



Detailed Project Report (DPR)

For

Capex Plan- FY 2022-23

Submitted By

TP Northern Odisha Distribution Ltd

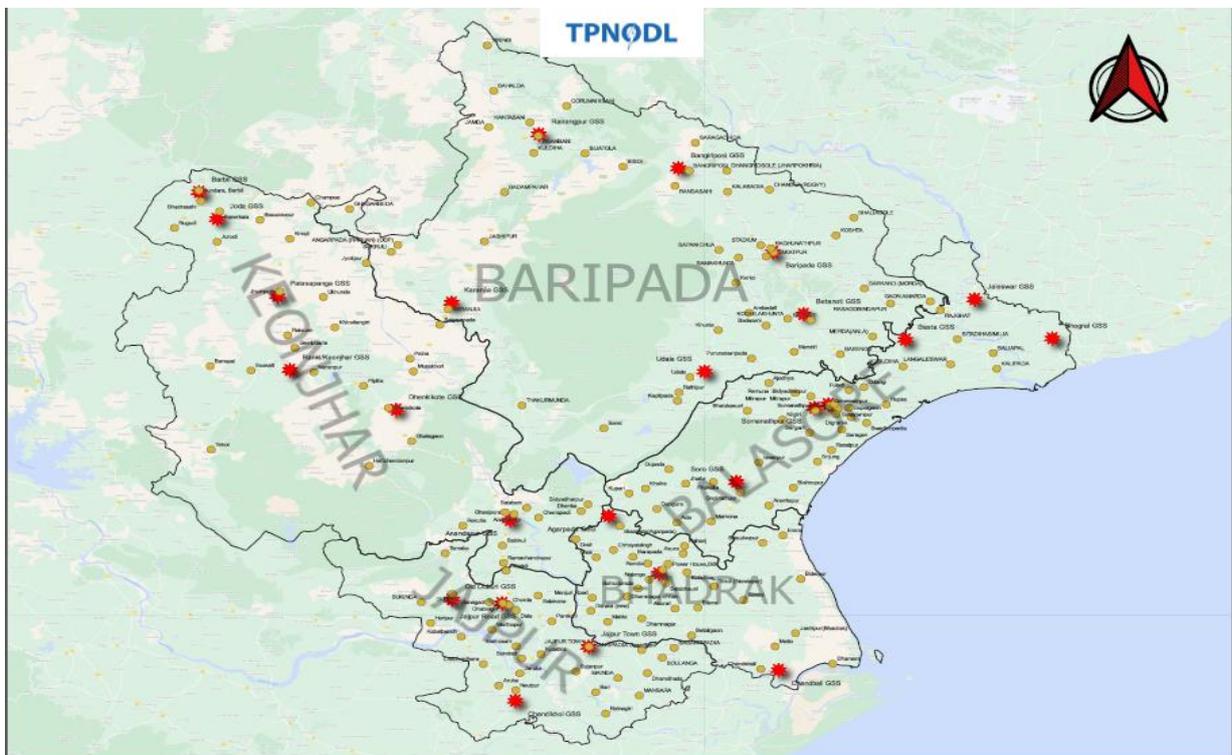


Table of Contents:

Sr no	Description	Page no
1	Introduction	4
2	Our Business Area	5
3	Existing Supply System	7
4	Key Challenges	9
5	Issues of Network Infrastructure	16
6	Network Analysis- Statutory Guidelines	19
7	Proposed CAPEX Plan for FY 21 -22	22
7.1	Statutory & safety	25
7.2	Loss Reduction	28
7.3	Network Reliability	32
7.4	Load Growth	48
7.5	Disaster Mitigation	53
7.6	Technology & Civil Infrastructure	58
8	Annexures	70

Detailed Project Report Capex Plan FY 22-23

Glossary		Glossary	
AB SWITCH	Air Break Switch	MBC	Metering Billing and Collection
AC	Alternating Current	MCC	Master Control Centre
ADMS	Advanced Distribution Management System	MCCB	Moulded Case Circuit breaker
U/G	Under Ground	MM	Material Management
AMI	Automatic Meter Infrastructure	MMG	Meter Management Group
AMR	Automated Meter Reading	MPG	Maintenance Planning Group
UPS	Uninterrupted Power Supply	MPLS	Multi-Protocol Label Switching
AT&C	Aggregate Technical and Commercial	MRT	Meter Reading & Testing
BA	Business Associate	MS	Microsoft
LTCT	Low Tension Current Transformer	MTTR	Mean Time to Repair
BO	Business Output	MU	Million Unit
BPL	Below Poverty Limit	MV	Medium Voltage
BW	Business Warehouse	MVA	Mega Volt Ampere
CAIDI	Customer Average Interruption Duration Index	MW	Mega Watt
CAPA	Corrective Action and Preventive Action	NABL	National Accreditation Board for Testing and Calibration Laboratories
CAPEX	Capital Expenditure	NCC	No Current Complaint
CC	Control Centre	NESCO	North Eastern Electricity supply Company of Odisha Ltd.
CIS	Customer Information System	O&M	Operation & Maintenance
Ckt.KM	Circuit Kilo meters	ODSSP	Odisha Distribution System Strengthening Project
COTS	Commercial of the shelf	OEM	Original Equipment Manufacturer
COVID	Corona Virus Disease	OERC	Odisha Electricity Regulatory Commission
CPSCC	Central Power System Control Centre	OFC	Optic Fibre Cable
CRM	Customer Relationship Management	O/H	Over head
CSR	Corporate Social Responsibility	OMS	Outage Management System
CT	Current Transformer	OPEX	Operational Expenditure
CWIP	Current Work In Progress	OPGW	Optical Ground Wire

Detailed Project Report Capex Plan FY 22-23

CYMDIST	Distribution System Analysis Package of CYME	OPTCL	Odisha Power Transmission Corporation Limited
DC	Direct Current	OS	Operating System
DCP	Data Collection Point	OT	Operational Technology
DD	Drop Down	PBMC	Performance Based Maintenance Contracts
DMS	Distribution Management System	PC	Personal Computer
DPR	Detailed Project Report	PGCIL	Power Grid Corporation of India Limited
DSS	Distribution Sub-Station	PoC	Proofing of Concept
DT	Distribution Transformer	LV	Low Voltage
EHT	Extra High Tension	PP	Production Planning
ELCB	Earth Leakage Circuit Breaker	PSC	Power System Control
EPC	Engineering Procurement and Construction	PT	Potential Transformer
ERP	Enterprise Resource Planning	PTR	Power Transformer
FCC	Fuse Call Centre	PTW	Permit To Work
FPI	Fault Passage Indicator	RoW	Right of Way
FY	Financial Year	R&R	Reward & Recognition
GIGO	Garbage in, garbage out	RCA	Root Cause Analysis
GIS	Geographical Information System	RMU	Ring Main Unit
GoI	Government of India	SAIDI	System Average Interruption Duration Index
GoO	Government of Odisha	SAIFI	System Average Interruption Frequency Index
GRIDCO	Grid Corporation of Odisha	SAP	System Application and Products
GSAS	Grid Station Automation System	SBM	Spot Billing Module
GSS	Grid Sub Station	SCADA	Supervisory Control and Data Acquisition
HMC	Hub Maintenance Crew	SD	Sales and Distribution
HT	High Tension	SDO	Sub Divisional Officer
HTCT	High Tension Current Transformer	SHG	Self help Group
HVAC	Heating, Ventilation and Air Conditioning	SITC	Supply Installation Testing and Commissioning
HVDS	High Voltage Distribution System	SLA	Service Level Agreement
IEC	International Electro technical Commission	SLDC	State Load Dispatch Centre

Detailed Project Report Capex Plan FY 22-23

IED	Intelligent Electronic Devices	SLMC	System Line Maintenance Crew
IEMS	Input Energy Monitoring System	SMC	Substation Maintenance Crew
IMS	Integrated Management System	SMS	Short Message Service
IPDS	Integrated Power development scheme	SOP	Standard Operating Procedure
ISU	Industry Specific Solution Utility	SSL	Secure Sockets Layer
IT	Information Technology	STS	Sub Transmission System
ITIA	IT Implementation Agency	STS	Sub transmission system
JE	Junior Engineer	T&D	Training & Development
KM	Kilo meter	TBEM	TATA Business Excellence Model
KV	Kilo Volt	TCOC	TATA Code of Conduct
KVA	Kilo Volt Ampere	TPCODL	TP Central Odisha Distribution Limited
LDMS	Local Data Monitoring System	LT	Low Tension

1. Introduction:

TP North Odisha Distribution Limited (TPNODL) was incorporated as a joint venture of The Tata Power Company (51%) and Odisha Government (49%) on the Public-Private Partnership (PPP) model. TPNODL took over the license to distribute electricity in the northern part of Odisha, which was earlier served by erstwhile NESCO, through a competitive bidding process. The business of TPNODL utility is governed by the provisions of license issued by Hon'ble Odisha Electricity Regulatory Commission (OERC) for distribution and retail supply of electricity in North Odisha. OERC regulates the working of the entire power sector of Odisha state, including determination of tariff chargeable to end consumers and establishing performance norms (mainly related to Loss reduction, Safety, Reliability of power supply and Consumer service delivery). The core business activities of TPNODL are summarized as follows:

1. Operation and maintenance of distribution network (33 kV and downstream up to customer premises).
2. Restoration of power after interruptions.
3. Meter reading, billing, and revenue collection.
4. Customer complaint resolution.
5. General customer care including provision of information on services.
6. Connection of new customers to the distribution network.
7. Expansion of distribution network.

2. Our Business Area:

TPNODL license area is spread over a geography of 27857 Sq.Km having coastal line of about 150 Km serving the registered consumer base of 2.05 million. TPNODL procures power from GRIDCO which is a state owned company. It receives electrical power at a sub transmission voltage of 33KV from **Odisha Power Transmission Company Limited's** (OPTCL) 220/132/33 kV Grid Substations and then distributes the power at 33KV / 11KV / 440V / 230V depending on the demand of the consumers. For effective operations, license area is divided in 5 circles which is further sub divided in 16 Divisions, 50 Sub-division & 159 sections which manages the commercial and O&M activities in order to serve its consumer. The detail of the same is as tabulated below

Sr. No.	Circle	Division	Sub-div
1	Balasore	BED, Balasore	Supply No-I
			Supply No-II
		BTED, Basta	Basta
			Jamsuli
		JED, Jaleswar	Jaleswar S/D
			Bhograi S/D
		CED, Balasore	RE-I
			RE-II
			Nilagiri
			Soro
			Bahanaga
		SED, Soro	Markona
Khaira			
No.I Bhadrak			
No.II Bhadrak			
Basudevpur			
2	Bhadrak	BNED, Bhadrak	Dhamra
			Tihidi
			Bhadrak Rural
			Dhamnagar
			Asurali S/D
		BSED, Bhadrak	Bhadrak Rural
			Rural S/D, Baripada
3	Baripada	BPED, Baripada	Betnoti
			Kuliana
			Moroda
			Khunta
		UED, Udala	Udala

Detailed Project Report Capex Plan FY 22-23

		RED, Rairangpur	Rairangpur-I
			Rairangpur-II
			Karanja
			Joshipur
4	Jajpur Road	JRED, Jajpur Road	Panikoili
			Jajpur Road
			Duburi
		JTED, Jajpur Town	No.I Jajpur Town
			Dasharathpur
			Binjharpur
		KUED, Kuakhia	Bari
			Dharamasala
			Kuakhia
5	Keonjhar	KED, Keonjhar	No.I Keonjhar
			No.II Keonjhar
			Turumunga
		JOED, Joda	Joda
			Champua
			Barbil
		AED, Anandapur	Anandapur
			Ghatagaon
			Bidyadharpur

3. Existing Supply System:

TPNODL receives electrical power at 33kV level from 27 numbers of Grid Sub stations (GSS) out of which 3 nos. GSS are rated at 220/33kV, and 23 nos. at 132/33kV located within and in the vicinity of TPNODL operational area. TPNODL distributes the power at 33kV / 11kV / 415V / 230V depending on the demand of the consumers.

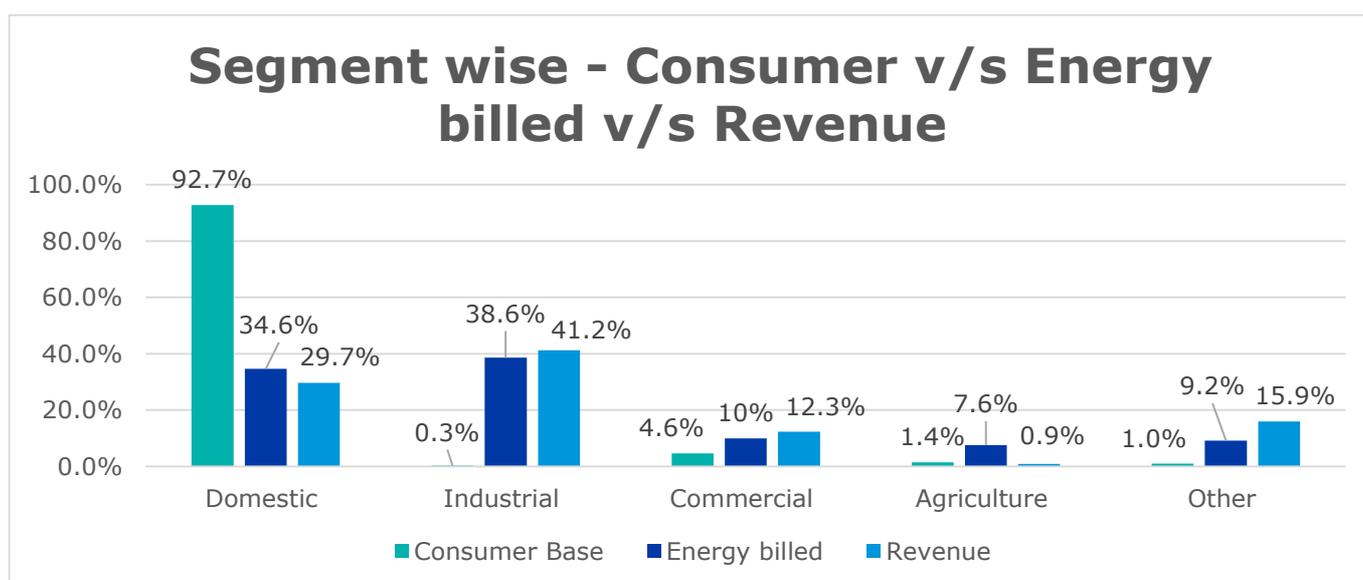
At present, there are 98 numbers of 33KV feeders with a combined route length of approximately 2,868 KMs supplying power to 228 numbers of 33/11KV Primary Substation (Structures). The 33KV supply is stepped down to 11KV level through 505 numbers of 33/11KV power transformers at these primary substations with an installed capacity of 2,313 MVA. Nearly 765 numbers of 11KV feeders radiates from the 33/11KV primary substations having length of approximately 37,296 KMs and supply power to HT consumers connected at 11KV level and LT customers connected to 11/0.415KV distribution substation. Approximately 71,358 numbers of distribution transformers are installed in all five circles with an installed capacity of 2618 MVA. The length of the LT feeders is 66,470 KMs approximately. These LT feeders supply power to three phase and single-phase consumers, right from large Industrial to BPL.

The information is summarized in the table below:

Detailed Project Report Capex Plan FY 22-23

Name of Circle	Balasore	Bhadrak	Jajpur	Keonjhar	Baripada	TPNODL Total
AREA IN sq.KM	3806	2505	2888	8240	10418	27857
No. OF CONSUMERS	537237	302908	321485	337356	552656	2051642
NO. OF GSS	6	3	5	7	6	27
TOTAL NO. OF 33 KV FEEDER	26	10	16	24	22	98
NO. OF 33/11KV SUB STATION	62	34	38	42	52	228
NO OF POWER TRANSFORMER	132	73	82	92	126	505
TRANSFORMATION CAPACITY 33/11(MVA)	604	360	398	442	509	2313
NO. OF 11 KV FEEDER	203	118	123	138	183	765
NO. OF DTR	20712	12250	13312	11501	13583	71358
TRANSFORMATION CAPACITY 33/0.415 kV, 11/.415/0.230 kV (MVA)	837	440	544	364	433	2618
33KV LINE IN KM	631	404	431	607	795	2868
11KV LINE IN KM	8962	5137	5220	7191	10786	37296
LT LINE WITH BARE CONDUCTOR IN KM	7545	1962	5551	3458	4179	22695
LT LINE WITH AB CABLE IN KM	8154	5803	4133	6668	19016	43774
TOTAL LT LINE IN KM	15699	7765	9684	10126	23195	66469

The graph below represents the share of customer base, their energy consumption and contribution in revenue based on H1 data of FY21-22



4. Key Challenges:

The brief inspection of the network reveals that the network in TPNODL is in very poor state and seriously lacks compliance with respect to the statutory guidelines. While this affects the system reliability due to frequent breakdowns, it may pose threat to safety of employees, public at large and animals.

4.1. 33 kV Lines/Feeders

33kV feeders connect a Primary substation (PSS) to the Grid substation (GSS) and supply primary substations and some 33/0.415 kV distribution transformers. These feeders are the main source of supply and reliability to the PSS. We have the following observations on 33 kV feeders.

1. Most of the feeders have long length and radially connected. The long overhead feeders are prone to faults. It is always difficult to inspect the feeder after occurrence of a fault leading to high equipment downtime and SAIDI.
2. At many of the locations these lines are installed on damaged, bent, and tilted poles which is unsafe for the asset as well as the public. Further these lines are observed with undersized & worn out bare conductor, having extremely long spans, multiple and poorly executed joints, and compromised safety clearances.
3. Most of the locations of feeders do not have guard wire beneath conductors, even in urban areas, for safety of public against conductor snapping and subsequent accidents.
4. We observed encroachment on RoW i.e. houses / structures constructed below 33 kV, 11kV and LV overhead feeders at many locations both in urban and rural areas.
5. At many locations two feeders running on single pole structure.
6. It is also observed that no intermediate H pole is used in 33 kV feeders for mechanical strength and for conductor jointing. These H poles are essential to avoid cascading effect of failure of a pole.
7. The installation of majority of poles is not as per standards.

Below table shows tripping data of 33 KV feeders.

Detailed Project Report Capex Plan FY 22-23

Category of Feeder	In FY - 18-19		In FY -19-20		In FY -20-21		In FY -21-22 (Till Dec -21)	
	No. of tripping	Duration of tripping	No. of tripping	Duration of tripping	No. of tripping	Duration of tripping	No. of tripping	Duration of tripping
	No.	Min	No.	Min	No.	Min	No.	Min
ALL 33 kV Incoming Feeders	5,260	838	5,968	872	3,359	614	14,754	9,89,200

4.2. 33/11 kV Primary Substations (PSS)

Primary substations transform 33 kV voltage to 11kV level. There are one or more 33 kV feeders supplying power to the PSS. 33 kV voltage is stepped down to 11kV through power transformers of various capacity viz. 1.0 MVA, 1.6 MVA, 2 MVA, 3.15 MVA, 5 MVA, 7.5 MVA, 8 MVA, 10 MVA and 12.5 MVA. At multiple 33/11 kV primary substations, the Power Transformers are not appropriately maintained. The silica gel, in most of the power transformers, is moisturized which can lead to breakdown of the power transformers. The silica gel can be replaced at very small cost and can avoid breakdown of the most costly equipment of the power distribution network. The connections in the outdoor yard, between bus bar and equipment, are done with poor jointing methods, leading to hotspots which may add to the technical losses. The technical loss due to poor jointing can be reduced significantly by using latest wedge connectors.

The analysis shows that some of the existing 33/11kV substation are already overloaded or approaching the overload limit. It is anticipated that some of the substation may be overloaded in next 2 to 3 years with the consumer growth of around 5% per annum. There is an obvious reliability concern for the substations with only power transformer in service at some substations. Below is the trend of power transformer (PTR) for past 3 years.

Particulars	FY 18-19	FY 19-20	FY 20-21	FY21-22 (till Dec-21)
Failure of Power Transformers (PTR)	15	23	19	23

Boundary walls for most of the substations are in damaged condition and there is no fencing between the substation premises and 33kV outdoor switchyard. This makes the PSS highly

unsafe as there are chances of entry of unauthorized persons and animals into the live switchyard which may result in accidents.

Earthing system is most important for safety & protection of men and equipment. The existing earthing system is in very bad condition and ineffective.

Many circuit breakers and CTs are lying bypassed since long for want of spares. This is another major threat for protection of the equipment. The failure of the substation equipment can result in substantial revenue loss due to breakdown of the equipment.

Automobile batteries and underrated battery chargers are used at many substations due to non-availability of standard equipment in stores. This makes the basic protection system ineffective and there are chances of major damage to substation capital intensive equipment if the defects are not addressed urgently.

Some of the pictures depicting the network condition and violation of statutory compliance posing safety threat to Public, Employees and animals are captured and presented in Annexure - 1

4.3. 11 kV Lines /Feeders

11kV feeders connect a Primary substation (PSS) to the distribution transformers and TPNODL have many long overhead feeders and some of these are more than 100 Ckt.KM length. We have identified following observations on the 11 kV feeders.

1. Most of the feeders are radially connected have longer length compared to the standard engineering practices. Some of the feeders are more than 100 Ckt. km long. The long overhead feeders are prone to faults. It is always difficult to inspect the feeder after occurrence of a fault leading to high equipment downtime and SAIDI.
2. At many of the locations these lines are installed on damaged, bent, and tilted poles which is unsafe for the asset as well as the public. Further these lines are observed with undersized & worn out bare conductor, having extremely long spans, multiple and poorly executed joints, and compromised safety clearances.
3. Most of the locations of feeders do not have guard wire beneath conductors, even in urban areas for safety of public against conductor snapping and subsequent accidents.
4. We observed encroachment on RoW i.e. houses / structures constructed below the overhead feeders at many locations both in urban and rural areas.

Detailed Project Report Capex Plan FY 22-23

5. It is also observed that no intermediate H pole is used in 11 kV feeders for mechanical strength and for conductor jointing. These H poles are essential to avoid cascading effect of failure of a pole.
6. The installation of majority of poles is not appropriate to the standards.

Below table shows tripping data of 11 KV feeders.

Category of Feeder	In FY - 18-19		In FY -19-20		In FY -20-21		In FY -21-22 (Till Dec)	
	No. of tripping	Duration of tripping	No. of tripping	Duration of tripping	No. of tripping	Duration of tripping	No. of tripping	Duration of tripping
	No.	Min	No.	Min	No.	Min	No.	Min
ALL 11 kV outgoing Feeders	3,50,582	88,397	4,66,528	95,962	2,47,894	45,448	2,90,834	90,53,898

4.4. Distribution Substations (DSS)

TPNODL has three types of distribution substations according to voltage levels i.e. 33/0.415 kV, 11/0.415 kV and 11/0.230 kV. The substations are either plinth mounted, or pole mounted. DD fuse is the primary protection equipment for the distribution transformer in a DSS which protects the DT, the costliest equipment of the DSS, in case of faults. It is noticed that AB switch and DD fuse are bypassed in some of the 11/0.415 kV Distribution Substations (DSS), thus compromising the life of the equipment beside network reliability. Following is the trend of Distribution Transformer (DTR) failure for past 3 years.

Below table shows Failure of Distribution Transformers.

Particulars	FY 18-19	FY 19-20	FY 20-21	FY21-22 (till Dec-21)
Failure of Distribution Transformers (DTR)	2347	2416	2312	2172

4.5. LT network

LT feeders emanate from DT secondary side and serve the electrical energy to the end customers. There is no effective LT feeder protection system in place on the secondary side of most of the DSS. In place of LT Fuse box/MCCB box; aluminum wire is used as fuses on the secondary side of the distribution substations at almost all substations. These fuse units are installed at very low height without any fencing of the DSS. The rating of the aluminum wires, used as fuses is not appropriate to the rating of the DT, and thus compromising the

life of the distribution transformer, in case of fault in the LT network. This is a potential safety threat to public at large and animals

4.6. Earthing

In an electrical installation, earthing system play important role for proper working of the power distribution system, and protection of human beings against electric shock. Metal frame of all power distribution equipment are connected with the general mass of the earth which is always at zero potential. It's worth mentioning that the general mass of the earth doesn't have any resistance.

In case the earthing of any power equipment or network becomes weak or defective due to corroded connections or damaged connection, clearance of fault may take more time and putting stress on the equipment connected in the network.

1. Lesser chances of fault
2. Reliable power supply
3. Equipment safety

4.7. Metering System

On commercial front, Energy Meter installed at consumer premises is a mix of electro-mechanical meters, consumer owned meters and electronic meters etc. These meters are connected to TPNODL system through PVC insulated service cable supported by GI wire which also serves as earth point to the consumer installation. Many of the meters are faulty which add to the non-technical losses as the energy consumption is not recorded and therefore bills are not raised as per the actual consumption. Further many of the meters are not provided with seals which creates a potential source for theft of the electrical energy.

One of the major reason for low Billing Efficiency is leakages in meter reading process clubbed with inaccurate or no recording of reading in meter due to faulty/no meter in approximately 2.78 lakh (2.02 lakh – Defective + 0.76 lakh No Meter) customers and 0.38 Lakh Mechanical meters in the network.

4.8. IT Issues

The journey of IT from last year has been challenging, many bespoke application and enterprise application including implementation of SAP with different module has been done. But to streamline IT system and to equip employee pan TPNODL with IT assets and secure

communication with full Cyber Security many more steps need to be taken. Also we have established IT Data Centre at BBSR OPTCL Data Centre and OT Data Centre at Balasore OpCenEx building.

Since our company is growing in a rapid rate we need to have our own data storage, also planning to have our own OS/DB Licenses for GIS software.

