

NAGPUR METRO RAIL PROJECT
BID DOCUMENTS
FOR

NAME OF WORK: CONSTRUCTION OF EIGHT NUMBER OF ELEVATED METRO STATIONS VIZ PRAJAPATI NAGAR , VAISHNO DEVI SQUARE , AMBEDKAR SQUARE, TELEPHONE EXCHANGE SQUARE, CHITTAR OLI SQUARE, AGRASEN SQUARE, DOSAR VAISYA SQUARE & NAGPUR RAILWAY STATION ON THE EAST-WEST CORRIDOR (REACH-4) OF NAGPUR METRPO RAIL PROJECT

TENDER NO.
N1C-06/2016

PART 4: Financial Bid & Bill of Quantities



Nagpur Metro Rail Corporation Limited
Metro House, Bungalow No: 28/2,
Anand Nagar, CK Naidu Road,
Civil Lines, Nagpur-440001
Maharashtra, INDIA

Website: <http://www.metrotrainnagpur.com>

Preamble:

1. The Bill of Quantities shall be read in conjunction with the Instructions To Bidders, Conditions of Contract, Notice Inviting Tender, Particular Specifications, Tender Drawings, Schedule, Annexure and Addendums.
2. The quantities given in the " Bill of Quantities" are estimated and provisional and are given to provide a common basis for Bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Engineer and valued at the rates in the accepted priced "Bill of Quantities", where applicable.
3. The bidder should quote his rate only in the Financial Bid/ Price Bid Summary sheet provided in the Commercial/ Price Envelope section of the E-Tender Portal of NMRCL.
4. The item rate shall be quoted only in the Financial Bid of the Commercial Envelope in e-tender portal of NMRCL. The same shall be in Indian Rupees both in figures and in words.
5. The bidder should ensure that the financial/ commercial quote should be only quoted in the Commercial bid option on e-tender portal of NMRCL & nowhere else. If by mistake / inadvertently the rate is quoted/ indicated anywhere in the Technical submission/ uploading of the entire Bid document/ Corrigendum / Addendum, the bid will be rejected outright and will not be considered for any further evaluation.
6. The quoted rates are for completed and finished items of work and complete in all respects. It will be deemed to have included all constructional plant, tools, machinery, labour, supervision, materials, fuel, oil, consumables, electric power, water, transportation, all leads and lifts, dewatering, ail temporary works and false works, construction of temporary stores and buildings, fencing, watering, lighting, erection maintenance, night working, inspection facilities, safety measures at work sites/casting yard for workmen and road users, preparation of design and drawings pertaining to the casting yard, staging, shuttering, form work, stacking yard etc, establishment and overhead charges, labour camps, insurance costs for labour and works, contractor's profit, all taxes, royalties, duties, cess, LBT, VAT, service tax and other levies and other charges together with all general risks, liabilities and

obligations set out or implied in the contract and including remedy of any defects during the Defect Liability Period, unless otherwise provided in BOQ. Reinforcement (supply, cutting, bending, placing in position, tying etc.) shall not be paid separately unless otherwise mentioned in BOQ.

7. Providing concrete for all works deemed to be inclusive of the cost towards production of concrete by Batching Plant, transit mixer, transportation of concrete with all feeds and lifts, form work, shuttering including staging as required, pouring of concrete by pump/tower crane to all heights/ depths, tremie or other approved means, compaction by vibrators, curing by approved means such as water, steam or curing compound and all labour, tools, plants, machinery required for execution of work complete in all respects including de-shuttering after completion of work.
8. The whole cost of complying with the provisions of the Contract shall be deemed to have been included in the quoted rates.
9. General directions and description of works and materials are not necessarily repeated or summarized in the Bill of Quantities.
10. The method of measurement of completed work for payment shall be in accordance with the requirements as stated in the individual sections of the Particular Specifications and Special Conditions of Contract (SCC).
11. Errors will be corrected by the Employer for any arithmetical errors in computation or summation as indicated in Contract Document.
12. Shuttering required for concrete work shall be of steel except wherever there are site constraints as decided by Engineer.
13. In the defined grade of concrete mix, the first figure defines the strength of concrete and second figure defines the maximum size of coarse aggregates to be used for production of particular concrete mix. e.g. M 35/20 means "M-35" is the grade of concrete and "20" is the maximum size of coarse aggregate in mm to be used.
14. Bidder may please note that to perform this contract, nothing extra shall be payable on account of field constraints, availability of front, preparation of detailed scheme for taking necessary clearance and approval from the concerned authority and other local bodies etc.
15. For Pier heights more than 12m above the starter, more than one pour shall be considered, but a maximum of two pours is allowed to complete pier concreting. In case of more than one pour, Engineer's approval for "method statement" must be obtained.

16. Hydraulic rig can be used in installation of casing.
17. Couplers may be used in pile caps and piers for reinforcement above 25 mm. in diameter. Welding of reinforcement can be permitted by Engineer in lieu of Coupler.
18. Geo technical data given in is an indicative only for Bidding purpose. The successful Bidder may have to carry out the Geo-technical Investigations if required and directed by the Engineer to perform this contract.
19. Charted utilities will be shifted by NMRCL. For uncharted utilities, payment for diversion will be made under relevant payment Schedule of CPWD-SOR (Latest Version). If work is stopped due to uncharted utilities, no claim shall be entertained on this account.
20. The Bidder's offer shall be inclusive of all taxes and duties payable by them, income Tax and any other statutory taxes to be deducted at source, if any, will be deducted by the Employer in accordance with the Income Tax Act and any other acts in force and in accordance with instructions issued by the Authorities on this behalf, from time to time.
21. Rate quoted shall be inclusive of VAT both on materials as well as works contract and will not be reimbursed by NMRCL. If Excise duty on precast elements are levied, NMRCL will reimburse the same on submission of documentary proof and a certificate that "no appeal for refund at a later date from revenue authorities will be made".
22. The Bidder is required to furnish the PAN for all members of Group.

IMPORTANT NOTES TO BIDDERS:

- 1. The bidder should quote his item rate against each items in Schedule "A", "C" to "F", "H" & "I" and duly scan it and upload in the "Financial Bid" of financial section of e-tender portal of NMRCL.**
- 2. In the financial bid section the bidders should enter in the template provided for abstract of amount of all schedules (Summary sheet) by filling in the last column of quoted INR against each of the schedules which shall be inclusive of all the taxes, duties, levies, cess, etc. including service tax.**
- 3. A separate template in the financial section of the e-tender portal has been provided for Details of Taxes / Duties / Levies Etc. included In the Schedules (For schedules A, C to F, H&I) which the bidder should duly fill up and submit.**
- 4. For comparison of the quoted bid price by the bidders, the grand total of the quoted amount from schedule "A", "C" to "I" in the schedule of**

abstract of amount of all schedules (Summary sheet) shall be taken in to consideration.

- 5. The total amount mentioned in the Schedule “G” of commercial bid shall be fixed and at Rupees Eight Crores Only. The bidders should not quote any amount in Schedule “G.”**
- 6. For arriving at the final price of bid for which the contract agreement shall be executed, Rupees Eight Crores fixed amount of Schedule “G” shall be added to the sum total of the quoted amount by the bidder from Schedule A, C to F, H & I.**
- 7. The rates for items to be executed under Schedule- “G” shall be as per schedule base rate of CPWD DSR of 2014 with latest amendments / directives as issued by CPWD applicable for Nagpur region.**
- 8. The items given in Schedule A, C to F & H shall be on item rate basis. ESHS (SHE) cost Schedule I is lump sum.**
- 9. Employer reserves the right to omit / partially execute any items in any of the Schedules (“A”, “C” to “T”) during construction without any liability to either party.**

**Name of the Work: "CONSTRUCTION OF EIGHT NUMBER OF ELEVATED METRO STATIONS VIZ PRAJAPATI NAGAR ,
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METRPO RAIL PROJECT"**

COST ESTIMATE FOR Tender No. N1C-06/2016 - EIGHT STATIONS IN REACH-4 (Summary Sheet)

ABSTRACT OF AMOUNT FOR ALL SCHEDULES (SUMMARY SHEET)

Item	Description	Description of Schedule	Quoted Amount (Rs.)
1	SCHEDULE-A	General Works of Stations	
2	SCHEDULE-C	Structural works of stations	
3	SCHEDULE-D	NDSR Items for the Architectural Finishing Works, Parking Works, Site development works etc and other Miscellaneous work	
4	SCHEDULE-E	DSR 2012 Items for the Architectural Finishing Works, Parking Works, Site development works etc and other Miscellaneous work	
5	SCHEDULE-F	Electrical, public Health Engineering, Fire Protection system and HVAC	
6	SCHEDULE-G	Miscellaneous Works: Miscellaneous items such as road repair, footpath, dismantling, tree cutting, excavation, boundary wall, utility diversion (Sewer, Storm water drain/water supply line) etc and any other contingency items which are not covered in other schedules.	80,000,000
7	SCHEDULE-H	Architectural, PHE, Fire, Electrical and other related works	
8	SCHEDULE-I	SOCIAL, HEALTH & ENVIRONMENT (SHE) (including ESMP) COST SCHEDULE (Lump sum)	
Grand Total (Rs.)			

Note: - The Amount Quoted in this Summary sheet should be inclusive of all taxes, levies, cess, royalty, LBT etc. including service tax.

DETAILS OF TAXES / DUTIES / LEVIES ETC. INCLUDED IN THE SCHEDULES (For schedules A, C to F, H & I)
 (Refer [Part-IV Financial and BOQ](#))

Schedule	Taxes, Duties, Levies etc.														Total Amount of all Taxes / Duties / Levies / Cess	
	Custom Duty		Excise Duty		Sales tax / VAT		Works Contract Tax (WCT)		Service Tax		LBT / Entry Tax		Any other Tax / Levy / Cess			
	(1)		(2)		(3)		(4)		(5)		(6)		(7)			(8) = Sum of (1) to (7)
	Rate (%)	Amount (INR)	Rate (%)	Amount (INR)	Rate (%)	Amount (INR)	Rate (%)	Amount (INR)	Rate (%)	Amount (INR)	Rate (%)	Amount (INR)	Rate (%)	Amount (INR)		
A																
C																
D																
E																
F																
H																
I																
Total																

SIGNATURE OF BIDDER

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4) OF NAGPUR METRPO RAIL PROJECT**

SCHEDULE-A (SUMMARY SHEET)		
Construction of Stations - General Works		
Item	Description	Amount (Rs)
1	Sub-head G01: General	
2	Sub-head G02: Geotechnical Works	
3	Sub-head G03 Traffic Signals, Signage etc.	
4	Sub-head G04 :Road works	
	GRAND TOTAL OF SCHEDULE-A	

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SCHEDULE-A: GENERAL

Item	Description	As per BOQ			
		Unit	Est. Qty	Unit Rate (Rs)	BOQ Amount (Rs)
1	<p>Detailed survey along the corridor shall be carried out with the following details:</p> <p>a) Establishing GPS stations (at every proposed station locations) at the interval of not more than 200-250 m. The GPS station shall be fixing concrete pillar 600 mm x 600 mm x 1000 mm on building roof free with a proper concrete platform. Stainless Steel (SS) Plate 100 mm x 100 mm x 4 mm with center punch shall be fixed on the top of the station. GPS instrument accuracy shall be minimum horizontal 5 mm + 0.5 ppm and vertical 10 mm + 0.5 ppm in static observation. The base line measurement shall be based on minimum 4 hrs. static observations and other observations shall be with minimum 2 hrs. Static observations. (The observation time may be increased if the no. of satellite is less than 8 as the project corridor is a urban section.)</p> <p>b) Closed traversing shall be carried out storing in total station Angle and Distance from GPS to GPS with an accuracy of 1: 50000 by observing minimum 3 sets of face right and 3 set of face left. Stations shall be established at an interval not more than 200 m. Closing error shall be distributed with least square method and Bowditch Method in commercial software compatible to the instrument used for traversing. The same commercial software shall be supplied to NMRC. Traverse pillar shall be established on permanent structure or providing and fixing concrete pillar 400mm x 400mm x 600mm along the alignment. Total station raw data, calculations shall be submitted to the employer along with before and after adjustment co-ordinates in tabular form.</p> <p>c) Detailed Topographical survey shall be carried out with adjusted traverse co-ordinates. All surface features, ground levels, and over-ground utilities shall be taken. Total Station raw data and calculations shall be submitted to Employer for No Objection. Drawings, raw data and calculations shall be submitted in soft and hard copy.</p> <p>d) A closed circuit leveling shall be run along the entire route connecting one pair of GPS to another pair of GPS station.</p> <p>Km. The accuracy of the leveling will be $(6\sqrt{K})$, where the k is length of the leveling loop . Digital leveling/Auto level instrument shall be used to establish bench mark. Raw data from digital level shall be submitted along with adjusted and unadjusted levels in tabular form.</p> <p>e) For Viaduct portion, survey has to be done from boundary line to boundary line or 50m from each side of alignment,</p>	Per Station	8		

Item	Description	As per BOQ			
		Unit	Est. Qty	Unit Rate (Rs)	BOQ Amount (Rs)
	<p>whichever is smaller. For station location, survey at Grid of 5m x 5m covering an area of approx. 100m beyond each side of station including area covering entry/exit structure, split concourse, property development etc. for verifying alignment and station footprint, making vertical & horizontal clearances and establishing triangular points and bench mark of the construction of station building, and matching it with the alignment of the approaches at station ends including correction, if any.</p> <p>f) Establish all control points, traverse, bench mark and TBM. Fixing and Validating Centre line of corridor, GAD and pier locations duly considering feasibility of the pier locations on account of physical site constraints, utilities (by physical verification) and on the basis of Geotechnical Investigation Reports, vertical & horizontal clearances and establishing traverse points and bench mark for the elevated section including modifications, if any, as per drawings. No extra amount will be paid to redo or to re-establish any of the survey points. The work shall be maintained during the Contract Period including the extended contract period till the completion of the work. Rate includes all survey work including preparation of revised GAD in consultation with the Engineer. However, physical verification of utilities and Geotechnical investigations will be paid separately under relevant Schedules.</p> <p>NOTE:</p> <p>i. Digital leveling instrument to be used for the work shall have the minimum accuracy of the order of ± 0.3 mm per km double run with least count not more than 0.01 mm</p> <p>ii. Total station instrument shall have minimum accuracy for:</p> <p>a) Angle measurements (Hz, V) of the order of 1"</p> <p>b) Distance measurement of the order of 1mm+2ppm</p> <p>Mi. Payment at 50% of total cost of the item on checking and verification of all control points and submission of drawings and approval of the same by the employer.</p> <p>iv. Payment at 40% of total cost of the item equally distributed over the duration of the contract and will be paid on prorata basis.</p> <p>v. Payment at 10% of total cost of the item on satisfactory completion of work along with the final bill.</p>				
2	<p>Providing temporary barricade and arrangement for traffic diversion such as traffic signals during construction at site, for day and night as per requirement and drawing. This item will be payable only at two stages of construction. First stage involves construction of foundations and substructures: pile, pile cap & pier. The construction of typical superstructure viaduct will not require barricading, however particular superstructure works will need barricading. Second stage involves construction of particular superstructures. In both the stages of construction, the barricading and arrangements for traffic diversion has to be kept continuously. Nothing extra will be paid for dismantling and re-erecting the barricades the traffic signals and other arrangements at the same place/stretch within the same stage. (As per drawing provided)</p>				

Item	Description	As per BOQ			
		Unit	Est. Qty	Unit Rate (Rs)	BOQ Amount (Rs)
	The construction barricading will be limited to a width of 8.0m (outside to outside of barricading). This can be increased at specific locations with approval of Engineer.				
	(i) 2m height	RM	2400		
	(Note: Barricading may be required to be shifted laterally number of times but the same will be paid only once).				
	(ii) 1m height	RM	2400		
	<p>The Payment schedule for item 2 shall be as follows:</p> <p>(i) On completion of Piling, Pile cap, open foundation and piers as approved by Engineer- 70% of accepted amount.</p> <p>(ii) After completion of all activities of Viaduct including removal of barricades and restoration of site with latest specification and as per the instructions of the Engineer, 30 % of accepted amount.</p> <p>(iii) Once barricade has been provided and work started, removal of barricade is not permitted till completion of viaduct including construction of pile, pile cap, pier and pier caps. Erection of girders, segments till completion of entire super structure.</p> <p>(iv) While erecting barricade, the bottom gap between barricade and road should be plugged with cement concrete from inside.</p> <p>(v) There should be minimum openings at the end of barricade to allow access of lorries and machine to site work area. Even these spacing should have proper opening/closing arrangements.</p> <p>(vi) Adequate blinking lights on barricade during night time must be ensured. The cost of this item should include provision for power pack/ Genset etc. so as to ensure the blinking of lights in night time as long as barricades are in position at the work spot.</p> <p>(vii) After completion of the entire work, the release barricades will be the property of the contractor and he is also responsible for shifting all such release materials away from the site.</p> <p>Note: 1 Running m = 1m LHS + 1m RHS</p> <p>Note: 2 At Station location, where barricading Periphery is not uniform the measurement shall be taken as half the total barricading perimeter.</p>				
3	Submit colour photographs report including description of works to establish progress as directed by the Engineer and supply at monthly intervals, or as instructed by the Engineer. One set shall comprise of soft copy and one hard copy.	Per set	24		
4	Supply of video DVDs of 180 minutes duration comprising one DVD master copy and one extra copy showing the progress of works as directed by Engineer.	Per set	18		
5	Supply of video DVDs with commentary of entire works comprising of every activities starting from commencement of work to the end of the work duly edited at the completion of work as directed by Engineer.	Per set	1		
6	Provide furnished site office, as per the drawing and specifications, for the use of Site Engineer and his supporting staff; at least at two locations; as per Specifications.	Per sqm of area	250		

Item	Description	As per BOQ			
		Unit	Est. Qty	Unit Rate (Rs)	BOQ Amount (Rs)
7	Cutting, Removal, transporting, disposal of trees/handing over to the concerned department as per the instruction of Engineer of girth (measured at height of 1.0M above ground level) including excavation, backfilling and levelling of the ground as directed and specified in technical specification.				
7.1	Up to 30 CM. Girth	Nos.	50		
7.2	Beyond 30 CM. Girth up to and including 50 CM. Girth	Nos.	20		
8	Planting saplings of Belto Foura (Red Poomaruthu), Belonex Gegiya (Poomaruthu), Cashina Festila (Kanikonna), Cabobia Rosia, Decoma Scanin, Chembakom, Gulmore etc. as approved, not less than 120cm tall including digging the holes to the required size and depth, providing new cow dung/manure etc. maintaining the growth for six months including watering, uprooting weeds, applying pesticides etc., as and when required, replacing the sapling in case of loss etc. complete (water and electricity shall be arranged by the contractor at his cost.)	Nos.	500		
SUB-TOTAL OF G1					

Item	Description	As per BOQ			
		Unit	Est. Qty	Unit Rate (Rs)	BOQ Amount (Rs)
G2	GEOTECHNICAL WORKS				
1	Drilling 150mm dia boreholes in all types of soil including mobilisation of machinery, conducting all SPT.vane shear test , collection of undisturbed and disturbed samples, setting up machinery, shifting etc. Including all lab, field tests & report preparation(pile foundation recommendations including safe pile capacities , pile settlement calculations, etc incorporating all field and laboratory testing) as per IRC: 78/IS codes.	Metres	800		
2	Drilling Nx size boreholes in all kinds of rock including mobilisation of machinery, collection of samples, working platform etc. Including all lab, field tests & report preparation(pile foundation recommendations including safe pile capacities, pile settlement calculations, etc incorporating all field and laboratory testing) as per IRC: 78/IS codes	Metres	120		
	SUB-TOTAL OF G2				

Item	Description	As per BOQ			
		Unit	Est. Qty	Unit Rate (Rs)	BOQ Amount (Rs)
G3	TRAFFIC SIGNALS, SIGNAGE ETC.				
1	Traffic Signals, Signage's & other Traffic aids (This shall include item no 1(i) to 1(vii)) (i) Providing and fixing of retro-reflective traffic sign boards using high intensity Retro Reflective Sheeting (encapsulated! lens type) as recommended by IRC and MoRT&H on 2 mm Alumimum Substratre properly processed on front side of Aluminium Substrated with Pressure sensitive Heat vaccume applicator. Logos and Borders may be out of cut- sheet or screen printing with appropriate ink which should also have 7 years warranty. The Retro-Reflective traffic sign boards using high intensity Tape should have M.S. angle support of size 25 x 25 x 3 mm or 35 x 35 x 4 mm depending upon the size.	LS per RM	800		
	(ii) Providing and fixing and maintaining the road infrastructure during executions, refixing as where required. (iii) Road delinator - Supply of Rectangular Metal Delineator (Black colour Rectangular Delineator with High Intensity Reflective Sheet)				
	Height: 1200 mm approx Size : 100 x 40 mm rectangular Reflective : 1 No. Band of 120 mm High Intensity Grade Red Colour Reflective tape and 3 Nos . Bande of 150 mm white colour paint. (iv) Portable Signage - Supporting of Retro-Reflective Sign Board of size 900 mm Triangular or 60 mm Dia Circle or 90 x 600 mm by using high intensity Retro Reflective Sheeting on 2 mm thick Alumimum Substrate with M.S. Back Support frame. (v) Reflective lights - Hazards warning Blinkers both sides (Rechargeable with 2 Nos. sealed maintenance free Batteries) (vi) Traffic Cones Square Base Cone with heavy base of size 390 mm x 390 mm Height: 705 mm Cone Colour: Red colour (UV stabilised) Body Material : Low Density Poly Ethylene Reflective Part: 1 No. White colour Engineering Grade Reflective band of 125 mm width all around. Note: - The specifications given in this BOQ item are not complete. In addition the items shall comply with the regulations and Tender Technical Specifications. After completion of the entire work, all the items will be the property of the contractor and he is also responsible for shifting all such release materials away from the site. (vii) Deployment of adequate manpower for 8hrs shift for day and night management of traffic at intersection, roadway influenced by contractor and traffic diversions at various levels. (a) In-charge (minimum 1) (Total of 2070 shifts) (b) Supervisor (minimum 4) (Total of 6030 shifts) (c) Traffic Guards (minimum 50 mandays per day)				

Item	Description	As per BOQ			
		Unit	Est. Qty	Unit Rate (Rs)	BOQ Amount (Rs)
	<p>Note-1: The deployment to be done with prior approval of NMRC and Traffic Police. The personnel at (a), (b) & (c) above should be familiar with traffic rules and regulations the traffic signals and road delineators shall be placed as per approved plan and shall be prepared as per relevant code and Nagpur Traffic police guidelines. The payment of such item would be made on per running meter basis of the completed length. Note-2: The stage payment for the item is as follows:</p> <p>(i) Submission and approval of the Traffic Management plan form Traffic Police, local authority, NMRC and deployment of the traffic marshal and traffic signage's etc, along the stretch.- 10% of the accepted rate For eg: If initially a stretch of 5 Km is taken up for construction the payment to be made will be = 5000 x Accepted rate x 10/100. (ii) Completion of the Piling work and Pile cap work- 30% of the accepted rate</p> <p>(iii) Completion of Pier and pier cap work- 30% of the accepted rate</p> <p>(iv) Completion of Launching of U Girder- 10% of the accepted rate</p> <p>(v) Completion of entire work and restoring the Traffic to the original condition.-20% of the accepted rate</p>				
	SUB-TOTAL OF G3				

Item	Description	As per BOQ			
		Unit	Est. Qty	Unit Rate (Rs)	BOQ Amount (Rs)
G4	ROAD WORKS				
	Providing & construction of flexible pavement consist of 200mm thick granular sub-base (As per CI.401), 225mm thick WMM (As per CI.406), 50mm BM (As per CI.504); 100mm thick Dense Bituminous Macadam (As per CI.507) and 50mm thick Bituminous Concrete As per CI.509 of MoRT&H Specification respectively, duly excavating the ground to the required depth, preparation of subgrade by filling with contractor's good quality own earth, levelling, compaction etc. as indicated in the tender drawing including matching the top BC layer with the existing Bituminous surface of adjecene lane etc. complete. Item also includes providing and laying prime coat with bituminous emulsion @ 6.0-9.0 kg/10 sqm over WMM surface (As per CI.502) and tack coat for BM.DBM and BC (As per CI. 503 of MoRT&H Specification). Rate shall also include the lane marking of road and maintenance of roads upto end of construction.				
1	Providing and laying Granular Sub-base of 200mm thickness complete as per MoRT&H Spec. CI 401. (DSR Ref Cl.16.78.1)	Cum	1200		
2	Providing and laying Wet Mix Macadam base of 225mm thickness on prepared surface complete as per MoRT&H Spec. CI.406. (DSR Ref Cl.16.79)	Cum	1200		
3	Providing bituminous primer coat over granular surface with bitumen emulsion complete as per MoRT&H Spec. Cl. 502 @ 6.0 to 9.0 kg/10 sq.m.	Sqm	6200		
4	Providing tack coat with bituminous emulsion all complete as per MoRT&H Spec. Cl 503				
	(i) On granular surface treated with primer and on hungry bituminous surface @2.5 to 3.0 kg/10 sq.m.	Sqm	6200		
	(ii) On Bituminous surface @ 2.0 to 2.5 Kg/10 sq.m.	Sqm	6200		
5	Providing & laying Bituminous Macadam course of 50mm thickness on prepared surface complete as per MoRTH Spec. Cl 504 (DSR Ref Cl.16.55.2)	Cum	310		
6	Providing & laying Dense Bituminous Macadam course of 100mm thickness on prepared surface complete as per MoRTH Spec. Cl 507. (DSR Ref Cl.16.54.2)	Cum	350		
7	Providing & laying Bituminous Concrete course of 50mm thickness on prepared surface complete as per MoRT&H Spec, Cl 509 (DSR Ref Cl.16.57.5)	Cum	250		
8	Constuction of subgrade and shoulders satisfying the requirements of minimum soaked CBR value as indicated in the specification with approved material with all leads and lifts all complete as per Tech. Spec.	Sqm	6200		
9	Bringing approved quality suitable good earth from outside for general filling of land, spreading the same in interspressed layers, and compacting as per specifications such that the compacted layer thickness is limited to 150mm. Rate to include, but not be limited to-all materials, labour, tools, equipments and incidentals as necessary to complete the work as per specifications	cum	930		
	SUB-TOTAL OF G4				
	TOTAL OF SCHEDULE-A				

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SCHEDULE-C (SUMMARY SHEET)		
Construction of Stations - Structural Works		
Item	Description	Amount (Rs)
1	Sub Total - Foundation:	
2	Sub Total - Concrete Works:	
3	Sub Total - Reinforcement & Presstressing Steel:	
4	Sub Total - Structural Steel:	
5	Sub Total - Miscellaneous Work:	
6	Sub Total - Earth fill:	
	GRAND TOTAL OF SCHEDULE-C	

