													
a	50 mm diameter	Nos							2	1		3	40000.00	1,20,000.00
3.10	Supply, Installation, Testing and Commissioning of Pressure Reducing Valve (PN16) having SS seal, metallic brass diaphargam, system suitable for controlling outlet pressure of water having inlet range of maximum 12 kg/cm2 and outlet range of 2.6 kg/cm2, complete as required. 250 NB								1			1	145000.00	1,45,000.00
	SUB-TOTAL FIRE HYDRANT SYSTEM - F01													**552,76,361.62**
F.02	**PORTABLE FIRE EXTINGUISHERS**													
	Supply and installation of portable fire Extinguishers as described below:													
2.1	9 litre capacity of water CO_2 type, IS marked, with discharge tube including clamps etc.	Nos	20	20	20	20	20	20	23	15		158	5,943.52	9,39,075.91
2.2	Carbon dioxide extinguisher conforming to IS with high pressure discharge tube, horn, control valve, IS marked including clamps etc.													
	4.5 kg capacity extinguisher	Nos	50	20	20	20	20	20	23	15		188	10,091.95	18,97,286.60
2.3	Mechanical foam type 9.0 liter capacity fire extinguisher (for DG room)	Nos	5	5	5	5	5	5	1	1		32	7,934.77	2,53,912.59
2.4	5 kg capacity of DCP(Dry Chemical Powder) fire extinguisher	Nos	20	20	20	20	20	20	5	2		127	5,943.51	7,54,826.09
2.5	Mechanical form type 50.0 liter capacity fire extinguisher trolley mounted complete set (for Plant Room)	Nos							2	2		4	12697.88	50,791.50
	SUB-TOTAL PORTABLE FIRE EXTINGUISHERS - F2													**38,95,892.68**
F.03	**PANEL FLOODING - CO2 GAS BASED FIRE TRACE TUBE SYSTEM**													
	Supply, fixing, testing and commissioning of Polymer Tube Detection based CO2 System for Electrical Panels including AMF and Communication Panels,The exact quantity of the Panels shall be finalized during detail design stage. (Firetrace Tube Panel Protection System), consisting of the following components:		1	1	1	1	1	1	1	1		8	14,16,000.00	113,28,000.00
(a1)	CO2 Cylinder, 8 kg capacity, complete with all necessary CO2 Gas, fittings, support and accessories, connected with Valve (with manual release facility).													
(a2)	CO2 Cylinder, 4.5 kg capacity, complete with all necessary CO2 Gas, fittings, support and accessories, connected with Valve (with manual release facility).													
(b)	Filling Adapter	Lumpsum												
(c)	Outlet adapter													
(d)	End of Line adapter													
(e)	Pressure switch													
(f)	Flexible Polymer Detection Tube with all necessary fittings & supports.													
(g)	Master Control Unit for controlling each system, complete with pressure switches, buzzers and electronic hooters, including all necessary accessories + electrical wiring to make each entire system functional.													
(h)	Auto weight measuring Unit for Cylinders with automatic audio/visual alarm.													
	SUB-TOTAL PANEL FLOODING - CO2 GAS BASED FIRE TRACE TUBE SYSTEM - F3													**113,28,000.00**
F.04	**FIRE ALARM AND DETECTION SYSTEM**													
	The Fire Alarm and Detection System specified herein, must conform to M & E Specifications, in addtion to the description given in respective items of BOQ, whether explicitly specified or not. In case of contradiction between M & E specification and description in BOQ, the most stringent of the condition will prevail.													
	All the items / parts mentioned in relevant clauses of the M & E specifications and not specifically mentioned in BOQ shall be													

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	All the items not specifically mentioned here but necessary to make the system complete and suitable for desired application as per M & E Specifications and Drawings will be deemed to be included in the quoted prices													
4.1	Supply, Installation, Testing and Commissioning of 2 Loop Addressable Main Fire Alarm Control Panel (MFACP) complete with capacity to connect Devices & Detectors (in zoned manner) as per M & E Specifications & Drawings but not limited to the following:	Set	1	1	1	1	1	1		1		7	4,83,800.00	33,86,600.00
a	2 Loop Panel													
b	Repeator Driver Board													
c	Communication Board													
d	Software & Graphics													
e	PC with 21" TFT + **80** column Printer.													
f	Nicl. Batteries & Battery Charger.													
g	Amplifier card													
h	Provision for interfacing with other systems such as SCADA / BMS with all required Hardware & Software.													
4.2	Supply, installation, testing and commissioning of the Microprocessor based intelligent analogue addressable, modular, expandable networkable, 10 loop (each loop shall consist of minimum 125 detector & 125 devices and 10% spare loop capacity) fire alarm control panel. The panel shall have a built-in integrated voice command center with suitable rating amplifiers for minimum 25 speaker zones. The panel shall support programmable relay for controlling fans/AC equipment and monitoring of fire sprinkler etc controlled by powerful Boolean logic equation. The panel shall have minimum five independent hazard release circuit built-in the panel. The panel shall have 240 volts AC power supply, automatic battery charger, 24 volts, sealed lead acid maintenance free batteries sufficient for 24 hours normal working and then be capable of operating the system for 4 hours during emergency condition. The panel shall be UL/EN listed.	Set							1			1	7,46,708.15	7,46,708.15
a	10 Loop Panel													
b	Repeater Driver Board													
c	Communication Board													
d	Software & Graphics													
e	PC with 21" TFT + **80** column Printer.													
f	Nicl. Batteries & Battery Charger.													
g	Amplifier card													
h	Terminal strips for receiving and terminations all external cabling													
i	Provision for interfacing with other systems such as SCADA / BMS with all required Hardware & Software.													
	Note: Provision for additional loops for Future floors shall be included													
4.3	Supply, Installation, Testing and Commissioning of Repeater Annunciator Panel with Mimic panel as per Specifications and Drawings.	Set	1	1	1	1	1	1	1	1		8	1,05,148.62	8,41,188.96
4.4	Supply, Installation, Testing & Commissioning of following Signal Initiating (Intelligent Analogue Addressable) devices complete with Detector Base etc. etc. complete as specified, required and as approved .												-	-
4.4.1	Intelligent Addressable Multi Sensor Smoke Detector.	Nos	105	150	95	80	94	95	65	225		909	2,856.78	25,96,813.02
	Rate of rise cum fixed Temperature thermister type Heat detector with mounting base complete as required													
4.4.2	Addressable Fault Isolator Base	Nos	19	32	19	19	19	19	10	15		152	1,739.32	2,64,376.64
4.4.3	Addressable Fault Isolator	Nos	19	32	19	19	19	19	10	15		152	3,363.00	5,11,176.00
4.4.4	Supply installation testing and commissioning of dust and vermin proof addressable analogue Manual Call Boxes to initiate audio visual alarm including the cost of mounting accessories complete as per specifications and as required.	Nos	15	23	15	20	20	15	18	8		134	3,776.00	5,05,984.00
4.4.5	Supply, installation, testing and commissioning of Wall/ Ceiling mounting strobes for visual indication including the cost of mounting accessories complete as per specifications and as required.	Nos	13	24	13	20	20	13	18	8		129	3,122.28	4,02,774.12
4.4.6	Addressable Loop Sounder 6.8 W.	Nos	0	0	0	0	0	0	18	8		26	3,001.92	78,049.92
4.4.7	Response Indicator constructed from 16 guage MS stove / ABS plastic enamelled sheet with front 16 guage steel cover plate / ABS plastic complete as required.	Nos	56	105	56	45	45	56	15	125		503	365.80	1,83,997.40
4.4.8	Intelligent Addressable Duct Detector.	Nos	0	0	0	0	0	0	5	5		10	7,670.00	76,700.00
4.4.9	Supply, installation, testing and commissioning of Control Modules including the cost of mounting accessories complete as per specifications and as required.	Nos	20	25	20	20	20	20	2	20		147	3,363.00	4,94,361.00
4.4.10	Supply, installation, testing and commissioning of Monitor Modules including the cost of mounting accessories complete as per specifications and as required.	Nos	34	32	34	26	23	34	2	8		193	3,363.00	6,49,059.00
4.4.11	Intelligent Addressable water Flow Monitoring Modules	Nos	20	20	20	20	20	20	8	8		136	3,363.00	4,57,368.00
4.4.12	High Temperature (min. 80 C degree trip) Heat detector	Nos	2	2	2	2	2	2	2	8		22	3,363.00	73,986.00
4.5	Supplying, Laying, Termination, Testing & Commisioning of Fire Survival Cables (confirming to BS: 7846 and Section E02, 35 of M & E specifications for perfomance requirements of Fire Survival Cables) armoured, 1 pair 2.5 sq.mm, screened / shielded, Copper conductor (one pair shielded and one pair unshielded) cable or Mineral Insulated cable complying the CWZ category.	Mtrs	0	0	0	0	0	0	1600	2500		4100	83.78	3,43,498.00

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
4.6	Supplying, Laying, Termination, Testing & Commisioning of Fire Survival Cables (confirming to BS: 7846 and Section E02, 35 of M & E specifications for perfomance requirements of Fire Survival Cables) armoured, 1 twisted pair 1.5 sq.mm, screened / shielded copper conductor cable or Mineral Insulated cable complying the CWZ category for looping of detection units etc.	Mtrs	2500	2500	2500	2000	2000	2000	3200	2500		19200	76.70	14,72,640.00
4.7	Fire Rated Material for Cut-outs Closing													
	Description of Work													
	All the Shaft and services openings in fire rated walls & floors are to be properly fire stopped with 2 hrs fire rated Insulation & integrity with PROMASTOP® **Mortar/**Cement . The system would involve providing and fixing of PROMASTOP® Cement with required thickness. Penetrations through walls and floors to be sealed with POMASTOP® **Mortar** as tested to BS: 476 Part 20 & AS 1530 part 4 to maintain the required fire rating of 4 hrs of the building element. Installation shall be done in accordance with the tested specification. **The system will have to be supported by a valid Test report of the complete system as per BS 476 part 20 issued by M/s.Promat International Asia Pacific Ltd.**	Sqm	10	10	10	10	10	10	150			210	12499.00	26,24,790.00
	SUB-TOTAL FIRE ALARM AND DETECTION SYSTEM - F.04													**157,10,070.21**
H.01	**VRV AIRCONDITONING SYSTEMS**													
1.1	Supply, Installation, testing and commissioning of Air Cooled Variable Refrigerant Volume System suitable for R410A and 415 ± 10% , 50 Hz, AC supply. The unit shall consist of indoor units and external condensing units and other accessaries as listed below complete in all respects. The unit shall be fully charged with gas and oil.													
1.1.1	**Outdoor Unit**													
	Supply, installation, testing and commissioning of Modular type outdoor condensing units equipped with highly efficient scrol/hermetic type DC twin rotary compressors with digital/ invertor technology, special acryl precoated heat exchanger, low noise condenser fan with motor, auto check function for errors in display panel, auto address setting, as per specifications and capacities as mentioned below.(The unit shall be fully charged with gas and oil.Price shall include pressure testing).													
	The units shall be complete with necessary mounting frames													
	Capacity shall be as under													
a	26 HP (22TR Nominal Capacity)	Nos	0	0	0	0	0	0				0	7,73,136.00	-
b	24 HP (20TR Nominal Capacity)	Nos	0	0	0	0	0	0				0	7,10,690.40	-
c	20 HP (16TR Nominal Capacity)	Nos	0	0	0	0	0	0				0	6,60,139.20	-
d	18 HP (15TR Nominal Capacity)	Nos	3	3	3	3	3	3				18	6,48,244.80	116,68,406.40
e	6 HP (5TR Nominal Capacity)	Nos	3	3	3	3	3	0				15	4,35,632.40	65,34,486.00
1.1.2	**Indoor Units**													
	Supply, installation, tesing and commissioning of ceiling mounted duct type indoor units each complete with coil, pre-filter, etc. The units casing shall be of steel construction, wall mounted split type indoor units and 220 volt, 1 phase, 50 Hz, AC supply all as per specifications.													
	The capacities shall be as follows:													
a	Ceiling mounted duct type 3500 CFM - 6.0 TR Nominal Capacity	Nos	0	0	0	0	0	0				0	2,53,053.36	-
b	Ceiling mounted duct type 3200 CFM - 5.0 TR Nominal Capacity	Nos	0	0	0	0	0	0				0	82,368.72	-
c	Ceiling mounted duct type 2800 CFM - 5.0 TR Nominal Capacity	Nos	0	0	0	0	0	0				0	82,368.72	-
d	Ceiling mounted duct type 2500 CFM - 4.0 TR Nominal Capacity	Nos	0	0	0	0	0	0				0	75,975.48	-
e	Ceiling mounted duct type 2400 CFM - 4.0 TR Nominal Capacity	Nos	0	6	5	0	0	0				11	75,975.48	8,35,730.28
f	Ceiling mounted duct type 2300 CFM - 4.0 TR Nominal Capacity	Nos	6	0	1	3	0	6				16	75,975.48	12,15,607.68
g	Ceiling mounted duct type 2000 CFM - 3.0 TR Nominal Capacity	Nos	0	2	3	6	9	3				23	81,625.32	18,77,382.36
h	Ceiling mounted duct type 1600 CFM - 3.0 TR Nominal Capacity	Nos	0	1	0	0	0	0				1	81,625.32	81,625.32
i	Wall mounted split type 2.0 TR Nominal Capacity	Nos	0	0	0	0	0	6				6	48,023.64	2,88,141.84
j	Wall mounted split type 1.5 TR Nominal Capacity	Nos	3	0	3	3	3	3				15	45,198.72	6,77,980.80
k	Wall mounted split type 1.0 TR Nominal Capacity	Nos	0	3	0	3	0	0				6	42,373.80	2,54,242.80
l	Ceiling mounted duct type - 2.5 TR Nominal Capacity	Nos	0	0	0	0	0	0				0	49120.00	-
m	Ceiling mounted duct type - 2.0 TR Nominal Capacity	Nos	3	3	0	3	6	0				15	42109.00	6,31,635.00
n	Ceiling mounted duct type - 1.5 TR Nominal Capacity	Nos	0	0	0	0	0	0				0	38363.00	-
o	Ceiling mounted duct type - 1.0 TR Nominal Capacity	Nos	0	3	3	3	0	0				9	38139.00	3,43,251.00
1.1.3	Supply, installation, tesing and commissioning of Corded Remote controllers for operation of indoor units.	Nos	12	15	12	18	18	15				90	4,014.36	3,61,292.40
1.1.4	Supply, installation, tesing and commissioning of Central Remote controller for complete system including all VRV indoor and outdoor units.	Nos	1	1	1	1	1	1				6	1,26,378.00	7,58,268.00

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
1.1.5	Supply, installation, tesing and commissioning of Imported fittings Y-joints, T-joints, distributer and headers for all Indoor units at both the floors layout as per layout drawings.	Nos	17	17	17	17	17	17				102	12,191.76	12,43,559.52
1.2	Refrigerant Piping													
	Supply,installation,testing and commissioning of Interconnecting refrigerant pipe work with elastomeric nitrile rubber/closed cell expanded polythene tubular insulation between each set of indoor & outdoor units as per specifications, all piping should be laid on Galvanised/Powder Coated tray supported by Galvanised M S Hangers & Clamps.													
a)	41.3 mm O.D. (insulation : 19 mm)	Mtrs	0	0	0	0	0	0				0	1,561.14	-
b)	34.9 mm O.D. (insulation : 19 mm)	Mtrs	0	0	0	0	0	0				0	995.92	-
c)	28.6 mm O.D. (insulation : 19 mm)	Mtrs	107	130	107	107	107	107				665	802.40	5,33,596.00
d)	22.2 mm O.D. (insulation : 13 mm)	Mtrs	36	54	36	36	36	36				234	798.41	1,86,828.31
e)	19.1 mm O.D. (insulation : 13 mm)	Mtrs	31	31	31	31	31	31				186	520.38	96,790.68
f)	15.9 mm O.D. (insulation : 13 mm)	Mtrs	315	291	315	315	315	315				1866	428.20	7,99,018.21
g)	12.7 mm O.D. (insulation : 13 mm)	Mtrs	36	144	36	36	36	36				324	334.53	1,08,387.72
h)	9.5 mm O.D. (insulation : 13 mm)	Mtrs	264	155	264	264	264	264				1475	243.84	3,59,656.92
i)	6.4 mm O.D. (insulation : 13 mm)	Mtrs	56	56	56	56	56	56				336	150.17	50,456.04
1.3	Control cum transmission wiring													
a	Supply,installation,testing and commisioning of control cum transmission wiring of 2 core x 1.5 sqmm copper in suitable GI conduits between indoor and outdoor units.	Mtrs	1000	1000	1000	1000	1000	1000				6000	356.82	21,40,921.20
b	Supply,installation,testing and commisioning of contl cum transmission wiring of 2 core x 1.0 sqmm copper in suitable GI conduits between indoor and outdoor units.	Mtrs	1000	0	0	0	0	0				1000	164.00	1,64,000.00
1.4	Supply,installation,testing and commissioning of power cables from isolator MCB to outdoor unit.	Mtrs	0	0	0	0	0	0				0	624.46	-
1.5	DX wall mounted Split Unit													
1.5.1	Providing, fixing, testing and commissioning of Hi wall split unit air conditioing air cooled type with evaporator coil, fan and fan motor ,air cooled condenser with hermatically sealed recipcating compressor, condenser coil and complete with electrical Wiring as required (Voltage stablizers are not to be provided)													
	Note:Providing and fixing of M.S. angle iron frame work for outdoor unit including P.O. painting of the same is also included in the above scope. Contractor to submit design/Scheme for Iron frame and obtain approval of engineer-in-chage before proceeding further.													
a)	Nominal capacity 1.5 TR	Nos	6	7	6	3	6	0				28	66,906.00	18,73,368.00
1.5.2	Providing, fixing and testing of copper refrigerant piping of apppriate sizes duly insulated with nitrile rubber insulation of 9 mm thickness for all types of split AC units. The pipes plus nitrile rubber insulation are to be covered with PVC flexible conduits for protection.	Mtrs	48	54	48	24	48	0				222	2,750.58	6,10,628.76
1.6	Condensate Drain Piping:													
	Providing, fixing and testing GI drain piping for condensate from indoor unit to nearest suitable drain system as per site conditions as per instructed at site engineer complete with all required fittings and pviding clean out plug at suitable location when required complete with 6mm thick elastomeric nitrile rubber insulation over GI pipe:													
a	40mm Dia.	Mtrs	0	0	0	0	0	0				0	564.98	-
b	32mm Dia.	Mtrs	0	0	0	0	0	0				0	460.91	-
c	25mm Dia.	Mtrs	125	125	125	125	125	125				750	416.30	3,12,228.00
	TOTAL FOR VRV AIRCONDITONING SYSTEMS - H.01													**340,07,489.25**
H.02	**VENTILATION SYSTEM**													
	Supply, installation, testing and commissioning of following equipment .													
2.1	Propeller type fan complete with motor suitable for 220±6% volt, 1 phase, 50 Hz AC supply, mounting frames and GI gravity louvers.													
a	Capacity 1500 CFM (2550CMH) wall mounted	Nos	0	0	0	0	0	0				0	9,664.20	-
b	Capacity 1350 CFM (2295CMH) wall mounted	Nos	0	0	0	0	0	0				0	8,177.40	-
c	Capacity 1300 CFM (2210CMH) wall mounted	Nos	0	0	0	0	0	0				0	8,177.40	-
d	Capacity 1200 CFM (2040CMH) wall mountde	Nos	0	0	0	0	0	0				0	7,434.00	-
e	Capacity 1150 CFM (1955CMH) wall mounted	Nos	0	0	0	0	0	0				0	7,434.00	-
f	Capacity 1080 CFM (1836CMH) wall mounted	Nos	0	0	0	0	0	0				0	7,434.00	-
g	Capacity 1000 CFM (1700CMH) wall mounted	Nos	0	0	0	0	0	0				0	6,690.60	-
h	Capacity 960 CFM (1632CMH) wall mounted	Nos	0	0	0	0	0	0				0	6,690.60	-
i	Capacity 920 CFM (1564CMH) wall mounted	Nos	0	0	0	0	0	0				0	6,690.60	-
j	Capacity 900 CFM (1530CMH) wall mounted	Nos	0	0	0	0	0	0				0	6,690.60	-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
k	Capacity 800 CFM (1360CMH) wall mounted	Nos	0	0	0	0	0	0				0	5,947.20	-
l	Capacity 650 CFM (1105CMH) wall mounted	Nos	0	0	0	0	0	0				0	5,947.20	-
m	Capacity 520 CFM (884CMH) wall mounted	Nos	0	0	0	0	0	0				0	5,947.20	-
n	Capacity 500 CFM (850CMH) wall mounted	Nos	0	0	0	0	0	0				0	4,460.40	-
o	Capacity 400 CFM (680CMH) wall mounted	Nos	0	0	0	0	0	0				0	4,460.40	-
p	Capacity 300 CFM (510CMH) wall mounted	Nos	3	3	3	3	3	3				18	3,717.00	66,906.00
q	Capacity 260 CFM (442CMH) wall mounted	Nos	3	3	3	0	0	0				9	2,973.60	26,762.40
2.2	cabinet fan with centrifugal blower driven by motor. The motor shall be suitable for 220 Volts ±6% 1 Phase 50 HZ AC supply.													
a	Capacity 9300 CFM (15810 CMH) ceiling mounted	Nos	0	0	0	0	0	0				0	71,366.40	-
b	Capacity 7440 CFM (12648 CMH) ceiling mounted	Nos	0	0	0	0	0	0				0	47,577.60	-
c	Capacity 6000 CFM (10200 CMH) ceiling mounted	Nos	0	0	0	0	0	0				0	42,373.80	-
d	Capacity 5000 CFM (8500 CMH) ceiling mounted	Nos	0	0	0	0	0	0				0	32,709.60	-
e	Capacity 4800 CFM (8160 CMH) ceiling mounted	Nos	0	0	0	0	0	0				0	32,709.60	-
f	Capacity 4000 CFM (6800 CMH) ceiling mounted	Nos	0	0	0	0	0	0				0	29,736.00	-
	TOTAL FOR VENTILATION SYSTEM - H.02													**93,668.40**
H.03	**AIR DISTRIBUTION SYSTEM**													
3.1	Supplying, fabricating, installing and testing of factory fabricated G.I. Sheet metal ducts with flanges complete with supports, vanes, dampers, links, levers and quadrants etc. as per specifications and drawings. The rates shall include all materials of the duct and labour for suspension and supporting arrangement for plenums, ducts, complete with fire retardant flexible connection as required and specifications.													
a	0.63 MM (24 Gauge) for ac duct	Sqm	5	5	5	5	5	5				30	966.42	28,992.60
b	0.63 MM (24 Gauge) for ventilation duct	Sqm	0	0	0	0	0	0				0	966.42	-
3.2	Grilles and Dampers													
a	Providing and fixing, testing and commissioning of powder coated extruded aluminium section grills with dampers for supply air terminal.	Sqm	0	0	0	0	0	0				0	13,381.20	-
b	Providing and fixing, testing and commissioning of powder coated extruded aluminium section grills without dampers for exhaust air terminal.	Sqm	0	0	0	0	0	0				0	6,690.60	-
3.3	Providing, fixing, testing and commissioning of exhaust air/fresh air louvers with filter of powder coated extruded aluminium construction with bird screen, minimum 80 mm deep.	Sqm	0	0	0	0	0	0				0	11,151.00	-
3.4	Providing and fixing, testing and commissioning of 16 Ga GI Frame / 24 Ga GI aerifoil blades type volume control damper for duct complete with linkages,levers, fittings, supports, all accessories and any other item required to make the system complete.	Sqm	0	0	0	0	0	0				0	7,434.00	-
3.5	Providing and fixing of self adhesive Closed Cell Elastomeric Nitrile rubber 13mm thick insulation on duct complete as per the specifications.	Sqm	0	0	0	0	0	0				0	743.40	-
3.6	Supplying and fixing of accoustic lining of duct with fiber glass rigid board of density 48 kg/m3 sealed in fiberglass tissue paper and covered with 0.5mm perforated aluminium sheet & conforming to standard specification.	Sqm	0	0	0	0	0	0				0	966.42	-
3.7	Providing, fixing, testing and commissioning of supply and return air Diffusers as per specification and drawings including fixing frames of GI in False ceiling / Wall.												-	-
a	Aluminium Diffuser without Damper	Sqm	1	1	1	1	1	1				6	7417.00	44,502.00
b	Aluminium diffuser with damper	Sqm	1	1	1	1	1	1				6	11651.00	69,906.00
	TOTAL FOR AIR DISTRIBUTION SYSTEM - H.03													**1,43,400.60**

	BOQ FOR ZERO MILE STATION													
ZE.01	**L.T. PANELS**													
1.1	Design, fabrication, assembling, wiring, supply, installation, testing and commissioning of Main LT panel/Main distribution panels/sub- distribution panels fabricated out of 3 mm thick for structural members and 2 mm thick for door and covers CRCA sheet steel in cubicle compartmentalised free standing floor mounted, dust and vermin proof with reinforcement of suitable size angle iron, channel T irons and/or flats wherever necessary. 16 gauge CRCA sheet steel shall be used for final distribution panels. Cable gland plates shall be provided on top as well as at the bottom of the panels. Panels shall, be treated with all anticorrosive process before painting as per specifications with 2 coats of zinc chromate primer and final approved shade of enamelled paint. 2 Nos. earthing terminals shall be provided for all distribution panels. Panels shall be suitable for 415V, 3 phase, 4 wire, 50 HZ supply system and with 15% spare space, lifting hooks shall also be provided in case of large panels. Approval shall be takeny (4) IEC 60364 : Electrical Installation of Buildings with zinc passivation shall be used in fabrication of panels.													
	The panels to confirm IP-43 for indoor & IP-54 for outdoor.													
Note:	RATING AND SWITCH BOARDS WILL BE DESIGNED AS PER ACTUAL													
	(NOTE: Unless not specified all incomers and outgoings ACBs/MCCBs of main LT panel shall be Microprocessor based with 485 communication port for BMS (Building Management system) connectivity through MODBUS protocol, as specified in Technical Specification)													
1.1	**MAIN LT PANEL**													
	SECTION - I													
	Incoming Air Circuit Breaker A' (Transformer-1)													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	4000A, 4 pole electrically operated (motorised) fully draw out type air circuit breaker with built in micro processor based release unit for short circuit, over current and earth fault protection with adjustable setting and with the following accessories :													
	Electronic energy meter of accuracy class-1 with 3 Nos 4000/5A, 15VA CTs to measure and display the following electrical quantities:													
	Real time													
	Total active energy (KWH/MWH)													
	Maximum Demand (KVA/MVA) (KW/MW)													
	Maximum Demand reset count													
	Instantaneous power factor													
	Eight time of a day energy													
	Current													
	Voltage													
	Frequency / Harmonics													
	0-500V digital voltmeter with selector switch with 6A MCB's - 1 Set													
	0-4000A digital ammeter with selector switch and 4000/5A, 15VA, CLASS 1, CT - 1 Set													
	Phase indicating lights and protected by 6A MCB's - 1 Sets													
	Breaker ON/OFF/TRIP indicating lights and push button -1 Set													
	230 V AC or 24V DC shunt trip coil - 1 Set													
	1 CT 4000/5A, 15VA, CL 5P10 consisting of													
	Undervoltage Relay (27) - 1 set													
	Over voltage relay (59)- 1 Set													
	Over current Relay (51) - 1 set													
	Earth fault Protective Device (51N) 1 set													
	4000/5A,15VA, CLASS-1, CT on Y Phase for APFCR.													
	Auxiliary contacts required for necessary interlocking of breakers.													
	Bus Bars													
	4000A, TPN tinned copper bus bars with heat shrinkable insulation sleeves 1Set													
	Outgoing													
	1250 amps TPN ACB draw out type (manually operated) 1 No													
	1000 amps TPN ACB draw out type (manually operated) 1 No													
	630 amps TPN (50 kA) MCCB 1 Nos													
	400 amps TPN (50 kA) MCCB 6 Nos													
	250 amps TPN (50 kA) MCCB 7 Nos													
	200 amps TPN (50 kA) MCCB 5 Nos													
	100 amps TPN (50 kA) MCCB 4 Nos													
	63 amps TPN (50 kA) MCCB 4 Nos													
	Bus Coupler-: Breaker "C													
	4000A, 4 pole electrically operated (motorised) fully drawotd type air circuit breaker with ON/OFF/TRIP indicating lamps & auxiliary contacts required for necessary interlocking of breakers - 1 Set													
	SECTION= II													
	Incoming Air Circuit Breaker B' (Transformer-II)													
	4000A, 4 pole electrically operated (motorised) fully draw out type air circuit breaker, with built in micro processor based release unit for short circuit, over current and earth fault protection with adjustable setting and with the following accessories :													
	Electronic energy meter of accuracy class-1 with 3 Nos 4000/5A, 15VA CTs to measure and display the following electrical quantities :													
	Real time													
	Total active energy (KWH/MWH)													
	Maximum Demand (KVA/MVA) (KW/MW)													
	Maximum Demand reset count													
	Instantaneous power factor													
	Eight time of a day energy													
	Current													
	Voltage													
	Frequency / Harmonics													
	0-500V digital voltmeter with selector switch with 6A MCB's - 1 Set													
	0-4000A digital ammeter with selector switch and 4000/5A, 15VA,CLASS 1, CTs - 1 Set													
	Phase indicating lights and protected by 6A MCB's - 1 Set													
	Breaker ON/OFF/TRIP indicating lights and push button - 1 Set													
	230 V AC or 24V DC shunt trip coil - 1 Set													
	1 Ct 4000/5,15VA,CL5P10 consisting of													
	Under Voltage relay (27) - 1 Set													
	Over voltage relay(59) - 1 Set													
	Overcurrent Relay(51)- 1 set													
	Earth fault Protective Device (51N) - 1 set													
	4000/5A, 15VA, CLASS-1, CT on Y Phase for APFCR.													
	Auxiliary contacts required for necessary interlocking of breakers.													
	Bus Bars													
	4000A, TPN tinned copper bus bars with heat shrinkable insulation sleeves 1Set													
	Outgoing													
	1250 amps TPN ACB draw out type (manually operated) 1 No													
	1000 amps TPN ACB draw out type (manually operated) 1 No													
	630 amps TPN (50 kA) MCCB 1 Nos													
	400 amps TPN (50 kA) MCCB 7 Nos													
	250 amps TPN (50 kA) MCCB 7 Nos													
	200 amps TPN (50 kA) MCCB 4 Nos													
	100 amps TPN (50 kA) MCCB 3 Nos													
	63 amps TPN (50 kA) MCCB 5 Nos													
	Red indicating light 230V (56 Nos.), Green indicating light 230V (56 Nos.), MCCB Aux. Contact Block T1-T6 (56 Nos.), MCB 6A SP 10KA (56 Nos.), CT 4000/5A CL-PS 15VA (08 Nos.)													
	Note -1. All outgoing feeders shall have suitable range of following (except capacitor feeders)													
	a. Digital electronic ammeter with selector swtich and CTs – 3 Nos													