In addition to above, these systems need to be secured completely from Virus and Cyber-attack for that we are planning to have fire wall, own optical fibre network with various other applications.

Further we are planning to implement GIS system in two Circle Balasore and Jajpur with proper consumer indexing which will help to identify and locate all consumers. Also planning to automate 75 PSS alongside with SCADA software which will help to increase the reliability of power in those areas of TPNODL

4.9. Housekeeping in working place

The level of hygiene and sanitation at the workplaces and different offices is poor. Office buildings, in general, are very old which need strengthening through major civil works. Infrastructure of the offices need revamping and major civil works are to be addressed for ensuring conducive work environment for Employees and consumers visiting the offices. Substantial investment is required to address the above stated challenges and to safeguard the assets, public & animals from the accident and ensuring statutory compliant network.

Besides TPNODL is also planning to improve the office infrastructure through revamping and other civil interventions. These activities are urgently needed to provide conducive work environment to TPNODL employees and all consumers visiting TPNODL offices. Many of the office buildings are very old and need urgent strengthening to avoid mishap. Call Centre and Customer Care Centers needs to be established / developed further to provide better connectivity to all category of consumers with TPNODL and provide them a unique service experience.

4.10. Natural Calamities

Apart from the vast geographical area, Odisha being a coastal State, it repeatedly encounters devastating storms / Cyclones. The loss due to these storms / cyclones are huge which is a major challenge for a distribution utility. The main concern related to these natural calamities

are that not only it results in disruption of power supply to consumers over extended period but also it damages the power distribution infrastructure resulting into requirement of huge funds to refix the network infrastructure. A permanent solution to address the issue of virtually annual disruption of supply and repeated infusion of CAPEX to restore/replace damaged infrastructure need to be developed.

Name	Lowest Pressure(mbar)	Year	Winds(km/hr)
Odisha Cyclone	912	1999	276
Phailin	940	2013	215
Hudhud	950	2014	185
Titli	978	2018	110
Fani	932	2019	250
Amphan	920	2020	260
YAAS	970	2021	140

Source: - https://en.wikipedia.org/wiki/List_of_tropical_cyclones_that_affected_India

So, it can be seen from the history that Odisha is prone to the natural disastrous cyclones which effected erstwhile NESCO in a very bad manner and will surely a major natural challenge for TPNODL. Apart from this there are other natural challenges like

1. Saline Coastal weather which deteriorates the electrical assets
2. Different forest ranges through which rural lines are running prone to unsafe situations

5. Issues of Network Infrastructure:

5.1. Unsafe Horizontal and Vertical Clearance

Any responsible Power distribution utility is bound to comply all statutory compliance. Any non-compliance to the statutory guidelines attracts penalties apart from damage to brand image. TPNODL has taken over the assets of erstwhile NESCO on “as is where is” basis. In erstwhile NESCO area, there was lack of compliance to statutory guidelines at many locations. For example, the height of the lowest conductor in many MV feeders from the ground is not meeting the safe clearances as mentioned in the Regulation 58 of CEA regulations (Measures relating to Safety and Electric Supply – 2010). In many cases the span length varies from 60-120 mtrs, which further worsens the problem. More span length causes high sag and results in low clearance from ground level.

In TPNODL licensed area, there are many locations which are not complying with the statutory guidelines and hence require huge funds and efforts to make the network safe. At some places vertical clearances of the lines have reduced, due to re-construction of the roads, to the dangerous level causing violation of statutory guidelines. TPNODL proposes to take up refurbishment/life enhancement work for lines to rectify all such defects. Since the volume of such locations are high, huge investment spread across many years would be required to rectify all the deficiencies.

5.2. Damaged Poles / Conductors / Stay / boundary Walls.

The network is in very poor state due to vast geography, widespread network, and absence of preventive maintenance practices. Major elements of the weak network comprise damaged poles, worn out conductors, damaged stay wires and ineffective earthing. At some locations, poles or support structure are damaged, rusted or tilted. Major factors causing damage to the poles includes structural deterioration of poles, flood, cyclone, heavy vegetation etc. Tilting of poles has resulted in increase in conductor sag and if replacement / refurbishment of the tilted or broken pole is not undertaken on priority, mechanical strength of the line will reduce and may result into falling of line during high speed winds / storms. Falling of line can cause fatal accident. It is also a major concern for ensuring reliable power supply to the consumers as restoration may take many days depending upon the location and severity of damage to the line. To prevent tilting of any pole from its normal position due to abnormal wind pressure, installation of Stay wire is required. At many places stay/guy insulators are either missing or damaged, which may cause major safety concern not only

for the safety of Public but animal also in case of leakage current. Especially animal use the stay wire for rubbing their skin and if the stay wire is live, the animals are likely to get electrocuted.

Moreover, there are other reasons, which have resulted into depletion of existing network such as use of undersized conductor in overhead feeders, poor condition of the conductor, multiple joints in a single span in many sections, poor binding wire joints etc. witnessed in the sections causing hot spot and may result into jumper parting. At some locations, stay wire are also damaged resulting into weaker mechanical support to the poles. Under the refurbishment/life enhancement activity TPNODL has planned to replace damaged poles, replacement of worn out conductor, re-sag the conductor, install mid-span pole, introduce stay-wire at start, end and at every H-pole with at least two stay together with two-anchor rod in same pit. This will strengthen the line and will reduce the effect of the bad weather conditions and at the same time will help to reduce accident due electrocution caused by leakage current.

5.3.No or poor Earthing of the Poles & Structure

In an electrical installation, earthing system plays important role for proper working of the power distribution system, and protection of human beings against electric shock. Metal frame of all power distribution equipment are connected with the general mass of the earth which is always at zero potential. It's worth mentioning that the general mass of the earth don't have any resistance. As per Central Electricity Authority Regulations (Measures relating to Safety and Electric Supply,2010) rule 41, there is provision of earthing, neutral wire in a 3-phase, 4-wire system and the additional third wire in a 2- phase, 3-wire system.

The grounding system must have minimum of two or more distinct earth pits (electrodes) to ensure effective grounding. Further, according to rule 42, installation with connected load of above 5 kW, and voltage exceeding 250 V shall have a suitable earth leakage protective device to isolate the load in case of earth fault or leakage in the circuit. In case the earthing of any power equipment or network becomes weak or defective due to corroded connections or damaged connection, clearance of fault may take more time and putting stress on the equipment connected in the network. During the site visits, it is observed that at most of the places proper earthing was not evident and at some of the 33/11kV primary substation, DSS and poles earthing is not adequate. Further the condition of earthing in old installations is observed to be extremely bad due to exhaustion of earthing electrodes/spikes and

connections. This situation is dangerous for the stability of power system and there are chances of electric shock to the human beings and animals if corrective actions are not taken urgently. Therefore, there is urgent need to strengthen the earthing system to ensure safety of man and material. TPNODL proposes to strengthen the earthing system by introducing fresh earthing in both DSS and PSS as part of refurbishment activity. This will enhance life not only of equipment but shall also help in proper functioning of protection relays.

5.4. Poor condition / Absence of fencing at most of the Distribution Substations & 33/11kV Primary Substations (Structures)

Absence of boundary walls and fencing around the Primary Substation and Distribution Substations has exposed the live power distribution equipment to the human beings and animals, who are not aware of the consequences of coming in direct contact or in the arching zone of high voltage equipment. Our site visits indicate that most of the 33/11kV Primary Substations and 11/0.415kV Distribution Substations either have broken boundary fence or there is no boundary fence, specifically in rural areas.

It is also observed that there is no fence between the substation premises and live 33kV switchyard in almost all 33/11kV Primary Substations. There are high chances of entry of unauthorized persons or animals in high voltage switchyards. There are information's regarding electrocution of human beings and animal's at substations in the past. TPNODL proposes to put up fencing/build boundary wall under the DSS and PSS Refurbishment job.

5.5. Temporary work for restoration of supply post cyclones

Site visits in the coastal areas and interactions with the technical team revealed that the overhead network is hit hard by various cyclone and a result major portion of the network got collapsed. Due to scarce manpower, and in order to restore the power supply to affected areas, the quality of workmanship was compromised and major focus shifted from doing the work right to fix the issues without following the best construction practices. Many parts of the network even today are temporary. Efforts and investment are needed to make the temporary systems permanent at the earliest as the temporary installations are unreliable and unsafe for operations. Although the funds are provided for rectifying the issues developed due to temporary restoration however TPNODL proposes to correct the network adequately under 33 kV & 11 kV Line Refurbishment activity to improve reliability, system improvement & mitigate unsafe situation.

6. Network Analysis- Statutory Guidelines:

In TPNODL, each division has different characteristics and thus have different challenges. However, some common challenges which were witnessed during our limited site visits, appears to be unsafe network from safety point of view to our employees, public and animals. Objective of site visit was to understand the issues, reasons and area where improvement can be made. The following issues were observed and the same needs urgent attention to make the network safe, reliable and statutory compliant:

- ❖ Unsafe horizontal / vertical clearances in 33 kV and 11kV feeders. **(Regulation 58)**
- ❖ Damaged Conductor / Poles / Stay wire / Boundary walls.
- ❖ No or poor earthing of the Poles & Structure. **(Regulation 41 & 72)**
- ❖ Absence of cradle wire in overhead MV feeders. **(Regulation 70)**
- ❖ Damaged / Missing fence at most of the Distribution Transformers Substations & 33/11kV Primary Substations (Structures) resulting into easy accessibility for Public and animals.

Regulations mentioned in the bracket are the applicable regulation of CEA (Measures relating to Safety and Electric Supply – 2010). Details are in Annexure 2

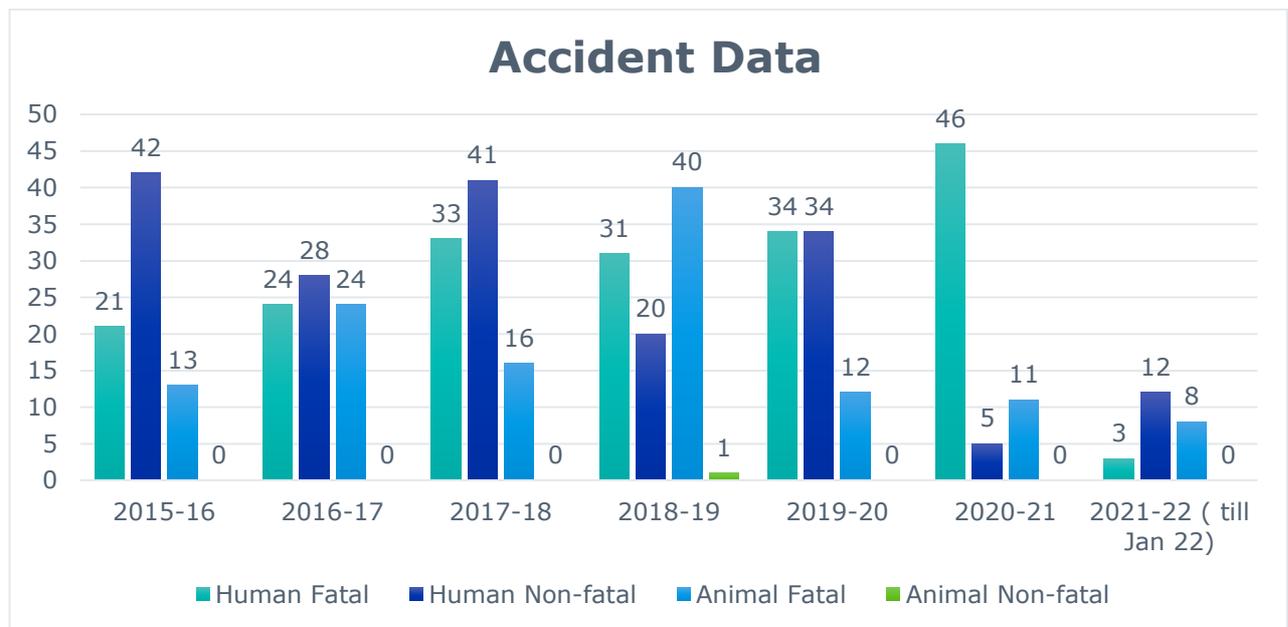
From the analysis of last ten years accident data, it is observed that most of the accident happened either due to deficiency in the network infrastructure or easy accessibility of the live parts to the Public and Animals. Even to operate network, necessary PPEs are also not available in sufficient quantity. Some of the PPEs were never procured by the erstwhile NESCO. Table below shows Year wise details of Fatal / Non-fatal Electrical accidents occurred under NESCO's operational area during Financial Year 2011-2021.

Detailed Project Report Capex Plan FY 22-23

SI no	Financial Year	Human			Animal			Total
		Fatal	Non-fatal	Total	Fatal	Non-fatal	Total	
1	2010-11	13	13	26	5	0	5	31
2	2011-12	14	6	20	8	0	8	28
3	2012-13	9	9	18	7	0	7	25
4	2013-14	14	8	22	6	0	6	28
5	2014-15	12	7	19	7	4	11	30
6	2015-16	21	42	63	13	0	13	76
7	2016-17	24	28	52	24	0	24	76
8	2017-18	33	41	74	16	0	16	90
9	2018-19	31	20	51	40	1	41	92
10	2019-20	34	34	68	12	0	12	80
11	2020-21	46	5	51	11	0	11	62
12	2021-22 (till Jan 22)	3	12	15	8	0	8	23

It is pertinent to mention here that the number of fatal accidents are more than the number of non- fatal accident, for both Human and Animals.

Below figure shows the detailed analysis of accidents.



Detailed Project Report Capex Plan FY 22-23

Table below shows the Fatal and non-fatal accident happened during the last 3 Years at different voltage level.

Voltage Level	FY 18-19				FY 19-20				FY 20-21				FY 21-22 (till Jan-22)			
	Fatal		Non-Fatal		Fatal		Non-Fatal		Fatal		Non-Fatal		Fatal		Non-Fatal	
	Human	Animal	Human	Animal	Human	Animal	Human	Animal	Human	Animal	Human	Animal	Human	Animal	Human	Animal
33KV	1	0	3	0	1	0	0	0	2	1	2	0	0	0	0	0
11KV	18	23	17	0	14	9	25	0	16	6	3	0	2	6	8	0
LV	12	17	0	1	19	3	9	0	17	4	0	0	1	2	4	0
Total	31	40	20	1	34	12	34	0	46	11	5	0	3	8	12	0

From the above table, it is observed that majority of the fatal and non-fatal accident occurred in 11kV & LV network and thus focused approach must be followed on these segments to make the network safe & secure. As a responsible distribution utility, we need to curtail it further. Hence potentially unsafe locations need to be addressed in time so as to ensure safe network for employees, Public and Animals.

Apart from high number of Accidents, other major problem is DT failure and extremely high number of interruptions at 11 kV and 33 kV level due to bad network condition. This affects the supply system very badly. The interruption at 11 kV feeders is too high by any utility standard.

7. Proposed CAPEX Plan for FY 22 -23:

As explained earlier, TPNODL has identified several challenges related to Safety, 33kV/11kV/0.415kV/0.230 kV network, Metering infrastructure, Customer Services and Technology usage. These challenges are planned to be addressed through a systematic investment plan by TPNODL. The proposed CAPEX plan represents a justified and efficient level of total capital investment estimated by TPNODL to meet the service obligation, improving safety, reliability of network, level of service standards.

In order to improve the reliability and reduce the losses, major interventions like Network reinforcement, Technology adoption is proposed in this plan so that equipment failure / tripping can be reduced and reliability, billing & collection efficiency can be improved. The network demands urgent refurbishment like re-conductoring of feeders, optimization of feeder length, dedicated feeders for industrial/ commercial customers, replacement of damaged / tilted poles, provision of intermediate poles, replacement of joints, enhancing system protection, replacement of sick equipment and network augmentation to improve the reliability of power supply.

Introduction of advanced technologies and analytics will be prime focus area for improving the accuracy of the meter reading, curtail tampering of the meters and providing better and effective customer services. Further Business process re-engineering is required to improve the customer services. Technology adoption is also required to provide quality customer services, manage revenue cycle processes for reduction of AT&C losses and efficiently manage to deliver reliable and quality supply in safe manner to its consumer by meeting various standards of operation.

During the initial phase, capital investments are proposed under the following broad cost centers that shall be aligned with multiple initiatives and schemes so as to reduce AT&C losses, improve system reliability and augment the network to support continuous load growth. Further, a need is also felt to improve the existing facilities and infrastructure to provide a better consumer experience and a modern, rich, and conducive work environment to all employees for better performance.

With this objective of ensuring reliable power supply and ensuring best customer services to the end consumers, TPNODL has come up with a capital investment plan under the

Detailed Project Report Capex Plan FY 22-23

major heads. These heads are detailed in subsequent sections along with fund requirement and activities to be performed.

- 1) Statutory Compliance/Safety
- 2) Loss Reduction
- 3) Reliability Improvement
- 4) Load Growth
- 5) Disaster Mitigation
- 6) Technology & Civil Infrastructure

TPNODL proposes Capital Expenditure of INR 442.97 Crores. For FY 22-23 to carry out various activities under 5 major categories.

S. No.	Major Category	Activity	Amount	Annexure
1	Statutory & Safety	Fencing of Distribution substations	4.68	Annexure- 3
		Boundary wall for Primary substations	4.95	Annexure- 4
		Development of training infrastructure for safety & strengthening of LOTO system	3.05	Annexure- 5
		Total (1)	12.68	
2	Loss Reduction	Installation of AMR meters at Distribution transformers.	4.50	Annexure- 6
		Conversion of LT Bare conductor to AB Cable	9.86	Annexure- 7
		Meters and metering equipment for energy audit	1.19	Annexure- 8
		Equipment for Meter data downloading	0.92	Annexure- 9
		Equipment for AMR enablement of 3 phase consumer meters	0.50	Annexure- 10
		Field Testing equipment - Metering (Portable Calibrator)	1.00	Annexure- 11
		Total (2)	17.97	
3	Reliability	Refurbishment of 33KV/11KV Primary Substation (PSS)	20.00	Annexure- 12
		33 KV Conductor up gradation	11.20	Annexure- 13
		11 KV Conductor up gradation	8.80	Annexure- 14
		Refurbishment of 11KV/0.415 KV Distribution Substation (DSS)	4.80	Annexure- 15
		Installation of LV protection at DSS	5.54	Annexure- 16
		Installation of Auto reclosure / Sectionalizers ,RMUs, &FPis	21.19	Annexure- 17

Detailed Project Report Capex Plan FY 22-23

		33KV and 11 Kv Voltage Regulators for voltage improvement	4.20	Annexure- 18
		LT FLC System - Vehicle Fitted (5 Nos. -- 1 for each circle) + Power Analyser for Transformer workshop (2 Nos.) +Ultrasound Scanner (5 Nos. -- 1 for each circle)	3.52	Annexure- 19
		Installation of station transformers (PPS)	2.55	Annexure- 20
		Capacitor Bank at PSS for low voltage improvement	0.88	Annexure- 21
		Earthing of Power Transformers and Distribution Transformers	0.98	Annexure- 22
		Total (3)	83.65	
4	Network Optimisation & Load Growth	Augmentation Power Transformers	9.96	Annexure- 23
		Augmentation of Distribution Transformers	20.81	Annexure- 24
		Addition of LT lines	13.66	Annexure- 25
		Addition of 11 kV Lines (O/H and U/G)	33.96	Annexure- 26
		Addition of 33 kV Overhead Lines (O/H and U/G)	21.74	Annexure- 27
		Addition of New PTR and New DTRs along with Associated HT/LT lines	31.15	Annexure- 28
		Provision for Nua Balasore Project	10.00	Annexure- 29
		Total (4)	141.28	
5	Disaster Mitigation	Conversion of 2nos PSS from AIS to GIS	20.40	Annexure- 30
		Conversion pole mounted DTR to plinth mounted (100 KVA and above)	3.52	Annexure- 31
		Height enhancement of the lines at river crossing	4.50	Annexure- 32
		Strengthening of poles in the cyclone prone area	2.40	Annexure- 33
		Trolley Mounted Pad Substations	2.34	Annexure- 34
		Overhead to Underground conversion for Major City	20.00	Annexure- 35
		Emergency Preparedness (Life boat and other emergency accessories)	1.80	Annexure- 36
		Total (5)	54.96	
6	Technology & Civil Infrastructure	DC Hardware	10.33	Annexure- 37
		Software Licenses for IT Application	12.66	Annexure- 38
		End computing devices	8.96	Annexure- 39
		Cyber Security	1.20	Annexure- 40
		Automation of non ODSSP PSS	15.31	Annexure- 41
		SCADA-ADMS	18.09	Annexure- 42

Detailed Project Report Capex Plan FY 22-23

	GIS Software Implementation and Land Base & Network Survey & Digitization for Balasore & Jajpur Circle	35.87	Annexure- 43
	Civil Infrastructure (Office Buildings , PSS, Stores, Approach Roads, Record room , Cafeteria Canteen , MRT office and others)	25.12	Annexure- 44
	Security cameras and heavy duty Racking system / Storage solutions for the store	0.96	Annexure- 45
	Offices Equipment	3.93	Annexure- 46
	Total (6)	132.43	
Grand Total (1+2+3+4+5+6)		442.97	

Note: The Grand Total cost is exclusive of capitalizable Project Employee Cost and calculated Interest during Construction (IDC).

For each of the above major categories, the investment has been further detailed below:

7.1 Statutory & safety

7.1.1 Installation / Construction of Plinth fencing for DSS and Boundary wall for PSS:

Distribution Substation are located at various locations catering the power supply requirement to the consumers. Since these are installed at various scattered locations along the Road, public places, near the commercial areas etc. During the survey, it is observed that boundary walls or fencing are either damaged or do not exist thus posing a safety threat to stray animals and public at large.

At many of the places it was found that the condition of the Fencing of DSS and Boundary wall for PSS is in a very bad condition. Ensuring safety of People & equipment is very much needed for safe operation. Hence it is proposed for Construction of fencing for DSS and Boundary wall of PSS, wherever required.

Distribution Substation (DSS) comprises of various equipment which perform specific task to ensure delivery of power supply at appropriate voltage to the end consumers. Main components are 11 kV Switching device, 11 kV Protection, Transformer, LV Protection, Earthing, fencing and O/G LV feeders. The most expensive equipment in the DSS is the Transformer and its life depends upon healthy condition of all other components be it LV Protection, HV Protection, Earthing or fencing. Thus, fencing is one of the most important part which ensures overall first-hand protection of the transformer. Therefore, installation

Detailed Project Report Capex Plan FY 22-23

of fencing and boundary wall to safeguard the DSS and PSS equipment and to maintain safety clearances is one of the major needs.

It will benefit by improving the safety of people and the equipment DSS failure will be reduced, hence power cuts will decrease.

Safety of public and stray animals

In this proposal, TPNODL intends to carry out new fencings in phase manner. In this year around 480 numbers of locations are being proposed for carrying out Fencing of DSS & 2940 meters of Boundary wall at PSS.

Detailed cost estimates for Boundary Wall & Fencing are attached in annexure No.4.

Circle wise Requirement of Fencing of DSS:

Circle Name	No of Divisions	Total no of 3 phase DT >100 KVA	DSS Fencing to be considered in FY22-23(Nos.)	Unit Cost for each DSS Fencing (in Rs)	Total Cost for DSS Fencing (in Crore)
Balasore	5	3360	150	97512	1.45
Bhadrak	2	1389	60		0.59
Baripada	3	1063	90		0.88
Jajpur	3	1754	90		0.88
Keonjhar	3	858	90		0.88
Total	16	8424	480		4.68

Circle wise Requirement of Boundary wall for PSS:

Circle Name	No of Divisions	No of PSS considered for boundary wall	Total quantity considered in FY21-22 (in meters)	Unit Cost for per meter Boundary wall for PSS in Rs.	Total Cost for PSS Boundary wall (in Crore)
Balasore	5	3	600	16829	1.01
Bhadrak	2	3	680		1.144
Baripada	3	2	620		1.043
Jajpur	3	2	580		0.976
Keonjhar	3	2	460		0.774
Total	16	12	2940		4.95

7.1.2 Development of training infrastructure for safety & strengthening of LOTO system:

Number of business associate (BA) employees and regular employees recruited at various level and deployed at various locations across the TPNODL. They are coming from different culture of organization and some of them are fresher also.

So, there are requirement of certain infrastructure as mentioned below to develop the competency level of all BA employees and engineers.

- Training center equipped with projector, training models and furniture etc. at every circle level.
- Practice yard with all electrical equipment at division level.

For safety of employees and public, isolation system is most important during maintenance and emergency situation. So, lock out and tag (LOTO) out equipment are as mentioned below required to isolate the electrical hazard at each PSS level.

- Locks
- Hasp
- Slings with lock
- Tags

7.1.3 CAPEX requirement for Statutory & Safety:

Since the geography is vast and huge investment is required to make the network fully compliant to safety and statutory standards, and since this huge investment is not possible in a single year, TPNODL shall address network deficiencies at critical locations. Table below suggest the activities to be performed along with funds required under Statutory and Safety Head.

S. No.	Major Category	Activity	Amount	Annexure
1	Statutory & Safety	Fencing of Distribution substations	4.68	Annexure- 3
		Boundary wall for Primary substations	4.95	Annexure- 4
		Development of training infrastructure for safety & strengthening of LOTO system	3.05	Annexure- 5
		Total (1)	12.68	

7.2 Loss Reduction:

During limited site inspections, energy meters were not found at consumer's premises which were energized under Saubhagya scheme, an initiative of Gol. Further, at number of places where energy meters are installed and available at site, the same are not functioning properly. The above issues are resulting into reduction in billing efficiency, high AT&C losses, increased provisional billing, defective bills, and increased consumer complaints leading to customer dissatisfaction. Errors in bills leads to non-payment of bills and thus hampers the collection efficiency. It is required to test meters on-site to detect any abnormality/theft thereby reducing AT&C losses. The Electronics meters have capacity for recording data in its memory. This meter data is required to be analysed for detecting any metering abnormality.