SCHEDULE C: - STRUCTURE

Item	Description	Unit	Qty	Unit Rate (Rs)	BOQ Amount (Rs.)
T01	FOUNDATION				
1.1	<p>Providing and installing cast-in-situ vertical bored piles of approximate depth as per drawing and with M35/20 where "35" is the grade of concrete (using portland slag cement / Ordinary Portland cement) including all operations such as installation and shifting of piling rig etc, in all soil strata along elevated section and "20" is the "nominal maximum aggregate size". The cost shall also include the cost of empty boring wherever required. The stated length include test piles for initial load tests. (Measurement shall be from cut-off level to founding level). The item includes disposal of earth, muck, slush released from piles, top cutted portion of pile at contractor's own disposal ground for all leads. Reinforcement shall be paid separately. Rate shall include cost of using required dosage of admixture in concrete for obtaining required workability as per approval of Engineer. Rate shall include provision of A class MS Steel pipes of 50mm outer Diameter as per technical specification , 2.9mm thick (light) as per IS: 1239 in all piles at the time of casting to be used for cross-hole sonic test. Pipes shall extend from ground level to bottom of pile where pipe shall be sealed at bottom. Rate shall include filling of tubes after sonic test using standard cement non-shrink mortar before casting of pile cap/transition block. The item includes drilling and socketing in rock at required depth. The item shall also include the cost of polymer to be used for stabilisation of bore.</p> <p>Note: Contractor shall locate suitable place for dumping waste material at his own.</p> <p>For 1200mm dia Pile</p> <p>(i) By hydraulic rigs using partial depth temporary casing and polymer</p> <p>(ii) Extra over (i) above for drilling and Socketing in rock with total socketing length up to 2xD (2.4 m) for 1200 mm dia pile</p>				
		RM	6650		
		RM	450		
1.2	<p>Providing and fixing permanent MS liner (of required thickness or as directed by engineer-in-charge) for 1200mm dia bored cast-in-situ piles where ever required as per the approved construction drawings and directions of engineer-in-charge all complete and applying a priming coat of approved steel primer.</p> <p>NOTES:</p> <p>(A) The scope of work in the above item includes.</p> <p>a) All incidentals, labour, material and equipment and works required to execute and complete the job.</p>	MT	22		
	<p>Measurement :-</p> <p>The liner shall be of MS steel plate, of required thickness or as per drawings duly approved. The payment of liner shall be made in Kg as per the area of the MS sheet provided in liner multiplied by standard weight coefficient or actual weight, whichever is less. The quoted rates will be applicable for all lengths provided upto the bottom of pile cap. The measurement will be made for the actual length of liner provided correct to one centimeter.</p>				

1.3	Non destructive integrity testing of cast in situ piles of 1200 mm dia and as per specifications, and submitting reports. (Payment shall be made for number of pile tested)	Nos	493		
1.4	Integrity pile test using cross hole sonic logging for 1.2m diameter pile as per the provision of ASTM standard D6760, as per drawings & technical specifications. (Payment shall be made for number of pile tested)	Nos	248		
1.5	Providing and laying M15/20 grade cement concrete for 100mm thick PCC below pile cap/open foundation extending 100mm all round beyond pile cap/open stepped foundation etc. Rate shall include preparing surface to receive PCC, shuttering and the cost of required dosage of admixture in concrete for obtaining required workability as per specifications and approval of Engineer.	Cu. M	164		
1.6	Providing and laying M35/20 grade reinforced cement concrete for pile cap (part of the foundation) including excavation through existing ground and water bound macadam road/bituminous road/cement concrete road of all thicknesses, soft and stiff clays including dismantling other structures, dead utilities etc. including dewatering, pumping and bailing out water. This item also includes cost involved in curing, required dosage of admixture in concrete for obtaining required workability as per specifications & approval of Engineer, providing shoring on all sides of excavated ground or road, all formwork and backfilling with suitable material in foundation in layers including watering, compacting with a vibratory plate compactor and loading, leading and disposal of surplus excavated material using covered trucks with all leads and lifts to designated dumping site of the city authorities with the approval of concerned authority and with the consent of the Engineer. Reinforcement shall be paid separately. Measurement shall be considered only the total volume of pile cap concrete (excluding PCC below pile cap)	Cu. M	0		
	(i) + backfilling with excavated material	Cu. M	1268		
	(ii) extra over (i) above for backfilling with coarse sand	Cu. M	271		
1.7	Boring 100mm dia borehole, 5m deep at pile locations to find out underground utilities as directed by Engineer	RM	1805		
1.8	Carrying out GPR survey to locate underground utilities upto 6m depth with a corridor width of 5mx5m grid as directed by Engineer. Cost should include preparation of report and drawings both in soft and hard copy.	Sq.M.	6000		
1.9	Providing M35/20 concrete (cement as per technical specification) for open foundation, basement slab, ancillary building foundation slab, retaining wall bottom slab including excavation through existing ground and water bound macadam road/bituminous road/cement concrete road of all thicknesses, soft and stiff clays including dismantling other structures, dead utilities etc. including dewatering, pumping and bailing out water. This item also includes cost involved in curing, required dosage of admixture in concrete for obtaining required workability as per specifications & approval of Engineer, providing shoring on all sides of excavated ground or road, all formwork and backfilling with suitable material in foundation in layers including watering, compacting with a vibratory plate compactor and loading, leading and disposal of surplus excavated material using covered trucks with all leads and lifts to designated dumping site of the city authorities with the approval of concerned authority and with the consent of the Engineer. Reinforcement shall be paid separately.				
	(i) + backfilling with excavated material	Cu. M	776		
	(ii) extra over (i) above for backfilling with coarse sand	Cu. M	212		

Sub Total - Foundation:					
T02	IN-SITU / PRECAST CONCRETE WORK				
2.1	Providing M45/20 concrete (cement as per technical specification) for station piers of all heights (standard pier, portal pier, cantilever piers, etc.) incl. shuttering, scaffolding and all related operations as required for completing the work. Reinforcement shall be paid separately. Rate shall include cost of using required dosage of admixture in concrete for obtaining required workability as per approval of Engineer.	Cu. M	100		
2.2	Providing M 40/20 concrete (cement as per technical specification) for structural elements at all levels like slabs, beams, shafts, walls, columns, pits etc., including centering, steel shuttering, scaffolding and all related operations as required to complete the work as specified in drawings. Reinforcement shall be paid separately. Rate shall include cost of using required dosage of admixture in concrete for obtaining required workability as per approval of Engineer. Rate shall include using of steel material for shuttering with suitable pads required for architectural finishes & steel props including of providing grooves, chamfers, moulding, cutout etc. with suitable arrangement in the formwork (Doka or equivalent), placing in proper position all types of inserts (contractor's or those provided by others), shear connectors etc. complete as per drawings, specifications and as directed by the Engineer. The rate shall also include construction joints as per specification and providing approved wire mesh/weld mesh at such location as approved by Engineer or as shown in drawings.	Cu. M	13117		
	(a) Providing M35/20 instead of M40/20 covered under item 2.2 above.	Cu. M	100		
	(b) Providing M30/20 instead of M40/20 covered under item 2.2 above.	Cu. M	10		
2.3	Providing M45/20 concrete (cement as per technical specification) for providing, casting, pre-stressing and curing of Normal / Cantilever Pier arms (integral to pier) supporting superstructure at all levels, in-situ connection with pier. The item includes centering, steel shuttering, scaffolding and all related operations as required to complete the work specified in drawings. (the cost shall be inclusive of the curing arrangements as required, all handling, non-shrink cement mortar, non-shrink concrete for in-situ connection with pier, temporary support etc. complete). Reinforcement, anchorages and sheathing shall be paid separately. Rate shall include cost of using required dosage of admixture in concrete for obtaining required workability as per approval of Engineer.	Cu. M	100		
2.4	Providing M50/20 concrete (cement as per technical specification) for casting, pre-stressing and curing precast full I-girder spans of all simply supported spans in the casting yard including provision of shear connector for dec slab secondary pour concrete (rail plinths), additional bars for earthing, bars/strands/hooks for lifting of I-Girder, cutting of bars/strands/hooks after transportation and sealing of lifting recess as specified in drawings, lifting the full spans from the mould and shifting the same to the stacking yard. (Note : the cost shall be inclusive of the cost of casting yard, gantry, moulds, providing cutouts where specified, beds for pre-tensioning and anchoring devices, curing arrangements as required, steam curing arrangement, all handling etc. complete). Reinforcement, strands & debonding tubes shall be paid separately. Rate shall include cost of using required dosage of admixture in concrete for obtaining required workability as per approval of Engineer.	m ³	4000		

2.5	<p>Transporting precast full I-Girder spans of simply supported span from the casting yard to work site, erection in position using lifting cranes including the cost of all temporary supports, erection equipment, lifting cranes, transporting etc, and positioning on bearings etc.</p> <p>Note: Item no 2.4 & 2.5 shall be operated when I-Girder being launched by Crane. The launching shall be preferably done at night. The payment schedule for item no. 2.4 and 2.5 shall be as follows:</p> <p>(i) On submission of Method statement, i.e detailed design, working drawings of casting yard, formwork, staging, stacking yard, EOT cranes etc. and approval of the same by Engineer - 0.5% of accepted amount for item no. 2.4 above.</p> <p>(ii) Providing Casting Yard, formwork, staging, stacking yard, batching plant, covered shed for casting beds, installation of T & P etc., curing arrangement and casting of one mock up full span and its approval -15% of accepted amount for item no. 2.4 above.</p> <p>(Hi) Providing and casting pre-cast spans in simply supported spans as detailed in item 2.4 above - 50% of accepted rate for item 2.4 above till the amount paid vide i & ii above is adjusted, thereafter at accepted rates.</p> <p>(iv) On submission of Method Statements, i.e., detailed design and shop drawings for all temporary equipments and approval of the same by the Engineer - 0.5% of accepted amount for item no. 2.5.</p> <p>(v) Mobilisation of cranes, trailers, etc. and erection of one pre-cast segment - 10% of accepted amount of item no. 2.5 for mobilizing all erection equipments.</p>	MT	10000		
	(vi) Transporting and erecting in position of pre-cast spans of simply support span detailed in items no. 2.5 - 40% of accepted rates for amount no. item no. 2.5 till the amount paid vide iv & v above is adjusted thereafter at accepted rates.				
2.6	<p>Providing M 45/20 concrete (cement as per technical specification) for In-situ Superstructure slabs / beams including centering, steel shuttering, scaffolding and all related operations as required to complete the work as specified in drawings. Reinforcement shall be paid separately. Rate shall include cost of using required dosage of admixture in concrete for obtaining required workability as per approval of Engineer.</p>	m ³	500		
Sub Total - Concrete Works:					
T03	REINFORCEMENT AND PRESTRESSING STEEL				
3.1	<p>Providing TMT reinforcement steel of Fe-500D grade, from approved supplier, handling, straightening, cutting, bending, tying, lap welding, placing in position including binding wire in diamond form at each reinforcement junction in all structural concrete at all heights and depths with all leads complete as per specifications and as directed including welding involved towards stray current protection effects as per the system approved by Engineer.</p> <p>Note:</p> <p>(i) No extra payment will be made for lap joint welding in pile reinforcement.</p> <p>(ii) For other structural members, lap joints are permitted for bar diameter <= 25 mm as directed by Engineer. However no extra payment shall be made for the lap the cost of which is deemed to be included in the rates.</p> <p>(iii) The cost quoted should cover all welding and providing mechanical couplers, etc., complete.</p> <p>(iv) The cost quoted should cover coating on reinforcement bar as per technical specification.</p>	MT	5000		

3.2	Supplying of uncoated stress-relieved low relaxation steel conforming to IS :14268 , class-2 for pretension of precast full span I girders (simply supported spans) incl. spacers, stressing of strands, protection of exposed cut-strands, HDPE debonding tubes at ends of strands if required, and all related operations to complete the work. (Note: the details shown on the drawing all likely to change and nothing extra will be paid to the contractor on this account).				
	(i) Strands (12.70mm / 15.2mm)	MT	180		
	(ii) HDPE debonding tubes for prestressing strands (to be cut off flush to concrete after casting), epoxy based sealing compound at edges of strand and epoxy putty to avoid slurry ingress during concreting. The quantity given is the net length of tubes without extra tube length required during construction. Rate includes filling HDPE tube with grease as specified in ASTM.	RM	1000		
3.3	Supplying and post threading uncoated stress-relieved low relaxation steel conforming to IS :14268 , class-2 in Standard pier caps incl.providing 107mm ID (for 19K15) or 86mm ID (for 12K15), corrugated HDPE duct (both sides) 3.3mm thick in case of 19K15 and 2,8mm in case of 12K15 with couplers & vent pipes, spacers, anchorages, stressing using 19K15 or 12K15 system and grouting, epoxy protection of anchorages, sealing of PT anchorage recess with concrete (same grade as structure) and all related operations to complete the work. (Note: the details shown on the drawing all likely to change and nothing extra will be paid to the contractor on this account).				
	(i) Strands	MT	54		
	(ii) Corrugated HDPE duct- 107mm ID	RM	6000		
	(iii) Corrugated HDPE duct - 86mm ID	RM	1500		
	(iv) Anchorages for 19K15 cable.	Nos.	320		
	(v) Anchorages for 12K15 cable	Nos.	50		
	Sub Total - Reinforcement & Presstressing Steel:				
T04	STRUCTURAL STEEL - PEB / AT SITE as required				
4.1	Providing, fabricating to require profile and shape, transporting, erecting and fixing in position structural steel work conforming to I.S. 2062 Grade B' including procurement of all raw steel materials, bolts, nuts & washer incl. sand blasting (as per requirement) its testing, allowance for all types of wastage's, straightening, cutting, bending of sections wherever specified, welding, full strength butt welding (shop or field) wherever specified, drilling holesbolting, provision of necessary tools, testing etc. The rate shall also include required surface preparation for application of primes and procurement and application of all coats of shop and site primers and paints as specified. The rate shall also includes preparation of all complete detailed fabrication drawings based on design drawings, required for all permanent and temporary structures and their approval from Engineer prior to execution. The rate shall also include provision and installation of base plate anchor bolts (measured in tonnes) etc as per drawings and specifications. Any temporary support, staging braces, strutting, tying or anchor bolts, black bolts, fasteners, welding required to withstand the stresses of erection and carrying of plant and equipment are to be included in the rate. it includes all type structural work including FOB. (All labour, materials tools and plants consumables such as welding rods etc. by contractor)	MT	2312		

	Note: 1. This includes the cost towards testing (such as D.P. Test, Radiography test, Ultrasonic and all relevant tests) as per technical specifications issued along with the tender. 2. Profiling and crimping of Galvalume sheeting to be carried out at site 3. Structural Painting works shall be as per technical specifications				
4.2	Designing, Providing, Fabricating, Painting, transporting, erecting and securing in position prefabricated structural steel roof work for elevated stations buildings complete as per specifications, approved shop drawings and /or instructions.				
4.2 (i)	Steel roof for platforms for elevated stations.	Sq. M	14000		
4.2 (ii)	Steel roof for station entrances for elevated stations.	Sq. M	4000		
	Payment stages: 45 % of Stage Payment of Item On Procurement & testing of steel quantities on receipt in fabrication work-shop against documentary evidence of purchase from approved supplier subject to a maximum of quantities as indicated in approved fabrication drawing & also as indicated schedule.				
	25 % of Stage Payment of Item On completion of fabrication of steel work quantities & testing of fabricated members including painting as per specification and its approval by Engineer in Charge.				
	10 % of Stage Payment of Item On Transportation and receipt of fabricated material in good condition at site, approval of Engineer in charge regarding physical receipt of fabricated materials in good condition				
	20 % of Stage Payment of Item On Final Erection				
	Sub Total - Structural Steel:				
T05	MISCELLANEOUS ITEMS				
5.1	Expansion Joints (Strip seal joint) Providing and Installing in position approved building expansion joint at floor level between platform level slab, concourse level slab or all location as shown in execution drawings or at locations approved by Engineer consisting of aluminium extrusions, anti-skid serrated top plate (Straight/Curved) with vapour barrier, sealant etc. as per details and specifications or as approved by Engineer. Entire installation is to be carried out strictly in the presence of manufacturer's representative at all times. No extra payment will be made for providing thermocoal at expansion joint between columns/beams/slabs or locations shown in drawing at the time of construction of RCC elements.				
	(i) Expansion /Contraction = +40mm/ -40mm Vertical seismic movement = +10mm/ -10mm	RM	1127		
	(ii) Expansion /Contraction = +25mm/ -25mm Vertical seismic movement = +15mm/ -15mm	RM	472		
5.2	Providing and filling sheet covering over expansion joint with iron screws as per design to match the colour / shade of wall reinforcement				
	(i) Aluminium fluted strips 3.15mm thick and 150mm wide	RM	483		
	(ii) Aluminium fluted strips 3.15mm thick and 200mm wide	RM	162		
5.3	Polysulphide Sealant				

	Providing and applying Polysulphide sealent in 50mm gap incl back up material in the form of round shape Polyethylene foam at both faces of expansion joint .	m	60		
5.4	Installing and fixing in position holding down bolts of various sizes and lengths, as per drawings and instructions, including making of pockets in foundations, column heads, beams etc. Providing, fabricating to required profile and shape, transporting, erecting and fixing in position MS members made of built-up sections/rolled or hollow structural steel sections to be used as fixtures/supports/hangers etc for system/roofing contractors at any location or as directed by Engineer in charge. Providing, fabricating, installing and fixing in position any additional structural connections for signages, gutters, or required by the system contractors using standard plate sections welded & built up section, tubes, square, rectangular pipe section, rolled sections such as angles, channels etc. material as per approved vendor list.	MT	130		
5.5	Grouting of anchor bolts with non-shrink grouting compound. Volume of grout shall be measured for payment.	Cu. M	30		
5.6	Supplying, pouring and packing non-shrink grout as per manufacturer's specifications under base plates of columns, trusses etc. complete as per drawings and specifications, including cost of packing plates, (per square of base plate shall be measured for payment).	Cu. M	45		
5.7	Providing and fixing 8 mm thick multi-wall clear Polycarbonate sheet with specially designed powder coated Al. ALCOX system, EPDM rubber gasket, GE silicon sealant cold forged etc all complete as per the direction of engineer-in-charge	Sq.M	810		
5.8	Supply and installation of roofing with colour coated, Galvalume substrate high tensile cold rolled steel panels corrugated to approved shape as per ASTM A446 (Grade D) / A653 (Grade50), coating class ASTM A792-AZ150 (minimum 150 gram/sqm Zinc-aluminium alloy coating mass for both sides), yield strength 275Mpa, thickness of bare metal=24gauge, total coated thickness - 0.68 mm thickness of bare metal=0.5mm, approximate mass of completed roofing shall be 4.12 kg/sqm). The painting shall be backed enamel polyester or silicon modified polyester or PVF2 (KYNAR® 500)with a film thickness of 1.0mil. The reverse side shall be white with 0.5mil film thickness. The sheet fixative shall be of fixed Snap-On seam roof/wall covering system that consists of structurally strong high-ribbed panels with wide-fluted pans for efficient water shedding and fixed by means of concealed clips. All the ribs should be clipped on and interlocked. No penetration should be done for its fixation to the roof or wall framing. Rate shall be including providing ridge pieces, horizontal/vertical flashing) at all heights etc., all complete complying specifications and as directed by the engineer in charge.	Sq.M	18000		
5.9	The zinc roof cladding system shall consist of the following elements to form a rigid, non-ventilated and watertight support base for installation of the ZINC QUARTZ pre-weathered zinc roofing sheets.	Sq.M	50		

	<p>(i) Top Layer – ZINC 25/430 of Umicore Building Product Bagnolet France or equivalent profiled sheeting manufactured from Zinc alloy ZnTiCu as specified in EN 988, minimum thickness of 0.7 mm and The zinc roof sheets shall have a protection on its underside consisting of a 60 micron thick composite acryl ate-urethane protective coating. The protective coating eliminates any risks related to possible corrosion due to contact with incompatible materials and where the underside of the roof sheets is not ventilated and finish as approved by Engineer-in-Charge.</p> <p>(ii) Ant abrasive breathable membrane laid at the underside of zinc panels.</p> <p>(iii) 0.47mm TCT Hi-Tensile steel sheets profile with nominal 3.5 mm deep ribs at pitch of nominal 48 mm centre to centre distance 550 MPa Yield Strength.</p> <p>(iv) GI Top Hat Z Section 1.2 mm thick</p> <p>(v) Insulation layer</p> <p>(vi) Solid Steel liner type Trapezoidal sheeting 28-25/198-250, 0.50 mm thick 550MPa, 25 microns polyester coated hot dip galvanized steel With all required system accessories such as fixing clips, flashings, eaves, gables, etc., as per shop drawings, specifications and as directed by the Engineer-in-Charge.</p>				
5.10	Supplying, transportation, lifting and fixing in position, true to line and level elastomeric bearings conforming to IRC:83 (Part II), section IX complete with all accessories as per drawing and specification below prefabricated steel girders of FOBs and precast concrete beams including testing of all bearings to the satisfaction of Engineer. Entire installation is to be racciid strictly in the presence of manufacturer's representative at all times.	Cu.cm	11539125		
Sub Total - Miscellaneous Work:					
Total of Schedule					
T06	EARTH FILL				
1	Bringing approved quality suitable good earth from outside for general filling of land, spreading the same in interspersed layers, and compacting as per specifications such that the compacted layer thickness is limited to 150mm. Rate to include, but not be limited to-all materials, labour, tools, equipments and incidentals as necessary to complete the work as per specifications	Cu. M	0		
Sub Total - Miscellaneous Work:					

Name of the work: CONSTRUCTION OF EIGHT NUMBER OF ELEVATED METRO STATIONS VIZ PRAJAPATI NAGAR , VAISHNO DEVI SQUARE , AMBEDKAR SQUARE, TELEPHONE EXCHANGE SQUARE, CHITTAR OLI SQUARE, AGRASEN SQUARE, DOSAR VAISYA SQUARE & NAGPUR RAILWAY STATION ON THE EAST-WEST CORRIDOR (REACH-4) OF NAGPUR METRPO RAIL PROJECT

SUMMARY: (SCHEDULE-D) NDSR ITEMS

Architectural and Site Developemnt works		
S.No	Description	Amount (Rs)
1.0	MASONRY WORKS	
2.0	STONE WORKS	
3.0	TILE WORKS	
4.0	ACCESS RAISED FLOOR	
5.0	WOOD WORKS AND IRON MONGREY	
6.0	STAINLESS STEEL WORKS	
7.0	ALUMINUM WORKS	
8.0	GLASS WORKS	
9.0	FALSE CEILING WORKS	
10.0	PAINTING WORKS	
11.0	MILD STEEL WORKS	
12.0	FIRE DOOR	
13.0	CONCRETE WORK	
14.0	LANDSCAPING AND EXTERNAL WORKS	
15.0	WATER PROOFING WORKS	
16.0	SPECIAL ITEMS	
GRAND TOTAL OF SCHEDULE -D		

CONSTRUCTION OF EIGHT NUMBER OF ELEVATED METRO STATIONS VIZ PRAJAPATI NAGAR , VAISHNO DEVI SQUARE , AMBEDKAR SQUARE, TELEPHONE EXCHANGE SQUARE, CHITTAR OLI SQUARE, AGRASEN SQUARE, DOSAR VAISYA SQUARE & NAGPUR RAILWAY STATION ON THE EAST-WEST CORRIDOR (REACH-4) OF NAGPUR METRPO RAIL PROJECT