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	b. Phase indicating light protected by 6A MCB's - 3 Nos													
	2. All incoming ACB shall be 65kA and outgoing MCCB shall be 50 KA breaking capacity													
	3. The two incomer shall be interlocked electrically and mechanically operated ACBs with Automatic source transfer system. so that only one supply can be swithed ON at a time.													
	Main LT Panel as described above	Set									1	1	106,15,604.54	106,15,604.54
														-
1.2	**Essential Power Panel (EPP)**													-
	Incoming Air Circuit Breaker A from AMF Panel													-
	1000 A, 4 pole electrically operated (motorised) fully draw out type air circuit breaker with built in micro processor based release unit for short circuit, over current and earth fault protection with adjustable setting and with the following accessories :													-
	Electronic energy meter of accuracy class-1 with 3 Nos. 1000/5A, 15VA CTs to measure and display the following electrical quantities :													-
	Real time													-
	Total active energy (KWH/MWH)													-
	Maximum Demand (KVA/MVA) (KW/MW)													-
	Maximum Demand reset count													-
	Instantaneous power factor													-
	Eight time of a day energy.													-
	Current													-
	Voltage													-
	Frequency / Harmonics													-
	0-500V digital voltmeter with selector switch with 6A MCB's - 1 Set													-
	0-1000A digital ammeter with selector switch and 1000/5A, 15VA, CLASS 1CT - 1 Set													-
	Phase indicating lights and protected by 6A MCB's - 1 Sets													-
	Breaker ON /OFF /TRIP indicating lights and push button - 1 Set													-
	1 CT, 1000/5A, 15VA, CL 5P10 consisting of													-
	Under Voltage relay (27) - 1 Set													-
	Over voltage relay (59) - 1 Set													-
	Overcurrent Relay (51)- 1 Set													-
	Earth fault protection device (51N)- 1 Set													-
	Auxiliary contacts required for necessary interlocking of breakers.													-
	Breaker control switch - 1 Set													-
	Under Voltage release - 1 Set													-
	Auto Manual Remote selector switch - 1 Set													-
	Voltage sensing relay & timer for auto change over.													-
	230 V AC or 24V DC shunt trip coil - 1 Set													-
	Bus Bars													-
	1000A, TPN tinned copper bus bars with heat shrinkable insulation sleeves 1 Set													-
	Outgoings													-
	400 amps TPN (50 kA) MCCB 3 Nos													-
	250 amps TPN (50 kA) MCCB 3 Nos													-
	200 amps TPN (50 kA) MCCB 5 Nos													-
	100 amps TPN (50 kA) MCCB 2 Nos													-
	63 amps TPN (50 kA) MCCB 7 Nos													-
														-
														-
	Bus Coupler													
	1 No. 1000A, 4 Pole ACB electrically operated drawout type with necessary potential free contacts for inter lockings and with breaker control switch, ON/OFF/TRIP indicating lamps with control MCB/s The two incomer shall be interlocked elecrtically and mechanically operated ACBs with Automatic source transfermer system. so that only one supply can be swithed ON at a time.													-
														-
	Incoming Air Circuit Breaker B and C from MDB													-
	1000A, 4 pole electrically operated (motorised) fully draw out type air circuit breaker with built in micro processor based release unit for short circuit, over current and earth fault protection with adjustable setting and with the following accessories:													-
	Electronic energy meter of accuracy class-1 with 3 Nos. 1000/5A, 15VA CTs to measure and display the following electrical quantities:													-
	Real time													-
	Total active energy (KWH/MWH)													-
	Maximum Demand (KVA/MVA) (KW/MW)													-
	Maximum Demand reset count													-
	Instantaneous power factor													-
	Eight time of a day energy													-
	Current													-
	Voltage													-
	Frequency / Harmonics													-
	0-500V digital voltmeter with selector switch with 6A MCB's - 1 Set													-
	0-1000 A digital ammeter with selector switch and 1000/5A, 15VA,CLASS,1CTs - 1 Set													-
	Phase indicating lights and protected by 6A MCB's - 1 Set													-
	Breaker ON/OFF/TRIP indicating lights and push button - 1 Set													-
	1 CT, 1000/5A, 15VA, CL 5P10 consisting of													-
	Under Voltage relay (27) - 1 Set													-
	Over voltage relay (59) - 1 Set													-
	Overcurrent Relay (51)- 1 Set													-
	Earth fault protection device (51N)- 1 Set													-
	Auxiliary contacts required for necessary interlocking of breakers													-
	Breaker control switch - 1 Set													-
	Under Voltage release - 1 Set													-
	Auto Manual selector switch - 1 Set													-
	Voltage sensing relay & timer for auto changeover													-
	230 V AC or 24V DC shunt trip coil - 1 Set													-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	Bus Bars													-
	1000A TPN tinned copper bus bars with heat shrinkable insulation sleeves - 1 Set													-
	Outgoings													-
	630 amps TPN (50 kA) MCCB 1 Nos													-
	400 amps TPN (50 kA) MCCB 2 Nos													-
	250 amps TPN (50 kA) MCCB 3 Nos													-
	200 amps TPN (50 kA) MCCB 3 Nos													-
	100 amps TPN (50 kA) MCCB 6 Nos													-
	63 amps TPN (50 kA) MCCB 6 Nos													-
	Note -1. All outgoing feeders shall have suitable range of following													-
	a. Digital electronic ammeter with selector swtich and CTs - 3 Nos													-
	b. ON, OFF, Trip status light protected by 6A MCB's - 3 Nos													-
	2. All incoming / outgoing ACB and MCCBs shall be 50 KA (1 sec) breaking capacity													-
	Main Emergency Panel as described above	Set									1	1	41,86,263.75	41,86,263.75
														-
1.3	**FIRE FIGHTING PANEL - FIRE PLANT ROOM**													-
														-
A.	Incomer 2 Nos. each comprising of :													-
														-
a.	400 amps 4 Pole motorized MCCB, minimum Ics = 50 kA with microprocessor release unit of Over current, Short Circuit, Ground Fault - 1 Set													-
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size summating CTs for above two incomer metering supporting SCADA/BMS connectivity													-
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size summation CTs connections as required for both incoming feeders.													-
d.	3 No. 400/5 amps cast resin current transformers with 15 VA Burden & Class 5P10 for protection and metering - 1 Set													-
e.	3 No. 400/5 amps cast resin current transformers with 15 VA Burden & Class 1.0 for metering - 1 Set													-
f.	Breaker ON / OFF / TRIP, Ready to close contact & indicating lights with control MCB - 2 Set													-
g.	RYB Phase indicating light protected by 6 amps MCB's. - 2 Set													-
h.	230 V AC Shunt trip coil. - 2 Set													-
i.	RS-485 port for display of ON/OFF status of MCCB on BMS workstation through MODBUS protocol													-
j.	Note: Contractor shall provide an earmarked terminal boards for SCADA and BMS signals as per specifications and requirements.													-
k.	Amber healthy trip indicating lamps													-
														-
B.	**Bus Bar comprising of :**													-
														-
i	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 400 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 50 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													-
														-
C.	**Outgoing comprising of :**													-
														-
i.	4 No. 200A, 415V, TPN MCCB (motor duty) each outgoing comprises with following													-
a	1 no. 100 HP/ 75 KW, star Delta starter comprising 1 Nos. TP contactor AC-3 duty, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control + 3 level liquid controller with following													-
b	1 – set Red/Green ON/OFF indicating lamps													-
c	1 – set start stop push buttons.													-
d	Auto / Manual selector switch.													-
e	Amber healthy trip indicating lamps													-
f	AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP•45 models of MECO or equivalent with necessary Circuit MCB, suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													-
														-
	Note: Contactor & overload relay shall be as per the type - 2 coordination chart													-
														-
ii.	2 No. 63A, 415V, TPN MCCB (motor duty) each outgoing comprises with following													-
a	1 no. 15 HP/ 10 KW, Star Delta starter comprising 1 Nos. TP contactor AC-3 duty, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control + 3 level liquid controller with following													-
b	1 – set Red/Green ON/OFF indicating lamps													-
c	1 – set start stop push buttons.													-
d	Auto / Manual selector switch.													-
e	Amber healthy trip indicating lamps													-
f	AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP•45 models of MECO or equivalent with necessary Circuit MCB, suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													-
	Note: Contactor & overload relay shall be as per the type - 2 coordination chart													-
														-
iii.	3 No. 40A, 415V, TPN MCCB (motor duty) each outgoing comprises with following													-

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
a	1 no. 10 HP/ 7.5 KW, Star Delta starter comprising 1 Nos. TP contactor AC-3 duty, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control + 3 level liquid controller with following													-
b	1 – set Red/Green ON/OFF indicating lamps													-
c	1 – set start stop push buttons.													-
d	Auto / Manual selector switch.													-
e	Amber healthy trip indicating lamps													-
f	AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP•45 models of MECO or equivalent with necessary Circuit MCB, suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													-
	Note: Contactor & overload relay shall be as per the type - 2 coordination chart													-
														-
	Notes:-													-
														-
a	All meters shall be wired at one point for BMS compatibility.													-
b	Both incoming breakers shall be electrically/ mechanically interlocked													-
c	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													-
d	**SCADA / BMS CONNECTIVITY** All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													-
e	Internal wiring in the Starters shall be done with FRLS PVC insulated cables of adequate size. Internal wiring, contactors, relay contacts, push button contacts should be rated not less than 2.5 Sqmm.													-
	FIRE FIGHTING PANEL - FIRE PLANT ROOM described as above	Set									1	1	7,42,860.00	7,42,860.00
														-
1.4	**Water pump Panel (WPP) as per specifications and as per following details**													-
	Internal wiring in the Starters shall be done with FRLSPVC insulated cables of adequate size. Internal wiring, contactors, relay contacts, push button contacts should be rated not less than 2.5 Sqmm.													-
A	**INCOMER**													-
a)	2 no. 125A ,415V, Ics=25 KA , TP MCCB with variable over current and short circuit releases each comprising of:													-
b)	1- set Red/Green ON/OFF indicating lamps													-
c)	1- set of three phase indicating lamps (red, yellow, blue)													-
d)	Amber healthy trip inicating lamps for above feeders													-
B	**BUSBAR**													-
	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 125 A having a maximum current density of 1.4 A per sq mm suitable to with stand symmetrical fault level of 25 kA. at 415 V. The neutral busbar is to be of same size as phases.													-
C	**OUTGOING**													-
a)	3no. 40A , Ics = 25 KA, 415V, TP MCCB(motor Duty) each with the following :													-
a1)	1 no. 10 HP/ 7.5 KW, Star Delta starter comprising 3 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control + 3 level liquid level controller													-
a2)	1 – set Red/Green ON/OFF indicating lamps													-
a3)	1 – set start stop push buttons.													-
a4)	Auto / Manual/ Remote/ Local selector switch.													-
a5)	Healthy and trip indicating lamps													-
a6)	1 no for each feeder AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCB, suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													-
b)	6 Nos. 20 A, Ics = 10KA, 415V, TP MCB(Motor duty) each with following													-
b1)	1 no. 2 HP/ 1.5 KW,DOL starter Star with bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.													-
b2)	1 - set Red / Green ON/OFF indicating lamp													-
b3)	1 - set start / stop puch buttons													-
b4)	Auto / Manual/Remote/Local selector switch.													-
b5)	Healthy and trip indicating lamps													-
b6)	1 no for each feeder AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCB,suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													-
c)	3 Nos. 16 A, Ics = 10KA, 230V, DP MCB each with following													-
c1)	1 nos. 1HP / 0.75 kW pump DOL starter with bimetallic over current relay with potential free contacts for remote monitoring and control													-
c2)	1 – set Red/Green ON/OFF indicating lamps													-
c3)	1 – set start stop push buttons.													-
c4)	Auto / Manual/Remote/Local selector switch.													-
c5)	Healthy and trip indicating lamps													-
c6)	1 no for each feeder AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCB,suitable size CTs and selector switch for current measurement on standby and main pumps including connections as required for incoming feeder and suitable selector for measuring other circuit current as required.													-
D	Metering													-
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity													-
E.	Presettable switching timer set for each pump													-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													-
	WATER PUMP PANEL - PLUMBING PLANT ROOM described as above	Set									1	1	4,78,954.85	4,78,954.85
														-
1.5	**MAIN LIGHTING PANEL (ASS Room)**													-
														-
A.	Incomer 2 No. each comprising of :													-
														-
a.	1 Nos. 200 amps TPN MCCB (35 kA) with release unit for SC and OL protection along with 1 Nos. 200 amps 4P AC3 duty Contactor - 1 Set													-
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size summating CTs for above two incomer metering supporting SCADA/BMS connectivity													-
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													-
d.	ON / OFF / TRIP indicating lights with control MCB - 1 Set													-
e.	Phase indicating light protected by 6 amps MCB's - 1 Set.													-
f.	Healthy and trip indicating lamps													-
														-
B.	**Bus Bar comprising of :**													-
														-
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 200 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 35 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													-
														-
C.	**Outgoing comprising of :**													-
														-
i.	63 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status. - 2 Set													-
														-
ii.	40 Amps TPN MCCB with releases for SC and OL protection & shunt trip each having indication lamps to give status - 14 Set													-
														-
	Notes:-													-
														-
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													-
b.	All Outgoing feeders shall be provided with earth fault release.													-
c.	Both the Incomers shall be electrically & mechanically interlocked with contactor based automatics chngeover system so that only one supply is switched on at a time.													-
d.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 6 amps SP MCBs.													-
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													-
														-
	MAIN LIGHTING PANEL (ASS Room) described as above	Set									1	1	5,31,359.70	5,31,359.70
														-
1.6	**ESSENTIAL LIGHTING PANEL (ASS Room)**													-
														-
A.	Incomer comprising of :													-
														-
a.	100 amps TPN MCCB (35 kA) with release for SC and OL protections - 2 Set													-
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size CTs for above incomer metering supporting SCADA/BMS connectivity													-
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													-
d.	ON / OFF / TRIP indicating lights with control MCB - 2 Sets													-
e.	Phase indicating light protected by 6 amps MCB's - 2 Sets													-
f.	Healthy and trip indicating lamps													-
														-
B.	**Bus Bar comprising of :**													-
														-
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 100 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 35 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													-
														-
C.	**Outgoing comprising of :**													-
														-
i.	63 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 4 Set													-
														-
ii.	32 Amps TPN MCCB with releases for SC and OL protection & shunt trip each having indication lamps to give status - 12 Set													-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
														-
	Notes:-													-
														-
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													-
b.	All Outgoing feeders shall be provided with earth fault release.													-
c.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 6 amps SP MCBs.													-
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													-
														-
	ESSENTIAL LIGHTING PANEL (ASS Room) described as above	Set									1	1	7,89,860.00	7,89,860.00
														-
1.7	**POWER PANEL (ASS Room)**													-
														-
A.	**Incomer comprising of :**													-
														-
a.	125 amps TPN MCCB (35 kA) with release for SC and OL protections - 2 Set													-
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size CTs for incomer metering supporting SCADA/BMS connectivity													-
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													-
d.	ON / OFF / TRIP indicating lights with control MCB - 2 Sets													-
e.	Phase indicating light protected by 6 amps MCB's - 2 Sets													-
f.	Healthy and trip indicating lamps													-
														-
B.	**Bus Bar comprising of :**													-
														-
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 125 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 35 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													-
														-
C.	**Outgoing comprising of :**													-
														-
i.	63 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 10 Set													-
														-
	Notes:-													-
														-
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													-
b.	All Outgoing feeders shall be provided with earth fault release.													-
c.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 6 amps SP MCBs.													-
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													-
														-
	POWER PANEL (ASS Room) described as above	Set									1	1	4,96,860.24	4,96,860.24
														-
1.8	**ESCALATOR POWER PANEL (ASS Room)**													-
														-
A.	**Incomer comprising of :**													-
														-
a.	400 amps TPN MCCB (35 kA) with Microprocessor release for SC, OL and E/F protections - 2 Set													-
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size summating CTs for above two incomer metering supporting SCADA/BMS connectivity													-
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													-
d.	ON / OFF / TRIP indicating lights with control MCB - 2 Sets													-
e.	Phase indicating light protected by 6 amps MCB's - 2 Sets													-
f.	Healthy and trip indicating lamps													-
														-
B.	**Bus Bar comprising of :**													-
														-
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 400 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 35 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													-
														-
C.	**Outgoing comprising of :**													-
														-
i.	63 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status. - 14 Set													-
	Space for providing variable KWHr meter with required CT's/PT's for each of the outgoing feeder with locking arrangement.													-
	Notes:-													-
														-
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													-
b.	All Outgoing feeders shall be provided with earth fault release.													-

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
c.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 6 amps SP MCBs.													-
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													-
														-
	ESCALATOR POWER PANEL (ASS Room) described as above	Set									1	1	5,28,184.52	5,28,184.52
														-
1.9	**SUB VENTILATION POWER PANEL - 1 (Basement - 2)**													-
														-
A.	**Incomer comprising of :**													-
														-
a.	160 amps TPN MCCB (25 kA) with release for SC and OL protections - 2 Set													-
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size CTs for incomer metering supporting SCADA/BMS connectivity													-
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													-
d.	ON / OFF / TRIP indicating lights with control MCB - 2 Sets													-
e.	Phase indicating light protected by 6 amps MCB's - 2 Sets													-
f.	Healthy and trip indicating lamps													-
														-
B.	**Bus Bar comprising of :**													-
														-
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 160 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 25 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													-
														-
C.	**Outgoing comprising of :**													-
														-
i.	63 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 5 Set													-
														-
ii.	40 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 11 Set													-
														-
	Notes:-													-
														-
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													-
b.	All Outgoing feeders shall be provided with earth fault release.													-
c.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 6 amps SP MCBs.													-
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													-
														-
	SUB VENTILATION POWER PANEL - 1 (Basement - 2) described as above	Set									1	1	4,56,830.00	4,56,830.00
														-
1.10	**SUB VENTILATION POWER PANEL - 2 (Basement - 1)& SUB VENTILATION POWER PANEL - 5 (Street level)**													-
														-
A.	Incomer comprising of :													-
														-
a.	125 amps TPN MCCB (25 kA) with release for SC and OL protections - 2 Set													-
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size CTs for incomer metering supporting SCADA/BMS connectivity													-
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													-
d.	ON / OFF / TRIP indicating lights with control MCB - 2 Sets													-
e.	Phase indicating light protected by 6 amps MCB's - 2 Sets													-
f.	Healthy and trip indicating lamps													-
														-
B.	**Bus Bar comprising of :**													-
														-
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 125 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 25 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													-
														-
C.	**Outgoing comprising of :**													-
														-
i.	63 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 9 Set													-
														-
	Notes:-													-
														-
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													-
b.	All Outgoing feeders shall be provided with earth fault release.													-
c.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 6 amps SP MCBs.													-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													-
														-
	SUB VENTILATION POWER PANEL - 2 (Basement - 1), SUB VENTILATION POWER PANEL - 3 & 4 (Platform level) SUB VENTILATION POWER PANEL - 5 (Street level) described as above	Set									4	4	5,78,040.00	23,12,160.00
														-
1.11	**RETAIL & ADVERTISEMENT POWER PANEL - 2 (DB ROOM)**													-
														-
A.	**Incomer comprising of :**													-
														-
a.	200 amps TPN MCCB (35 kA) with release for SC and OL protections - 1 Set													-
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size CTs for incomer metering supporting SCADA/BMS connectivity													-
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													-
d.	ON / OFF / TRIP indicating lights with control MCB - 1 Set													-
e.	Phase indicating light protected by 6 amps MCB's - 1 Set.													-
f.	healthy and trip indicating lamps													-
														-
B.	**Bus Bar comprising of :**													-
														-
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 200 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 35 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													-
														-
C.	**Outgoing comprising of :**													-
														-
i.	100 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 2 Set													-
														-
ii.	63 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 2 Set													-
														-
iii.	40 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 10 Set													-
														-
	Notes:-													-
														-
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													-
b.	All Outgoing feeders shall be provided with Multifunction meter for V,A, KWHr, Hz, P with 3 No. 40/5 amps cast resin current transformers with 15 VA Burden & Class 5P10 for protection and metering and RS 485 communication port - 1 Set													-
c.	All Outgoing feeders shall be provided with earth fault release.													-
d.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 6 amps SP MCBs.													-
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													-
														-
	RETAIL & ADVERTISEMENT POWER PANEL - 2 (DB ROOM) described as above	Set									1	1	3,56,898.85	3,56,898.85
														-
1.12	**RETAIL & ADVERTISEMENT POWER PANEL - 1 (DB ROOM)**													-
														-
A.	**Incomer comprising of :**													-
														-
a.	125 amps TPN MCCB (35 kA) with release for SC and OL protections - 1 Set													-
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size CTs for incomer metering supporting SCADA/BMS connectivity													-
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													-
d.	ON / OFF / TRIP indicating lights with control MCB - 1 Set													-
e.	Phase indicating light protected by 6 amps MCB's - 1 Set.													-
f.	Healthy and trip indicating lamps													-
B.	**Bus Bar comprising of :**													-
														-
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 125 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 35 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													-
														-
C.	**Outgoing comprising of :**													-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
														-
i.	40 Amps TPN MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 27 Set													-
														-
	Notes:-													-
														-
a.	All outgoing breakers shall be minimum 25 kA rating with Icu = Ics.													-
b.	All Outgoing feeders shall be provided with Multifunction meter for V,A, KWHr, Hz, P with 3 No. 60/5 amps cast resin current transformers with 15 VA Burden & Class 5P10 for protection and metering and RS 485 communication port - 1 Set													-
c.	All Outgoing feeders shall be provided with earth fault release.													-
d.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 6 amps SP MCBs.													-
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													-
														-
	RETAIL & ADVERTISEMENT POWER PANEL - 2 (DB ROOM) described as above	Set									1	1	4,73,900.00	4,73,900.00
														-
1.13	**UPS OUTPUT PANEL - 1 (UPS Room & Basement UPS Room)**													-
														-
A.	**Incomer comprising of :**													-
														-
a.	125 amps DP MCCB (25 kA) with release for SC and OL protections - 2 Set													-
b.	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency, kWH, kVAH, maximum demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size CTs for incomer metering supporting SCADA/BMS connectivity													-
c.	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Voltmeter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders.													-
d.	ON / OFF / TRIP indicating lights with control MCB - 2 Sets													-
e.	Phase indicating light protected by 6 amps MCB's - 2 Sets													-
f.	Healthy and trip indicating lamps													-
														-
B.	**Bus Bar comprising of :**													-
														-
a	Electrolytic high conductivity tinned copper single phase and neutral busbars rated at 125 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 25 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													-
														-
C.	**Outgoing comprising of :**													-
														-
i.	63 Amps DP MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 3 Set													-
														-
ii.	40 Amps DP MCCB with releases for SC and OL protections & shunt trip each having indication lamps to give status - 12 Set													-
														-
	Notes:-													-
														-
a.	All outgoing breakers shall be minimum 16 kA rating with Icu = Ics.													-
b.	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 6 amps SP MCBs.													-
c.	**SCADA / BMS CONNECTIVITY** All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													-
														-
	UPS OUTPUT PANEL - 1 (UPS Room) described as above	Set									2	2	2,31,774.35	4,63,548.70
														-
1.14	**400 kVAR Capacitor Panel (ASS Room)**													-
														-
A.	**Incomer comprising of :**													-
														-
a.	1000 amps 4 Pole Electrically operated fully draw out type air circuit breaker (50 kA) with over current, short circuit & earth fault protection releases, UVR & shunt trip each having indication lamps to give status etc. - 1 Set													-
b.	Microprocessor APFC controller relay to sense and monitor the system power factor and provide impulses for operation of 5 capacitor circuits with automatic switching over facility with manual override. It shall continuously monitor all three phases and displays various Electrical Parameters like voltage, input current, capacitive current, kVA demand, kW, Power Factor, self diagnostic error code indication with printout facility of the above with RS 485 port. Controller should mounted on the front side of the panel. It shall have data logging for minimum 2 months, it shall provide output for maximum 8 stages.													-
c.	Multifunction meter for V, Hz & A with CT's - 1 Set													-
d.	Breaker ON / OFF / TRIP indicating lights with control MCB - 1 Set													-
e.	Phase indicating light protected by 6 amps MCB's. - 1 Set													-
f.	Healthy and trip indicating lamps													-
														-
B.	**Bus Bar comprising of :**													-
														-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 1000 A having a maximum current density of 1.4 A per sqmm suitable to with stand symmetrical fault level of minimum 50 kA. at 415 V with necessary high temp PVC colour coded heat shrinkable sleeving. The neutral busbar shall be of same capacity as phases.													-
														-
C.	**Outgoing comprising of :**													-
														-
a.	100 kVAR Capacitor Bank - 1 Set each comprising of following:													-
i)	250 Amps TPN MCCB - 1 Set													-
ii)	250 amps or capacitor heavy duty 525 volts 50Hz contactors. - 1 Set													-
iii)	"ON" /"OFF" push buttons and indicating lamps. - 1 Set													-
iv)	100 kVAR, 525 volts hermetically sealed metalized polypropylene capacitors in well ventilated enclosures complete as per specifications, application duty and as required - 1 Set													-
v)	7% Harmonic Filters, On/Off push button, Indicating lamps - 1 Set													-
														-
b.	50 kVAR Capacitor Bank - 4 Set each comprising of following:													-
i)	125 Amps TPN MCCB - 1 Set													-
ii)	125 amps or capacitor heavy duty 525 volts 50Hz contactors. - 1 Set													-
iii)	"ON" /"OFF" push buttons and indicating lamps. - 1 Set													-
iv)	50 kVAR, 525 volts hermetically sealed metalized polypropylene capacitors in well ventilated enclosures complete as per specifications, application duty and as required - 1 Set													-
v)	7% Harmonic Filters, On/Off push button, Indicating lamps - 1 Set													-
														-
c.	25 kVAR Capacitor Bank - 3 Set each comprising of following:													-
i)	80 Amps TPN MCCB - 1 Set													-
ii)	80 amps or capacitor duty 525 volts 50Hz contactors. - 1 Set													-
iii)	"ON" /"OFF" push buttons and indicating lamps. - 1 Set													-
iv)	25 kVAR, 525 volts hermetically sealed metalized polypropylene capacitors in well ventilated enclosures complete as per specifications, application duty and as required - 1 Set													-
v)	7% Harmonic Filters, On/Off push button, Indicating lamps - 1 Set													-
														-
d.	12.5 kVAR Capacitor Bank - 2 Set each comprising of following:													-
i)	40 Amps TPN MCCB - 1 Set													-
ii)	40 amps or capacitor duty 525 volts 50Hz contactors. - 1 Set													-
iii)	"ON" /"OFF" push buttons and indicating lamps. - 1 Set													-
iv)	12.5 kVAR, 525 volts hermetically sealed metalized polypropylene capacitors in well ventilated enclosures complete as per specifications, application duty and as required - 1 Set													-
v)	7% Harmonic Filters, On/Off push button, Indicating lamps - 1 Set													-
														-
	Notes:													-
a.	All outgoing breakers shall be minimum 35 kA rating with Icu = Ics.													-
b.	Heavy duty exhaust fans to be provided for cooling Capacitors & Filters.													-
c.	LED indication for number of capacitor banks 'ON' and 'OFF'													-
d.	LED indication of Power Factor lagging or leading.													-
e.	APFC system shall comprise of following: i. Over Voltage ii. Voltage Imbalance iii. Earth Leakage													-
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													-
	400 kVAR Capacitor Panel (ASS Room) described as above	Set									2	2	17.16.733.73	34,33,467.46
														-
	Addition /Deletion Items													-
														-
2	Adjustment rates for addition/deletion of supply & fixing of following including making of suitable holes/space in the panel/DBs and making good all external/internal finishes, terminations etc complete in all respect as required.													-
a	Voltage Transduser	Set									1	1	8,131.00	8,131.00
b	Under & Over Voltage Relay	Set									1	1	34,151.00	34,151.00
c	Multifunction Meter with CTs	Set									1	1	25,702.00	25,702.00
d	Digital Load Manager with CTs	Set									1	1	25,701.00	25,701.00
e	Electrical, Mechanical Interlock	Set									1	1	12,196.00	12,196.00
f	Surge Protection Device	Set									1	1	36,235.00	36,235.00
g	Micom Relay P127 with CT	Set									1	1	90,152.00	90,152.00
h	Under & Over Voltage Release	Set									1	1	4,309.00	4,309.00
i	Motor Mechanism 100A/160A	Set									1	1	34,964.00	34,964.00
j	Motor Mechanism 250A	Set									1	1	31,646.00	31,646.00
k	Motor Mechanism 400A/630A	Set									1	1	49,828.00	49,828.00
l	Integral Type Digital Energy Meter with CTs	Set									1	1	41,390.00	41,390.00
m	Copper Busbar	KG									1	1	764.00	764.00
n	Multiple LED/neon type indications	Nos									1	1	127.30	127.30
o	Astronomical digital timer	Nos									1	1	7,459.40	7,459.40
p	Ammeter/Voltmeter (3.5 digit display)	Nos									1	1	1,141.90	1,141.90
q	TP Contactor - 40/32 Amps	Nos									1	1	2,768.30	2,768.30
r	Aux. Contact 1 NO + 1 NC for MCB	Nos									1	1	359.10	359.10
														-
3	Adjustment rates for addition/deletion of compartmentalised switchgear in above panels/board of following rating including the supply, fabrication, extension, modification of the enclosure or in a separate enclosure, earthing ,busbar, other sub-systems, accessories etc complete as required and as per specifications and as specified in of item 1.0 above													-
														-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
3.1	1 no. 4000 A, 415V, 65kA, 4P draw out Electrically operated ACB complete with:	Nos									1	1	4,50,700.00	4,50,700.00
a	1- set Red/Green ON/OFF indicating lamps													-
b	1- set of three phase (red, yellow, blue) indicating lamps													-
c	Amber healthy trip indicating lamps													-
d	3 nos. cast resin current transformers of 4000/5 ratio with15 VA Burden & Class 5P10 for protection													-
e	3 nos. cast resin current transformers of 4000/5 ratio with 15VA burden and Class 1.0 for measurement													-
f	Microprocessor based release having variable range of overcurrent, short circuit and earth fault protection with time lag facility for each of the fault for achieving discrimination along with distinct fault indication through LED's.													-
g	230V AC or 24 V DC shunt trip coil													-
h	230V, AC Motor wound spring closing mechanism.													-
i	Terminals to receive suitable rating bus duct/XLPE armoured cables													-
j	RS-485 port for display of ON/OFF status of ACB on BMS workstation through MODBUS protocol													-
														-
3.2	1 no. 1600 A, 415V, 50kA, 4P draw out Electrically operated ACB complete with:	Nos									1	1	3.71.000.00	3,71,000.00
a	1- set Red/Green ON/OFF indicating lamps													-
b	1- set of three phase (red, yellow, blue) indicating lamps													-
c	Amber healthy trip indicating lamps													-
d	3 nos. cast resin current transformers of 1600/5 ratio with15 VA Burden & Class 5P10 for protection													-
e	3 nos. cast resin current transformers of 1600/5 ratio with 15VA burden and Class 1.0 for measurement													-
f	Microprocessor based release having variable range of overcurrent, short circuit and earth fault protection with time lag facility for each of the fault for achieving discrimination along with distinct fault indication through LED's.													-
g	230V AC or 24 V DC shunt trip coil													-
h	230V, AC Motor wound spring closing mechanism.													-
i	Terminals to receive suitable rating bus duct/XLPE armoured cables													-
i	RS-485 port for display of ON/OFF status of ACB on BMS workstation through MODBUS protocol													-
														-
3.3	1 no. 1250 A, 415V, 50kA, 4P draw out Electrically operated ACB complete with:	Nos									1	1	3,22,702.65	3,22,702.65
a	1- set Red/Green ON/OFF indicating lamps													-
b	1- set of three phase (red, yellow, blue) indicating lamps													-
c	Amber healthy trip indicating lamps													-
d	3 nos. cast resin current transformers of 1250/5 ratio with15 VA Burden & Class 5P10 for protection													-
e	3 nos. cast resin current transformers of 1250/5 ratio with 15VA burden and Class 1.0 for measurement													-
f	Microprocessor based release having variable range of overcurrent, short circuit and earth fault protection with time lag facility for each of the fault for achieving discrimination along with distinct fault indication through LED's.													-
g	230V AC or 24 V DC shunt trip coil													-
h	230V, AC Motor wound spring closing mechanism.													-
i	Terminals to receive suitable rating bus duct/XLPE armoured cables													-
i	RS-485 port for display of ON/OFF status of ACB on BMS workstation through MODBUS protocol													-
														-
3.4	1 no. 1000 A, 415V, 50kA, 4P draw out Electrically operated ACB complete with:	Nos									1	1	2,83,617.75	2,83,617.75
a	1- set Red/Green ON/OFF indicating lamps													-
b	1- set of three phase (red, yellow, blue) indicating lamps													-
c	Amber healthy trip indicating lamps													-
d	3 nos. cast resin current transformers of 1000/5 ratio with15 VA Burden & Class 5P10 for protection													-
e	3 nos. cast resin current transformers of 1000/5 ratio with 15VA burden and Class 1.0 for measurement													-
f	Microprocessor based release having variable range of overcurrent, short circuit and earth fault protection with time lag facility for each of the fault for achieving discrimination along with distinct fault indication through LED's.													-
g	230V AC or 24 V DC shunt trip coil													-
h	230V, AC Motor wound spring closing mechanism.													-
i	Terminals to receive suitable rating bus duct/XLPE armoured cables													-
j	RS-485 port for display of ON/OFF status of ACB on BMS workstation through MODBUS protocol													-
														-
3.5	1 no. 800 A, 415V, 50kA, 4P draw out Electrically operated ACB complete with:	Nos									1	1	2,61,799.10	2,61,799.10
a	1- set Red/Green ON/OFF indicating lamps													-
b	1- set of three phase (red, yellow, blue) indicating lamps													-
c	Amber healthy trip indicating lamps													-
d	3 nos. cast resin current transformers of 800/5 ratio with15 VA Burden & Class 5P10 for protection													-
e	3 nos. cast resin current transformers of 800/5 ratio with 15VA burden and Class 1.0 for measurement													-
f	Microprocessor based release having variable range of overcurrent, short circuit and earth fault protection with time lag facility for each of the fault for achieving discrimination along with distinct fault indication through LED's.													-
g	230V AC or 24 V DC shunt trip coil													-
h	230V, AC Motor wound spring closing mechanism.													-
i	Terminals to receive suitable rating bus duct/XLPE armoured cables													-
j	RS-485 port for display of ON/OFF status of ACB on BMS workstation through MODBUS protocol													-
														-
3.6	630A, 415V, Ics=50 kA, 4P, MCCB with variable over current and short circuit releases and 1-set of three phase indicating lamps (red, yellow, blue)	Nos									1	1	60,185.35	60,185.35
														-
3.7	630A, 415V, Ics=50 kA, TP, MCCB with variable over current and short circuit releases with heavy duty solid neutral link and 1-set of three phase indicating lamps (red, yellow, blue)	Nos									1	1	55,102.85	55,102.85
														-
3.8	400A, 415V, Ics=35 kA, 4P, MCCB with variable over current and short circuit releases and 1-set of three phase indicating lamps (red, yellow, blue)	Nos									1	1	47,347.05	47,347.05
														-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
3.9	400A, 415V, Ics=35 kA, TP, MCCB with variable over current and short circuit releases with heavy duty solid link and 1-set of three phase indicating lamps (red, yellow, blue)	Nos									1	1	44,198.75	44,198.75
														-
3.10	250/200 A ,415V, Ics=35kA, 4P, MCCB with variable over current and short circuit releases and 1-set of three phase indicating lamps	Nos									1	1	41,208.15	41,208.15
														-
3.11	250/200 A ,415V, Ics=35kA, TP, MCCB with variable over current and short circuit releases with heavy duty solid neutral link and 1-set of three phase indicating lamps	Nos									1	1	37,446.15	37,446.15
														-
3.12	100/63 A, 415V, Ics=35 kA ,TP, MCCB with variable over current and short circuit releases with heavy duty solid neutral link and 1-set of three phase indicating lamps	Nos									1	1	20,634.95	20,634.95
														-
3.13	Less than 63A to 40A, 415V, Ics=25 kA ,TP, MCCB with variable over current and short circuit releases with heavy duty solid neutral link and 1-set of three phase indicating lamps	Nos									1	1	20,634.95	20,634.95
														-
3.14	32A, 415V, Ics=25 kA ,TP, MCCB with variable over current and short circuit releases with heavy duty solid neutral link and 1-set of three phase indicating lamps	Nos									1	1	12,392.00	12,392.00
														-
3.15	Electrical operating mechanism (Motorised mechanism) for all type of above MCCBs	Nos									1	1	11,971.90	11,971.90
														-
3.16	40-63A FP MCB 9/10 kA	Nos									1	1	4,289.25	4,289.25
3.17	40-63A TP MCB 9/10 kA	Nos									1	1	4,047.00	4,047.00
3.18	40-63A DP MCB 9/10 kA	Nos									1	1	1,380	1,380.00
3.19	40-63A SP MCB 9/10 kA	Nos									1	1	730	730.00
3.20	5-32A FP MCB 9/10 kA	Nos									1	1	1,860	1,860.00
3.21	5-32A TP MCB 9/10 kA	Nos									1	1	1,380	1,380.00
3.22	5-32A DP MCB 9/10 kA	Nos									1	1	900	900.00
3.23	5-32A SP MCB 9/10 kA	Nos									1	1	410	410.00
3.24	16-32Amp DP RCCB, 30 mA	Nos									1	1	3,480	3,480.00
3.25	1000mA 4P RCCB/ELCB-MCB	Nos									1	1	17,321.00	17,321.00
														-
3.26	Supply, installation and testing of 63/40 Amp adjustable, TP MCCB with fixed neutral in sheet steel enclosure with incoming & outgoing cable box and ON indication lamp complete as required.	Nos									10	10	13,442.00	1,34,420.00
														-
3.27	Supplying installation testing and commissioning of 10/25/32A DP MCB in IP 54 rated surface/recessed box with the total unit having IP 54 ingress protection with incoming & outgoing cable box for AC indoor unit complete as required.	Nos									1	1	1,829.00	1,829.00
														-
3.28	Supplying installation testing and commissioning of 63 A 4P isolator MCCB in IP 56 rated surface/recessed GI box with the total unit having IP 56 ingress protection for AC Outdoor Units/Lifts/Escalators etc.	Nos									1	1	2,666.00	2,666.00
														-
3.29	Supplying installation testing and commissioning of 125 A 4P isolator MCCB in IP 56 rated surface/recessed GI box with the total unit having IP 56 ingress protection for Station UPS	Nos									1	1	4,748.00	4,748.00
														-
3.30	Supply, installation and testing of 4 way TPN sheet steel enclosure with incoming and outgoing cable, distribution board complete as required.	Nos									1	1	16,368.50	16,368.50
														-
3.31	Supply, installation and testing of 200 amps 4 Pole Isolator in sheet steel enclosure with incoming and outgoing cable box and indication lamps complete as required.	Nos									1	1	18,107.00	18,107.00
														-
3.32	Overload relay													-
a	4 - 6 A	Nos									1	1	740.05	740.05
b	6 - 12A	Nos									1	1	740.05	740.05
c	9 - 15 A	Nos									1	1	950.95	950.95
d	30 - 40 A	Nos									1	1	2,091.90	2,091.90
e	40 - 65 A	Nos									1	1	2,145.10	2,145.10
f	63 - 100 A	Nos									1	1	3,508.35	3,508.35
														-
3.28	100 HP, **Star Delta starter** comprising 3 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.	Nos									1	1	1,41,045.00	1,41,045.00
3.29	75 HP, **Star Delta starter** comprising 3 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.	Nos									1	1	1,41,045.00	1,41,045.00
3.30	50 HP, **Star Delta starter** comprising 3 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.	Nos									1	1	42,961.00	42,961.00
3.31	10/7.5 HP, **Star Delta starter** comprising 3 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.	Nos									1	1	36,774.00	36,774.00