Therefore, in this head, following activities are planned for execution:

- Data collection & analysis for detecting problematic meters.
- Energy Monitoring System (AMR)
- LT bare to ABC Conversion
- On-site testing of meters to detect any metering abnormalities/theft.

7.2.1 Installation of AMR meters at Distribution transformers:

IN TPNODL we have 15766 no. of DTs of 63 KVA and above capacity and at most of the DTs are without meter or the installed meter on the DTs are faulty. Due to which energy order on these DTs not possible. In the absence of the DT meter the correct peak loading on the DTs also not available so TPNODL has proposed to install the 2750 AMR meters on the DTS with the following objectives

- For correct energy audit
- For recording the DT peak loading
- Reducing the No of transformer burning due to overloading.

7.2.2 LT Bare Line to AB cable conversion:

In TPNODL, LT network plays important role of the Power supply distribution system and spread across TPNODL licensed area for power distribution. The bare overhead used is more prone to transient fault due to tree branch touching or any foreign particle fall on the line. Due to this, consumer's experiences frequent fault however, this can be reduced by structured maintenance. Moreover, Bare conductor is easier to maintain and faster to restore during any fault but at the same time, it requires more clearances. These bare

conductor lines are more subject to electricity theft through direct hooking and thus causing revenue leakage in the system. LT AB cables exist in the system and constitute approx. 66 % of the total LT network across TPNODL.

To improve the safety factor, minimize the safety accident risk, reduce the chances of fault & strengthen existing 415V network, it is suggested for replacement of overhead bare conductors with new aerial bundled cables. This in turn will help in providing reliable power supply for all consumers & stakeholders.

Moreover, during the survey, it is observed that LT bare conductor are more prone to hooking result into direct theft of the electricity. To avoid direct hooking, it is proposed to convert LT OH bare conductor into LT AB cable. This will help in eliminating the direct theft and thus protecting the revenue leakage.

The same resulted in reduced direct 'hooking' done on bare LT conductor lines thereby reducing commercial losses drastically in theft prone areas. LT Bare Line to ABC conversion would encompass following scope:

1. LT Bare shall be replaced with LT ABC.
2. Erection of mid span pole.
3. Earthing of every 5th Pole and poles which are installed across the road.
4. Erection of Mid span pole wherever the span length is more than 40 Mtrs to reduce the Sag.
5. Installation of Distribution Box and removing of jumbling of service line cables

Benefit to customer:

By executing the proposals as made in this head, 415V network can be strengthened and we would be able to serve our consumers in much better way. Following benefits are envisaged from this investment:

1. Reliable Power supply to the Consumers since bare conductor will get converted into insulated cable.
2. Comparatively safer than the LT Bare conductor and eliminate the element of risk if comes in proximity.
3. Simpler installation, as crossbars and insulators are not required.

4. Suitable for congested lanes as well.
5. Electricity theft is becoming hard as hooking would not be possible.
6. Less required maintenance and necessary inspections of lines.

7.2.3 Meter and metering equipment for feeder energy audit

The energy meters installed at the exchange points i.e. all 33 kV feeders emanating from the O.P.T.C.L are metered and properly accounted. The energy accounting losses at the exchange level are reduced to acceptable level by ensuring 100% installation of utility meters for 33 kV feeders at the O.P.T.C.L also by the correction of the defective wiring. Hence, accurate energy accounting is ensured at the energy exchange points of utility so that there is no delay for payment of the bulk power purchase bills on account of any discrepancies or disputes but the most of the meters installed at 33KV/ 11KV at the PSS are not working properly or no meter installed on the feeders. So to do the proper energy audit at 33 KV and 11 KV replace of faulty meters and installation of the new meter is proposed.

7.2.4 Equipment for Meter data downloading -

TPNODL has started the data downloading of large & medium category consumer's data however collection of whole current meter consumer's is still not started at site. It is proposed to procure CMRI's for data collection & analysis. This will help in identification of any problematic meters & take corrective action. The cost estimate is mentioned in annexure 6.

S No.	Material	Total Qty	Unit
1	CMRI	50	Nos
2	Bluetooth Device (Mobile) , Laptop etc.	150	Set

7.2.5 GSM Modem for AMR Communication

The proposed AMR will offer multiple benefits to the DISCOM as well as consumers. It is proposed to install 1500 nos for consumers having load above 20 KW. This will improve revenue cycle of the DISCOM. TPNODL will be able to control the billing and collection for these consumers effectively. Less billing disputes as 100% correct bills issued on actual meter readings.

Detailed Project Report Capex Plan FY 22-23

S. No	Activity	Material	Qty	Unit
1	Equipment for AMR enablement of 3 phase consumer meters	AMR - Modem , Cable , Antenna etc (Connection 70 - 110 kVA)	1,500	Set

7.2.6 Field Testing Equipment

As per Requirement of Statutory testing, meters installed at Grids, HT & LT customers' needs to be tested in pre-defined time, based on voltage level, on which meter is serving. Officials have to undertake testing of these meters at site as per IS 15707, with calibrated standard meters, specific for defined voltage levels. In order to perform these testing, sufficient equipment's are not available with TPNODL. This will also help in identifying faulty meters at site & take required corrective action. Consumer complaints regarding fast / slow meters after meter installation / during life cycle of meters need to be addressed by testing meters at site as per IS 15707. In order to perform these testing, sufficient equipment's are not available with TPNODL.

Requirement of testing equipment for LT & HT meters at site is given below:

Activity	Material	Qty	Unit
Field Testing equipment - Metering (Accu-chek etc.)	HT Accucheck	16	Nos
	LT Accucheck-1ph	50	Nos
	LT Accucheck-3ph	16	Nos

7.2.7 CAPEX requirement for AT&C Loss Reduction

S. No.	Major Category	Activity	Amount	Annexure
2	Loss Reduction	Installation of AMR meters at Distribution transformers.	4.50	Annexure- 6
		Conversion of LT Bare conductor to AB Cable	9.86	Annexure- 7
		Meters and metering equipment for energy audit	1.19	Annexure- 8
		Equipment for Meter data downloading	0.92	Annexure- 9
		Equipment for AMR enablement of 3 phase consumer meters	0.50	Annexure- 10
		Field Testing equipment - Metering (Portable Calibrator)	1.00	Annexure- 11
		Total (2)	17.97	

7.3 Network Reliability

TPNODL have many long overhead feeders. The present power distribution network is in bad condition resulting into frequent tripping's and as a result consumer are not getting reliable and quality power supply. There are total 215 numbers of 33/11kV Primary Substations. Table below shows tripping occurred in FY18-19, FY 19-20, FY20-2 and FY-21-22 till Dec-21. From the below table there is increasing trend in the Tripping. The number of tripping's are extremely high when compared to best in class utilities.

Category of Feeder	In FY - 18-19		In FY -19-20		In FY -20-21		In FY -21-23 till Dec-21	
	No. of tripping	Duration of tripping	No. of tripping	Duration of tripping	No. of tripping	Duration of tripping	No. of tripping	Duration of tripping
	No.	Min	No.	Min	No.	Min	No.	Min
ALL 33 kV Incoming Feeders	5,260	838	5,968	872	3359	614	14,754	9,89,200
ALL 11 kV outgoing Feeders	3,50,582	88,397	46,6528	95,962	24,7894	45,448	2,90,834	90,53,898

TPNODL intends to implement the following actions to improve the reliability of power supply

- Identification and replacement of faulty / sick equipment causing frequent tripping.
- Introduction of technology to ensure faster restoration of supply in case of any tripping.

Most faults that occur on overhead lines are transient faults caused by lightning and tree branches touching the live line conductor. The transient fault caused by lightning results in damage to insulators if lightning arresters are not provided or not working. Transient faults caused by tree branches interfering with line conductor are removed immediately by operation of a protection relay.

Regular inspection of feeders followed by tree trimming regularly helps to minimize transient faults and in most cases trial recloser are found to be successful in feeder with higher transient fault. However, each time the feeders are tripped due to transient fault, all customers connected to the feeder experience outage. Utilities at times finds it difficult

to identify the exact reason of the fault. In a long distribution feeder with many unprotected branches, it becomes difficult to identify the faulty and healthy sections of the feeder. TPNODL intends to use Auto-reclosers, Sectionalizers, and fault passage indicators to improve the reliability of overhead feeders. Apart from installing the above stated equipment, it is also planned to introduce AB switches at 33kV & 11kV long feeders so as to sectionalize at the appropriate location for any planned / unplanned shutdown thereby reducing the no. of affected consumers.

As discussed earlier, most of the LT feeders emanating from 11/0.415/0.230kV distribution substations don't have protection and control as a result, fault in any one LT circuit is likely to affect the supply of all customers connected on the same DT. Same is true with maintenance outages. To overcome this situation, TPNODL is planning to provide circuit breakers on LT feeders for control and protection of the feeder. Various initiatives proposed to improve the reliability of power supply in 11kV and downstream network are given below

1. 33 kV & 11 kV Network refurbishment to ensure Horizontal / Vertical clearances and as per Load flow distribution planning done by GRIDCO.
2. Primary Substation (PSS) Distribution Substation (DSS) Refurbishment.
3. Installation of Auto Reclosure & Sectionalizers in important and critical feeders.
4. Installation of Communicable overhead FPIs for faster identification of faults.
5. Installation of LV protection at Distribution substation to arrest the LT faults at LT level itself instead escalating to the 11kV feeder level.
6. Replacement of Battery & Battery Charger to strengthen the DC protection system in 33/11kV Grid Substations.
7. Installation of AB switches at 33kV & 11kV lengthy feeders for improving Reliability during planned / unplanned outages.
8. Proposal for Trolley mounted pad substations.
9. Installation of Lightning arrestors.

7.3.1 Refurbishment of Primary Substations (PSS)

The Power distribution network & its equipment health is a critical factor for ensuring reliable & quality power supply to the end consumers. Although field teams are committed

to upkeep the equipment by doing preventive maintenance, but still some of the equipment gets faulty and may result into pre-mature failure due to frequent tripping.

Pre-mature failure of the equipment results into long duration outage as it becomes difficult to restore the power supply if it happens during odd hours or if spare equipment is not available in the inventory. Hence, to ensure highest reliability, all equipment needs to operate properly at all the time.

To strengthen the existing network, it is suggested to replace the sick equipment in the existing network. Further, this replacement will help in utilization of the resource to the optimum level, managing the load in case of any exigency and mitigate the issue of overloading etc.

Budget is proposed for Sick equipment replacement to improve reliability of Power supply. Also, this will ensure better operation & control of the network & faster restoration of supply in case of interruptions.

1. Replacement of the faulty equipment (VCB, CT/PT, CRP, Isolator, etc.) in PSS.
2. Replacement / provision of AB switches.
3. Provision of new / additional earthing as per site requirement.
4. Carry out civil works as per site requirement.
5. Replacement of damaged support structure at PSS. This includes MS / GI structure, channels etc. Dismantling of existing structure and erection of new structure at same location has been considered in scope of the work.
6. Replacement of Battery and Charger.
7. Replacement of all undersize bus bars with standard size to remove hotspot.
8. Carry out civil works as per site requirement.
9. Detailed technical inspection and testing of the equipment.

Battery & Battery Charger:

During the field visits, it has been observed that some of the Battery and Battery charges are not operational and needs immediate replacement. Replacement of Battery & Battery Charger is essential to strengthen the DC protection system in 33/11kV Grid Substations to improve reliability. Installation of Battery & Battery charges have been proposed to strengthen the DC system in the 33/11kV Grid Substations. In this year, 65 sets of Battery and 48 nos Battery chargers are proposed to be replaced.

7.3.2 33 kV & 11 kV Network Refurbishment / Conductor upgradation:

33kV or 11kV feeders are important asset for a distribution utility which connects various substations and provide power to end consumers. TPNODL has 2868 Ckt. KMs of 33kV and 37296 Ckt. KMs of 11kV feeders under its operational area. Besides, 66469 Ckt. KMs of LT feeders provides power to the end customers.

Proper upkeep of the feeders is important for ensuring safety and reliability of power supply. During site visits, it was observed that most of the 33kV / 11kV / LV lines are in very poor condition and pose safety threat to the human beings and animals. Most of the feeders have binding wire / multiple joints. As a result, there are chances of snapping of conductors and subsequent electrocution of human beings or animals since cradle guards are not provided. Due to scarcity of staff and materials, there is no structured maintenance program. Tree branches / creepers are interfering with live conductor at many locations. Huge number of tripping's are reported on 33 and 11kV feeders in previous years. With poor condition of network and absence of maintenance program, it is difficult for utility to ensure delivery of reliable and quality power supply to the end users. During site visits, it has been observed that conductor of different sizes is used in different phases which restricts the circuit capacity limiting to the lowest size of the conductor used in the circuit. Moreover, over sagged wires in 33kV or 11kV feeders are posing major threat to the lives of human beings and animals. At some places, due to re-construction/ widening of roads, vertical clearances of the feeders have reduced to the dangerous level. This is not only causing violation of statutory guidelines but also enhancing chances of fatal accidents.

There are few lines in TPNODL area which are crossing the river. During heavy rains, the rivers get flooded. The riverbed height increases & comes close to sag of 11 KV & 33 KV lines. The clearance between the lines & water reduces. Even at some places the lines got submerged in water. As a result, the supply to the customers get affected. To overcome this issue height of the line is required to be raised by installing the towers at both the ends of river crossing.

Based on the load flow studies, we have identified 7 no of lines for conductor upgradation as well as new line installation (14 no.). Detail load flow studies have been carried out in this regards and same can be refer to "Annexure – 47"

To ensure safety of equipment and human beings / animals, refurbishment of 33kV, 11kV and LV lines is urgently required in phase manner starting from critical area where movement of public / animals is high. Refurbishment job would encompass following scope.

1. Straightening of tilted poles.
2. Replacement of damaged poles, insulators, and accessories.
3. Earthing of every 5th Pole and poles which are installed across the road.
4. Erection of Mid span pole wherever the span length is more than 50 Mtrs to reduce the Sag.
5. Restrunging of conductor to increase the vertical clearance by reducing the sag.
6. Replacement of the conductor in the sections having multiple joints.
7. Replacement of weak Jumpers and connections.
8. Replacement of binding wire joints with wedge connector to remove hotspots.
9. Installation of Danger boards, Anti climbing devices, stay sets etc. to ensure safety & statutory compliance.

7.3.3 Refurbishment of Distribution Substation (DSS):

Distribution Substation (DSS) comprises of various equipment which perform specific task to ensure delivery of power supply at appropriate voltage to the end consumers. Main components are 11 kV Switching device, 11 kV Protection, Distribution Transformer, LV Protection, Earthing, fencing and O/G LV feeders. The most expensive equipment in the DSS is Distribution Transformer and its life depends upon healthy condition of all other components be it LV Protection, HV Protection, Earthing or fencing. The age of Distribution Transformer can be enhanced by ensuring healthiness of all other components. Generally, in power distribution utility, most of the transformers are either approaching or have outlived their operational life. TPNODL, however, is of opinion that replacement of power distribution equipment merely on the basis of ageing is not advisable and other factors such as health of the assets & their associated components, loading conditions, and other operational criticalities also needs to be considered. The above exercise is necessary as replacement of equipment is capital intensive and has direct impact on tariff.

Detailed Project Report Capex Plan FY 22-23

In our preliminary site visits, it is observed that existing DSS are in shabby condition with damaged or ill-maintained HT & LT protection equipment. All connections at pole mounted or plinth mounted substations are in very bad condition which not only cause high technical loss but also give rise to undue interruptions. The Aluminum lug / sockets used in DTs and other equipment in the substations are observed to be of inadequate size and proper crimping of lugs with the help of crimping tools found missing at almost all places. This is resulting into generation of hotspots and failure of connections.

At all location, fuse cut-out arrangement found with oversize fuse wire. Most of the fuse cut-outs are installed at a lower height accessible to public and animals thus creating safety hazard. Analysis of distribution transformer's failure data for the last few years also suggest that effective HV & LV protection might have reduced the transformer failure. For example, if there is no effective protection on LV side and any fault occur on the load side, the fault current will pass through the transformer for a longer duration till such time the fault is isolated by upstream network. Since the magnitude of the fault current is high, it is likely to produce mechanical and thermal stresses in the transformer causing pre-mature failure of the transformer.

During the survey, it is observed that boundary walls and fencing are either damaged or do not exists thus poses safety threat to stray animal and public at large. At many of the places it was found that the condition of the Fencing of DSS was in a very bad condition.

Ensuring safety of People & equipment is very much needed for safe operation. Hence it is proposed for Construction of fencing for DSS wherever required. Refurbishment/Life Enhancement of DSS helps in addressing the above-mentioned issues, improve the reliability of power system and above all ensures safety. TPNODL proposes for activities under Refurbishment of Distribution Substation:

S.No	Description	UOM	Unit Rate	Quantity Considered in this FY 22-23 (Nos.)	Amount
					(in Crores)
1	100 KVA DSS	EA	0.04	65	2.34
2	250 KVA DSS	EA	0.05	33	1.67
3	500 KVA DSS	EA	0.05	15	0.79
Total				113	4.80

Detailed Project Report Capex Plan FY 22-23

- Detailed technical inspection and testing of the equipment.
- Replacement of damaged support structure at DSS. This includes MS / GI structure, channels etc. Dismantling of existing structure and erection of new structure at same location has been considered in scope of the work.
- Installation of palm connectors at HT and LT side of Distribution Transformers and ensuring that all connections are through palm connectors.
- Replacement of all undersize conductors with standard size to remove hotspot.
- Replacement / provision of AB switch, DD Fuse units, LT ACB or MCCB (depending on Transformer ratings) and all associated cables / conductors.
- Provision of new / additional earthing in all DSS as per site requirement.
- Installation of fencing to safeguard the DSS equipment and to maintain safety clearances.
- Installation of danger boards, anti-climbing devices, stay-sets etc. to ensure safety & statutory compliance.
- Carry out civil works as per site requirement.

7.3.4 Installation of LV protection at DSS

During site visit it was observed that there are no LT Protection at DT secondary side, so any fault occurred during in LT shifts to 11kV System due to which 11kV feeders trips most of the time. The Tripping on 11kV feeders has impact of SAIFI and SAIDI and more and more consumers are being affected by the fault, which in turn reduces the reliability of the system.

To reduce the effect of LT fault on 11kV System, it is recommended to install the MCCB on Pole Mounting substation for 100 kVA, ACB on 250 KVA & 500 KVA Distribution Substations.

S.No	Description	UOM	Unit Rate	Quantity Considered in this FY 22-23 (Nos.)	Amount
					(in Crores)
1	Supply and Installation of MCCB-100 KVA	EA	0.007	520	3.65
2	Supply and Installation of ACB -250 KVA	EA	0.012	140	1.68
3	Supply and Installation of ACB-500 KVA	EA	0.034	6	0.21
Total				609	5.54

7.3.5 Installation of Auto-reclosure / Sectionalizers, FPI, RMU AB switches:

Auto-reclosure are very efficient in minimizing outages from transient faults on overhead feeders. When installed along with Sectionalizers, they can isolate the faulty sections of the feeder while re-energizing the rest of the feeders. In case of very long circuits, the Sectionalizers can also be connected in series.

TPNODL currently has many very long overhead feeders. Moreover, it is observed that multiple 11kV feeders are controlled through single 11kV breaker or AB switch in some primary substation. Fault in any 11kV feeder or maintenance activity in 11kV breaker at primary substation affects the supply of consumers connected on all 11kV feeders controlled from that breaker. To improve reliability of power supply at such substations, installation of Auto-recloser, Sectionalizers and Ring Main Units (RMU) is being proposed in phase manner. In first year, a total of 10 numbers of Autorecloser and 30 numbers of Sectionaliser have been proposed for installation.

TPNODL is also planning to install 72 numbers of RMUs to improve reliability. This will help in improving the reliability since currently entire feeder is forced tripped for such outages.

Installation of overhead Fault Passage Indicators (O/H FPIs) is proposed for faster identification and restoration of faults on long 11kV feeders with multiple sections. In first year, 147 sets of communicable FPIs are proposed for installation on pilot basis.

S.No	Description	UOM	Quantity	Unit Rate	Amount (INR)
1	Supply & Installation Auto Reclosure	Nos	10	0.156	1.56
2	Supply & Installation Sectionaliser	Nos	30	0.157	4.70
3	Supply & Installation RMU 4 way O/D at 11 KV	Nos	35	0.169	5.92
4	Supply & Installation RMU 3 way O/D at 11 KV	Nos	32	0.160	5.13
5	Supply & Installation RMU 4 way O/D at 33 KV	Nos	5	0.526	2.63
6	Supply & Installation FPI	set of 3	147	0.008	1.16
Total					21.10

Benefits

Auto-Recloser and Sectionalizer-Benefits

Continuity of power supply for the consumers resulting in less complaints from citizens.

1. Reduce the time of power supply disconnection in cases of transient faults.
2. Reduce the unsold energy due to faults.
3. Reduce the cost of manpower operating in managing disconnected lines.
4. Maximum utilization of the network components.
5. Event Log and Remote control.
6. Reduce cost of fault finding.

RMU- Benefits:

1. The major advantage of Ring Main Units is the safety they provide to the operators. Like the operation of switching devices with interlocking system requires less knowledge and effort.
2. Working with IEDs allows remote operation. SCADA implementation is easy with smart Ring main units.
3. The space occupied by RMUs is less as they are Gas Insulated Switchgear.
4. The time taken for installation and commissioning of RMUs is very less. RMUs require less maintenance.
5. Beautification in the network

FPI - Benefits

1. Easy fault identification.
2. Easy to install, even on live network.
3. Detects both short circuit and low current earth faults.
4. Indicates both permanent and transient faults.
5. Highly visible red flashlight.
6. Reduction in supply restoration time by 1-2 hrs.
7. Reduction in unserved Energy
8. Enhancing customer satisfaction

7.3.6 33 KV and 11 KV Voltage Regulators for voltage improvement

TPNODL has 2868 CKT Km. of 33kV line and 37296 CKT Km. of 11 kV line to serve electricity in five circles of northern region of Odisha Namely Balasore, Bhadrak, Baripada, Keonjhar & Jajpur. The average total length of 33kV lines is 35 Circuit Km and average total length of 11kV lines is 55 Circuit Km. Even the longest 33kV line has the total length of 177Km and the longest 11 kV line has the total length of 325Km. The high distribution line losses cause severe voltage dip at the Fag-end of the line. The lowest fag end voltage seen on 33kV lines ranging from 25kV to 29kV and on 11kV line ranging from 8kV to 10kV.

Drawbacks of existing system:

Length of 33 kV lines are too long because PSS are located far from each other, no provision for improving voltage profile in between. The voltage profile of 11kV distribution lines feeding to industrial areas are taken care by industries itself using capacitor banks (Voltage regulator) but actually these are very less. Rest of maximum lines are feeding domestic and agriculture loads having huge number of complaints regarding poor quality of power supply & low reliability.

Some of significant consequences of poor voltage profiles faced by the end user – increased current for constant power loads, redistribution of the existing loads, technical problems (T&D Losses) in DTRs, improper behavior of consumer loads, cumulative line losses and supply interruption which leads to higher AT&C losses.

Solution:

To overcome the stated challenges & improve upon the voltage profile and quality of power supply, advance power system equipment - Automatic voltage regulators (Power distribution voltage regulators) are required. Simply because, it is not feasible everywhere to shorten the long length of the existing feeder in between & to install a new transformer along with a new feeder specially looking into the huge operational areas & mostly rural. Here the voltage regulator can solve the purpose of booting up the voltage even at the fag end where low voltage issues occur.

The voltage regulator takes an incoming voltage that varies with load conditions and maintains a constant output voltage. This helps improve power quality as voltage at the receiving end is maintained constant amidst varying demand, increasing longevity of all load equipment. These regulators can improve the utility's return on investment by reducing line losses and increasing equipment life.

A power distribution voltage regulator is an auto transformer that is able to add or subtract voltage to provide consistent system voltage levels. A voltage regulator control senses system voltage and commands the tap changer to operate when voltage

changes are needed. The tap changer operation changes the configuration of the auto transformer coil resulting in a change in the voltage.

Construction

Voltage regulators are constructed from three basic parts:

- **Autotransformer:** A transformer with part of one winding common to both the primary and secondary windings.
- **Load tap changer:** The switch is designed to work under load to change the configuration of a transformer coil, providing greater regulator versatility.
- **Voltage regulator control:** The control senses the system and automatically commands the tap changer.



Figure 1: Pole mounted voltage regulator installed in a distribution network

Features

- Can operate up to 2 million mechanical operations (Tap Changer operations)
- 20 years maintenance free operation
- Inbuilt superior internal arrester provides optimum surge protection against abnormal voltage surges
- Fast response time for voltage correction in fractions of seconds
- The typical voltage regulators available in the power range of 250 to 5000KVA per phase.
- 33kV voltage regulators maintains output voltage 33kV even in input voltage ranging from 29kV to 33kV.
- 11kV voltage regulators maintains output voltage 11kV even in input voltage ranging from 8kV to 12kV.



Figure 2: Pole mounted voltage regulator

Benefits

- Avoid the necessity of redistribution the loads on the phases, cable changes or construction of new substations.
- Reduction of the energy interruption rate due to inappropriate voltage level.
- Improvements of the utilities gains due to the continuous supply of energy.
- Proper behaviors of the loads for example: motors, irrigation systems, illumination and electronic loads.
- Better quality and reliability on the utility service.
- Improvement of the voltage levels results on better load power factor and reduction of the energy cost.

