

Terms of Reference (TOR) on Consultancy Services for Feasibility Study to establish an underground Distribution Network replacing the existing Overhead Distribution Network under Dhaka Palli Bidyut Samity-3

1. Background

Bangladesh Rural Electrification Board (REB) is working to electrify in rural areas of the country since 1978. In consistence with these rigorous activities REB has already provided 100% electricity to 461 villages (on-grid) and 01 off-grid village. To achieve vision 2021, Honorable Prime Minister of Bangladesh, Sheikh Hasina announced a slogan "Electricity for all by 2021." REB has achieved this milestone of 100% electrification within stipulated time.

The activities of REB is not just confined within RE program, it is also appreciated for the increase of the number of industries and commercial consumers rapidly in rural areas. Furthermore, most of the upcoming 100 economic zones are situated in REB operation area and Government has also taken "Amar Gram, Amar Shohor" program translating urban facilities to the rural areas. To support country's economic growth those industrial and commercial institutes need un-interrupted, reliable and quality electricity supply and REB has to take up this great responsibly provide these facilities. According to power system master plan (PSMP-2016) of Bangladesh, REB has to supply 16000 MW by the year 2025 and 25000 MW by 2030. Present REB's demand is 8003 MW. REB has targeted to take modernization and capacity enhancement project in each division to meet the projected demand & ensure un-interrupted, reliable, quality and modern energy services to achieve SDG goal.

Dhaka PBS-3 is one of the 80 PBSs of the RE (Rural Electrification) System in Dhaka Division in Bangladesh. The area of the PBS is 455 sq km, covering all the Savar (Partial), Manikgonj sadar (partial), Mirjapur-Tangail (partial) and Damrai in Dhaka district. The PBS area is having population of 1301823. Total 3452.867 km electrified power line is connected through 19 nos. of 33/11 kV substation. Total connected consumers are 428790 which are categorized as domestic (376598), Commercial (378949), Industrial (4993) and others (9350). System Loss of the PBS is around 4.16%.

Dhaka PBS-3 started its commercial Operation in 1 January 2014. In consideration of PBS geographical location as in the vicinity of Capital Dhaka, present trend of socioeconomic rapid growth & industrialization with extension of Industrial hub characteristic, future power load demand has thus been assessed. Stakeholders such as household as well as industry and commercial consumers in the PBS project area have been contacted for a meeting, where power load demand forecast in future have been thoroughly assessed. Based on the background of block load study, and based concerned field survey, pending applications in PBS, associated statistical information as available, the power system master plan with load growth, consumer growth and revenue growth trends of Dhaka PBS-3 for 10 years has been projected. Based on the load in 2016 as 157 MW & in 2021 as 219 MW, the forecasted load in the next 5 years in 2026 is 300 MW and in 2030 is 350 MW.

REB now intends to appoint an international consulting firm for Feasibility Study, Preparation of Detailed Drawing, Design and Estimate of Underground Electric Distribution Network at Savar Upazila & adjacent area in Dhaka District under Dhaka PBS-3.

2. The Assignment

As a part of the "Replacement of Existing Distribution Network by Underground Distribution Network" Project under Dhaka PBS-3, REB now intends to appoint an international consulting firm for Detailed survey and Feasibility Study of Sub-transmission and Distribution Network at Savar Upazila & adjacent area in Dhaka district under Dhaka Palli Bidyut Samity-3 and Preparation of Drawing & Design, BOQ, Cost Estimate and Bidding Document to Establish an Underground Distribution Network Replacing the existing Overhead Sub-transmission and Distribution Network at Savar Upazila & adjacent area in Dhaka District under Dhaka Palli Bidyut Samity-3.

3. Objectives of the Project:

The major objectives of the study are;

- (i) Ensure quality, reliable, uninterrupted power supply etc. for the consumers;
- (ii) Meet up future load demand and changing needs of the customers through development of required distribution infrastructures in planned and economic ways.
- (iii) Determine the requirement, location, capacity etc. of underground distribution network at Savar Upazila & adjacent area in Dhaka District under Dhaka Palli Bidyut Samity-3 are to meet up the projected demand up to 2041
- (iv) To prepare plan for modern and automated underground Electricity Distribution Network at Savar Upazila & adjacent area in Dhaka District under Dhaka Palli Bidyut Samity-3 are a like modern city in the world
- (v) Ensure financial sustainability of the REB/PBS to implement the Underground Distribution Network project.
- (vi) Necessary Technology Transfer to Dhaka PBS-3 will be carried out during the study.
- (vii) Loss Reduction of the distribution network.
- (viii) Voltage drop study of the distribution network.
- (ix) Charging current calculation of the underground distribution system.
- (x) Required study for smooth operation & maintenance of the system.
- (xi) Project implementation plan with Gantt chart has to be prepared and accordingly project implementation period has to be identified.
- (xii) Capital expenditure has to be calculated based on BOQ.
- (xiii) Specific recommendation whether the project is feasible or not based on CBA and making the project output sustainable and weather resilient. Provide the soft (editable) and hard copy of all report and documents including cost analysis.
- (xiv) The Consultant will assist the client for getting the approval of all documents mentioned in Scope of work from the DoE.
- (xv) Final Feasibility Study report must be prepared according to the **Planning Commission's approved format** including all other related documents in print & soft format and completion report.