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
3.32	Upto 5HP, **DOL starter** comprising 3 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.	Nos									1	1	22,824.00	22,824.00
														-
3.33	Adjustment rates for addition/deletion of Power Contactor of following rating including the supply, fabrication, extension, modification of the enclosure or in a separate enclosure, earthing ,basbar, other sub-systems, accessories etc complete as required and as per specifications													-
a	400 Amps 4 P Power Contactor	Nos									1	1	21,576.40	21,576.40
b	300 Amps 4 P Power Contactor	Nos									1	1	16,770.35	16,770.35
c	250 Amps 4 P Power Contactor	Nos									1	1	9,117.15	9,117.15
d	200 Amps 4 P Power Contactor	Nos									1	1	8,136.75	8,136.75
														-
	TOTAL FOR LV SWITCHBOARDS ZE.01													**289,79,081.02**
ZE.02	**DISTRIBUTION BOARDS**													-
														-
1	Supply, installation, testing & commissioning of front operated front access cubical type indoor duty dead front wall / recess/ surface mounting, totally enclosed dust and vermin proof (minimum protection IP 54) panels with foamed-in neoprene gasketted hinged doors, fabricated from 2 mm thick CRCA with powder coated finish suitable for 415 V, 3-phase, 4 wire, 50 Hz system including suitably rated insulated copper busbars, interconnections, neutral bar assembly, phase segregating barriers, LED indicating lamps for incoming and outgoing feeders,15% spare space for future expansion, knockouts and gland plates for entry of cables and conduits, all internal wiring using high temperature FRLS wires, independant terminals for each phase, earthing terminals and including the cost of providing Master key lock on the door and pad locking facility on door as well as at incomer, bonding to earth etc. complete as per specification, drawings as required and as under:													-
														-
a	MCBs shall conform to IEC898/IS 8828 (latest) and, with breaking capacity 9/10 kA at 415 V AC, current limiting type lower powerloss appx 40 -70% of the stipulated value and suitable for magnetic releases operating between 3 to 5 times rated current for normal power distribution application and 5 to 10 times rated current for moter application duty, with minimum Electrical endurance of the order of 20000 operation cycles.													-
														-
b	Residual current circuit breaker (RCCB) conforming to IS 12640 shall be provided with 30 mA sensitivity and electrically connected rated current capacity MCB for short circuit and over load protection as required													-
														-
c	All incomer MCBs of boards /panels shall be provided with NO/NC contacts as specified in specifications and drawings													-
														-
d	The LDBs may be required to accommodate Dimming Control equipment mountable on DIN rail. Contractor should refer to relevant specifications and drawings in this regard and submit his scheme for approval by Engineer.													-
														-
e	All the contactors shall be provided with potential free contacts for remote monitoring and control.													-
														-
f	Various distribution boards as given below:													-
														-
1.1	Lighting Distribution Boards (LDB) Type-1 as per specification and Drawing as per following details.													-
	One lighting distribution board (LDB) unit consisting of 3 compartments with respective incoming TPN MCBs, DP MCB RCCBs/ELCBs, set of contactors and outgoing SP MCBs each having indications for incoming & outgoing feeder status e.g. LDB is combination of LDB /N, LDB /G, LDB /U connected to incoming Supplies from Normal, DG set & UPS respectively including a set of time switches as per specifications and as shown on Drawing and as under:	Nos									5	5	1,54,964.00	7,74,820.00
A	Normal													-
	INCOMER													-
a)	1 no. 40A TPN Contactor with astronomical digital timer													-
b)	1 no. 40A TPN MCB													-
c)	1 set of (ON) indicating lamps for each													-
	OUTGOINGS feeder													-
a)	24 nos. 10A/20A SP MCB arranged in three rows and each row controlled by one no. 32A DP ELCB/RCCB with feeder ON indication lamps													-
b)	3 nos. 32A DP MCB + ELCB/RCCB with feeder ON indication lamps tapped from above contactor (non timer -controlled feeders).													-
B	DG													-
	INCOMER													-
a)	1 no. 40A TPN Contactor with astronomical digital timer													-
b)	1 no. 40A TPN MCB													-
c)	1 set of (ON) indicating lamps for each													-
	OUTGOINGS feeder													-
a)	24 nos. 10A/20A SP MCB arranged in three rows and each row controlled by one no. 32A DP ELCB/RCCB with feeder ON indication lamps													-
b)	3 nos. 32A DP MCB + ELCB/RCCB with feeder ON indication lamps tapped from above contactor (non timer -controlled feeders).													-
C	UPS													-
	INCOMER													-
a)	1 no. 25A DP Contactor with astronomical digital timer													-
b)	1 no. 25A TP MCB + ELCB/RCCB													-
c)	1 set of (ON) indicating lamps for each													-
	OUTGOINGS feeder													-
a)	10 nos. 10A/20A SP MCB arranged in a row and controlled by one no. 25A DP ELCB/RCCB with feeder ON indication lamps													-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
b)	4 nos. 10A/20A SP MCB arranged in a row and controlled by a 20A DP MCB + ELCB/RCCB with feeder ON indication lamps tapped from above contactor (non timer -controlled feeders).													-
	SCADA / BMS CONNECTIVITY Contactor & Timer shall be provided with necessary NO/NC potential free contact & should provide single point to communicate with BMS/SCADA.													-
														-
1.2	**Lighting Distribution Boards (LDB) Type-2 as per specification and Drawing as per following details.**													-
	One lighting distribution board (LDB) unit consisting of 2 compartments with respective incoming TPN MCBs, DP MCB RCCBs/ELCBs, set of contactors and outgoing SP MCBs each having indications for incoming & outgoing feeder status e.g. LDB is combination of LDB /N, LDB /G/LDB /U connected to incoming Supplies from Normal, DG set / UPS respectively including a set of time switches as per specifications and as shown on Drawing and as under:	Nos									2	2	50,847.00	1,01,694.00
	SCADA / BMS CONNECTIVITY Contactor & Timer shall be provided with necessary NO/NC potential free contact & should provide single point to communicate with BMS/SCADA.													-
A	Normal													-
	INCOMER													-
a)	1 no. 40A TPN MCB													-
b)	1 set of (ON) indicating lamps for each													-
														-
	OUTGOINGS feeder													-
a)	24 nos. 10A/20A SP MCB arranged in three rows and each row controlled by one no. 32A DP ELCB/RCCB with feeder ON indication lamps													-
														-
B	UPS													-
	INCOMER													-
a)	1 no. 25A DP MCB ELCB/RCCB													-
b)	1 set of (ON) indicating lamps for each													-
	OUTGOINGS feeder with feeder ON Indication LED Lamps													-
a)	10 nos. 10A/20A SP MCB													-
	SCADA / BMS CONNECTIVITY Contactor & Timer shall be provided with necessary NO/NC potential free contact & should provide single point to communicate with BMS/SCADA.													-
														-
1.3	**Lighting Distribution Boards (LDB) Type-3 as per specification and Drawing as per following details.**													-
	One lighting distribution board (LDB) unit consisting of 2 compartments with respective incoming TPN MCBs, DP MCB RCCBs/ELCBs, set of contactors and outgoing SP MCBs each having indications for incoming & outgoing feeder status e.g. LDB is combination of LDB /N, LDB /G/LDB /U connected to incoming Supplies from Normal, DG set / UPS respectively including a set of time switches as per specifications and as shown on Drawing and as under:	Nos									1	1	1,17,067.00	1,17,067.00
A	Normal													-
	INCOMER													-
a)	1 no. 40A TPN Contactor with astronomical digital timer													-
b)	1 no. 40A TPN MCB													-
c)	1 set of (ON) indicating lamps for each													-
	OUTGOINGS feeder													-
a)	18 nos. 10A/20A SP MCB arranged in three rows and each row controlled by one no. 32A DP ELCB/RCCB with feeder ON indication lamps													-
b)	3 nos. 32A DP MCB + ELCB/RCCB with feeder ON indication lamps tapped from above contactor (non timer -controlled feeders).													-
B	DG													-
	INCOMER													-
a)	1 no. 40A TPN Contactor with astronomical digital timer													-
b)	1 no. 40A TPN MCB													-
c)	1 set of (ON) indicating lamps for each													-
	OUTGOINGS feeder													-
a)	9 nos. 10A/20A SP MCB arranged in three rows and each row controlled by one no. 32A DP ELCB/RCCB with feeder ON indication lamps													-
b)	3 nos. 32A DP MCB + ELCB/RCCB with feeder ON indication lamps tapped from above contactor (non timer -controlled feeders).													-
														-
1.4	**Vertical Power distribution boards (VDPN) Type-4 as per specification and as per following details. (ViaDuct Socket)**	Nos									2	2	50,946.50	1,01,893.00
A	INCOMER													-
	1 no. 80 TP MCCB													-
	1 set of (ON) indicating lamps.													-
B	OUTGOINGS													-
	8 Nos of 32 TPN MCB													-
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													-
														-
1.5	**Lighting distribution boards (LDB/PDP) Type-5 as per specification and as per following details. (Adversement DB Concourse and Platform level)**	Nos									3	3	54,693.40	1,64,080.20
	One lighting distribution board (LDB) unit with respective incoming TP MCBs, outgoing TP MCBs DP RCCB and outgoing SP MCBs each having indications for incoming & outgoing feeder status as per specifications and as under:													-
A	INCOMER													-
a.	1 no. 63A Ics =35kA TPN MCCB													-
b.	1 set of (ON) indicating lamps.													-
														-
B	OUTGOINGS with feeder ON Indication LED Lamps													-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
a)	3 No. 32A TP MCBs													-
b)	9 Nos of 10A/20A SPMCB arranged in three rows and each row controlled by one no. 32A DP ELCB with feeder (ON) indication lamps.													-
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													-
														-
1.6	**Lighting distribution boards (LDB/PDP) TYPE-6 as per specification and as per following details.**	Nos									12	12	36,364.62	4,36,375.46
	One lighting distribution board (LDB) unit with respective incoming TP MCBs, DP RCCB and outgoing SP MCBs each having indications for incoming & outgoing feeder status as per specifications and as under:													-
A	INCOMER													-
a.	1 no. 32A TP MCB													-
b.	1 set of (ON) indicating lamps.													-
														-
B	OUTGOINGS													-
a)	18 Nos of 10A/20A SPMCB arranged in three rows and each row controlled by one no. 40A DP ELCB with feeder (ON) indication lamps.													-
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													-
														-
	TOTAL FOR DISTRIBUTION BOARDS - ZE.02													**16,95,929.66**
														-
ZE.03	**MV CABLING, BUSDUCT AND TRAY**													-
														-
3.1	Supply, laying, jointing, terminating, testing and commissioning of 1100 V grade, armoured / unarmoured, FRLSZH, **XLPE**, aluminium(AL) / Copper (CU) conductor cables on existing trays/walls/columns/ indoor/ trenches including the cost of supports with suitable clamps, saddles, hooks, bolts etc. and including the cost of proper dressing of cables, markers providing identification tags,earthing of glands armouring etc. complete as per specifications, as required and as below.													-
	Note 1: All cables above 16 sq. mm are Al Conductor unless specified otherwise.													-
														-
a)	3.5 core 400 sq mm AL conductor	Mtrs									420	420	1,794.78	7,53,807.60
b)	3.5 core 300 sq mm AL conductor	Mtrs									2700	2700	1,129.26	30,49,002.00
c)	3.5 core 240-sqmm AL conductor	Mtrs									300	300	814.15	2,44,245.00
d)	3.5 core 185-sqmm AL conductor	Mtrs									720	720	774.08	5,57,337.60
e)	3.5 core 150 sq mm AL. Conductor	Mtrs									540	540	499.70	2,69,838.00
f)	3.5 core 120-sqmm AL conductor	Mtrs									420	420	536.90	2,25,498.00
g)	3.5 core 95 sq mm AL. Conductor	Mtrs									540	540	563.35	3,04,209.00
h)	4 core 95 sq mm AL. Conductor	Mtrs									300	300	408.50	1,22,550.00
i)	3.5 core 70-sqmm AL conductor	Mtrs									2160	2160	389.40	8,41,104.00
l)	3.5 core 50 sq mm AL. Conductor	Mtrs									1560	1560	320.96	5,00,697.60
k)	3.5 core 35-sqmm AL conductor	Mtrs									13656	13656	256.06	34,96,755.36
l)	3.5 core 25-sqmm AL conductor	Mtrs									2400	2400	239.54	5,74,896.00
m)	4 core 16 sq mm CU Conductor	Mtrs									16560	16560	598.26	99,07,185.60
n)	4 core 10 sq mm CU Conductor	Mtrs									4200	4200	487.34	20,46,828.00
o)	4 core 6 sq mm CU Conductor	Mtrs									300	300	331.58	99,474.00
p)	4 core 4 sq mm CU Conductor	Mtrs									300	300	266.68	80,004.00
q)	3 core 6 sq mm CU Conductor	Mtrs									900	900	226.10	2,03,490.00
r)	3 core 4 sq mm CU Conductor	Mtrs									900	900	133.00	1,19,700.00
s)	2 core 16 sq mm AL. Conductor	Mtrs									1500	1500	95.95	1,43,925.00
t)	2 core 50 sq mm Cu. Conductor	Mtrs									30	30	732.45	21,973.50
u)	1 core 95 sq.mm. Cu unarm.	Mtrs									720	720	238.00	1,71,360.00
v)	1 core 50 sq.mm. Cu unarm.	Mtrs									630	630	140.00	88,200.00
														-
3.2	Cable jointing and termination of cable as per item 1.1 -including cost of supplying and fixing, crimping lugs, double compression brass glands, insulation tape etc. complete as per specifications and as required.													-
														-
a)	3.5 core 400 sq mm AL conductor	Nos									24	24	3,176.56	76,237.44
b)	3.5 core 300 sq mm AL conductor	Nos									48	48	2,748.22	1,31,914.56
c)	3.5 core 240-sqmm AL conductor	Nos									24	24	2,379.00	57,096.00
d)	3.5 core 185 sqmm AL conductor	Nos									24	24	1,587.10	38,090.40
e)	3.5 core 150 sq mm AL. Conductor	Nos									12	12	1,268.00	15,216.00
f)	3.5 core 120 sqmm AL conductor	Nos									24	24	1,220.12	29,282.88
g)	3.5 core 95 sq mm AL. Conductor	Nos									24	24	821.00	19,704.00
h)	4 core 95 sq mm AL. Conductor	Nos									24	24	1,542.80	37,027.20
i)	3.5 core 70 sqmm AL conductor	Nos									12	12	731.60	8,779.20
j)	3.5 core 50 sq mm AL. Conductor	Nos									36	36	625.40	22,514.40
k)	3.5 core 35 sqmm AL conductor	Nos									24	24	522.74	12,545.76
l)	3.5 core 25 sqmm AL conductor	Nos									108	108	374.06	40,398.48
m)	4 core 16 sq mm CU Conductor	Nos									300	300	363.44	1,09,032.00
n)	4 core 10 sq mm CU Conductor	Nos									252	252	302.08	76,124.16
o)	4 core 6 sq mm CU Conductor	Nos									252	252	256.06	64,527.12
p)	4 core 4 sq mm CU Conductor	Nos									252	252	213.58	53,822.16
q)	3 core 6 sq mm CU Conductor	Nos									72	72	1,174.20	84,542.40
r)	3 core 4 sq mm CU Conductor	Nos									72	72	880.65	63,406.80
s)	2 core 16 sq mm AL. Conductor	Nos									144	144	853.10	1,22,846.40
t)	2 core 50 sq mm Cu. Conductor	Nos									10	10	940.50	9,405.00
u)	1 core 95 sq.mm. Cu unarm.	Nos									12	12	964.00	11,568.00

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
v)	1 core 50 sq.mm. Cu unarm.	Nos									12	12	747.00	8,964.00
														-
3.3	Supply, laying testing and commissioning of 1.5 sqmm 1100 V grade, armoured, FRLSZ PVC insulated, FRLSZH PVC sheathed copper conductor cables on existing trays/walls/columns/ indoor/ trenches including the cost of supports with suitable clamps, saddles, hooks, bolts etc. and including the cost of proper dressing of cables and including the cost of providing identification tags etc. complete as per specifications, as required and as below.													-
	Note : Termination of all control cables to be provided under the above item and as per schematic diagram including the cost of supplying and fixing crimping lugs, compression type brass glands, heavy duty ferrules, insulation tape etc. complete as per specifications and as required.													-
														-
a)	2 C x 1.5 sqmm	Mtrs									100	100	229.90	22,990.00
b)	4 C x 1.5 sqmm	Mtrs									100	100	127.44	12,744.00
c)	5 C x 1.5 sqmm	Mtrs									100	100	166.00	16,600.00
d)	8 C x 1.5 sqmm	Mtrs									100	100	210.00	21,000.00
e)	10 C x 1.5 sqmm	Mtrs									100	100	268.00	26,800.00
f)	12 C x 1.5 sqmm	Mtrs									100	100	282.02	28,202.00
														-
3.4	Trunking made of roll-formed sheet steel in white polyster lacquer finish,11 conductors embeded in an integral conductor moulding. 5 mains power lines plus 2x2 conductors for integrating imergency lighting using two independently isolated circuits,plus 2 control-line conductors.Tool-free connection using electrical feed kit complete as required.Dimensions:4000x60x54 mm	Mtrs									10	10	3,012.45	30,124.50
														-
3.5	BUS DUCTS													-
3.5.1	Design, manufacture, testing at works, supplying, Installtion, testing and Commissioning of sheet steel structure Sandwitch type TPN "Al" bus duct having neutral cross section equal to phase, 50% Integral earth which is part of housing itself and class F/H insulation and enclosure will be of minimum 1.6 mm GI sheet steel epoxy powder coated paint with approved shade as per specification including suitable earthing conductor through out the length of bus duct. The bus bar will be of Aluminium with radialised edges. Individual sections will not be more than 3 meters long uniblock. One section will be connected to adjacent section by joint system operating by single bolt. Sub assembly should be removable without disturbing the adjacent bus bars. Rates shall be inclusive of all accessories i.e. bends, expansion joint, end feed box, Fire barriers inccluding all required necessary supports etc. as required.(Phase sequence shall be matched at both ends)													-
														-
a	1000 amps Sandwich Busduct with short circuit withstand of 50kA for one Sec.	Mtrs									0	0	31,501.20	-
b	1600 amps Sandwich Busduct with short circuit withstand of 50kA for one Sec.	Mtrs									0	0	28,800.00	-
c	2000 amps Sandwich Busduct with short circuit withstand of 50kA for one Sec.	Mtrs									0	0	33,285.60	-
d	2500 amps Sandwich Busduct with short circuit withstand of 50kA for one Sec.	Mtrs									0	0	43,560.00	-
e	4000 amps Sandwich Busduct with short circuit withstand of 65kA for one Sec.	Mtrs									40	40	86,180.00	34,47,200.00
														-
3.5.2	Design, manufacture, testing at works, supplying, Installation, Testing and Commissioning of flanged end Bimetallic flexible Termination with all accessories as required for the following rating of bus duct. The Flange End should be suitable for the Transformers and Panels:													-
														-
a	1000 amps	Nos									0	0	59,102.40	-
b	1600 Amps	Nos									0	0	30,930.00	-
c	2000 Amps	Nos									0	0	37,950.00	-
d	2500 Amps	Nos									0	0	49,215.60	-
e	4000 Amps	Nos									4	4	1,69,811.00	6,79,244.00
														-
3.6	Supply, fabrication & installation of perforated hot dipped galvanised double bended cable trays from 2 mm thick GI sheets continuously connected including horizontal and vertical bends, reducers, tees, and other accessories and duly suspended from the ceiling with suitable size vertical fully threaded G.I rods or suitable size G.I angles supported by 40mm x 40 mm x 5 mm GI angle etc. (or installed on wall supported on suitable G.I.brackets as required) complete as per specifications, as required and as below.as per Engineer In-charge. **Note: All cable tray, bends, tee, reducer, accessories etc shall be factory fabricated as approved by Engineer In-charge.**													-
	Note: Trays shall be supported adequately at minimum 1 m distance from the building structure/ ceiling by means of painted/galvanized (as specified) MS structural members secured to the structure by dash fasteners or by grouting. This support should be capable of withstanding the weight equivalent of 3m length of the cables that can be laid in the trays. At turns the support has to be double and at both ends of the bend.													-
														-
a)	600 mm wide x 50 mm deep x 2mm thick	Mtrs									500	500	1,651.00	8,25,500.00
b)	450 mm wide x 50 mm deep x 2mm thick	Mtrs									500	500	981.35	4,90,675.00
c)	300 mm wide x 50 mm deep x 2mm thick	Mtrs									3000	3000	961.70	28,85,100.00
d)	200 mm wide x 50 mm deep x 2mm thick	Mtrs									140	140	640.74	89,703.60
e)	150 mm wide x 50 mm deep x 2mm thick	Mtrs									2000	2000	587.64	11,75,280.00
f)	100 mm wide x 50 mm deep x 2mm thick	Mtrs									0	0	534.54	-
g)	50 mm wide x 50 mm deep x 2mm thick	Mtrs									0	0	281.20	-
														-
3.7	Supply, & installation of prefabricated, GI, ladder type cable tray conforming to M & E Specifications continuously connected including horizontal & vertical bends reducers, tees, coupling plate, nut bolts washers etc. The side runners shall be 100 x 20 x 2.5 mm and centre rungs shall be of size 30 x 15 x 2.5 mm with centre to centre distance of 250 mm, as required.The rate shall include the supporting arrangement with suitable size fully threaded rod or G.I suitable size angles as required. **Note: All cable tray, bends, tee, reducer, accessories etc shall be factory fabricated as approved by Engineer In-charge.**													-