In FY 22-23 TPNODL has proposed to install 5 Nos. of 33KV and 10 Nos of 11 KV voltage regulators at strategic location just to improve upon voltage profile & quality.

Sr. no	Material	Quantity	UOM
1	33KV Voltage Regulator (5Nos.)	10	Nos
2	11KV Voltage Regulator (10 Nos.)	20	Nos

7.3.7 LT FLC System, Ultra sound scanner, Power Analyser:

LT FLC System

TPNODL serves a Customer Base of 20.5 Lakh with the population of 97 Lakhs under a vast operational area of 27,920 Sq. Km with the people mix of urban, semi – urban & rural category. We are having a vast network of aerial bunched cable along with few quantities of underground cable network. At TP Northern Odisha Distribution Limited, the entire focus is on providing reliable power supply, enhanced customer services and reducing the existing AT&C losses in a systematic manner. Since inception, TPNODL is working rigorously towards reliability & safety. In this direction, we have already started laying underground power cables at all voltage level (1.1.kv to 33KV) all across the operational area. Underground cables are started to be laid under annual CAPEX 21—22 & under Yass Cyclone fund as well. There will be a significant amount of underground network in TPNODL from this year onwards to serve reliable power supply to our valuable customer base.

Existing vast ABC network as well the upcoming cable network will quite obviously have a failure rate primarily due to asset ageing for existing ABC network & forecasted external damage in underground network by civic agencies (like Municipality/PWD/Roads/OFC) during construction works or any other interim fault during laying/execution etc.

Cable/ABC failure leads to the unexpected power cut and loss of revenue. Quick supply restoration is of utmost priority to dissolve customer unrest. In such condition, Supply restoration time for underground cable & ABC network failure, highly depends upon quick availability of Cable Test equipment set-up.

We propose to procure 5 Nos. FLC low voltage cable test units to overcome the above stated problems in all the circles. We will be locating one LT FLC Vehicles in each circle to cater high operational areas under the circle. Further this vehicle will have the system to test & locate the fault upto & including 11KV network. This will ease the fault finding time for both 1.1KV & 11KV underground cable & ABC network

The new generation high-performance cable fault location system is based on state-of-the-art technology and provides efficient, safe and reliable cable fault location, cable testing and cable tracing/identification with its software support.

Thus in the direction of improving the reliability of the system & reducing the SAIFA / SAIDI parameters & also to meet the PA timeline in case of untoward failure of ABC/Cable network,

it is proposed to have Five (5) Nos. LT FLC Testing equipment (one in each circle) to get all such breakdown/failure attended on a larger scale with minimum possible time cycle.

Ultrasound Scanner

Ultrasound inspection is an effective screening tool for detecting the potential for arc flash incidents. There are basically three types of discharges in an electrical network – Corona, Tracing & Arcing. Arcing, tracking and corona emissions produce ionization. Ionization, a process by which a neutral atom or molecule loses or gains electrons, thereby acquiring a net charge and becoming an ion, occurs as the result of the dissociation of the atoms of a molecule in solution or of a gas in an electric field. Ionization has by-products: ozone and nitrogen oxides. These combine with moisture to produce nitric acid, which is destructive to most dielectrics and certain metallic compositions, resulting in corrosion.

The objective of this electric condition monitoring is to detect the presence of these events before flashover or before they produce an arc flash incident when a cabinet is opened. If we can capture or identify such discharges in advance & take corrective measures accordingly, that can prevent the equipment failure & untimely breakdown. To detect these discharges which are not audible through naked ears, ultrasound scanner is used. This ultrasound scanner is basically a handheld device which converts the ultrasound frequency (produced during corona, tracking & arcing) to an audible frequency. When hand-held ultrasonic instruments are used to scan enclosed electrical apparatus the procedure is fast, accurate and simple. It can help inspectors by eliminating the need for wearing cumbersome, uncomfortable PPE during a preliminary survey. Online continuous monitors can alarm personnel of the presence of arcing, tracking and corona in advance of an inspection. This major initiative shall contribute towards extensive preventive maintenance planning of capital equipment.

This portable instrument provides information via headphones for the audio signal usually as decibels. These hand-held devices usually contain two sensing heads containing piezoelectric transducers: a scanning module for airborne sounds and a contact probe/wave-guide for structure borne signals. If any of these conditions are detected, the potential for arc flash exists and field team will act to safely open and repair the condition. Infrared scans can also be clubbed to confirm the diagnosis and to identify any additional problems that would generate heat and not sound.

Periodically, condition monitoring of Critical Capex equipment – Transformers, Switchgears, ACBs & Auto – reclosers, will reduce the chance of any untoward breakdown & if any in case can be predicted and preventive maintenance planning can be accordingly scheduled. Therefore, condition monitoring & preventive maintenance of all capital equipment can be extensively planned in a phase manner throughout the year.

In TPNODL we are having 159 sections spread across 28 thousand square km of geographical areas with more than 70,000 DTRs, 505 Nos. PTRs, 2270 nos. of 11 / 33 kV

Switchgears. Hence ultrasound scanning tool becomes a necessity for the utility like us for preventive & predictive maintenance panning of the se high value assets.

Hence, initially it is proposed to have Five (5) Ultra sound detector (one in each circle) to get all such high value assets to be scanned on regular basis for further corrective actions to prevent the untimely failure. Initially this is planned to have 1 scanner in each circle to get acquainted with the equipment & process for carrying out the scanning but with the years to come, this quantity will be further enhanced to utilize this scientific tools for detecting the potential failures in assets to minimize failure & breakdowns.

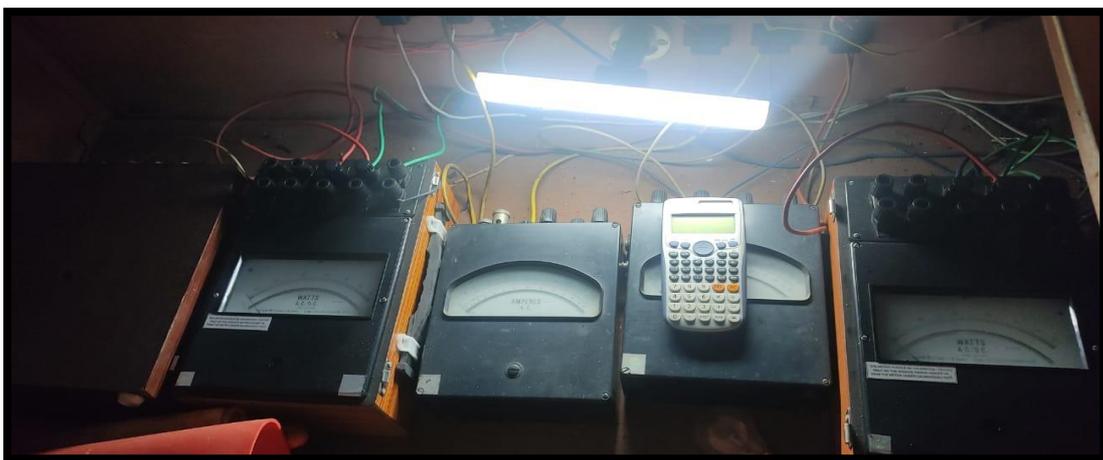
Power Analyzer for Transformer workshop

TPNODL, has established an in – house transformer repairing facility & workshop in the year 2012, where every month approx. 200 to 250 distribution transformers (DTRS) are being repaired in a month, tested & shipped to the various sections as per requirement.

In the last decade, very few initiatives for upgrading the workshop has been taken, so as to improve the (Mean Time to Repair) MTTR & (Turn – Around Time) TAT of each transformer under repair or overhauling.

After repairing the distribution transformers, several routine tests – Polarity Test, Ratio Test, Open circuit & Short circuit tests must be carried out to assess the healthiness of the repaired job.

To calculate the No-load loss, Load loss, Total Loss at 50% &100% of loading, several methods – Two Wattmeter method, Three Wattmeter method are used.



Drawbacks of existing setup:

Presently, we are using Two-wattmeter method, which has a conventional lab testing setup comprising of analog meters such as Ammeters, Voltmeters, Watt meters, and power factor meters. To carry out the tests with the existing setup, a lot of time and manpower is required for experimental connection setup, & further No Load / Load Losses

is calculated manually through a scientific calculator – often leads to observational / computational errors.

In the present facility, the metering instruments can be tested only for DTRs of 11/0.433kV. The station transformers of 33/0.433kV & Power Transformers more than 1.6 MVA, the full load current cannot be injected through the existing system subjected to instrument limitations.

As calculated w.r.t. the monthly data, the average no. of testing for 10 nos. of DTRs is taking 3½ hours involving 3/4 manpower for setting up, testing & computation.

Solution:

To improve the accuracy and accelerate the testing process involving reduced manpower, advanced testing equipment's – namely Power Analyzers are required.



Features:

Power analyzers are accurately precise used in the power utilities transmission and distribution sectors to perform No Load & Load Test of 1 – Phase & 3 – Phase Distribution / Power / Isolation transformers.

This instrument is simpler and reliable with its high performing Digital Signal Processors (DSP) based circuitry and user friendly operational features.

Power analyzers displays Voltage, Current, Frequency, Active Power and Power Factor, both phase wise and Total/Average as shown in figure2.

Power Analyzers provides high speed measurement & consumes very less power. Moreover, it is portable & very compact along with USB Interface.

Benefits:

The power analyzer will reduce the time up to 1/3rd in comparison to the conventional testing setup. All the tests with help of this instrument, the time for testing 10 DTRs will take only one hour of time with reduced manpower.

Eradication of human / manual computational errors during measurement & data calculations.

Power analyzers can be used for testing a wide range of DTRs from 16KVA DTRs to 5MVA PTRs.

7.3.8 Installation of station transformer:

Station Transformer supply the total 'station' load (due to outage of the other station transformer) as well as supply the starting load of a PSS. Supply its proportion of the station load. During the PSS survey it has been gathered that in 40 nos of substations station transformer has not been installed.

So it is proposed to install 28 station transformer in the PSS to provide the reliable power to the consumers

7.3.9 Capacitor bank at PSS for low voltage Improvement

IN the TPNODL area, we are receiving the low voltage complaints from the consumers from the some areas where the Length of the feeders are more. Hence to improve the Voltage of the consumers it is proposed to install the capacitor bank at the 5 PSS during the FY 22-23

Other than the voltage improvement capacitor bank is used for the following:

- Capacitors are used to cancel out the lagging current effects from the motors and transformers.
- Capacitor can reduce the system losses and help provide voltage support.
- Another benefit of the capacitor is how they can reduce the total current flowing through a wire thus leaving capacity in the conductors for additional load.

7.3.10 Earthing of Power and distribution transformer

In an electrical installation, earthing system play important role for proper working of the power distribution system, and protection of human beings against electric shock.

The Main objectives of an earthing system are to provide an alternate path for the fault current to flow so that it will not endanger the user, maintain the voltage at any part of an electrical system at a known value and prevent excessive voltage on the equipment.

Detailed Project Report Capex Plan FY 22-23

As per Central Electricity Authority Regulations (Measures relating to Safety and Electric Supply,2010) rule 41, there is provision of earthing, neutral wire in a 3-phase, 4-wire system and the additional third wire in a 2- phase, 3-wire system.

Hence 1105 nos of earthing are proposed in this DPR.

7.3.11 CAPEX requirement for Network Reliability:

S. No.	Major Category	Activity	Amount	Annexure
3	Reliability	Refurbishment of 33KV/11KV Primary Substation (PSS)	20.00	Annexure- 12
		33 KV Conductor up gradation	11.20	Annexure- 13
		11 KV Conductor up gradation	8.80	Annexure- 14
		Refurbishment of 11KV/0.415 KV Distribution Substation (DSS)	4.80	Annexure- 15
		Installation of LV protection at DSS	5.54	Annexure- 16
		Installation of Auto reclosure / Sectionalizers ,RMUs, &FPis	21.19	Annexure- 17
		33KVand 11 Kv Voltage Regulators for voltage improvement	4.20	Annexure- 18
		LT FLC System - Vehicle Fitted (5 Nos. -- 1 for each circle) + Power Analyser for Transformer workshop (2 Nos.) +Ultrasound Scanner (5 Nos. -- 1 for each circle)	3.52	Annexure- 19
		Installation of station transformers (PPS)	2.55	Annexure- 20
		Capacitor Bank at PSS for low voltage improvement	0.88	Annexure- 21
		Earthing of Power Transformers and Distribution Transformers	0.98	Annexure- 22
Total (3)		83.65		

7.4 Load Growth

Every year DISCOM have to release applied new connection. To meet this consumer growth, both network infrastructure needs to be extended, strengthened, or augmented and new energy meters to be installed to release the new connection. Some of the connections can be released from the existing network and some may require augmentation/addition/extension before release of new connection.

The following tables represent the data for consumer base in FY 19-20 & FY 20-21.

Detailed Project Report Capex Plan FY 22-23

Consumer Base	Mar-20	Mar-21	Dec-22	Consumer Growth
	1906556	2009292	2051642	5%

Also, with the increase in consumer base there is load on DTR. Few DTR's get overloaded & get burnt. Below table shows the details of Burnt transformers in FY 21-22 till Jan 22.

Circle	PTR burnt till Jan-22		DTR Burnt in till- Jan 22	
	No.	Capacity (MVA)	No.	Capacity (MVA)
Balasore	10	42.2	788	34.84
Bhadrak	4	9.75	410	20.99
Baripada	5	14.5	443	17.77
Jajpur road	4	23.15	426	21.61
Keonjhar	3	15	243	11.65
Total	26	104.6	2310	106.87

Hence for carrying out network extension/ augmentation/addition, we propose expenditure under this head to consider load growth, network extension / augmentation / addition is expected to be carried out to cater the new demand.

Benefit to customer: Better the availability of supply, faster will be process of providing new connection hence more will be the customer satisfaction.

Reduce over-burdening of existing Distribution transformers, lines etc. thereby reducing power cuts.

7.4.1 Augmentation of 33kV, 11Kv line, Power Transformers and DTs

Augmentation of 33/11kV new line:

During site survey it is observed that most of 33/11kV Primary Sub-Stations are having single incoming 33kV source. With failure of single existing 33kV source entire 33/11kV PSS gets shutdown thereby causing shutdown to all the downstream 11kV & LT network consumers.

It is also observed that HT consumers on 33kV and 11kV are being fed through tapping point instead of a dedicated feeder. There are multiple HT consumers source also mixed

with incoming source of 33/11kV PSS. In case of technical fault at one of the HT consumers leads to tripping of incoming source and another connected HT consumer.

To overcome this issue, it is proposed to study to establish link line from alternative available source.

At present 11kV feeders are radial and do not have ring connectivity with another 11kV feeder as per N-1 philosophy. It is proposed to study ring connectivity between nearest 11kV feeder in the vicinity and adjacent PSS 11kV feeders like Hospitals, town, commercial and key government establishments.

Augmentation/ addition of Power Transformers

To cater the increasing load demand, PTR augmentation/ Addition is required to avoid any overloading and N-1 fail situations. Also, to ensure reliable power supply to our consumers, PTRs has to be kept at optimum loading so as to avoid any mechanical stress on the transformers due to overloading.

To avoid any overloading issues especially in urban areas where the load growth is high, it is required to augment some of the power transformers in city area which are over loaded /may get overloaded considering load growth for the next two years. It will give benefit to consumers as follows:

1. Reliable power supply by ensuring N-1 reliability at PTR level.
2. Reduce over-burdening of existing PTRs thereby reducing power cuts.

Augmentation/ Addition of Distribution transformer

To cater the increasing load demand, DT augmentation and new DT addition is required to avoid overloading of transformer leading to transformer failure and power interruptions. Also, to ensure reliable power supply to our consumers, Distribution Transformers need to be kept at optimum loading to avoid any mechanical stress on the transformers due to overloading.

When a distribution transformer loading exceeds 80% of the rated capacity of the transformer, then it is “overloaded”.

To avoid these overloading issues especially in urban areas where the load growth is high, it is required to augment the capacity of the Distribution transformers/ addition of

new distribution transformer to mitigate the overloading issue. It will provide benefit to consumers as follows:

1. Reliable power supply by reducing chances of fault in network, thereby reducing power interruptions
2. Reduce over-burdening of existing Distribution transformers thereby reducing power cuts.

In case of overloading of the Distribution Transformer, it not only hampers the power supply to the consumers but also may cause pre-mature failure of DT due to operating for long hours on overload condition. Thus, to abide by the safe loading limits, augmentation of distribution transformers are proposed for locations, where loading is exceeding the rated value.

In this proposal, TPNODL intends to carry out Distribution Transformer's augmentation for those DTs which are identified as overloaded at various locations. 30 nos. of Transformers are proposed for Augmentation of 200/250 kVA to 400 kVA DTs, 90 nos of DTs Proposed for augmentation from 100 KVA to 250 KVA and 109 nos of DTs proposed for augmentation from 63/25 kVA to 100 kVA at different locations.

In this proposal, TPNODL intends to carry out PTR augmentation for those PTRs which are identified as overloaded at various locations. Total 5 nos PTR are proposed for Augmentation from 5 MVA to 8 MVA, 2 nos PTR proposed for augmentation from 8 MVA to 12.5 MVA at different location. & 10 nos additional PTR are proposed where single PTR exiting on PSS.

7.4.2 Addition of 33KV, 11KV and LT lines

In order to provide the reliable and Quality power supply to the consumers in TPNODL's Licensed area, we have conducted the survey of all 33KV feeders to identify the weaker section which require immediate attention. Based on the survey reports, it is observed that in some of the feeders, conductor sizes are different resulting into compromising the circuit capacity which is limited to the lowest size of the conductor available in the ckt. Looking at the existing load demand and factoring the projected load growth, it is required to be rectified so as to avoid overloading of the network.

Further, a SLD based network study carried out for Balasore and Jajpur circle area and found that some interventions are required to be taken under Capex to provide alternate source to the existing feeders, load balancing on the feeders and Reducing the length of the lengthy feeders. This will help in optimizing the feeder loading and will support in shifting the load to another structure or OPTCL grid in case of any source failure.

Moreover, in various forums, OPTCL has raised the issue of recently commissioned 220/33KV or 132/33KV and 33/11 KV PSS which are either lightly loaded or even have no loading. OPTCL has asked TPNODL to evacuate power from these Grid substations and PSS and ease out the loading on other OPTCL Grids which are currently catering the load. Therefore, TPNODL is also proposing evacuation of Power from these OPTCL Grid substations by laying new 33KV feeders or interconnectors to transfer the load.

This overall expenditure will help in strengthening the 33KV network to some extent since the requirement is huge but considering the resource availability, it will be done in phase manner.

- 7.4.3 **Nua Balasore Project:** Balasore is an important town in the TPNODL area and most of the important installations like AIIMS, FM medical college, District head quarter hospital, DC office, Integrated test range, 2 industrial areas and TPNODL corporate office exists in the town. The study 11 KV and 33 Network of the Balasore is being done by the PRDC and comprehensive plan is being prepared by the PRDC. It is envisaged to provide N-1 reliability to critical 11 kV as well as 33 kV feeders in next four years. Additional Link lines to serve as interconnections across radial feeders are envisaged along with suitable switching arrangement such as RMUs and AB Switches. The provision of FPI (Fault passage indicators) on branch lines is also covered to facilitate fault isolation in minimum time leading to improved reliability To start with, the provision of Rs 10 Cr for FY23 has been considered in the DPR.

Budgetary provision spread over 4 years (in Rs Crs)				
Project title	FY23	FY24	FY25	FY26
Project Nua Balasore – N-1 network availability	10	20	20	10

7.4.4 CAPEX Summary for Network Load Growth

S. No.	Major Category	Activity	Amount	Annexure
4	Network Optimisation & Load Growth	Augmentation Power Transformers	9.96	Annexure- 23
		Augmentation of Distribution Transformers	20.81	Annexure- 24
		Addition of LT lines	13.66	Annexure- 25
		Addition of 11 kV Lines (O/H and U/G)	33.96	Annexure- 26
		Addition of 33 kV Overhead Lines (O/H and U/G)	21.74	Annexure- 27
		Addition of New PTR and New DTRs along with Associated HT/LT lines	31.15	Annexure- 28
		Provision for Nua Balasore Project	10.00	Annexure- 29
		Total (4)	141.28	

7.5 Disaster mitigation:

The Company is serving 27920 Sq. Km of area having coastal line of about 150 Km. Natural Disasters in terms of Cyclones and floods are frequently reported in this area. To ensure the supply continuity as well as timely restoration after cyclones/ floods, we have followed the recommendations of the Report of Task Force on Cyclone Resilient Robust Electricity Transmission & Distribution (T&D) Infrastructure in Coastal area published in March 2021. To ensure the supply continuity as well as timely restoration after cyclones/ floods, following activities are planned:

7.5.1 Conversion of 2nos PSS from Outdoor AIS to Indoor GIS:

Two Nos of PSS, namely, “Balasore City” and “Jajpur Town” have been identified for conversion to Indoor AIS/GIS Stations.

1) City PSS (Balasore) is located within 20 km of coast line feeding critical loads of Balasore city such as District Headquarters, Admin blocks & Hospitals, . The PSS is located in flood prone area . Based on the recommendations of above mentioned Task force (extract given below), it is proposed to convert existing outdoor switchyard substation in to Indoor switch gear arrangement with 33kV GIS and 11 kV AIS arrangement.

As the said PSS is in service, detailed planning is carried out to Reconfigure the existing substation layout without taking any shutdown of any running feeders.

2) Jajpur Town PSS: is located within 60 km of Coast line feeding critical load of Jajpur town. The said PSS is at lower level as compared to National Highway passing close by. As a result, regular flooding is observed in the PSS during monsoon / cyclone leading to forced shutdown to feeders due to safety measures. Based on the recommendations of above mentioned Task force (extract given below), it is proposed to convert existing outdoor switchyard substation in to Indoor switch gear arrangement with 33kV GIS and 11 kV AIS arrangement. As the said PSS is in service, detailed planning is carried out to Reconfigure the existing substation layout without taking any shutdown of any running feeders.

Extract of “Task force on Cyclone Resilient Robust Electricity Transmission & Distribution (T&D) Infrastructure in Coastal area” is as below:

“Ref “Executive summary, page 5. :The measures recommended for existing Transmission & Distribution substations are as follows:

a) Exploring the possibilities of conversion of existing AIS to GIS substation for transmission substations

b) Examining the feasibility of conversion of Air insulated distribution substations to indoor installation with conventional switchgear / GIS without affecting power supply etc.”

7.5.2 Conversion pole mounted DTR to plinth mounted (100 KVA and above):

Conversion of Pole mounted DTRs to Plinth mounted: Distribution Transformers (100 kVA and above) which are currently having Pole mounting arrangement are generally vulnerable during cyclonic conditions. Rearranging such transformers for Plinth mounting arrangement is an effective way to ensure the availability of substations during cyclonic conditions. Further, the above said Task force report on Cyclone Resilient T&D Infrastructure in Coastal area also recommends Plinth mounted arrangement (refer extract given below). Accordingly, 100 Nos of such installations are envisaged in FY23.

Extract of “Task force on Cyclone Resilient Robust Electricity Transmission & Distribution (T&D) Infrastructure in Coastal area” is as below:

“Ref “Executive summary, page 5 :

The measures recommended for existing Distribution lines are as follows:

a) Refurbishment of existing line by use of rail poles / joist / Spun Poles / Double Pole (DP) structure,

- b) Introduction of additional poles in between span*
- c) Conversion of overhead lines to underground cable system at 33 kV and 11kV level in urban areas located within 20km of coast line and similar action to be taken in stages for areas located beyond 20km & up to 60km based on importance of connectivity with load centres*
- d) Use of epoxy-based paint coating for protection against corrosion of steel structures*
- e) Installation of distribution transformer on plinth mounted structure*
- f) Use of Aerial Bunched cable for 11kV & LT overhead lines “*

7.5.3 Height enhancement of the lines at river crossing:

10 Nos of locations have been identified wherein existing clearance of overhead Conductors above river water line is very low. As a result, during flood conditions, these lines are required to be shut down considering safety of general public at large. Accordingly, increasing the height of overhead conductors at 6 Nos of locations in FY23 is planned.

7.5.4 Strengthening of poles in the cyclone prone area:

During the field visits it has been observed that most of the poles do not have the muffing around it and not installed properly at the time of installation. Due to which these are very prone to damages even in mild storm which are frequent in the TPNODL area. Based on the recommendations of above mentioned Task force (extract given below), it is proposed to strengthen the OH lines by 1) installation of Spun Poles 2) providing additional poles in between span, and 3) Muffing around the pole. The necessary approvals for installation of Spun Poles from competent authority (EIC) is in place.

Extract of “Task force on Cyclone Resilient Robust Electricity Transmission & Distribution (T&D) Infrastructure in Coastal area” is as below:

“Ref “Executive summary, page 6

The measures recommended for existing Distribution lines are as follows:

- a) Refurbishment of existing line by use of rail poles / joist / Spun Poles / Double Pole (DP) structure,*
- b) Introduction of additional poles in between span*
- c) Conversion of overhead lines to underground cable system at 33 kV and 11kV level in urban areas located within 20km of coast line and similar action to be taken in stages*

for areas located beyond 20km & up to 60km based on importance of connectivity with load centers .