₳

4. Scope of Services

Scope of services under the proposed assignments include, but not limited to:

4.1 Inventory of Existing Distribution System including all assembly unit with material list Preparation of work plan, Line Sketch, Single Line Diagram etc. as per REB specification and standard:

- (i) **Inventory** and Preparation of Geographical Map with Establishment of Geo-coordinate including roads, buildings, various installations, empty spaces, sewerage lines, water supply lines, gas transmission lines, telephone and internet lines etc. Within Savar Upazila and adjacent area Dhaka District under Dhaka Palli Bidyut Samity-3 on Digital Base Map.
- (ii) To conduct pole to pole survey with respect to the base point for collecting data/information of the existing distribution system (substations, switching-stations, overhead lines, underground cables, equipment, transformers, towers, poles, service drops, consumers etc. at each voltage level i.e. 33 kV, 11 kV, 0.4 kV and 0.23 kV) as per approved forms with the help of GPS receiver/transceiver. The accuracy of the GPS data should not be higher than 50 cm for the coordinate of each pole or other installation of REB and any margin of error for distance between objects will not be allowed after post processing and shall be approved by REB. The base point of this survey will be defined by REB authority.
- (iii) Identifying capacity and dimension of existing 33 kV, 11 kV, 0.4 kV and 0.22 kV underground cables/conductors / service cables etc.
- (iv) To prepare feeder wise work plan, Line Route Sketch, Single Line Diagram (SLD) etc. of existing system;
- (v) Analyze the system demand data, load curve, consumer growth, consumption growth, per capita consumption, historical demand growth etc for proper design of underground Distribution Network considering REB Master Plan up to year 2041.
- (vi) Preparation of existing underground Distribution Network diagram (with route map) of REB area showing in the geographical map.
- (vii) Environmental Impact on implementation of U/G system will be included in the feasibility study. Scope of environmental Works, mitigation, action plan etc.

4.2 Feasibility Study of Proposed Underground Distribution Network:

- (i) Feasibility study of underground Distribution system in network at Savar Upazila & adjacent area in Dhaka District under Dhaka Palli Bidyut Samity-3.
- (ii) Identifying barriers and challenges for implementation of the proposed underground Distribution Network considering ducting system.
- (iii) Preparation of plans and strategies to mitigate the barriers and challenges for implementation of the mentioned Underground Distribution Network.
- (iv) Environmental Impact on implementation of U/G System or conversion of O/H system into U/G system will be included in the feasibility study.
- (v) To develop forms for survey of existing distribution network system (substations, switching-stations, overhead lines, underground cables, equipment, transformers, towers, poles, service drops, consumers etc. at each voltage level i.e. 33 kV, 11 kV, 0.4 kV and 0.23 kV) which will fulfill the requirement of REB and applicable to GIS database as well and get the forms approved by REB before conducting detailed survey. Survey forms must contain the data.

3

4.3 Design and Drawing of Proposed Underground Distribution Network must be on the basis of voltage drop calculation & system loss analysis:

- (i) Preparation of design for proposed 11/0.4 kV transformers (Pad Mounted/ Four leg Mounted Unit/Kiosk substation/built-in RMU when necessary), 11 kV Ring Main Unit (Drawings with Detailed Specification) and 0.4 kV Switchgear/Distribution Box considering all protection scheme, the roads and space limitation of Savar Upazila & adjacent area in Dhaka District under Dhaka Palli Bidyut Samity-3.
- (ii) Preparation of detail Drawing, Design, work plan, estimation etc. for construction of underground electrical distribution network at Savar Upazila & adjacent area in Dhaka District under Dhaka Palli Bidyut Samity-3 like modern underground system in the developed country.
- (iii) Underground system should be designed considering probable Earthquakes and any other disasters.
- (iv) Preparation of Drawing, Design, work plan BOQ estimation etc. for Conversion of all existing Overhead of Savar Upazila & adjacent area in Dhaka District under Dhaka Palli Bidyut Samity-3 in to Underground Distribution Network.
- (v) Preparation of existing underground Distribution Network diagram (with route map) of REB area showing in the geographical map.

4.4 Preparation of Master Plan, Work Plan, BOQ, Cost Estimation, Bid Documents for appointing contractor etc. for the Proposed Underground Distribution Network:

- (i) Master Plan, Work Plan estimation etc for conversion of all Existing Overhead networks of Savar Upazila and adjacent area in Dhaka District under Dhaka Palli Bidyut Samity-3 into Underground Distribution Network.
- (ii) Feeder to feeder interlink (11 kV) and future 11 kV feeder split up must be considered during Design of 11 kV RMUs. Provision for sufficient 0.4 kV and 0.22 kV service connections should be available in the Distribution Box.
- (iii) Submission of proposal for new 33/11 kV substations and replacement of existing Overhead Distribution Network by Underground Distribution Network System analyzing the system demand data, load curve, consumer growth, consumption growth, per capita consumption, historical demand growth and load centers for proper design of Underground Distribution Network considering Master Plan of REB and Government of the People's Republic of Bangladesh up to year 2041.
- (iv) The entire area shall be divided into several zones and preparation of Priority List for implementation of the mentioned Underground Electric Distribution Network considering load growth, location, voltage level, consumer pattern, revenue income, existing road network and road size and preparation of time bound detailed implementation schedule.
- (v) Cost estimation for design, drawing, Work Plan, BOQ, Bid Documents for appointing contractor etc. Preparation of the proposed Underground Distribution Network.
- (vi) Any other scope felt essential by the consultant for successful completion of the study.
- (vii) Identify barriers and challenges for implementation of the proposed underground Distribution Network Projects Savar Upazila & adjacent area in Dhaka District under Dhaka Palli Bidyut Samity-3, **considering ducting system**. Identify barriers and challenges for other areas also.
- (viii) Preparation of plans and strategies to mitigate the barriers and challenges for implementation of Underground Distribution Network in Savar Upazila & adjacent area in Dhaka District under Dhaka Palli Bidyut Samity-3.
- (ix) Preparation of a priority list for implementation of Underground Electric Distribution Network considering load growth location, Voltage level, consumer pattern, revenue income, existing network, road size etc.
- (x) Underground system should be designed considering probable Earthquakes and any other disaster.
- (xi) Environmental Impact on implementation of U/G system or conversion of O/H system into U/G system will be included in the feasibility study.
- (xii) Preparation of time bound detailed implementation schedule.
- (xiii) Re-settlement plan to be considered.