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
														-
a	900 mm wide x 2.5 mm thick	Mtrs									100	100	1,062.00	1,06,200.00
b	600 mm wide x 2.5 mm thick	Mtrs									100	100	885.00	88,500.00
c	450 mm wide x 2.5 mm thick	Mtrs									100	100	590.00	59,000.00
d	300 mm wide x 2.5 mm thick	Mtrs									100	100	1,030.00	1,03,000.00
e	150 mm wide x 2.5 mm thick	Mtrs									100	100	523.92	52,392.00
														-
														-
7	Supply, installation of sheet steel raceways /trunking , fabricated from 2.0 mm thick GI with minimum coating thickness 260 gm / sq. meter on both sides with removable cover plate complete with counter sunk cadmium plated brass screws, bends, tee-junctions, cross junction tap-off boxes of adequate size etc ,in floor and suspended from the ceilling with required support . **Coloured Raceways shall be provided as per Engineer In-charge**. Rendered electrically continuous as approved and of following sizes.													-
														-
a	100 x 100 mm raceway	Mtrs									0	0	1,009.00	-
b	100 x 50 mm raceway	Mtrs									100	100	1,888.00	1,88,800.00
c	150 X 100 mm raceway	Mtrs									0	0	2,242.00	-
d	150 x 150 mm raceway	Mtrs									0	0	683.00	-
e	200 x 50 mm raceway	Mtrs									100	100	2,935.00	2,93,500.00
														-
8	Steel Works													-
	Supply, fabrication & installation, of fabricated GI steel work conforming to M & E specification and tender doct, to support GI cable trays, bus duct, light fixtures, conduit wirings, Bracket ,& other electrical works, as required.	KG									1500	1500	133.34	2,00,010.00
														-
	TOTAL CARRIED TO SUMMARY OF MV CABLING BUSDUCT AND TRAY - ZE.03													**357,57,689.72**
														-
ZE.04	**INTERNAL WIRING & ACCESSORIES**													-
														-
	Whether explicitly stated in the schedules below or not, the following must be complied with:													-
	For supply and installation, of conduits, cable trunking, raceway, flexible conduits and wiring,													-
	Wires supplied must conform to relevant clauses of tender doct. And Specifications.													-
	Wiring accessories must conform to relevant clauses of tender doct. And Specifications.													-
	In case of any contradiction between BOQ and tender doct. And specifications, the stringent condition of the two will apply.													-
4.1	Supply and laying of Lighitng Submains/circuit mains (3R x 2.5 Sqmm) in concealed or surface conduit system with GI conduits & 1100 V grade, multi strand copper conductor, FRLSZH-PVC insulated wires for phase, neutral & earth, shall include end termination. The conduits shall be complete with bends, JBs etc. The laying cost shall also include chipping works if necessary.													-
a	Primary Point (30 meter)	Points									250	250	6,079.36	15,19,840.00
b	Secondary Point	Points									2300	2300	2,138.16	49,17,768.00
														-
4.2	Supply and laying of circuit wiring along with earth wire with the following size of FRLSZH PVC insulated copper conductor single core cable in GI conduit as required. Compete in all respect to the entire satisfaction of engineer-in-charge													-
a	3 R of 1 c x 2.5 Sqmm	Mtrs									9750	9750	153.40	14,95,650.00
b	3R of 1 c x 4 Sqmm	Mtrs									2400	2400	205.00	4,92,000.00
c	3c x 2.5 Sqmm	Mtrs									100	100	151.00	15,100.00
														-
4.3	Supply and laying of Power Submains/circuit mains (3R x 4 Sqmm)in concealed or surface conduit system with GI conduits & 1100 V grade, multi strand copper conductor, FRLSZH-PVC insulated wires for phase, neutral & earth, shall include end termination. The conduits shall be complete with bends, JBs etc. The laying cost shall also include chipping works if necessary.													-
a	Primary Point (30 meter)	Points									210	210	6,185.20	12,98,892.00
b	Secondary Point	Points									420	420	2,926.93	12,29,308.50
														-
4.4	Supply and laying of circuit wiring along with earth wire with the following size of FRLSZH PVC insulated copper conductor single core cable in GI conduit as required. Compete in all respect to the entire satisfaction of engineer-in-charge													-
														-
a	3R of 1 c x 4 Sq sqmm	Mtrs									8400	8400	206.50	17,34,600.00
b	4c x 6 sqmm	Mtrs									2120	2120	484.00	10,26,080.00
														-
4.5	32A 3pin industrial socket outlet with 32A DP RCCB 30mA with MCB shall be standard powder coated MS sheet steel IP 55 enclosure, separately lockable	Each									30	30	8,786.55	2,63,596.50
														-
4.6	S&F suitable size GI box with modular plate and cover in front on surface or in recess including providing and fixing of 6/16A 1P+N+E water proof socket with switch as required.	Points									10	10	2,190.08	21,900.80
														-
4.7	S&F suitable size GI box with modular plate and cover in front on surface or in recess including providing and fixing of 6/16A 1P+N+E socket with switch as required.	Points									0	0	649.00	-
														-
4.8	S&F suitable size GI box with modular plate and cover in front on surface or in recess including providing and fixing of 32A 3P+N+E water proof socket with plug as required.	Points									0	0	7,670.00	-
														-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
4.9	S&F suitable size GI box with modular plate and cover in front on surface or in recess including providing and fixing of 20A 1P+N+E socket as required for AC .	Points									5	5	1,003.00	5,015.00
														-
4.10	S&F of 32 A 4P isolators with box complete as required by the engineer	Points									0	0	4,130.00	-
														-
4.11	S&F of 63 A 4P isolators with box complete as required by the engineer	Points									0	0	6,195.00	-
														-
4.12	Supply installation testing and commissioning of Occupancy sensor based movement detector with a build-in switch suitable for recessed mounting at a height of 3m with detection pattern of 6m X 8m. The sensor should have an operating voltage range of 230VAC +/10%; 50/60Hz and should be able to take upto 6A of electrical load and should be able to provide the switch off delay from 1 minute to 30 minutes range. The sensor should be in compliance with EN/IEC 60669-2-1, IEC (EN) 60669-2-1, IEC (EN) 61547, IEC (EN) 55015 and IEC (EN) 55022, class B.	Nos									5	5	3,293.65	16,468.25
4.13	Supply and installation of GI conduiting complete with GI junction and pull boxes, GI fish wires as specified and as shown below.													-
a	25 mm dia 1.6mm thick	Mtrs									100	100	182.40	18,240.00
b	32 mm dia 1.6mm thick	Mtrs									20	20	255.55	5,111.00
c	50 mm dia 2.0mm thick	Mtrs									10	10	421.80	4,218.00
4.14	Supply and providing of PVC cable trough complete with all fittings and accessories	Mtrs									100	100	221.00	22,100.00
														-
	TOTAL CARRIED TO SUMMARY INTERNAL WIRING AND ACCESSORIES ZE.04													**140,85,888.05**
														-
ZE.05	**LIGHTING FIXTURES & FANS**													-
														-
1	Lighting Fixtures													-
														-
1	Supply, installation, testing & commissioning of light fittings including all accessories e.g. ballast, HPF condensers, lamps, holders, surface/recess mounting arrangement etc. including necessary supports, accessories and hardware as per specifications & as required at site and as below:													-
														-
	Luminaire minimum specifications and requirements													-
														-
a	Luminaires should operate at +/-6% voltage fluctuation for continuous use to comply to IEC. PF > 0.95 for HF ballasts; for EM circuits PF > 0.85 with capacitor.													-
														-
b	All the components including the internal wiring of the luminaries to be used shall be manufactured of material, which are of low smoke and zero halogen type. All luminaires shall be manufactured to relevant sections of IEC60598 or other approved international standards and the type tests for all luminaries shall be provided.													-
														-
c	All internal wiring within the lighting fixtures shall be heat-resisting cables.													-
														-
d	All light fixtures model no. specified are tentative and contractor shall ensure latest generation model no. shall be provided in case of any change in technical specification / obsolete model no. by light manufacturer at the time of installation.													-
														-
	REFERRED STANDARDS FOR LED LIGHTING FIXTURES													-
														-
	IS: 513 Cold-rolled low carbon steel sheets and strips													-
	IEC 60529 Classification of degree of protections provided by enclosures.													-
	EN 55015, CISPR15 Limits and methods of measurement of radio disturbance characteristic of electrical lighting and similar equipment.													-
	IEC 62031 LED modules for general lighting-Safety requirements													-
	EN 61547 Equipment for general lighting purposes – EMC immunity requirement.													-
	EN 60929 Performance, AC supplied electronics ballast for tubular fluorescent lamps performance requirement.													-
	IEC 60598-2-1 Fixed general purpose luminaries													-
	IEC 60598-1 Luminaires - General requirement and tests													-
	IEC 61000-3-2 Electro Magnetic compatibility (EMC) -Limits for Harmonic current emission -- (equipment input current = 16 Amps. per phase.													-
	IEC 60068-2-38 Environmental Testing :Test Z- AD: composite temperature/humidity cyclic test													-
	IEC 61347-2-13 Lamp control gear : particular requirements for DC or AC supplied electronic control gear for LED modules.													-
	IS 10322 Specification for the luminaries													-
	IS 4905 Method for random sampling													-
	LM 79 LED luminaire photometry measurement.													-
	LM 80 Lumen Maintenance													-
	IEC 62384 DC or AC supplied electronic control gear for LED modules performance requirements													-
	IEC/PAS 62612 Self-ballasted LED lamps for general lighting services- Performance													-
														-
5.1	Supply, Installation, Testing & Commissioning of 38W LED Recess mounted Luminaire with 5700K colour temperature having 50000 burning hours life with minimum 70% lumen maintenance, CRI should be greater than 80, system lumen output should be minimum 3500 lumens and efficacy >100 lm/W. Housing should made of CRCA with PMMA diffuser and shall be with Electronic driver. The luminaire shall have life of 50000 hours, power factor >0.9 with THD <10%. LED make should be from CREE / Nichia /Philips Lumileds / LG. System Consumption should be less than 38W. Similar to **PHILIPS Cat Ref. RC380B G2 LED35S-6500 PSU OD WH or Equivalent.**	Nos									155	155	7,198.00	11,15,690.00
														-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
5.2	Supply, Installation, testing and commissioning of Surface mounted LED luminaire with Mid flux LED using efficient optics , System lumen efficacy > 100 Lumen/Watt , System Luminous flux of >=3200 lumens, System Wattage <=43W with 50,000 hours burning life. Colour rendering index > 70 and Colour temperature 4000K. CRCA housing with high efficiency opal diffuser. Luminaire sealed from bottom. Inbuilt gear . Zero maintenance, Zero mercury. Driver Surge protection > 1.5kV. Electronic In-Built PF > 0.9 , THD < 10% , IEC Compliant for Safety , Performance & EMI. The type shall be of 2'x2'. EQUIVALENT TO **PHILIPS CAT. No. SM365C LED-34-4000 PSE-OD or as per the approved make list**	Nos									10	10	5,910.00	59,100.00
														-
5.3	Supply, Installation, testing and commissioning of LED based luminaire enclosed in a CRCA housing with diffused optics. The luminaire shall be suitable for Wall / conduit/suspended/surface mounting. With a minimum system level lumen package of 3900 lumens should have a maximum system level wattage of 42W giving a system efficacy of > 100 lm/W. The product is available in colour temperatures of 6500K with CRI>80 and a system lifetime of 40,000 burning hours at 70 percent lumen maintenance. It has electronic driver with a pf>0.95 and THD<=10%. The luminaire is IP 20 protected. Operating voltage range of 140-270 V AC. LED make should be from CREE/Nichia/Philips Lumileds/ LG. The diffuser shall be made of polycarbonate. The luminaire shall be with Short circuit and Over voltage cut off protection and Electrical Class I. **Similar to Philips BN108C LED 40S PSU CDL WH**	Nos									100	100	3,776.00	3,77,600.00
														-
5.4	Supply, Installation, testing and commissioning of LED highbay symmetric beam luminaire with housing made of die-cast aluminium of system wattage not more than 72W. The luminaire shall be with dedicated optics to provide precise light distribution of symmetric beam angle. The luminaire shall be designed to meet its specifications on performance & lifetime at a design ambient temperature of 45 deg C. A specially designed heat management system to ensure luminous efficacy >=102 lm/W for the system and ensure lumen depreciation upto 30% over 50k burning hours. The luminaire is designed to meet IP 65 classification and is compliant with relevant immunity, safety and performance and EMI standards. The system lumens shall not be less than 7200 lumens with 5700K CCT. The CRI shall be > 70. The luminaire shall be able operate from 190 - 270V AC, 50Hz with > 0.9 PF & THD <=20%. The luminaire shall have an in-built surge protection upto 3kV. The LEDs shall be of SMD type (not COB type). The luminaire shall be supplied with suitable suspended / surface mounting kit. **Similar to Philips: BY400V LED72S CW SY PSU S2 FG WH – Surface.**	Nos									70	70	21,240.00	14,86,800.00
														-
5.5	LED based IP54 Light trunking system suitable for Suspended, surface-continuous or standalone mounting applications provided with slim extruded housing having width<75mm. With a minimum system level lumen package of 3900 lumens should have a maximum system level wattage of 42W. The LED used in the system shall be best in class ensuring system efficacy of at least 100 lumen/watt . Colour rendering index (CRI) >80. The trunking system shall be available in single sections of up to 3M length to ensure continuity along the length of the platform. The electronic driver used in the fixture shall be a constant current type driver with power factor > 0.9 and THD < 10%.The CCT shall be 4000K. **Similar to Philips: LL199X 1XDLED40-4000 PSE ODWH - IP54**	Nos									120	120	8,850.00	10,62,000.00
														-
5.6	Supply and Installation of Trunking system suitable for the above Trunking based Luminaire, Housing shall be made of extruded aluminium with white powder coating, the length of the trunking system shall be 3.5 to 3.6m the trunking system shall be supplied with necessary suspenstion rods and end caps. **Equivalent to TTX 199/03LED**	Nos									40	40	2,655.00	1,06,200.00
														-
5.7	Supply, installation, testing and commissioning of LED round downlighter with > 1600 lumens with 4000K CCT. The optic shall be diffuser. The reflector shall be of polycarbonate and heat sink shall be of die-cast aluminium. The wattage of the luminaire shall be with not more than 18W. The efficacy of the downlighter shall be >100 lm / W. The luminaire shall be mounted using spring clip. The CRI of the luminaire shall be >80. The luminaire shall be with electronic driver with THD < 10% and PF > 0.9 . The driver shall comply to IEC 62384 , IEC 61347-2-13, IEC 61547, EMI- CISPR15 standards. **Equivalent to Philips: DN394B LED16S-4000 PSU WH**	Nos									410	410	3,776.00	15,48,160.00
														-
5.8	Supply, installation, testing and commissioning of contemporary post top luminaire with system wattage not more than 36W and system lumens > 3400. The luminaire shall be with operating voltage 140-270V with PF > 0.9. The LED shall be of SMD type only with CCT 5700K CRI >70. The luminaire shall be with IP 66, IK 10 and Electrical protection Class I. The luminaire shall have an efficacy > 100 lm /W. The luminaire shall comply to IS 10322, IEC 60698. The light distribution shall be street lighting distribution. The housing shall be of die-cast aluminium with flat glass cover. The luminaire shall be with 0% ULOR. The pole height shall be 3m from FFL. The life of luminaire shall be > 50000 hours at L70. The luminaire manufacture shall submit LM79 and LM80 reports from NABL accredited lab. The luminaire shall be supplied with square shaped pole of height > 3.0m. The base plate dimension shall be 300mm x 300mm with 4 nos of holes of dia 15mm. Equivalent to **Philips BGP400 LED 35L CW MR FG S1 WITH BRACKET ZGP400 L TYPE LUMACUBE AND POLE ZGP400 3M POLE complete with pole & accessories**	Nos									10	10	44,250.00	4,42,500.00
														-
5.9	Supply, Installation, testing and commissioning of LED Flood light with system power not more than 70W High efficiency glass cover with Aesthetically Designed LM6 PDC housing with Black corrosion resistant polyester Powder coating, IP66 & IK≥07 with operating voltage from 140-270VAC, 50 Hz, with LED Life of 50000 Burning Hours @L70 with system efficacy not less than 100 Lumen/Watt for the light fixture. The system lumen shall be > 7000 lumens . The supplier shall provide LM80 and LM 79 test reports from NABL accredited LAB before supplying the luminaires . **Equivalent to Philip: BVP120 LED70 CW FG S1 PSU GR**	Nos									25	25	18,880.00	4,72,000.00
														-
5.10	Supply, Installation, testing and commissioning of LED floodlight with LM6 Pressure die-cast aluminium Housing and High efficiency Glass cover. The system wattage shall be not more than 115W and system lumen output shall not be less than 10000 lumens. The Driver Efficiency : > 85% and Life L70, 50k Hrs. Colour temp shall be 5700K. The luminaire shall be provided with Graduation disk for aiming and Suitable 'C' clamp mounting. The luminaire shall have an efficacy > 100lm /W. The luminaire shall be IP 65, Class I protected. The dimension of the luminaire shall not be more than 447 x 327 x 163mm (H x W x H). The luminaire shall not weigh more than 13kg. The supplier shall provide LM80 and LM 79 test reports from NABL accredited LAB before supplying the luminaires **.Similar to PHILIPS: BVP410 LED 107 CW HE NB FG S3 XT**	Nos									10	10	41,300.00	4,13,000.00
														-

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
5.11	Supply, Installation, Testing & Commissionimg of Surface mounted Bulkhead LED with a system lumen output of 600 lumens and a system efficacy of 100 lumen/watt The luminarie shall be IP66 & IK09 rated and shall have a CRI of 70. The housing of luminarie is made of high pressure die cast aluminium with front cover made of polycarbonat diffuser. Similar to Philips WT202W LED 6S and must conform to ingress Protection Clasification of IP54	Nos									50	50	1,479.15	73,957.50
														-
5.12	Supply, Installation, testing and commissioning of 4ft linear recess mounted light fixture with a system efficacy of at least 110lm/W and nominal system lumen output of 2600lumens. CRI greater than 80, SDCM<5 and the fixture CCT shall be available in 4000 as well as 6500K. The luminaire shall have a total harmonic distortion factor of not more than 10% and power factor of at least 0.9. The width of the fixture shall not be more than 60mm. The fixture shall have an extruded aluminium housing with an anodized finish and high efficiency extruded polycarbonate diffuser. Heat sink to be made of CRCA. Operating voltage range of 140-270V AC with an inbuilt surge protection of 2.5kV. The thickness of the luminaire wall shall be 1.7mm and width of the fixture shall not be more than 60mm. The luminaire shall have Class B serviceability and a life class of at least 50k hours at L70B50. The luminaire shall be available in options of continuous as well as standalone versions. It should also have options of fixed output as well as DALI dimmable versions. LM79 and LM80 reports to be available **similar to Philips RC780B LED 26S**	Nos									370	370	10,619.00	39,29,030.00
														-
5.13	Supply, installation, testing and commissioning of LED round downlighter with > 1600 lumens with 4000K CCT. The optic shall be diffuser. The reflector shall be of polycarbonate and heat sink shall be of die-cast aluminium. The wattage of the luminaire shall be with not more than 18W. The efficacy of the downlighter shall be >100 lm / W. The luminaire shall be mounted using spring clip. The CRI of the luminaire shall be >80. The luminaire shall be with electronic driver with THD < 10% and PF > 0.9 . The driver shall comply to IEC 62384 , IEC 61347-2-13, IEC 61547, EMI- CISPR15 standards. **Equivalent to Philips: SM251C LED15S-4000 PSU WH**	Nos									180	180	1,508.00	2,71,440.00
														-
5.14	Supply, installation, testing and commissioning of LED round downlighter with > 1200 lumens with 4000K CCT. The optic shall be diffuser. The reflector shall be of polycarbonate and heat sink shall be of die-cast aluminium. The wattage of the luminaire shall be with not more than 12W. The efficacy of the downlighter shall be >100 lm / W. The luminaire shall be mounted using spring clip. The CRI of the luminaire shall be >80. The luminaire shall be with electronic driver with THD < 10% and PF > 0.9 . The driver shall comply to IEC 62384 , IEC 61347-2-13, IEC 61547, EMI- CISPR15 standards. **Equivalent to Philips: SM250C LED12S-4000 PSU WH**	Nos									10	10	1,141.00	11,410.00
														-
5.15	Supply, Installation, Testing & Commissioning of LED Wall mounted linear batten fixture (1200mm length approx.), Aluminium housing, high optically efficient translucence diffuser complete with driver, PF>0.9, THD<20%, rated life of L-70@ 50,000 hours having minimum system lumen output of 2000 Lumens and system efficacy of minimum 100 Lumens / watt with CRI ≥ 80. **Similar to PHILIPS BN108C LED 20S PSU**	Nos									1010	1010	1,049.00	10,59,490.00
														-
														-
	Fans													-
														-
5.16	Supply and installations of 230 V, 1-phase, 1440 RPM, sweep of appx. 400mm Bracket fan including mounting bracket, blades, starters & other standard accessories complete as required.	Nos									10	10	1,879.00	18,790.00
														-
5.17	Supplying and installations of 230 V single phase, 1400 mm sweep ceiling fans with electronic regulators including all standard accessories complete, mounting of regulator on grid plate & MS BOX etc. and suitable length down rod, duly painted, not exceeding minimum fan height of 2.4 m from floor as required and as below.	Nos									10	10	2,136.98	21,369.80
														-
5.18	Supply, installation, testing and commissioning of exhaust fan with fan guards on both sides, double ball bearings, class-E insulation, capacitor (pf 0.90 or better) complete with all other accessories as per IS 2312 and as required, of following sizes:													-
a)	Size 450 mm dia, 1400 rpm	Nos									0	0	3,232.85	-
b)	Size 300 mm dia, 1400 rpm	Nos									0	0	8,160.50	-
														-
3	Lighting Control System													-
a	Supply, Installation ,Testing and commissioning of Lighting control panel to achieve 33%,66% and 100% on/off the lighting. The Lighting Control System shall be integrated with the E& M SCADA . Each lighting circuit from the lighting control panels (LCP) shall be controlled by the SCADA between the LCP and RTU.The Schedule for control and monitoring of lighting circuits and graphic of lighting control floor plan shall be from the E & M SCADA work station in SCR and OCC . The lighting control system configuration such as graphic, layout, setting, etc., shall be adjusted to harmonize with Architectural finishes. This is also applied to third party vendors interfaces with the system. The lighting control system shall comply with the following codes and standards: (1) IEEE 802 : Standard for Information Technology – Telecommunications and Information exchange between systems (2) IEC 60529/1989 : Degree of protection provided by enclosures (IP Code) (3) IEC 60255 : Electrical Relay (4) IEC 60364 : Electrical Installation of Buildings													-
														-
b	LX Lighting Control Panels with encloser,24 Relay Spaces, Relays Ratings : 120, 277, and 347VAC 20 Amp Single Pole Input: 120/277/347VAC multi-tap transformer.	Nos									4	4	3,09,695.72	12,38,782.88
														-
c	Power Supply for LX Panel	Nos									4	4	69,913.82	2,79,655.28
														-
d	LX Switches for Manual Override, 5 Switches, White Color	Nos									10	10	11,442.46	1,14,424.60
														-
e	Graphic User Interface for LX Panel for Local Control	Nos									4	4	35,851.94	1,43,407.76
														-