7.5.5 Trolley Mounted/ mobile Pad Transformers for fast restoration:

Mobile trolley mounted Pad substations can rapidly restore electrical service. Compact and easy mobility for emergency Service, forced outage repairs, temporary service restoration and regularly scheduled maintenance. Mobile substations are designed to withstand the road travel requirements and maximum stability and protection for safe movement over uneven pavement. Supply interruption for this considerable amount of time leads to customer dissatisfaction apart from loss of MUs that would have been consumed. Inclusion of some Trolley mounted Pad substations will lead to Flexible and faster temporary restoration. Total time for restoration is equal to that required to move the trolley at the location and to connect the HT and LT jumpers

In this proposal, TPNODL intends to procure 10 Nos. 500 kVA new trolley mounted Pad Substations on priority basis.

In this scheme, TPNODL proposes use of trolley mounted Pad substations to make the process of immediate power restoration at the time of natural calamities like storms and cyclones more flexible.

1. This will reduce the restoration time, apart from lowering the requirement of man-hours.
2. Faster power restoration at time of DT failure and disaster.
3. Public Safety
4. Lesser Road Congestion

7.5.6 O/H to U/G conversion of major cities:

As underground network is the most reliable as compare to O/H lines, conversion from overhead to underground lines are proposed to provide the reliable power to the important/ critical load during the cyclone period as well as normal days. The recommendations from report of “Task force on Cyclone Resilient robust T&D infrastructure in coastal area” are considered while keeping provision for conversion to underground cables of critical 33 and 11 KV O/H lines feeding District Headquarters. Accordingly, detailed studies are undertaken for Balasore and Bhadrak city, within 20 Km from sea coast. Provision for next four years is envisaged under this activity. (refer table below).

Budgetary provision spread over 4 years (in Rs Crs)				
Project title	FY23	FY24	FY25	FY26
O/H to U/G conversion for Disaster prone cities.	20	20	20	10

Extract of “Task force on Cyclone Resilient Robust Electricity Transmission & Distribution (T&D) Infrastructure in Coastal area” is as below:

“Ref “Executive summary, page 5:

The measures recommended for existing Distribution lines are as follows:

- a) Refurbishment of existing line by use of rail poles / joist / Spun Poles / Double Pole (DP) structure,*
- b) Introduction of additional poles in between span*
- c) Conversion of overhead lines to underground cable system at 33 kV and 11kV level in urban areas located within 20km of coast line and similar action to be taken in stages for areas located beyond 20km & up to 60km based on importance of connectivity with load centers.*
- d) Use of epoxy-based paint coating for protection against corrosion of steel structures*
- e) Installation of distribution transformer on plinth mounted structure*
- f) Use of Aerial Bunched cable for 11kV & LT overhead lines “*

7.5.7 Emergency Preparedness (Life boat and other emergency accessories)

Balasore, Bhadrak and Jajpur districts are affected by flood, cyclone and water logging during rainy season every year. It is very difficult to manage maintenance work to restore power supply in those area. Sometimes it is impossible to reach the electric poles for restoration of power due to flow of water. To manage such emergency situations required power life boat, life buoy, rope ladder, life jacket, emergency chargeable lights, walky talky, flood light, portable engine with winch machine.

During Cyclone, National Disaster Relief Force (NDRF) provides the life boats for evacuation of the general people at large at the time of cyclone. The restoration activity starts after the cyclone is over and by that time NDRF team are no longer available. TPNODL teams have to navigate through flooded fields with equipment. In view of the same, it is proposed to have provision of lifeboats under the capex plan. The life boats will be located at Strategic locations.

7.5.8 CAPEX Summary for Disaster Mitigation:

S. No.	Major Category	Activity	Amount	Annexure
5	Disaster Mitigation	Conversion of 2nos PSS from AIS to GIS	20.40	Annexure- 30
		Conversion pole mounted DTR to plinth mounted (100 KVA and above)	3.52	Annexure- 31
		Height enhancement of the lines at river crossing	4.50	Annexure- 32
		Strengthening of poles in the cyclone prone area	2.40	Annexure- 33
		Trolley Mounted Pad Substations	2.34	Annexure- 34
		Overhead to Underground conversion for Major City	20.00	Annexure- 35
		Emergency Preparedness (Life boat and other emergency accessories)	1.80	Annexure- 36
		Total (5)	54.96	

7.6 Technology & Civil Infrastructure: Proposed Technology Transformation

Background – IT & OT commenced its journey in FY 22, the very first year of TPNODL, by initiating large scale computerization & digitalization efforts in the Company. For year 2021-2022, IT & OT was given Rs 67.75 Cr towards CAPEX by honorable Commission towards nine themes namely building Data Center (DC) Development Cost; IT Infrastructure Hardware Cost; End user Devices; Software Licenses and Applications; Communication Network; SCADA Implementation; GIS Implementation; and Smart Metering Infrastructure; Call Center Solution. The journey of IT & OT adoption, introduction of different technologies, began last year. The journey will continue to ensure large scale adoption across TPNODL, scale up the pilots which began in FY 2022 and train more and more people to the new initiatives and introduce path breaking applications built to take advantage of the new interventions so as to maximize the

Detailed Project Report Capex Plan FY 22-23

operational gains and efficiencies which would ultimately help reduce the AT&C levels and enhanced Consumer Experience.

Pillars for FY 23 – The proposed CAPEX plans for FY 23 revolve around the same themes which were introduced last year. The idea is to scale up, strengthen the existing by covering more consumer services, additional divisions and build redundancies in the schemes which have commenced operations in FY 22. The IT & OT CAPEX for FY 23 will have following five pillars:

- I. Augmentation of Data Center Hardware and communication network
- II. Software Licenses, Applications and Cyber Security practices
- III. End Computing Devices
- IV. Operation Technology Implementation of SCADA-ADMS & Automation of PSS
- V. GIS Software Implementation and GIS mapping of Land Base, Network and consumer indexing

The detail proposals are as follows:

7.6.1 Augmentation of Data Center Hardware and communication Network:

Augmentation of Data Center Hardware is required in order to cater the hosting various IT applications like MBC on FG system where under IPDS 100% consumers are not covered but it is pertinent to have 100% consumers on same CIS for uniform billing and it is proposed to enhance the storage, servers for CIS along with deployment of other IT applications and back up for protection for making the process of digital enablement and enhancing the services of consumers using various technologies interventions. Main data center for IT Applications is established in Bhubneshwar. However, Main OT Data Center is commissioned at Balasore. Proposal for various data center hardware is mentioned below.

Data Center Hardware

S. No.	Description	Qty	UOM
1	SAN Switch for storage for covering 100% consumers of TPNODL in CIS	2	EA
2	SAN Storage 100 TB for covering 100% consumers of TPNODL in CIS	1	EA

Detailed Project Report Capex Plan FY 22-23

S. No.	Description	Qty	UOM
3	DB Server for various application & implementation of Biometric attendance system.	1	EA
4	IT Infra along with OS/DB Licences for GIS software	1	EA
5	Gateway Firewall at Data center for data protection	2	EA
6	Core Switch 48 Port, L3 for connecting server farms	2	EA
7	EMS/NMS Server with Network Operation Console	2	EA
8	Backup Disc base Appliance for back up of data	1	EA
Total			

The sum total proposal for all mentioned above one theme is described as below:

Data Center Hardwar	Amount in Rs Cr
Augmentation of Data Centre Hardware and application	10.33

Benefits

- I. Augmentation of Datacenter infrastructure to cover new IT & digital services for employees and consumers.
- II. Augmentation of IPDS data center for will result in an integrated approach to ensure commonality of applications and maximum utilization of physical as well as human resources.
- III. Centralized Data Center for pan TPNODL

7.6.2 Software Licenses and Applications:

Under IPDS, Billing system & ERP has been installed through M/s Fluent Grid but system was covered for limited consumers but it is very important to cover 100% consumers under same billing system. To continue with same billing system, we need to invest on additional licenses through M/s Fluent Grid in FY 23.

To enhance the digital enablement for employees and consumers for providing services in terms of e-governance of processes and mobile app for consumers, we need to develop and host various applications for our each function like operation, HR, Projects, and Contracts etc. where users can work through various applications for providing faster and better services to our consumers. To make this enable and hosting various developed applications, it is required to invest on various software licenses like DB licenses, Active Directory licenses for monitoring and controlling of users and management of various applications through single sign on, NMS/EMS licenses for applications monitoring and user management.

Proposal for Software licenses and various applications deployment is mentioned below

Detailed Project Report Capex Plan FY 22-23

S. No.	Description	Qty	UOM
1	MBC software licences for additional consumers to cover 100% TPNODL area	1	EA
2	DB License (SQL for developed Application)	8	EA
3	EMS /NMS solution	2	EA
4	Additional Active Directory licences and single sign on for new users of TPNODL	700	EA
5	Visual Studio	15	EA
6	Oracle DB + Partition + Cluster Licences for reports & MIS	1	EA
7	Backup Software	1	EA
8	Other Technologies	1	EA
9	E-Governance Software for e-digital process enablement at TPNODL offices.	1	EA
10	Mobile App for TPNODL Consumers through third party	1	EA

Cyber security Software and practices:

For enhancing cyber security measures and for compliance to cyber security guidelines published by Ministry of Power, Government of India, necessary infrastructure is proposed to be invested for protection of various deployed applications and connecting users through secured communication link from their offices to data center.

There is also a requirement to have a dedicated separate network for OT (SCADA/ADMS) but integration of OT network with IT network is required for various information flow to our front team to get the details and intimating to our consumers, this can be protected through firewall level between IT & OT network.

Proposal for Cyber security software is mentioned below

S. No.	Description	Qty	UOM
1	Enterprise SIEM	1	EA
2	MPLS firewall	2	EA
3	IT&OT firewall	1	EA

Detailed Project Report Capex Plan FY 22-23

The sum total proposal for all mentioned above two themes are described as below:

Software Licenses and Applications	Amount in Rs Cr
Software Licenses and Applications	12.66
cyber security measures	1.20

Benefits

- I. Compliance of cyber security guidelines published by MoP will ensure safety of IT/OT applications and data.
- II. CIS application shall be used for MBC activities of entire TPNODL. CIS ensures digitization of the entire MBC process leading to accuracy and transparency.
- III. Penetration of digital services to provide the information faster to our consumers and bringing agility in employees for faster work and deliver up to data services to the consumers.
- IV. Office will be connected through secured OFC.

7.6.3 End computing devices

In FY 22, TPNODL procured around 900 laptops, 300 Desktops for its offices under executive cadre and important persons under non-executive cadre. With more and more penetration of new digital services and new joining in the organization, it is required to have the system for new joining as well as existing staff who have not got the system so far but they will be trained and work on applications through system.

In addition to the system, there are various other software which are required on end devices like MS Office, Antivirus, pdf reader, Printers etc.

In the current pandemic, it is very important to maintain social distancing and connect each other through digital platform. For this video conferencing is the most effective when offices connect through proper system. So, video conferencing system is required at major offices like Circle and division

Proposal for end computing devices is mentioned below

S.No	Description	FY22-23	
		Qty	UOM
1	Laptops with OS	700	EA
2	Microsoft office for New Laptops for Point No. 1	700	EA

Detailed Project Report Capex Plan FY 22-23

3	Microsoft office for IPDS supplied desktop (MS Office was not part of the IPDS deliverables)	340	EA
4	Anti Virus	700	EA
5	Adobe Licences	40	EA
6	Printer for offices	100	EA
7	Plotter for GIS	1	EA
8	High End Printer for GIS	2	EA
9	MS Project	10	EA
10	Video Conferencing System	25	EA

The summary of prices of end computing devices is mentioned below:

End Computing Devices	Amount in Rs Cr
End Computing devices along with MS licenses, Antivirus, Adobe, Printer, plotter etc.	8.96
Total	8.96

Benefits

- I. Enhancing the reach of computerization across the organization
- II. Build a culture of following online processes and less of paper movement
- III. Availability of end user computing devices up to last level like section for proper use of various IT applications towards more effective and transparent execution of business processes.
- IV. Build a more robust and reliable communication platform based on our own network as an alternate to cell phone communication
- V. Enable seamless real time communication across TPNODL
- VI. End user computing devices will enable use of IT applications up to section level. Operating System Licenses shall be needed for the functioning of the end user devices.

7.6.4 Operation Technology Implementation of SCADA-ADMS & Automation

OpCenEx has been set up with the best of operation technology-SCADA to monitor and control the 33KV/11KV network operations. Hon'ble Commission has approved Rs.2.55Cr for implementation of Mini SCADA in FY 21-22.

However, we have also initiated to implement Main SCADA/ADMS. Supervisory Control and Data Acquisition (SCADA) & Advanced Distribution Management System (ADMS) are the software system through which TPNODL intends to monitor the 33 / 11 kV Primary Sub Station (PSS) and its electrical network topology on real time basis to ensure the network reliability and power availability through proactive remedial actions and necessary analysis for making the system robust and reliable to serve electric power to their consumers. Further, down the line,

Detailed Project Report Capex Plan FY 22-23

ADMS will be monitoring up to consumers outages through its integration with GIS and CRM. Will initiate the remedial action to restore the supply and trigger to network planner to strengthen the areas to improve reliability and quality of power.

We initiated for procurement of SCADA/ADMS as we have already put up petition to Hon'ble commission for investment and it has been agreed by Hon'ble commission to initiate the procurement and put the proposal in FY 23. Hence, proposal is put up for investment.

SCADA-ADMS

S. No.	Item	Qty	UOM
1	SCADA - Hardware, Software, Project Implementation, Training & etc	1	EA
2	ADMS - Hardware, Software, Project Implementation, Training & etc	1	EA

Currently, there are 226 numbers of 33/11 kV substations in TPNODL areas out of which 30 PSS is considered to be automated in FY of 21-22. In FY 22-23, total 75 PSS (Non ODSSP PSS - 55 ODSSP + 20 Old) is considered to be covered under automation. Similarly, in subsequent year, we will put for automation of left out PSS to cover up 100% PSS.

Automation of non ODSSP PSS (Non ODSSP PSS - 55 ODSSP + 20 Old)

S. No.	Item	Qty	UOM
1	RTU/Data Concentrator (Old)	25	Nos
2	BCPU/Relays	210	Nos
3	Master Trip Relay/Aux Relays	450	Nos
3	Ethernet Switch (12/24 Port)	80	Nos
4	Miscellaneous Items (Converter, transducers, Cable, Conduit etc)	80	Nos
5	Router	80	Nos
6	Earthing (2 no pit per RTU panel)	80	Nos
7	Fire Alarm	80	Nos
8	Integration support for ODSSP PSS	55	Nos
9	33KV Control Relay Panel for Transformer	30	Nos
10	33kV and 11KV Control relay Feeder panel	65	Nos
11	Revamping of Old control panels (as life enhancement) & integrating with SCADA	90	Nos

Detailed Project Report Capex Plan FY 22-23

The proposal for 2 themes is as follows

Operation Technology Implementation of SCADA-ADMS & Automation	Amount in Rs Cr
SCADA-ADMS	18.09
Field Automation including switch, fire alarm, RTU & etc.	15.31

Benefits

- I. Adoption of very strong integrated automated application for pan TPNODL area
- II. Ensure secured and much better services to customers.
- III. Integrated and secure processes with strong access control of PSS
- IV. Monitoring of PSS network assets.
- V. Ensure customer delight and effective solutions for addressing needs
- VI. Enhanced user experience with extensive standard features & functionalities
- VII. Standardized process workflow across organization
- VIII. Centralized data base for synchronized data.

7.6.5 GIS Software Implementation and Land Base & Network Survey & Digitization for Balasore & Jajpur Circle

TPNODL is implementing GIS system to have better asset management and its topology which will further facilitate to implement OT technologies by integrating with GIS. System once implemented will strengthen various other business processes viz. energy audit process, technical feasibility, dues verification, network planning. GIS will be backbone for Electrical linear and nonlinear asset repository as well as its connectivity topology. Being a large geography, GIS will be implemented in parts:

For the FY 21-22 budget of 3 cr. was approved by OERC, however, we have submitted prayers for enhancement of budget later OERC has consented to go ahead with GIS subject to keeping the overall budget of 7.91 cr. within the approved limit and put the additional requirement in FY 22-23 budget.

In FY 22-23, it is proposed to implement the GIS in two Circle namely Balasore & Jajpur and remaining Circles will be considered in scope in the upcoming financial year. Also we have planned to procure pan TPNODL satellite image as it will help to create seamless data along

Detailed Project Report Capex Plan FY 22-23

with this scope covers survey and capturing of Landbase, network and consumer data base as per actuals from the field.

GIS implementation for Balasore & Jajpur Circle

Sr.No	Item	Quantity	Unit
1	Procurement of satellite image for Base map creation of pan TPNODL	28000	Sq Km
2	Software licences with warranty for new divisions	1	Lot
3	Google Map Plugin to view Google Images in GE Smallworld	2	No
4	Lanbase Survey and mapping of Balasore & Baripada Circle	6600	Sq Km
5	GSS & PSS Survey and mapping	110	No
6	33 Kv Line Survey and mapping with assets	1100	Km
7	11Kv Line Survey and mapping with assets	15000	Km
8	LT Network Survey and mapping with assets	27000	Km
9	Asset Numbering and Pole Painting	897000	No
10	Consumer indexing	850000	No
11	Migration / Updation	6600	Sq Km
12	Deployment of Surveyor	2	No
13	Deployment of Digitizer	1	No
14	GPS enabled Mobile/Tablets(10" screen & latest OS) for Delta Updation	2	No

The proposal for 1 scheme is as follows

GIS Software Implementation and Land Base & Network Survey & Digitization for Balasore & Jajpur Circle	Amount in Rs Cr
GIS implementation of two Circle Balasore & Jajpur along with land base, network & consumer survey	35.87

Benefits

- IX. Adoption of very strong integrated application landscape for enterprise wide implementation
- X. Pan TPNODL satellite image will ensure seamless landbase data creation with completely matched edge between the circles
- XI. Ensure secured services to customers to safe guard the confidentiality, integrity and availability of IT systems
- XII. Integrated processes with strong access control

- XIII. Drive the culture of safety and ethics among the workforce and all stakeholders
- XIV. Ensure customer delight and effective solutions for addressing needs
- XV. Stringent data integrity to avoid any revenue leakage
- XVI. Increased Billing and collection efficiency
- XVII. Enhanced user experience with extensive standard features & functionalities
- XVIII. Standardized process workflow across organization
- XIX. Centralized data base for synchronized data.
- XX. Enhanced integration and automation capabilities with Non-SAP applications
- XXI. Using SAP standard capabilities combined with customer presentment platforms for a delightful customer experience

7.6.6 Civil Infrastructure

TPNODL currently have offices in all the five circles and subdivisions. Some of them are owned and about 40% offices are on rented property. TPNODL is facing challenge while accommodating additional new employees in current office buildings and infrastructure. The current existing infrastructure are old and needs modernization to provide hygienic, well ventilated and spacious work environment. These office locations are touch base points between end consumers and utility. Hence, aesthetic along with safety of each stakeholders needs to be focused. To ensure above it is proposed to carry out civil infrastructure of designated offices in phase manner.

Up gradation of Road and Offices:

It is observed that various Grid Sub Stations, access road needs repair and strengthening along with drainage system. In addition, it is required to complete structural rehabilitation and refurbishment of existing Offices/ Control Rooms. The area grading/ leveling, repairs to existing cable trenches and trench covers needs to be done for maintaining safety during operation. During rainy season road condition further, worsen.

Following activities are planned to improve the civil infrastructure:

1. Repair/ New wash room construction for substation.
2. Additional Material Storage area
3. New Store building /storage yard

4. New Building for Division/ Subdivision Section/Commercial Office
5. Refurbishment of old building for office at various location
6. Approach road of Offices and PSS

Renovation of various office buildings

Office building including the corporate office & all field offices upto the section level which are in dilapidated conditions will be completely renovated to increase their usable life. Further the existing furniture which are in poor condition will be replaced by modern workstations, cabins, etc.

Remodeling & Creation of Additional Workspaces in various office buildings.

The office buildings upto Division offices need to be remodelled to create additional space for accommodating the new recruits, provisions for conference rooms, canteens, visitors lounge, etc.

Record rooms

Record rooms of Structural Steel and covered with Percolated Sheets will be set at each circle with "State of the Art" provision of storage, protection, fire proofing, mass scanning, bar coding of all records & files for easy access to employees.

Cafeteria Canteen

Canteen facilities are the necessity of satisfying employees with a better range of foods and healthy options. Workplace canteens need to provide with options to cater for lunch with meals or light breakfast items and fruit or snacks for mid-afternoon along with tea/ cold drinks/ coffee in order to promote healthy eating & refreshments for employees and stakeholders so as to ensure maximum focus of employees on their work without worrying about their meals.

7.6.7 Administration

In TPNODL, the office space is currently crowded and haphazardly planned for seating arrangements, moreover, most of the circulation area has been occupied with files, documents etc. Some of offices are owned and others are on rented property.

The challenges exist in TPNODL using current buildings and infrastructure is to accommodate more employees and providing a hygienic, well ventilated, and spacious working environment to them.

Detailed Project Report Capex Plan FY 22-23

To provide best in class services to consumers, earn consumer delight, and improve satisfaction among other stakeholders and maintaining a clean & safe working environment, following infrastructures are required at above stated workplace.

- ❖ **Office air conditioning systems** are required to provide a comfortable working environment to bring and control Energy Efficiency, Humidity, Air Quality, and Reduction in Noise & Keeping Business Critical Equipment at the Right Temperature.
- ❖ **Water cooler & Purifiers** are required for proper hydration employees and to ensure good health and improve overall efficiency. An employee should drink at least eight glasses of water a day to be properly hydrated as Water increases the amount of blood flow and oxygen to the brain and other body parts which in turn increases brain activity and attentiveness
- ❖ **Tables and Ergonomic office chairs** for sitting long periods with ease. This naturally helps employees work more efficiently and productively. Another benefit is reduction in healthcare expenses related to poor posture from unsuitable office chairs.
- ❖ **Photocopier machines** to offer a fast and easy way of getting single or multiple copies of documents & Improves Functionality of businesses.
- ❖ **Projector and Display screen:** Required in different office to project the data to the team for better understanding during the meetings.

7.6.8 CAPEX Summary for Technology and Civil Infrastructure

S. No.	Major Category	Activity	Amount	Annexure
6	Technology & Civil Infrastructure	DC Hardware	10.33	Annexure- 37
		Software Licenses for IT Application	12.66	Annexure- 38
		End computing devices	8.96	Annexure- 39
		Cyber Security	1.20	Annexure- 40
		Automation of non ODSSP PSS	15.31	Annexure- 41
		SCADA-ADMS	18.09	Annexure- 42
		GIS Software Implementation and Land Base & Network Survey & Digitization for Balasore & Jajpur Circle	35.87	Annexure- 43
		Civil Infrastructure (Office Buildings , PSS, Stores, Approach Roads, Record room , Cafeteria Canteen , MRT office and others)	25.12	Annexure- 44
		Security cameras and heavy duty Racking system / Storage solutions for the store	0.96	Annexure- 45
		Offices Equipment	3.93	Annexure- 46
	Total (6)	132.43		

Annexures

8.1 Annexure1- Sample Photographs related to depilated network & civil infrastructure









8.2 Annexure 2 CEA regulations

CEA regulations (Measures relating to Safety and Electric Supply – 2010)

41. Connection with earth-

The following conditions shall apply to the connection with earth of systems at voltage normally exceeding 125 V but not exceeding 650 V, namely: -

(i) neutral conductor of a 3-phase, 4-wire system and the middle conductor of a 2-phase, 3-wire system shall be earthed by not less than two separate and distinct connections with a minimum of two different earth electrodes or such large number as may be necessary to bring the earth resistance to a satisfactory value both at the generating station and at the sub-station.

(ii) Neutral conductor shall also be earthed at one or more points along the distribution system or service line in addition to any connection with earth which may be at the consumer's premises.

58 (1) No conductor of an overhead line, including service lines, erected across a street shall at any part thereof be at a height of less than—

- For lines of voltage not exceeding 650 volts—5.8 meters
- For lines of voltage exceeding 650 volts but not exceeding 33 kV-6.1 metres

58 (2) No conductor of an overhead line, including service lines, erected along any street shall at any part thereof be at a height less than—

- For lines of voltage not exceeding 650 volts—5.5 metres
- For lines of voltage exceeding 650 volts but not exceeding 33 kV—5.8 meters

58 (3) No conductor of an overhead line, including service lines, erected elsewhere than along or across any street shall be at a height less than—

- For lines of voltage up to and including 11000 volts, if bare----4.6 meters.
- For lines of voltage up to & including 11,000 volts, if insulated—4.0 meters.
- For lines of voltage exceeding 11,000 volts—but not exceeding 33 kV----5.2 meters.

60. Maximum interval between supports-

All conductors shall be attached to supports at intervals not exceeding the safe limits based on the ultimate tensile strength of the conductor and the factor of safety specified under regulations 57. Provided that in the case of overhead lines carrying conductors of voltage not exceeding 650 V when erected in, over, along or across any street, the interval shall not, without the consent in writing of the Electrical Inspector, exceed 65 meters.

69. Lines crossing or approaching each other and lines crossing- Street and road.

ii) Guarding shall be provided where lines of voltage not exceeding 33 kV cross a road or street.

(iii) Where an overhead line crosses or is in proximity to another overhead line, guarding arrangements shall be provided so to guard against the possibility of their coming into contact with each other.

69. Guarding-

(1) Where guarding is required under these regulations the following shall be observed namely:

- a) Every guard-wire shall be connected with earth at each point at which its electrical continuity is broken.
- b) Every guard-wire shall have an actual breaking strength of not less than 635 kg and if made of iron or steel, shall be galvanized.
- c) Every guard-Wire or cross-connected systems of guard-wires shall have sufficient current-carrying capacity to ensure them rendering dead, without risk of fusing of the guard-wire or wires, till the contact of any live wire has been removed.