4.5 Transfer of Technology:

Transfer of necessary technology to REB (including tools, models, training & capacity development of REB Engineers etc).

4.6 GIS Survey works details:

Consultant have to survey existing electrical distribution network such as distribution lines & poles including all details (e.g.-incoming and outgoing details, location, type, size, environment, conductors, fittings, service connection etc. on poles as per GIS Inventory sheet with accurate geo-coordinate (latitude-longitude), based on the standards projection (BTM, BUTM, WGS-84). Details of the GIS survey works and database preparation are as follows:

Sl. No.	Description	Unit	Quantity
1	Preparation of Desktop based GIS Map		
	Total area to be covered	Sq-Km	144
	Base map feature extraction, Building, Road, WB	Sq-Km	144
	GIS Database & Electricity line drawing	Pole no.	20000
2	Surveying, Preparation of Data base and GIS Mapping		
	Ground-trothing for Base Map	Sq-Km	144
	Total pole survey	Pole no.	20000
	Populating Electric database	Pole no.	20000
	Consumer Reconciliation	Pole no.	20000

4.6.1 Details of the GIS Survey Works & Database Preparation:

Features	Format	Description	Accuracy
Administrative Boundaries	Polygon & Line	PBS Boundary, District Boundary, Upazila Boundary, Paurashava/Union Boundary etc.;	±50 CM
Structure	Polygon	Structure Information [Structure Type-Pucca, Semi-pucca, Katcha) Structure use (As per filed survey), Building Height, Structure Name];	
Road	Polygon & Line	Road Name, Road Number, Road Type (Pucca, Semi-pucca, Katcha), Road width, Footpath Width, Railway, No. of Railway tracks, RoW;	
Bridge/Culvert	Polygon	Length, Width, Location (Address);	
Utility	Polygon & Line	Gas Line, Water Supply Line, Drain/Sewerage & its width;	
Important Area/Land Mark	Polygon & Point	Name, Location, Type (Graveyard, Crematorium, Cemetery, Eidgah, Restricted Area, Airport, Brick Field, Monument, Open Space, Parks, Playground, Stadium, Botanical Garden, Zoological Park, Power Plant/Station, Bus Terminal, Truck, Terminal, Water Treatment Plant, Waste Disposal Plant, Railway Station, Forest Land, Swimming Pool, Slum, Embankment, Homestead);	

Features	Format	Description	Accuracy
Water bodies	Polygon	Type (River, Khal, Irrigation Canal, Lake, Pond, Ditch etc.);	
PBS Details	Point	Location of PBS's HQ, Zonal Office, Sub-zonal Office, Area Office, Complain Center and Connected 132/33 KV Grid S/S, 33/11 KV Sub-Station, Distribution Transformer Distribution Line (Type-Underground/Overhead, Voltage Level-33 KV to Consumer End);	
Electric Lines	Line	Overhead Line [All type of 3-Ø HT (33 KV & 11 KV), 1-Ø LT (6.35 KV, 0.400 KV & 0.230 KV) and Underground Line from Source Grid to Consumer end including Consumer counting in each service pole;	
Electric Pole	Point	Unique pole number with feeder name/ID, Latitude, Longitude, Pole Size, Materials, Type, Fittings, Environment, Conductor Size/Type, Phase Sequence, Line Voltage, Transformer Capacity & Phase Connection, Guy unit, Jumper Size, Devices. As per GIS Inventory Sheet.	
Proposed UG Line	Line	Feeder Name/ID, Connected 132/33 KV Grid S/S, 33/11 KV Sub-Station, RMU Unit, Inspection Pit, Distribution Transformer, Voltage Level & Total No. of Consumer in a single Feeder.	±50 CM
RMU Unit	Point	Location (Latitude & Longitude), Locational Address, Unique ID, Connected 132/33 KV Grid S/S, 33/11 KV Sub-Station, RMU Unit, Distribution Transformer, Inspection Pit & Feeder.	
Transformer			
Inspection Pit			
Consumer	Point	Location (Latitude & Longitude), Locational Address, Connected Feeder, Distribution Transformer, 33/11KV Sub-Station, 132/33 KV Grid S/S, RMU Unit & Inspection Pit.	

4.6.2 Geo-referencing:

The GIS Data must be geo-referenced in respect to Bangladesh's coordinate system. For this purpose, consultants may use RTK GPS, DGPS, Level Machine & Total Station for establishing Ground Control Point (GCP) and Temporary Control Point (TCP) on Bench Mark (BM). These GCP and TCP will be used as Geo-Reference Point. Consultants will establish a concrete based Ground Control Point (GCP) in PBS HQ & every Zonal Office in related PBS and required no. of TCP for maintaining desired accuracy (±50 CM).