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
1.0		MASONRY WORKS				
A		HOLLOW BLOCKS				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
B		LIGHT WEIGHT BLOCKS				
3	NDSR	Providing and constructing wall with light weight concrete block masonry (Aerocon block or equivalent) of size 600 x 200 x 200mm (l,b,h) strength not less than 3N/Sqm with cement mortar 1:6 confirming to IS: 2185 (Part III) 1984, (Specifications for AAC) and IS: 6041, and IS: 6441 1972 (Part I to Part V): including the cost of materials, labour, scaffolding, curing etc., complete as per the manufacturer's specifications for rectangular, curved or circular masonry works in pier or around the concrete columns/ walls etc., all as per specifications, drawings and as directed etc., complete at any height including all lead and lift. For 200mm thick wall.	Cum	115		
C		STONE MASONRY				
4	NDSR	Size stone masonry: Providing and constructing granite/trap/basalt rubble masonry (coursed) in cement mortar 1:3 using clean sieved approved sand mixed in concrete mixer for substructure complete as per drawings, in courses not less than 150 mm high, bond stones 2m apart in each course including the cost of all materials, labour, scaffolding, curing, transportation, loading, unloading, lead, lift etc., complete.	Cum	80		
D		CEMENT CONCRETE BLOCKS				
5	NDSR	Providing and fixing precast cement concrete solid block (SIZE 400X200X200) with cement concrete 1:2:4 (1 Cement : 2 coarse sand : 4graded stone aggregate 20mm nominal size) including hoisting and setting in position with cement mortar 1:3 (1 Cement : 3 coarse sand), cost of required centering, shuttering etc. complete up to any height including making Openings for duct of any size & shape & Finishing the same. up to 6 m	Cum	1512		
		(i)Extra for lifting charges from 6m to 12m	Cum	500		
		(ii)Extra for lifting charges from 12 m to 20 m	Cum	500		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
6	NDSR	Providing and fixing precast cement concrete solid block (SIZE 400X200X100) with cement concrete 1:2:4 (1 Cement : 2 coarse sand : 4graded stone aggregate 20mm nominal size) including hoisting and setting in position with cement mortar 1:3 (1 Cement : 3 coarse sand), cost of required centering, shuttering etc. complete up to any height including making Openings for duct of any size & shape & Finishing the same.	Cum	127		
		(i)Extra for lifting charges from 6m to 12m	Cum	100		
		(ii)Extra for lifting charges from 12 m to 20 m	Cum	100		
E		PLASTERING WORKS				
7	NDSR	Cutting chases for conduiting in walls as per direction and marking by the E&M site in charge to the required depth with a machine cutter & covering the same with galvanized wire mesh after installation of conduit by E&M and making ready for plastering works.	Rm	1200		
8	NDSR	Proma seal or equivalent acrylic intumescent sealant 2 hours fire rated in accordance with BS 476-Part 20, IS 1530 Part 4 to seal gap & joint in fire rated walls with roof slab and around service penetration for 25 mm gap and 12 mm depth with compressible filler backing.	Rm	160		
9	NDSR	20 mm water proofing cement plaster of mix 1:4 (1 cement : 4 coarse sand) in two coats for lining the drains, mixed with approved water proofing admixture for sunken areas of toilets, balconies or wherever directed by engineer in charge, including the neat cement punning over the base surface.	Sqm	400		
10	NDSR	Providing 12 mm thick cement plaster in single coat with cement mortar 1:6 to brick / Aerocon masonry/ concrete works including rounding off corners wherever required smooth rendering, providing and removing scaffolding, including cost of material, labour, curing complete as per specification for all heights.	Sqm	13793		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
11	NDSR	Providing rough cement plastering 15 mm thick in single coat with cement mortar 1:6 to brick/Aerocon masonry/ concrete works for base of dadoing works with sand of approved quality, providing and removing scaffolding, including cost of material, labour, curing complete as per specification for all heights.	Sqm	14096		
12	NDSR	Providing 12 mm thick cement plaster in single coat with cement mortar 1:3 to ceiling including rounding off corners wherever required smooth rendering, providing and removing scaffolding , including cost of material, labour, curing complete as per specification for all heights.	Sqm	11291		
		TOTAL MASONRY WORKS				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
2.0		STONE AND GRANITE WORKS				
		Note: All granite slabs shall be selected as per approved sample from Tamil Nadu / Karnataka / Rajasthan (Jhalore) of selected quality, uniform in colour, free from cracks, fissures and flakes with straight edges and perfect corners.				
A		GRANITE STONE				
1	NDSR	Providing and fixing flamed finish Sadarahalli grey granite stone (bull-nosed) of size 1200x600x60 mm at platform edge level using 5mm thick approved thick bed adhesive as per specification over prepared base on 20mm (average) thick base of cement mortar in 1:4 (1 cement : 4 total aggregate- sand and 10mm single sized aggregate) using 43 grade cement, water reducing admixture as per ISO 9103:1999 and jointing with white cement with matching colour pigment all complete in levelling course laid to proper slopes over screed base including, base preparation including movement joint in screed as per specification with 10mm thick compressible filler to edge of screed with two parts polysulphide sealant to top edge as per approved drawing and directions of engineer-in-charge.	Sqm	780		
1.1	NDSR	Extra for Red/Raw silk/Tan brown/Jet black granite	Sqm	0		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
2	NDSR	Providing and laying 25 mm thick prepolished Sadarhalli Grey/ Cheema Pink/ Jhalore Beige granite slab of sizes up to and including 1200X600mm on floor using 5mm thick approved thick bed adhesive as per specification over prepared base on 20mm (average) thick base of cement mortar 1:4 (1 Cement : 4 total aggregates - coarse sand and 10mm single sized aggregates) using 43 grade cement, water reducing admixture as per ISO 9103:1999 and jointing with white cement with matching colour pigment all complete (Colour of granite as approved by Engineer) in levelling course laid to proper slopes over screed base including base preparation, movement joint in screed as per specification with 10mm thick compressible filler to edge of screed/ blockwork junction with two parts polysulphide sealant to top edge, drainage gullies as per approved section, curing, testing etc. all complete as per specifications and relevant drawings.				
2.1		Extra for Red/Raw silk/Jet Black/Tan Brown/Kashmir Yellow/ Ikon Brown/ Multi Red/ Blue Pearl granite	Sqm	0		
		(i)1200X600mm sized granite slab	Sqm	14400		
		(ii)600X600mm sized granite slab	Sqm	0		
		(iii)300X300mm sized granite slab	Sqm	0		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
2.2		Providing and laying 30mm thick prepolished Sadarhalli Grey/ Cheema Pink/ Jhalore Beige granite slab of sizes up to and including 1200X600mm on floor using 5mm thick approved thick bed adhesive as per specification over prepared base on 20mm (average) thick base of cement mortar 1:4 (1 Cement : 4 total aggregates - coarse sand and 10mm single sized aggregates) using 43 grade cement, water reducing admixture as per ISO 9103:1999 and jointing with white cement with matching colour pigment all complete (Colour of granite as approved by Engineer) in levelling course laid to proper slopes over screed base including base preparation, movement joint in screed as per specification with 10mm thick compressible filler to edge of screed/ blockwork junction with two parts polysulphide sealant to top edge, drainage gullies as per approved section, curing, testing etc. all complete as per specifications and relevant drawings.				
2.3		Extra for Red/Raw silk/Jet Black/Tan Brown/Kashmir Yellow/ Ikon Brown/ Multi Red/ Blue Pearl granite				
		(i)1200X600mm sized granite slab	Sqm	2594.4		
		(ii)600X600mm sized granite slab	Sqm	0		
		(iii)300X300mm sized granite slab	Sqm	0		
3	NDSR	Providing and laying 30mm thick FLAMED Sadarhalli Grey Granite Stone flooring in treads and landings (including bull nosing, rounding the nose and making groove) of steps of approved colour, size and pattern, (sample of granite stone shall be approved by Engineer-in-charge) over 20mm (average) thick base of cement mortar 1:4 (1 cement : 4 core sand) laid and jointed with neat cement slurry mixed with pigment to match the shade of granite stone complete as per specifications and architectural drawings. Allow for cutting & finishing for handrails fixing as per design.	Sqm	3000		
3.1		Extra for Red/Raw silk/Tan Brown/Jet Black granite	Sqm	0		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
4	NDSR	Providing and laying 20mm thick mirror polished Granite Stone in Risers of steps of approved colour, size and pattern, (sample of granite stone shall be approved by Engineer-in-charge) over 12 mm thick bed of cement mortar 1:4 (1 cement: 4 coarse sand) and jointed with neat cement slurry mixed with pigment to match the shade of granite stone complete as per specifications and relevant drawings.	Sqm	900		
4.1		Extra for Red/ Raw Silk/ Tan Brown/ Jet Black granite	Sqm	0		
5	NDSR	Providing and laying 30mm thick mirror polished Sadarhalli Grey/Cheema pink/Jhalore Beige granite stone work of up to and including sizes of 1200mm*600mm of approved colour/pattern with 4mm groove all around at all levels for wall linings/columns/skirting(veneer work) by mechanical arrangement with SS cramps/brackets, anchor bolts,5mm vertical SS pins of approved make and inserts as per drawings and specifications. The cost of making necessary grooves all around stone pieces, chamfering of corner edges and polishing are included. Allow for cutting of holes and box outs for services etc...	Sqm	1950		
5.1		Extra for Red/ Raw Silk/ Tan Brown/ Jet Black granite	Sqm	0		
6	NDSR	Providing & Fixing Polished Granite Coping, bull-nosed over 20 mm thick cement mortar 1:4(1 cement: 4coarse sand) with joint treated with white cement mixed with matching pigment including Rubbing, Curing , Moulding & polishing to edge to give high gloss finish etc. complete.				
6.1		30 mm thick Jet black Granite	Rm	400		
7	NDSR	Providing and laying 40mm polished Red/Raw silk/Black/Tan brown/Blue pearl granite slabs for trench cover with 25mm dia holes @ 75mm c/c spacing complete	Sqm	400		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
8	NDSR	Providing and laying sand blasted finish granite stones in desired colour as per control sample, size 1200x600x30 mm on floor using 5mm thick approved thick bed adhesive as per specification over prepared base on 20mm (average) thick base of cement mortar 1:4 (1 cement : 4 core sand) laid and jointed with neat cement slurry mixed with pigment to match the shade of granite stone complete as per specifications and relevant drawings, in external development areas.				
9	NDSR	Providing and installing counters of MS (with primer and 2 coats of enamel paint) carcass in TOM, EFO, SCR etc. with 30mm thick polished & moulded Jet Black Granite top with all cutouts/ openings including providing and fixing over 19mm thick commercial board & 19 x 3 mm teak wood lipping all complete of approved quality as per specifications and relevant drawings (Plan area shall be considered for measurement)	Sqm	128		
10	NDSR	Providing and fixing stone slab with table rubbed, edges rounded and polished, of size 75x50 cm deep and 18mm thick, fixed in urinal partitions by cutting a chase of appropriate width with chase cutter and embedding the stone in the chase with epoxy grout or with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 6 mm nominal size) as per direction of Engineer-in charge and finished smooth.				
10.1		Granite Stone of a approved shade	Each	53		
11	NDSR	Providing and laying polished granite slab of approved colour, origin and shade, 18mm thick laid in skirting on 20mm (average) thick cement mortar 1:4 (1 cement: 4 coarse sand), sprinkled with white cement and jointed with white cement slurry mixed with pigment to match the shade of the slabs including rubbing and polishing complete. Rates include coordination with other agencies for cutouts, holes and finishing of the same.				
11.1		600mm x 100mm sized polished granite slabs	Sqm	4000		
11.2		300mm x 100mm sized polished granite slabs	Sqm	0		
11.3		In required sizes for staircase flights	Sqm	0		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
16	NDSR	Granite of 20mm thick for wall cladding clamped by 'Z' SS angles at regular intervals fastened on to concrete or brick wall by SS expansion bolters or SS self locking screws and fixing the sealants at joints of matching or any colour recommended by the Engineer-in-charge.	Sqm	0		
16.1		18mm thick	Sqm	885		
16.2		25mm thick	Sqm	0		
21	NDSR	Sadarhalli Stone work of 20mm thick (machine cut edges) for wall lining etc.(veneer work) up to 10 meter height, backing filled with a grout of average 12 mm thick cement mortar 1:3 (1 cement : 3 coarse sand) including pointing in white cement mortar 1:2 (1 white cement : 2 stone dust) with an admixture of pigment matching the stone shade : (To be secured to the backing and the sides by means of cramps and pins which shall be paid for separately).	Sqm	932		
B		RED AGRA STONE				
22	NDSR	Wall cladding with approved Red Agra stone stone 35 mm thick rough facing on the exposed surface with stone strips of minimum length 300 mm and required width, including embedding every tenth layer and bottom most layer in masonry or concrete after making necessary chases of size 75x75 mm and by providing layer of 75 mm thick strips i/c 12 mm thick bed of cement mortar 1:3 (1 Cement : 3 coarse sand) i/c ruled pointing in cement mortar 1:2 (1 white cement : 2 stone dust) with an admixture of pigment to match the shade of stone complete as per direction of Engineer-in-charge.	Sqm	160		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
C		SANDSTONE LOUVERS				
23.3.1		(i) Sandstone louvers 100*100*1200mm	Sqm	0		
		(ii) Red sandstone, machine cut to shape as per drawing, positioned and fixed onto vertical concrete pillars and fixed with mortar 1:2 (1 cement : 2 coarse sand) to be secured to the bottom and the sides by means of angles and pins which shall be paid for separately. Kindly refer the drawings for details of fixing.				
		TOTAL OF GRANITE AND STONE WORKS				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
3.0		TILE WORKS				
A		VITRIFIED TILES				
1	NDSR	Providing and laying matte finish vitrified tile of 1st quality in all colors as per control sample at all levels in public & back-of-house areas and toilet floor and skirting over 20mm thick bed of cement mortar 1:4 (1 cement : 4 coarse sand) including pointing the joints with white cement and matching pigments- all complete as per relevant drawings and specifications laid over screed/ foam concrete as per relevant architectural drawing. Rates include coordination for cutouts, holes and finishing of the same.	Sqm	1500		
		600x600x10 mm thick				
2	NDSR	Providing and fixing 1st quality Vitrified wall tiles of approved make, shade, colour and finish in all colours, shades, size in skirting, wall cladding, border tiles and dados over 20/12 mm thick bed of cement Mortar 1:4 (1 cement : 3 coarse sand) and jointing with approved grouting material with pointing in white cement mixed with pigment of matching shade complete.	Sqm	1614.9		
3	NDSR	Providing and fixing 10 mm thick acid and / or alkali resistant vitrified tiles of approved make and colour using acid and /or alkali resisting mortar bedding and joints filled with acid and / or alkali resisting cement as per IS:4457 complete as per the direction of Engineer-in-charge. On a flooring on a bed up to 30mm thick mortar of 1:4 proportion.	Sqm	438.2		
4	NDSR	Providing and laying yellow visibility vitrified tile as per control sample of size 200*100*8 mm thick at platform level over 20mm thk bed of cement mortar 1:4(1 cement : 4 coarse sand) in levelling coarse laid to proper slopes over screed base including base preparation including movement joint in screed as per specification with 10mm thick compressible filler to edge of screed with two parts polysulphide sealant to top edge as per approved drawing and directions of engineer-in-charge.	Sqm	235		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
5	NDSR	Providing & laying in position on floor, skirting and in bands, vitrified unglazed anti skid/Uni colour series floor tiles 300 x 300 x 7.3 mm thick of approved make, specification and colours like terra cotta, polo, Mushroom, Nut brown laid over up to 30 mm thick bed of cement mortar 1:4 (1 cement: 4 coarse sand) to the pattern as called for including finishing the joints with matching pigment and approved grouting materials etc., complete.	Sqm	638.6		
B		CERAMIC TILES				
6	NDSR	Providing and laying glazed tile dadoing using glazed tiles conforming to IS.777-1970, 2.20 m high with tiles of 200x100 mm size and 6mm thick of approved quality, brand and colour for toilets, over 12 mm thick, 1:3 cement mortar backing, pointed neatly with white cement mixed with colouring pigment to match color of tile, properly cured and finished in all respects including cost of material and labour complete, at all levels including lead, lifts and descents	Sqm	800		
7.1		a) 200 mm x 200 mm sized ceramic tiles		100		
7.2		b) 300 mm x 300 mm sized ceramic tiles		100		
8.1		a) 200 mm x 100 mm sized ceramic tiles		0		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
C		TACTILE FLOORING				
9	NDSR	Providing and laying 12mm (minimum)thick with 3mm(minimum)thick projection on surface yellow coloured directional vitrified porcelain tactile tile of pelican or equivalent(as per specification)laid on floor with laterite 111 crete filler powder mixed with laterite 73 latex admix and applied to a minimum thickness of 4.5mm(The mixing ratio shall be as follows:20kg bag (laterite 111):5.5 liter (Laterite 73).Spacer of 3mm shall be used between the tiles and joints filled using Laterite Latapoxy SP-100 epoxy grout in Inca Gold colour. The joint depth shall be 6mm.Laticrete product shall be as manufactured by Laterite India Pvt.ltd/Laterite International Inc.)over 20mm thick bed of cement mortar 1:4(1 cement:4 coarse sand) in levelling course laid to proper slopes over screed base including base preparation including movement joint in screed as per specification with 10mm thick compressible filler to edge of screed with two parts polysulphide sealant to top edge as per approved drawings and directions of engineer-in-charge.		0		
9.1		300*300 hazard warning and directional tactile tiles as per approved drawings	Each	6384		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
D		TERRA COTTA TILES				
E		CONCRETE DESIGNER TILES				
		TOTAL OF TILES WORKS				
4.0		ACCESS RAISED FLOOR				
1	NDSR	Providing and fixing access raised floor of light grade of minimum 15 KN/m ² UDL panels manufactured from pressed formed corrosion resistant galvanized steel with total overwrap of one piece top, sides and bottom flange encapsulating monolithic homogeneous totally premiered fiber reinforced calcium silicate material with balanced density over panel, to cater in the size 600 x 600 x 41mm. The panel has to be placed on the pedestal made from all solid steel construction, galvanized plated consisting of stringers, an anti-vibrational head cap with cruciform upstands and four panels locating studs, positively clipped pedestal clipped to the steel base plate. The pedestal cap shall have an electrical conductor plate for dissipation of static electricity. The steel base plate of the pedestal shall be fixed on the sub-floor with Epoxy pedestal adhesive and/or mechanical fixing with fasteners (8mm X 75mm). The Access floor should be able to take a point load of minimum 2.5 KN over 25 mm sq. and UDL of minimum 15 KN/sq. meter. The panel shall be finished with high abrasion, anti static HPL				
1.1		Up to 450 mm high cavity floor	Sqm	1509.7		
		TOTAL OF ACCESS RAISED FLOOR WORKS				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
5.0		WOOD WORKS AND IRON MONGREY				
5	NDSR	Providing & fixing Toilet Cubicle (of following standard dimension which includes 900mm door size width) made of heat, bacteria, water,chemical,scratch, impact and anti bacterial resistant 12mm thick solid compact laminate panels tested in approved laboratory. Finish of the compact laminate should be Suede, Raw silk model includes doors, pilasters & intermediate panels finished with approved texture/shade as per the detail drawings & as per IS 2046 (Indian standard) and as per fire retardant BS-476/97 standard. This also includes providing and fixing in position necessary hardware made out of stainless steel (Grade 304) as per manufacturers specifications & Architects instructions like (1)Door knob(2)Gravity hinges(3)Thumb turn lockset with occupancy indicators(4)Coat hooks with Door stopper(5)U-channels(6)Adjustable foot/pedestal(7)Top rail with corner connector(8) Rubber noise deafening tape(9)Screws & wall plugs. All screws will of 304 Grade in stainless steel with satin finish. All pilasters are supported by stainless steel bottom cladding. The base of the stainless steel bottom cladding will be anchored to the floor with a clearance height up to 150mm. the top fitting should consist of SS round top rail which will get fixed with pilasters, with SS panel tube holder, SS corner bend (connected with top rail) will be used on the corner of cubicle in absence of brick wall, SS wall fixing is used only on the wall which will hold the SS top rail.				
5.1		Toilet Cubicle with standard dimension of 2025mm Height x 1000mm width x 1550mm Depth, which includes up to 900mm door size width)	Nos	75		
		TOTAL OF WOOD AND IRON MONGREY WORKS				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
6.0		STAINLESS STEEL WORKS				
A		STAINLESS STEEL RAILING				
1	NDSR	Supplying, fabricating, matt finished, erection of wall mounted handrail as per design comprising of 50mm dia Stainless steel Grade 304 including threading on both sides to receive grub screw on one side and rail holding barrel on the other side, 25mm dia rod upright threaded to receive 50mm dia handrail, 80mm OD 6mm thick SS plate, 50mm OD-3.15mm thick pipe fixing the same by cutting 49mm dia hole in granite/vitrified tile wall cladding in required position including angular assembly at every bend and fixing handrail in concrete/block with SS fasteners complete in all respect and making good the wall as per Specifications and Architect Drawing.	Rm	951.15		
2	NDSR	Supplying, fabricating, MATTE FINISH, erection of 1100mm high SS hand railing as per design comprising of 50mm dia, 3.15mm thick, Stainless steel Grade 304 with balustrades as per drawing, SS base plate, pipe adjuster M16X200mm SS fasteners for fixing railing in floor by cutting hole of required dia in floors/ landing/staircase complete in all respect and making good the floors as per Specifications and Architectural Drawings.	Rm	3971.05		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
3	NDSR	Fabricating, supplying and installing in position all types of railing to spiral stairs and other stairs, terrace, parapets and other locations called for with stainless steel of SS grade - 304 consisting of tubes of various sizes like 100mm, 50mm, 40mm, 25mm, 20mm dia and such flats, solid, square, circular bars etc. arranged in verticals and horizontals with spacing as required and anchored to sides/ top of steps/ slab , hand rail and all other stainless steel pipes (wall thickness minimum 1.25mm and maximum 2.0mm thick) fixed to stainless steel verticals through shaped SS plates/ flats including approved brackets and fittings, anchoring arrangement, all fixing accessories, all cutting, welding, bending, grinding, drilling, tapping and all other incidental works and approved buffing to stainless steel members as directed by the Engineer-in-charge complete for all leads and lifts.	Rm	800		
4	NDSR	Providing and Fixing the perforated SS sheets of 1mm thickness with perforations of 50mm dia at regular intervals 150mm c/c both ways, vertically and horizontally welded on to the square tube bars of 75mm x 75 mm supported at regular intervals by 6mm thick steel sheeting cut to shape as shown in drawing. the top handrail dia 100mm fixed on the vertical 8mm plates as per drawing.	Rm	325		
B		STAINLESS STEEL GLASS RAILING				
5	NDSR	Supplying, fabricating, MATTE FINISH, erection of required height (900 to 1100) mm high SS hand railing system, System comprising of 38mm Dia & 1.6mm thick Top-Rail Stainless steel Grade 304 connected to 50 mm Dia 3.15mm thick Baluster through Stainless Steel Saddle Plate connector. And a Grab Rail of 38mm Dia connected to Baluster through a Stainless Steel Stem Key. Baluster fixed to slab with GI Baseplate & M16x200 mm Fastener. A SS cover plate would be provided above GI Base Plate. Infill of 1 No. 12mm thick toughened glass connected to baluster with Stainless Steel Twin- arm Spider Clamp.	Rm	7222.78		
C		STAINLESS STEEL CLADDING				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
6	NDSR	Providing , Fabricating, Polishing & Erection of Required Height, Shape and Designing Comprising of 2 mm thick SS Grade 304 Sheet Cladding Over RCC Column on Aluminum Base frame of 25x35x5mm and 5mm thk & 450 mm width Perforated (6mm perforations @ 12mm c/c) SS Grade 304 Matte Finished Sheet fixed on Frame 2 nos of 50 mm SS Grade 304 Dia Concentric Pipe, Bracing of 2 rings with 12 nos of 50 mm SS Grade 304 Dia pipe fixed on to the RCC Column with 3 nos. of 20 mm thick Arched shape Plate to support the Frame As / Drawing (for payment purpose only SS item shall be measured. Aluminum base frame shall be paid extra).	Sqm	250		
D		STAINLESS STEEL ARTICLES				
7	NDSR	Fabricating and supply of stainless steel (conforming to grade SS 304 satin finish) four seater bench without backrest as per drawing	Nos	16		
8	NDSR	SS Trash bins as per design	Nos	40		
9	NDSR	Fabrication ,supply & erection of matte finish grade 304 SS sump covers of size 600mmX600mm suitably supported & fixed over MS frame along with granite stone matching with relevant floor finish, lifting hooks/keys etc. complete as per relevant architectural drawing.	Each	8		
11	NDSR	Fabrication, supply, erection and joining to relevant site of miscellaneous Matte finish grade 304 SS angle/ section/ pressed plate/ pipe etc. items like platform end gates etc. complete as per architectural drawings and directions of engineer-in-charge as per drawing.	Each	32		
12	NDSR	Supply and installation service of hazard and directional 316 grade stainless steel & carborundum tactile mat ground surface tactile indicators as per approved drawing. 300x 600x7mm with 72 buttons	Rm	1210		
		TOTAL STAINLESS OF STEEL WORK				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
7.0		ALUMINUM WORKS				
A		ALUMINUM CLADDING				
1	NDSR	<p>Providing and fixing Aluminum Composite panels in all colours of approved brand for wall cladding at all heights and elevations including necessary aluminum composite panel consist of 3mm thermoplastic core of anti oxidant LDPE sandwiched between two skin of 0.5 mm thick alloy sheet making a total sheet thickness of 4 mm. The surface shall be finished with PDVF base coating on the top side and service coating on the reverse side shall be with a polymer paint. Coating shall confirm to ECCA of AAMA. The system shall design to withstand wind pressure of 200 Kg/Sqm and shall be fixed to the masonry/RCC walls with necessary clamps, bracket and anchor fasteners.</p> <p>All Clamps and brackets shall be hot dip galvanized minimum 80 micron thick and confirmed to IS : 4759 - 1996. The extruded aluminum sections shall be anodized in approved colour with anodic coating minimum 20 microns. Extruded section shall be of 6063 T5 or T6 alloy confirming to ASTM B 221. (items include cost of aluminum frame, ACP Panels, Cramps 110mm size, weather sealant, gasket, foam, fixtures, scaffolding, all machineries and any other fastening strips, nuts, bolts, rivets, washers, etc. complete).</p>	Sqm	6980		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
2	NDSR	<p>Supply and installation of 6mm thick Fundermax Exterior grade F-Quality panels of standard size with both side décor. Exterior panels should ne duromer high-pressure laminates (HPL) as per EN 438-6, type EDF manufactured using patented Technology (NT), Panels should be double hardened including acrylic polyurethane resin which is thermally cured under high pressure.</p> <p>Explanation NT: Non fading high performance acrylic polyurethane surface Technology.</p> <p>Installation of panels shall be done by MBE Rivets (with Fixed and Sliding Points) with minimum recommended Aluminum T section and L section held by Wall Bracket with Wind load and Dead load slot as per design, anchored by standard Hilti/Fischer or equivalent make anchor fasteners along with Thermal Separator.</p> <p>Installation of Panels will be done using Rear Ventilated Principles only which is ensured by providing gaps of 20 mm at top and bottom (for free flow of air behind the façade) for the façade and using the framework with no horizontal section.</p>	Sqm	1800		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
3	NDSR	<p>Supply & fixing of Luxalon perforated horizontal and vertical panels by Hunter Douglas of 2 to 3 mm thick. The panel will consist of single skin of flat Aluminum alloy AA3005/3105, Panel width will be to a maximum of 900 mm and of variable lengths up to maximum of 5000 mm (Manufactured as per the project requirement). The perforation shall be customized as required. The panel will be coated on the exterior/exposed surface with Exterior Architectural Coating. The horizontal joints will have a recessed joint of width of 20mm and will incorporate facilities for allowing adjustment of ± 1 mm. The panels will be secured to a tailor made rigid support system by means of a fixing side extrusion fixed to the panel, fixed at appropriate centers to proprietary metal clamp as per the proprietary HDI design.</p> <p>Things to be taken Care by Installer (Non-HDI): The panel needs to be fastened to a Suitable Aluminum substructure as per the load requirement. Installer will erect the secondary and primary substructure within the tolerances of span/1000 of plumb line and level per support (non-Cumulative to a maximum of 2 mm). Aluminum alloy for substructure will comply with IS 8147. Anodic coating on Aluminum substructure (wherever applicable) and its specified alloy will comply with IS 1968-1996. The substructure will be fixed to the backing wall by means of Aluminum/ MS brackets with wedge type/RAWL PLUG stainless steel anchor fastener/HILTI or equivalent chemical fastener. The brackets will allow for a vertical and horizontal alignment tolerance of 12.5 mm. A Nylon/Rubber bush will protect joints between any two dissimilar metals.</p>		1435		
C		ALUMINUM LOUVERS				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
4	NDSR	Providing and fixing PVDF aluminum extruded single bank louvers with AMCA certification complete. The louvers should have hidden mullions and an insect screen and should be equivalent to C/S louver model RS-1605. All work to be complete with extruded aluminum sub frame extruded built up standard elliptical section conforming to IS 733 and IS 1285 fixed with raw plugs and stainless steel screws or with fixing clip or with expansion hold fasteners including necessary filling up of gaps at junctions at top bottom and sides with required PVC/neoprene felt complete in all respect. Aluminium sections shall be smooth rust free, straight as per architectural drawings and the direction of Engineer-in-charge etc. All structural steel support frame work shall be paid separately	Sqm	11366.3		
D		ALUMINUM DOORS				
6	NDSR	Providing and fixing Aluminum Door with frame of approved make with door frame / chowkhat of section 101.6 x 44.45 x 3.16 mm (2.508 kg/R.mt) and shutters with stiles and rails of aluminum sections 85 x 44.5 x 3 mm (2.1 Kg / R.mt) with bottom panel made of 12 mm thick prelaminated Novo pan or equivalent flat pressed three layered prelaminated particle board exterior grade ISI stamped IS: 12823 grade, type-II, one side decorative and other balancing white and edges sealed with water resistant paint. Top panel with 6 mm thick clear glass. Both board and glass will be fixed with glazing clips and beadings / gaskets and necessary fittings all as per manufacturer's specifications and directions. EPDM rubber gasket and frame fixed in position with steel screws and rawl plugs. All visible steel screws shall be rust resistant and coloured as approved.				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
		All aluminum sections shall be as per drawing and conforming to grade 63400 WP alloy as per IS:733 and IS: 1285 and colour 65 microns powder coated finish complete as approved and directed by the Engineer. The door to be complete with all necessary accessories such as aluminum handles, tower bolts, locks, pivot / hinges etc. complete.	Sqm	1320		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
E		ALUMINUM WINDOWS & GLAZING				
7	NDSR	Providing, fabricating and installing in position, pure polyester powder coated aluminum doors, windows, curtain walling, skylights, partitions, grilles, glazing with extruded aluminum sections and profiles complete in all respects in straight or faceted profiles including arched angular in elevation including sub frames in tubular aluminum (having mill finish), outer frames, architraves, beading, wool pile 6mm thick clear float glass, gaskets, all complete. The minimum sizes, thickness and weights per unit length of the aluminum sections to be given by tenderer, however, nothing extra shall be payable to the Contractor for using larger/heavier sections than those given, if found inadequate including all fittings.				
		WINDOWS TYPES				
7.1		Openable / sliding / side hung / windows.	Sqm	4050		
7.2		Fixed glazing	Sqm	3375		
7.3		Extra for 6 mm thick toughened glass, in place of 6mm normal float glass	Sqm	200		
7.4		Extra for 12.76 mm thick (6mm + 0.76 + 6mm) PVB laminated glass, in place of 6 mm normal float glass	Sqm	200		
		TOTAL OF ALUMINIUM WORKS				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
8.0		GLASS WORKS				
1	NDSR	Providing and installing fixed glazed security wall assembly of stainless steel to ticket offices, Station Control Room, etc. with specified fixings and finish using 2 sheets of 6mm thick toughened glass with nominal gap silicone sealant joints. Glass shall be clear, toughened and laminated with 1.52mm thick polyvinyl butyral layer-all complete as per relevant architectural drawings and specification with cut out & holes	Sqm	576		
2	NDSR	Providing and fixing of toughened laminated glass door in EFO (6mm + 1.52mm + 6mm) including stainless steel door handles, deadlock and Floor spring complete necessary cutting in granite flooring for housing of floor spring as / drawing	Sqm	39.87		
3	NDSR	Providing and fixing in position frameless glass partition walls made out of 12mm thick toughened clear float glass held in position by wall connecting profile (with or without open able glass door made out	Sqm	120		
3.1		Two set of 350mm long pull handles of approved make				
3.2		Two number corner locks of approved make				
3.3		Floor spring of approved make				
3.4		Lock keeper plate stainless steel strip at the bottom of doors for doors exceeding 1100mm With open able door (double leaf)				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
4	NDSR	<p>Designing, Providing, erecting and fixing structural glazing unitized using specially designed aluminum grade 63400 WP IS: 733 and ID: 1285 electro colour anodized 25 micron or pure polyester powder coated 65 microns in approved shade and colour through adequately designed MS galvanized / aluminum anchor brackets. The structural glazing design to be based on rain screen and pressure equalized drainage system. The complete drainage system to be incorporated in the design which drain water at every transom in the unlikely event that water penetrate the pressure seal. This include structural grade and weathering grade silicon sealant "Dow Corning" or "GE Silicon" or equivalent as per the design requirement. This includes structural designing, shop drawing complete. structural calculations and water penetration test as per (Structural Test (Wind load serviceability) - ASTM E 330, Water Penetration Test - AAMA 501.2).The specified test is to be carried out only for location where executed qty will be more than 50Sqm in one go.</p> <p>The structure glazing shall be double glazed 23mm thick (6mm thick toughened blue/smoke grey on outer side, 12 mm air gap and 5 mm thick clear float glass on inner side). no members to visible from outside complete as per drawing and direction of engineer in charge. including required aluminum sub-frame Silicon filling all height i/c double height for straight / curve and scaffolding complete.</p>	Sqm	6400		
5	NDSR	Providing and fixing toilet mirror in 6 mm thick clear float glass with beveled and polished at edge, fixed on wall with 6mm thick hard board backing fixed to wooden cleats with 8mm dia 38mm long stainless steel stud complete.	Sqm	160		
6	NDSR	Providing and fixing 10mm thk toughened glass in aluminum frames, fixed or openable. Rubber gaskets, silicone etc. all complete & inclusive (Aluminum work to be paid separately)	Sqm	80		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
7	NDSR	Supply and fixing of Laminated clear Glass of thickness 8+1.5+8 mm fixed with MS frame work with necessary casket as per the detailed drawing	Sqm	1486		
8	NDSR	Supply and installation of 7"x7"x3.5" glass brick with appropriate sealant	Sqm	800		
9	NDSR	Providing & fixing 8mm thick toughened glass on wall with glued fitting and on glass back side Translucent film of approved shade the vinyl should be 2-mil thick with or without adhesive: 3 to 4 mils (0.08 to 0.1 mm), long-term cast vinyl films with a synthetic lay flat liner that is not affected by water or humidity. The film should be plotter cutted as per the approved design. Warranty to be given by vinyl company for 5 years.	Sqm	400		
		GLASS DOME				
10	NDSR	Providing & fixing of triangular glass with 6mm + 0.78 centry + 6mm brown tint toughened laminated glass. And fixed with 20/100 mm vertical ss flat rids connected to ss final circle at dome top and 23/80 mm horizontal ss flat rids reinforcement and other ss fittings as per architectural drawing provided.	Nos	0		
		TOTAL OF GLASS WORKS				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
9.0		FALSE CEILING WORKS				
A		CALCIUM SILICATE BOARD CEILING				
1	NDSR	Providing and installing suspended ceiling systems / vertical fascia as per controlled sample for concourse, 12mm thick Calcium Silicate Board panels with paint as per specification including supply of suspension system of galvanized steel as per manufacturer's recommendation, top fixing of SS expanding anchor bolts, rigid hangers, accessories inclusive of providing opening for electrical fixtures / fittings, fixed framing to support fixtures / fittings and providing secondary supporting system for cable tray and duct and all complete as per relevant drawings and the direction of Engineer-in-charge.	Sqm	1586.53		
B		PERFORATED METAL PANEL CEILING				
2	NDSR	Providing and installing suspended ceiling system at all levels with interlocking grid of size 1200x600mm / 600x600mm ceiling module of size (1250x600) consisting of demountable infill units (size 1200x600x1.2mm) having 50mm gap at every 1200mm, gap covered with 82mm wide channel having flanges to hold ceiling panels. The panels and channels shall be made from 1.2mm thick GI sheet, punched and bent to shape. The panels shall have perforated area 30-40%. The ceiling shall be powder coated (PPC, 80micron) on exposed and unexposed surface with approved colour. The grid system shall include hangers and runners of size 50x50x3mm thick hot dip galvanized steel, fixed on soffit of slab with the help of stainless steel expansion fasteners of size 10x75mm (Tam Anchor), The ceiling system to include panels, hanging system including the cost of providing opening and electrical fittings/fixtures, secondary supporting system for opening and below cable tray and duct, access to maintenance, all complete as per requirement of Engineer-in Charge.	Sqm	5080.37		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
3	NDSR	<p>Supply & Fixing of Luxalon torsion spring Tile Ceiling System by Hunter Douglas comprising of Tile of 600mm wide and 600mm long manufactured out of 0.5mm thick Galvanized steel perforated 1.5mm dia 2.15/4.3mm c/c. With 22% open area. The metal ceiling panels shall be downward accessible with a minimum of four (4) torsion springs per panel . The Tile will be manufactured on advanced CAD/CAM equipment that includes several stages of manufacturing process, and special process of six roller sheet levelling to achieve flat panels.</p> <p>Torsion Spring panel with two side legs die formed and two end legs die formed and punched to receive torsion springs (min two springs each end or side) for secure engagement into Tee Grid main runners which are factory punched to receive torsion springs. Tiles will be square edged. The metal ceiling panels shall be downward accessible with a minimum of four (4) torsion springs per panel. The Tile shall be Polyester powder coated in white colour.</p> <p>Main Runners: 24mm deep, inverted "Tee" sections, 3m long, with</p>	Sqm	800		
		<p>Suspension : Approved 12 GA Hanger wire along with pre-stretched galvanized steel. Or 6mm Threaded Rod with bracket</p> <p>Paint finish: The panels will be pre treated in latest nano technology process and electro statically powder coated with automatic Carona system and cured with gas catalytic technology.</p> <p>Fire Retardant: The system will meet Fire retardant standard of BS 476: Part 6 & Part 7</p> <p>Acoustic Felt : Non-woven felt made of glass-reinforced fiber glued over the perforation for sound absorption. NRC- 0.7 & 0.45</p>				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
4	NDSR	Supply and Installation of 6mm thick grade Fundermax F- Quality panels of standard size with both side décor . The Panels shall be perforated as per the design of the Architect. The panels are duromer high-pressure laminates (HPL) as per EN 438-6 type EDF manufactured with norm conformity of EN 438-7 using patented NT Technology (NT is Non fading high performance acrylic polyurethane surface Technology). Panels will be double hardened including acrylic polyurethane resin and thermally cured under high pressure. These Panels will have CE-Mark necessary for their use in building applications. Installation of FunderMax panels will be done by MBE Rivets (with Fixed and Sliding Points) with recommended Aluminum T section of 75*37*2.8 mm thick and L section 30*30*2.8mm thick held by Aluminum Wall Bracket with Wind load and Dead load slot as per design, anchored by standard anchor fasteners along with Thermal Separator. Installation of FunderMax Panels will be done using Rear Ventilated Principles only, which is ensured by providing ventilation gap minimum 200 cm2/ per Meter	Sqm	1040		
7	NDSR	FLAT METAL CEILING: Providing and installing suspended false ceiling systems as per control sample for Concourse and subway areas with hook n tiles and various tile sizes, butt jointed, fully demountable, 1.2mm thick flat pressed steel infill units and facia ceiling type finished with 80 micron thick powder coated to specification K40/217A, top fixing of SS expanding anchor bolts, rigid hangers, concealed type with trim inclusive of cutting for electrical fixtures/ fittings.VAC grills fixed framing to support fixtures/fittings and providing secondary supporting system below cable tray and duct and all complete as shown in drawings and specifications nos K40/106	Sqm	400		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
8	NDSR	<p>Providing and fixing of Grade 3003 Aluminum coil coated perforated metal silhouette false ceiling system using the grids of USG or CMC from their US plant and tiles from USG/ CMC/Armstrong/Hunter Douglas with the suspension system designed to suspend the entire false ceiling with the help of suspended rod of 4mm dia and clamps of size 26x26x2mm thick to be fastened with anchor fastener not less than 6mm dia to the soffit of slab beam. Minimum anchorage lengths shall be in the range of 50 to 60mm main runner 'Silhouette' profile shall be suspended from the soffit of slab at an interval of 1200x600mm center to center and appropriate distance as required to sustain the suspended load including all the fixtures as shown RCP cross runner</p> <p>having 'Silhouette' profile shall be 600mm center to center with interlocking arrangements in such a way to form grid of 600x600mm and fix the lay in tile in the grid pattern and laying of false ceiling polyester powder coated metal tile of size 597x597mmx9mm MICRO PERFORATED of 1.5 mm dia in a 3mm diagonal square pattern given 22%perforated area. in correct line and levels as per the approved design and drawings submitted. All steel sections to be marked with the manufacturer's registered trademark and hologram.</p> <p>The rate shall include marking levels and grid of entire false ceiling as per the RCP necessary wall angles and profiles between gypsum and metal false ceiling as per the drawing, tools and tackles for installation of the complete system. The entire false ceiling system shall be supplied by the metal false ceiling supplier. The cutouts required for the down lighters, sprinklers, speakers etc. shall be made at factory only.</p> <p>The rate shall include providing and fixing of a thin nonwoven fabric made of cellulosic and glass fibers (weight 47 g/m², thickness 0,2 mm) of approved make with a hot melt adhesive (15 g/m²) on back side of tile</p>	Sqm	450		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
		Rate includes providing and fixing of M.S angle support for false ceiling at under the AC ducts or other equipment where ever required, Using 65mmx65mmx6mm thick and painted with two coats of red oxide primer of required length supported to the true ceiling through 12mm thick G.I treaded rod with necessary hanger fasteners. complete. Also the rate includes of providing all around wall step profile with black/white powder coated aluminum profile to get 50mm x50 mm grove , and with Gyp board 12mm groove				
		Erection of false ceiling with lay in tile system with Aluminum Coil coated Grade 3003 of 600 x 600 x 9mm depth and 0.7mm thick tile with perforation with 1.5 mm thick approved quality non woven textile on back side for acoustic purpose in specified areas etc., and as per specification, drawings as directed.				
		TOTAL OF FALSE CEILING WORKS				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
10.0		PAINTING WORKS				
1	NDSR	Providing and applying two coats of Unitile's Rodeo or Spectrum Perlina fine or Heritage Granula Surface Texture paint after applying corresponding roller coat as primer on pre-plastered surface as per approved sample in approved shade. The composition of the texture paint should consist of ACRYLIC copolymer resins combined with quartz ,silica, mineral, aggregates, synthetic inorganic pigments, bactericide, fungicides and various other additives, giving the product water repellent properties. The first coat to be applied by brush or wool roller as a base coat, diluted with sufficient water and the final coat (Undiluted) to be applied by trowel and finished with acrylic trowel to maintain with or without grooves, as per details in drawings. The thickness of both coats should be 1.0 to 1.5mm. the water repellency of the product shall be $\geq 86\text{gm/m}^2$ as per test method IS:5410-1969, complete as per manufacturer's specifications and instructions by Engineer in Charge at site. The rate shall include necessary scaffolding, labour and material complete	Sqm	2000		
2	NDSR	Finishing new surfaces at all levels with 3 coats of approved Acrylic Emulsion of required shade over a thinned coat of emulsion as recommended by manufacturers, including primer coat and 15mm thick plaster to be done by contractor in 2 coats (thickness excludes dubbing out) in 1:4 (1 cement : 4 coarse sand) render with wood float finish over blockwork / brickwork, including surface preparation, beads / stops, etc. all complete as per specifications.	Sqm	16789.2		
3	NDSR	Applying epoxy based solvent free anti - dust concrete sealer (sealocote or equivalent) on fair faced blockwork/brickwork and concrete surfaces inclusive of surface preparation, over primer coat/ initial coat as per manufacturer's recommendation - all complete as per specification.				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
3.1	NDSR	Applying epoxy based solvent free three coat clear sealer on fair faced blockwork/brickwork and concrete surfaces inclusive of surface preparation, over primer coat/ initial coat as per manufacturer's recommendation - all complete as per specification	Sqm	1305.88		
4	NDSR	Providing and applying 3mm 1.5mm thick exterior Birla/JK or equivalent ready made putty in two coats over Brickwork/ Blockwork/ RCC surface of ceiling/beam/column etc. to prepare even and smooth surface including sand papering, grinding, scaffolding etc., complete as per direction of Engineer-in-Charge.	Sqm	10276		
5	NDSR	Providing and painting acrylic polyurethane enamel paint of approved brand and shade, on new work (plaster, wood or metal) two or more coats, to given an even shade, including one coat of primer, preparation of surface using automotive putty, thinners etc. surface duly emery papered to give a perfectly smooth and even prepared surface before painting etc. complete.	Sqm	800		
6	NDSR	Providing and applying Acrylic Smooth exterior paint with two or more coats of approved colour and shade to give an even shade. All as per manufacturer's specifications and as directed by the Engineer	Sqm	10643		
7	NDSR	Providing and applying Acrylic Emulsion to ceiling surfaces including necessary surface preparation, scaffolding / staging etc. All as per manufacturer's specifications and as directed by the Engineer	Sqm	5244		
8	NDSR	Providing and applying Acrylic emulsion paint on new work with two or more coats of approved colour and shade to give an even shade .	Sqm	14616		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
13	NDSR	Providing and painting acrylic polyurethane enamel paint of MRF or approved equivalent brand, manufacturer and shade, on new work (plaster, wood or metal), including one or more coats, to give an even shade, including provision or primer, preparation of surface using automotive putty, thinners etc. surface duly emery papered to give a perfectly smooth and even prepared surface before painting all as per specifications and as directed.	Sqm	800		
		Cladding to walls and columns in round and rectangular shape.				
15	NDSR	Providing and applying Exterior Emulsions Non Flat paint (VOC in 56.31 grams/liter) with two or more coats of approved colour and shade to give an even shade.	Sqm	13164		
16	NDSR	Providing and applying texture wall finish (exterior grade) of Spectrum/ Birla or equivalent to the wall surface of approved colour, design and specification all as per manufacturer's specification including all necessary scaffolding, cost of materials, labour, lead and lift at all levels and for all heights as approved by the engineer in charge.	Sqm	250		
		TOTAL OF PAINTING WORKS				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
11.0		MILD STEEL WORKS				
2	NDSR	Supplying and fixing automatic galvanized industrial motorized rolling shutters (heavy duty) of approved make i.e. Indo-Germa Ltd. Chennai or equivalent made of required sizes and shape with G.I guides control box drive unit and with all other accessories complete as per manufacturer's specifications.				
2.1		Extra for area exceeding 10sqm and up to 16.80 Sqm in area	Sqm	400		
2.2		Extra for area exceeding 16.80 Sqm in area	Sqm	0		
4	NDSR	Providing and fixing M.S. steel hand railing as per the design and drawings and specifications to staircase approximately 1200 mm high comprising of 32 mm dia 10 Gauge MS hollow tube vertically fixed to every fourth step welded to 50 mm dia 10 gauge MS pipe on top for handrail and 20 mm dia MS pipe vertically in between welded to 2 Nos of 20 mm dia M.S. Pipe all as per the drawings, the vertical balusters are fixed in position with molten lead poured into 40 mm dia GI sleeve with 80 x 80 x 3mm GI Plate and embedded in RCC including necessary steel cover and completed as shown in the drawings or any other method of fixing as approved by the Engineer in charge like epoxy grout fixing etc., complete. All M.S. members will be painted with two coats of synthetic enamel paint of approved make and colour over one coat of primer all as per manufacturer's instructions and with the engineer's approval.	Rm	550		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
7	NDSR	Providing and fixing swing and folding single shutter with MS louvers steel door of required size as per approved drawings, designs, specifications and directions as per the following details. Outer frames with 50 x 50 x 5mm MS angle frame and 4 leaved MS shutters and each leaf is made out of 40 x 40 x1.25 mm thick MS square section all round 40 x 4mm MS flats louvers fabricated as per the drawings with all necessary arrangements like pivot, hinges, with ball bearing movement, handles, stoppers, tower bolts and locking arrangements etc. including applying priming coat of red lead paint cost of materials, labour, HOM of machineries complete as per specifications including fixing to the walls as approved by the Engineer.	Sqm	160		
		TOTAL OF MILD STEEL WORKS				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
12.0		FIRE DOOR				
1	NDSR	<p>Fire Check doors design & supply of approved make fire rated door fabricated and successfully tested at CBRI Roorkee in both direction satisfying two criteria (Stability and Integrity) confirming to BS:476 part II, IS3614 Part II as per schedule of requirement, complete with shutters, frames, hinges, conforming to the design intent. All fire doors must conform to the requirements of fire authority having jurisdiction and as per prototype tested by approved fire testing agency acceptable to fire authority having jurisdiction.</p> <p>Door shutter and frames to have all hardware preparations must be prepunctured at the factory for fixing of said hardware. Shutters & frames to be filled with suitable fillers, insulation to meet the required fire resistance criteria as specified, with all grouting, reinforcements, flushed lock seam joints including all seals, washers, linings etc. complete. All fire doors to be primed and painted with approved painting system as per tested prototype and to approved colour. Provision of mortice sash lock (ML 100A) with S.S. lever handles and door closers heavy duty (imported) LCN 1461 with standard arm on every leaf, stainless steel hinges as per approved shop drawing.</p>				
1.1		60minutes (1 hour) fire rated metal door assembly	Sqm	50.4		
1.2		120 minutes (2 hour) fire rated metal door assembly	Sqm	591.36		
1.3		180minutes (3 hour) fire rated metal door assembly	Sqm	138.24		
2	NDSR	Clear Vision panel of 200mm*300mm per leaf with fire rating	Each	200		
3	NDSR	Heavy Duty Door closer	Each	200		
4	NDSR	Eurofile Mortice lock 240 with double pin cylinder master arrangement and SS handles	Each	200		
5	NDSR	Concealed SS finish tower bolts (300mm)	Each	200		
6	NDSR	Magnum or equivalent make SS 4 ball bearing hinges	Each	600		
7	NDSR	SS handles Dorma or equivalent make for double leaf door	Each	400		
8	NDSR	Dorma make panic bar for double leaf door or similar item or similar rate.	Each	16		
9	NDSR	Installation charges	Sqm	0		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
		TOTAL OF FIRE DOOR WORKS				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
13.0		CONCRETE WORK				
1	NDSR	Providing and fixing of Glass Reinforced Concrete(G.R.C)Jalli 40mm thick in approved size,patters,design,thickness and colour of M/S Unistone make or equivalent to be fixed on/between RCC/block work column or structural steel work with Dry fixing method with all appropriate steel frame work, stainless steel (SS-304) 'L' shaped clamps, dash fasteners and pins including anchoring,lifting,scaffolding etc. complete as per architectural drawing and manufacture specification The screens should be made from '53 grade' white portland cement manufactured by 'JK Cement' or equivalent, super plasticizers manufactured by 'BASF' or equivalent, polymers manufactured by 'BASF' or equivalent and UV resistant synthetic inorganic pigments should be used fro pigmentation manufactured by 'BAYFERROX (Germany) or equivalent . The material casting should take place in Synthetic rubber/FRP mould manufactured by Reckli or equivalent	Sqm	1600		
2	NDSR	Providing and fixing approved make Glass reinforced concrete GRC stone wall cladding tiles on external façade. The tiles in approved design, size 205mm x 60mm, texture, thickness, pattern and colour. the thickness of the tiles should range between 12 to 18mm (depending on texture of tiles), allowing variance ± 2 mm in accordance with IS: 1237- 1980. The composition of tile should be 43 grade white portland cement, reinforced with alkali resistant glass fiber and homogeneous pigmentation should be done with exterior grade synthetic inorganic iron oxide the other additive should be fine washed graded quartz, super plasticizers and integrated water proofing agent. The Compressive strength of tile should be M40	Sqm	1600		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
		The Tile should be applied on rough plaster 1:3 (1 cement : 3 coarse sand) as per approved pattern as shown in the drawings pointed neatly with white cement mixed with matching pigment including curing and finishing in all respect at all heights complete in all respect including the cost of scaffolding, etc. complete as per drawings / specifications and directions of architect / engineer-in-charge.				
3	NDSR	Providing and applying anti dust sealer (epoxy coating) 1000μ thick epoxy floor coating along with necessary floor preparation by ASIAN PAINTS PPG make or equivalent with use of APCPFLOOR HFP 120 Two component, high solid, epoxy resin based floor primer @50 μ & then topcoat APCOFLOOR SL2 Self levelling coatings with excellent flow & levelling characteristics, conforms to the Global Migration Standards laid down in US-FDA: 21CFR 175-300 and also having mechanical properties such as compressive strength 51 mpa (ASTM C 579), Flexural strength 12 mpa (ASTM C 580) & Tensile Strength 8 mpa (ASTM C 307) on floor as per approved colour and shade. Floor condition shall be of Trimix and the moisture content of the concrete flooring should be less than 5%	Sqm	800		
4	NDSR	Providing and laying 18mm thick cement plaster skirting (up to 45cm height) with cement mortar 1:3 (1 cement: 3 coarse sand) finished with a floating coat of neat cement.	Sqm	80		
5	NDSR	Providing and laying 50mm thick cement concrete granolithic flooring 1:2:4 (1 cement : 2 coarse sand: 4 graded stone with 20mm nominal size stone aggregate) finished with Non-metallic Monolithic surface using hardening compound such as Nitoflor Hardtop Standard of Fosroc or approved equivalent to Concrete floor to develop proper bonding and to seal, harden, water-proof, improve abrasion, chemical resistance and to form a dust free surface as per manufacturer's specifications. Using power trowel including aluminum strips 40mm wide and 2mm thick in joints of cement concrete floor etc. complete.	Sqm	4240		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
6.1		Light shade pigment using white cement	Sqm	0		
6.2		Medium shade pigment using 50% white cement & 50% ordinary cement	Sqm	0		
6.3		Dark shade pigment using ordinary cement	Sqm	0		
10	NDSR	Providing and laying concrete panels of M15 grade for compound walls as per drawing	Rm	400		
		TOTAL OF CONCRETE WORKS				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
14.0		LANDSCAPING AND EXTERNAL WORKS				
1	NDSR	Construction of Rain water harvesting pit with necessary cement rings and filling with brick bat, 20mm blue metal, sand , pebbles and providing perforated PVC pipes and covering with RCC manholes as per architectural drawings.	Nos	16		
		TOTAL OF LANDSCAPING AND EXTERNAL WORKS				
15.0		WATER PROOFING WORKS				
1	NDSR	Providing and laying integral cement based treatment for water proofing on the vertical surface by fixing specified stone slab 20mm thick with cement slurry mixed with water proofing compound conforming to IS: 2645 in recommended proportion with a gap of 20 mm (minimum) between stone slabs and the receiving surfaces and filling the gaps with neat cement slurry mixed with water proofing compound and finishing the exterior of stone slab with cement mortar 1:4 (1 cement : 4 coarse sand) 20 mm thick with neat cement punning mixed with water proofing compound in recommended proportion complete at all levels and as directed by Engineer-in-charge.	Sqm	1675		
		Providing and laying Brick bat water proofing treatment for terrace with the following including cleaning the RCC slab top surface.				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
2	NDSR	Providing on top of slab surface cement slurry mixed with water proofing compound thereafter providing cement mortar 1:4 (1 cement : 4 coarse sand) 20mm thick with polymer based water proofing compound and layer of new half broken bricks (coba) giving gaps of 15-20mm between broken bricks, providing necessary gradient for proper flow of water and providing cement slurry with water proofing compound spread over brick bat coba in cement mortar 1:4 (1 cement : 4 coarse sand) with water proofing compound filled in gaps of broken bricks and 20mm plaster in cement mortar 1:4 (1 cement : 4 coarse sand) mixed with polymer based water proofing compound, top finished smooth with neat cement and providing rope chequers including extending the water proof plaster 300mm on vertical surfaces with necessary chasing / treating of walls including providing and making gola as per drawing etc. Average thickness of the brick bat coba to be 125mm.	Sqm	6658		
		The item also include providing and making khurrahs 450mm x 450mm/ 300mm x 300mm with average minimum thickness of 50mm cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate of 20 mm nominal size) finished with aluminum foil and 12mm cement plaster 1:3 (1 cement : 3 coarse sand) and a coat of neat cement rounding the edges and making and finishing the outlet complete. (Plan area will be measured and paid)				
3	NDSR	Extra for providing and mixing water proofing compound in cement plaster for masonry work at one kg per bag or in the proportion recommended by the manufacturers, for cement mortar 1:4, 18 mm thick including cost of materials complete as per specification for all heights.	Sqm	80		
		TOTAL OF WATER PROOFING WORKS				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
16.0		SPECIAL ITEMS				
1	NDSR	Supply and installation of 16 gauge thick cold rolled exterior panel polished finish stainless steel sheet (ASTM A240, type 316) of panel size 1.2m x 3.6m (Max) with interlocking edges, fitted with continuous gaskets. As per drawing.	Sqm	80		
2	NDSR	Providing & installation of approved quality vertical linear baffle ceiling made out of folded Aluminum. The baffle units shall be in size of 50mm (W) x 150mm (H) and 1000mm x 4500mm x 1mm (thk), non-perforated. The ceiling baffle units shall be installed at a distance of 300mm c/c in one direction. The baffle units shall be attached to C-channel carriers spaced at 1200mm c/c. The C-channel carriers shall then be cross connected to perforated L-angle primary grid and suspended with M6 threaded rod hangers spaced at 1200mm and pertaining to Class A Fire Rated, as per ASTM E-84	Sqm	400		
		<p>PTFE-coated glass cloth membrane made of Support cloth of High-strength glass cloth, EC 3/4, Weave of Linen or panama weave and coated with PTFE on both sides. And these shall be with following properties.</p> <p style="text-align: center;">Properties</p> <p>Test Method Type III</p> <p>Finished Coated Weight (g/m2) DIN 53354 1305</p> <p>Breaking Strength - Warp(N/5cm) DIN 53354 7000*</p> <p>Breaking Strength – Weft (N/5cm) DIN 53354 6000*</p> <p>Tear Strength – Warp (N) DIN 53363 500*</p> <p>Tear Strength – Weft (N) DIN 53363 500*</p> <p>Coating Adhesion (N/5cm) DIN 53357 100*</p> <p>Translucency (% @ 550nm) 12</p> <p>Reflectance (%) ASTM E424 73</p>				