72. Earthing-

- 1. All metal supports and all reinforced and pre-stressed cement Concrete supports of overhead lines and metallic fittings attached thereto, shall be either permanently and efficiently earthed by providing a continuous earth wire and securely fastening to each pole and connecting with earth ordinarily at three points in every km with the spacing between the points being as neatly equidistant as possible or each support and the metallic fitting attached thereto shall be efficiently earthed.
- 2. Metallic bearer wire used for supporting insulated wire of overhead service lines of

voltage not exceeding 650 V shall be efficiently earthed or insulated.

3. Each stay-wire shall be similarly earthed unless insulator has been placed in it at a height not less than 3.0 metres from the ground.

Statutory guidelines (CEA – Technical Standards for Construction of Electrical Plants and Electric Lines,2010) in respect of Lines and its associated Poles and Towers, Span Length, Erection of Poles, and Stay.

95. Supports (Poles and Towers)-

1. The supports shall be poles or narrow based lattice towers with fully galvanized structure as per site requirement.
2. Poles may be used for 33 kV, 22 kV, 11 kV and LT lines (lines below 500 V) as per requirement. The poles shall be pre-cast concrete (PCC) pole, pre-stressed cement concrete (PSCC) pole, steel joist, rail pole or steel tubular pole as required, provided PCC and PSCC poles shall not be used at cut-points and as end poles.
3. Poles shall conform to relevant IS as the case may be.
4. Concrete poles shall be preferred in plain areas.
5. In hilly areas appropriate snow or ice loading shall be considered for design of poles and towers.
6. For locations involving long spans or higher clearances on account of crossing of power or communication lines or a railway line, specially designed poles/lattice towers may be used.
7. For angles of deviation of more than 10-degree, double pole structure shall be used.
8. The height of the pole above the ground level, length of pole below ground and working load shall be decided taking into consideration wind zone, terrain, topography, and the statutory clearances required to be maintained and these shall conform to relevant IS.

96. Line Span-

1. Line span shall be decided taking into consideration topography, wind pressure, type of support, conductor configuration and ultimate tensile strength of conductor.
2. The span shall be within the range specified by IS.
3. Uniform span shall be maintained as far as possible between consecutive pole structures.
4. While constructing a line, if a road crossing occurs at mid span, then a pole shall be placed on one side of the road so as to avoid mid span at the road crossing.
5. While crossing another power line, the lower voltage line shall be underneath. The lower line shall normally not cross at mid span of the upper line.
6. While placing poles on high ground, shorter poles can be used while maintaining proper ground clearance at the middle of the span.
7. Poles shall normally not be placed along the edges, cuts, or embankments of creeks and streams.
8. At all the places where the new line crosses over roads or another existing line, adequately earthed guard wire mesh below the line shall be provided to avoid the conductor of the new line falling over the areas below, in case of any break. In cases where the line passes below an existing line, the guard wire mesh shall be provided above the new line under construction.

97. Erection of Poles-

Erection of poles shall be carried out in accordance with the provisions of relevant IS.

98. Factor of Safety-

The supports shall be suitable for the wind loads as per relevant IS. The minimum factor of safety for supports shall be as per Central Electricity Authority (Measures Relating to Safety and Electricity Supply), Regulations as and when these are notified by the Authority.

100. Stay Arrangements-

1. To prevent tilting of a pole from its normal position due to abnormal wind pressure and deviation of alignment, the pole shall be kept in position by stays. The stays shall be provided at:

- a. Angle locations.
 - b. Dead end locations.
 - c. Tee off points.
 - d. Steep gradient locations.
 - e. cut- point.
 - f. Along the straight run at minimum two locations in 1 km.
2. Galvanized iron stay wires and stay rods of adequate size shall be used. The individual wire used to form "stranded stay-wire" shall have a minimum tensile strength complying with relevant IS. For double pole structure, four stays along the line, two in each direction and two stays along the bisection of the angle of deviation or as required depending on the angle of deviation shall be provided.
 3. When two or more stays are provided on the same pole, each stay shall be grouted entirely separate from the other.
 4. The angle between the pole and stay wire shall be about 45 degrees and in no case it shall be less than 30 degrees. .
 5. Stays shall be anchored by either providing base plates, angle iron or rail.
 6. Stay wires shall be connected to the pole with a Porcelain Guy Strain Insulator. The standard Guy Strain insulators shall be as per relevant IS. The Porcelain insulator shall be inserted in the stay wire at a height of minimum 3 m vertically above the ground level. The strain insulators shall be free from defects, thoroughly vitrified and smoothly glazed.
 7. Wooden insulators shall not be used for stay/guy wire.

99. Earthing of Poles-

1. All metallic supports shall be permanently and effectively earthed. The Earthing arrangement shall conform to relevant IS.
2. Metal cross arms and insulator pins for PCC and PSCC poles shall be bonded together and normally earthed at every pole for 33 kV or 22 kV or 11 kV lines and at every 5th pole for lines below 500 volts.
3. The support on each side of a road crossing, railway crossing or river crossing shall be earthed.

4. Normally coil Earthing shall be provided except for locations involving railways, telegraph line, power line crossings and special structures where pipe/rod type Earthing shall be provided. Whenever the electric lines pass close to a well or a permanently moist place, an earth should be provided in the well or the marshy place and connected to the electric line pole.
5. All steel poles on which switches, transformers, fuses etc. are mounted shall be earthed.
6. All poles above 650 volts, irrespective of inhabited areas, shall be earthed. For poles below 650 V guarding with continuous earth-wire shall be provided invariably, connected to earth at three equidistant points in one km.

101. Protective Guard-

Guard wire shall be used where an overhead line crosses or is in proximity to any telecommunication line or any other overhead line and in populated localities. Every guard wire shall be connected to earth wherever its electrical continuity is broken. The minimum factor of safety for stay wires, guard and bearer wires shall not be less than 2.5 based on ultimate strength of the wire.

71. Fencing and Approach Arrangement-

Fencing shall be provided around the sub- station. A metalled approach road to transport the equipment should be provided leading from the main road.

77. Transformer Mounting Structure-

1. The transformer shall be mounted on a single pole, H pole structure or on a plinth depending upon site requirements, size and weight of the transformer.
2. Direct single pole mounting shall be used for transformers up to 25 kVA only.
3. The transformers of more than 25 kVA and up to 250 kVA can be mounted on H pole structure or on plinth. Transformers above 250 kVA shall be mounted on plinth only.
4. The structures shall be provided with anti-climbing devices and danger board.
5. The plinth shall be higher than the surroundings. The plinth foundation shall

be of concrete.

6. Plinth mounted distribution sub-stations shall be adequately protected by fencing so as to prevent access to the equipment by unauthorized persons, animals and shall be provided with standard danger boards. The enclosure shall permit free circulation of air on all sides.

8.3 Annexure 3 Cost Estimate for Fencing of Distribution Substations

S.NO.	Brief Item Description	Quantity	Unit	Rate	Amount
1	Excavation in all types of ordinary soils / hard murrum including all necessary permissions, depositing / stacking of all materials, removal of vegetation, backfilling with excavated earth in layers, well-watered, compacted, transporting of surplus excavated material for backfilling or stacking or spreading or removal of surplus excavated earth within a basic lead of 100 mtrs as directed for a depth from 0.0 to 1.5 mtrs	408	M3	250	102000
2	Providing and laying 225 or 300 mm thick dry rubble soling with approved quality stones including filling gaps with small chips ramming with hand rammer etc. complete.	157	M3	2000	314000
3	Supplying, Providing and laying in position plain cement concrete of grade M15 machine mixed, vibrated and placed to correct line and level in levelling course/fill under or around foundations pits, slabs on grade, sumps, soak pits, etc. at any depth with 30 mm downgraded coarse aggregates including curing, compacting, de-watering wherever necessary, providing marine plywood shuttering, form work, steel scaffolding wherever required etc. complete. (Min cement content 300 Kg/m3)	51	M3	6000	306000
4	Supplying, Providing and laying in position plain cement concrete of grade M15 machine mixed, vibrated and placed to correct line and level in bedblocks/ concrete blocks, coping, etc. at any depth with 30 mm downgraded coarse aggregates including curing, compacting, de-watering wherever necessary, providing marine plywood shuttering, form work, steel scaffolding wherever required etc. complete. (Min cement content 300 Kg/m3)	82	M3	6500	533000

Detailed Project Report Capex Plan FY 22-23

5	Providing all material and constructing brick masonry 230 mm. thick and above in cement mortar (1:5) using approved quality class 50 conforming to IS:3102 table moulded bricks, including leaving inserts / pockets, steel scaffolding, curing, raking joints, etc.	196		6000	1176000
6	Providing and plastering external surfaces of concrete and brick work such as walls, columns, beams, coping etc. with cement mortar 1:4 mix finish smooth with 1:1 proportion cement & slaked lime neeru / instant neeru, including providing and erecting steel scaffolding, hacking concrete surface, providing bands, grooves drip moulds, curing, etc - 12 mm thk	1326	M2	350	464100
7	Providing steel and supplying all material, fabricating and erecting structural steel work at all heights including steel scaffolding for roof trusses, purlins, beams, columns, posts for gates, chequered plate flooring, treads, risers, stringers, bracings, runners etc. at all heights including welding and gas cutting, drilling of holes etc. complete as per the approved drawing or as directed. Contractor shall use his own welding set, gas cutting set, gas, electrodes, drill machine and other accessories, required for carrying out the entire work. The rate shall include supply and fixing of MS bolts, and nuts, and washers and applying one coat of Shalimar or any other approved make red oxide (primer) paint to all the exposed surfaces of steel including applying synthetic enamel paint of approved make over one coat of primer. Structural steel section shall be of primary manufacturer and confirm to IS2062 requirements	24.65	MT	89890	2215788.5
8	Providing and fixing reinforced barbed wire tape (RBT) (2.6mm) thick single wire along the boundary wall / fencing on angle iron post with all necessary fitting such as welding of nuts, bolts, clips, split pins, steel scaffolding, TSP & labour etc.complete.	5100	M	30	153000
9	Providing all the materials including binding wires, cleaning, bending, cutting, hoisting, placing in position, lapping and binding with 16 SWG annealed soft iron wire or tack welding reinforcement steel for all types of RCC / Precast work irrespective of locations & levels all as per drawings including handling and transporting from site stores, steel scaffolding complete as directed by using High yield strength deformed bars conforming to IS 1786 - HYSD Bars	2.785	MT	75000	208875

Detailed Project Report Capex Plan FY 22-23

10	Providing cartage service and transporting, excavated soil, debris, bricks, concrete, scrapwood including loading and unloading and disposing off to dumping sites approved by statutory bodies outside premises including submission of relevant documents, as applicable outside the station premises . (Note. Payable measurement shall be dismantelled qty. (Voids to be deducted as applicable whenever heap / truck measurements are taken))	325	M3	450	146250
11	Providing , stretching and fixing Galvanised Iron chain link fencing 2" square and of gauge 10 (bare metal thickness) on angle posts with heavy duty GI split pins etc. in position complete as directed at all Heights including steel scaffolding.	4250	M2	400	1700000
12	Stretching and fixing chain link fencing 2" square and of gauge 10 (bare metal thickness) on angle posts with heavy duty GI split pins etc. in position complete as directed at all Heights including steel scaffolding. (Only Chain link shall be supplied by the Owner).	4250	M2	200	850000
13	Providing, Fabricating and erecting MS gates consisting of MS hollow rectangular or square box sections with 6mm to 8mm thk. MS joining plates, including welding of sections as per design approved by the Owner. Fabricating the framework with necessary hinges, locking arrangement including applying synthetic enamel paint of approved make over one coat of primer. Contractor shall use his own welding set, gas cutting set, gas, electrodes and other accessories, steel scaffolding required to complete the entire job. All hollow box steel section shall be of primary manufacturer and confirm to IS 4923 requirements	6.8	MT	89890	611252
				Total	8780265.5
			Add GST	18%	1580447.8
		Grand Total including taxes			10360713
	Cost for Total RM			1700	10360713
	Cost Per RM of fencing				6094.53
	Cost for 1 unit of 4 x4				97512.59
	Say for One Unit			Rs. Cr	0.0098
	Total Cost for 480 Unit			Rs. Cr	4.68

8.4 Annexure 4 Cost Estimate for Boundary wall for Primary substation

S.NO.	Item Description (Short Text)	Brief Item Description	UOM	Rate	Qty for RCC Frame Wall	Total Qty	Total Amount (Rs)
1	Exc Soil (1.5 m depth) M'bhanj/K'j har	Excavation in all types of ordinary soils / hard murrum including all necessary permissions, depositing / stacking of all materials, removal of vegetation, backfilling with excavated earth in layers, well-watered, compacted, transporting of surplus excavated material for backfilling or stacking or spreading or removal of surplus excavated earth within a basic lead of 100 mtrs as directed for a depth from 0.0 to 1.5 mtrs	M3	226.78	120.435	120.44	27312.78
2	P& L Rubble Soling M'bhanj/K'j har	Providing and laying 225 or 300 mm thick dry rubble soling with approved quality stones including filling gaps with small chips ramming with hand rammer etc. complete.	M3	1,930.00	19.78575	19.79	38194.7
3	RCC M25 for Raft footing M'bhanj/K'j har	Providing and placing to correct line and level, in position, machine mixed reinforced cement concrete RCC of grade M25 with required slump for Raft / footings at all levels including vibrating, curing, providing construction joints, leaving cutouts/ pockets, placing of inserts/ embedments, dewatering wherever necessary etc., complete all as per drawing, including cost of providing form work for all shapes (including steel plate/ply wood shuttering, strutting, steel scaffolding etc.), but excluding the cost of providing reinforcement, inserts / embedments, and as directed by the ENGINEER	M3	7,527.00	21.50625	21.51	161905.8

Detailed Project Report Capex Plan FY 22-23

4	RCC M25 for Col Ped Wall M'ghanj/K' har	Providing and placing to correct line and level, in position, machine mixed reinforced cement concrete RCC of grade M25 with required slump for Pedestals, columns, walls at all levels including vibrating, curing, providing construction joints, leaving cutouts/ pockets, placing of inserts/ embedments, dewatering wherever necessary etc., complete all as per drawing , including cost of providing form work for all shapes (including steel plate/ply wood shuttering, strutting, steel scaffolding etc.), but excluding the cost of providing reinforcement, inserts / embedments, and as directed by the ENGINEER	M3	7,720.00	11.16	11.16	86155.2
5	RCC M25 for Beam, slabs M'ghanj/K' har	Providing and placing to correct line and level, in position, machine mixed reinforced cement concrete RCC of grade M25 with required slump for Beams / slabs at all levels including vibrating, curing, providing construction joints, leaving cutouts/ pockets, placing of inserts/ embedments, dewatering wherever necessary etc., complete all as per drawing , including cost of providing form work for all shapes (including steel plate/ply wood shuttering, strutting, steel scaffolding etc.), but excluding the cost of providing reinforcement, inserts / embedments, and as directed by the ENGINEER .	M3	7,720.00	7.475	7.48	57745.6
6	PCC M10(levelin g course) M'ghanj/K' har	Supplying, Providing and laying in position plain cement concrete of grade M10 machine mixed, vibrated and placed to correct line and level in levelling course/fill under or around foundations pits, slabs on grade, sumps, soak pits, etc. at any depth with 30 mm down graded coarse aggregates including curing, compacting, de-watering wherever necessary, providing marine plywood shuttering form work wherever required etc. complete. (Min cement content 210Kg/m3)	M3	6,079.50	9.2325	9.23	56113.79

Detailed Project Report Capex Plan FY 22-23

7	PCC M15(levelin g course) M'bhanj/K'j har	Supplying, Providing and laying in position plain cement concrete of grade M15 machine mixed, vibrated and placed to correct line and level in levelling course/fill under or around foundations pits, slabs on grade, sumps, soak pits, etc. at any depth with 30 mm down graded coarse aggregates including curing, compacting, de-watering wherever necessary, providing marine plywood shuttering form work wherever required etc. complete. (Min cement content 300 Kg/m3)	M3	6,272.50	2.9348	2.93	18378.43
8	P&F HYSD Reinf Steel M'bhanj/K'j har	Providing all the materials including binding wires, cleaning, bending, cutting, hoisting, placing in position, lapping and binding with 16 SWG annealed soft iron wire or tack welding reinforcement steel for all types of RCC / Precast work irrespective of locations & levels all as per drawings including steel scaffolding, handling and transporting from site stores, complete as directed by using High yield strength deformed bars conforming to IS 1786 - HYSD Bars	TON	72,375.00	5	4.5	325687.5
9	P&L Brick Mas. Class 50 M'bhanj/K'j har	Providing all material and constructing brick masonry 230mm. thick and above in cement mortar (1:5) using approved quality, class 50 conforming to IS:3102 table moulded bricks, including leaving inserts / pockets, steel scaffolding, curing, raking joints, etc.	M3	6,272.50	36.432	36.43	228507.2
10	P&L18 thk plaster CM1:4 M'bhanj/K'j har	Providing all materials and carrying out sand faced plaster 18 mm thick in sigle layer and plastering external surfaces of concrete and brick work such as walls, columns, beams etc. with 1:4 cement mortar, including providing & erecting steel scaffolding, hacking of concrete surfaces, curing including bands, drip moulds, grooves, etc. complete with 2% Accoproof or approved waterproofing compound	M2	434.25	400	400	173700

Detailed Project Report Capex Plan FY 22-23

11	Ext Paint Plastic Emul. M'bhanj/K'j har	Providing all materials, tools tackles and labour, preparing the surface by scrapping / sand papering to remove loose scales, making the surface to receive exterior quality paint , Applying a coat of approved Primer and Two Coats of Paint. Including necessary scaffolding / staging etc. complete as directed. Paint shall be of First Quality Manufactured by Asian / Burger / Shalimar paints Exterior quality Plastic Emulsion paint	M2	212.30	400	400	84920
12	P&L Synthetic Enamel M'bhanj/K'j har	Providing all materials, tools tackles and labour, preparing the surface by scrapping / sand papering to remove loose scales, making the surface plain by applying putty, Applying a coat of approved Primer and Two Coats of Paint. Including necessary steel scaffolding / staging etc. complete as directed. Paint shall be of First Quality Manufactured by Asian / Burger / Shalimar paints Synthetic Enamel Paint	M2	212.30	6	6	1273.8
13	Sup/Fab/Ere ct Strl Steel M'bhanj/K'j har	Providing steel and supplying all material, fabricating and erecting structural steel work at all heights including steel scaffolding for roof trusses, purlins, beams, columns, chequered plate flooring, treads, risers, stringers, bracings, runners etc. at all heights including welding and gas cutting, drilling of holes etc. complete as per the approved drawing or as directed. Contractor shall use his own welding set, gas cutting set, gas, electrodes, drill machine and other accessories, required for carrying out the entire work. The rate shall include supply and fixing of MS bolts, and nuts, and washers and applying one coat of Shalimar or any other approved make red oxide (primer) paint to all the exposed surfaces of steel. Structural steel section shall be of primary manufacturer and confirm to IS2062 requirements	TON	86,743.85	0.696	0.7	60720.7

Detailed Project Report Capex Plan FY 22-23

14	P&F Rein Barb Wire M'bhanj/K'j har	Providing and fixing G I barbed wire of 10 guage along the boudary wall / fencing on angle iron post with all necessary fitting such as welding of nuts, bolts, clips, split pins, manpower etc.complete	M	33.78	700	700	23642.5
15	P&F Concertina Coil M'bhanj/K'j har	Providing and fixing concertina coil of 610 mm dia., 80 Nos. of circles, 200 Nos. of clips, hot dip galvanized. The wire shall be of 12 SWG tensile wire, covering 10 RM with one coil, each RM will have 8 Nos. of circles, including labour, fixing in position on existing V shaped angles including 2 nos. of guard wires and painting with 2 coats of Bus green paint complete at all heights including scaffolding.	M	458.38	100	100	45837.5
16	P&F MS Gate M'bhanj/K'j har	Providing, Fabricating and erecting MS gates consisting of MS hollow rectangular or square box sections with 6mm to 8mm thk. MS joining plates, including welding of sections as per design approved by the Owner. Fabricating the framework with necessary hinges, locking arrangement including applying synthetic enamel paint of approved make over one coat of primer. Contractor shall use his own welding set, gas cutting set, gas, electrodes and other accessories, steel scaffolding required to complete the entire job. All hollow box steel section shall be of primary manufacturer and confirm to IS 4923 requirements	MT	86,743.85	0.4	0.4	34697.54
17	Clearing Vegetation M'bhanj/K'j har	Clearing jungle including uprooting of rank vegetation, grass, brush wood, trees and saplings of girth upto 30 cm measured at a height of 1m above ground level and removal of rubbish upto a distance of 100 m outside of periphery of the area cleared.	M2	14.47	100	100	1447
						Total	1426240
						GST@18%	256723.2
						Grand Total	1682963
						Total Cost of one RM	16829.6
						Total Cost of 2940 RM	4.95

8.5 Annexure 5 Cost Estimate for Development of training infrastructure for safety & strengthening of LOTO System

S No.	Item Description	Quantity	Unit	TPNODL/ CDB Rates INCL GST	Total Amount
1	Development of training infrastructure for safety	5	No	3200000	16000000
2	Practice yard	16	No	762500	12200000
3	Strengthening of LOTO system set	230	No	10000	2300000
Total 251 No. LOTO System					30500000
Total (In cr.)					3.05

8.6 Annexure 6 Cost Estimate for Installation of AMR Meter at Distribution Transformer

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs)	Amount (in Rs)
1	SMART/IRDA METERS FOR DT METER DLMS COMPLIANT (FOR 200 KVA AND ABOVE TX)	2750	No.	2200	6050000
2	METER BOX WITH COMPOSITE RESIN CAST CT/RING CT & CABLE	2750	No.	6700	18425000
3	MODEM GSM FOR REMOTE METERING SYSTEM	2750	No.	1970	5417500
4	CABLE CONTROL 1.1KV CU 10CX2.5 SQMM ARM (10 M FOR EACH DT)	23650	M	200	4730000
5	METER INSTALLATION	2750	No.	1150	3162500
SUBTOTAL					37785000
GST 18%					6801300.00
CESS 1%					377850.00
Total of Estimate(K+L+M)					44964150.00
Inspection Fee					0.00
Drawing Approval					0.00
Grand Total					4,49,64,150.00
Total(In Crores)					4.50

8.7 Annexure 7 Cost Estimate for Conversion of LT Bare conductor to AB Cable

SL NO	Description	UOM	Qty	Amount in Cr.
A	4x95+1x95+1x16mm2 AB cable	Km	50	6.54
B	4x50+1x50+1x16mm2 AB cable	Km	36.5	3.32
TOTAL in Rs Crs				9.86

a. Conversion of LT Bare Conductor to 4x95+1x95+1x16mm2 AB cable

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	1.1KV LT AB Cable 4x95+1x95+1x16mm2	51,500.00	M	422	21716005.0
2	300Kg PSC pole 9Mtr long	500.00	EA	3,000.00	1500000.0
3	Base Plate for PSC pole	500.00	EA	230	115000.0
4	BOARD DANGER	500.00	EA	80	40000.0
5	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	150.45	KG	75	11283.8
6	ANTICLIMBING DEVICE (3 KG per supprot)	1,500.00	KG	416	623700.0
7	Pole clamp for EYE hook for XLPE Aerial bunched Cable	1,750.00	pair	200	350000.0
8	Suspension Clamp with EYE hook for ABC	1,100.00	No.	340	374000.0
9	Eye Hook for AB cable for dead end point	650.00	No.	60	39000.0
10	Conductor Dead End Clamp suitable for bare messenger XLPE Aerial bunched cable(25-70 sq mm)	650.00	No.	65	42250.0
11	LT Stay set Complete	500.00	Set	520	260000.0
12	LT Stay Insulator	500.00	No.	30	15000.0
13	LT Stay clamp	500.00	pair	110.00	55000.0
14	7/10 SWG G I stay wire (10Kg. / Set)	4,850.00	KG	75.00	363750.0
15	Coil Earthing	500.00	EA	166.00	83000.0

Detailed Project Report Capex Plan FY 22-23

16	Pipe HDPE Size 25MM (3 mtr each)	12,250.00	M	28	343000.0
17	Lug AL 70 SQMM for 7/8 SWG WIRE/EARTHING	1,000.00	EA	36	36000.0
18	LT Distribution Box Polycarbonate	1,000.00	EA	984	984240.0
19	Cap cable end for ABC Cables	1,000.00	EA	81	81000.0
20	IPC KZ 4X150	4,000.00	EA	52	207080.0
21	IPC EP 95 LT ABC 16-95 & 5-10 SQMM ST.LT	3,000.00	EA	88	264870.0
22	IPC KZ 2x150 LTABC 50-150 & 6-35(50) sqmm	5,000.00	EA	64	322300.0
23	STEEL STRAP SIZE 20 MMX50 M LONG	200.00	ROL	1,620	323924.0
24	BUCKLES FOR STEEL STRAP (1 EA = 100 NOS)	200.00	EA	491	98134.0
25	CABLE 1.1KV AL 4CX25 SQMM ARM	3,000.00	M	170	508590.0
26	GLAND FOR CABLE 4X25 SQ.MM	1,000.00	EA	48	47847.5
27	LUG AL CRIMPING 25 SQMM XLPE SINGLE HOLE	2,000.00	EA	7	13920.0
28	FLAT GI Size 25x6 MM	15,750.00	KG	75	1181250.0
29	BOLT & NUT GI 12MMX50MM HEX	600.00	KG	78	46800.0
30	BOLT & NUT GI 16MMX75M HEX	1,200.00	KG	78	93600.0
31	WASHER GI SIZE 12MM DIA	200.00	KG	78	15600.0
32	2Cx4 mm2 LT XLPE Cable	10,000.00	Mtr	48	480000.0
33	4Cx10 mm2 LT XLPE Cable	5,000.00	Mtr	84	422200.0
34	WASHER GI SIZE 16MM DIA	300.00	KG	78	23400.0
35	TIE PLASTIC BLACK SIZE 7.6 MM X 380 MM	2,000.00	EA	26	51660.0
36	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	100.00	No	1,050.00	105000.0
37	Tie Plastic size 9mmx265mm	3,000.00	EA	22	66990.0
Subtotal Material(A)					3,13,05,394
Stock, Storage and Insurance@3% of A					939161.83
Sub- Total-B					32244556.04
T & P Charges @ 2% of B					644891.12
Contingency @ 3% of B					967336.68
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					3475689.27
Transportation Charges@7.5% of B					2418341.70