5

4.6.3 Data Processing & Mapping Software:

Using different licensed software's, prepare Comprehensive survey of Distribution System under REB/PBS with Preparation of Database of Existing Network Elements and Preparation of short term, mid-term and long-term plan for Renovation and Expansion of Distribution Network up to 2041.

- **GIS Data Processing & Map:** Arc GIS Pro Advanced Mapping Software with latest version is to be supplied. While providing ArcGIS, consultant must provide Feature Manipulation Engine (FME) Data Integration Platform.
- **Electrical Analysis:** CYME (CYMDIST Network Analysis Software) with latest version is to be supplied. CYME or equivalent software preferable because it is mainly used for Electrical Analysis such as load flow, balance/unbalance, contingency, switching optimization etc. However, the consultant shall quote the price of ETAP & Bentley separately in the price schedule. This price will be used for evaluation purposed only but will not be included in the contract price.
- While providing CYMDIST Network Analysis Software, consultant must provide Custom Developed Interface between ArcGIS and CYMDIST software.
- While providing above software, consultant must provide Perpetual/permanent license with at least one-year maintenance support of the software's by the name of client (REB/PBS).
- The software must support Windows latest version (The software must support both 32-bit and 64-bit Windows Server operating system (Windows Server 2012/2016 or latest) as well as desktop operating system (Windows 10/11)

4.6.4 Format for Submission of Maps:

SL. No.	Description of Map	Scale	No. of Copies to be Submitted.		Remarks
			Draft	Final	
1	Detail Maps of Existing Electrical Distribution Network	1:1000	As required		All Maps to be submitted in 120gm Matt paper (Color) and Sheet size 30"x40"; Digital copies for all reports and maps to be submitted in each submission (Draft & Final) One copies each of compact disk (CD) & another memory stick.
2	Detail Maps of Proposed Underground Design				
3	Draft Master Map				
4	Final Master plan				

4.6.5 Format for Map and Digital Information:

1. GIS Database : Shape file, gdb file, coverage file with accurate attribute information & MXD file;
2. Projection System : BTM/BUTM & WGS-84;
3. Map : PDF format. All printed Map must be WGS-84 Projection System. One set Maps Soft copy will submit in BTM/BUTM Projection System;
4. Drawing : Shape, DWG;
5. Analysis : Access, Excel, DOC and Others (with graph/chart);
6. Reports : DOC & PDF (Maps in report in separately PDF format);
7. Image : IMG/JPEG/TIFF;
8. Presentation : PPT/PPTX;
9. Electrical Analysis data : International Std. Software.
10. Data will submit on CD/DVD & one memory stick with marking contents and date.

4.6.6 System Specification of Hardware, Tools & Technology: The following hardware requirements will be provided as part of the contract:

SL No.	Description of Item(s)	Specification	Unit	Qty.
1.	PC (Desktop), Core i7, Latest generation	Annex-1	Nos.	2
2.	UPS for PCs 1 KVA	Annex-1	Nos.	2
3.	Printer (A3, Color)	Annex-1	Nos.	2

Above hardware's have to be handed over to client after completing all tasks with the soft copy of all furnished deliverable and the database used for the assignment.

5. Capacity Building of REB/PBS Personnel:

5.1 Local Training:

To provide classroom training to 10 (ten) REB/PBS officials in one session, having duration of 01 (One) weeks on cable-trench/duct & switchgear design at different voltage levels, underground distribution network system design, substation design and GPS survey in a comprehensive manner to make the participants capable of undertaking similar assignments independently. The Consultant shall provide state-of-the-art training curriculum and course materials for each participant. Cost of providing all necessary facilities/items shall be included in the Consultant's offered price and also pay the honorarium to the trainee @Tk. 1,500 per day per trainee. Complete training schedule, trainer & course curriculum to be prepared by the Consultant.

5.2 On Job Training:

To provide On the Job Training (OJT) for at least 4 engineers nominated by REB during implementation of the assignment.

6. Environmental Clearance Certificate (ECC) from DoE:

Preparation of a sound and comprehensive Initial Environmental Examination (IEE), Environmental Impact Assessment (EIA) including Environmental & Social Management Plan (ESMP) and Environmental Risk Management Plan (ERMP) etc. as required (not limited to the mentioned items) for the proposed project's Environmental Clearance Certificate (ECC) from the Department of Environment (DoE). However, DoE official fee will be provided by the PBS separately which will not be included in the contract price.

≡

7. Project Duration:

The assignment is proposed to be commenced immediately after the signing of the contract and the project completion period will be 01 (one) year.

8. Reports and Documents to be submitted:

For the preparation of Consultant's reports, drawings, recommendations etc., the consultant may acquire some of the required system data (if available) for studying and analyzing from the concerned PBS and other related offices under REB. The consultant will complete the assignment under the supervision of Dhaka PBS-3. The consultant will report time to time to Dhaka PBS-3 and get necessary instructions to complete the assignment properly as per schedule.

Every deliverable has to be presented before concern officials, there has to be discussed and accordingly has to be updated and finally it will be approved by the concern authority considering as final document. List of Deliverables (with deadlines) by the consultant are stated below:

8.1 Inception Report:

An inception report shall be prepared by the consultant containing pole proposed survey forms, work plan for carrying out the assignment. 6 (Six) copies of inception report shall be submitted by the consultant to REB within **2 weeks** after signing of contract.

8.2 Interim Report:

The consultant would be required to submit 10 (Ten) copies of the Interim Project Report no later than Six weeks of the effective date of contract signing. The interim Report should contain preliminary finding and analysis, approach for the work during the subsequent Period.