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)																											
3	NDSR	<p>*These values are “minimum values” determined by average of testing prescribed across fabric web. Other values are nominal values within +/-10%.For pigmented products, translucency will go to zero (0) and reflectance value will vary based on the color. The testing listed above is performed and reported for each production roll. Additionally, biaxial testing is done for each roll using MSAJ method, 1:1 stress ratio.</p> <p>The following characteristic values describe the attributes of the material and should be confirmed through the manufacturer and/or third party test reports. These tests are not performed on an individual roll basis.</p> <table> <thead> <tr> <th>Properties</th> <th>Test Method</th> <th>Type III</th> </tr> </thead> <tbody> <tr> <td>Grey Cloth Weight (g/m2)</td> <td>DIN 53854</td> <td>485</td> </tr> <tr> <td>Fire Testing</td> <td>EN 13501</td> <td>B1-s1-d0</td> </tr> <tr> <td colspan="3">Burning Characteristics</td> </tr> <tr> <td>Flame Spread</td> <td>ASTM E84</td> <td>5 max</td> </tr> <tr> <td>Smoke Generation</td> <td>Tunnel Test</td> <td>10 max</td> </tr> <tr> <td>Incombustibility of Substrates</td> <td>ASTM E136</td> <td>Pass</td> </tr> <tr> <td>Flame Resistance</td> <td>ASTM 108</td> <td>Class A</td> </tr> <tr> <td>Methylene Blue Mineralization</td> <td>ISO 10678:2010</td> <td>15</td> </tr> </tbody> </table>	Properties	Test Method	Type III	Grey Cloth Weight (g/m2)	DIN 53854	485	Fire Testing	EN 13501	B1-s1-d0	Burning Characteristics			Flame Spread	ASTM E84	5 max	Smoke Generation	Tunnel Test	10 max	Incombustibility of Substrates	ASTM E136	Pass	Flame Resistance	ASTM 108	Class A	Methylene Blue Mineralization	ISO 10678:2010	15	Sqm	1600		
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S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
6	NDSR	Design, supply, and erection of Tee Pee System in ready to fit condition with top roof made of pre-straint 650 to 950 gram per square meter with strength 250/250 daN/5 cm, Tear Strength 25/20 daN with Flame Remisant M2/NFP 92-507 monsoon protected with. If it will be our STD model, No welding / fabrication work is allowed to carry out at site other then assembling and grouting. Steel structure should be galvanized. For Customised Models Minimum Welding/Fabrication work will be done at site. Supply and installation of Tensile Modular structure made up with Hot Dip Galvanized Steel Tubes and cover made with Water proof, UV & Flame Retardant Architectural Fabricing for locations at Footpath, Sky walk, Foot over bridge and locations as directed by client/engineer. This item includes concrete in foundations, holding down bolt (or welding with the existing steel structure on base plate), Hot Dip Galvanized MS structure which is modular in nature and fabric which coregent and rust free, highly fired retardant with life expectancy ten years, UV protected. The weight of fabric may vary between 700 g/sq.m to 900 g/sq.m with tensile strength between 280 daN/5cm to 350 daN/5 cm and Tear strength varying between 28 daN to 40 daN. The payment shall be plan area per square meter and as directed by Engineer in charge. (Excluding Civil Work)	Sqm	200		
7	NDSR	Providing and laying of Full-Body Vitrified Tiles of approved make and quality of required size and thickness for flooring in required position,laid on bed of C.M.1:4 including cement float with white colour cement slurry with cleaning and complete curing,including 5mm spacers with Epoxy Joint filler of matching colour as per approved samples and details of Tiles Mentioned in Drawings and as directed by Engineer in charge.				
	(i)	Size of Tiles-1200mmx600mmx14.5mm	Sqm	1,500		
	(ii)	Slab- 900mmx600mm	Sqm	1,100		
	(iii)	Steps up of size-1200mmx300mm with rounding bull-nose and elevated ridges	Sqm	800		

S.No	NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
	(iv)	Steps up of size-900mmx300mm with rounding bull-nose and elevated ridges	Sqm	700		
8	NDSR	Providing and laying "Cipy flooring unlimited" with Epoxy technology, self levelling CipoxySL low Roller coating FC 100, FC. Surface grinding with Diamond Cutter, applying Cipoxy 16 as penetration Primer, Epoxy Self Leveling screed for 2 mm and later surface putty using Talc and Epoxy Base Cipothane 50 G, and Finish coat of 1 mm Pigmented Self Leveling in Gloss as directed by Engineer in charge.	Sqm	5,000		
		TOTAL OF SPECIAL ITEMS				
		TOTAL OF ARCHITECTURAL WORKS				

*RO- Rate only defined as below

The contractor shall quote the rates for this item. The above Schedule will be added for final evaluation of bidder as per point 2 of important note to bidder as mentioned in preamble of financial BOQ. These items will be operated as required as per the instruction of The Client or The Architect or The Engineer in-charge with no claim from either parties.