Detailed Project Report Capex Plan FY 22-23

A	Cement concreting for support with C.C. 1:3:6 by using 4cm size hard granite metal=(0.45Mx0.45Mtrx1.5)M3=0.3cum	500.00	No.	2,124	1062000.00
B	Cement concreting for Stud & Stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal=(0.45Mx0.45Mtrx1.5)M3=0.3cum	500.00	No.	1,270	635000.00
	Sub-Total C				41447814.81
	Over Head Charges (Including Supervision charges) @6% of C				2486868.89
C	Dismantling of Conductor and transporting to nearest store of TPNO DL for 1 ckt Km	50	Ckm	3,344	167175.00
	Total D				44101858.70
	Gross Cost				46588727.59
	OR Say				46588728.00
	GST @18%				8385971.04
	CESS 1%				-
	Gross Cost (Inc. GST)				55440586.32
	Total(In Crores)				5.54
	Escalation of 3 years with 18% of grand Total				6.54

b. Conversion of LT Bare Conductor to 4x50+1x50+1x16mm2 AB cable

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	1.1KV LT AB Cable 4x50+1x50+1x16mm2	37,595.00	M	228	8587449.9
2	300Kg PSC pole 9Mtr long	365.00	EA	3,000.00	1095000.0
3	Base Plate for PSC pole	365.00	EA	230	83950.0
4	BOARD DANGER	365.00	EA	80	29200.0
5	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	109.83	KG	75	8237.1
6	ANTICLIMBING DEVICE (3 KG per support)	1,095.00	KG	416	455301.0
7	Pole clamp for EYE hook for XLPE Aerial bunched Cable	1,277.50	pair	200	255500.0
8	Suspension Clamp with EYE hook for ABC	803.00	No.	340	273020.0
9	Eye Hook for AB cable for dead end point	474.50	No.	60	28470.0
10	Conductor Dead End Clamp suitable for bare messenger XLPE Aerial bunched cable(25-70 sq. mm)	474.50	No.	65	30842.5
11	LT Stay set Complete	365.00	Set	520	189800.0
12	LT Stay Insulator	365.00	No.	30	10950.0

Detailed Project Report Capex Plan FY 22-23

13	LT Stay clamp	365.00	pair	110.00	40150.0
14	7/10 SWG G I stay wire (10Kg. / Set)	3,650.00	KG	75.00	273750.0
15	Coil Earthing	365.00	EA	166.00	60590.0
16	Pipe HDPE Size 25MM (3 Mtr each)	9,271.00	M	28	259588.0
17	Lug AL 70 SQMM for 7/8 SWG WIRE/EARTHING	730.00	EA	36	26280.0
18	LT Distribution Box Polycarbonate	730.00	EA	984	718495.2
19	Cap cable end for ABC Cables	730.00	EA	81	59130.0
20	IPC KZ 4X150	2,920.00	EA	52	151168.4
21	IPC EP 95 LT ABC 16-95 & 5-10 SQMM ST.LT	2,190.00	EA	88	193355.1
22	IPC KZ 2x150 LTABC 50-150 & 6-35(50) Sqmm	3,650.00	EA	64	235279.0
23	STEEL STRAP SIZE 20 MMX50 M LONG	146.00	ROL	1,620	236464.5
24	BUCKLES FOR STEEL STRAP (1 EA = 100 NOS)	146.00	EA	491	71637.8
25	CABLE 1.1KV AL 4CX25 SQMM ARM	2,190.00	M	170	371270.7
26	GLAND FOR CABLE 4X25 SQ.MM	730.00	EA	48	34928.6
27	LUG AL CRIMPING 25 SQMM XLPE SINGLE HOLE	1,460.00	EA	7	10161.6
28	FLAT GI Size 25x6 MM	11,497.50	KG	75	862312.5
29	BOLT & NUT GI 12MMX50MM HEX	438.00	KG	78	34164.0
30	BOLT & NUT GI 16MMX75M HEX	876.00	KG	78	68328.0
31	WASHER GI SIZE 12MM DIA	146.00	KG	78	11388.0
32	2Cx4 mm2 LT XLPE Cable	7,300.00	Mtr	48	350400.0
33	4Cx10 mm2 LT XLPE Cable	3,650.00	Mtr	84	308206.0
34	WASHER GI SIZE 16MM DIA	219.00	KG	78	17082.0
35	TIE PLASTIC BLACK SIZE 7.6 MM X 380 MM	1,460.00	EA	26	37711.8
36	Tie Plastic size 9mmx265mm	2,190.00	EA	22	48902.7
Subtotal Material(A)					1,55,28,465
Stock, Storage and Insurance@3% of A					465853.94

Detailed Project Report Capex Plan FY 22-23

	Sub- Total-B				15994318.46
	T & P Charges @ 2% of B				319886.37
	Contingency @ 3% of B				479829.55
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				1760199.80
	Transportation Charges@7.5% of B				1199573.88
A	Cement concreting for support with C.C. 1:3:6 by using 4cm size hard granite metal=(0.45Mx0.45Mtrx1.5)M3=0.3cum	365.00	No.	2,124	775260.00
B	Cement concreting for Stud & Stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal=(0.45Mx0.45Mtrx1.5)M3=0.3cum	365.00	No.	1,270	463550.00
	Sub-Total C				20992618.06
	Over Head Charges (Including Supervision charges) @6% of C				1259557.08
C	Dismantling of Conductor and transporting to nearest store of TPNODL for 1 ckt Km	36.5	Ckm	3,344	122037.75
	Total D				22374212.89
	Gross Cost				23633769.97
	OR Say				23633770.00
	GST @18%				4254078.6
	CESS 1%			-	236337.7
	Gross Cost (Inc. GST)				28124186.30
	Total(In Crores)				2.81
	Escalation of 3 years with 18% of grand Total				3.32

8.8 Annexure 8 Cost Estimate for Meter and Metering equipment for energy audit

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs)	Amount (in Rs)
1	FEEDER METERS FOR 33 KV & 11 KV (DLMS)	610	No.	4618	2816980
2	MODEM GSM FOR REMOTE METERING SYSTEM	610	No.	1970	1201700
3	METER BOX WITH COMPOSITE RESIN CAST CT/RING CT & CABLE	610	No.	6700	4087000
4	CABLE CONTROL 1.1KV CU 10CX2.5 SQMM ARM (10 M FOR EACH DT)	6100	M	200	1220000
5	METER INSTALLATION	610	No.	1150	701500
				SUBTOTAL	10027180
				GST 18%	1804892.40
				CESS 1%	100271.80
				Total of Estimate(K+L+M)	11932344.00
				Inspection Fee	0.00
				Drawing Approval	0.00
				Grand Total	1,19,32,344.00
				Total(In Crores)	1.19

8.9 Annexure 9 Cost Estimate for Equipment for Meter data downloading

S No.	Material	Total Qty	Unit	Rate Rs / Unit	Amount
1	CMRI	50	Nos	42,400	21,20,000
2	Bluetooth Device (Mobile) , Laptop etc.	150	Set	47,500	71,25,000
Total					92,45,000
Amount in Cr.					0.92

8.10 Annexure 10 Cost Estimate for Equipment for AMR enablement of 3 Phase consumer meters

S. No	Activity	Material	Qty	Unit	Rate Rs / Unit	Amount
1	Equipment for AMR enablement of 3 phase consumer meters	AMR - Modem , Cable , Antenna etc (Connection 70 - 110 kVA)	1,500	Set	3,000	45,00,000
Total in Cr.						0.5

8.11 Annexure 11 Cost Estimate for Field Testing equipment – Metering (Portable Calibrator)

Sr. No	Activity	Material	Qty	Unit	Rate Rs / Unit	Amount
1	Field Testing equipment - Metering (Accucheck etc.)	HT Accucheck	16	Nos	3,50,000	56,00,000
		LT Accucheck-1ph	50	Nos	75,000	37,50,000
		LT Accucheck-3ph	16	Nos	95,000	15,20,000
Total						1,08,70,000
Total In Cr.						1

8.12 Annexure 12 Cost Estimate for Refurbishment of 33KV/11KV Primary Substation (PSS)

Cost estimate for Sick Equipment replacement (VCB, CT/PT, CRP, Isolator, AB switches, Battery bank & Charger) in PSS:

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	33KV VCB -800A	54	EA	2,22,091.00	1,19,92,914
2	33KV CT- 800-400-200/1-1-1	100	EA	40,781	40,78,087

Detailed Project Report Capex Plan FY 22-23

3	33KV PT	100	EA	19,208	19,20,838
4	11KV VCB - 1200A	70	EA	2,04,000	1,42,80,000
5	11KV CT- 300-600/1-1, 400-800-1200/1-1-1	100	EA	33,393	33,39,303
6	11KV PT	100	EA	14,283	14,28,315
7	33kv Isolator (1250A)with Earth Switch Double Break_Non Motorized	150	EA	88,000	1,32,00,000
8	33kv Isolator (1250A)with Earth Switch Double Break_Motorized	16	EA	1,30,000	20,80,000
9	14 C 2.5 mm sq Cu Control Cable, armoured	1200	Mtr.	360	4,32,000
10	10 C 1.5 mm sq Cu Control Cable, armoured	1200	Mtr.	330	3,96,000
11	2C 2.5mm sq Cu Control Cable, armoured	1000	Mtr.	68	68,000
12	11kv Isolator (1250A)with Earth Switch Double Break_Non Motorized	175	Set	65,000	1,13,75,000
13	11kv Isolator (1250A)with Earth Switch Double Break_Motorized	30	EA	1,27,200	38,16,000
14	33KV LA	300	Set	4,840	14,52,000
15	11KV LA	400	Set	2,602	10,40,800
16	24 V, 100 AH, maintenance free VRLA Battery (Set. 4 Nos of 12V Battery)	40	EA	25,289	10,11,560
17	24V, 100A Float cum Boost Charger (Float/Boost current as per above VRLA Battery)	38	EA	1,98,851	75,56,338
18	48 V, 100 AH, maintenance free VRLA Battery (Set. 4 Nos of 12V Battery)	25	EA	48,578	12,14,450
19	48V, 100A Float cum Boost Charger (Float/Boost current as per above VRLA Battery)	10	EA	2,24,888	22,48,880
20	Control Cable 2Cx 50 Sq mm (ACDB/DCDB)	1000	Mtr.	203	2,03,000
21	30kV, 10kA, Metal Oxide, Class-3, Surge Arrester	150	EA	4,840	7,26,000
22	9kV, 5kA, Metal Oxide, Surge Arrester (Distribution Class)	150	EA	2,602	3,90,300
23	33KV switchboard(AIS	20	EA	7,15,000	1,43,00,000
24	11kV switchboard AIS	33	EA	5,76,000	1,90,08,000
25	440V ACDB	50	EA	80,000	40,00,000
26	230V Sub ACDB	55	EA	45,000	24,75,000
27	24V DCDB	50	EA	40,000	20,00,000
28	48V DCDB	10	EA	40,000	4,00,000

Detailed Project Report Capex Plan FY 22-23

Subtotal Material(A)		12,64,32,785
Stock, Storage and Insurance@3% of A		3792983.55
Sub- Total-B		130225768.55
T & P Charges @ 2% of B		2604515.37
Contingency @ 3% of B		3906773.06
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)		12060199.09
Transportation Charges@7.5% of B		9766932.64
Sub-Total C		158564188.71
Over Head Charges (Including Supervision charges) @6% of C		9513851.32
Total D		168078040.03
Gross Cost		168078040.03
OR Say		168078040.00
GST @18%		30254047.2
CESS 1%		- 1680780.4
Gross Cost (Inc. GST)		200012867.60
Total(In Crores)		20.00

8.13 Annexure 13 Cost Estimate for 33 KV Network Conductor up Gradation

S. No.	Description	UOM	Qty	Amount in Crores.
A	33 kV Line Refurbishment-148 sq.mm AAAC	Ckt Km	46.6	7.03
B	33 kV Line Refurbishment-232 sq.mm AAAC	Ckt Km	21	4.17
Total Cost in Cr.				11.20

A. Cost Estimate for 33 kV Overhead Line Conductor up gradation with 148 sq.mm AAAC

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	148mm ² All Aluminium Alloy Conductor. AAAC	143994	M	82.00	1,18,07,508
2	150X 150mm RS joist (13 Mtr long)(34.6 kg Per meter)(Each 415.2kg)	466	KG	29,237	1,36,24,442
3	BOLT & NUT GI 16MMX75M HEX	1212	KG	82	99,351
4	BOLT & NUT GI 16MMX200MM HEX	1118	KG	82	91,709
5	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr. length, 6 no's required = (6x2.36x0.280)	554	KG	65	36,028
6	50x50x6 mm M.S Angle (4.50Kg. / Mtr)	4194	KG	65	2,72,610

Detailed Project Report Capex Plan FY 22-23

7	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	4194	KG	65	2,72,610
8	100x50x6 mm MS Channel (9.2Kg. / Mtr)	3542	KG	65	2,30,204
9	50x6 mm G I flat	0	KG	75	-
10	25x6 mm G I flat	1491	KG	75	1,11,840
11	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	93	EA	1,050	97,860
12	PIPE HDPE SIZE 25 MM	1212	M	31	37,560
13	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	746	EA	17	12,675
14	WASHER MS SIZE 16MM DIA	140	KG	95	13,247
15	BOARD DANGER 33KV SIZE 8X10 INCH	1165	EA	80	93,200
16	G I Barbed wire	2330	EA	80	1,86,400
17	INSULATOR STAY (GUY/EGG) 11KV	559	EA	50	27,960
18	PLATE BASE RCC SIZE 450X450X50MM	466	EA	110	51,260
19	HT stay set complete	559	Set	1,050	5,87,160
20	Disc insulator (B&S) 120KN Polymer	559	EA	1,440	8,05,248
21	33KV H W fitting(B&S)90KN, 3Bolt	559	EA	351	1,96,279
22	V-Cross arm 33 KV 22 KG	559	EA	1,580	8,83,536
23	7/10 SWG G I stay wire (12Kg. / Set)	6710	KG	75	5,03,280
24	HT stay Clamp (1.9Kg/pair)	559	Pair	125	69,900
25	Back Clamp for V cross arm(33KV) 1.7 kg each 950*8 Flat)	559	EA	150	83,880
26	No. 6 GI wire	2004	KG	75	1,50,285
27	PG clamp for 148 mm ² AAA conductor	839	EA	620	5,20,056
28	Earthing Coil	466	No	166	77,356
29	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	93	LS	1600.00	1,49,120
30	33KV pin insulator polymer	3215	EA	480	15,43,392
31	Cradle guarding for road/line crossing	93	Ls	11,071	10,31,817
Subtotal Material(A)					3,36,67,773
Stock, Storage and Insurance@3% of A					1010033.19
Sub- Total-B					34677806.17

Detailed Project Report Capex Plan FY 22-23

	T & P Charges @ 2% of B				693556.12
	Contingency @ 3% of B				1040334.19
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				2870155.27
	Transportation Charges@7.5% of B				2600835.46
A	Cement concreting for support with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtrx1.5)M3=0.3cum@4158.84=@4158.84 =0.3037xRs.4185.84=Rs.1263.03 or Rs.1270.00(Including HT and LT)	466.00	No.	2,124	989784.00
B	Cement concreting for Stud & Stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtrx1.5)M3=0.3cum@4158.84=@4158.84 =0.3037xRs.4185.84=Rs.1263.03 or Rs.1270.00(including HT and LT)	559.20	No.	1,270	710184.00
	Sub-Total C				43582655.21
	Over Head Charges (Including Supervision charges) @6% of C				2614959.31
C	Dismantling of Conductor and transporting to nearest store of TPNODL for 3 Km of Conductor	46.6	EA	27000	1258200.00
	Total D				47455814.52
	Gross Cost				50070773.83
	OR Say				50070774.00
	GST @18%				9012739.32
	CESS 1%			-	500707.74
	Gross Cost (Inc. GST)				59584221.06
	Total(In Crores)				5.958
	Escalation of 3 years with 18% of grand Total				7.03

B. Cost Estimate for 33 kV Overhead Line Conductor up gradation with 232 sq.mm AAAC

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	232 Sqmm All Alloy Aluminium Conductor AAAC	64890	M	156.50	1,01,55,285
2	150X 150mm RS joist (13 Mtr long)(34.6 kg Per meter)(Each 415.2kg)	210	KG	29,237	61,39,770
3	BOLT & NUT GI 16MMX75M HEX	546	KG	82	44,772
4	BOLT & NUT GI 16MMX200MM HEX	504	KG	82	41,328
5	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 Mtr. length, 6 no's required = (6x2.36x0.280)	250	KG	65	16,236
6	50x50x6 mm M.S Angle (4.50Kg. / Mtr)	3255	KG	65	2,11,575
7	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	2415	KG	65	1,56,975
8	100x50x6 mm MS Channel (9.2Kg. / Mtr)	1596	KG	65	1,03,740
9	50x6 mm G I flat	0	KG	75	-
10	25x6 mm G I flat	672	KG	75	50,400

Detailed Project Report Capex Plan FY 22-23

11	40mm nominal bore GI pipe (medium gauge) earthing device with 3 Mtr .Long	42	EA	1,050	44,100
12	PIPE HDPE SIZE 25 MM	546	M	31	16,926
13	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	336	EA	17	5,712
14	WASHER MS SIZE 16MM DIA	63	KG	95	5,970
15	BOARD DANGER 33KV SIZE 8X10 INCH	525	EA	80	42,000
16	G I Barbed wire	1050	EA	80	84,000
17	HT stay insulator TYPE-C	252	EA	50	12,600
18	PLATE BASE RCC SIZE 450X450X50MM	210	EA	110	23,100
19	HT stay set complete	252	Set	1,050	2,64,600
20	Disc insulator (B&S) 120KN Polymer	252	EA	1,440	3,62,880
21	33KV H W fitting(B&S)90KN, 3Bolt	252	EA	351	88,452
22	V-Cross arm 33 KV 22 KG	252	EA	1,580	3,98,160
23	7/10 SWG G I stay wire (12Kg. / Set)	3024	KG	75	2,26,800
24	HT stay Clamp (1.9Kg/pair)	252	Pair	125.00	31,500
25	Back Clamp for V cross arm(33KV) 1.7 kg each 950*8 Flat)	252	EA	150	37,800
26	No. 6 GI wire	903	KG	75	67,725
27	T clamp for 232 mm ² conductor	336	EA	960	3,22,560
28	Earthing Coil	210	No	166	34,860
29	Materials for Massionary work for Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2"x2") and RCC slab cover	42	LS	1600.00	67,200
30	33KV pin insulator polymer	1449	EA	480	6,95,520
31	Cradle guarding for road/line crossing	42	Ls	11,071	4,64,982
Subtotal Material(A)					2,02,17,527
Stock, Storage and Insurance @3% of A					606525.82
Sub- Total-B					20824053.19
T & P Charges @ 2% of B					416481.06
Contingency @ 3% of B					624721.60
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					1828679.32
Transportation Charges@7.5% of B					1561803.99
A	Cement concreting for support with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtx1.5)M3=0.3cum@4158.84=@4158.84 =0.3037xRs.4185.84=Rs.1263.03 or Rs.1270.00(Including HT and LT)	210.00	No.	2,124	446040.00
B	Cement concreting for Stud & Stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtx1.5)M3=0.3cum@4158.84=@4158.84 =0.3037xRs.4185.84=Rs.1263.03 or Rs.1270.00(including HT and LT)	252.00	No.	1,270	320040.00
Sub-Total C					26021819.17
Over Head Charges (Including Supervision charges) @6% of C					1561309.15
C	Dismantling of Conductor and transporting to nearest store of TPNODL for 3 Km of Conductor	21	EA	27000	567000.00
Total D					28150128.32

Detailed Project Report Capex Plan FY 22-23

	Gross Cost		29711437.47
	OR Say		29711437.00
	GST @18%		5348058.66
	CESS 1%	-	297114.37
	Gross Cost (Inc. GST)		35356610.03
	Total(In Crores)		3.54
	Escalation of 3 years with 18% of grand Total		4.17

8.14 Annexure 14 Cost Estimate for 11 KV Network Conductor up Gradation

S. No.	Description	UOM	Qty	Amount in Crores.
A	11 kV Line Refurbishment-100 sq.mm AAAC	Ckt Km	72.1	8.8
	Total Cost in Cr.			8.8

A. Cost Estimate 11 kV Overhead Line Conductor up gradation with 100 sq.mm AAAC

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	100 Sqmm All Alloy Aluminium Conductor AAAC	222789	M	55.00	1,22,53,395
2	150X 150mm RS joist (11 Mtr long)(34.6 kg Per meter)(Each 380.6kg)	721	KG	24,739	1,78,36,819
3	BOLT & NUT GI 16MMX75M HEX	1875	KG	82	1,53,717
4	BOLT & NUT GI 16MMX200MM HEX	1730	KG	82	1,41,893
5	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 Mtr. length, 6 no's required = (6x2.36x0.280)	858	KG	65	55,743
6	50x50x6 mm M.S Angle (4.50Kg. / Mtr)	5814	KG	65	3,77,919
7	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	8237	KG	65	5,35,386
8	100x50x6 mm MS Channel (9.2Kg. / Mtr)	11144	KG	65	7,24,345
9	50x6 mm G I flat	0	KG	75	-
10	25x6 mm G I flat	2307	KG	75	1,73,040
11	40mm nominal bore GI pipe (medium gauge) earthing device with 3 Mtr .Long	144	EA	1,050	1,51,410
12	PIPE HDPE SIZE 25 MM	1586	M	31	49,172
13	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	1154	EA	17	19,611
14	WASHER MS SIZE 16MM DIA	216	KG	95	20,495
15	BOARD DANGER 11KV SIZE 8X10 INCH	1803	EA	80	1,44,200
16	G I Barbed wire	3605	EA	80	2,88,400
17	INSULATOR STAY (GUY/EGG) 11KV	865	EA	50	43,260
18	GI Base Plate (500x500x10mm)for PSC pole (20kg)	721	EA	1,500	10,81,500
19	HT stay set complete	865	Set	1,050	9,08,460
20	Disc Insulator(B&S) 70KN Polymer	865	EA	1150	9,94,980
21	HW FITTING(B&S) 70KN 3 BOLT	865	EA	350	3,02,820
22	11 KV V cross arm 10.2 Kg each	865	EA	810	7,00,812
23	7/10 SWG G I stay wire (11Kg. / Set)	9517	KG	75	7,13,790
24	HT stay Clamp (1.9Kg/pair)	865	Pair	125	1,08,150

Detailed Project Report Capex Plan FY 22-23

25	GI Back Clamp for V cross arm (11KV) (0.85 kg each)	865	EA	80	69,216
26	No. 6 GI wire	3100	KG	75	2,32,523
27	PG clamp for 100 mm ² AAA conductor	1298	EA	580	7,52,724
28	Earthing Coil	721	No	166	1,19,686
29	Materials for Massionary work for Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2"x2") and RCC slab cover	144	LS	1600.00	2,30,720
30	11KV pin insulator polymer	4326	EA	200	8,65,200
31	Cradle guarding for road/line crossing	144	Ls	11,071	15,96,438
Subtotal Material(A)					4,16,45,825
Stock, Storage and Insurance@3% of A					1249374.75
Sub- Total-B					42895199.86
T & P Charges @ 2% of B					857904.00
Contingency @ 3% of B					1286856.00
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					3499609.41
Transportation Charges@7.5% of B					3217139.99
A	Cement concreting for support with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtrx1.5)M3=0.3cum@4158.84=@4158.84 =0.3037xRs.4185.84=Rs.1263.03 or Rs.1270.00(Including HT and LT)	721.00	No.	2,124	1531404.00
B	Cement concreting for Stud & Stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtrx1.5)M3=0.3cum@4158.84=@4158.84 =0.3037xRs.4185.84=Rs.1263.03 or Rs.1270.00(including HT and LT)	865.20	No.	1,270	1098804.00
Sub-Total C					54386917.25
Over Head Charges (Including Supervision charges) @6% of C					3263215.04
C	Dismantling of Conductor and transporting to nearest store of TPNODL for 3 Km of Conductor	72.1	EA	27000	1946700.00
Total D					59596832.29
Gross Cost					62860047.33
OR Say					62860047.00
GST @18%					11314808.46
CESS 1%					628600.47
Gross Cost (Inc. GST)					74803455.93
Total(In Crores)					7.48
Escalation of 3 years with 18% of grand Total					8.8

8.15 Annexure 15 Cost Estimate for Refurbishment of 11KV/0.415 KV Distribution Substation (DSS)

Sr.No	Description	UOM	Qty	Amount
				in Rs. Crores
A	Refurbishment of 100 KVA 11KV/0.415 KV DSS	EA	65	2.34