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
f	PC Integration Tool for remote controlling Panels Via IP Address Input: 120VAC	Nos									4	4	2,25,663.20	9,02,652.80
														-
g	Building Automation multi-protocol gateway (BACnet, Metasys N2 by JCI, and Modbus) for providing control and access to LX Network Lighting Control Panel system Input: 24VDC	Nos									4	4	1,60,570.86	6,42,283.44
														-
h	Power Supply for ProtoCessor Input: 100-240VAC, 1.5A Output: 24V, 1.5A	Nos									4	4	572.30	2,289.20
														-
i	Control Cable for LON Communication between Panels (100 Ft Reel)	Nos									4	4	12,407.70	49,630.80
														-
j	Surface Mounted Cabinet for LX Panel Accessories	Nos									4	4	4,068.64	16,274.56
														-
	TOTAL CARRIED TO SUMMARY LIGHTING FIXTURE AND FANS - ZE.05													**158,57,938.62**
														-
ZE.06	**PROTECTIVE EARTHING**													-
														-
6.1	Earthmat													-
6.1.1 6.1.2 6.2	Supply, laying, testing and commissioning of 30 mm dia MS rod for earth mat grid conductor (at 500mm or deeper as per the final approved design as per the site condition) as per specifications including lap (of not less than 150mm) & cross weld joints and providing bitumin coat at every joint as required. Risers from earth mat to be brought out as per approved drawings and specifications. (Cost of risers not included in this item). Supply, laying, testing and commissioning of vertical earth electrodes of 30 mm dia MS rod, 3 m deep from earth mat including weld joints with earth mat as per approved drawings and specifications. The weld joints to be provided with bitumin coats. Providing and making plate earthing station including the cost of 600 mm x 600 mm x 6.3 mm G. I. plate electrode, 15 mm dia G.I.watering pipe, CI funnel with wiremesh charcoal/coke , salt, all earth work, masonry enclosure with frame,hinged cover plate having locking arrangement,Disconnecting links, complete as per IS 3043:1987 for earthing.	Lumpsum									1	1	3,65,800.00	3,65,800.00
														-
6.3	Providing and making plate earthing station with 600mm x 600 mm x 3.15 mm Cu plate electrode, 50 mm dia G.I. watering pipe, CI funnel with wiremesh charcoal/coke , salt, all earth work, masonry enclosure with frame, hinged heavy duty RCC top cover plate having locking arrangement,Disconnecting links, complete as per IS 3043:1987 for earthing.	Nos									10	10	35,400.00	3,54,000.00
														-
6.4	Supply, Installing,Testing and commissioning of 50mm dia ,3m length ,pipe in pipe Chemical earth electrode complete as required as per IS 3043-1987 for earthing.	Nos										0	14,750.00	-
														-
6.5	Supply and laying,Testing and commissioning of copper/GI Strips/wire for interconnecting the earthing stations ,panels,DBs etc. of the following sizes in built up trenches /surface/wall/ground complete with holes & fixing,jointing / terminating accessories as per specifications & drawing as required. (Quantity shall be paid as per the actual measurement as executed, however direct measurement shall not exceed the quantity indicated in drawing approved .													-
														-
a	75 mm x 6 mm GI strip	Mtrs									2000	2000	305.90	6,11,800.00
b	50 mm x 6 mm GI strip	Mtrs									1000	1000	236.00	2,36,000.00
c	25 mm x 6 mm GI strip	Mtrs									5000	5000	141.60	7,08,000.00
d	20 mm x 3 mm GI strip	Mtrs									100	100	123.90	12,390.00
e	50 x 6 mm Cu strip	Mtrs									100	100	2,419.00	2,41,900.00
f	8 SWG / 4 mm diameter, copper Wire	Mtrs									100	100	112.10	11,210.00
														-
6.6	Supply, laying and testing of unarmoured, stranded copper conductor, Low Smoke Zero Halogen, green coloured cables of following sizes, conforming to BS 7211 and Section E02 of M & E Specifications, for earthing, including termination of the same by copper lugs at both ends.													-
														-
a	1 x 6 sq. mm	Mtrs									0	0	65.00	-
b	1 x 10 sq. mm	Mtrs									0	0	84.00	-
c	1 x 16 sq. mm	Mtrs									0	0	180.00	-
d	1 x 70 sq. mm	Mtrs									0	0	606.00	-
e	1 x 150 sq. mm	Mtrs									0	0	1,247.00	-
														-
	Note-1: In case of non availability of any of the sizes mentioned above, next higher size available in market shall be provided at the same rate.													-
	Note-2: No additional payment will be made for providing Main Earth Terminals (made out of GI/Cu strips from within the above sizes). The METs will required to be fixed on walls as required and will be required to be provided with 12/16/20mm holes for connections of individual equipments including of other contractors'.													-
														-
6.7	Extra for bituminous coating and hessian tape wrap or polyethylene faced hessian complete for buried G.I/Cu strips as per specifications and drawings as required.	Mtrs									0	0	75.00	-
														-
6.8	Extra for GI / Electrolytic Copper test links/ termination With building pier continuity conductor including termination plate, nut& bolts,fixing/welding etc as per specifications and as required.	Nos									0	0	252.00	-
														-
	TOTAL CARRIED TO SUMMARY PROTECTIVE EARTHING ZE.06													**25,41,100.00**
														-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
ZE.07	**LIGHTNING PROTECTION**													-
														-
1	Providing and fixing of stainless steel SS-304 air terminations, base plate and clamping of down conductor complete with base plate, concrete coping, fixing accessories and clamping with down conductor etc. complete as required as per specifications.	Nos									20	20	1,871.00	37,420.00
														-
2	Supplying and laying of the stainless steel SS-304 strip down conductor size 25 x 3 on surface/wall / parapet/ shaft complete with joints, bimetallic connectors, testing links & other fixing accessories and clamping/ connection with earth terminations as per specifications & drawing as required.	Mtrs									2200	2200	320.96	7,06,112.00
														-
3	Supplying and laying of the stainless steel SS-304 strip Earth terminations with burried conductor size 25 x 3 with bituminous coating and covered with PVC taping complete as per specifications & drawing as required.	Mtrs									1800	1800	240.72	4,33,296.00
														-
4	Earth terminations pit as per IS 3043 with 50 mm dia GI perforated pipe complete with funnel, Wire mesh, Masonary Chamber with Heavy duty cover etc. complete as per specification and drawing as required.	Nos									20	20	5,341.86	1,06,837.20
														-
	TOTAL CARRIED TO SUMMARY LIGHTNING PROTECTION ZE.07													**12,83,665.20**
														-
ZE.08	**EXTERNAL LIGHTING**													-
														-
1	Poles													-
														-
8.1.1	9m Octagonal pole hot dip galvanised with top bottom dia 70/155 mm , thickess 3 mm , base plate 260 mm X 260 mm X 16 mm , with single arm bracket 1.5 m with required concrete foundation including foundation bolts, nuts and accessories.The rate shall inclusive of 2x40 mm dia G.I pipe for cable looping excluding cables and other electrical accessories	Nos									5	5	20,701.00	1,03,505.00
8.1.2	9m Octagonal polem hot dip galvanised with top bottom dia 70/155 mm , thickess 3 mm , base plate 260 mm X 260 mm X 16 mm , with double arm bracket 1.5 m with required concrete foundation including foundation bolts,nuts and accessories.The rate shall inclusive of 2x40 mm dia G.I pipe for cable looping excluding cables and other electrical accessories	Nos									5	5	21,830.00	1,09,150.00
8.1.3	7m Octagonal polem hot dip galvanised with top bottom dia 70/130 mm , thickess 3 mm , base plate 220 mm X 220 mm X 16 mm , with single arm bracket 1.5 m with required concrete foundation including foundation bolts,nuts and accessories.The rate shall inclusive of 2x40 mm dia G.I pipe for cable looping excluding cables and other electrical accessories	Nos									5	5	17,388.00	86,940.00
8.1.4	7m Octagonal polem hot dip galvanised with top bottom dia 70/130 mm , thickess 3 mm , base plate 220 mm X 220 mm X 16 mm , with double arm bracket 1.5 m with required concrete foundation including foundation bolts,nuts and accessories.The rate shall inclusive of 2x40 mm dia G.I pipe for cable looping excluding cables and other electrical accessories	Nos									5	5	18,493.00	92,465.00
														-
8.1.5	Ornamental Cast iron Pole with double arm bracket, of total height 3500mm nominal above the foundation top level fabricated with cast iron embellishment, joints, column sections etc re-inforced internally with a pipe inside. The bottom column should have accommodation to mount MCB, Bakelite sheet and connector. The pole shall be painted with polyurethane paint of approved colour finish with supply of Foundation bolt M16*600. Similar to BAJAJ Make : ALEXANDER 3.5 M or equivalent	Nos									10	10	59,256.00	5,92,560.00
														-
8.1.6	Supply, installation, testing and commissioning of Decorative Light 40W LED Luminaire which shall be black painted Die cast aluminium pole cap with top mounting arrangement for post top having optical compartment tightness level shall be IP65 The LED color temp shall be 5700 K. Two fittings required on each Edgar Pole. Similar to BAJAJ MAKE:- GLORILILLY 40W LED or equivalent.	Nos									20	20	16,322.00	3,26,440.00
														-
8.1.7	Ornamental Cast iron Pole with of height 3500mm nominal above the foundation top level fabricated with cast iron embellishment, joints, column sections etc re-inforced internally with a pipe inside. The pole should be painted with polyurethane paint of antique finish copper colour finish. Similar to BAJAJ MAKE : EDGAR 3.5 M or equivalent	Nos									10	10	54,406.00	5,44,060.00
														-
8.1.8	Supply, installation, testing and commissioning of 45W LED suspension type decorative street light fitting, made of spun aluminium housing, polycarbonate diffuser protector with IP 65 protection for optical compartment with high power LEDs and inbuilt driver with efficiency > 0.85 and having surge protection device,, Color temperature 5700K. Similar to BAJAJ MAKE : BORAGE 45W LED or equivalent	Nos									10	10	28,776.00	2,87,760.00
														-
8.2	Luminaries													-
														-
8.2.1	Supply, installation, testing and commissioning of LED Street light fixture - 70 watt with IP66 protected LM6 high pressure aluminium die cast housing capable of delivering a nominal system lumen output of 7200 lumens with a minimum system efficacy of 100 lumen/watt and a CRI greater than 70. The luminaire shall have a life class of 50,000 hours @ L70 and driver efficiency of >85%.(Similar to Philips Cat. No. BRP410 LED CW072 MR FG S1 PSU or equivalent)	Nos									20	20	15,045.00	3,00,900.00
														-
8.2.2	Supply of 75mm dia HDPE pipe confirming to PN-4 boring of road channel area by using open trench method and laying of HDPE pipe properly continuously jointed restoring the surface where pitting is done ,to original position.	Mtrs									200	200	212.00	42,400.00
8.2.3	Supply and laying of 6 SWG wire along with the cable	Mtrs									1000	1000	17.00	17,000.00

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
8.2.4	Providing and fixing thermo plastic poly carbonate pole boxes confirming to IP-65 degree of protection, along with 16A MCB and 5 way connector and 2 No. cable gland suitable for 4x25 sq.mm cable.	Nos									60	60	6,220.00	3,73,200.00
8.2.5	wiring for luminaries in existing poles with following sizes of unarmoured cu cables from pole box to each fittings.													-
a	3x2.5 sq mm	Mtrs									200	200	189.00	37,800.00
														-
8.3	High Mast													-
														-
	Supply, installation, Testing and Commissioning 20 m high area lighting High Mast of Wipro/Philips/GE/Thorn, suitable for 06 nos. 250W LED luminaires complete with all standard accessaries like winches, latern carriage etc. including the cost of providing supplying and fixing 6 nos of IP65 rated 250W LED flood light luminaires with High efficiency, long life, high power LED- Chip On Board(COB) Technology with luminaire Lumen output> 22900lm, Luminaire efficacy>92lm/W, CCT- 5000K, 50000 burning hours as per L70 Criteria. Housing: Extruded Aluminium, Highly efficient & specially designed glass lens optics, Constant current-Constant voltage isolated mutistage LED driver with operating voltage ranges from 90V-305V AC. Operating power factor>0.95, THD<10%, Driver efficiency > 85%, Complete assembly with LED, Driver and accessories pre wired in driver compartment, best efficient heat dissipation system similar to Wipro Cat num LF07-272-060-50-XX with beam angles 60degrees. System should include Lightning Arrestor and others accessaries like phosper Bronz Gear, double drum, stainless steel wire ropes, suitable MCB wires/cables as required with alongwith the folowing accessaries as required as under : -20 m High Mast suitable for 6 Nos LF07-582-XXX-50-XX with lantern carriage excluding lightening arrestor, panel, cables & other electrical accessories like MCB etc. The supplier shall provide LM80 and LM 79 test reports from NABL accredited LAB before supplying the luminaires.	Nos										0	7,20,000.00	-
a	Suitable foundation for the Mast considering soil bearing capacity 10 Ton per Sqm, with base pedestal of approve design, incoporating a suitable cable looping box with terminal blocks MCB etc.													-
b	S.I.T.C. of Earth station of Pipe earthing as per IEEE 80 -2000, ans IS 3043 -1987, including duplicate earth connection to the mast with 25X3 mm size MS GI flate.													-
c	S.I.T.C. of suitable neon Aviation lights as required.													-
														-
	TOTAL CARRIED TO SUMMARY EXTERNAL LIGHTING ZE.08													**29,14,180.00**
														-
ZE.09	**UNINTERRUPTED POWER SUPPLY SYSTEM**													-
														-
9.1	Supply, Installation, Testing and Commissioning of **true parallel redundant 2x30 kVA, online, UPS** system suitable for providing power supply to emergency lighting at station, suitable for incoming 415 volts, 3 phase +10 % -20%, 50 Hz, supply and single phase output voltage, variation ± 1%, including isolation transformer, rectifier/dual converter, static switch, inverter, filter, Bypass & static transfer switch for automatic switch over without giving any break of power, maintenance bypass switch, Micro processor/ software controlled annunciation,protection(including against input phase reversal), and menu run diagnostic module,associated cabling and connections/ terminations, complete as per specifications and as required.										1	1		18,76,275.00
	Note-1: The price of above item is inclusive of a manual chnageover switch suitable for terminating 2 nos. of 4 core aluminium conductor armoured cables of suitable size on the incoming side of UPS. The manual change over switch may be wall mounted in the UPS room. From manual chnageover switch to UPS, the connection should be through an adequately rated copper cable, and RS 485 port for display of ON/OFF status of UPS on BMS work station through MODBUS protocol is also included in the price.	Set											18,76,275.00	-
	Note-2: The above price is also inclusive of suitable size copper conductor, armoured cable from UPS outgoing side to UPS Output Panel. Size shall be cross varified by the E & M designer in reference to the allowable voltage drop before installation.													-
														-
9.2	Supply, Installation, Testing and Commissioning of valve regulated lead acid-sealed maintenance free suitable for 30-minute-battery backup to the each UPS of item 9.1, Battery shall comply with relevant regulations & Battery racks shall be made of acid resistant material complete as per specifications & as required.													-
														-
9.3	Supply, Installation, Testing and Commissioning of **1 x 15 kVA, online, UPS** system suitable for providing power supply to emergency lighting at station & viaduct, Platform edge door and Computerised Control panel load of approved make, suitable for incoming 415 volts, 3 phase +10 % -20%, 50 Hz, supply and single phase output voltage, variation ± 1%, including transformer, rectifier/dual converter, static switch, inverter, filter, Bypass & static transfer switch for automatic switch over without giving any break of power, maintenance bypass switch, Micro processor/ software controlled annunciation,protection(including against input phase reverssal), and menu run diagnostic module,associated cabling and connections/ terminations, complete as per specifications and as required.										1	1		6,11,861.00
	Note-1: The price of above item is inclusive of a manual chnageover switch suitable for terminating 2 nos. of 4 core aluminium conductor armoured cables of suitable size on the incoming side of UPS. The manual change over switch may be wall mounted in the UPS room. From manual chnageover switch to UPS, the connection should be through an adequately rated copper cable, and RS 485 port for display of ON/OFF status of UPS on BMS work station through MODBUS protocol is also included in the price.	Set											6,11,861.00	-
	Note-2: The above price is also inclusive of suitable size copper conductor, armoured cable from UPS outgoing side to Emergency Lighting Panel (EMLP). Size shall be cross varified by the E & M designer in reference to the allowable voltage drop before installation.													-
														-
9.4	Supply, Installation, Testing and Commissioning of valve regulated lead acid-sealed maintenance free suitable for 30-minute-battery backup to the each UPS of item 9.1, Battery shall comply with relevant regulations & Battery racks shall be made of acid resistant material complete as per specifications & as required.													-
														-
	TOTAL CARRIED TO SUMMARY UNINTERRUPTED POWER SUPPLY ZE.09													**24,88,136.00**
														-
ZE.10	**DIESEL GENERATOR**													-
														-

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
1	Supply, installation, testing and commissioning a complete system of 500kVA Prime duty type diesel generator sets to meet the load requirements for all essential loads as mentioned in these Specifications/Contract. The DG set emissions shall cofirm to the latest regulation of the Central Pollution Control Board (CPCB). Installation Batteries with Stand, leads, cover and accessories. 990 Ltrs Day Tank fabricated out of 6mm thick sheet steel with secondary containment tank and with fitments and float level switches. Drip Tray for fuel tank ,Drip Tray below engine crank case The entire set shall be housed in soundproof enclosure mounted on suitable Rubber-in-shear type vibration mounts with 6mm static deflection for isolating the building floor. A nominal base concrete pad (if required) shall be provided over which the engine set with its own base frame and vibration mounts shall be mounted. Adopter Box for cable / bus duct termination with extension bus bars. Any other item not specifically mentioned but required for proper performance and safe working of the system. The DG system shall be provided to interface with Station Management System (SMS)/Building Management system(BMS) for remote monitoring and management in Station Control Room and/or OCC room (if available) respectively.										1	1		38,01,570.00
	AMF Panel													-
	The AMF Panel should therefore comprise: (i) 800A , 4 Pole ACB with 4-pole contactor as main Incomer from AMF Panel, copper bus bar of adequate rating with one no. 4-pole ACBs as outgoing for Essential Power Panel 800A and Fire Pump Panel 400A, MCCB of adequate rating, duly interlocked. (ii) Battery charger with normal and trickle charging facility and an isolating switch with voltmeter of range 0-50 volts and ammeter of range 0-50 amps (iii) Over load and Earth Fault protection for the generator set.													-
	Incoming breaker shall comprise of following:	Set											38,01,570.00	-
a	Excitor field DC voltmeter and ammeter.													-
b	Voltage resrained over current protection (50 V / 51 V) type CDV62 or equivalent with CT's - 1 Set													-
c	Engine cranking relay- 1 Set													-
d	Microprocessor based engine control automatic failure stand by relay including all accessories													-
e	Selector switch for engine control OFF/ON													-
f	Five push buttons – start, stop, reset, test and accept													-
g	Three indicating lamps "load on set', 'Load on Mains' and " Set fail to start'.													-
h	16 Window alarm annunciators panel with hooter, push buttons, aux. Contactors etc as required as per specification.													-
i	Temperature scanner (Messi Bus/Procon)													-
i	Underpower Relay with Timer - 1 Set													-
k	Reverse Power Relay - 1 Set													-
l	Phase Sequence Relay - 1 Set													-
m	Differential Protection Relay (87 G/N) - 1 Set													-
n	Under / Over Frequency Relay - 1 Set													-
														-
	DG Exhaust Pipe as per CPCB and local authority norms													-
	Selector switch for engine control OFF/ON													-
														-
	SCADA / BMS CONNECTIVITY All the breakers should be provided with communication facilities & contractor should provide single point to communicate with BMS/SCADA for all system parameter of the panel. DC source & other accessories including software and hardware as required.													-
														-
	TOTAL CARRIED TO SUMMARY DIESEL GERERATOR ZE.10													**38,01,570.00**
														-
ZE.11	**BMS/SCADA for all system parameter of the panel**													-
11.1	The Specifications shall be read in conjuction with Manual of specifications and standards and Technical Specifacations.										1	1	53,10,000.00	53,10,000.00
														-
	Supply, Installation, testing, commissioning, trainging and AMC of Biluding Management System PLC, Remote Processor, Siganl Interface wiring and cabling with field equipment interface and provision of supervisory control and monitoring for M&E SCADA contractor using standard protocol over Ethernet(Station LAN-Provided by Others(S&T Contractor)) as per specification and Tender clauses.													-
														-
11.2	SOFTWARE - RPU Programming and Configuration Software(Rate included in item 11.1)(Complies to SIL-2)													-
	Programme software for RPU logic develolpment and debugging for use with													-
	compatible Personal Computer with Licence to carry required engineering													-
	and maintenance function with below marked minimum functions:													-
	RPU Programming and Configuartion Functionality													-
	RPU dignosis and data monitoring function locally.													-
	RPU histroic data download function for record and fault segregation process.													-
	RPU software interlock and logic development for process or data management													-
	Communication and Integration mangement and configuration of I/Os fucntion													-
														-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
a	The RPU shall be capable of fully stand-alone operation and shall be independent of any central computer for all specified control or communication applications. The software shall include all necessary routines and modules required to implement any control strategy and shall be user programmable. The programming language shall be English and shall use standard controls terminology.													-
														-
b	Input and Output point processing shall include:													-
	(i) Continuous update of input and output values, conditions and status. All connected points are to be updated at a maximum of 5 second intervals, under worst conditions.													-
	(ii) Analog to digital conversion of input values shall be carried out with at least 11 bit resolution with typically 40 dB series mode rejection @50 Hz. It shall be possible to calibrate the inputs by means of movable jumpers or links to suit the sensor type in use, to achieve a high accuracy reading.													-
	(iii) Input reading shall be automatically checked to determine that the reading is within the sensor"s range and within the range of the input circuit, i.e. 0-10V or 4-20mA. Should this not be the case then an alarm status shall be indicated.													-
	(iv) All sensor readings shall be in engineering or user-definable units. These units shall be calculated by the sensor scaling type assigned to each sensor.													-
	(v) Each sensor shall have, in addition to the checks specified above, operator adjustable High and Low alarm limits. If the sensor reading is outside these limits then an alarm shall be generated. It shall be possible to delay these alarms by a user-defined amount so that spurious alarms are not reported.													-
	(vi) All inputs shall be filtered to reject mains frequency interference. The mains frequency of 50 Hz shall be selectable in software.													-
														-
c	Each RPU is to be configured to run the control strategies called for in the sequence													-
	of operation sections of this specification. Each RPU shall have the required software													-
	modules available for arithmetic calculations, logical decisions and relational operators													-
	necessary for the implementation of these control sequences.													-
	(i) RPU data such as set points, sensor values, loop parameters etc., shall be available to													-
	the operator for display and modification at the main supervisor, the portable													-
	supervisor or the display panel.													-
	(ii) The reschedule time of control loops shall be adjustable, in 5 second intervals.													-
														-
d	Each RPU shall provide five independent time zones, each of which shall have three													-
	separate start and stop periods within each 24 hours.													-
	(i) Unique time program shall be provided for each day of the week, plus a unique													-
	holiday schedule. Each RPU time zone may be provided with unique time programs,													-
	or they may be grouped and assigned a common time program as configured by													-
	the operator.													-
	(ii) For each time program, the main supervisor shall have a calendar available which													-
	may be used to make simple modifications up to a year in advance. The calendar													-
	shall allow these modifications to be permanent or to execute only once and then													-
	return to the previous (permanent) schedule.													-
	(iii) Calendar days which are intended to operate as Holidays shall also be definable													-
	up to a year in advance.													-
														-
e	All control strategies shall be held in RAM, battery backed up for at least 2 years. All													-
	data shall be available for review and modification from the main or portable supervisors.													-
														-
11.4	Remote Processor Unit (RPU), It's Sub-components and Mounting Panel													-
														-
	Remote Processor Unit (RPU) Modules should have (Digital Input, Digital Output,													-
	Analog Input and Analog Output Modules integrated to CPU module along with													-
	other required interface or system module for integration of field signals;													-
	should capable of standalone monitoring and control function irrespective to													-
	server communication interface; should fully equiped with Power Supply module,													-
	device protection and intrface terminals and wiring and other devices as required to													-
	meet tender specification & functional requirment.													-
														-
	The contractor shall cross reference the RPU Panel and others to Housing Type as required.													-

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	A by-pass switch/s shall be provided to completely by-pass the RPU in the event of a total													-
	failure of the Processor and associates equipment to enable the normal operation of													-
	the equipment controlled by the RPU. Panels shall be fitted with a suitable pocket to contain													-
	circuit diagrams and other relevant Definitive Design Drawings. An "as installed" set shall be													-
	having. All wiring and equipment tagging as per most acceptable inernational standards and													-
	metro practice.													-
														-
	CPU with onboard RS485port for profibus/mpi/Modbus communication.													-
	Data and program backup without external battery. CPU shall have scan time of													-
	not less than 0.1ms per 1k bit instruction and 5ms per 1k floating point instructions.													-
	Micro-Memory Card													-
	Power Supply Module with AC/DC converter as required.													-
	AI Module of 8 Channel as per Signal list with necessary spare and redundant I/O consideration.													-
	DI Module of 16 / 32 /64 Channel as per Signal list with necessary spare and redundant I/O consideration.													-
	DO Module of 8 / 16 / 32 Channel as per Signal list with necessary spare and redundant I/O consideration.													-
	AO Module of 8 Channel as per Signal list with necessary spare I/O consideration. (Minimum 1 Modules per panel)													-
	Front Connector for Programming/console port (Serial RS232 / Ethernet) with portable computer communication BUS.													-
	BMS Workstation / Server system interface provison in PLC communication Port (Ethernet TCP/IP Rj45 connector)													-
	Field equipment serial RS485/Rs232 Port interface port (3 nos or as required to meet the functional and integration requirment													-
	Active Bus Module for IO Modules (As applicable for DI module up to field cable interface TBs)													-
	Active Bus Module for DO Modules (As applicable for DO module up to Relay control Board/ field cable interface TBs)													-
	Active Bus Module for AI/AO Modules (As applicable for AI/AO module up to field cable interface TBs)													-
	Mounting Rail and other cable containment for RPU panel different component mounting and Cable wiring.													-
	RPU Required frameware, protocol and data point licence as required to meet the interface and programming requirement in ref to tender specification with provision of spare (i.e. spare of 50% of Total IO Point as future expansion requirement without any upgradation)													-
	Bus cable for different module integration. Or as required for intermodule communication.													-
	Interface Module and/ or integrator module with or without gateway for ethernet interface provision of M&E SCADA system.													-
	Ethernet Module TCP/IP 10/100 MBPS													-
	MODBUS/PROFIBUS/BACNET card as required													-
	Terminal block 8 slots (as required for field cable interface and termnination)													-
	16 channels Relay Board PCB Mounted type, plug in relays. (As per DO module)													-
	Allowance for 30% Spare I/O Points Modules and expansion by 50% shall be possible by adding more I/O modules and software reconfiguration													-
	Assorted connectors, pre-formed connecting cables, special terminal blocks, bus cables, taps, tap links, networking accessories consisting of patch Panels, Cat 5 patch cords etc.													-
														-
	Note:													-
	All devices as required to meet tender specification & Operational requirment shall be provided for fully functioning of BMS system.													-
														-
	The RIO shall be designed in accordance with the IO signals given as per the IO													-
	Summary Provided for stations.													-
														-
	All RPU Controller input modules served equipment from outside are													-
	protected against voltage transients. All input/output modules are													-
	galvanically separated from CPU & internal bus. It is protected against													-
	short circuit and it is connected via separate terminal strip. PLCs shall													-
	be designed by taking 20% of spares in I/O's signals with Mounting													-
	cabinet.													-
														-
11.5	Marshalling Cabinets													-
														-
	Terminal blocks shall be designed and tested in complying with IEC 60947-7-1.	Lumpsum												-
	Terminal block shall have ability to receive unprepared conductors.													-
														-
	Terminal block shall be single terminal type. Each terminal shall be exchangeable													-
	without dismounting adjacent terminals and also suitable for designative labeling.													-
														-

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	Terminal blocks shall be of the rail-mounted type and shall be of screwless type													-
	terminals 600V a.c. moulded block type with molded insulating barrier between terminals.													-
	Terminal connections shall be such that the conductors shall be connected with the													-
	necessary maintained contact pressure. Terminals shall be so constructed that the													-
	conductors can be clamped between suitable surface without any significant damage													-
	either to conductors or terminals.													-
														-
	Terminal blocks shall have test probe facilities for connections of test leads and an													-
	integral disconnecting device to facilitate testing.													-
														-
	The rated cross-section of a terminal block shall be 0.5-2.5 mm2 of round copper													-
	conductor. No terminal can carry more two conductors simultaneously connectable on													-
	each incoming/outgoing side.													-
														-
	The spare terminating block in all MS shall be provided with capacity at least 20% of the													-
	number of I/O points.													-
														-
	The Marshalling Cabinet shall be of 1.6 mm thick galvanized sheet steel with gray													-
	colour epoxy and electrostatic powered coated. The protection class shall be IP 31.													-
														-
11.6	ETHERNET SWITCHES													-
														-
	Providing, Installing, Testing & Commissioning of industrial Ethernet Switches having the													-
	following specifications to meet the functional and system reqrment in a redundant													-
	system architechure													-
	1. Ethernet 10/100MBPS Switch													-
	2. Network Protocol - IEEE 802													-
	3. Data Protocol - Modbus over TCP/IP													-
	4. Full or half duplex operation with flow control supported on all the ports													-
	5. Reverse polarity protection													-
	6. Industrial surge and Spike protection													-
	7. IP 30 protection													-
	8. Operating temperature 0 to 60 deg C													-
	9. Storage temperature -40 to +85 deg C													-
	10. Relative Humidity 10 to 95 % non condensing													-
	11. UL listed equipment													-
	12. 24AWG Cat 6 RJ 45 port and 6 fiber optic port													-
														-
11.7	Integrators/ Modems/ Gateways/Protocol Converters													-
														-
	Supply, installation, testing and commissioning of Integrators/ Modems/ Gateways/													-
	Protocol Converters for Integration of standalone Systems with BMS (All software,													-
	hardware required for integration with the specific standalone system with BMS shall be													-
	supplied by respective contractor). The following Equipments with necessary													-
	Data Points as mentioned below shall be considered for integration with individual PLC.													-
														-
	Uninterrupted Power Supply													-
	Digital Power Meter .													-
	DG Set													-
	Lifts													-
	Escalators													-
	Water Meter													-
	Fire Alarm Panel													-
	HV Panels													-
	Fire Fighting systems and Panel flooding system													-
	All the Panel boards incoming and out going breakaers													-
	PHE systems													-
	Systems not listed above but that requires BMS/SCADA to be considered.													-
														-
11.8	Field Devices													-
														-
	Pressure transmitters													-
	Pressure transmitters shall have a linear output of 0-10V. Pressure transmitters shall be a													-
	span of not greater than twice the s tatic pressure at maximum flow or differential													-
	pressure at shutoff as applicable.													-
														-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	Water-Flow Meter													-
	Water-flow measuring devices consisting of annular averaging pilot tube flow elements													-
	having the following minimum Specifications. Select the Annular for the operating flow													-
	range, pipe size and fluid temperature.													-
	(i) Accuracy - 2%													-
	(ii) Repeatability - 1.2%													-
	(iii) Pressure Drop - 1.5 kPa maximum													-
	(iv) Operating Temperature Range - 4°C to 95°C [140°F to 203°F]													-
	(v) Operating Pressure Rating - 174 kPa [250 psig]													-
														-
	Level Switch													-
														-
	Wind Transmitter													-
														-
	Wind Speed & Direction Sensors													-
														-
	Temperature Sensors													-
														-
	Temprature and Humidity Sensors													-
														-
11.9	Control Cable													-
														-
	Supply and laying Control Cables with following specification including 25mm dia rigid													-
	GI conduits as applicable for running cable from Cable try / Raceways to equipment panel or													-
	required to be laid at open.													-
														-
	All control cable shall be suitable for installation in wet and dry locations. The conductor													-
	shall be of soft or annealed strand uncoated copper wire.													-
	The insulation shall be FRLS, PVC, insulated cables suitable for use on a copper													-
	conductor with a maximum operating temperature not less than 70°C.													-
	Fillers shall be used in the interstice of the multi-conductor cable where necessary to give													-
	the complete cable a substantially circular cross section. Fillers shall be Polyvinyl													-
	chloride (PVC) rod or Polyethylene (PE) materials.													-
	The cable shall be helically wrapped over the filler and copper shielding with													-
	non-hygroscopic Mylar or Polyester tape.													-
	The shielding, for control cables, shall be annealed copper tape or suitable width and													-
	shall be helically applied with a minimum 10% lap. The annealed copper tape shall be a													-
	least 0.1mm thickness and substantially free from burrs.													-
														-
	For Analogue Signals and Data Communication													-
	2 Twisted Pair 0.5 Sq mm copper Cable with Aluminium Schelding.													-
														-
	For Digital Signals													-
	12 Core X 1.0 Sq. mm Copper, screened cable													-
														-
	05 Core X 1.0 Sq. mm Copper, screened cable													-
														-
11.10	CAT5e CABLE - Data Cable													-
	Supply, Installation, testing and commissioning of CAT 5e cable with													-
	25mm GI conduit & complying to Class 1E type Communication with													-
	MODBUS, BACnet, Lontalk, ARCNET on RS 232/485 port to match the control system													-
	requirement, thick 20mm dia Conduit shall be supported at regular intervals not													-
	exceeding 2.5 m. on horizontal runs and 1.5 m. on vertical runs. as required at site.													-
	etc. (For RPU panel internal Data commuication, Station LAN interface, etc..)													-
														-
	OPTICAL FIBRE CABLE - Communication Cable													-
														-
	Supply, Installation, testing and commissioning of 6 core single mode													-
	OFC with all accessories necessary such as listed below:													-
														-
	i) 12Port fiber Patch cord Loaded with adapter Plates & Splice tray													-
														-
	ii) 24Port fiber Patch cord Loaded with adapter Plates & Splice tray													-
														-
	iii) SC-LC, Duplex OFC patch cord, 3mtrs, OM3													-
														-
	iv) SC-Style Pigtail, 50/125, Multimode, OM3, 1.5 meter													-
														-
	v) Line interface unit for Fo cable termination, supply, installation and connection													-
	as required to meet functional requirment.													-
														-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	Note: The items indicated above are probable and main items.													-
	vendor to include all allied and implied items and required quantity													-
	for station building management system as indicated in various areas of													-
	BOQ.													-
														-
	Qunatity shall be as per detail design requirement or as to meet system operational and functional requirement as required by the													-
														-
														-
	Make: Honeywell / Equivalent													-
														-
	SUB TOTAL BMS/SCADA for all system parameter of the panel - ZE.11													**53,10,000.00**
														-
ZE.12	**Safety and Other accessories**													-
														-
12.1	Supply and fixing of the following safety equipments in Aux. Sub.Station/MDB room as per detailed descriptions given below and as per relevant IE rules & code of standard practice.	Lumpsum									1	1	59,000.00	59,000.00
a)	**1000 mm** wide rubber matting complying with I.S. 15652 and suitable to withstand 11 kV in front of all panels in ASS building & MDB room as required.													
b)	**Laminated** standard shock treatment charts in English & Hindi in ASS, ESR, DG room and Pump room in each station.													
c)	**Danger** plate as per approved Style & sample written in English & Hindi for MV installations as required as per IE rules, IES and IS 2551 (latest) - 8 nos. per station													
d)	**2 nos.** per station First Aid Box Complete as approved by St. John ambulance or Indian Red Cross													
e)	**4 nos. per** station of 3-fire-buckets set each painted red with 'fire' written complete with sand filling, floor/wall mounting brackets/stand complete as per elevant IS and as required.													
	One Tool kit per station comprising 1 set of flat spanner (Taparia / Jalan), 1 set of box spanner, 1 no. Hacksaw frame with 10 No. blades, 1 no. large, medium, small screw drivers, 1 no. insulated plier, 1 no nose plier, 1 no. hand crimping tool upto 16 sq.mm, 1 no. digital multimeter, 1 no. test lamp and 1 no. tester. Screw driver set for all types of screw heads also to be provided.													
	TOTAL CARRIED TO SUMMARY ZE.12													**59,000.00**
														-
ZE.13	**Mandatary Operational Spares for the Panels And safety items**										1	1	3,54,000.00	3,54,000.00
	R,Y,B Phase Indication lamp Led Type													-
	Red / Green On, Off Indication lamp Led Type ,On,Off,trip Indication lamp Led Type													-
	Amber trip Indication lamp Led Type													-
	3Phase Digital Amp/Volt. Meter 96mm*96mm with inbuilt Selector Switch													-
	Electronic Multifunction Meter 3Phase Class1.0 EM6400													-
	CTs 1000/5A Cl 1.0 15VA, cast resin for measurement													-
	CTs 1000/5A Cl 5P10 15VA, cast resin for protection													-
	CTs 100/5A Cl 1.0 5VA, tapewound													-
	230V AC or 24V DC shunt trip coil													-
	230V AC motor wound spring close mechanism													-
	Control MCB 6A SP 10kA MCB, 'C' Curve													-
	CTTB+Neutral Link	Lumpsum												-
	Power terminals ,Control Terminal Block,Neutral Link,Spreader Terminals													-
	Shunt release,UV release													-
	RS-485 port for display of ON/OFF status of ACB on BMS workstation through MODBUS protocol													-
	Exhaust Fan 8" with Filter and Switch													-
	Rotary Operating Handle													-
	Control MCB 6A SP 10kA MCB, 'C' Curve,													-
	Power Contactor 3Pole 9A 220V AC-3 Duty,Auxiliary Contact Block 2No+2NC													-
	On, Off Push Button,Auto Manual Selector Switch													-
	Single phase Preventor													-
	Over current Relay													-
	And not limited to the above and any other items necessay shall also be considered.													-
	TOTAL CARRIED TO SUMMARY ZE.13													**3,54,000.00**
														-
ZE.14	**FACADE LIGHTING**													-
														-
1	Supply, installation, testing & commissioning of light fittings including all accessories e.g. ballast, HPF condensors, lamps, holders, surface/recess mounting arrangement etc. including necessary supports, accessories and hardware as per specifications & as required at site and as below:													-
														-
1.1	Surface mounted RGB direct view aluminum profile 25mm (approx) with snap in notch , to be installed together with aluminium bracket profiles for cable conduit, screws hidden. With opal semi translucent sealed encapsulation. 18w per meter with direct view led profile. .IP67. Approved Makes - Bharat Alurays-Connect/Instapower/Tulip	Mtrs									550	550	28,619.00	157,40,450.00
														-
1.2	LPV-100/24V Qty to be confirm as per site requirement.	Nos									115	115	26,131.00	30,05,065.00
														-
1.3	Surface mounted linear grazer with adjustable mounting base 45mm with snap in notch , to be installed together with aluminium bracket profiles for cable conduit, screws hidden. With opal semi translucent sealed encapsulation. 18w per meter with direct view led profile. 48w/m .IP67. Approved Makes - Bharat Alurays-Connect/Instapower/Tulip	Mtrs									150	150	49,773.00	74,65,950.00
														-
1.4	LPV-100/24V Qty to be confirm as per site requirement.	Nos									35	35	26,131.00	9,14,585.00
														-