Name of the work: CONSTRUCTION OF EIGHT NUMBER OF ELEVATED METRO STATIONS VIZ PRAJAPATI NAGAR ,
VAISHNO DEVI SQUARE , AMBEDKAR SQUARE, TELEPHONE EXCHANGE SQUARE, CHITTAR OLI SQUARE, AGRASEN
SQUARE, DOSAR VAISYA SQUARE & NAGPUR RAILWAY STATION ON THE EAST-WEST CORRIDOR (REACH-4) OF
NAGPUR METRPO RAIL PROJECT

SUMMARY: (SCHEDULE-E) DSR ITEMS

Architectural and Site Developemnt works		
S.No	Description	Amount (Rs)
1.0	MASONRY WORKS	
2.0	STONE WORKS	
3.0	WOOD WORKS AND IRON MONGREY	
4.0	LANDSCAPING AND EXTERNAL WORKS	
GRAND TOTAL OF SCHEDULE -E		

CONSTRUCTION OF EIGHT NUMBER OF ELEVATED METRO STATIONS VIZ PRAJAPATI NAGAR , VAISHNO DEVI SQUARE , AMBEDKAR SQUARE, TELEPHONE EXCHANGE SQUARE, CHITTAR OLI SQUARE, AGRASEN SQUARE, DOSAR VAISYA SQUARE & NAGPUR RAILWAY STATION ON THE EAST-WEST CORRIDOR (REACH-4) OF NAGPUR METRPO RAIL PROJECT						
S.No	DSR-2014 S.No	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
1.0		MASONRY WORKS				
A		BRICK MASONRY				
1	6.1.1	Providing and constructing burnt brick masonry with approved quality bricks of standard size of class designation 7.5 (table moulded) with cement mortar 1:4 for basement and super structure including the cost of materials, labour charges, scaffolding, cuing etc., complete for rectangular, curved or circular brick work etc., in pier or around the concrete columns/ walls all as per specifications, drawings and as directed etc., complete, at any height including all lead and lift.	Cum	3566.40		
2	6.1.2	Providing and constructing burnt brick masonry with approved quality bricks of standard size of class designation 7.5 (table moulded) with cement mortar 1:6 for basement and super structure including the cost of materials, labour charges, scaffolding, cuing etc., complete for rectangular, curved or circular brick work etc., in pier or around the concrete columns/ walls all as per specifications, drawings and as directed etc., complete, at any height including all lead and lift.	Cum	199.69		
3	6.13.1	Providing and construction of partition wall half brick masonry with table moulded burnt bricks of class designation 7.5 with cement mortar 1:3 including cost of materials, labour charges, scaffolding, curing etc., complete as per specifications at any height including all lead and lift charges.	Sqm	163.91		
4	6.13.2	Providing and construction of partition wall half brick masonry with table moulded burnt bricks of class designation 7.5 with cement mortar 1:4 including cost of materials, labour charges, scaffolding, curing etc., complete as per specifications at any height including all lead and lift charges.	Sqm	80.00		

S.No	DSR-2014 S.No	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
B		PLASTERING WORK				
6	13.1.1	Providing and applying 12 mm cement plaster of mix 1:4 (1 cement : 2 parts coarse sand + 2 parts fine sand) including providing galvanized chicken wire mesh at the junctions of concrete and masonry work including side laps of minimum 75mm and fixing in position with galvanized wire nails including scaffolding etc. complete.	Sqm	800.00		
7	13.1.2	Providing and applying 12 mm cement plaster of mix 1:6 (1 cement : 3 parts coarse sand + 3 parts fine sand) including providing galvanized chicken wire mesh at the junctions of concrete and masonry work including side laps of minimum 75mm and fixing in position with galvanized wire nails including scaffolding etc. complete.	Sqm	160.00		
8	13.2.1	Providing and applying in two coats 15mm cement plaster on external surfaces in 1:4 (1 cement : 2 parts coarse sand + 2 parts fine sand) including providing galvanized chicken wire mesh at the junctions of concrete and masonry work including side laps of minimum 75mm and fixing in position with galvanized wire nails including scaffolding etc. complete etc. complete.	Sqm	1200.00		
9	13.2.2	Providing and applying in two coats 15 mm cement plaster on external surfaces in 1:6 (1 cement : 3 parts coarse sand + 3 parts fine sand) including providing galvanized chicken wire mesh at the junctions of concrete and masonry work including side laps of minimum 75mm and fixing in position with galvanized wire nails including scaffolding etc. complete etc. complete.	Sqm	160.00		
10	13.3.1	Providing and applying in two coats 20 mm cement plaster on external surfaces in 1:4 (1 cement : 2 parts coarse sand + 2 parts fine sand) including providing galvanized chicken wire mesh at the junctions of concrete and masonry work including side laps of minimum 75mm and fixing in position with galvanized wire nails including scaffolding etc. complete etc. complete.	Sqm	160.00		

S.No	DSR-2014 S.No	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
11	13.3.2	Providing and applying in two coats 20 mm cement plaster on external surfaces in 1:6 (1 cement : 3 parts coarse sand + 3 parts fine sand) including providing galvanized chicken wire mesh at the junctions of concrete and masonry work including side laps of minimum 75mm and fixing in position with galvanized wire nails including scaffolding etc. complete etc. complete.	Sqm	80.00		
12	13.16.1	Providing and applying 6mm thick cement plaster to ceiling of mix 1:3 (1 cement : 3 fine sand) including hacking RCC, scaffolding, drip mold etc. complete.	Sqm	80.00		
		TOTAL MASONRY WORKS				

S.No	DSR-2014 S.No	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
2.0		GRANITE AND STONE WORKS				
A		SAND STONE				
23		Stone work (machine cut edges) for wall lining etc. (veneer work) up to 10 meter height, backing filled with a grout of average 12 mm thick cement mortar 1:3 (1 cement : 3 coarse sand) including pointing in white cement mortar 1:2 (1 white cement : 2 stone dust) with an admixture of pigment matching the stone shade : (To be secured to the backing and the sides by means of cramps and pins which shall be paid for separately) :		0		
23.1		Sand stone - Exposed face machine cut and table rubbed with rough backing.				
23.2	7.23.1.5	30 mm thick	Sqm	0		
		TOTAL OF GRANITE AND STONE WORKS				

S.No	DSR-2014 S.No	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
4.0		LANDSCAPING AND EXTERNAL WORKS				
1		Providing and laying factory made coloured chamfered edge Cement Concrete paver blocks of required strength, thickness & size/shape, made by table vibratory method using PU mould, laid in required colour & pattern over 50mm thick compacted bed of fine sand, compacting and proper embedding/laying of inter locking paver blocks into the sand bedding layer through vibratory compaction by using plate vibrator, filling the joints with jamuna sand and cutting of paver blocks as per required size and pattern, finishing and sweeping extra sand in footpath, parks, lawns, drive ways or light traffic parking etc. complete as per manufacturer's specifications & direction of Engineer-in-Charge.		0		
1.1	16.94	80mm thick C.C. paver block of M-30 grade with approved colour, design & pattern.	Sqm	6564.00		
2	16.92	Providing and fixing 10x10x7.50 cm Granite stone block hand cut and chisel dressed on top, for paving in floors, drains etc. laid over 20mm thick base mortar 1:4 (1cement:4 coarse sand) with joints 10mm wide filled with same mortar including ruled pointing etc. complete as per direction of engineer-in charge.	Sqm	6250.00		
3	16.93	Providing and placing in position 100mm thick factory made machine batched & machine mixed Precast RCC Rectangular Covers on drains of footpath of various sizes, of M-25 grade cement concrete for RCC work, including cost of centering, shuttering, reinforcement of 8mm dia TMT bars of Fe 500 grade @ maximum 100mm c/c on both ways, neat cement punning on finished surface, properly encased on all edges with 1.6 mm thick, 100mm wide MS sheet duly painted over priming coat, reinforcement to be welded at edges with MS sheet and providing 2 Nos. 12 mm dia bar for hooks etc. i/c cost of cartage, all leads & lift, handling at site etc. all complete as per direction of Engineer-in-Charge	Sqm	700.00		

S.No	DSR-2014 S.No	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
4	16.69	Providing and laying at or near ground level factory made curb stone of M-25 grade cement concrete in position to the required line, level and curvature jointed with cement mortar 1:3 (1 cement : 3 coarse sand), including making joints with or without grooves (thickness of joints except at sharp curve shall not to more than 5 mm), including making drainage opening wherever required complete etc. as per direction of Engineer-in-Charge (length of finished curb edging shall be measured for payment). (Precast C.C. curb stone shall be approved by Engineer-in-Charge).	Cum	710		
5	7.36	Wall lining butch work up to 10 m height with Dholpur stone 40 mm thick rough facing on the exposed surface with stone strips of minimum length 300 mm and required width, including embedding every tenth layer and bottom most layer in masonry or concrete after making necessary chases of size 75x75 mm and by providing layer of 75 mm thick strips i/c 12 mm thick bed of cement mortar 1:3 (1 cement : 3 coarse sand) i/c ruled pointing in cement mortar 1:2 (1 white cement : 2 stone dust) with an admixture of pigment to match the shade of stone complete as per direction of Engineer-in charge.	Sqm	950.00		
6		Providing and fixing 18 mm thick gang saw cut, mirror polished, pre moulded and pre polished, machine cut for kitchen platforms, vanity counters, window sills, facias and similar locations, of required size, approved shade, colour and texture laid over 20 mm thick base cement mortar 1:4 (1 cement : 4 coarse sand), joints treated with white cement, mixed with matching pigment, epoxy touch ups, including rubbing, curing, moulding and polishing to edges to give high gloss finish etc. complete at all levels.		0		
6.1	8.2.1.2	Raj Nagar Plain white marble / Udaipur green marble / Zebra black marble	Sqm	1550.00		

S.No	DSR-2014 S.No	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
7	4.17	Making plinth protection 50mm thick of cement concrete 1:3:6 (1 cement : 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) over 75 mm bed of dry brick ballast 40 mm nominal size well rammed and consolidated and grouted with fine sand including finishing the top smooth.	Sqm	750.00		
		TOTAL OF LANDSCAPING AND EXTERNAL WORKS				
		TOTAL OF ARCHITECTURAL WORKS				

SUMMARY (SCHEDULE - F)

SCHEDULE - F (SUMMARY SHEET FOR STATIONS)		
	Electrical, Public Health Engineering, Fire Protection and HVAC System	Amount (Rs.)
Item	Description	
E	Electrical	
F	Fire Protection	
H	HVAC system	
P	Public Health Engineering	
	Grand Total of Schedule - F	

Name of Work: CONSTRUCTION OF EIGHT NUMBER OF ELEVATED METRO STATIONS VIZ PRAJAPATI NAGAR , VAISHNO DEVI	
SCHEDULE-F ELECTRICAL, PUBLIC HEALTH ENGINEERING,FIRE PROTECTION AND HVAC SYSTEMS	
E	General Notes for Electrical Works
1	The BOQ specified below include the latest relevent standards, specifications, drawings (In conjunction 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.
E1	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
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
c)	The panel shall have tinned copper busbars with bar type feeder connections, spacers etc.and neutral busbar shall be of 50%
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,
f)	Each incomer and outgoing feeder shall be provided with multiple LED/neon type status indication lamps suitable for 230 V, AC as
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,

i)	Switchboard including interconnections, labeling, earthing, associated foundation / masonry work & erection etc. complete as
j)	All MCCBs shall be current limiting type microprocessor based, rated for requisite specified Service short circuit breaking capacity
k)	MCCBs shall be compact (As the Engineer may decide), suitably designed to provide protection of motors, cables, busbars to suit
l)	All the MCCBs shall be provided with potential free contacts for connectivity to PLC in ESR/Pump Room for ON/OFF status and
m)	MCCBs shall conform to IEC898/IS 8828 (latest) and, with breaking capacity 9/10 kA at 415 V AC, current limiting type lower
n)	Panel/board design shall be compact and components / accessories of compact sizes be used to economise the room space
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
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.
r)	Various panels/boards as given below:

Sl.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
1.1	Main Distribution Board (MDB1 and MDB 2)				
	Main Distribution Board (MDB)as per specifications & as per following details:	No.	8		
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.				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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				

Sl.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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.				
	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 summing CTs for above two incomer metering supporting SCADA/BMS connectivity				
F	MDB1 OUTGOINGS -For KPR,NAR,ARS,ASQ and ARP (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.				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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 -For JPN,UJR, CSQ,RCN and CNR (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				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
1.2	Capacitor Panel				
	Capacitor Bank Panel (75kVAR) as per specifications & as per following details:	No	16		
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.				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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				
1.3	Essential Main distribution Board (EMDB) complete with automatic source transfer system as per specifications and as per following details	No	8		
	Automatic source transfer system suitable for the below				

Sl.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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 summing 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				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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:	No	8		
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)				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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 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 suitable size summing 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:	No	8		
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				
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.				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
	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:	No	8		
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.				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
1.7	Water pump Panel (WPP) as per specifications and as per following details	No.	8		
	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)				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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)	2 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 puch buttons				
b4)	Auto / Manual selector switch.				
b5)	Amber healthy trip indicating lamps				
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.				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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.	Presetable 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.	No.	8		
	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 Smm.				
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				

Sl.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
	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 summing 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: (For KPR,NAR,ARS,ASQ and ARP (TYPE 1))	No.	4		
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.				

Sl.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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: For RCN and CNR (TYPE 2)	No	3		
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				

Sl.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
	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: For JPN,UJR and CSO (TYPE 3)	No	1		
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 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) 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 as per specifications and as per following details:	No.	8		

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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.				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
1.13	DIESEL GENERATOR				
	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 confirm 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.	No.	8		
	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				
	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.				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
1.14	Synchronizing Panel for Solar power Intake				
	Supply,Installation,Testing and commissioning of synchronizing panel comprising of	No	8		
	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.				
	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				

Sl.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
	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				
1.15	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 ,basbar, other sub-systems, accessories etc complete as required and as per specifications and as specified in of item 1.0 above				
a)	1 no. 800 A, 415V, 50kA, 4P draw out Electrically operated ACB complete with:	Deleted and Shifted to Schedule-H			
	1- set Red/Green ON/OFF indicating lamps				
	1- set of three phase (red, yellow, blue) indicating lamps				
	Amber healthy trip indicating lamps				
	3 nos. cast resin current transformers of 800/5 ratio with 15 VA Burden & Class 5P10 for protection				
	3 nos. cast resin current transformers of 800/5 ratio with 15VA burden and Class 1.0 for measurement				
	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.				
	230V AC or 24 V DC shunt trip coil				
	230V, AC Motor wound spring closing mechanism.				
b)	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)	Deleted and Shifted to Schedule-H			

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
c)	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)				
		Deleted and Shifted to Schedule-H			
d)	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				
		Deleted and Shifted to Schedule-H			
e)	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				
		Deleted and Shifted to Schedule-H			
f)	Less than 63A to 40A, 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				
		Deleted and Shifted to Schedule-H			
g)	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				
		Deleted and Shifted to Schedule-H			
h)	5-32A FP MCB 9/10 kA				
		Deleted and Shifted to Schedule-H			
j)	5-32A TP MCB 9/10 kA				
		Deleted and Shifted to Schedule-H			
l)	5-32A DP MCB 9/10 kA				
		Deleted and Shifted to Schedule-H			
m)	40-63A DP MCB 9/10 kA				
		Deleted and Shifted to Schedule-H			
n)	5-32A SP MCB 9/10 kA				
		Deleted and Shifted to Schedule-H			
o)	40-63A SP MCB 9/10 kA				
		Deleted and Shifted to Schedule-H			
p)	16-32Amp DP RCCB, 30 mA				
		Deleted and Shifted to Schedule-H			
1.16	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.				
		Deleted and Shifted to Schedule-H			
1.17	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.				
		Deleted and Shifted to Schedule-H			
1.18	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.				
		Deleted and Shifted to Schedule-H			

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
1.19	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				
		Deleted and Shifted to Schedule-H			
E2	DISTRIBUTION BOARDS				
	Supply, installation, testing & commissioning of front operated front access cubical type indoor duty dead front wall / recess/				
a)	MCBs shall conform to IEC898/IS 8828 (latest) and, with breaking capacity 9/10 kA at 415 V AC, current limiting type lower				
b)	Residual current circuit breaker (RCCB) conforming to IS 12640 shall be provided with 30 mA sensitivity and electrically connected				
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				
e)	All the contactors shall be provided with potential free contacts for remote monitoring and control.				
f)	Various distribution boards as given below:				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
2.1	Lighting/Power distribution boards (LDB/PDB) as per specification and as per following details.	No.	82		
	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 including a set of time switches as per specifications and as shown on Drawing and as under:				
A	Normal				
	INCOMER				
	a. 1 no. 32A TP Contactor with timer				
	b. 1 no. 32A TP MCB				
	c. 1 set of (ON) indicating lamps for each				
	OUTGOINGS with feeder (ON) indication lamps				
	a. 24 nos. 10A/20A SPMCB arranged in three rows and each row controlled by one no. 32A DP MCB 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)				
	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.				
2.2	Lighting distribution boards (LDB/PDP) as per specification and as per following details.	No.	80		
	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:				

Sl.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
2.2.1	INCOMER				
a.	1 no. 40A TP MCB				
b.	1 set of (ON) indicating lamps.				
2.2.2	OUTGOINGS				
a)	18 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.				
2.3	Vertical Power distribution boards (VDPN) as per specification and as per following details.	No.	16		
	INCOMER				
	1 no. 80 TP MCCB				
	1 set of (ON) indicating lamps.				
	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.				

Sl.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
E03	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, FRLS, 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	m	1,300		
b)	3.5 core 300 sq mm Al conductor	m	1,360		
b1)	3.5 core 240-sqmm Al conductor	Deleted and Shifted to Schedule-H			
c)	3.5 core 185-sqmm Al conductor	m	750		
c1)	3.5 core 150 sq mm Al Conductor	Deleted and Shifted to Schedule-H			
d)	3.5 core 120-sqmm Al conductor	m	200		
d1)	3.5 core 95 sq mm Al Conductor	m	112		
e)	3.5 core 70-sqmm Al conductor	m	240		
f)	3.5 core 50 sq mm Al Conductor	m	2,455		
g)	3.5 core 35-sqmm Al conductor	m	1,866		
h)	3.5 core 25-sqmm Al conductor	m	3,031		
i)	4 core 16 sq mm Cu Conductor	m	13,111		
j)	4 core 10 sq mm CU Conductor	m	5,390		
k)	4 core 6 sq mm CU Conductor	m	1,512		
l)	4 core 4 sq mm Cu Conductor	m	1,005		
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.	76		
b)	3.5 core 300 sq mm Al conductor	Nos.	52		
b1)	3.5 core 240-sqmm Al conductor	Nos			
c)	3.5 core 185 sqmm Al conductor	Nos.	20		
c1)	3.5 core 150 sq mm Al. Conductor	Nos			
d)	3.5 core 120 sqmm Al conductor	Nos.	20		
d1)	3.5 core 95 sq mm Al. Conductor	Deleted and Shifted to Schedule-H			
e)	3.5 core 70 sqmm Al conductor	Nos.	16		
f)	3.5 core 50 sq mm Al. Conductor	Nos.	54		
g)	3.5 core 35 sqmm Al conductor	Nos.	30		
h)	3.5 core 25 sqmm Al conductor	Nos.	100		
i)	4 core 16 sq mm CU Conductor	Nos.	288		
j)	4 core 10 sq mm CU Conductor	Nos.	316		

Sl.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
j)	4 core 6 sq mm CU Conductor	Nos.	320		
j)	4 core 4 sq mm CU Conductor	Nos.	320		
3.1.3	Supply, laying testing and commissioning of 1.5 sqmm 1100 V grade, armoured, FRLS 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	m	520		
b)	5 C x 1.5 sqmm				Deleted and Shifted to Schedule-H
c)	7 C x 1.5 sqmm				Deleted and Shifted to Schedule-H
d)	8 C x 1.5 sqmm				Deleted and Shifted to Schedule-H
e)	10 C x 1.5 sqmm				Deleted and Shifted to Schedule-H
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				Deleted and Shifted to Schedule-H
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				Deleted and Shifted to Schedule-H

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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				
				Deleted and Shifted to Schedule-H RO	
d)	Flexible joints Consists of a right hand and left hand unit Used to change direction, change level or overcome obstructions				
				Deleted and Shifted to Schedule-H	
3.3	Cable Trays				
3.3.1	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)	300 mm wide x 50 mm deep x 2mm thick	m	5,794		
b)	200mm wide x 50mm deep x 2mm thick	m	1,310		
c)	150mm wide x 50mm deep x 2mm thick	m	3,990		
d)	100mm wide x 50mm deep x 2mm thick	m	3,824		
3.4	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 x 2mm thick	m	753		
b	600 mm wide x 2mm thick	m	470		

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
c	450 mm wide x 2mm thick	m	509		
d	300 mm wide x 2mm thick	Deleted and Shifted to Schedule-H			
3.5	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 electrically continuous as approved and of following sizes.				
a)	100 x 100 MM	Deleted and Shifted to Schedule-H			
b)	100 x 50 MM	m	720		
c)	150 X 100 MM	m	4,281		
d)	150 x 150 MM	Deleted and Shifted to Schedule-H			
3.6	STEEL WORK	kg	13,200		
	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.				
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 Lightning 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, JB's etc. The laying cost shall also include chipping works if necessary.				
a	Primary Point (30M length)	Points	700		
b	Secondary Point	Points	4,410		

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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	m	32,300		
b	3R of 1 c x 4 Sqmm			Deleted and Shifted to Schedule-H	
c	3c x 2.5 Sqmm			Deleted and Shifted to Schedule-H	
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 (30M length)	Points	400		
b	Secondary Point	Points	470		
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	Mtr.	36,350		
b	4c x 6 SqMM			Deleted and Shifted to Schedule-H	
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	200		
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	640		
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	80		
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	80		
4.9	S&F of 32 A 4P isolators with box complete as required by the engineer	Nos	64		
4.10	S&F of 63 A 4P isolators with box complete as required by the engineer	Nos	16		

Sl.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
E5	INDOOR LIGHTING AND FANS				
	Supply, installation, testing & commissioning of light fittings including all accessories e.g. ballast, HPF condensers, lamps, holders,				
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				
b.	All the components including the internal wiring of the luminaries to be used shall be manufactured of material, which are of low				
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				
	IEC 62031 LED modules for general lighting-Safety requirements				
	EN 61547 Equipment for general ighting purposes - EMC iimunity requiemnt.				
	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.				
	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 >100 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	No	1,102		

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
5.2	Mid flux LED using efficient optics , System lumen efficacy > 100Lumen/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 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	Deleted and Shifted to Schedule-H			
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 color temperatures of 6500K with CRI>80 and a system lifetime of 40,000 burning hours at 70 percent lumen maintenance. It has an 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. Philips BN108C LED 40S PSU CDL WH	No.	1,532		
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.	No	335		

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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	No	990		
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 suspension rods and end caps TTX 199/03LED	No.	360		
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	No	256		

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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 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	No	40		
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 Philips: BVP120 LED70 CW FG S1 PDC GP	Deleted and Shifted to Schedule-H			
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 > 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 .PHILIPS: BVP410 LED 107 CW HE NB FG S1 PDC GP	Deleted and Shifted to Schedule-H			
	FANS				
5.11	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.	Deleted and Shifted to Schedule-H			

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
5.12	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	No.	80		
5.13	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	Deleted and Shifted to Schedule-H			
5.14	High Voltage Low Speed (HVLS FANS) - 8 per station				
a	Supply and Installation of 10 feet diameter HVLS fans without gearbox, with IP 65 protection, having Safety Cable, Standard Mount, Blade Retainer Links, and Guy Wires	No.	288		
b	Assembly charges	No.	288		
E6	PROTECTIVE EARTHING				
6.1	Earthmat				
6.1.1	Supply, laying, testing and commissioning of 25 mm dia Copper bound MS rod for earth mat grid conductor (at 1000mm or deeper as per the final approved design as per the site condition) as per specifications including lap (if required) shall not be less than 150mm & cross Exothermic 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).				
6.1.2	Supply, laying, testing and commissioning of vertical earth electrodes of 25 mm dia Copper bound MS rod, 3 m deep from earth mat including exothermic weld joints with earth mat as per approved drawings and specifications. The weld joints to be provided with bitumin coats.	Lumpsum	8		