8.3 Capacity Building Materials:

6 (Six) sets of training materials pertaining to class room training and on the job training shall be submitted to REB apart from providing training materials to all participants within 02 (two) month after signing the contract including CV of resource persons/trainers, schedule and course curriculum.

8.4 Inventory report:

Inventory report of the existing distribution system (Inventory, Staking Sheets with fittings assembly unit and material list as per REB Standard), Cost Benefit Analysis, Voltage Drop calculation, System Loss analysis, Materials Specification and Feasibility Study with overall Recommendation of Proposed Underground Distribution Network.

Inventory report containing the summary of the survey, line route sketch, single line diagram. 6 (Six) copies of survey report shall be submitted by the consultant to REB within **04 months** after the signing date of contract.



8.5 GIS Map and Database

GIS map and Database of the existing and proposed distribution network shall be prepared (As per Art. 4.6) by the consultant. This will be demonstrated by the consultant to REB for verification within **6 (Six) months** after the signing date of contract.

8.6 Master Plan:

8.6.1 Draft Master Plan:

Draft Master Plan for replacing existing overhead distribution system by underground distribution network shall be prepared (including distribution transformer, unique ID of RMU and GIS database) by the consultant and submitted to REB within **07 (Seven) months** after the signing date of contract for REB's comments/ approval.

8.6.2 Final Master Plan:

Final Master Plan for replacing existing overhead distribution system by underground distribution network shall be prepared by the consultant incorporating tender document, O&M manual, material specification, soft copy of all report, database shape file etc and submitted to REB within **10 (Ten) months** after the signing date of contract.

8.7 BOQ, Estimate, Bid Documents for appointing contractor, Work Plan, Specifications of U/G Distribution Network materials:

- a) Preparation of BOQ and work Plan of existing Distribution System and proposed Undergrounding Distribution Network. Consultant has to specify the local purchase of goods / materials and foreign purchase of goods / materials for the project implementation in the EPC stage. For this, the consultant has to specify the HS codes of all foreign products and estimate the price of materials for the given EPC work timeline.
- b) Materials Specifications of proposed U/G Distribution Network. Consultant has to declare the characteristics/ specifications of all materials from the technical data sheets of the proposed network in the probable range of materials.
- c) Preparing Owners Consultant's ToR (with scope of works) for supervision during the project implementation as the part of client with its cost estimation which will be reflected on BOQ.
- d) Analysis of NPV, ERR, IRR, CBR, FRR should be included.

The Consultant will prepare Project Completion Report (PCR) including comparative statement of Voltage Drop and system loss of existing OH line and proposed U/G system, BOQ, Estimate, Bid Documents for appointing contractor, Work Plan, material Specifications of U/G Distribution Network (consisting the gist of all other reports) and submit **6 (Six) copies** to BREB within **11 (eleven) months** after the signing date of contract. Finally, The Consultant will also hand over the computer center with GIS maps, GIS database. Engineering Analysis and other related software packages in good running condition along with PCR.

≠

8.8 Environmental Clearance Certificate:

Environmental Impact Assessment (EIA) with Environmental Management Plan (EMP) for existing distribution System and proposed U/G Distribution Network. Preparation of a sound and comprehensive Initial Environmental Examination (IEE), Environmental Impact Assessment (EIA) including Environmental & Social Management Plan (ESMP) and Environmental Risk Management Plan (ERMP) etc. as required (not limited to the mentioned items) for the proposed project's Environmental Clearance Certificate (ECC) from the Department of Environment (DoE). The Consultant will assist the client for getting the approval of all documents mentioned in Scope of work from the DoE, and Re-settlement issue should be included.

8.9 Draft Final Report:

The consultant would be required to submit 10 (Ten) copies of draft final report no later than 10 (Ten) months from the signing date of contract. This report should include detailed review of the existing work, demand projections, investment requirements, financial and economic feasibility and other related matters. Consultant will also provide its assessment of adequacy on different aspects as outlined in the scope of Work. As part of this analysis, following would also be provided.

Draft Final Report (DFR) must be prepared according to the Planning Commission's approved format including all other related documents in print & soft format and completion report. All the individual report under DFR shall be approved by the concern offices of REB.

8.10 Final Report:

Workshop/Presentation on Draft Final Report and submission of Final Report based on comments received from client and incorporating comments to Final Report must be prepared according to the Planning Commission's approved format including all other related documents in print & soft format and completion report. Related hardware and licensed Software must be delivered to client. The consultant would be required to submit 10 (Ten) copies of draft final report no later than 11 (Eleven) months from the date of contract signing.

±

9. Payment Schedule:

Payment will be made after the approval of each consecutive report. The consultant shall be paid in accordance with the following payment schedule:

Sl. No.	Deliverables / Output	Time line	Payment upon successful completion
1	Inception Report	Within 02 weeks after signing date of contract	15% of the contract
2	Interim Report		
	a) Capacity Building Materials	Within 02 months after signing date of contract	5% of the contract
	b) Survey Report of the Existing System and proposed underground distribution network	Within 04 months after signing date of contract	10% of the contract
	c) GIS map and database Development of the Existing Distribution Network	Within 06 months after signing date of contract	5% of the contract
	d) GIS map and Database Development of the Proposed Underground Distribution Network	Within 07 months after signing date of contract	5% of the contract
	e) Draft Master Plan	Within 07 months after signing date of contract	5% of the contract
3	Preparation of Draft Final Report		
	a) Final Master Plan	Within 10 months after signing date of contract	5% of the contract
	b) Preparation of BOQ, Estimate, Bid Documents for appointing contractor and work Plan of existing Distribution System and proposed Undergrounding Distribution Network. Supervision consultant's ToR and estimated cost.		15% of the contract
	c) Materials Specifications of proposed U/G Distribution Network.		8% of the contract
	d) STD (Standard Tender Document).		5% of the contract
	e) O & M manual.		2% of the contract
	f) The Consultant will assist the client for getting the approval of all documents mentioned in Scope of work regarding EIA, EMP & etc. from the DoE and Re-settlement issue.		5% of the contract
4	Preparation of Final Report		
	a) a) Workshop/Presentation on Draft Final Report and submission of Final Report based on comments received from client.	Within 11 months after the effective date of contract	15% of the contract
	b) b) Delivery of software and related hardware to the client.		