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
1.5	LED high-performance floodlight with very narrow beam light distribution.Floodlight made of aluminium alloy, aluminium and stainless steel. Clear safety glass. Silicone gasket. Reflector surface made of pure aluminium. with integral silicone lens and louvre. Swivel range -10°/+170°. Mounting bracket made of steel. 300w, 3000k, 10°,IP67. Approved Make - Bega 84540, Acuity, Simes, instapower	Nos									2	2	2,78,112.00	5,56,224.00
														-
1.6	Exterior projector for permanent outdoor installations to integrate textures, patterns and graphics for limitless creative exterior lighting designs. Flat field, high contrast image projection based on high power LED engine. 0-100% electronic dimming. Full CMY color mixing + additional color wheel with 7 interchangeable colors. 7 gobo slots for projecting graphic images (gobos included). Animation system for creating animated lighting effects (horizontal and vertical). Zoom range from 10° - 43° for exact projection on desired surfaceVariable frost for creating morphing effects and hybrid function as wash light. rotating prisms for creating abstract multi patterns. Intuitive setup, configuration and stand-alone programming via graphical OLED display. RDM and DMX control. Housing: Cast aluminum Finish: Hard anodized, white or metallic grey lacquered Front glass: 5 mm (0.2 in.) anti-reflection coated tempered glass Ingress protection: IP66. Approved Makes - Martin exterior projection 1000, Selecon/ Showline	Nos									1	1	9,33,240.00	9,33,240.00
														-
1.7	Surface floodlight with mounting box. Flat beam light distribution. LED 65 W, 8200 lm, half beam angle 28/92°, colour temperature 3000 K. Colour rendering index (Ra) > 90. With replaceable LED module with overheating protection and an expected service life of at least 50,000 operating hours. 2 years warranty of availability of LED module and wear parts. With LED power supply unit, 220-240 V, 0/50-60 Hz. Protection class IP 65. Luminaire made of cast aluminium, aluminium and stainless steel, colour silver. Safety glass with optical texture. Reflector made of pure anodised aluminium. Two cable entries for through-wiring power connecting cable up to 10.5 mm in diameter, max. 5 G 1.5 qmm. Approved Makes - Bega 77584AK3, Simes, Acuity, instapower	Nos									30	30	80,881.00	24,26,430.00
														-
1.8	LED pole-top luminaire with symmetrical light distribution. Luminaire made of aluminium alloy, aluminium and stainless steel Synthetic diffuser, clear Silicone gasket. Reflector made of pure anodised aluminium. 35w 3000K. IP65. Approved Makes - Bega 77175, Acuity, Simes, instapower	Nos									10	10	1,05,767.00	10,57,670.00
														-
1.9	3 mtr GI Pole as per requirement	Nos									10	10	9,177.00	91,770.00
														-
	TOTAL CARRIED TO SUMMARY FACADE LIGHTING ZE.14													**321,91,384.00**
														-
														-
ZF.01	**FIRE HYDRANT SYSTEM**													-
														-
1	Supply installation and testing of fire pumps, electrically driven generally as specified and shown in equipment schedule complete with:													-
i)	all accessories													-
ii)	vibration mounts													-
iii)	test connection excluding starter panel													-
iv)	Civil foundation in R.C.C.1:2:4, 200mm high and 150mm projection allround base plate.													-
														-
1.1	**Sprinkler / Hydrant Main Fire Pumps**													-
	Providing and fixing horizontal single stage, single outlet pumping set with bronze impeller, C.I. body and connected by a flexible coupling to a totally enclosed fan cooled induction motor mounted on a common M.S. structural base plate with RCC base and with all pump accessories, including pressure switch, pressure guage (both with cut off ball valves) complete as per specifications. Motor to be suitable for 415V, 3-phase, 50 Hz AC supply (specifications as per fire fighting requirements and on the pattern of local authority approval) as per instruction and specifications.													-
a	Capacity : 2850 lpm,	Nos									3	3	6,39,999.00	19,19,997.00
b	Capacity : 900 lpm, Head : 40m, HP : 15 HP (For Water Curtain)	Nos									1	1	1,75,000.00	1,75,000.00
														-
1.2	**Fire Jockey Pumps**													-
	Supplying, installing, testing, & commissioning of electric driven automatic pressurisation pump set consisting of the following.													-
	a) Vertical mounted multi stage centrifugal Jockey pump.													-
	b) Squirrel cage induction motor suitable for 415 V, 50Hz, AC supply of the above pump with synchronous speed of 2900 RPM T.E.F.C type such as confirming to IP:55 and flexible coupling and coupling guard with the pump.													-
	c) Common bed plate of fabricated mild steel channel or cast iron type.													-
	d) Suitable cement concrete pump foundation of 1:2:4 ratio (1 cement : 2 fine aggregate : 4 coarse aggregate) with MS bolts, washers as required.													-
	Capacity : 180 lpm,	Nos									2	2	1,82,247.46	3,64,494.92
														-
2	Supply and installation of pressure gauge panel (manifold) as per the requirement & Comprising:	Set									6	6	18,710.08	1,12,260.48
	i) Pressure gauges													-
	ii) Pressure switches with snubber ball valve and 2 x 1.5 sq mm copper conductor wiring to motor starter panel													-
	iii) Water piping from system upto the gauge panel along with valves etc.													-
	iv) Sheet metal enclosure with glass paneling etc. as approved													-
														-
3	**Internal hydrants/landing valves**													-
3.1	Internal hydrants/landing valves generally as specified and all complete with:	Nos									15	15	51,812.00	7,77,180.00
	i) 63mm dia Single headed landing valve IS marked (Stainless steel)													-

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	ii) First aid hose reel with 25 mm dia, 45 m long thermoplastic hose as per IS 12585 rubber hose, ball valve, piping and 7-8mm nozzle as required													-
	iii) 38mm synthetic hoses with 63mm instantaneous SS coupling, IS marked- 15 m x 2 lengths with suitable arrangement of connecting the hose pipe with coupling as required.													-
	iv) branch pipe and nozzle IS marked (Stainless steel)													-
														-
														-
4	Supply, installation, testing and commissioning of external (yard) hydrants inclusive of :	Nos									9	9	62,540.00	5,62,860.00
	i) MS Box cabinet of size 750 x 600 x 250 mm of 2mm thickness with 2 nos x 15M Length of 38mm dia synthetic hose with 1 no branch SS nozzle.													-
	ii) 63 mm dia single headed landing valve IS marked.													-
														-
5	Providing and fixing Orifice Plate made out of 8 mm thick stainless plate for pipe to reduce pressure upto 3.5 Kg/sqcm complete in all respect.													-
a)	80 mm dia	Nos									20	20	1,421.00	28,420.00
b)	150 mm dia	Nos									2	2	1,751.00	3,502.00
														-
6	Providing and fixing in position the industrial type Pressure Gauges with gun metal / brass valves complete as required.	Each									44	44	1,038.00	45,672.00
7	**FIRE DOOR**													-
7.1	Providing and fixing 4mm thick glass door of size 2.1m x 9.0m along with anodised aluminium frame with centre opening for fire hose cabinet. Suitably marked on the outside with the letters "FIRE HOSE" including locking arrangement.	Nos									0	0	11,597.00	-
														-
7.2	Hose cabinet as approved or as per site conditions with universal locking arrangement. Glazed with 5.5mm clear glass Powder coated Aluminium shutter door as appropriate with universal locking arrangement with aluminium grill of following sizes and types :													-
a	Size 1200 x 1500 in 2 mm thick stainless steel sheet	Set									0	0	27.642.00	-
b	Size 1500 x 1850 in 2 mm thick stainless steel sheet	Set									35	35	31,136.00	10,89,760.00
c	Size 2100 x 900 in 2 mm thick stainless steel sheet	Set									0	0	29.073.00	-
														-
7.3	Hose cabinet door as approved or as per site conditions with universal locking arrangement. Toughen Glass of following sizes and types :													-
a	Size 1200 x 1500 in 2 mm thick stainless steel sheet	Set									0	0	29.880.00	-
b	Size 1500 x 1850 in 2 mm thick stainless steel sheet	Set									0	0	34.120.00	-
c	Size 2100 x 900 in 2 mm thick stainless steel sheet	Set									0	0	32.057.00	-
														-
9	**PIPING FOR FIRE FIGHTING SYSTEM**													-
														-
9.1	Supply, fabricating, laying, testing, painting and commissioning external piping (UNDERGROUND / ALONG WALL) generally as specified using heavy class G.I. pipe conforming to IS : 1239 & BS : 1387 with all fittings and complete with one protection layer of 4mm thick wrapping and coating for underground piping.													-
	i) All pipes and all heavy grade fittings conforming to IS 1239 together with suitable joints, flanges, gaskets, bolts & nuts, washers, fittings, adapter pieces etc.													-
a	150mm nominal bore	Mtrs									330	330	2,447.32	8,07,615.60
b	100mm nominal bore	Mtrs									60	60	1,643.74	98,624.40
c	80mm nominal bore	Mtrs									20	20	1,190.62	23,812.40
														-
9.2	Excavation upto hard murramas per general profiles and back filling	Cu.m									10	10	531.00	5,310.00
														-
9.3	Making 1:2:4 cement concrete supports and thrust block generally as required and approved.	Cu.m									3	3	3,873.94	11,621.82
														-
10	**Butterfly Valve**													-
	Supplying, fixing, testing and commissioning of Butterfly Valve with C.I. body, SS Disc, Nitrile Rubber Seal & O-Ring PN16 pressure rating as specified.													-
a	300mm nominal bore (Gear Operated)	Nos									1	1	27,500.00	27,500.00
b	250mm nominal bore (Gear Operated)	Nos									3	3	21,513.00	64,539.00
c	200mm nominal bore	Nos									3	3	15,489.00	46,467.00
d	150mm nominal bore	Nos									28	28	15,133.50	4,23,738.00
e	100mm nominal bore	Nos									8	8	9,317.28	74,538.24
f	80mm nominal bore	Nos									48	48	7,583.86	3,64,025.28
g	65mm nominal bore	Nos									0	0	4.738.00	-
h	50mm nominal bore	Nos									3	3	3,226.00	9,678.00
														-
10	**Non Return Valve**													-
	Supplying, fixing, testing and commissioning of Non-Return Valve with dual plate of C.I. body, SS Plates vulcanized NBR seal flanged end & PN16 pressure rating including insulation as specified.													-
a	250mm nominal bore	Nos									1	1	26,200.00	26,200.00
b	200mm nominal bore	Nos									0	0	25.500.00	-
c	150mm nominal bore	Nos									6	6	29,761.96	1,78,571.76
d	100mm nominal bore	Nos									1	1	6.008.00	6,008.00
e	80mm nominal bore	Nos									2	2	9,705.50	19,411.00
f	65mm nominal bore	Nos									0	0	2.700.00	-
g	50mm nominal bore	Nos									2	2	2,400.00	4,800.00
														-
11	**Y-strainer**													-

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	Providing, fixing, testing & commissioning of cast Iron double flanged type `Y' strainer with SS 304 perforated metal removable basket including all fittings complete as required and suitable for system pressure.													-
a	250mm nominal bore	Nos									0	0	38,200.00	-
b	200mm nominal bore	Nos									3	3	37,787.00	1,13,361.00
c	150/100 mm nominal bore	Nos									4	4	22,615.00	90,460.00
d	80mm nominal bore	Nos									2	2	4,500.00	9,000.00
														-
12	**Foot Valve**													-
	Supply and installation of Foot Valves with mating flanges generally as specified all complete.													-
a	200mm nominal bore	Nos									0	0	35,394.10	-
b	100mm nominal bore	Nos									2	2	9,027.00	18,054.00
														-
13	**Rubber Bellow**													-
	Supply, fixing, testing & commissioning of resilient rubber lined single arch vibration eliminators suitable for raw water up to 45 oC temperature, working pressure 15 Kg/cm2 and test pressure 20 Kg/cm2 for :-													-
a	200mm nominal bore	Nos									3	3	9,117.00	27,351.00
b	150mm nominal bore	Nos									4	4	6,768.00	27,072.00
c	100mm nominal bore	Nos									1	1	5,333.00	5,333.00
d	80mm nominal bore	Nos									4	4	4,474.00	17,896.00
e	65mm nominal bore	Nos									0	0	4,300.00	-
f	50mm nominal bore	Nos									0	0	3,800.00	-
														-
14	**Internal Piping**													-
														-
14.1	Supply, fabrication, laying, testing and commissioning of heavy grade IS marked G.I. piping conforming to IS: 1239 & BS : 1387 complete with fittings, pipe supports, clamps, painting of two coats of red enamel etc.including support arrangements.													-
a	300mm nominal bore (6 mm wall thickness)	Mtrs									15	15	4,000.00	60,000.00
b	250mm nominal bore (6 mm wall thickness)	Mtrs									24	24	3,200.00	76,800.00
c	200mm nominal bore (6 mm wall thickness)	Mtrs									6	6	3,390.14	20,340.84
d	150mm nominal bore	Mtrs									1070	1070	2,330.50	24,93,635.00
e	100mm nominal bore	Mtrs									210	210	1,565.86	3,28,830.60
f	80mm nominal bore	Mtrs									700	700	1,135.16	7,94,612.00
g	65mm nominal bore	Mtrs									600	600	869.66	5,21,796.00
h	50mm nominal bore	Mtrs									410	410	754.02	3,09,148.20
i	40mm nominal bore	Mtrs									800	800	532.18	4,25,744.00
j	32mm nominal bore	Mtrs									625	625	484.98	3,03,112.50
k	25mm nominal bore	Mtrs									4300	4300	362.26	15,57,718.00
														-
15	**Air Vessel**													-
	Supply, fabrication (as per code), installation, testing and commissioning of Air vessels 300mm diameter and 1000mm high with ball valve inlet/outlet valve drain, air release valve, valve air inlet etc. all complete with including inside painting with epoxy and outside with enamel.	Nos									2	2	73,204.84	1,46,409.68
														-
16	**Pressure Vessel**													-
	Supply, fabrication (as per code), installation, testing and commissioning of Pressure vessels 450mm diameter and 1000mm high fabricated with 8-10mm M.S. plate with ball valve inlet/outlet valve drain, air release valve, valve air inlet etc. all complete with including inside painting with epoxy and outside with enamel.	Nos									2	2	81,501.42	1,63,002.84
														-
17	**Fire Brigade Connection (2-way)**													-
	Supply, installation, testing and commissioning fire brigade connection with 2 way 63mm valves inlets, stand post and 150mm MS pipe for mounting the stand post etc. as specified all complete as approved. The fire brigade connection shall be provided in a suitable MS box having mesh doors with universal locking arrangement. Note: The drawings of the proposed arrangement shall be provided by the contractor for approval of engineer incharge.	Nos									1	1	28,342.42	28,342.42
														-
18	**Fire Brigade Connection (4-way)**													-
	Supply, installation, testing and commissioning Siamese connection with 4 way 63mm outlets with non-return valves and sluice valve etc. complete as required and approved including MS cabinets with universal locking arrangement, MS welded mesh inside at road level cabinets. Note: The drawings of the proposed arrangement shall be provided by the contractor for approval of engineer incharge.	Nos									2	2	66,205.08	1,32,410.16
														-
19	100 mm dia stainless steel Draw Out connection with foot valve for Fire Brigade.	Set									6	6	6,839.00	41,034.00
														-
20	**Air Release Valve**													-
	Supply, installation, testing and commissioning of 25mm dia Air Release valve with Ball valve to be fixed on top of risers.	Nos									8	8	7,375.00	59,000.00
														-
21	Providing & Fixing of Installation control valve with turbine type automatic Alarm Gong to be connected with control valve, drain & test valve as per manufacturer's specifications complete as required													-
	a) 150 mm dia	Set									2	2	40,151.00	80,302.00
														-
22	Providing, Fixing, Testing & Commissioning 15 mm dia Quartzite bulb type GEM. Sprinkler head suitable to operate at 68 deg.C (UL/FM/LOC listed/ approved).													-
a)	Standard Pendent / Upright type in brass / Chrome finish.	Nos									2145	2145	179.00	3,83,955.00
b)	Side wall Sprinkler 68^{0}C in brass / chorme finish	Nos									90	90	550.00	49,500.00
														-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
23	Supply, fixing, testing & commissioning of Braided FM & VDS approved Annular Corrugation Stainless Steel **flexible sprinkler pipe drop** pressure rated upto 200 psi. The drop shall consist of a BRAIDED type 304 stainless steel flexible tube, zinc plated steel Male threaded nipple for connection to branch-line piping, and a zinc plated steel reducer with a female thread for connection to the sprinkler head and with a numbering on the reducer to ease the process for vertical positioning of the sprinklers with Bracket arrangement as per the Ceiling Profile. The bracket assembly shall be one piece open gate bracket complete in all respect.													-
														-
a)	1000mm	Nos									100	100	895.00	89,500.00
b)	1200mm	Nos									15	15	1,800.00	27,000.00
c)	1500mm	Nos									100	100	2,200.00	2,20,000.00
														-
24	Supply, fixing, testing & commissioning of 25 mm dia **inspecting and testing assembly** with gun metal valve, sight glass, with 50 mm dia by pass valve and connection to the drain line as required to complete the system.	Set									12	12	8,000.00	96,000.00
														-
25	Supply, fixing, testing & commissioning of 25 mm dia **drain ball valve** (gun metal) at end of sprinkler branch line with connection to the nearest drain with all fittings, pipe and acessoreis complete in all respect.	Set									12	12	2,500.00	30,000.00
														-
26	Providing and fixing UL listed Flow Switch of 65/ 80 / 100 / 150 mm dia on Sprinkler Header complete with flexible full bore paddle, U clamp and NO / NC contact terminals										12	12	4,893.00	58,716.00
														-
27	Supply, fixing, testing & commissioning of UL / FM listed / approved 15 mm NB **water curtain nozzle** chrome plated complete including fixing in position on pipe complete in all respects with Teflon tape.	Nos									32	32	2,100.00	67,200.00
														-
28	Providing and Fixing of UL/FM Approved **Deluge Valve** with Grooved Ends low differential, latched clapper design, black enamel coated ductile iron body conforming to ASTM A-536, grade 65-45-12, aluminum bronze clapper, stainless steel spring and shaft, peroxide cured EPDM diaphragm, EPDM seal, brass seat, and Nitrile seat O-rings. & S.S Shaft complete with Electrical release trim, Hydraulic Release trim, Pressure Switch, Solenoid valve actuator and Control Panel, control wiring including necessary accessories, complete with tap off socket arrangement as required, with potential free contact with 2 Nos. NO/NC & ON/OFF arrangement and all other associated works of complete as required. Note: Cable for Integration of deluge valve / Drencher system with Fire Alarm System shall be included.													-
														-
a)	50 mm diameter	Nos									2	2	40,000.00	80,000.00
b)	80 mm diameter	Nos									0	0	60,000.00	-
														-
	PORTABLE FIRE EXTINGUISHERS (As per IS 15683)													-
														-
29	Supply and installation of portable fire extinguishers as described below:													-
29.1	9 liter capacity of water CO2 type, IS marked, with discharge tube including clamps etc.	Nos									35	35	5,943.66	2,08,028.10
29.2	4.5 kg capacity Carbon dioxide extinguisher conforming to IS with high pressure discharge tube, horn, control valve, IS marked including clamps etc.	Nos									35	35	10,092.54	3,53,238.90
29.3	Mechanical form type 9.0 liter capacity fire extinguisher (for DG room)	Nos									2	2	7,934.32	15,868.64
29.4	5 kg capacity of DCP (Dry chemical powder) fire extinguisher	Nos									4	4	5,943.66	23,774.64
29.5	Mechanical foam type 50.0 liter capacity fire extinguisher trolley mounted complete set (for Plant Room)	Nos									2	2	12,075.51	24,151.02
														-
	MISCELLANEOUS ITEMS													-
														-
30	Constructing brick masonry manhole in cement mortar 1:4 (1 cement : 4 coarse sand) with R.C.C. top slab with 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size), foundation concrete 1:4:8 mix (1 cement : 4 coarse sand : 8 graded stone aggregate 40 mm nominal size), inside plastering 12 mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) finished with floating coat of neat cement and making channels in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) finished with a floating coat of neat cement, including orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS:10910 on 12 mm dia steel bar conforming to IS 1786 having minimum cross section as 23 mm x 25 mm and overall minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs complete as per standard design :													-
a)	Inside size 120x80 cm and 120 cm deep including C.I. cover with frame (medium duty) 455x610 mm internal dimensions.													-
	With bricks conforming to IS : 4885	Each									3	3	12,500.00	37,500.00
														-
31	**PANEL FLOODING - CO2 GAS BASED FIRE TRACE TUBE SYSTEM**													-
														-
	Supply, fixing, testing and commissioning of Polymer Tube Detection based CO2 System for Electrical Panels including AMF and Communication Panels,The exact quantity of the Panels shall be finalized during detail design stage. (Firetrace Tube Panel Protection System), consisting of the following components:										1	1	14,16,000.00	14,16,000.00
(a1)	CO2 Cylinder, 8 kg capacity, complete with all necessary CO2 Gas, fittings, support and accessories, connected with Valve (with manual release facility).													-
(a2)	CO2 Cylinder, 4.5 kg capacity, complete with all necessary CO2 Gas, fittings, support and accessories, connected with Valve (with manual release facility).													-
(b)	Filling Adapter	Lumpsum												-
(c)	Outlet adapter													-
(d)	End of Line adapter													-
(e)	Pressure switch													-
(f)	Flexible Polymer Detection Tube with all necessary fittings & supports.													-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
(g)	Master Control Unit for controlling each system, complete with pressure switches, buzzers and electronic hooters, including all necessary accessories + electrical wiring to make each entire system functional.													-
(h)	Auto weight measuring Unit for Cylinders with automatic audio/visual alarm.													-
														-
	Total of ZF01													**183,02,804.44**
														-
ZF.02	**FIRE ALARM SYSTEM**													-
														-
	The Fire Alarm and Detection System specified herein, must conform to M & E Specifications, in addtion to the description given in respective items of BOQ, whether explicitly specified or not. In case of contradiction between M & E specification and description in BOQ, the most stringent of the condition will prevail.													-
	All the items / parts mentioned in relevant clauses of the M & E specifications and not specifically mentioned in BOQ shall be deemed to be included in the quoted rates, unless specifically excluded.													-
	All the items not specifically mentioned here but necessary to make the system complete and suitable for desired application as per M & E Specifications and Drawings will be deemed to be included in the quoted prices													-
1	Supply, installation, testing and commissioning of the Microprocessor based intelligent analogue addressable, modular, expandable networkable, 10 loop (each loop shall consist of minimum 125 detector & 125 devices and 10% spare loop capacity) fire alarm control panel. The panel shall have a built-in integrated voice command center with suitable rating amplifiers for minimum 25 speaker zones. The panel shall support programmable relay for controlling fans/AC equipment and monitoring of fire sprinkler etc controlled by powerful Boolean logic equation. The panel shall have minimum five independent hazard release circuit built-in the panel. The panel shall have 240 volts AC power supply, automatic battery charger, 24 volts, sealed lead acid maintenance free batteries sufficient for 24 hours normal working and then be capable of operating the system for 4 hours during emergency condition. The panel shall be UL/EN listed.	Nos									1	1	7,46,708.15	7,46,708.15
a	10 Loop Panel													-
b	Repeater Driver Board													-
c	Communication Board													-
d	Software & Graphics													-
e	PC with 21" TFT + **80** column Printer.													-
f	Nicl. Batteries & Battery Charger.													-
g	Amplifier card													-
h	Terminal strips for receiving and terminations all external cabling													-
i	Provision for interfacing with other systems such as SCADA / BMS with all required Hardware & Software.													-
	Note: Provision for additional loops for Future floors shall be included													-
														-
2	Supply, Installation, Testing and Commissioning of Repeater Annunciator Panel with Mimic panel as per Specifications and Drawings.	Nos									1	1	1,05,148.62	1,05,148.62
														-
3	Supply, Installation, Testing & Commissioning of following Signal Initiating (Intelligent Analogue Addressable) devices complete with Detector Base etc. etc. complete as specified, required and as approved .													-
														-
3.1	Intelligent Addressable Multi Sensor Smoke Detector.	Nos									865	865	2,856.78	24,71,114.70
														-
3.2	Addressable Fault Isolator Base	Nos									100	100	1,739.32	1,73,932.00
														-
3.3	Addressable Fault Isolator	Nos									100	100	3,363.00	3,36,300.00
														-
3.4	Supply installation testing and commissioning of dust and vermin proof addressable analogue Manual Call Boxes to initiate audio visual alarm including the cost of mounting accessories complete as per specifications and as required.	Nos									50	50	3,776.00	1,88,800.00
														-
3.5	Supply, installation, testing and commissioning of Wall/ Ceiling mounting strobes for visual indication including the cost of mounting accessories complete as per specifications and as required.	Nos									50	50	3,122.28	1,56,114.00
														-
3.6	Addressable Loop Sounder 6.8 W.	Nos									50	50	3,001.92	1,50,096.00
														-
3.7	Response Indicator constructed from 16 guage MS stove / ABS plastic enamelled sheet with front 16 guage steel cover plate / ABS plastic complete as required.	Nos									265	265	365.80	96,937.00
														-
3.8	Intelligent Addressable Duct Detector	Nos									30	30	7,670.00	2,30,100.00
														-
3.9	Supply, installation, testing and commissioning of Control Modules including the cost of mounting accessories complete as per specifications and as required.	Nos									60	60	3,363.00	2,01,780.00
														-
3.10	Supply, installation, testing and commissioning of Monitor Modules including the cost of mounting accessories complete as per specifications and as required.	Nos									45	45	3,363.00	1,51,335.00
														-
3.11	Intelligent Addressable water Flow Monitoring Modules	Nos									50	50	3,363.00	1,68,150.00
														-
3.12	High Temperature (min. 80 C degree trip) Heat detector	Nos									25	25	3,363.00	84,075.00
														-