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
6.2	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.				
	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	No.	80		
6.4	Supply, Installing,Testing and commissioning of 25mm dia ,3m length ,pipe in pipe Chemical earth electrode (ground enhancing material conforming to IEC 62561-7) complete as required as per IEEE 80 :2000 and IS-3043-1987 for earthing.	No	80		
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 .				
6.5.1	50 mm x 6 mm GI strip	m	7,820		
6.5.2	25 mm X 6 mm GI strip	m	1,900		
6.5.3	20 mm X 3 mm GI strip	m	1,900		
6.5.4	50 x 6 mm Cu strip	m	2,200		
6.5.5	8 SWG / 4 mm diameter, copper Wire	m	600		
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				Deleted and Shifted to Schedule-H
b	1 x 10 sq. mm				Deleted and Shifted to Schedule-H
c	1 x 16 sq. mm				Deleted and Shifted to Schedule-H
d	1 x 70 sq. mm				Deleted and Shifted to Schedule-H
e	1 x 150 sq. mm				Deleted and Shifted to Schedule-H

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
	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.	Deleted and Shifted to Schedule-H			
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.	Deleted and Shifted to Schedule-H			
6.9	Rubber Mat				
	Supply & placing of ribbed surface rubber mat 12 mm thick and 900 mm width as required including cutting to required lengths, of approved make, with test certificates for L.T. panels.	No	16		
E7	LIGHTNING PROTECTION				
7.1	Supply and fixing of Early steamer emission Level-1 of coverage dia of 48 Mtrs Lightning Conductor complete with Extension Mast complete with necessary accessaires Model No. Pulsar - 60 or Equivalent	No.	8		
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.	m	1,110		
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.	m	3,900		

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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.	No	80		
E8	EXTERNAL LIGHTING				
8.1	Poles				
8.1.1	9m Octagonal pole hot dip galvanised with top bottom dia 70/155 mm , thickness 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	Deleted and Shifted to Schedule-H			
8.1.2	9m Octagonal pole hot dip galvanised with top bottom dia 70/155 mm , thickness 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	No	40		
8.1.3	7m Octagonal pole hot dip galvanised with top bottom dia 70/130 mm , thickness 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	Deleted and Shifted to Schedule-H			
8.1.4	7m Octagonal pole hot dip galvanised with top bottom dia 70/130 mm , thickness 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	Deleted and Shifted to Schedule-H			
8.2	Luminaires				
	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)	No	80		
8.2.1	Supply of 75mm dia HDPE pipe conforming 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.	Deleted and Shifted to Schedule-H			
8.2.2	Supply and laying of 6 SWG wire along with the cable	Deleted and Shifted to Schedule-H			
8.2.3	Providing and fixing thermo plastic poly carbonate pole boxes conforming 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.	Deleted and Shifted to Schedule-H			

Sl.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
8.2.4	wiring for luminaries in existing poles with following sizes of unarmoured cu cables from pole box to each fittings.	Deleted and Shifted to Schedule-H			
8.2.5	3x2.5 sq mm				

Sl.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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 accessories like winches, lantern 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>100lm//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 accessories like phosper Bronz Gear, double drum, stainless steel wire ropes, suitable MCB wires/cables as required with alongwith the folowing accessories 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.				
	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.				
E9	UNINTERRUPTED POWER SUPPLY SYSTEM				

Deleted and Shifted to Schedule-H

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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 (240V) voltage, variation \pm 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 reversal), and menu run diagnostic module, associated cabling and connections/ terminations, complete as per specifications and as required.	set	8		
	Note-1: The price of above item is inclusive of a manual changeover 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.				
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 1.1, Battery shall comply with relevant regulations & Battery racks shall be made of acid resistant material complete as per specifications & as required. Battery shall be 2V SMF VRLA battery.				
E10	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 15 mm thick rubber matting (complying with I.S.S.) and suitable to withstand 11 kV in front of all panels in ASS building & MDB room as required of 'Syntax' make.				
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	Lumpsum	8		
d)	2 nos. per station First Aid Box Complete as approved by St. John ambulance or Indian Red Cross.				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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 relevant IS and as required.				
f)	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.				
E11	BMS/SCADA for all system parameter of the panel				
11.1	The Specifications shall be read in conjunction with Manual of specifications and standards and Technical Specifications.	Lumpsum	8		
	Supply, Installation, testing, commissioning, trainging and AMC of Biluding Management System PLC, Remote Processor, Sigantl 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. BMS Communication Protocol should be compliant to OCC				
11.2	SOFTWARE - RPU Programming and Configuration Software(Rate included in item 11.1)(Complies to GP)				
	Programme software for RPU logic developlment 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 fuction				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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 <u>standard controls terminology</u> .				
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, <u>under worst conditions</u> .				
	(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 <u>reported</u> .				
	(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 <u>sequence</u>				
	of operation sections of this specification. Each RPU shall have the required <u>software</u>				
	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.				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
	(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 equipped with Power Supply module,				
	device protection and intrface terminals and wiring and other devices as required to meet tender specification & functional requirment.				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
	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 international 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 provision 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 requirement)				
	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.				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
	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 termination)				
	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.				
	Terminal block shall have ability to receive unprepared conductors.				
	Terminal block shall be single terminal type. Each terminal shall be exchangeable				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
	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 mm ² 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 powder 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 requirement in a redundant				
	system architecture				
	1. Ethernet 10/100MBPS Switch				
	2. Network Protocol - IEEE 802				
	3. Data Protocol - Modbus over TCP/IP				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
	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				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
	span of not greater than twice the static 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				
	Temperature 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 tray / 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 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				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
	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 communication, 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				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
	v) Line interface unit for Fo cable termination, supply, installation and connection as required to meet functional requirement.				
	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				
E12	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	Lumpsum			
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				

Sl.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
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				
	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.				
	a) 150mm wide x 50mm deep x 2mm thick				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
E13	Mandatory Operational Spares for the Panels And safety items				
	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 CI 1.0 15VA, cast resin for measurement				
	CTs 1000/5A CI 5P10 15VA, cast resin for protection				
	CTs 100/5A CI 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	8		
	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 necessary shall also be considered.				
	TOTAL				
E14	Lighting Control System				

SI.No	Description	Unit	Qty	Unit Rate (Rs.)	BOQ Amount
	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.	No	32		
b)	Power Supply for LX Panel Input: 120VAC Output: LON Protocol	No	8		
c)	LX Switches for Manual Override, 5 Switches, White Color	No	64		
d)	Graphic User Interface for LX Panel for Local Control	No	8		
e)	PC Integration Tool for remote controlling Panels Via IP Address Input: 120VAC	No	8		
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	No	8		
g)	Power Supply for ProtoCessor Input: 100-240VAC, 1.5A Output: 24V, 1.5A	No	8		
h)	Control Cable for LON Communication between Panels (100 Ft Reel)	No	8		
i)	Surface Mounted Cabinet for LX Panel Accessories	No	8		
Grand Total					

Name of Work:CONSTRUCTION OF EIGHT NUMBER OF ELEVATED METRO STATIONS VIZ PRAJAPATI NAGAR, VAISHNO DEVI SQUARE, AMBEDKAR SQUARE, TELEPHONE EXCHANGE SQUARE, CHITTAR OLI SQUARE, AGRASEN SQUARE, DOSAR VAISYA SQUARE & NAGPUR RAILWAY STATION ON THE EAST-WEST CORRIDOR (REACH-4) OF NAGPUR METRPO RAIL PROJECT

SCHEDULE-F ELECTRICAL, PUBLIC HEALTH ENGINEERING,FIRE PROTECTION AND HVAC SYSTEMS

F1	<u>FIRE HYDRANT SYSTEM</u>				
	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				
S.No	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
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 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.				
	Capacity : 2850 lpm, App.head : 76 m, HP : 75 HP	No	2		
	Capacity : 1800 lpm, App.head : 76 m, HP : 45 HP	No	16		
			-		

S.No	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
1.2	Diesel Fire Pumps		-		
	Supplying, installing, testing and commissioning of diesel engine driven fire pump suitable for automatic operation consisting of the following (as per CPWD specifications partv 1985.) horizontal centrifugal type multi-stage, fire pump with bronze impeller to ensure a minimum pressure of 3.5 kg per sq.cm. at the highest & farthest outlet at the specified flow, complete. The engine shall be capable to drive the pump at 150% rated discharge at 65% head and shall be suitable for 10% overload capacity for one hour in any period of 12 hrs. continuous run. common bed plate fabricated from mild steel channel. isolation valve suitable cement concrete pump foundation & vibration damping arrangement with cushy foot mounting as required. app hp : 100 hp, head : 85 m		-		
	Capacity : 1800 lpm, App.head : 70 m, HP : 80 HP	No	1		
	Capacity : 1800 lpm, App.head : 90 m, HP : 100 HP	No	1		
			-		
1.3	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.		-		

S.No	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
	Capacity : 180 lpm, App.head : 76 m, HP : 7.5 HP	No	9		
	Capacity : 180 lpm, App.head : 76 m, HP : 10 HP	No	1		
			-		
1.4	Supply and installation of pressure gauge panel as per the requirement & Comprising:	Set	8		
	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		-		
1.5	Supply, installation, testing, trial run and commissioning of hydrants all complete as required and as approved		-		
1.5.1	Internal hydrants/landing valves generally as specified and all complete with:	Nos	80		
	i) 63mm dia Single headed landing valve IS marked		-		
	ii) First aid hose reel with 19 mm dia, 45 m long rubber hose, ball valve, piping and 7-8mm nozzle as required		-		
	iii) 38mm synthetic hose 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		-		
	v) hose cabinet size 600 mm x 1200 mm x 350mm of MS, rustfree treatment, painted with color as approved as appropriate or as per site conditions with universal locking arrangement.		-		
1.5.2	Supply, installation, testing and commissioning of external (yard) hydrants inclusive of :	Nos	16		

S.No	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
	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.		-		
			-		
1.5.3	<u>PIPING FOR FIRE FIGHTING SYSTEM</u>		-		
	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.				
a	150 mm nominal bore	m	960		
b	100 mm nominal bore	m	720		
c	80mm nominal bore	m	360		
d	200 mm nominal bore (6 mm wall thickness)	m	60		
1.5.4	Excavation upto hard murram as per general profiles and back filling	Cu.m	4,320		
			-		
1.5.5	Making 1:2:4 cement concrete supports and thrust blocks generally as required and approved.	Cu.m	4		
			-		
1.5.6	Butterfly Valve		-		
	Supply and installation of Butterfly Valve with mating flanges generally as specified all complete.		-		
a	150 nominal bore	Nos	49		

S.No	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
b	100 nominal bore	Nos	112		
c	80 nominal bore	Nos	64		
d	200 mm nominal bore	Nos	16		
			-		
1.5.7	Non Return Valve		-		
	Supply and installation of Non Return Valve with mating flanges generally as specified all complete.		-		
a	150 mm dia	Nos	24		
b	80 mm dia	Nos	8		
c	200 mm dia	Nos	16		
			-		
1.5.8	Foot valve		-		
	Supply and installation of Foot Valves with mating flanges generally as specified all complete.		-		
a	200 nominal bore	Nos	16		
b	100 nominal bore	Nos	16		
			-		
1.6	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.		-		
a	200 mm nominal bore (6 mm wall thickness)	m	160		
b	150 mm nominal bore	m	1,040		
c	100 mm nominal bore	m	1,280		
d	80 mm nominal bore	m	641		
e	50 mm nominal bore	m	-		
f	40 mm nominal bore	m	-		

S.No	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
g	32 mm nominal bore	m	-		
h	25 mm nominal bore	m	-		
			-		
1.7	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	8		
			-		
1.8	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	8		
			-		
1.9	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 brigade connection shall be provided in a suitable MS box having mesh doors with universal locking arrangement. <i>Note:</i> The drawings of the proposed arrangement shall be provided by the contractor for approval of employer's representative.	Nos	8		
			-		
1.10	Fire Brigade Connection (4-way)		-		

S.No	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
	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. <i>Note:</i> The drawings of the proposed arrangement shall be provided by the contractor for approval of employer's representative.	Nos	8		
			-		

S.No	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
1.11	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	16		
			-		
F2	<u>PORTABLE FIRE EXTINGUISHERS</u>		-		
			-		
	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	96		
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	224		
2.3	Mechanical foam type 9.0 liter capacity fire extinguisher (for DG room)	Nos	41		
2.4	5 kg capacity of DCP(Dry Chemical Powder) fire extinguisher	Nos	144		
			-		
F3	CLEAN AGENT BASED PANEL FLOODING (FIRE TRACE TUBE) SYSTEM FOR ELECTRICAL (LT) PANELS				
	Supply, fixing, testing and commisioning of Automatic linear pneumatic Tube Detection based NOVEC 1230 System for Electrical Panels (Fire Tube Panel Protection System), consisting of the the following components: (For Main Distribution Panel,CapacitorPanel, Emergency Main Distribution Panel, DG Panel, Main Lighting Panel, Emergency Lighting Panel, Power Panel, Water Pump Panel, Fire Pump Panel, Escalator Panel, UPS Panel, Lift Panel, Solar Panel)				

S.No	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
	10LB Capacity Novec 1230 system complete with all necessary Novec 1230 gas, fittingsupport, and accessories,connected with valve	Nos	64		
	5LB capacity Novec 1230 system complete with all necessary Novec 1230 gas, fittingsupport, and accessories,connected with valve	Nos	40		
	2LB capacity Novec 1230 system complete with all necessary Novec 1230 gas, fittingsupport, and accessories,connected with valve	Nos	20		
	End of Line Adapter	Nos	104		
	Pressure Switch	Nos	104		
	Flexible Polymer Detection Tube with all necessary fittings & supports	Nos	5,304		
	Master Control Unit for connecting each system with electronic hooters and productivity input to SCADA/Fire Alarm System including all necessaries + electrical wiring to make each entire system functional	Nos	104		
	Note: The items indicated above are notable items. The vendor to include all allied and implied items in required quantity at no extra cost				

S.No	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
F4	FIRE ALARM AND DETECTION SYSTEM				
	The Fire Alarm and Detection System specified herein, must conform to M & E Specifications, in addition 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				
4.1	Supply, Installation, Testing and Commissioning of 4 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	8		
a	4 Loop Panel				
b	Repeater Driver Board				

S.No	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
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 Repeater Annunciator Panel with Mimic panel as per Specifications and Drawings.	Set	8		
4.3	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 .				
4.3.1	Intelligent Addressable Multi Sensor Smoke Detector.	Nos.	640		
	Rate of rise cum fixed Temperature thermister type Heat detector with mounting base complete as required				
4.3.2	Addressable Fault Isolator Base	Nos.	80		
4.3.3	Addressable Fault Isolator	Nos.	80		

S.No	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
4.3.4	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.	96		
4.3.5	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.	80		
4.3.6	Addressable Loop Sounder 6.8 W.	Nos.	80		
4.3.7	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.	120		

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SCHEDULE-F ELECTRICAL, PUBLIC HEALTH ENGINEERING, FIRE PROTECTION AND HVAC SYSTEMS

S.No.	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
H1	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 accessories 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 with 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				

S.No.	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
	Capacity shall be as under				
	26 HP (22TR Nominal Capacity)	Nos	1		
	24 HP (20TR Nominal Capacity)	Nos	1		
	20 HP (16TR Nominal Capacity)	Nos	8		
	18 HP (15TR Nominal Capacity)	Nos	8		
	12 HP (10TR Nominal Capacity)	Nos	8		
	6 HP (5TR Nominal Capacity)	Nos	1		

S.No.	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
1.1.2	Indoor Units				
	Supply, installation, tesing and commissioning of ceiling mounted indoor units each complete with coil, pre-filter, etc. The units casing shall be of steel construction, wall mounted / Highwall metallic indoor units and 220 volt, 1 phase, 50 Hz, AC supply all as per specifications.				
	The capacities shall be as follows:				
	Ceiling mounted 3500 CFM - 6.0 TR Nominal Capacity	Nos			
	Ceiling mounted 3200 CFM - 5.0 TR Nominal Capacity	Nos	8		
	Ceiling mounted 2800 CFM - 5.0 TR Nominal Capacity	Nos	8		
	Ceiling mounted 2500 CFM - 4.0 TR Nominal Capacity	Nos	16		
	Ceiling mounted 2400 CFM - 4.0 TR Nominal Capacity	Nos			
	Ceiling mounted 2300 CFM - 4.0 TR Nominal Capacity	Nos	16		
	Ceiling mounted 2000 CFM - 3.0 TR Nominal Capacity	Nos			
	Ceiling mounted 1600 CFM - 3.0 TR Nominal Capacity	Nos			
	Wall mounted / Highwall metallic 2.0 TR Nominal Capacity	Nos	16		
	Wall mounted / Highwall metallic 1.5 TR Nominal Capacity	Nos	40		
	Wall mounted / Highwall metallic 1.0 TR Nominal Capacity	Nos	8		

S.No.	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
1.1.3	Supply, installation, tesing and commissioning of Corded Remote controllers for operation of indoor units.	Nos	112		
1.1.4	Supply, installation, tesing and commissioning of Central Remote controller for complete system including all VRV indoor and outdoor units.	Nos	8		
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	96		
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)	Rm			
b)	34.9 mm O.D. (insulation : 19 mm)	Rm			
c)	28.6 mm O.D. (insulation : 19 mm)	Rm	900		
d)	22.2 mm O.D. (insulation : 13 mm)	Rm	400		
e)	19.1 mm O.D. (insulation : 13 mm)	Rm	300		

S.No.	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
f)	15.9 mm O.D. (insulation : 13 mm)	Rm	1,700		
g)	12.7 mm O.D. (insulation : 13 mm)	Rm	440		
h)	9.5 mm O.D. (insulation : 13 mm)	Rm	1,820		
i)	6.4 mm O.D. (insulation : 13 mm)	Rm	580		
1.3	Supply,installation,testing and commisioning of contl cum transmission wiring of 2 core x 1.5 sqmm copper in suitable GI conduits between indoor and outdoor units.	Rm	3,684		
1.4	Supply,installation,testing and commissioning of power cables from isolator MCB to outdoor unit.	Rm	400		

S.No.	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
1.5	DX wall mounted Split Unit				
1.5.1	Providing, fixing, testing and commissioning of Hi wall split unit air conditioning air cooled type with evaporator coil, fan and fan motor ,air cooled condenser with hermetically 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			
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.	Rmt			
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:				

S.No.	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
	40mm Dia.	RM	180		
	32mm Dia.	RM	300		
	25mm Dia.	RM	220		
	TOTAL FOR M.01		11,276		
H2	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.				
	Capacity 1500 CFM (2550CMH) wall mounted (exhaust fan)	Nos	4		
	Capacity 1350 CFM (2295CMH) wall mounted (exhaust fan)	Nos			
	Capacity 1300 CFM (2210CMH) wall mounted (exhaust fan)	Nos	4		
	Capacity 1200 CFM (2040CMH) wall mountde (supply fan)	Nos			
	Capacity 1150 CFM (1955CMH) wall mounted (exhaust fan)	Nos	4		
	Capacity 1080 CFM (1836CMH) wall mountde (supply fan)	Nos			
	Capacity 1000 CFM (1700CMH) wall mountde (supply fan)	Nos	12		
	Capacity 960 CFM (1632CMH) wall mountde (supply fan)	Nos			
	Capacity 920 CFM (1564CMH) wall mountde (supply fan)	Nos	4		
	Capacity 900 CFM (1530CMH) wall mountde (supply fan)	Nos			
	Capacity 800 CFM (1360CMH) wall mountde (supply fan)	Nos	4		
	Capacity 650 CFM (1105CMH) wall mounted (exhaust fan)	Nos			
	Capacity 520 CFM (884CMH) wall mountde (supply fan)	Nos			
	Capacity 500 CFM (850CMH) wall mountde (supply fan)	Nos			

S.No.	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
	Capacity 400 CFM (680CMH) wall mountde (supply fan)	Nos	12		
	Capacity 300 CFM (510CMH) wall mountde (supply fan)	Nos	8		
	Capacity 260 CFM (442CMH) wall mountde (supply fan)	Nos			
2.2	cabinet fan with centrifugal blower driven by motor. The motor shall be suitable for 220 Volts $\pm 6\%$ 1 Phase 50 HZ AC supply.				
	Capacity 9300 CFM (15810 CMH) ceiling mounted (exhaust fan)	No			
	Capacity 7440 CFM (12648 CMH) ceiling mounted (supply fan)	No			
	Capacity 6000 CFM (10200 CMH) ceiling mounted (exhaust fan)	No			
	Capacity 5000 CFM (8500 CMH) ceiling mounted (exhaust fan)	No	8		
	Capacity 4800 CFM (8160 CMH) ceiling mounted (supply fan)	No			
	Capacity 4000 CFM (6800 CMH) ceiling mounted (supply fan)	No	8		
	TOTAL FOR M.02		68		
H3	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.				

S.No.	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
	0.63 MM (24 Gauge) for ac duct	Sqm	420		
	0.63 MM (24 Gauge) for ventilation duct	Sqm	480		
3.2	Grilles and Dampers				
	Providing and fixing, testing and commissioning of powder coated extruded aluminium section grills with dampers for supply air terminal.	Sq m	24		
	Providing and fixing, testing and commissioning of powder coated extruded aluminium section grills without dampers for exhaust air terminal.	Sq m	8		
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	10		
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	12		
3.5	Providing and fixing of self adhesive Closed Cell Elastomeric Nitrile rubber 13mm thick insulation on duct complete as per the specifications.	Sqm	500		
3.6	Supplying and fixing of acoustic lining of duct with fiber glass rigid board of density 48 kg/m ³ sealed in fiberglass tissue paper and covered with 0.5mm perforated aluminium sheet & conforming to standard specification.	Sqm	52		
	TOTAL FOR M.03				

S.No.	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
M.04	GEOTHERMAL				
1	GeoSink				
1.1	GeoSink development - comprehensive geophysical analysis that includes vertical electrical soundings, electrical resistivity analysis, precision vertical drilling, development of CFVS geothermal sink by IGSHPA accredited driller and installer. Working in multiple shifts with multiple geothermal drilling equipment. Manholes with branding as advised by Client. Restoration of the drilling area.	Each	4		
1.2.a	Centrifugal Pump (Submersible)	Each	2		
2	GeoExchange Interface system				
2.1	GeoExchange re-circulator pumps with accessories				
2.1.a	Centrifugal pump (Re-circulation)	Each	2		
2.2	GeoExchange condenser pumps with accessories				

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SCHEDULE-F ELECTRICAL, PUBLIC HEALTH ENGINEERING, FIRE PROTECTION AND HVAC SYSTEMS

S.No	Description	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
P1	Public Health Engineering				
1.1	Water Closet (European Type)				
	Providing and fixing pastel shade European type Water Closet with concealed 'P' or 'S' trap, C.P. bolts, nuts, C.I. chair or other hanging/fixing arrangement with multi connector to mains, solid plastic seat with lid, C.P. brass hinges and rubber buffers with wall mounted concealed dual low volume flushing cistern, C.P. brass screws and washers complete, including cutting holes in walls, floors and making good. Wall mounted sanitary porcelain W.C. Pan.	Nos	92		
1.2	Health Faucet				
	Providing & fixing of health faucet of the closet mounting type with hose connected Two Way Bib Cock with flow restrictors / aerators with complete fittings. (All fittings of approved make)	Nos	92		
1.3	Urinal				
	Providing and fixing vitreous chinaware urinal on RCC/CC/Masonry including GI clamps, paintings of fittings and brackets, cutting and making good to the wall floor wherever required all complete as per the direction of Engineer - in- Charge comprising of	Nos	27		
	Large Flat Back Wall Hung Urinal in White Glazed Vitreous China 610mm x 410mm x 380mm				
	15 mm Battery Operated Solenoid Valve with Infrared Sensor Mounted in a box with SS cover				
	CP Brass Chromium Plated Flush Piping from Valve to Urinal Terminated with a 15mm Screwed Spreder				
	32mm Nominal Bore CP Cast Brass Waste				
1.4	Bib Cock				
	Supply and Installation of CP brass Bib Cock (Heavy Grade) with screw-down type of approved quality conforming to IS : 781	Nos	80		

S.No	Description	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1.5	CP Brass Auto Closing Pillar/Mixer tap				
	Providing and fixing of CP Brass Auto Closing Pillar/Mixer tap for best Indian make white vitreous chinaware wash hand basin as per direction of Engineer - in - Charge.	Nos	84		
1.6	Heavy Quality CP Brass Angular Stop Cocks				
	Providing and fixing of heavy quality CP brass Angular Stop Cocks for best Indian make white vitreous chinaware wash hand basin mounted and European type Water Closet as per direction of Engineer - in - Charge, comprising of 15mm heavy quality CP brass Angular Stop Cocks with CP brass flexible connector pipe, nuts, washers etc.	Nos	176		
1.7	Wash Basin (Counter Top Oval Wash Basin Size 660 mm x 460 mm)				
	Providing and fixing best Indian make white vitreous chinaware wash hand basin mounted on cantilever supports fixed to wall including making all connections, necessary fitting, screws and cutting and making good to wall and floor wherever required all complete as per direction of engineer - in - charge, comprising of counter top oval wash basin size 560 mm x 410 mm	Nos	84		
1.8	Sink				
	Providing and fixing of, Single compartment stainless steel sink, drop-in, selfrimming, ledge-type and connected with a drain. It shall be provided with pre-punched fixture center hole, integral back ledge to accommodate deck-mounted fixtures, brushed interior and top surfaces, sound deadened as per direction of engineer - in - charge	Nos	8		
1.9	Bottle Trap (32 mm CP Brass (Cast) Bottle Trap)				
	Providing and Fixing of CP brass bottle trap for wash basin and urinals including CP waste fittings complete as per direction of engineer - in - charge, comprising of 32 mm CP brass (cast) bottle trap with extension piece to wall flange with rubber adopter for waste connection including connection with the drainage line	Nos	84		
1.1	Floor Trap				
	Supply and Installation of Floor Trap (HCI Nahni Trap) shall be heavy cast iron as per IS 3989 with 100mm inlet and 80/100mm outlet with CP pressed steel grating	Nos	215		

S.No	Description	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1.11	Water cooler				
	Water Cooler Having Nominal Cooling Capacity of 40 Liters Per Hours Supply, Installation, Testing and Commissioning of water cooler having nominal cooling capacity of 40 liters per hours, with 40 litres storage tank with 2 nos. of faucets, one no goose neck type (for glass filling) and other one fountain type (for drinking) both with separate mechanical lever control with 1.5 hp electric motor for compressor to work on single phase 230 volts 50 Hz AC power supply with complete accessories including cutting and making wall as required.	Nos	40		
1.12	Water Purifier Comprising 5 Micron Filter				
	Supply Installation Testing and Commissioning Water Purifier comprising 5 Micron Filter and UV Steriliser on cold water supply in drinking water cooler to work on Single Phase 230 Volts 50 Hz AC Power Supply With Capacity 120 lph (Aqua Guard Make).	Nos	40		
1.13	Fixing Cast Brass Clean Out				
	Providing and Fixing Cast Brass Clean Out Plug with suitable insert keys for opening in brass cap, male threaded joint with G.I socket caulked to pipe/fitting of H.C.I. or C.I. (L.A) pipe as required complete in all respects. (100 mm Dia)	Nos	73		
1.14	Mirror				
	Supply and Installation of Mirror with aluinium beading all around and shall be approved make of size of 600 x650 x 5.5mm thick and fixed to the wall on wooden blocks with CP brass screws and CP washers.	Nos	84		
1.15	Liquid Soap Container (Soap Dispenser)				
	Providing and fixing Soap Dispenser on Masonry/RCC/CC including all fitting and screws including cutting and making good the wall wherever required	Nos	47		
1.16	Toilet Paper Holder				
	Supply and Installation of CP brass Toilet Paper Holder shall be 100mm long.	Nos	92		
1.17	CP Brass Twin Coat Hooks Fixed to Wooden Cleats with CP Brass Screws				
	Providing and fixing CP brass twin coat hooks fixed to wooden cleats with CP brass screws, hooks.	Nos	92		