₹

10. Performance Security

The contract shall be accompanied by a performance security given by the international consultant in the shape of a Pay order/ Bank Draft/ Bank Guarantee in a form acceptable to the PBS at 5% of contract price. The Performance Security must be valid for 28 (Twenty-Eight) days more than contract period.

Performance Security may also be deposited through certified Pay order/ Bank Draft/ Bank Guarantee in favor of PBS. The Performance Security may be released on application form the consultant when contract period exceeds 28 (Twenty-Eight) days, for the faithful performance of the contract according to its tenor.

With the extension of the contract the Consultant will either extend the validity of the Performance Security covering the extended period of the contract or shall furnish a new Security.

£

11. Consultancy Man-Months:

11.1 International Key Experts:

SI. No.	Position	Number of Persons	Man-Months
K-1	Underground cable Expert/ Team Leader	1	3
K-2	Modern Underground Distribution Network Designer	1	3
K-3	Civil Engineer/Ducting Expert	1	3
K-4	Economist/Financial Analyst	1	1
Total=		4	10

11.2 Local Key Experts:

SI. No.	Position	Number of Persons	Person-Months
A-1	Deputy Team Leader (Digital Mapping)	1	5
A-2	Electrical Distribution Design Expert	1	5
A-3	Social and Environmental Specialist	1	1
A-4	Electrical sub-station Specialist	1	2
A-5	Coordinator, Survey	1	3
A-6	Coordinator, Database Design & Digital mapping	1	3
A-7	Coordinator, Distribution and System Planning	1	3
Total=		7	22

11.3 Local Non key staffs:

SI. No.	Position	Number of Persons	Person-Months
N-1	Supervisor (Survey staffs,33/11/0.4 kV Feeder and Related Data)	3	6
N-2	Supervisor (Sub-station/Switching Stations/Office Location and Related Data)	2	2
Total=		5	8

≠

12. Qualification and Experience of the consultant:

Educational qualifications and experiences of the professional staff for the assignment should be as follows:

12.1 International Key Expert

12.1.1 K-1: Underground cable Expert/ Team Leader

The Team Leader must have minimum B.Sc. in Electrical Engineering with minimum of 10 years related experience with 5 years experience in modern power distribution network planning and design, She/he should have experience to prepare a plan for modern and automated underground Electricity Distribution Network like smart city in the world and must have working experience in similar conditions outside the home country. She/he must have knowledge about cable ducting system. He must have analytical ability to review and analyze underground Distribution Network project through ducting system.

12.1.2 K-2: Modern Underground Distribution Network Designer

The Modern Distribution Network Expert must have minimum B.Sc. in Electrical Engineering with minimum 10 years experience with 5 years experience in modern power distribution system design of modern cities. She/he should have experience to prepare the planning, design drawing and estimation of Underground distribution system.

His function will include all engineering and technical matters relating to this contract, arrangement for prompt and efficient execution of work to be performed as outlined herein and required by REB' assuring adequate number of personnel assigned by the Consultancy firm for the work to be done, organizing and coordinating all services enumerated in line with this contract. He has to provide updated drawing (AutoCAD) and existing underground cable routes shown in the geographical maps.

12.1.3 K-3: Civil Engineer/Ducting Expert

Minimum B.Sc. in Civil Engineering, with minimum of 10 (Ten) years experience among which minimum 05 years in underground ducting system and able to prepare drawing, design and estimate of Utility Duct for the desired underground networking system. He also experienced about utility tunnel, utility corridor or utilid or is a passage built underground or above ground to carry utility lines such as electricity, steam water supply pipes, and sewer pipes. Communication utilities like fiber optics, cable television and telephone cables etc.

12.1.4 K-4: Economist/Financial Analyst

Minimum Master's degree in Economics, Finance, Business Administration or related disciplines with minimum 10 (Ten) years experience in cost estimation, financial and economic analysis and related project cost analysis, able to run/operate financial model/tool and familiarity with the Power sector.

₹

12.2 Local Key Expert:

12.2.1 A-1: Deputy Team Leader (Digital Mapping)

He must have minimum B.Sc. in Computer Science & Engineering / Electrical/ Mechanical Engineering or Master's in Geographical Information Science with at least 10 years of experience of distribution consultancy services including GIS / Digital Mapping and provide training on the same to the client. He must have capability to plan, organize, monitor & coordinate the works of data analysis and design appropriate data base and conduct GIS / digital mapping of the distribution network under this proposed project.

12.2.2 A-2: Electrical Distribution Design Expert

He must have minimum B.Sc. in Electrical Engineering with minimum of 10 years related experience with 5 years experience in modern power distribution network planning and design, He should have experience to prepare a plan for modern and automated Electricity Distribution Network and must have working experience. He must have analytical ability to review and analyze Distribution Network project through Overhead system.