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
3.13	Supply, installation, testing and commissioning of wall or ceiling mounted 240V AC illuminated double sided pictorial Exit signs provided with appropriate direction arrow painted in green on white with LED lamp including the cost of in-built rechargable batteries with charger suitable for 90 minute operation and including the cost of mounting accessories for surface/recessed or ceiling suspended complete as per specifications and as required.	Nos									0	0	1,223.00	-
														-
4	Supplying, Laying, Termination, Testing & Commisioning of Fire Survival Cables (confirming to BS: 7846 and Section E02, 35 of M & E specifications for perfomance requirements of Fire Survival Cables) armoured, 1 pair 2.5 sq.mm, screened / shielded, Copper conductor (one pair shielded and one pair unshielded) cable or Mineral Insulated cable complying the CWZ category.	Mtrs									2800	2800	83.78	2,34,584.00
														-
5	Supplying, Laying, Termination, Testing & Commisioning of Fire Survival Cables (confirming to BS: 7846 and Section E02, 35 of M & E specifications for perfomance requirements of Fire Survival Cables) armoured, 1 twisted pair 1.5 sq.mm, screened / shielded copper conductor cable or Mineral Insulated cable complying the CWZ category for looping of detection units etc.	Nos									4800	4800	76.70	3,68,160.00
														-
6	Mandatary Operational Spares for the Panels including with minimum as follows: a. 2 No. for each type of Detector and devices b. 5 No. MCP c. 1 No. controllers in FACP d. 2 No. Power supply e. 5 No. Response indicator f. 2 No. Hooter g. 2 No. Strobe h. All other spares as required	Nos									1	1	3,54,000.00	3,54,000.00
														-
7	Fire Rated Material for Cut-outs Closing													-
	Description of Work													-
	All the Shaft and services openings in fire rated walls & floors are to be properly fire stopped with 2 hrs fire rated Insulation & integrity with PROMASTOP® Mortar/Cement . The system would involve providing and fixing of PROMASTOP® Cement with required thickness. Penetrations through walls and floors to be sealed with POMASTOP® Mortar as tested to BS: 476 Part 20 & AS 1530 part 4 to maintain the required fire rating of 4 hrs of the building element. Installation shall be done in accordance with the tested specification. The system will have to be supported by a valid Test report of the complete system as per BS 476 part 20 issued by M/s.Promat International Asia Pacific Ltd.	Sqm									200	200	12,499.00	24,99,800.00
														-
	TOTAL CARRIED TO SUMMARY FIRE DETECTION ZF.02													**87,17,134.47**

	HVAC SYSTEM BOQ FOR KASTURCHAND PARK PD														
KA	**EQUIPMENT**														
1	Supplying, installing, testing and commissioning of **Smoke extraction Fire Rated Axial fans** as per specifications. Fan shall be with direct driven Tube axial fan. The fan shall be equipped with mounting bracket,inlet & outlet cone required at suction & discharge, fire rated flexible connection. Cost of spring isolators for the installation of the fans needs to be included.														
.															
1.1	The motor shall be Class H rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE2 efficiency at full load. Fan shall be selected for minimum efficiency of 65%.														
1.2	Fan and casing shall be suitable for normal & smoke exhaust application.Motor shall be mounted inside the fan casing & thermally rated for 300 Deg C for 2 hour as per [BS-7346 Part-2 : 1090]														
1.3	External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be checked by vendor and motor shall be compatible to operate on VFD. For EA-1-4 & 6-9, external static pressure shall be 35-40 mm (WC) minimum and total static pressure shall be checked by vendor														
1.4	Fan if used for any case other than in case of fire shall be selected for lower noise level and shall not exceed 70 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 65% and motor shall be compatible to operate on VFD.														
1.5	Fan are used in case of fire and can be selected for higher outlet velocity as sound is not criteria while selecting.														
1.6	The fan capacities shall be as follows:														
	Equipment Tag / **Space** / **Location** / **CFM** / **Motor kW**														
	EA 1-2 / Exhaust Air- Normal / Basement 2 / 10000 / 3.7	Nos							2			2	1.55,887.00	3,11,774.00
	EA 3-4 / Exhaust Air- Normal / Basement 2 / 10000 / 3.7	Nos							2			2	1.55,887.00	3,11,774.00
	EA 5 / Exhaust Air- HVAC Plant / Basement 2 / 8000 / 1.5	Nos							1			1	89,691.00	89,691.00
	EA 6-7 / Exhaust Air- Normal / Basement 1 / 10000 / 3.7	Nos							2			2	1.55,887.00	3,11,774.00
	EA 8-9 / Exhaust Air- Normal / Basement 1 / 10000 / 3.7	Nos							2			2	1,55,887.00	3,11,774.00
	EA 10 / Plumbing Plant Room / Basement 1 / 4500 / 1.10	Nos							1			1	78.575.00	78,575.00
	EA 11 / LT Panel Room / Basement 1 / 4200 / 1.10	Nos							1			1	88,113.00	88,113.00
															-
2	Supply, installation, testing & commissioning of **Axial Flow Fans** suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed fan cooled motor belt drive, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as follows														-
															-

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REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description					Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
2.1	Fan used for any purpose other than in case of fire shall be selected for lower noise level and shall not exceed 65 DB (A) at 3m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60- 65% and also these fan will operate through VFD. AXF 8-16 Fans are used in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting.																	-
																		-
2.2	The motor selected shall be IE 2 efficiency TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 2 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met..																	-
																		-
2.3	External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be checked by vendor. For AXF-1-4 , external static pressure shall be 35-40 mm (WC) minimum and total static pressure shall be checked by vendor																	-
																		-
2.4	The fan capacities shall be as follows:																	-
																		-
	Equipment Tag	**Space**	**Location**	**CFM**	**Motor kW**													-
																		-
	AXF 1-2	Fresh Air- Normal	Basement 2	10000	3.7	Nos							2			2	1,42,180.00	2,84,360.00
	AXF 3-4	Fresh Air- Normal	Basement 2	10000	3.7	Nos							2			2	1,42,180.00	2,84,360.00
	AXF 5	HVAC Plant Room	Basement 2	8000	1.50	Nos							1			1	1,07,156.00	1,07,156.00
	AXF 6	Plumbing Plant Room	Basement 1	4500	1.10	Nos							1			1	73,712.00	73,712.00
	AXF 7	LT Panel Room	Basement 1	4200	1.10	Nos							1			1	69,481.00	69,481.00
	AXF 8-11	Lift Well Pressurization	Terrace	16500	5.5	Nos							4			4	1,27,748.00	5,10,992.00
	AXF 12	Lift Lobby Pressurization	Terrace	26500	7.5	Nos							1			1	1,82,827.00	1,82,827.00
	AXF 13-16	Staircase Pressurization	Terrace	24000	7.5	Nos							4			4	1,82,827.00	7,31,308.00
																		-
3	Supplying, installing, testing and commissioning of **Ceiling Mounted Inline Fans** suitable for installing in any position in vertical or horizontal ducts. The casing shall be double skin, internally acoustically lined and constructed of galvanised steel. The fan shall be DIDW with forward curve impeller fitted with maintenance free external rotor motor. The motor shall be suitable for 220 ± 10% volt single phase 50 cycles AC supply. All units shall be complete with duct flexible connector, speed regulator (with wiring of 3 m included between fan & regulator) and volume control damper and static pressure or to suit the system, shall be as follows:																	-
																		-
3.1	The fan shall have low sound level exceeding not more than 40 db(A) at three metre distance. Actual static to be checked by the vendor during the shop drawings.																	-
																		-
	Fan Tag		**Location**	**CFM**	**SP (mmwg)**													-
																		-
	IF - 01-		Electrical Room	550	10-15	Nos							1			1	10,295.00	10,295.00
	IF - 02-		Toilet	200	10-15	Nos							1			1	5,935.00	5,935.00
	IF - 03-		Toilet	400	10-15	Nos							1			1	7,025.00	7,025.00
4	Supplying, installing, testing and commissioning of direct drive domestic propeller fans. Each fan shall be complete with permanent split capacitor or shaded pole motor, mounting plate, accessories like wire guard, bird screen and fixed louvers for weather protection as required. The fan shall be of following rating:																	-
																		-
	300 mm dia 900 RPM fan suitable for 220±6% volts 50 cycles, 1 phase AC supply.					Nos							3			3	8,590.00	25,770.00
																		-
5	Supply, installing, testing and commissioning of VFD suitable for HVAC application **with minimum IP 55** enclosures complying with the tender specifications and shall be complete in all respects and suitable for following motor rating and shall meet the following specifications :																	-
																		-
	a) The VFD shall have a dual 5% impedance DC link reactor (Harmonic filters) on the positive and negative rails of the DC bus to minimize power line harmonics and protect the VFD from power line transients. The chokes shall be non-saturating.																	-
	b) All the VFD's should have factory fitted IP55 enclosure protection																	-
	c) EMC filters, C1 Category, Drive should support at least 3 PID loops are required																	-
																		-
	Application					**Motor HP**												-
	Axial Fan (FA and EA)																	-
						5	Nos							18			18	65,412.00	11,77,416.00
						3	Nos										0	65,412.00	
																		-
																		-
6	Supply, installing, testing and commissioning of Adequate number of CO sensors,PLC with power / control cabling for car park ventilation fans (at B1, B2) and logic controller with necessary Control panel & control cabling will form a part of the same.																	-
	Please note that VFD, Fan is considered in separate item of the BOQ.																	-
6.1	*Second Basement (Zone-01 719 Sqm, Zone-02 -686 Sqm)*					Lot							1			1	6,12,686.00	6,12,686.00
6.2	*First Basement (Zone-01 688 Sqm, Zone-02 699 Sqm)*																	-
																		-
6.3	Providing & fixing of control cum transmission flexible copper wiring of 2 core x 1.5 sq mm in 20/25 mm dia MS conduit between CO senser & controllers .					Mtrs							1000			1000	265.00	2,65,000.00
																		-
	CO sensor shall be provided one no per 250 Sqm																	-
																		-
7	Supply, installation, testing and commissioning of Digital cooling thermostats to be installed for controllig air handling units & fan coil units as described elsewhere in BOQ.																	-
																		-
7.1	Snap acting thermostat for controlling Axial Fan					Nos							3			3	3,990.00	11,970.00
																		-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	TOTAL CARRIED TO SUMMARY OF KA													**58,63,768.00**
														-
KB	**AIR DISTRIBUTION**													-
														-
1	Supply, installation and testing of GI sheet metal ducts fabricated in factory as per SMACNA Standard and approved shop drawings. Duct shall be supported via Gripples supports as per the specifications :													-
														-
	Duct Size — **Recommended Gauge of GI sheet**													-
														-
	1 -900 mm — 26	Sqm							1400			1400	577.00	8,07,800.00
														-
	901 -120 mm — 24	Sqm							2060			2060	685.00	14,11,100.00
														-
	1201 -1800 mm — 22	Sqm							1110			1110	790.00	8,76,900.00
														-
	1801 - 2100 mm — 20	Sqm							20			20	890.00	17,800.00
														-
	2101 - above — 18	Sqm							100			100	1,100.00	1,10,000.00
														-
2	Supply, installation and testing of GI sheet metal ducts Site fabricated as per IS Standard and approved shop drawings. Duct shall be supported via Gripples supports as per the specifications :													-
														-
	Duct Size — **Recommended Gauge of GI sheet**													-
														-
	Upto 750mm — 24	Sqm							10			10	577.00	5,770.00
														-
	750mm- 1500 mm — 22	Sqm							10			10	682.00	6,820.00
														-
	1510 mm- 2250 mm — 20	Sqm							10			10	790.00	7,900.00
														-
	above 2250 mm — 18	Sqm							200			200	945.00	1,89,000.00
														-
3	Supply, installation and balancing of Extruded Aluminium construction Supply air Grilles with volume control dampers. The grilles will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications. The grilles may be double or single louvered, adjustable or fixed as required by Client	Sqm							20			20	8,400.00	1,68,000.00
														-
4	Supply, installation and balancing of Extruded Aluminium construction Return/Exhaust air Grilles without volume control dampers. The grilles will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications. The grilles may be double or single louvered, adjustable or fixed as required by Client	Sqm							22			22	6,300.00	1,38,600.00
														-
5	Supplying & fixing of opposed blade GI construction **volume control dampers** in Rectangular supply air duct as per approved drawings and specifications.	Sqm							15			15	5,775.00	86,625.00
														-
6	Supply, installation, testing and balancing of Powder coated/Anodised extruded aluminium construction inlet air **louvers with bird screen** for fresh air alongwith GI construction volume control damper.The louvers will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications.	Sqm							18			18	9,450.00	1,70,100.00
														-
7	Supply, installation, testing and balancing of Powder coated/Anodised extruded aluminium construction exhaust air **louvers with bird screen**.The louvers will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications.	Sqm							22			22	6,825.00	1,50,150.00
														-
8	Supply, installation, testing and balancing of Powder coated/Anodised extruded aluminium construction **Door Transfer Grille** for make up/exhaust air. The grilles will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications.	Sqm							2			2	8,400.00	16,800.00
														-
9	Supply, installation, testing and commissioning of **motorised combined smoke & fire damper(UL 555 Rated).** complete with control panel, inter connecting wiring at locations shown in approved shop drawings and as per specifications. The quoted price shall include control panel alongwith fire resistant inter connecting wiring and also termination of Fire alarm control wiring.													-
														-
9.1	Motorized Dampers.	Sqm							18			18	7,875.00	1,41,750.00
														-
9.2	Control Panel & Wiring (including actuators)	Nos							31			31	9,450.00	2,92,950.00
														-
	TOTAL CARRIED TO SUMMARY KB													**45,98,065.00**
														-
KC	**THERMAL INSULATION**													-
														-
1	Supply and fixing of duct acoustic lining with in supply and return air ducts as per specifications.													-
														-
1.1	15 mm thick nitrile rubber duct lining	Sqm							100			100	1,575.00	1,57,500.00
														-
	TOTAL CARRIED TO SUMMARY KC													**1,57,500.00**
														-
KD	**ELECTRICAL INSTALLATION**													-
														-
1	**CONTROL PANELS FOR FANS & FAN SECTION (IP 55)**													-
														-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels, including anchoring into the wall, wiring terminating into MCCB and copper earthing, in each panel shall be provided by the electrical contractor.													-
														-
	All outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System.													-
														-
	The panel shall include the following components & accessories.													-
														-
	a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA.													-
														-
	b. DOL/SD starter as HP rating													-
														-
	c. Terminal block for power distribution as required.													-
														-
	d. Contactor, over load relay with built in single phasing protection.													-
														-
	e. Phase indicating lights and indicating light for ON status.													-
														-
	f. Digital voltmeter and digital ammeter.													-
														-
	g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation.													-
														-
	h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare.													-
														-
	i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System.													-
														-
	j. 220 / 24 V Transformer													-
														-
	The number of control panels shall be as follows.													-
														-
1.1	Suitable rating MPCB with DOL starter for upto 5 HP motor	Nos										0		
														-
1.2	Suitable rating MCCB with DOL starter with VFD for upto 5 HP motor	Nos							18			18	22,000.00	3,96,000.00
														-
1.3	Suitable rating MPCB with S/D starter for 7.5 HP motor	Nos							4			4	27,500.00	1,10,000.00
														-
1.4	Suitable rating MPCB with S/D starter for 10 HP motor	Nos							5			5	39,896.00	1,99,480.00
	Note :- All Outdoor panel shall be IP 55													-
														-
	TOTAL CARRIED TO SUMMARY KD													**7,05,480.00**
	HVAC SYSTEM BOQ FOR GADDIGODAM PD													
GA	**EQUIPMENT**													-
1	Supplying, installing, testing and commissioning of **Smoke extraction Fire Rated Axial fans** as per specifications. Fan shall be with direct driven Tube axial fan. The fan shall be equipped with mounting bracket,inlet & outlet cone required at suction & discharge, fire rated flexible connection. Cost of spring isolators for the installation of the fans needs to be included.													-
.														-
1.1	The motor shall be Class H rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE2 efficiency at full load. Fan shall be selected for minimum efficiency of 65%.													-
														-
1.2	Fan and casing shall be suitable for normal & smoke exhaust application.Motor shall be mounted inside the fan casing & thermally rated for 250 Deg C for 2 hour as per [BS-7346 Part-2 : 1090]													-
														-
1.3	External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be checked by vendor and motor shall be compatible to operate on VFD. For EA-1-9, external static pressure shall be 35-40 mm (WC) minimum and total static pressure shall be checked by vendor													-
														-
1.4	Fan if used for any case other than in case of fire shall be selected for lower noise level and shall not exceed 70 DB (A) at 3m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 65% and motor shall be compatible to operate on VFD.													-
														-
1.5	Ffan are used in case of fire and can be selected for higher outlet velocity as sound is not criteria while selecting.													-
														-
1.6	The fan capacities shall be as follows:													-
														-
	Equipment Tag / **Space** / **Location** / **CFM** / **Motor kW**													-
														-
	EA 1-2 / Exhaust Air- Normal / Basement 2 / 8500 / 3.7	Nos								2		2	1,04,092.00	2,08,184.00
	EA 3-4 / Exhaust Air- Normal / Basement 2 / 7500 / 3.7	Nos								2		2	1,04,092.00	2,08,184.00
	EA 5-6 / Exhaust Air- Normal / Basement 1 / 7000 / 3.7	Nos								2		2	1,04,092.00	2,08,184.00
	EA 7-8 / Exhaust Air- Normal / Basement 1 / 6500 / 2.2	Nos								2		2	84,701.00	1,69,402.00
	EA 9 / Plumbing Plant Room / Basement 1 / 2000 / 0.55	Nos								1		1	59,278.00	59,278.00
														-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
2	Supply, installation, testing & commissioning of **Axial Flow Fans** suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed fan cooled motor belt drive, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as follows													-
														-
2.1	Fan used for any purpose other than in case of fire shall be selected for lower noise level and shall not exceed 65 DB (A) at 3m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60- 65% and also these fan will operate through VFD. AXF 6-10 Fans are used in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting.													-
														-
2.2	The motor selected shall be IE 2 efficiency TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 2 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met..													-
														-
2.3	External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be checked by vendor. For AXF-1-4, external static pressure shall be 35-540 mm (WC) minimum and total static pressure shall be checked by vendor													-
														-
2.4	The fan capacities shall be as follows:													-
														-
	Equipment Tag / **Space** / **Location** / **CFM** / **Motor kW**													-
														-
	AXF 1-2 — Fresh Air- Normal — Basement 2 — 8500 — 3.7	Nos								2		2	92,534.00	1,85,068.00
	AXF 3-4 — Fresh Air- Normal — Basement 1 — 6500 — 2.2	Nos								2		2	75,353.00	1,50,706.00
	AXF 5 — Plumbing Plant Room — Basement 1 — 2000 — 0.55	Nos								1		1	53,026.00	53,026.00
	AXF 6-9 — Lift Well Pressurization — Terrace — 16500 — 5.5	Nos								4		4	1,27,748.00	5,10,992.00
	AXF 10 — Lift Lobby Pressurization — Terrace — 22500 — 7.5	Nos								1		1	1,73,889.00	1,73,889.00
	AXF 11-12 — Staircase Pressurization — Terrace — 22500 — 7.5	Nos								2		2	1,73,889.00	3,47,778.00
														-
3	Supplying, installing, testing and commissioning of **Ceiling Mounted Inline Fans** suitable for installing in any position in vertical or horizontal ducts. The casing shall be double skin, internally acoustically lined and constructed of galvanised steel. The fan shall be DIDW with forward curve impeller fitted with maintenance free external rotor motor. The motor shall be suitable for 220 ± 10% volt single phase 50 cycles AC supply. All units shall be complete with duct flexible connector, speed regulator (with wiring of 3 m included between fan & regulator) and volume control damper and static pressure or to suit the system, shall be as follows:													-
														-
3.1	The fan shall have low sound level exceeding not more than 40 db(A) at three metre distance. Actual static to be checked by the vendor during the shop drawings.													-
														-
	Fan Tag / **Location** / **CFM** / **SP (mmwg)**													-
														-
	IF - 01-02 — Store (Basement 2) — 250 — 10-15	Nos								2		2	13,443.00	26,886.00
	IF - 03-04 — Store (Basement 1) — 250 — 10-15	Nos								2		2	13,443.00	26,886.00
	IF - 05 — Male Toilet (Ground Floor) — 500 — 10-15	Nos								1		1	17,803.00	17,803.00
	IF - 06 — Electrical Room (Ground — 200 — 10-15	Nos								1		1	9,205.00	9,205.00
	IF - 07 — Male Toilet (Mezzanine — 500 — 10-15	Nos								1		1	17,804.00	17,804.00
	IF - 08 — Electrical Room (Ground — 200 — 10-15	Nos								1		1	9,205.00	9,205.00
	IF - 09-10 — Store (Mezzanine) — 250 — 10-15	Nos								2		2	13,443.00	26,886.00
														-
4	Supplying, installing, testing and commissioning of direct drive domestic propeller fans. Each fan shall be complete with permanent split capacitor or shaded pole motor, mounting plate, accessories like wire guard, bird screen and fixed louvers for weather protection as required. The fan shall be of following rating:													-
														-
	300 mm dia 900 RPM fan suitable for 220±6% volts 50 cycles, 1 phase AC supply.	Nos								2		2	8,590.00	17,180.00
												0		-
5	Supply, installing, testing and commissioning of VFD suitable for HVAC application **with minimum IP 55** enclosures complying with the tender specifications and shall be complete in all respects and suitable for following motor rating and shall meet the following specifications :													-
														-
	a) The VFD shall have a dual 5% impedance DC link reactor (Harmonic filters) on the positive and negative rails of the DC bus to minimize power line harmonics and protect the VFD from power line transients. The chokes shall be non-saturating.													-
	b) All the VFD's should have factory fitted IP55 enclosure protection													-
	c) EMC filters, C1 Category, Drive should support at least 3 PID loops are required													-
														-
	Application / **Motor HP**													-
	Axial Fan (FA and EA)													-
	5	Nos								12		12	65,412.00	7,84,944.00
	3	Nos								2		2	65,412.00	1,30,824.00
														-
														-
6	Supply, installing, testing and commissioning of Adequate number of CO sensors,PLC with power / control cabling for car park ventilation fans (at B1, B2) and logic controller with necessary control cabling will form a part of the same.													-
	Please note that VFD, Fan is considered in separate item of the BOQ.													-
6.1	*Second Basement (Zone-01 701 Sqm, Zone-02 630 Sqm)*	Lot								1		1	3,85,279.00	3,85,279.00
6.2	*First Basement (Zone-01 612 Sqm, Zone-02 588 Sqm)*													-
	CO sensor shall be provided one no per 250 Sqm													-
														-
	Providing & fixing of control cum transmission flexible copper wiring of 2 core x 1.5 sq mm in 20/25 mm dia MS conduit between CO senser & controllers .	Mtrs								1000		1000	265.00	2,65,000.00

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
														-
7	Supply, installation, testing and commissioning of Digital cooling thermostats to be installed for controllig air handling units & fan coil units as described elsewhere in BOQ.													-
														-
7.1	Snap acting thermostat for controlling Axial Fan	Nos								2		2	3,990.00	7,980.00
														-
	TOTAL CARRIED TO SUMMARY OF GA													**40,00,573.00**
														-
														-
GB	**AIR DISTRIBUTION**													-
														-
1	Supply, installation and testing of GI sheet metal ducts fabricated in factory as per SMACNA Standard and approved shop drawings. Duct shall be supported via Gripples supports as per the specifications :													-
														-
	Duct Size **Recommended Gauge of GI sheet**													-
														-
	001 -900 mm 26	Sqm								970		970	577.00	5,59,690.00
														-
	901 -1200 mm 24	Sqm								350		350	685.00	2,39,750.00
														-
	1201 -1800 mm 22	Sqm								1040		1040	790.00	8,21,600.00
														-
	1801 - 2100 mm 20	Sqm								210		210	890.00	1,86,900.00
														-
	2101 - above 18	Sqm								50		50	1,100.00	55,000.00
														-
2	Supply, installation and testing of GI sheet metal ducts Site fabricated as per IS Standard and approved shop drawings. Duct shall be supported via Gripples supports as per the specifications :													-
														-
	Duct Size **Recommended Gauge of GI sheet**													-
														-
	Upto 750mm 24	Sqm								10		10	577.00	5,770.00
														-
	750mm- 1500 mm 22	Sqm								10		10	682.00	6,820.00
														-
	1510 mm- 2250 mm 20	Sqm								10		10	790.00	7,900.00
														-
	above 2250 mm 18	Sqm								200		200	945.00	1,89,000.00
														-
3	Supply, installation and balancing of Extruded Aluminium construction Supply air Grilles with volume control dampers. The grilles will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications. The grilles may be double or single louvered, adjustable or fixed as required by Client	Sqm								14		14	8,400.00	1,17,600.00
														-
4	Supply, installation and balancing of Extruded Aluminium construction Return/Exhaust air Grilles without volume control dampers. The grilles will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications. The grilles may be double or single louvered, adjustable or fixed as required by Client	Sqm								17		17	6,300.00	1,07,100.00
														-
5	Supplying & fixing of opposed blade GI construction **volume control dampers** in Rectangular supply air duct as per approved drawings and specifications.	Sqm								15		15	5,775.00	86,625.00
														-
6	Supply, installation, testing and balancing of Powder coated/Anodised extruded aluminium construction inlet air **louvers with bird screen** for fresh air alongwith GI construction volume control damper.The louvers will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications.	Sqm								8		8	9,450.00	75,600.00
														-
7	Supply, installation, testing and balancing of Powder coated/Anodised extruded aluminium construction exhaust air **louvers with bird screen**.The louvers will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications.	Sqm								10		10	6,825.00	68,250.00
														-
8	Supply, installation, testing and balancing of Powder coated/Anodised extruded aluminium construction **Door Transfer Grille** for make up/exhaust air. The grilles will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications.	Sqm								2		2	8,400.00	16,800.00
														-
9	Supply, installation, testing and commissioning of **motorised damper** complete with control panel, inter connecting wiring at locations shown in approved shop drawings and as per specifications. The quoted price shall include control panel alongwith fire resistant inter connecting wiring and also termination of Fire alarm control wiring.													-
														-
9.1	Motorized Dampers.	Sqm								13		13	7,875.00	1,02,375.00
														-
9.2	Control Panel & Wiring (including actuators)	Nos								20		20	9,450.00	1,89,000.00
														-
	TOTAL CARRIED TO SUMMARY OF GB													**28,35,780.00**
														-
GC	**THERMAL INSULATION**													-
														-
1	Supply and fixing of duct acoustic lining with in supply and return air ducts as per specifications.													-
														-
1.1	15 mm thick nitrile rubber duct lining	Sqm								150		150	1,575.00	2,36,250.00
														-
	TOTAL CARRIED TO SUMMARY OF GC													**2,36,250.00**
														-
GD	**ELECTRICAL INSTALLATION**													-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
														-
1	**CONTROL PANELS FOR FANS & FAN SECTION (IP 55)**													-
														-
	Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels, including anchoring into the wall, wiring terminating into MCCB and copper earthing, in each panel shall be provided by the electrical contractor.													-
														-
	All outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System.													-
														-
	The panel shall include the following components & accessories.													-
														-
	a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA.													-
														-
	b. DOL/SD starter as HP rating													-
														-
	c. Terminal block for power distribution as required.													-
														-
	d. Contactor, over load relay with built in single phasing protection.													-
														-
	e. Phase indicating lights and indicating light for ON status.													-
														-
	f. Digital voltmeter and digital ammeter.													-
														-
	g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation.													-
														-
	h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare.													-
														-
	i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System.													-
														-
	j. 220 / 24 V Transformer													-
														-
	The number of control panels shall be as follows.													-
														-
1.1	Suitable rating MPCB with DOL starter for upto 5 HP motor	Nos										0		
														-
1.2	Suitable rating MCCB with DOL starter with VFD for upto 5 HP motor	Nos								14		14	22,000.00	3,08,000.00
														-
1.3	Suitable rating MPCB with S/D starter for 7.5 HP motor	Nos								4		4	27,500.00	1,10,000.00
														-
1.4	Suitable rating MPCB with S/D starter for 10 HP motor	Nos								3		3	39,896.00	1,19,688.00
														-
														-
	Note :- All Outdoor panel shall be IP 55													-
														-
	TOTAL CARRIED TO SUMMARY OF GD													**5,37,688.00**
														-
	HVAC BOQ FOR ZERO MILE STATION													
ZA	**EQUIPMENT & PIPING**													-
														-
1.1	Supply, Installation, testing and commissioning of Air Cooled Variable Refrigerant Volume System suitable for R410A and 415 ± 10% , 50 Hz, AC supply. The unit shall consist of indoor units and external condensing units and other accessaries as listed below complete in all respects. The unit shall be fully charged with gas and oil.													-
														-
1.1.1	**Outdoor Unit**													-
	Supply, installation, testing and commissioning of Modular type outdoor condensing units equipped with highly efficient scrol/hermetic type DC twin rotary compressors with digital/ invertor technology, special acryl precoated heat exchanger, low noise condenser fan with motor, auto check function for errors in display panel, auto address setting, as per specifications and capacities as mentioned below.(The unit shall be fully charged with gas and oil.Price shall include pressure testing).													-
														-
	The units shall be complete with necessary mounting frames													-
														-
	Capacity shall be as under													-
														-
a	26 HP (22TR Nominal Capacity)	Nos										0	7,73,136.00	-
												0		-
b	24 HP (20TR Nominal Capacity)	Nos										0	7,10,690.40	-
												0		-
c	20 HP (16TR Nominal Capacity)	Nos										0	6,60,139.20	-
														-
d	18 HP (15TR Nominal Capacity)	Nos										0	6,48,244.80	-
														-
e	14 HP (11.6 TR Nominal Capacity)	Nos										0	4,52,176.25	-
														-
f	12 HP (10 TR Nominal Capacity)	Nos										0	4,10,221.40	-
														-
g	10 HP (8.3 TR Nominal Capacity)	Nos									3	3	3,36,418.75	10,09,256.25
														-
h	6 HP (5TR Nominal Capacity)	Nos									3	3	4,35,632.40	13,06,897.20