S.No	Description	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1.18	Water Heater				
	Supply and Installation of vertical storage type hot water heater fixed to wall with anchor bolts & nuts, 20mm CP brass non return valve complete including making connection with 15mm dia CP connecting pipe on inlet and outlet, suitable length of power cable.				
	25 lit Capacity	Nos	19		
1.19	GI pipes and fittings for Water Supply System				
	Supply & Install GI pipes & fittings conforming to IS 1239 Part I (heavy grade 'c' class pipe) for process of water supply distribution network, including all necessary fixings, accessories, supports, pipe work finishes, Pressure testing, cleaning and flushing as per Specification.				
	20 mm	m	970		
	25 mm	m	1385		
	32 mm	m	450		
	40 mm	m	815		
	50 mm	m	1120		
	65 mm	m	200		
	75 mm	m	0		
1.2	Enclosed Type Water Meter (Bulk Type)				
	Providing And Fixing Enclosed Type Water Meter (Bulk Type) conforming to IS:2373 and tested by appropriate authority with bolts, nuts, rubber insertions etc. (the tall pieces if required will be paid separately)	Nos	8		
1.21	Multi-Level Indicator Cum Controller				
1	Providing all materials and labour for supplying and fixing multi-level indicator cum controller, operating in electronic sensing probe and having the controller equipped with level monitoring system and phase monitoring system for automatic operations of various pumps and indicating water levels for various tanks and having multi-level 4 nos. Visual indications on panel with alarm system and timer including necessary cable and acknowledge facilities as per requirement and all complete as approved. water tanks i) Controller/Multilevel Indicators ii) Electronic sensing probe to cut-off domestic water pumps at low level in domestic water tank.	Nos	8		

S.No	Description	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1.22	Pump for Water Supply System				
	Supply, Inspection, Testing, Delivery, Installation and commissioning of following Pumps with the specified capacity and Head including electrical motors, VFD, valves and all the necessary piping, fittings, accessories as per and Specification.				
	Electric Motor Driven Pump 5 HP (150lpm, 40m head) (1 Duty + 1 Standby)	Set	8		
1.23	Submersible Pump for Waste water				
	Supply, Inspection, Testing, Delivery, Installation and commissioning of following Submersible Pumps with the specified capacity and Head including electrical motors, VFD, valves and all the necessary piping, fittings, accessories as per and Specification.		0		
	Electric Motor Driven Submersible Pump 5 HP (300lpm, 25m head) (1 Duty + 1 Standby)	Set	0		
1.24	Non Return Valve				
	Providing and fixing gun metal non-return valve of approved quality (screwed end)				
	50mm Dia	Nos	16		
	65mm Dia	Nos	0		
1.25	Gate Valves				
	Providing and fixing gun metal Gate Valve with CI wheel of approved quality (screwed end)				
	32 mm (For Domestic Water Pipe)	Nos	24		
	40 mm (For Domestic Water Pipe)	Nos	24		
	50 mm Dia (For Domestic Water Pump)	Nos	24		
	65 mm Dia (For Waste Water Pump in the subway)	Nos	0		
	80 mm Dia (For Bore Well Pump)	Nos	14		
1.26	Brass Ball Valve of Approved Quality (Screwed End)				
	Providing and fixing Brass Ball Valve of approved quality (screwed end), nominal bore of				
	20 mm	Nos	160		
	25 mm	Nos	40		

S.No	Description	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1.27	PRV with CI wheel of approved quality (screwed end)				
	Providing and fixing brass PRV with CI wheel of approved quality (screwed end), nominal bore of				
	25 mm	Nos	8		
	32 mm	Nos	8		
1	Strainer (Double Flanged Strainers with CI Body)				
	Supply, installation testing and commissioning double flanged strainers with CI body and SS 40-grade mesh strainer.				
	Size 100 mm	Nos	8		
1.29	Float Valve				
	Providing and fixing of float valve with approved quality (screwed end)				
	Size 100 mm	Nos	16		
1.3	Foot Valve				
	Providing and fixing of foot valve with approved quality (screwed end)				
	Size 65 mm	Nos	16		
1.31	C.I. Double Acting Air Release Valve				
	Providing and fixing C.I double acting air release valve of approved quality with bolts, nuts, rubber insertions etc. 20 mm dia				
	20 mm	Nos	16		
1.32	CHANNEL DRAIN				
	Providing and fixing of 300mm wide channel drain with Stainless Steel / Cast Iron grating.				
	300mm Wide	m	2220		
1.33	Submersible Bore Well Pump				
	Supply And Installation of Submersible Bore Well Pump with bronze or S.S.impeller, S.S. shaft with mechanical seal, submersible electric motor to work on 3 phase 440 volts 50 cycle A.C. supply, required length of water proof cable for connection to motor, complete in all respects. capacity 50000 lph, approx head - 120 m, depth as required.	No	7		

S.No	Description	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1.34	Boring Tube Well				
	Bore Well 300 mm				
	Construction of bore well all complete comprising with 300 mm dia bore in all classes of soil, murrumm, disintegrated or soft rock	m	700		
	Providing and fixing 150 mm dia casing blind pipe with screwed joints				
	Construction of bore well all complete comprising with providing and fixing 150 mm dia casing blind pipe with screwed joints	m	700		
	Providing and fixing 150 mm dia slotted pipes with screwed joints				
	Construction of bore well all complete comprising with providing and fixing 150 mm dia slotted pipes with screwed joints	m	700		
	Gravel filter fill				
	Construction of bore well all complete comprising with pea gravel filter fill between bore and pipe assembly	m ³	37		
	Cleaning developing for atleast 60 hrs				
	Construction of bore well all complete comprising with cleaning developing for atleast 60 hrs. and conducting yield tests as per is 2800 part ii	hrs	420		
	Testing water samples				
	Construction of bore well all complete comprising with testing water samples from the well for biological and chemical contents.	LS	7		
	Boring in hard rock				
	Construction of bore well all complete comprising with xtra over item 'a' for boring in hard rock.	m	140		
	Sewage Network				
1.35	Sewer and Waste Water Pipe				
	Supply & Installation of Cast Iron soil waste pipe shall conform to IS 1729, work complete including excavation in any type of soil, trenching, bedding and surround backfilling, compaction, disposal of surplus excavated material, dewatering, warning tape, all fittings such as bends and Y joints etc. including all necessary fixings, accessories, supports, pipe work finishes, Pressure testing, cleaning and flushing. These pipes are shall be used for Soil, Waste and Vent Pipe.				
	80 mm (G.I pipe)	m	715		
	100 mm (C.I pipe)	m	860		
	150 mm (C.I pipe)	m	310		

S.No	Description	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1.36	Gully Trap				
	Gully Trap construction including excavation in any type of soil, trenching, bedding and surround backfilling, compaction, disposal of surplus excavated material, dewatering. The squar mouth gully trap shall be of 100mm dia, conforming to IS 651 of specified and/or approved stoneware, complete with cast iron grating. The size of CI frame and cover shall be 300 x 300mm and chamber shall be 300 x 300 x 675mm (internal). It shall be constructed of brick masonry walls 115mm thick in 1:4 cement mortar and M-15 concrete foundations.	Nos	24		
	Rain Water Pipe				
1.37	Wall Faced Pipe				
	Providing & fixing on wall face CI pipe (working pressure 6kg/cm ²) rain water pipes conforming to IS code including jointing with seal ring conforming to IS code leaving 10mm gap for thermal expansion.				
	100 mm dia	m	1010		
	150 mm dia	m	2226		
1.38	Under Ground Pipe Work for Gravity Flow				
	Providing and laying non-pressure NP2 class (light duty) R.C.C. pipes with collars jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) including testing of joints etc. complete:				
	150 mm dia	m	680		
	250 mm dia	m	2200		
	300 mm dia	m	410		
1.39	Holder-Bat Clamps				
	Providing and fixing M.S Holder-Bat Clamps of approved design to M.S pipe embedded and including cement concrete block 10 x 10 x 10 cm of 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) including cost of cutting holes and making good etc.				
	100 mm dia	Nos	1010		
	160 mm dia	Nos	2226		

S.No	Description	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1.4	Manholes & Covers				
	Manhole construction including excavation in any type of soil,trenching,bedding and surround backfilling, compaction, disposal of surplus excavated material, dewatering, blinding concrete, reinforced cement concrete of grade M25 and cover shall be equal to heavy roadway type made of ductile iron, with frame of cast iron Ft.20 for closed manholes.				
	Man Holes Depth ranges less than 1000mm	Nos	120		
	Man Holes Depth ranges between 1000mm to 2000 mm	Nos	80		
1.41	Miscellaneous Item Cost	LS	8		
	TOTAL AMOUNT				

Name of the work: CONSTRUCTION OF EIGHT NUMBER OF ELEVATED METRO STATIONS VIZ PRAJAPATI NAGAR ,
VAISHNO DEVI SQUARE , AMBEDKAR SQUARE, TELEPHONE EXCHANGE SQUARE, CHITTAR OLI SQUARE, AGRASEN
SQUARE, DOSAR VAISYA SQUARE & NAGPUR RAILWAY STATION ON THE EAST-WEST CORRIDOR (REACH-4) OF
NAGPUR METRPO RAIL PROJECT

SUMMARY: (SCHEDULE-H)

Architectural, Electrical, Fire, HVAC and PHE		
S.No	Description	Amount (Rs)
1.0	Architectural Works	
2.0	Electrical Works	
3.0	Fire	
4.0	HVAC	
5.0	PHE	
GRAND TOTAL OF SCHEDULE -H		

CONSTRUCTION OF EIGHT NUMBER OF ELEVATED METRO STATIONS VIZ PRAJAPATI NAGAR , VAISHNO DEVI SQUARE , AMBEDKAR SQUARE, TELEPHONE EXCHANGE SQUARE, CHITTAR OLI SQUARE, AGRASEN SQUARE, DOSAR VAISYA SQUARE & NAGPUR RAILWAY STATION ON THE EAST-WEST CORRIDOR (REACH-4) OF NAGPUR METRPO RAIL PROJECT						
S.No	DSR/ NDSR	Description	Units	Est. Quantity	Unit Rate (RS)	BOQ AMOUNT(RS)
1	NDSR	Providing and constructing load bearing wall with cement concrete cavity block (hollow blocks) of required proportion and blocks of size 400 x 200 x 200 mm , (l,b,h)strength not less than 50 kg/sq.cms with cement mortar 1:4 confirming to IS 2185 of 1967 having not less than 40mm shell thickness with two or more large cavities and having solid materials between including cost of materials, labour charges, scaffolding, curing etc., complete at all levels and heights and as per specifications, drawings and as directed complete. For 200mm thick wall.	Cum	400		
2	NDSR	Providing and constructing non load bearing wall with cement concrete cavity blocks (hollow blocks) of required proportion and blocks of size 400 x 100 x 200 mm (l,b,h) strength not less than 35 kgs per sq.cms with cement mortar 1:4 confirming to IS 2185 having not less than 40mm shell thickness 50% of total volume of block having 2 large cavities with 20mm wall thickness in between including cost of materials, labour charges, scaffolding, curing complete as per specifications at all height and as per specifications, drawings and as directed etc., complete. For 100mm thick wall.	Sqm	400		
3	NDSR	Making Grooves 15*6mm on internal/external wall plaster complete as per architectural drawing.	Rm	400		
4	6.15	Extra over items 2 for using 2 nos. 6mm dia M.S. bars at every third course in half brick masonry.	Sqm	80		

5	NDSR	Providing & Fixing Polished Granite Coping, bull-nosed over 20 mm thick cement mortar 1:4(1 cement: 4coarse sand) with joint treated with white cement mixed with matching pigment including Rubbing, Curing , Moulding & polishing to edge to give high gloss finish etc. complete.				
5.1		30 mm thick Jet black Granite	Rm	400		
6	NDSR	Providing and laying sand blasted finish granite stones in desired colour as per control sample, size 1200x600x30 mm on floor using 5mm thick approved thick bed adhesive as per specification over prepared base on 20mm (average) thick base of cement mortar 1:4 (1 cement : 4 core sand) laid and jointed with neat cement slurry mixed with pigment to match the shade of granite stone complete as per specifications and relevant drawings, in external development areas.				
6.1		Sadarahalli Grey/Cheema Pink/Jhalore Beige granite	Sqm	80		
6.2		Jet Black/ Red/ Raw Silk/ Tan Brown granite	Sqm	80		
7	NDSR	Providing and laying 12mm thick putty of plaster of paris, mixed with 10% cement over black polyvinyl chloride sheet 400 micron on the floor to form a protective layer on finished surface of granite floor etc. Removing and cleaning before ROD.	Sqm	800		
8	NDSR	Making nosing to staircase treads as per profile	Rm	1600		
9	NDSR	Making anti slip grooves pattern at the edge of tread with 3 nos. of anti slip grooves, and filled with antislip treatment.	Rm	1600		
10	NDSR	Extra for providing opening of required size & shape for wash basins/kitchen sink in kitchen platform, vanity counters and similar location in marble/Granite/stone work including necessary holes for pillar taps etc. including moulding, rubbing and polishing of cut edges etc. complete.	Each	80		
11	NDSR	Black Granite Extra for providing opening of required size and shape for wash basins in counters and similar location in marble/stone work including necessary holes for pillar taps etc. including rubbing and polishing of cut edges etc. complete.	Each	80		

12	NDSR	Providing and fixing stainless steel cramps of required size, specification and shape in RCC /CC / Brick work/ Aerocon block work backing with cement mortar 1:2 (1 cement : 2 fine sand) including drilling necessary hole in stones and embedding the cramp in the hole (fastener to be paid separate)	Kg	400		
13	NDSR	Providing and fixing expansion hold fastener with threaded dia 10mm on RCC/CC/Brick work/Aerocon block work surface backing including drilling necessary holes and the cost of bolt etc. complete.	Each	400		
14	NDSR	Providing and laying 25mm thick and minimum 1200mm long Sadarahalli flamed finished granite on approx. 300mm wide tread on stairs with and including nosing and 2 Nos. 6x6 anti-slip grooves filled with carborandum powder mixed with Araldite or equal adhesives. (Colour of granite as approved by Engineer) all laid over base cement mortar 1:4, up to 30mm thick with ordinary Portland Cement, fit jointed with/ without groove, with white cement slurry mixed with pigment to match shade of granite including all finishing, all as required, as per specifications and drawings and as directed	Sqm	800		
15	NDSR	Providing and fixing 1st quality ceramic matt finished floor tiles (thickness to be specified by the manufacturer) of approved make in all colours, shades, size in flooring over 20 mm thick bed of cement Mortar 1:4 (1 cement : 4 coarse sand) and jointing with grey cement slurry including pointing in white cement mixed with pigment of matching shade complete.				
15.1		a) 200 mm x 200 mm sized ceramic tiles				
15.2		b) 300 mm x 300 mm sized ceramic tiles	Sqm	800		
16	NDSR	Providing and fixing 1st quality ceramic matt finished tiles (thickness to be specified by the manufacturer) of approved make in all colours, shades, size in skirting over 12 mm thick backing of cement mortar 1:3 (1 cement : 3 coarse sand) and jointing with grey cement slurry including pointing in white cement mixed with pigment of matching shade complete.				
16.1		a) 200 mm x 100 mm sized ceramic tiles	Sqm	800		

17	NDSR	Design, supply and installation of Terra Cotta clay tiles NBK,Argeton, Agrob Buchtal or equivalent, 28 mm thickness (Length: max. 1200 mm, Height: 300 mm), back ventilated, with self-draining open joint system in approved color, finish, texture, sizes and profiles. Tiles must have customized enamel based high gloss finish as approved for the project requirement. It shall be double-leaf construction and have labyrinth top and bottom returns to prevent easy water excess behind tiles. The tiles shall be fixed on aluminum support system which includes adjustable aluminum wall brackets, extruded aluminum vertical carrier tracks with gaskets, tile clips, and fastening devices for Terra Cotta clay tile elements. Terra Cotta tiles must be removable, without breakage or disruption to adjacent tiles. Tile clips must be concealed and the design system must accommodate thermal movement. Stainless steel screws and metal devices (aluminum support system) attached to building shall transmit imposed loads from the Terra cotta system to building.	Sqm	400		
18	NDSR	Providing and fixing cement concrete designer tiles similar to Eurocon tiles of approved make, specification, colour and size laid in cement mortar 1:3 on existing bed and pointed with white cement mortar 1:4 mixed with colour pigment to match the colour of tiles finishing nicely all as per architect's directions with necessary cleaning and wash etc., complete for flooring. The tiles are to be laid in the pattern given in the approved drawings and approved by Engineer including all lead lift, cutting charges etc., complete. Tile thickness 20mm thick.				
18.1		For flooring at all levels.	Sqm	800		
18.2		For staircase treads using step tiles of maximum 1000 mm length at all levels as approved by engineer	Sqm	400		
18.3		For staircase risers and skirting of maximum 1000 mm length using the equivalent riser / skirting tiles at all levels as approved by engineer	Sqm	400		

19	NDSR	Providing and fixing combi pack with ultra mortise lock (200mm), ultra pin cylinder of (1Ck) / (2C) latch set, complete with door strike, lever or knob handles, screws, etc. complete in stainless steel as manufactured by Cavalier/Godrej or approved equivalent, for use on paneled/solid and glazed doors etc. including all fixings and other accessories as required and as per drawings, specifications and as directed complete.	Set	80		
20	NDSR	Providing and fixing stainless steel door stops/wall stops to flush doors or paneled solid and glazed doors, etc., including all fixings and other accessories as required and as per drawings, specifications and as directed complete.	Each	80		
21	NDSR	Providing and fixing in position including all screws, making recesses, etc. in stainless steel/chrome finish complete and making good thereafter, all as required and as per drawings, specifications and as directed complete.				
21.1		Dorma hydraulic door closers Type TS-68 or similar item or similar rate.	Each	80		
21.2		Dorma hydraulic floor springs type BTS-75 or similar item or similar rate.	Each	80		
22	NDSR	Providing and fixing 10mm diameter stainless steel tower bolt. 200mm long	Each	80		
23		providing and fixing M.S.grillss of required pattern in frames of windows etc. with M.S. flats, square or round bars etc. including priming coat with approved steel primer all complete				
23.1	9.48.2	Fixed to openings /wooden frames with rawl plugs screws etc. ,	Kg	400		
24		Providing and fixing aluminum tower bolts ISI marked anodized (anodic coating not less than grade AC 10 as per IS i 1868) transparent or dyed to required colour or shade with necessary screws etc. complete				
24.1	9.97.50	100x10mm	Each	80		

25		Providing and fixing aluminum handles ISI marked anodized (anodic coating not less than grade AC 10 as per IS:1868) transparent or dyed to required colour or shade with necessary screws etc. complete				
25.1	9.100.2	100mm	Each	80		
26		providing and fixing aluminum hanging floor door stopper ISI marked anodized (anodic coating not less than grade C 10 as per IS:1868) transparent or dyed to required colour and shade with necessary screws etc. complete				
26.1	9.101.2	Twin rubber stopper	Each	80		
27	9.102	Providing and fixing aluminum casement stays ISI marked anodized (anodic coating not less than grade AC 10 as per IS 1868) transparent or dyed to required colour and shade with necessary screws etc. complete.	Each	80		
28		Door Frame				
	NDSR	Providing and fixing Fiber Glass Reinforced plastic (FRP) Door Frames of cross-section 90 mm x 45mm having single rebate of 32 mm x 15 mm to receive shutter of 30 mm thickness. The laminate shall be moulded with fire resistant grade unsaturated polyester resin and chopped mat . Door frame laminate shall be 2 mm thick and shall be filled with suitable wooden block in all the three legs. The frame shall be covered with fiber glass from all sides. M.S. stay shall be provided at the bottom to steady the frame.	Rm	160		
28.1		Door Shutter				
	NDSR	30 mm thick Fiberglass Reinforced Plastic (F.R.P.) flush door shutter in different plain and wood finish made with fire retardant grade unsaturated polyester resin, moulded to 3 mm thick FRP laminate all around, with suitable wooden blocks inside at required places for fixing of fittings and polyurethane foam (PUF) / Polystyrene foam to be used as filler material throughout the hollow panel, casted monolithically with testing parameters of F.R.P. laminate conforming to table - 3 of IS: 14856, complete as per direction of Engineer-in-	Sqm	160		

29	NDSR	Providing and fixing panels of 3 mm, pressed plate of grade 304 stainless steel, matte finish including Stainless Steel frame of 30x30x3 mm with all accessories and fixtures for removable access panel in block work, all complete as per drawings and specifications. (for payment purposes only SS item shall be weighed.)	Sqm	80		
30	NDSR	Providing and fixing 100 mm wide 3mm thick 304 grade stainless steel plate fixed over expansion joints screwed to floor with CSK screws and rawl plugs through slotted holes on one edge and round holes on other edge (screw on both edges @ 600 c/c). Screws shall be staggered on either ends all complete as per detail.	Rm	400		
31	NDSR	Providing and fixing in position stainless steel sheet 3mm thick for covering work in between escalator and the staircase over a frame work of M.S. angle frame work of size 50mm x 50mm x 5mm all along the escalator and the staircase including all necessary hardwares,fabrication,fixing including necessary scaffolding, red oxide primer of approved make and quality to the M. S. angle frame etc., complete as per approved drawings and specification and as directed by engineer in charge.	Sqm	160		
32	NDSR	Providing and fixing Acoustic Aluminum louvers of approved make and colour.Louvers shall be furnished with bird screen, insect screen, supports, installation hardware and finishes as specified and as required for a complete installation	Sqm	800		
33	NDSR	Providing and fixing acoustic insulation of ceiling at Platform and Concourse levels with resin bonded Fiber Glass Wool confirming to IS:8193, (Twiga Insulation 1500/50 mm or equivalent) density 24 kg/Cum., 50mm thick wrapped in black glass cloth and wire mesh, fixed in position on the soffit of slab by fasteners etc. complete as per drawings and specification and the direction of Engineer in Charge.	Sqm	800		

34	NDSR	Providing and laying Promaseal or equivalent bulkhead coating system up to 2mm thickness, as per BS476 part 20 to provide fire resistance of minimum 120 minutes in concrete / brick / panel / wall sub floors consisting of two layers of 50 mm thick rock wool panel insert (of min 144 kg/m ³ density), tightly sealed and coated with two coats of fire rated bulkhead coating system at both faces, clamping and holding structure and fire proof coating of up to 1.0 m distance on either side of seal for all cables complete as required by manufacturer.	Sqm	400		
35	NDSR	Providing and fixing aluminum linear ceiling using 84 mm x 16 mm deep, aluminum alloy AA 3105 with powder coated finished panel ceiling, type 84 R Exterior grade, manufactured by Hunter Douglas/ Interact Building Products Ltd. or approved equivalent in approved colour and enameled aluminum panel carriers of satin black colour, panel carriers suspension system, including cutouts and additional framing around light fixtures, grilles, diffusers, access panels, etc. all as per specifications and as directed complete. The carrier spacing shall not exceed 1 meter center to center and these will be suspended at every 800 mm center to center.	Sqm	1600		
36	NDSR	Providing and applying synthetic enamel painting of approved brand, colour, and shade 2 or more coats on new surfaces (plaster, wood or metal), to give an even shade, cleaning the surface of all dirt, dust and foreign materials, sand papering including cost of materials, labour, complete as per specifications with priming coat for all heights.	Sqm	800		
37	NDSR	Providing white washing to new wall surface in three or more coats with lime of approved quality to give an even shade including cost of material, labour complete as per specification for all heights.	Sqm	800		

38	NDSR	Providing and finishing external walls in three or more coats with water proof cement paint of approved brand and shade to give an even shade after thoroughly brooming the surface to remove all dirt and loose powdered material, free from mortar drops and other foreign materials including cost of material, labour complete as per specification with primer for all heights.	Sqm	1600		
39	NDSR	Providing and applying painting in two or more coats with plastic emulsion paint of approved brand on wall / ceiling surface to give an even approved shade after thoroughly brushing the surface, free from mortar drops and other foreign matter including preparing the surface even and sand paper smooth, cost of materials, labours, complete as per specification with primer for all heights.	Sqm	4000		
40	NDSR	Providing and painting acrylic polyurethane enamel paint of MRF or approved equivalent brand, manufacturer and shade, on new work (plaster, wood or metal), including one of more coats, to give an even shade, including provision or primer, preparation of surface using automotive putty, thinners etc. surface duly emery papered to give a perfectly smooth and even prepared surface before painting all as per specifications and as directed.	Sqm	800		
41	NDSR	Providing and fixing (at locations called for) glass mosaic tiles of size 20 x 20 x 4 mm of Palladio / Italia or approved equivalent make of approved colours laid over approved adhesives and jointed with permanent pigment to match the shade of the tiles complete	Sqm	160		
42	NDSR	Fabrication, supply and erection of hot dip galvanized MS cover plate, fabricated from minimum 6mm thick, MS chequered plate fixed over cleats, stiffeners, runners using 40*40*6 mm Ms angle grouted in position etc. Complete as per directions of engineer-in-charge (only galvanized chequered plate is covered under this item. Other items shall be paid by weight separately)	Kg	800		

43	NDSR	Supplying and fixing automatic galvanized industrial motorized rolling shutters (heavy duty) of approved make i.e. Indo-Germa Ltd. Chennai or equivalent made of required sizes and shape with G.I guides control box drive unit and with all other accessories complete as per manufacturer's specifications.				
43.1		Providing and fixing ball bearing for rolling shutters.	Each	16		
43.2		Extra for providing motorized grided rolling shutters manufactured out of 8mm dia. M.S. bar instead of laths as per design approved by the Engineer-in-Charge. (area of grill to be measured)	Sqm	160		
44	NDSR	Design, supplying and installing closed jointed 3mm thick solid G.I. perforated sheet cladding systems in straight profiled sections, 60 micron polyester powder coated & with perforations of approved type and of customized design / pattern, shape and size, including approved chromotised aluminum sub-structure frame work, aluminum brackets, gaskets, approved fixing arrangement to main structure using approved structural steel framework if required etc. complete at all heights, levels, and locations as directed by the Engineer.	Sqm	800		
45	NDSR	Providing and fixing GI rain proof lovers using 100 X 45 X 3 frame and aluminum lover blade 1.5 or 2mm thickness,100m wide with a overlap of 25mm per blade. All hardware shall be sheet metal / stainless steel .The frame fixed such that no frame in visible from outside.	Sqm	800		
46	NDSR	Providing and fixing non fire rated ACCESS DOOR fabricated in GMS Z sections with GMS sheet infill inclusive of SS hardware and locking arrangement, fixed on GMS framework made of angles and channels as per drawing, complete in walls and floors, making arrangements for required finish. All assembly to be painted & finished with approved colour and make.	Sqm	200		

47	NDSR	Providing and fixing 2 hour fire rated ACCESS DOOR fabricated in GMS Z sections with calcium silicate board 9mm thick infill inclusive of SS hardware and fire rated locks, fixed on GMS framework made of angles and channels as per drawing, complete for cutouts in walls. All assembly to be painted with fire retardant approved colour & shade.	Sqm	160		
48	NDSR	Providing and fixing structural glass assembly of glazed smoke down stand using 2 sheets 6mm thick toughened glass with nominal gap silicon sealant joint. Glass shall be clear, toughened and laminated with 1.52mm thick polyvinyl butyral layer, as per specification and grade 304 stainless steel of hairline finish assembly fixing on bolted patch plate & SS Spider Fitting with counter sunk screw including down hang galvanized bracket support from structural slab using approved anchor as shown in the detailed drawing, including providing and fixing Rock Wool packing with 12mm thk calcium silicate board as per specification from 1500 to 2000 mm height above false ceiling and bottom edge finished with 3mm grade 304 SS pressed plate as per relevant architectural drawing, for fire separation. (for payment purposes area of glass only shall be measured)	Sqm	400		
49	NDSR	Precast terrazo tiles 22 mm thick with graded marble chips of size up to 12 mm, laid in floors, and landings, jointed with neat cement slurry mixed with pigment to match the shade of the tiles, including rubbing and polishing complete, on 20 mm thick bed of cement mortar 1:4 (1 cement: 4 coarse sand)	Sqm	400		
50	NDSR	Providing and laying 15 mm thick heavy duty floor hardener topping course with "IRONITE" @2.2 Kg/m ² or approved equivalent including the bedding layer of 25 mm thick screed concrete (1:1:2) with 10 mm and down graded stone aggregate topping course laid over 25 thick granolithic floor finish whilst the screed concrete is still green, all according to the manufacturer's specification including trowel finishing and curing, all materials, tools, plant and labour complete.	Sqm	800		