12.2.3 A-3: Social and Environmental Specialist

He must have minimum B.Sc. in Electrical/Mechanical Engineering or Master's in Geographical Information Science with at least 10 years of experience of distribution consultancy services including surveying & data collection of power distribution network. He must have capability to plan, organize, monitor & coordinate all the functions related to surveying and data collection of electrical distribution system under this proposed project and lead the survey team.

12.2.4 A-4: Electrical sub-station Specialist

Minimum B.SC in Electrical Engineering, with minimum of 10 (Ten) years Experience among which minimum 05 years in Electrical Sub-station for under-ground ducting system and able to prepare drawing, design and estimate of Utility **Duct/Cable** trench for the desired underground networking system.

12.2.5 A-5: Coordinator, Survey

He must have minimum B.Sc. in Electrical/ Mechanical Engineering or Master's in Geographical Information Science with at least 10 years of experience of distribution consultancy services including surveying & data collection of power distribution network. He must have capability to plan, organize, monitor & coordinate all the functions related to surveying and data collection of electrical distribution system under this proposed project and lead the survey team.

12.2.6 A-6: Coordinator, Database Design & Digital mapping

He must have minimum B.Sc. in Computer Science & Engineering/Electrical/Mechanical Engineering or Master's in Geographical Information Science with at least 10 years of experience of distribution consultancy services including Data base design and GIS / Digital Mapping and provide training on the same to the client. He must have capability to plan, organize, monitor & coordinate the works of data analysis and design appropriate data base and conduct GIS / digital mapping of the distribution network under this proposed project.

12.2.7 A-7: Coordinator, Distribution and System Planning

He must have minimum B. Sc. in Electrical/ Mechanical Engineering or equivalent qualification with at least 10 years of experience in electrical distribution system consultancy services including GIS based distribution system planning with analysis / studies, Load Forecast, Preparation of Master Plan and preparation of BOQ and material estimate and provide training on the same to the client in power distribution sector. Must have capability to plan, organize, monitor & coordinate all the functions related to GIS based network planning of distribution system under this proposed project.

12.3 Local Non key staffs:

12.3.1 N-1: Supervisor (Survey staffs, 33/11/0.4 kV Feeder and Related Data)

He must have minimum B.Sc. in Electrical/Mechanical Engineering or Master's in Geographical Information Science with at least 05 years of experience of GIS survey & data collection of power distribution network. He must have capability to plan, organize, monitor & coordinate all the functions related to surveying and data collection of electrical distribution system under this proposed project and lead the survey team.

12.3.2 N-2: Supervisor (Sub-station/Switching Stations/Office Location and Related Data)

He must have minimum B.Sc. in Electrical/Mechanical Engineering or Master's in Geographical Information Science with at least 05 years of experience of GIS survey & data collection of power distribution network. He must have capability to plan, organize, monitor & coordinate all the functions related to surveying and data collection of electrical distribution system under this proposed project and lead the survey team.

₹

13. Annex-1: SPECIFICATION FOR COMPUTER & OTHER ACCESSORIES

A) Technical Specification of Desktop Computer:

Brand	Internationally Reputed Brand
Model	To be mention by the bidder
Country of Origin	To be mention by the bidder
Processor	<p>1. Intel 9th Gen Coffee Lake Core i7 9700K 3.6GHz-4.9GHz, 8 Core, 12MB Cache LGA1151 Socket Processor.</p> <p>Technical Specifications: Base Frequency - 3.60 GHz, Turbo Frequency Max. - 4.90 GHz, Core - 8, Threads - 8, Smart Cache - 12 MB, Bus Speed - 8 GT/s DMI3, TDP - 95 W, Lithography - 14 nm, Memory Max. - 64 GB, Memory Type - DDR4-2666, Memory Chanel - 2, ECC Memory Supported - No, Processor Graphics - Intel UHD Graphics 630, Graphics Base Frequency - 350 MHz, Graphics Dynamic Frequency Max. - 1.20 GHz, Graphics Video Memory Max. - 128 GB, Graphics Resolution Max. - 4096x2304@24Hz, DirectX Support - 12, OpenGL Support - 4.5, Sockets Supported - LGA1151, Specialty - Intel Quick Sync Video, Intel InTru 3D Technology, Intel Clear Video HD Technology, Intel Optane Memory Supported, Intel Turbo Boost Technology, Intel vPro Platform Eligibility, Intel Virtualization Technology (VT-x), Compatible Products - Chipset: B360, H370, H310, Q370, Z370, Z390.</p> <p>Speed: Base 3.6 GHz & Turbo 4.9 GHz or Higher. Smart Cache: 16 MB or Higher.</p>
Chipset/Mainboard	<p>Gigabyte Z390 AORUS PRO WIFI DDR4 8th/9th Gen LGA1151 or Higher. (B360, H370, H310, Q370, Z370, Z390.)</p> <p>Product Highlights:</p> <ul style="list-style-type: none"> • Dark Mirror Front Panel • RGB LED Fans and Lighting Control • Performance Intakes • Edge-To-Edge Tempered Glass Side Panel • Support for a Total of 6 Fans and Water Cooling • Graphics Card Support Up to 410mm • Storage Trays and Full-Length PSU Shroud.
RAM	16GB (G.Skill Trident Z 8GB DDR4 3200 Bus)
Hard Disk/Storage	<p>1. Samsung SSD 970 PRO Quick Overview: Model - Samsung 970 Pro Capacity- 512GB Type - NVMe PCIe Gen3x4 SSD Drive Capacity - 512GB SSD Interface - NVMe PCIe Gen3 x 4 Read speed- 3500MB/s Write speed- 2700MB/s</p> <p>2. Seagate Barracuda Quick Overview: Storage - 2TB Type - SATA Barracuda HDD RPM – 5400/7200 RPM Cache Buffer- 64 or Higher Form Factor- 3.5 Inch Bytes per Sector: 4096, Load/Unload Cycles: 600,000,</p>
Graphics (AGP)	Gigabyte GeForce GTX 1050 Ti G1 Gaming 4GB GDDR5 Graphics Card #GV-N105TG1 GAMING-4GD or Higher.