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
														-
1.1.2	**Indoor Units**													-
														-
	Supply, installation, tesing and commissioning of ceiling mounted duct type indoor units each complete with coil, pre-filter, etc. The units casing shall be of steel construction, wall mounted split type indoor units and 220 volt, 1 phase, 50 Hz, AC supply all as per specifications.													-
	The capacities shall be as follows:													-
														-
a	Ceiling mounted duct type 3500 CFM - 6.0 TR Nominal Capacity	Nos									0	0	2,53,053.36	-
														-
b	Ceiling mounted duct type 3200 CFM - 5.0 TR Nominal Capacity	Nos									6	6	82,368.72	4,94,212.32
														-
c	Ceiling mounted duct type 2800 CFM - 5.0 TR Nominal Capacity	Nos									0	0	82,368.72	-
														-
d	Ceiling mounted duct type 2500 CFM - 4.0 TR Nominal Capacity	Nos									0	0	75,975.48	-
														-
e	Ceiling mounted duct type 2400 CFM - 4.0 TR Nominal Capacity	Nos									0	0	75,975.48	-
														-
f	Ceiling mounted duct type 2300 CFM - 4.0 TR Nominal Capacity	Nos									0	0	75,975.48	-
														-
g	Ceiling mounted duct type 2000 CFM - 3.0 TR Nominal Capacity	Nos									0	0	81,625.32	-
														-
h	Ceiling mounted duct type 1600 CFM - 3.0 TR Nominal Capacity	Nos									0	0	81,625.32	-
														-
i	Wall mounted split type 2.0 TR Nominal Capacity	Nos									0	0	48,023.64	-
														-
j	Wall mounted split type 1.5 TR Nominal Capacity	Nos									3	3	45,198.72	1,35,596.16
														-
k	Wall mounted split type 1.0 TR Nominal Capacity	Nos									0	0	42,373.80	-
														-
l	Ceiling mounted duct type - 2.5 TR Nominal Capacity	Nos									0	0	49,120.00	-
														-
m	Ceiling mounted duct type - 2.0 TR Nominal Capacity	Nos									0	0	42,109.00	-
														-
n	Ceiling mounted duct type - 1.5 TR Nominal Capacity	Nos									0	0	38,363.00	-
														-
o	Ceiling mounted duct type - 1.0 TR Nominal Capacity	Nos									0	0	38,139.00	-
														-
1.1.3	Supply, installation, tesing and commissioning of Corded Remote controllers for operation of indoor units.	Nos									14	14	4,014.36	56,201.04
														-
1.1.4	Supply, installation, tesing and commissioning of Central Remote controller for complete system including all VRV indoor and outdoor units.	Nos									1	1	1,26,378.00	1,26,378.00
														-
1.1.5	Supply, installation, tesing and commissioning of Imported fittings Y-joints, T-joints, distributer and headers for all Indoor units at both the floors layout as per layout drawings.	Nos									12	12	12,191.76	1,46,301.12
														-
1.2	**Refrigerant Piping**													-
														-
	Supply,installation,testing and commissioning of Interconnecting refrigerant pipe work with elastomeric nitrile rubber/closed cell expanded polythene tubular insulation between each set of indoor & outdoor units as per specifications, all piping should be laid on Galvanised/Powder Coated tray supported by Galvanised M S Hangers & Clamps.													-
														-
a)	41.3 mm O.D. (insulation : 19 mm)	Mtrs									3	3	1,561.14	4,683.41
														-
b)	34.9 mm O.D. (insulation : 19 mm)	Mtrs									4	4	995.92	3,983.68
														-
c)	28.6 mm O.D. (insulation : 19 mm)	Mtrs									52	52	802.40	41,724.80
														-
d)	22.2 mm O.D. (insulation : 13 mm)	Mtrs									19	19	798.86	15,178.34
														-
e)	19.1 mm O.D. (insulation : 13 mm)	Mtrs									21	21	520.38	10,927.88
														-
f)	15.9 mm O.D. (insulation : 13 mm)	Mtrs									100	100	428.34	42,834.00
														-
g)	12.7 mm O.D. (insulation : 13 mm)	Mtrs									29	29	335.12	9,718.48
														-
h)	9.5 mm O.D. (insulation : 13 mm)	Mtrs									79	79	244.26	19,296.54
														-
i)	6.4 mm O.D. (insulation : 13 mm)	Mtrs									37	37	149.86	5,544.82
														-
1.3	**Control cum transmission wiring**													-
a	Supply,installation,testing and commisioning of contl cum transmission wiring of 2 core x 1.5 sqmm FRLSZH copper in suitable GI conduits between indoor and outdoor units.	Mtrs									202	202	356.36	71,984.72
b	Supply,installation,testing and commisioning of contl cum transmission wiring of 2 core x 1.0 sqmm copper in suitable GI conduits between indoor and outdoor units.	Mtrs									0	0	164.00	-
														-
1.4	**DX wall mounted Split Unit**													-
														-
1.4.1	Providing, fixing, testing and commissioning of Hi wall split unit air conditioing air cooled type with evaporator coil, fan and fan motor ,air cooled condenser with hermatically sealed recipcating compressor, condenser coil and complete with electrical Wiring as required (Voltage stablizers are not to be provided)													-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
	Note:Providing and fixing of M.S. angle iron frame work for outdoor unit including P.O. painting of the same is also included in the above scope. Contractor to submit design/Scheme for Iron frame and obtain approval of engineer-in-chage before proceeding further.													-
														-
a)	Nominal capacity 1.5 TR	Nos									0	0	66,906.00	-
														-
b)	Nominal capacity 2.0 TR	Nos										0	66,906.00	-
														-
c)	Nominal capacity 2.5 TR	Nos										0	66,906.00	-
														-
1.4.2	Providing, fixing and testing of copper refrigerant piping of apppriate sizes duly insulated with nitrile rubber insulation of 9 mm thickness for all types of split AC units. The pipes plus nitrile rubber insulation are to be covered with PVC flexible conduits for protection.	Mtrs									60	60	2,750.58	1,65,034.80
														-
1.5	**Condensate Drain Piping:**													-
														-
	Providing, fixing and testing GI drain piping for condensate from indoor unit to nearest suitable drain system as per site conditions as per instructed at site engineer complete with all required fittings and pviding clean out plug at suitable location when required complete with 6mm thick elastomeric nitrile rubber insulation over GI pipe:													-
														-
a	40mm Dia.	Mtrs									32	32	565.22	18,087.04
b	32mm Dia.	Mtrs									38	38	461.38	17,532.44
c	25mm Dia.	Mtrs									27	27	416.54	11,246.58
														-
2	Supply, installing, testing and commissioning of **INVERTER AIR COOLED SPLIT AIR CONDITIONING UNITS** as described in													-
														-
	Note : Copper piping between indoor & outdoor units duly insulated with closed cell tublar nitrile foam insulation of													-
														-
a	4 TR Cassette Type split air conditioning units as described above (R410a) (Cooling Only)	Nos									4	4	1,89,505.00	7,58,020.00
														-
b	3.0 TR Ductable Type split air conditioning units as described above (R410a/ R407c) - Non Inverter	Nos									0	0	76,942.00	-
														-
c	5.5 TR Ductable Type split air conditioning units as described above (R410a/ R407c) - Non Inverter	Nos									2	2	1,16,838.00	2,33,676.00
														-
d	8.5 TR Ductable Type split air conditioning units as described above (R410a/ R407c) - Non Inverter	Nos									0	0	1,82,381.00	-
														-
e	11 TR Ductable Type split air conditioning units as described above (R410a/ R407c) - Non Inverter	Nos									0	0	2,23,701.00	-
														-
3	Supplying, installing, testing and commissioning of **Smoke extraction Fire Rated Axial fans** as per specifications. Fan shall be with direct driven Tube axial fan. The fan shall be equipped with mounting bracket, inlet & outlet cone required at suction & discharge, fire rated flexible connection. Cost of spring isolators for the installation of the fans needs to be included.													-
.														-
3.1	The motor shall be Class H rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE2 efficiency at full load. Fan shall be selected for minimum efficiency of 65%.													-
														-
3.2	Fan and casing shall be suitable for normal & smoke exhaust application.Motor shall be mounted inside the fan casing & thermally rated for 250 Deg C for 2 hour as per [BS-7346 Part-2 : 1090]													-
														-
3.3	External static pressure shall be 15-20 mm (WC) minimum and Total static pressure shall be check by vendor and motor shall be compatible to operate on VFD. EA-1-4, 7-10 shall have External static pressure shall be 35-40 mm (WC) minimum and Total static pressure shall be check by vendor													-
														-
3.4	Fan if used for any case other than in case of fire shall be selected for lower noise level and shall not exceed 65 DB (A) at 3m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 65% and motor shall be compatible to operate on VFD.													-
														-
3.5	Fan used in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting.													-
														-
3.6	The fan capacities shall be as follows:													-
														-

	Equipment Tag	Space	Location	CFM	Motor kW										
															-
	EA 1-2	Exhaust Air- Normal	Basement 2	16000	7.5	Nos							2	2	3,30,017.00	6,60,034.00
	EA 3-4	Exhaust Air- Normal	Basement 2	20500	11	Nos							2	2	3,63,569.00	7,27,138.00
	EA 5	Pump Room Hotel	Basement 2	5500	2.2	Nos							1	1	1,26,500.00	1,26,500.00
	EA 6	Pump Room Metro	Basement 2	2000	2.2	Nos							1	1	1,02,628.00	1,02,628.00
	EA 7 -10	Exhaust Air- Normal	Basement 1	20500	11	Nos							4	4	3,63,569.00	14,54,276.00
	EA 11	BOH	Street Level	3000	1.1	Nos							1	1	91,360.00	91,360.00
	EA 12	Electrical UPS Room	Concourse Level	1500	0.55	Nos							0	0	87,266.00	-
	EA 13	STP Exhaust	Underground	20000	11.0	Nos							1	1	2,40,224.00	2,40,224.00
																-
4	Supply, installation, testing & commissioning of **Axial Flow Fans** suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed fan cooled motor belt drive, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as follows														-
															-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
4.1	Fan used for any purpose other than in case of fire shall be selected for lower noise level and shall not exceed 65 DB (A) at 3m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60- 65% and also these fan will operate through VFD. AXF1-14 and 25-32 Fan used in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting.													-
														-
4.2	The motor selected shall be IE 2 efficiency TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 2 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met..													-
														-
4.3	External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor. AXF-15-18 shall have External static pressure shall be 35-40 mm (WC) minimum and Total static pressure shall be check by vendor													-
														-
4.4	The fan capacities shall be as follows:													-
														-
														-

Equipment Tag	Space	Location	CFM	Motor kW												
AXF 1	Fresh Air- Normal (Lift	Platform	21000	7.5		Nos							1	1	1,98,333.00	1,98,333.00
AXF2-3	Fresh Air- Normal (staircase)	Technical Floor	18000	5.5		Nos							2	2	1,98,333.00	3,96,666.00
AXF4-7	Fresh Air- Normal (staircase)	Technical Floor	19500	7.5		Nos							4	4	1,98,333.00	7,93,332.00
AXF 8-9	Fresh Air- Normal (staircase)	Technical Floor	15000	5.5		Nos							2	2	1,65,300.00	3,30,600.00
AXF 10	Fresh Air- Normal (	Platform	15000	5.5		Nos							1	1	1,65,300.00	1,65,300.00
AXF 11-13	Fresh Air- Normal (	Street Level	17500	5.5		Nos							3	3	1,98,333.00	5,94,999.00
AXF 14	Fresh Air- Normal (2.4 M	Street Level	19500	5.5		Nos							1	1	1,98,333.00	1,98,333.00
AXF 15	Fresh Air- Normal (2.4 M	Street Level	34000	11		Nos							1	1	2,84,193.00	2,84,193.00
AXF 16-17	Fresh Air- (Car Parking)	Basement 2	16000	7.5		Nos							2	2	2,85,298.00	5,70,596.00
AXF 18-19	Fresh Air- (Car Parking)	Street Level	20500	11		Nos							2	2	3,19,354.00	6,38,708.00
AXF 20	Fresh Air- (Pump Room	Basement 2	5500	2.2		Nos							1	1	1,27,843.00	1,27,843.00
AXF 21	Fresh Air- (Pump Room	Basement 2	2000	0.75		Nos							1	1	87,266.00	87,266.00
AXF 22-23	Fresh Air- (Car Parking)	Basement 1	20500	11		Nos							2	2	3,19,354.00	6,38,708.00
AXF 24	Fresh Air- (BOH)	Street Level	3000	1.1		Nos							1	1	98,030.00	98,030.00
AXF 25	Fresh Air- (UPS Room)	Concourse Level	1500	0.55		Nos							0	0	80,648.00	-
AXF 26	STP Fresh air	Underground	20000	11		Nos							1	1	2,63,317.00	2,63,317.00

																-
5	Supplying, installing, testing and commissioning of double skin construction fan sections (made out of 25mm thick panel) complete with internally mounted motor, fan belt drive, flexible connection, vibrations isolators and complete with following:															-
																-
5.1	TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 2 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met															-
																-
5.2	Forward curved fan mounted inside double skin housing with efficiency not less than 60-65%															-
																-
5.3	Minimum 20-25 mm (WC) external static pressure shall be considered. However, actual total static pressure shall be calculated and confirmed by the vendor at the time of bidding.															-
																-
5.4	Pre filter (MERV 8) in exhaust air stream.															-
																-
5.5	The rating of fan sections shall be as follows:															-
																-

FAN Tag	Space	Location	CFM	SP(mmwg)	Motor kW											
																-
EA 1-4	ASS DB Room	Concourse	5000	20-25	2.2	Nos							0	0	71,100.00	-
																-
6	Supplying, installing, testing and commissioning of **Ceiling Mounted Inline Fans** suitable for installing in any position in vertical or horizontal ducts. The casing shall be double skin, internally acoustically lined and constructed of galvanised steel. The fan shall be DIDW with forward curve impeller fitted with maintenance free external rotor motor. The motor shall be suitable for 220 ± 10% volt single phase 50 cycles AC supply. All units shall be complete with duct flexible connector, speed regulator (with wiring of 3 m included between fan & regulator) and volume control damper and static pressure or to suit the system, shall be as follows:															-
																-
6.1	The fan shall have low sound level exceeding not more than 45 db(A) at three metre distance. Actual static to be checked by the vendor during the shop drawings.															-
																-

Fan Tag	Location	CFM	SP (mmwg)											
IF - 01,02	Fresh / Exhaust air Service	900	10-15	Nos							2	2	18,772.00	37,544.00
IF - 03,04	Fresh / Exhaust air Service	900	10-15	Nos							2	2	18,772.00	37,544.00
IF - 05,06	Fresh / Exhaust BOH area	1300	10-15	Nos							0	0	18,772.00	-
IF - 07,08	Fresh / Exhaust BOH area	1600	10-15	Nos							0	0	18,772.00	-
IF - 09	Fresh air solar panel-	1200	10-15	Nos							0	0	18,772.00	-
IF - 10	Toilet (HE & PWD)-	650	10-15	Nos							1	1	10,295.00	10,295.00
IF - 11	Toilet (HE & PWD)-	550	10-15	Nos							1	1	10,295.00	10,295.00
IF -12	Toilet (SHE Concourse Level	400	10-15	Nos							1	1	7,025.00	7,025.00
IF - 13	Toilet Janitor Concourse	200	10-15	Nos							1	1	5,935.00	5,935.00
IF - 14	Mantainer Concourse Level	450	10-15	Nos							1	1	8,115.00	8,115.00
IF - 15	Store-Platform	700	10-15	Nos							1	1	10,295.00	10,295.00
IF - 16-17	FPS-Platform	1000	10-15	Nos							2	2	18,772.00	37,544.00
IF - 18-23	Store/BOH	750	10-15	Nos							6	6	11,687.00	70,122.00
IF - 24-25	Store/BOH	550	10-15	Nos							2	2	10,295.00	20,590.00

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
														-
7	Supplying, installing, testing and commissioning of direct drive propeller fans (Heavy duty). Each fan shall be complete with permanent split capacitor or shaded pole motor, mounting plate, accessories like wire guard, bird screen and fixed louvers for weather protection as required. The fan shall be of following rating:													-
														-
	450 mm dia 900 RPM fan suitable for 220±6% volts 50 cycles, 1 phase AC supply.	Nos									4	4	3,233.80	12,935.20
														-
	300 mm dia 900 RPM fan suitable for 220±6% volts 50 cycles, 1 phase AC supply.	Nos									16	16	8,160.50	1,30,568.00
														-
8	Supplying, installing, testing and commissioning of direct drive domestic propeller fans. Each fan shall be complete with permanent split capacitor or shaded pole motor, mounting plate, accessories like wire guard, bird screen and fixed louvers for weather protection as required. The fan shall be of following rating:													-
														-
	90-100 CMH, Noise level 38 DB,fan suitable for 220±6% volts 50 cycles, 1 phase AC supply.	Nos									1	1	8,000.00	8,000.00
														-
9	Supply, installing, testing and commissioning of VFD suitable for HVAC application **with minimum IP 55** enclosures complying with the tender specifications and shall be complete in all respects and suitable for following motor rating and shall meet the following specifications :													-
														-
	a) The VFD shall have a dual 5% impedance DC link reactor (Harmonic filters) on the positive and negative rails of the DC bus to minimize power line harmonics and protect the VFD from power line transients. The chokes shall be non-saturating.													-
	b) All the VFD's should have factory fitted IP55 enclosure protection													-
	c) EMC filters, C1 Category, Drive should support at least 3 PID loops are required													-
														-
	Motor HP													-
														-
	Application- wherever required and as mentioned in the drawing — 15	Nos									12	12	1,13,509.00	13,62,108.00
	Application- wherever required and as mentioned in the drawing — 10	Nos									10	10	84,122.00	8,41,220.00
	Application- wherever required and as mentioned in the drawing — 7.5	Nos									8	8	76,349.00	6,10,792.00
	Application- wherever required and as mentioned in the drawing — 5	Nos									1	1	65,412.00	65,412.00
	Application- wherever required and as mentioned in the drawing — 3	Nos									3	3	65,412.00	1,96,236.00
	Application- wherever required and as mentioned in the drawing — 1.5	Nos									5	5	44,329.00	2,21,645.00
														-
10	Supply, installing, testing and commissioning of Adequate number of CO sensors,PLC with power / control cabling for car park ventilation fans (at B1, B2) and logic controller with necessary control cabling will form a part of the same.													-
	Please note that VFD, Fan is considered in separate item of the BOQ. Electrical starter panel shall be provided by main electrical contractor.													-
10.1	*Second Basement (Zone-01 1283 Sqm, Zone-02 1900 Sqm)*	Lot									1	1	8.49.211.00	8,49,211.00
10.2	*First Basement (Zone-01 1850 Sqm, Zone-02 1830 Sqm)*													-
	CO sensor shall be provided one no per 250 Sqm													-
														-
11	Supply, installing, testing and commissioning of Sequential Controller to operate Hi-wall split AC's in Server/ UPS room. PLC should capable to start/stop and run equal time.	Nos									3	3	39,896.00	1,19,688.00
														-
	TOTAL CARRIED TO SUMMARY - ZA													**181,65,818.82**
														-
ZB	**AIR DISTRIBUTION**													-
1	Supply, installation and testing of GI sheet metal ducts fabricated in factory as per SMACNA Standard and approved shop drawings. Duct shall be supported via Gripples supports as per the specifications :													-
														-
	Duct Size — **Recommended Gauge of GI sheet**													-
	1 - 900 mm — 26	Sqm									1500	1500	577.00	8,65,500.00
	901 -1200 mm — 24	Sqm									1310	1310	685.00	8,97,350.00
	1201 -1800 mm — 22	Sqm									1800	1800	790.00	14,22,000.00
	1801 - 2100 mm — 20	Sqm									425	425	890.00	3,78,250.00
	2101 - above — 18	Sqm									1000	1000	1,100.00	11,00,000.00
														-
2	Supply, installation and testing of GI sheet metal ducts Site fabricated as per IS Standard and approved shop drawings. Duct shall be supported via Gripples supports as per the specifications :													-
														-
	Duct Size — **Recommended Gauge of GI sheet**													-
	Upto 750mm — 24	Sqm									10	10	577.00	5,770.00
	750mm- 1500 mm — 22	Sqm									10	10	682.00	6,820.00
	1510 mm- 2250 mm — 20	Sqm									10	10	790.00	7,900.00
	above 2250 mm — 18	Sqm									10	10	945.00	9,450.00
														-
3	Supply, installation and balancing of Extruded Aluminium construction Supply air Grilles with volume control dampers. The grilles will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications. The grilles may be double or single louvered, adjustable or fixed as required by Client	Sqm									40	40	8,400.00	3,36,000.00
														-
4	Supply, installation and balancing of Extruded Aluminium construction Return/Exhaust air Grilles without volume control dampers. The grilles will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications. The grilles may be double or single louvered, adjustable or fixed as required by Client	Sqm									40	40	6,300.00	2,52,000.00
														-
5	Supply, installation and balancing of Extruded Aluminium construction square / round shape supply air **diffusers** with removable core & anti smudge ring & volume control dampers.The diffusers will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications.	Sqm									10	10	9,450.00	94,500.00
														-

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
6	Supply, installation and balancing of Extruded Aluminium construction square / round shape return air **diffusers** with removable core & anti smudge ring & without volume control dampers.The diffusers will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications.	Sqm									10	10	6,825.00	68,250.00
7	Supply, installation and balancing of Extruded Aluminium construction **Supply Air Multi Slot Diffuser** complete with air pattern controllers & Hit & Miss volume control damper. The diffusers will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications. Number of slots will vary as per volume of air to be handled.	Sqm									1	1	15,750.00	15,750.00
														-
8	Supply, installation and balancing of Extruded Aluminium construction **Return Air Multi Slot Diffuser** complete with air pattern controllers. The diffusers will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications. Number of slots will vary as per volume of air to be handled.	Sqm									1	1	15,750.00	15,750.00
														-
9	Supply, installation and balancing of Extruded Aluminium construction Supply/Return air Linear Grilles. The grilles will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications. The grilles may be double or single louvered, adjustable or fixed as required by Client with removable core. Quoted price shall be inclusive of volume control damper behind supply air collar.	Sqm									1	1	5,250.00	5,250.00
														-
10	Supplying & fixing of opposed blade GI construction **volume control dampers** in Rectangular supply air duct as per approved drawings and specifications.	Sqm									40	40	5,775.00	2,31,000.00
														-
11	Supply, installation, testing and balancing of Powder coated/Anodised extruded aluminium construction inlet air **louvers with bird screen** for fresh air alongwith GI construction volume control damper.The louvers will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications.	Sqm									40	40	9,450.00	3,78,000.00
														-
12	Supply, installation, testing and balancing of Powder coated/Anodised extruded aluminium construction exhaust air **louvers with bird screen**.The louvers will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications.	Sqm									40	40	6,825.00	2,73,000.00
														-
13	Supply, installation, testing and balancing of Powder coated/Anodised extruded aluminium construction **Door Transfer Grille** for make up/exhaust air. The grilles will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications.	Sqm									2	2	8,400.00	16,800.00
														-
14	Supply, installation, testing and commissioning of **motorised combined smoke & fire damper.** The quoted price shall include control panel alongwith fire resistant inter connecting wiring and also termination of Fire alarm control wiring.													-
a	Smoke & Fire Dampers.	Sqm									1	1	7,875.00	7,875.00
b	Control Panel & Wiring (including actuators)	Nos									1	1	9,450.00	9,450.00
														-
15	Supply, installation, testing and commissioning of **motorised damper** complete with control panel, inter connecting wiring at locations shown in approved shop drawings and as per specifications. The quoted price shall include control panel alongwith fire resistant inter connecting wiring and also termination of Fire alarm control wiring.													-
	Motorized Dampers.	Sqm									30	30	5,775.00	1,73,250.00
	Control Panel & Wiring (including actuators)	Nos									44	44	9,450.00	4,15,800.00
														-
16	Supply, installation, testing and balancing of Ex. Al or PVC construction Exhaust Valves for air as per specifications and approved shop drawings. The valves will be in shade approved by Client and installed as per approved shop drawings and specifications.	Nos									27	27	1,260.00	34,020.00
														-
17	Supply, fabrication and installation fire resistant double resin sleeve fire rated flexible connection of size as per approved shop drawing.	Sqm									10	10	4,725.00	47,250.00
	Note: All exposed surfaces & duct shall be painted in black mat finish by the HVAC contractor.													-
														-
	TOTAL CARRIED TO SUMMARY -ZB													**70,66,985.00**
ZC	**THERMAL INSULATION**													-
														-
1	Supply and fixing of duct acoustic lining in supply and return air ducts and room lining as per specifications.													-
														-
1.1	15 mm thick nitrile rubber/ crosslinked polyethylene duct lining	Sqm									100	100	1,575.00	1,57,500.00
														-
1.2	20 mm thick nitrile rubber/ crosslinked polyethylene for wall lining	Sqm									100	100	2,625.00	2,62,500.00
														-
2	Supply and fixing of external insulation on supply & return air ducts as per specification. Material of insulation shall be closed cell crosslinked polyethelene/Nitrile rubber as per thickness given below:													-
														-
2.1	Insulation of 13 mm thickness	Sqm									100	100	788.00	78,800.00
														-
2.2	Insulation of 19 mm thickness	Sqm									100	100	1,155.00	1,15,500.00
														-
2.3	Insulation of 25 mm thickness on supply & return air ducts exposed to air. Quote price shall include cost of UV protection coating on the insulation.	Sqm									50	50	1,260.00	63,000.00
														-
3	Supplying and fixing of 25 mm thick pre-moulded pipe section of T.F. quality expanded polystyrene (24 Kg / M^3 density) insulation on chilled water and condensate drain piping/fittings includng valves, flanges, union etc. as per the approved shop drawings and specifications. Pipe shall be finished with 26 Gauge G.I Cladding.													-
														-
3.1	MS pipes of 40 mm dia	Mtrs									1	1	577.00	577.00
														-
3.2	MS pipes of 32 mm dia	Mtrs									1	1	462.00	462.00
														-
3.3	MS pipes of 25 mm dia	Mtrs									1	1	346.00	346.00

Name of Work: CONSTRUCTION OF BALANCE WORK OF SEVEN NUMBER ELEVATED METRO STATONS (AUTOMOTIVE SQUARE, NARI ROAD, INDORA CHOWK, KADVI CHOWK, GADDI GODAM STATION, KASTURCHAND PARK AND ZERO MILE) INCLUDING E&M WORKS AND PD AREA BALANCE WORKS EXCLUDNG VIADUCT IN REACH-2 OF NAGPUR METRO RAIL PROJECT.

REVISED SCHEDULE-F ELECTRICAL, FIRE PROTECTION AND HVAC SYSTEMS

Item	Description	Unit	AMS	NAR	INS	KDC	GGS	KCP	KCP PD	GGS PD	ZM	Total Qty	Rate (INR)	Amount (INR)
														-
3.4	MS pipes of 20 mm dia	Mtrs									1	1	290.00	290.00
														-
3.5	Condensate drain pipes of 50 mm dia	Mtrs									1	1	630.00	630.00
														-
3.6	Condensate drain pipes of 40 mm dia	Mtrs									1	1	565.22	565.22
														-
3.7	Condensate drain pipes of 32 mm dia	Mtrs									55	55	461.38	25,375.90
														-
3.8	Condensate drain pipes of 25 mm dia	Mtrs									20	20	416.54	8,330.80
														-
	TOTAL CARRIED TO SUMMARY -ZC													**7,13,876.92**
ZD	**ELECTRICAL INSTALLATION**													-
														-
1	**CONTROL PANELS FOR AXIAL FANS (IP 55 rated)**													-
														-
1.1	Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels including anchoring into the wall, wiring, incoming, earthing & terminating into MPCB in each panel shall be provided by the electrical contractor.													-
														-
	The panel shall include the following components & accessories.													-
														-
	MPCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA.													-
														-
	DOL / SD starter as per HP gratings given.													-
														-
	Terminal block for power distribution.													-
														-
	Contactor, over load relay with built in single phasing protection.													-
														-
	Phase indicating lights and indicating light for ON status.													-
														-
	144 mm x 144 mm voltmeter and digital ammeter.													-
														-
	Time delay relay for delayed automatic restart of motor.													-
														-
	For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation.													-
														-
	The number of control panels shall be as follows.													-
														-
1.1.1	Suitable rating MCCB, outgoing to VFD operated motor upto 5 HP motor	Nos									9	9	22,000.00	1,98,000.00
														-
1.1.2	Suitable rating MPCB with DOL starter upto 5 HP motor	Nos									0	0	24,200.00	-
														-
1.1.3	Suitable rating MPCB with S/D starter for 7.5 HP motor	Nos									0	0	27,500.00	-
														-
1.1.4	Suitable rating MCCB, outgoing to VFD operated motor of 7.5 HP motor	Nos									8	8	25,300.00	2,02,400.00
														-
1.1.5	Suitable rating MCCB, outgoing to VFD operated motor of 10 HP motor	Nos									10	10	30,800.00	3,08,000.00
														-
1.1.6	Suitable rating MCCB, outgoing to VFD operated motor of 15 HP motor	Nos									12	12	50,000.00	6,00,000.00
														-
														-
														-
	TOTAL CARRIED TO SUMMARY -ZD													**13,08,400.00**
														-
	Grand Total of Schedule F(E&M)													**8069,11,950**

MAHA-METRO **Signature and Seal of Bidder**