51	NDSR	Providing and laying floor consisting of concrete grade M30 including all operations viz. Cleaning of under floors, providing slurry, placing of concrete, use of poker and surface vibrators, floating and troweling, laying the surface to slope as called for , all incidental work etc. complete	Cum	160		
52	NDSR	Extra over above for Vacuum De-watering System treatment including fixing of the channels / side form and setting them to the required level, 12/25 mm thick expanded polystyrene for expansion / isolation joints to the full thickness of the concrete, dewatering the surplus water using filter pads & vacuum pumps, floating with a disc, power troweling with blades including all incidental work etc., complete. The VDS equipment shall be of TREMIX / AQUARIOUS TECH., The channel shall have holes of dia. and intervals specified by Engineer in charge and perpendicular at the edges.	Sqm	160		
52.1		Providing and applying "Ashford Formula' or approved equivalent to concrete floor as called for to develop sealing hardening, improve abrasion resistance, chemical resistance as per manufacturer's specification.	Sqm	400		
53	NDSR	Extra for providing and mixing water proofing compound in cement plaster for masonry work at one kg per bag or in the proportion recommended by the manufacturers, for cement mortar 1:4, 18 mm thick including cost of materials complete as per specification for all heights.	Sqm	80		
54	NDSR	Supply and installation of 16 gauge thick cold rolled exterior panel polished finish stainless steel sheet (ASTM A240, type 316) of panel size 1.2m x 3.6m (Max) with interlocking edges, fitted with continuous gaskets. As per drawing.	Sqm	80		

55	NDSR	<p>*These values are “minimum values” determined by average of testing prescribed across fabric web. Other values are nominal values within +/-10%.For pigmented products, translucency will go to zero (0) and reflectance value will vary based on the color. The testing listed above is performed and reported for each production roll. Additionally, biaxial testing is done for each roll using MSAJ method, 1:1 stress ratio.</p> <p>The following characteristic values describe the attributes of the material and should be confirmed through the manufacturer and/or third party test reports. These tests are not performed on an individual roll basis.</p> <table border="0"> <thead> <tr> <th>Properties</th> <th>Test Method</th> <th>Type III</th> </tr> </thead> <tbody> <tr> <td>Grey Cloth Weight (g/m2)</td> <td>DIN 53854</td> <td>485</td> </tr> <tr> <td>Fire Testing</td> <td>EN 13501</td> <td>B1-s1-d0</td> </tr> <tr> <td colspan="3">Burning Characteristics</td> </tr> <tr> <td>Flame Spread</td> <td>ASTM E84</td> <td>5 max</td> </tr> <tr> <td>Smoke Generation</td> <td>Tunnel Test</td> <td>10 max</td> </tr> <tr> <td>Incombustibility of Substrates</td> <td>ASTM E136</td> <td>Pass</td> </tr> <tr> <td>Flame Resistance</td> <td>ASTM 108</td> <td>Class A</td> </tr> <tr> <td>Methylene Blue Mineralization</td> <td>ISO 10678:2010</td> <td>15</td> </tr> </tbody> </table>	Properties	Test Method	Type III	Grey Cloth Weight (g/m2)	DIN 53854	485	Fire Testing	EN 13501	B1-s1-d0	Burning Characteristics			Flame Spread	ASTM E84	5 max	Smoke Generation	Tunnel Test	10 max	Incombustibility of Substrates	ASTM E136	Pass	Flame Resistance	ASTM 108	Class A	Methylene Blue Mineralization	ISO 10678:2010	15	Sqm	0		
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56	NDSR	LATCHWAYS , UK Fall Protection System: Supply & fixing of Latchways fall protection system with Constant Force® Post suitable for Kalzip roofing sheets using 4 x Aluminum clamps, as specified in the Tender manufacture by Latchways PLC Wiltshire UK.The complete system shall be tested to EN795 Class A2 & Class C and be capable of supporting TWO users working simultaneously at any point along the 8 mm, 7 x7 stainless steel cable even in the same area between 2 posts and shall demonstrate that an individual post is capable of absorbing a direct dynamic load of 300 kg dropped through 1.5m and limit the fore to the roof to 10kN in shear without damage to the roofing substrate. The system shall hold a valid CE mark followed by 4 digit and shall hold EC declarations of conformity. Each individual post shall have a unique traceable serial No. and be manufactured from 5083 aluminum and 316 stainless steel . Evidence of salt spray testing to 1000 hrs. with no corrosion. Shall be provided inclusive of : 2 nos of Trans fasteners. The Fall Protection System to be approved by the roofing manufacturer. As per drawings	Sqm	400		
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57.0	NDSR	<p>CEM BOARD Supply and installation of Non-combustible CEM board suspended ceilings / Side cladding on metal frames / Paneling on metal frames for partitioning / Holding insulation materials in position of the side cladding. The CEM board panels shall be 12mm, 10mm, 8mm, 6mm and 4mm thick with recessed edges in panel's sizes of maximum 1200 x 600mm as directed by the Design. The 1200 x 600 x 16mm CEM board ceiling shall be fixed butt jointed concealed suspension system consisting of aluminum tee grid system or of other approved metal suspension system. The CEM board ceiling panels shall be fixed to the aluminum or metal tee grid by means of screws or with edges grooved or recessed for housing the edges of the tee grids. If screws are used for fixing the ceiling panels to the suspension grids, the screw heads shall be countersunk and stopped up with approved filler and prepared the board surface for receiving paint. Provide and apply one coat of alkali resisting primer and two coats of emulsion paint to the CEM board ceilings on completion. The Contractor shall submit full details of the type of ceiling systems proposed complete with fixing and suspension details for the notice of the Employer's Representative.</p>	Sqm	2,000		
58.0	NDSR	<p>ALUMINIUM ROOF VENT - Mechanical Providing and fixing 24 inches turbine air vent system of aluminium built. With 0.5mm thick 46 Nos of vanes with central shaft made of stainless steel of appropriate grade. 2 Nos of "HCH" 6001 2Z (Self-lubricating bearing). Rivets made of aluminium pneumatic rivets. Turbine dome thickness of 1.2mm , Outer dia 685mm , Rotor dia 810mm , Height 495 mm , Dome dia 380mm , Throat dia 650mm.</p>	Nos	80		

59.0	NDSR	<p>LLOYDS Standing seam with rock wool insulation Supplying and Fixing Double Skin Metal Roofing or Equivalent in technical specifications and as well as cost comprising of: External sheeting – Lloyd Standing Seam profiled panels having 450mm – 455mm wide pan and 50 mm depth rib manufactured out of 0.6 mm / 0.7 mm TCT cold rolled steel 300 Mpa –yield stress with hot dip metallic coating of aluminium zinc alloy (Galvalume 150 gm / sq.m. total of both sides having 20 microns Polyester coating on the exposed side. The Standing Seam profile shall be site roll formed so as to provide single length panels from ridge to eave and fixed on the clip provided on the purlins. The clip shall be fixed to the purlins with wafer head self drilling fasteners 2 Nos per clip. The site seaming shall be done with a special machine to ensure 100% water tightness. Internal sheeting – LLOYDECK Profiled sheet having 975 mm cover width, 28 mm crest height at 195 mm pitch, shall be made out of 0.5 mm TCT, Galvalume Sheet (AZ 150 - 150 GSM (min) Zinc Aluminium Alloy coating Mass, with 20 microns SMP color coating.</p>	Sqm	1600		
		<p>Lloydeck profiled sheets shall be fixed to the Purlins with self self drilling and self tapping fasteners with EPDM washers and with necessary overlap as per manufacturer's specification. Insulation - Rockloyd Slab - Mineral wool slabs of 50 mm thick having 48 Kg/cu.m. Density shall be sandwiched between the internal and external sheeting. The sheets shall be separated with 'Z' shaped sub-girts of 50 x 50 x 50 mm size, made out of 1.6 mm. thick galvanized steel. The sub-girts shall be fixed on the internal sheet and shall be used for supporting the external sheet.</p>				

60.0	NDSR	Rock Wool insulation: Mineral wool slabs of 50 mm thick having 48 Kg/cu.m. Density shall be sandwiched between the internal and external sheeting. The sheets shall be separated with 'Z' shaped sub-girts of 50 x 50 x 50 mm size, made out of 1.6 mm. thick galvanized steel. The sub-girts shall be fixed on the internal sheet and shall be used for supporting the external sheet.	Sqm	50.00		
61.0	NDSR	Glass Wool Underdeck Insulation – Glass wool Building Rolls of 50 mm thick having 24 Kg/cu.m density with one side aluminium foil facing shall be placed above the purlin and held in place with 75 x 75 x 1.6 mm thick GI Weld Mesh. Insulation material shall be applied prior to the erection of Roofing Sheet.	Sqm	400.00		
*RO- Rate only defined as below The contractor shall quote the rates for this item. These items will be operated as required as per the instruction of The Client or The Architect or The Engineer in-charge. These items can also be used instead of quoted items in the contract or as additional items in the contract. These items are stand alone and will not be added on to the main BOQ.						
3.0		WOOD WORKS AND IRON MONGREY				
1		providing and fixing M.S.grillss of required pattern in frames of windows etc. with M.S. flats, square or round bars etc. including priming coat with approved steel primer all complete				
1.1	9.48.2	Fixed to openings /wooden frames with rawl plugs screws etc. ,	Kg	400	RO	
2		Providing and fixing aluminum tower bolts ISI marked anodized (anodic coating not less than grade AC 10 as per IS i 1868) transparent or dyed to required colour or shade with necessary screws etc. complete				
2.1	9.97.50	100x10mm	Each	80	RO	

3		Providing and fixing aluminum handles ISI marked anodized (anodic coating not less than grade AC 10 as per IS:1868) transparent or dyed to required colour or shade with necessary screws etc. complete				
3.1	9.100.2	100mm	Each	80	RO	
4		providing and fixing aluminum hanging floor door stopper ISI marked anodized (anodic coating not less than grade C 10 as per IS:1868) transparent or dyed to required colour and shade with necessary screws etc. complete				
4.1	9.101.2	Twin rubber stopper	Each	80	RO	
5	9.102	Providing and fixing aluminum casement stays ISI marked anodized (anodic coating not less than grade AC 10 as per IS 1868) transparent or dyed to required colour and shade with necessary screws etc. complete.	Each	80	RO	
		TOTAL OF WOOD WORKS AND IRON MONGERY				
TOTAL						

CONSTRUCTION OF EIGHT NUMBER OF ELEVATED METRO STATIONS VIZ PRAJAPATI NAGAR , VAISHNO DEVI SQUARE , AMBEDKAR SQUARE, TELEPHONE EXCHANGE SQUARE, CHITTAR OLI SQUARE, AGRASEN SQUARE, DOSAR VAISYA SQUARE & NAGPUR RAILWAY STATION ON THE EAST-WEST CORRIDOR (REACH-4) OF NAGPUR METRPO RAIL PROJECT				
SCHEDULE - H : ELECTRICAL, PUBLIC HEALTH ENGINEERING, FIRE PROTECTION AND HVAC SYSTEM				
E	General Notes for Electrical Works			
1	The BOQ specified below include the latest relevent standards, specifications, drawings (In conjunction with relevant Station drawings)			
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.			
	Addition/Deletion			
1.15	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 ,basbar, other sub-systems, accessories etc complete as required and as per specifications and as specified in of item 1.0 above			
a)	1 no. 800 A, 415V, 50kA, 4P draw out Electrically operated ACB complete with: 1- set Red/Green ON/OFF indicating lamps	No	8	

	1- set of three phase (red, yellow, blue) indicating lamps				
	Amber healthy trip indicating lamps				
	3 nos. cast resin current transformers of 800/5 ratio with 15 VA Burden & Class 5P10 for protection				
	3 nos. cast resin current transformers of 800/5 ratio with 15VA burden and Class 1.0 for measurement				
	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.				
	230V AC or 24 V DC shunt trip coil				
	230V, AC Motor wound spring closing mechanism.				
b)	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)	No	8		
c)	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)	No	8		
d)	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	No	8		
e)	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	No	8		
f)	Less than 63A to 40A, 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	No	8		
g)	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	No	8		
h)	5-32A FP MCB 9/10 kA	No	80		
j)	5-32A TP MCB 9/10 kA	No	80		

l)	5-32A DP MCB 9/10 kA	No	80		
m)	40-63A DP MCB 9/10 kA	No	80		
n)	5-32A SP MCB 9/10 kA	No	80		
o)	40-63A SP MCB 9/10 kA	No	80		
p)	16-32Amp DP RCCB, 30 mA	No	80		
1.16	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.	No	16		
1.17	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.	No	16		
1.18	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.	No	16		
1.19	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	No	16		
E03	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.				

b1)	3.5 core 240-sqmm AL conductor	m	2,400		
c)	3.5 core 185-sqmm AL conductor	m	1,600		
c1)	3.5 core 150 sq mm AL. Conductor	m	800		
d1)	3.5 core 95 sq mm AL. Conductor	m	800		
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.				
b1)	3.5 core 240-sqmm AL conductor	Nos.	80		
c)	3.5 core 185 sqmm AL conductor	Nos.	80		
c1)	3.5 core 150 sq mm AL. Conductor	Nos.	80		
d1)	3.5 core 95 sq mm AL. Conductor	Nos.	40		
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.				
b)	5 C x 1.5 sqmm	m	1,200		
c)	7 C x 1.5 sqmm	m	1,200		
d)	8 C x 1.5 sqmm	m	1,200		
e)	10 C x 1.5 sqmm	m	1,200		
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	m	40		
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	16		
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	64		
d)	Flexible joints Consists of a right hand and left hand unit Used to change direction, change level or overcome obstructions	Nos	80		
3.3	Cable Trays				
3.4	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.				
d	300 mm wide x 2mm thick	m	200		
3.5	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 electrically continuous as approved and of following sizes.				
a)	100 x 100 MM	m	400		
d)	150 x 150 MM	m	400		
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.				
4.2	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				
b	3R of 1 c x 4 Sqmm	m	200		
c	3c x 2.5 Sqmm	m	800		
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				
b	4c x 6 SqMM	Mtr.	4,000		
E5	INDOOR LIGHTING AND FANS				

Supply, installation, testing & commissioning of light fittings including all accessories e.g. ballast, HPF condensers, lamps, holders,					
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 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	No	160		
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 PSL GP	No	40		
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	No	40		
FANS					

5.11	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.	No.	200		
5.13	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	No.	200		
E6	PROTECTIVE EARTHING				
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	m	400		
b	1 x 10 sq. mm	m	400		
c	1 x 16 sq. mm	m	400		
d	1 x 70 sq. mm	m	400		
e	1 x 150 sq. mm	m	400		
	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.	m	400		

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.	No	80		
E8	EXTERNAL LIGHTING				
8.1	Poles				
8.1.1	9m Octagonal pole hot dip galvanised with top bottom dia 70/155 mm , thickness 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	No	16		
8.1.3	7m Octagonal pole hot dip galvanised with top bottom dia 70/130 mm , thickness 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	No	16		
8.1.4	7m Octagonal pole hot dip galvanised with top bottom dia 70/130 mm , thickness 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	No	40		
	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%.(Similar to Philips Cat. No. BRP410 LED CW072 MR FG S1 PSU or equivalent)	No	8		
8.2.1	Supply of 75mm dia HDPE pipe conforming 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.	m	200		
8.2.2	Supply and laying of 6 SWG wire along with the cable	m	800		
8.2.3	Providing and fixing thermo plastic poly carbonate pole box conforming 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.	m	80		
8.2.4	wiring for luminaries in existing poles with following sizes of unarmoured cu cables from pole box to each fittings.				

8.2.5	3x2.5 sq mm	m	200		
8.3	High Mast				
8.3.1	<p>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 accessories like winches, lantern 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 accessories like phosper Bronz Gear, double drum, stainless steel wire ropes, suitable MCB wires/cables as required with alongwith the folowing accessories 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.</p>	NO	0		

	<p>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 accessories like winches, lantern 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 accessories like phosper Bronz Gear, double drum, stainless steel wire ropes, suitable MCB wires/cables as required with alongwith the folowing accessories 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.</p>	No	10		
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.				

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 three 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.	set	2		
	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.				
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 1.1, Battery shall comply with relevant regulations & Battery racks shall be made of acid resistant material complete as per specifications & as required.				
Grand Total					

CONSTRUCTION OF EIGHT NUMBER OF ELEVATED METRO STATIONS VIZ PRAJAPATI NAGAR , VAISHNO DEVI SQUARE , AMBEDKAR SQUARE, TELEPHONE EXCHANGE SQUARE, CHITTAR OLI SQUARE, AGRASEN SQUARE, DOSAR VAISYA SQUARE & NAGPUR RAILWAY STATION ON THE EAST-WEST CORRIDOR (REACH-4) OF NAGPUR METRPO RAIL PROJECT

SCHEDULE-H ELECTRICAL, PUBLIC HEALTH ENGINEERING, FIRE PROTECTION AND HVAC SYSTEMS

F1	<u>FIRE HYDRANT SYSTEM</u>				
	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				
S.No	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
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 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.				
	Capacity : 1800 lpm, App.head : 70 m, HP : 80 HP	No	8		
1.2	Diesel Fire Pumps				

	Supplying, installing, testing and commissioning of diesel engine driven fire pump suitable for automatic operation consisting of the following (as per CPWD specifications partv 1985.) horizontal centrifugal type multi-stage, fire pump with bronze impeller to ensure a minimum pressure of 3.5 kg per sq.cm. at the highest & farthest outlet at the specified flow, complete. the engine shall be capable to drive the pump at 150% rated discharge at 65% head and shall be suitable for 10% overload capacity for one hour in any period of 12 hrs. continuous run. common bed plate fabricated from mild steel channel. isolation valve suitable cement concrete pump foundation & vibration damping arrangement with cushy foot mounting as required. app hp : 100 hp, head : 85				
	Capacity : 1800 lpm, App.head : 70 m, HP : 80 HP	No	8		
1.3	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, App.head : 70 m, HP : 7.5 HP	No	8		
1.6	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.				
e	50 mm nominal bore	m	400		
f	40 mm nominal bore	m	400		
g	32 mm nominal bore	m	400		
h	25 mm nominal bore	m	400		

4.3.1a	Rate of rise cum fixed Temperature thermister type Heat detector with mounting base complete as required	Nos	160		
	TOTAL AMOUNT				

**CONSTRUCTION OF EIGHT NUMBER OF ELEVATED METRO STATIONS VIZ PRAJAPATI NAGAR , VAISHNO DEVI SQUARE ,
AMBEDKAR SQUARE, TELEPHONE EXCHANGE SQUARE, CHITTAR OLI SQUARE, AGRASEN SQUARE, DOSAR VAISYA SQUARE &
NAGPUR RAILWAY STATION ON THE EAST-WEST CORRIDOR (REACH-4) OF NAGPUR METRPO RAIL PROJECT**

SCHEDULE-H ELECTRICAL, PUBLIC HEALTH ENGINEERING, FIRE PROTECTION AND HVAC SYSTEMS

S.No.	Description	Unit	Quantity	Rate (Rs.)	BOQ Amount
H1	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 accessories 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				
	26 HP (22TR Nominal Capacity)	Nos	8		
	20 HP (16TR Nominal Capacity)	Nos	8		
	18 HP (15TR Nominal Capacity)	Nos	8		
	6 HP (5TR Nominal Capacity)	Nos	8		

1.1.2	Indoor Units				
	Supply, installation, testing 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:				
	Ceiling mounted duct type 3500 CFM - 6.0 TR Nominal Capacity	Nos	8		
	Ceiling mounted duct type 2800 CFM - 5.0 TR Nominal Capacity	Nos	8		
	Ceiling mounted duct type 2400 CFM - 4.0 TR Nominal Capacity	Nos	8		
	Ceiling mounted duct type 2300 CFM - 4.0 TR Nominal Capacity	Nos	8		
	Ceiling mounted duct type 2000 CFM - 3.0 TR Nominal Capacity	Nos	8		
	Ceiling mounted duct type 1600 CFM - 3.0 TR Nominal Capacity	Nos	8		
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)	Rm	160		
b)	34.9 mm O.D. (insulation : 19 mm)	Rm	160		
1.5	DX wall mounted Split Unit				

1.5.1	Providing, fixing, testing and commissioning of Hi wall split unit air conditioning air cooled type with evaporator coil, fan and fan motor ,air cooled condenser with hermetically sealed reciprocating compressor, condenser coil and complete with electrical Wiring as required (Voltage stabilizers 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-charge before proceeding further.				
a)	Nominal capacity 1.5 TR	Nos	8		
1.5.2	Providing, fixing and testing of copper refrigerant piping of appropriate 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.	Rmt	160		
H2	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.				
	Capacity 1500 CFM (2550CMH) wall mounted (exhaust fan)	Nos	8		
	Capacity 1350 CFM (2295CMH) wall mounted (exhaust fan)	Nos	8		
	Capacity 1300 CFM (2210CMH) wall mounted (exhaust fan)	Nos	8		
	Capacity 1200 CFM (2040CMH) wall mounted (exhaust fan)	Nos	8		
	Capacity 1150 CFM (1955CMH) wall mounted (exhaust fan)	Nos	8		
	Capacity 1080 CFM (1836CMH) wall mountde (supply fan)	Nos	8		
	Capacity 1000 CFM (1700CMH) wall mountde (supply fan)	Nos	8		
	Capacity 960 CFM (1632CMH) wall mountde (supply fan)	Nos	8		
	Capacity 920 CFM (1564CMH) wall mountde (supply fan)	Nos	8		
	Capacity 800 CFM (1360CMH) wall mountde (supply fan)	Nos	8		
	Capacity 650 CFM (1105CMH) wall mounted (exhaust fan)	Nos	8		
	Capacity 520 CFM (884CMH) wall mountde (supply fan)	Nos	8		
	Capacity 500 CFM (850CMH) wall mountde (supply fan)	Nos	8		

	Capacity 260 CFM (442CMH) wall mountde (supply fan)	Nos	8		
2.2	cabinet fan with centrifugal blower driven by motor. The motor shall be suitable for 220 Volts $\pm 6\%$ 1 Phase 50 HZ AC supply.				
	Capacity 9300 CFM (15810 CMH) ceiling mounted (exhaust fan)	No	8		
	Capacity 7440 CFM (12648 CMH) ceiling mounted (supply fan)	No	8		
	Capacity 6000 CFM (10200 CMH) ceiling mounted (exhaust fan)	No	8		
	Capacity 4800 CFM (8160 CMH) ceiling mounted (supply fan)	No	8		
	TOTAL FOR M.02				
	TOTAL SUMMARY				

CONSTRUCTION OF EIGHT NUMBER OF ELEVATED METRO STATIONS VIZ PRAJAPATI NAGAR , VAISHNO DEVI SQUARE , AMBEDKAR SQUARE, TELEPHONE EXCHANGE SQUARE, CHITTAR OLI SQUARE, AGRASEN SQUARE, DOSAR VAISYA SQUARE & NAGPUR RAILWAY STATION ON THE EAST-WEST CORRIDOR (REACH-4) OF NAGPUR METRPO RAIL PROJECT					
SCHEDULE-H ELECTRICAL, PUBLIC HEALTH ENGINEERING, FIRE PROTECTION AND HVAC SYSTEMS					
S.No	Description	Unit	Quantity	Rate (Rs.)	Amount(Rs.)
P1	Public Health Engineering				
1.19	GI pipes and fittings for Water Supply System				
	Supply & Install GI pipes & fittings conforming to IS 1239 Part I (heavy grade 'c' class pipe) for process of water supply distribution network, including all necessary fixings, accessories, supports, pipe work finishes, Pressure testing, cleaning and flushing as per Specification.				
	75 mm	m	200		
1.23	Submersible Pump for Waste water				
	Supply, Inspection, Testing, Delivery, Installation and commissioning of following Submersible Pumps with the specified capacity and Head including electrical motors, VFD, valves and all the necessary piping, fittings, accessories as per and Specification.				
	Electric Motor Driven Submersible Pump 5 HP (300lpm, 25m head) (1 Duty + 1 Standby)	Set	8		
1.24	Non Return Valve				
	65mm Dia	Nos	16		
1.25	Gate Valves				
	Providing and fixing gun metal Gate Valve with CI wheel of approved quality (screwed end)				
	65 mm Dia (For Waste Water Pump in the subway)	Nos	16		
	TOTAL AMOUNT				

CONSTRUCTION OF EIGHT NUMBER OF ELEVATED METRO STATIONS VIZ PRAJAPATI NAGAR , VAISHNO DEVI SQUARE , AMBEDKAR SQUARE, TELEPHONE EXCHANGE SQUARE, CHITTAR OLI SQUARE, AGRASEN SQUARE, DOSAR VAISYA SQUARE & NAGPUR RAILWAY STATION ON THE EAST-WEST CORRIDOR (REACH-4) OF NAGPUR METRPO RAIL PROJECT

SCHEDULE-I ENVIRONMENT, SOCIAL, HEALTH & SAFETY (ESHS) COST SCHEDULE

Item N ^o	Description	SHE Specifications Clause No	Unit	Amount [specify currency]
SHE 1	Resources allocated to ESHS management	Clause 4	Lump sum	
SHE 2	Drafting and updating the ESHS documentation, reporting, inspections	Clauses 1, 2, 3, 5, 6, 7, 9	Lump sum	[Cost SHE 1 should exclude all or part of the costs of those tasks]
SHE 3	Implementation of the Health and Safety Plan: Meetings, health care center, medical check-ups, emergencies and evacuations, safety protective equipment, hygiene	Clauses 1, 9, 20 to 24, 26 to 36, 40	Lump sum	[Cost SHE 1 should exclude all or part of the costs of those tasks]
SHE 4	Accommodation, drinking water, meals and transportation of staff(*) (*): The Bidder shall detail the financial conditions of the supply of accommodation, meals and transport to its staff: – Accommodation – Meals – Transport	Clauses 35, 38, 39	Lump sum Lump sum Lump sum	[The cost for “site mobilization” should exclude all or part of the costs of those tasks]
SHE 5	Training and local recruitment management costs	Clauses 8, 37	Lump sum	[Cost SHE 1 should exclude all or part of the costs associated to those tasks]
SHE 6	Protection of adjacent areas, prevention of erosion and wastewater management	Clauses 10, 11, 12, 17	Lump sum	
SHE 7	Traffic, noise and atmospheric emissions management, land take	Clauses 13, 14, 41, 42	Lump sum	
SHE 8	Waste and hazardous products management	Clauses 15, 25, 39	Lump sum	
SHE 9	Vegetation clearing and site rehabilitation	Clauses 16, 18, 19	Lump sum	[The cost for “site mobilization” should exclude all or part of the costs associated to those tasks]
SHE 10	All other items except SHE 1 to 9, contained in SHE manual & ESMP	SHE Manual	Lump sum	

Total for Bill SHE

SHE costs are deemed to cover operations on all Sites (as defined in Clause 1.3 of SHE Specifications)

Interim payment certificates shall include the portion of each SHE cost amounting to the percentage of the actual progress achieved in executing the SHE measures in compliance with the SHE Specifications and approved by the Engineer. Payment towards Schedule-D will be in proportion to IPC payment on compliance of various items of Schedule ‘I’.