₹

Brand	Internationally Reputed Brand Quick Overview Chipset - NVIDIA GeForce. Graphics Engine Model- Gigabyte GeForce GTX 1050 Ti G1 Gaming. Interface Bus - PCI-Express 3.0 x 16 Core Clock- 1366 MHz in Gaming Memory Clock- 7008 MHz Memory Type- GDDR5 Memory Bus- 128 bit Memory Size - 4 GB. Resolution- 7680x4320 DirectX- 12 OpenGL- 4.5 PCB Form- ATX Recommended PSU - 300W Power Connectors – 6 pin x 1 Output: Dual-link DVI-D *1 HDMI-2.0b*3 (Max Resolution: 4096x2160 @60 Hz) Display Port-1.4 *1 (Max Resolution: 7680x4320 @60 Hz)
Monitor	HP EliteDisplay E223 21.5" FHD IPS Monitor Quick Overview Model - HP Elite Display E223 Display Size- 21.5 Inch Display Type- FHD IPS Micro Edge LED Display Resolution - 1920 x 1080 (WxH) FHD Contrast Ratio (TCR/DCR) - 1000:1 (Static), 5000000:1 (Dynamic) VGA Port- 1 HDMI Port- 1 Display port-1
Casing	Cooler Master MasterBox MB520 RGB Mid Tower Case or Higher.
Power Supply	Cooler Master MWE Gold 650Watt Full Modular Power Supply or Higher.
UPS	Max Green 1200VA GOLD Offline UPS
LAN Card	Integrated-10/100/1000 or Higher
Expansion Slots	Min. 3 PCI Slot with one PCIeX16, Min. 3 SATA Connector.
Ports	USB Port Min.-6 (2 Front, Rear 4), 1 VGA Display Connector, Rj-45 etc.
Audio (Sound Card)	Built-in.
Speakers	Built-in High Definition Audio Codec or External Speakers.
DVD-RW Drive	16X DVD Writer or Higher or Portable DVD Writer.
Key-Board	USB Enhanced.
Mouse	USB Optical Mouse.
OS Support	Windows 8/Windows 10 or User Friendly.
Software	Windows 8/10/Vista, Office & Others Software as per site requirements.
Accessories	Driver DVD (Copy) & Manual & Heavy-duty power supply strip (Manual pin plugs supported), All necessary power and data connection cable.
Antivirus	Brand: To be mention by the Bidder.
Warranty	3 Years (Full)

±

- B) **Technical Specification of Color Printer (A3 Size Printer):** Color Printer (A3 Size Printer) is basically is used to color print of Map and Engineering Drawings such as mechanical drawings, building plans, circuit diagrams, charts, and more in A4 & A3 paper.

Serial No.	Description	Required Specification
1	Brand	Internationally Reputed Brand
2	Model	To be mentioned by the bidder
3	Country of Origin	USA/JAPAN/Mexico/Indonesia/Philippine
4	Place of Manufacturer	USA/JAPAN/Vietnam/Indonesia/China/Philippine
5	Language	English
6	Printing Method	On Demand Inkjet (Micro Piezo Electric)
7	Nozzle Configuration	90 Nozzles Black, 90 Nozzles per Color
8	Minimum Droplet Size	1.5 pl, With Variable Sized Droplet Technology
9	Ink Technology	Dye Ink
10	Printing Resolution	5,760 x 1,440 DPI
11	Printing Speed ISO/IEC 24734	2.6 Pages/min Monochrome, 2.6 Pages/min Color
12	Printing Speed	15 Pages/min Monochrome (Plain Paper 75 g/m ²), 15 Pages/min Color (Plain Paper 75 g/m ²), 45 Seconds per 10x15 cm photo (Epson Premium Glossy Photo Paper)
13	Colors	Black, Cyan, Light Cyan, Yellow, Magenta, Light Magenta
14	Number of Paper Trays	1
15	Paper Size/Formats	A3+, A3, A4, A5, A6, B5, C4 (Envelope), C6 (Envelope), DL (Envelope), Letter, 10 x 15 cm, 13 x 18 cm, 16:9, Legal
16	Duplex	Manual
17	Output Tray Capacity	50 Sheets
18	Paper Tray Capacity	100 Sheets Standard, 30 Photo Sheets
19	Media Handling	Manual duplex
20	Supply Voltage	AC 110 V 240 V,50 Hz 60 H
21	Product dimensions	705x 322 x 215 mm (Width x Depth x Height)
22	Product Weight	12.5 kg
23	Compatible Operating System	Mac OS 10.5.8 or later, Windows 7, Windows 8, Windows 10, Windows Vista, Windows XP.
24	Interfaces	USB
25	Power Supply	100V, 110V, 220V, 240V
26	Network Print	Yes
27	Warranty	Minimum one (1) year warranty & after sales services minimum one (1) year.

±