Detailed Project Report Capex Plan FY 22-23

B	Refurbishment of 250 KVA 11KV/0.415 KV DSS	EA	33	1.67
C	Refurbishment of 500 KVA 11KV/0.415 KV DSS	EA	15	0.79
Total			113	4.80

A. Cost Estimate for Refurbishment of 100 KVA 11KV/0.415 KV DSS

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	100 KVA,11/0.4KV(Al) Transformer	-	EA	1,17,000	0.0
2	LT Distribution Box for 100 KVA S/S.	65.00	EA	24,419.00	1587235.0
3	AB Switch(11KV,200A,3Pole,50Hz)	65.00	EA	7,350	477750.0
4	Lightening Arrester(9KV,5KA)	195.00	EA	980	191100.0
5	HG Fuse(11KV,3 Pole)	195.00	EA	6,120	1193400.0
6	100MMSQ AAA CONDUCTOR FOR JUMPERING	1,495.00	M	55	82225.0
7	CABLE 1.1KV AL 1CX150 SQMM ARM	650.00	M	279	181350.0
8	GLAND FOR ARM CABLE 1CX150 SQ.MM	260.00	EA	280	72800.0
9	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos (9.2 Kg. / Mtr.) with Galvanization	3,348.80	KG	75	251160.0
10	Transformer Mounting Channel (100x50X6)mm 2.8 Mtr long 2 Nos (9.2 Kg./Mtr.) with Galvanization	3,348.80	KG	75	251160.0
11	AB Switch and HG Fuse Mounting Channel (75x40X6)mm 2.8 Mtr long 4Nos (6.8 Kg./Mtr.) with Galvanization	4,950.40	KG	75	371280.0
12	Transformer Belting angle (50X50X6) mm 2.8mtr long 2 nos. (4.5 Kg./Mtr.)with side angle (total 7mtr) with Galvanization	2,047.50	KG	75	153562.5
13	Angle for mounting LT distribution box (50X50X6) mm 2.8mtr long 2nos (4.5 Kg./Mtr.)with side angle with Galvanization	877.50	KG	75.00	65812.5
14	11 KV Disc Insulator T & C Type 45 KN POLYMER	195.00	NO	860.00	167700.0
15	11 KV hard ware fitting T & C Type 45KN	195.00	NO	130.00	25350.0
16	50x6 mm G I flat	2,600.00	KG	75	195000.0
17	25x6 mm G I flat	1,094.60	KG	75	82095.0
18	G.I NUTS,BOLTS & WASHERS	650.00	KG	78	50700.0
19	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	650.00	EA	12	7689.5

Detailed Project Report Capex Plan FY 22-23

20	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	3,510.00	EA	36	126360.0
21	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	520.00	EA	29	15126.8
22	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	195.00	EA	320	62400.0
23	TEMPLETE FOR TRANSFORMER MAINT.RECORD	65.00	EA	68	4420.0
24	TAPE HT SCOTCH 23 25MMX9.1M 66KV	59.15	ROL	540.54	31972.9
25	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	23.40	EA	1,550.75	36287.6
26	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	260.00	EA	1,188.38	308978.8
27	ALNOX 3M (HOT SPOT REDUCING PASTE)	4.55	EA	4,084.64	18585.1
28	3M SCOTCH 1625 SPRAY	26.00	EA	754.98	19629.5
29	3M SCOTCH FILL PUTTY	65.00	EA	462.69	30074.9
30	RODENT CAPACITIVE SCREEN GUARD FOR-DT	195.00	EA	2,177.28	424569.6
31	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	130.00	EA	884.00	114920.0
32	SLEEV BLACK POLYOLEFIN	130.00	M	377.41	49063.3
33	40MM NOMINAL BORE GI PIPE (MEDIUM GAUGE) EARTHING DEVICE WITH 3 MTR LONG	325.00	EA	1,050	341250.0
34	PIPE HDPE SIZE 25 MM	1,495.00	M	28	41860.0
35	7/10 SWG G I stay wire (10Kg. / Set)	1,300.00	KG	75	97500.0
36	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	325.00	LS	1600.00	520000.0
37	FRP Fencing	1,820.00	Sq.M	2615.00	4759300.0
38	CONNECTOR MINI WEDGE 25 SQMM TO DOG	195.00	EA	183	35685.0
Subtotal Material(A)					1,24,45,353
Stock, Storage and Insurance@3% of A					373360.59
Sub- Total-B					12818713.52
T & P Charges @ 2% of B					256374.27
Contingency @ 3% of B					384561.41
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					1320327.49
Transportation Charges@7.5% of B					961403.51
Sub-Total C					15741380.21
Over Head Charges (Including Supervision charges) @6% of C					944482.81
Total D					16685863.02

Detailed Project Report Capex Plan FY 22-23

	Gross Cost		16685863.02
	OR Say		16685863.00
	GST @18%		3003455.34
	CESS 1%	-	166858.63
	Gross Cost (Inc. GST)		19856176.97
	Total(In Crores)		1.99
	Escalation of 3 years with 18% of grand Total		2.34

B. Cost Estimate for Refurbishment of 250 KVA 11KV/0.415 KV DSS

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	250 KVA,11/0.4KV(Al) Transformer	-	EA	2,68,450	0.0
2	ACB LT 400A	66.00	EA	39,919.00	2634654.0
3	AB Switch(11KV,400A,3Pole,50Hz)	33.00	EA	11,850	391050.0
4	Lightening Arrester(9KV,5KA)	99.00	EA	980	97020.0
5	HG Fuse(11KV,3 Pole)	99.00	EA	11,530	1141470.0
6	100MMSQ AAA CONDUCTOR FOR JUMPERING	759.00	M	55	41745.0
7	CABLE 1.1KV AL 1CX150 SQMM ARM	330.00	M	279	92070.0
8	GLAND FOR ARM CABLE 1CX150 SQ.MM	132.00	EA	280	36960.0
9	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos (9.2 Kg. / Mtr.) with Galvanization	1,700.16	KG	75	127512.0
10	Transformer Mounting Channel (100x50X6)mm 2.8 Mtr long 2 Nos (9.2 Kg./Mtr.) with Galvanization	1,700.16	KG	75	127512.0
11	AB Switch and HG Fuse Mounting Channel (75x40X6)mm 2.8 Mtr long 4Nos (6.8 Kg./Mtr.) with Galvanization	2,513.28	KG	75	188496.0
12	Transformer Belting angle (50X50X6) mm 2.8mtr long 2 nos. (4.5 Kg. /Mtr.)with side angle (total 7mtr) with Galvanization	1,039.50	KG	75	77962.5
13	Angle for mounting LT distribution box (50X50X6) mm 2.8mtr long 2nos (4.5 Kg. /Mtr.)with side angle with Galvanization	445.50	KG	75.00	33412.5
14	11 KV Disc Insulator T & C Type 45 KN POLYMER	99.00	NO	860.00	85140.0
15	11 KV hard ware fitting T & C Type 45KN	99.00	NO	130.00	12870.0
16	50x6 mm G I flat	1,680.36	KG	75	126027.0
17	25x6 mm G I flat	555.72	KG	75	41679.0
18	G.I NUTS,BOLTS & WASHERS	330.00	KG	78	25740.0
19	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	330.00	EA	12	3903.9

Detailed Project Report Capex Plan FY 22-23

20	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	1,782.00	EA	36	64152.0
21	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	264.00	EA	29	7679.8
22	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	99.00	EA	320	31680.0
23	TEMPLETE FOR TRANSFORMER MAINT.RECORD	33.00	EA	68	2244.0
24	TAPE HT SCOTCH 23 25MMX9.1M 66KV	30.03	ROL	540.54	16232.4
25	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	11.88	EA	1,550.75	18422.9
26	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	132.00	EA	1,188.38	156866.2
27	ALNOX 3M (HOT SPOT REDUCING PASTE)	2.31	EA	4,084.64	9435.5
28	3M SCOTCH 1625 SPRAY	13.20	EA	754.98	9965.7
29	3M SCOTCH FILL PUTTY	33.00	EA	462.69	15268.8
30	RODENT CAPACITIVE SCREEN GUARD FOR-DT	99.00	EA	2,177.28	215550.7
31	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	66.00	EA	884.00	58344.0
32	SLEEV BLACK POLYOLEFIN	66.00	M	377.41	24909.1
33	40MM NOMINAL BORE GI PIPE (MEDIUM GAUGE) EARTHING DEVICE WITH 3 MTR LONG	165.00	EA	1,050	173250.0
34	PIPE HDPE SIZE 25 MM	759.00	M	28	21252.0
35	7/10 SWG G I stay wire (10Kg. / Set)	660.00	KG	75	49500.0
36	Materials for Massionary work for Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2"x2") and RCC slab cover	165.00	LS	1600.00	264000.0
37	FRP Fencing	924.00	Sq.M	2615.00	2416260.0
38	CONNECTOR MINI WEDGE 25 SQMM TO DOG	99.00	EA	183	18117.0
Subtotal Material(A)					88,58,354
Stock, Storage and Insurance@3% of A					265750.62
Sub- Total-B					9124104.57
T & P Charges @ 2% of B					182482.09
Contingency @ 3% of B					273723.14
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					939782.77
Transportation Charges@7.5% of B					684307.84
Sub-Total C					11204400.41
Over Head Charges (Including Supervision charges) @6% of C					672264.02
Total D					11876664.43
Gross Cost					11876664.43
OR Say					11876664.00

Detailed Project Report Capex Plan FY 22-23

	GST @18%		2137799.52
	CESS 1%	-	118766.64
	Gross Cost (Inc. GST)		14133230.16
	Total(In Crores)		1.41
	Escalation of 3 years with 18% of grand Total		1.67

C. Cost Estimate for Refurbishment of 500 KVA 11KV/0.415 KV DSS

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	500 KVA,11/0.4KV(Al) Transformer	-	EA	5,80,000	0.0
2	ACB LT 400A	30.00	EA	39,625.00	1188750.0
3	75x40x6 mm Channel (6.80Kg. / Mtr) With Galvanization	1,470.00	KG	75.00	110250.0
4	AB Switch(11KV,400A,3Pole,50Hz)	15.00	EA	11,850	177750.0
5	Lightening Arrester(9KV,5KA)	45.00	EA	980	44100.0
6	HG Fuse(11KV,3 Pole)	45.00	EA	11,530	518850.0
7	100MMSQ AAA CONDUCTOR FOR JUMPERING	345.00	M	55	18975.0
8	CABLE 1.1KV AL 1CX630 SQMM ARM	150.00	M	618	92700.0
9	GLAND FOR ARM CABLE	60.00	EA	280	16800.0
10	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos (9.2 Kg. / Mtr.) with Galvanization	772.80	KG	75	57960.0
11	Transformer Mounting Channel (100x50X6)mm 2.8 Mtr long 2 Nos (9.2 Kg./Mtr.) with Galvanization	772.80	KG	75	57960.0
12	AB Switch and HG Fuse Mounting Channel (75x40X6)mm 2.8 Mtr long 4Nos (6.8 Kg./Mtr.) with Galvanization	1,142.40	KG	75	85680.0
13	Transformer Belting angle (50X50X6) mm 2.8mtr long 2 nos. (4.5 Kg./Mtr.)with side angle (total 7mtr) with Galvanization	472.50	KG	75	35437.5
14	Angle for mounting LT distribution box (50X50X6) mm 2.8mtr long 2nos (4.5 Kg./Mtr.)with side angle with Galvanization	202.50	KG	75.00	15187.5
15	11 KV Disc Insulator T & C Type 45 KN POLYMER	45.00	NO	860.00	38700.0
16	11 KV hard ware fitting T & C Type 45KN	45.00	NO	130.00	5850.0
17	50x6 mm G I flat	763.80	KG	75	57285.0
18	25x6 mm G I flat	252.60	KG	75	18945.0
19	G.I NUTS,BOLTS & WASHERS	150.00	KG	78	11700.0

Detailed Project Report Capex Plan FY 22-23

20	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	150.00	EA	12	1774.5
21	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	810.00	EA	36	29160.0
22	LUG AL CRIMPING 630 SQMM XLPE ONE HOLE	120.00	EA	164	19728.0
23	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	45.00	EA	320	14400.0
24	TEMPLATE FOR TRANSFORMER MAINT.RECORD	15.00	EA	68	1020.0
25	TAPE HT SCOTCH 23 25MMX9.1M 66KV	13.65	ROL	540.54	7378.4
26	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	5.40	EA	1,550.75	8374.1
27	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	60.00	EA	1,188.38	71302.8
28	ALNOX 3M (HOT SPOT REDUCING PASTE)	1.05	EA	4,084.64	4288.9
29	3M SCOTCH 1625 SPRAY	6.00	EA	754.98	4529.9
30	3M SCOTCH FILL PUTTY	15.00	EA	462.69	6940.4
31	RODENT CAPACITIVE SCREEN GUARD FOR-DT	45.00	EA	2,177.28	97977.6
32	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	30.00	EA	884.00	26520.0
33	SLEEV BLACK POLYOLEFIN	30.00	M	377.41	11322.3
34	40MM NOMINAL BORE GI PIPE (MEDIUM GAUGE) EARTHING DEVICE WITH 3 MTR LONG	75.00	EA	1,050	78750.0
35	PIPE HDPE SIZE 25 MM	345.00	M	28	9660.0
36	7/10 SWG G I stay wire (10Kg. / Set)	300.00	KG	75	22500.0
37	Materials for Massionary work for Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2"x2") and RCC slab cover	75.00	LS	1600.00	120000.0
38	FRP Fencing	420.00	Sq.M	2615.00	1098300.0
39	CONNECTOR MINI WEDGE 25 SQMM TO DOG	45.00	EA	183	8235.0
Subtotal Material(A)					41,95,042
Stock, Storage and Insurance@3% of A					125851.25
Sub- Total-B					4320892.97
T & P Charges @ 2% of B					86417.86
Contingency @ 3% of B					129626.79
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					445051.98
Transportation Charges@7.5% of B					324066.97
Sub-Total C					5306056.57
Over Head Charges (Including Supervision charges) @6% of C					318363.39
Total D					5624419.96
Gross Cost					5624419.96
OR Say					5624420.00
GST @18%					1012395.6
CESS 1%					-
					56244.2

Detailed Project Report Capex Plan FY 22-23

	Gross Cost (Inc. GST)	6693059.80
	Total(In Crores)	0.67
	Escalation of 3 years with 18% of grand Total	0.79

8.16 Annexure 16 Cost Estimate for Installation of LV Protection at DSS

Sr.No	Description	UOM	Qty	Amount
				in Rs. Crores
A	ACB Protection for 500 KVA 11KV/0.415 KV DSS	EA	6	0.21
B	ACB Protection for 200/250 KVA 11KV/0.415 KV DSS	EA	140	1.68
C	MCCB Protection for 100 KVA 11KV/0.415 KV DSS	EA	520	3.65
Total			666	5.54

A. Cost Estimate for Installation of ACB "LV" Protection for 500 KVA 11KV/0.415 KV DSS

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	ACB LT 400 A	12.00	EA	39,919.00	479028.0
2	CABLE 1.1KV AL 1X630 SQMM UNAR XLPE	270.00	M	466.24	125884.8
3	LUG AL CRIMPING 630 SQMM XLPE ONE HOLE	72.00	EA	135.70	9770.4
4	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	294.00	KG	65	19110.0
5	50x6 mm G I flat	60.00	KG	75	4500.0
6	25x6 mm G I flat	30.00	KG	75	2250.0
7	BOLT & NUT GI 12MMX50MM HEX	6.00	KG	82	492.0
8	BOLT & NUT GI 16MMX75M HEX	6.00	KG	82	492.0
9	WASHER GI SIZE 16MM DIA	1.50	KG	114	171.3
10	WASHER GI SIZE 12MM DIA	1.50	KG	114	171.3
11	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	12.00	EA	17	204.0
12	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	96.00	EA	13	1236.6
13	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	6.00	EA	1,050	6300.0
14	11 Mtr long 330 kg PSC Pole(including transportation cost upto store)	12.00	EA	7,000.00	84000.0

Detailed Project Report Capex Plan FY 22-23

15	PIPE G.I.100MM DIA HEAVY CLASS PLAIN END	36.00	M	772.63	27814.6
16	CABLE 1.1KV AL 4CX300 SQMM XLPE ARM	240.00	M	1,011.00	242640.0
17	PIPE HDPE SIZE 25 MM	18.00	M	31.00	558.0
18	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	6.00	LS	1,600.00	9600.0
Subtotal Material(A)					10,14,223
Stock, Storage and Insurance@3% of A					30426.69
Sub- Total-B					1044649.74
T & P Charges @ 2% of B					20892.99
Contingency @ 3% of B					31339.49
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					103272.92
Transportation Charges@7.5% of B					78348.73
A	Cement concreting for support with C.C. 1:3:6 by using 4cm size hard granite metal=(0.45Mx0.45Mtrx1.5)M3=0.3cum	12.00	No.	2,124	25488.00
Sub-Total C					1303991.87
Over Head Charges (Including Supervision charges) @6% of C					78239.51
Total D					1382231.38
Gross Cost					1460470.89
OR Say					1460471.00
GST @18%					262884.78
CESS 1%					14604.71
Gross Cost (Inc. GST)					1737960.49
Total(In Crores)					0.17
Escalation of 3 years with 18% of grand Total					0.21

B. Cost Estimate for Installation of ACB "LV" Protection for 200/250 KVA 11KV/0.415 KV DSS

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	ACB LT 400 A	140.00	EA	39,919.00	5588660.0
2	CABLE 1.1KV AL 4CX300 SQMM XLPE ARM	2,100.00	M	1,011.00	2123100.0
3	GLAND FOR ARM CABLE 4X150 SQ.MM	560.00	EA	280.00	156800.0
4	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	6,860.00	KG	65	445900.0
5	50x6 mm G I flat	1,400.00	KG	75	105000.0
6	25x6 mm G I flat	700.00	KG	75	52500.0
7	BOLT & NUT GI 12MMX50MM HEX	280.00	KG	82	22960.0
8	BOLT & NUT GI 16MMX75M HEX	280.00	KG	82	22960.0
9	WASHER GI SIZE 16MM DIA	35.00	KG	114	3997.7

Detailed Project Report Capex Plan FY 22-23

10	WASHER GI SIZE 12MM DIA	35.00	KG	114	3997.7
11	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	280.00	EA	17	4760.0
12	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	1,120.00	EA	13	14427.1
13	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	140.00	EA	1,050	147000.0
14	PIPE HDPE SIZE 25 MM	420.00	M	31.00	13020.0
15	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	140.00	LS	1,600.00	224000.0
Subtotal Material(A)					89,29,083
Stock, Storage and Insurance@3% of A					267872.48
Sub- Total-B					9196955.02
T & P Charges @ 2% of B					183939.10
Contingency @ 3% of B					275908.65
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					947286.37
Transportation Charges@7.5% of B					689771.63
Sub-Total C					11293860.77
Over Head Charges (Including Supervision charges) @6% of C					677631.65
Total D					11971492.42
Gross Cost					11971492.42
OR Say					11971492.00
GST @18%					2154868.56
CESS 1%					119714.92
Gross Cost (Inc. GST)					14246075.48
Total(In Crores)					1.42
Escalation of 3 years with 18% of grand Total					1.68

C. Cost Estimate for Installation of MCCB “LV” Protection for 100 KVA 11KV/0.415 KV DSS

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	LT Distribution Box for 100 KVA S/S.	520.00	EA	24,419.00	12697880.0
2	CABLE 1.1KV AL 4CX150 SQMM ARM	7,800.00	M	280.00	2184000.0
3	GLAND FOR ARM CABLE 4X150 SQ.MM	2,080.00	EA	280.00	582400.0
4	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	25,480.00	KG	65	1656200.0
5	50x6 mm G I flat	5,200.00	KG	75	390000.0
6	25x6 mm G I flat	2,600.00	KG	75	195000.0
7	BOLT & NUT GI 12MMX50MM HEX	1,040.00	KG	82	85280.0

Detailed Project Report Capex Plan FY 22-23

8	BOLT & NUT GI 16MMX75M HEX	1,040.00	KG	82	85280.0
9	WASHER GI SIZE 16MM DIA	130.00	KG	114	14848.6
10	WASHER GI SIZE 12MM DIA	130.00	KG	114	14848.6
11	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	1,040.00	EA	17	17680.0
12	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	4,160.00	EA	13	53586.4
13	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	520.00	EA	1,050	546000.0
14	PIPE HDPE SIZE 25 MM	1,560.00	M	31.00	48360.0
15	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	520.00	LS	1,600.00	832000.0
Subtotal Material(A)					1,94,03,364
Stock, Storage and Insurance@3% of A					582100.91
Sub- Total-B					19985464.64
T & P Charges @ 2% of B					399709.29
Contingency @ 3% of B					599563.94
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					2058502.86
Transportation Charges@7.5% of B					1498909.85
Sub-Total C					24542150.58
Over Head Charges (Including Supervision charges) @6% of C					1472529.03
Total D					26014679.61
Gross Cost					26014679.61
OR Say					26014680.00
GST @18%					4682642.4
CESS 1%					-
Gross Cost (Inc. GST)					30957469.20
Total(In Crores)					3.10
Escalation of 3 years with 18% of grand Total					3.65

8.17 Annexure 17 Cost Estimate for Installation of Auto reclosure / Sectionalizer, RMU (4 Way & 3 Way) & FPI

Sr.No	Description	UOM	Qty	Amount
				in Rs. Crores
A	Auto reclosure	EA	10	1.56
B	Sectionalizer	EA	30	4.70
C	RMU 4 way Out Door at 11 KV	EA	35	5.92
D	RMU 3 way Out Door at 11 KV	EA	32	5.13

Detailed Project Report Capex Plan FY 22-23

E	RMU 4 way Out Door at 33 KV	EA	5	2.63
F	Overhead Communicable FPI	Set of 3	147	1.25
Total				21.19

A. Cost Estimate for Supply and Installation of 11 kV Auto-Recloser

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	Auto reclosure	10.00	ST	6,96,058.00	6960580.0
2	Lightening Arrester(9KV,5KA)	60.00	EA	980.00	58800.0
3	BOLT & NUT GI 12MMX50M HEX	10.00	KG	78.00	780.0
4	BOLT & NUT GI 16MMX75M HEX	30.00	KG	78	2340.0
5	50x6 mm G I flat	100.00	KG	75	7500.0
6	25x6 mm G I flat	150.00	KG	75	11250.0
7	RS Joist 150x150 (11Mtr. Long, 34.6KG/Mtr.)	20.00	EA	24,739	494780.0
8	75x40x6 mm Channel (6.80Kg. / Mtr) With Galvanization	250.00	KG	75	18750.0
9	100x50x6 mm Channel (9.2Kg. / Mtr) with Galvanization	150.00	KG	75	11250.0
10	40mm nominal bore GI pipe (medium gauge) earthing device with 3 Mtr .Long	20.00	EA	1,050	21000.0
11	LUG AL CRIMPING 95MM2 XLPE SINGLE HOLE	80.00	EA	12	946.4
12	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	60.00	EA	366	21960.0
13	100 Sqmm All Alloy Aluminium Conductor AAAC	150.00	M	55	8250.0
14	ANTICLIMBING DEVICE	20.00	EA	415.80	8316.0
15	BOARD DANGER	20.00	EA	80.00	1600.0
16	GI PLATE BASE SIZE	20.00	EA	1,500.00	30000.0
17	HT stay set complete	40.00	No	1,050.00	42000.0
18	HT Stay insulator	40.00	No	50.00	2000.0
19	HT Stay clamp	40.00	Pair	125.00	5000.0
20	7/10 SWG stay wire	400.00	KG	75.00	30000.0

Detailed Project Report Capex Plan FY 22-23

21	PIPE HDPE SIZE 25 MM	60.00	M	28.00	1680.0
22	Materials for Massionary work for Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2"x2") and RCC slab cover	20.00	LS	1,600.00	32000.0
23	11KV pin insulator polymer	60.00	EA	200.00	12000.0
Subtotal Material(A)					77,82,782
Stock, Storage and Insurance@3% of A					233483.47
Sub- Total-B					8016265.87
T & P Charges @ 2% of B					160325.32
Contingency @ 3% of B					240487.98
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					800194.21
Transportation Charges@7.5% of B					601219.94
A	Cement concreting for support with C.C. 1:3:6 by using 4cm size hard granite metal=(0.45Mx0.45Mtrx1.5)M3=0.3cum	20.00	No.	2,124	42480.00
B	Cement concreting for Stud & Stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal=(0.45Mx0.45Mtrx1.5)M3=0.3cum	40.00	No.	1,270	50800.00
Sub-Total C					9911773.32
Over Head Charges (Including Supervision charges) @6% of C					594706.40
Total D					10506479.72
Gross Cost					11101186.12
OR Say					11101186.00
GST @18%					1998213.48
CESS 1%					111011.86
Gross Cost (Inc. GST)					13210411.34
Total(In Crores)					1.32
Escalation of 3 years with 18% of grand Total					1.56

B. Cost Estimate for Supply and Installation of 11 kV Sectionalizer

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	Sectionalizer 11KV 3Ph Pole mounted	30.00	EA	6,96,058.00	20881740.0
2	Lightening Arrester(9KV,5KA)	180.00	EA	980.00	176400.0
3	BOLT & NUT GI 12MMX50M HEX	30.00	KG	78.00	2340.0
4	BOLT & NUT GI 16MMX75M HEX	90.00	KG	78	7020.0
5	50x6 mm G I flat	300.00	KG	75	22500.0
6	25x6 mm G I flat	450.00	KG	75	33750.0

Detailed Project Report Capex Plan FY 22-23

7	75x40x6 mm Channel (6.80Kg./ Mtr) with Galvanization	750.00	KG	75	56250.0
8	100x50x6 mm Channel (9.2Kg./ Mtr) with Galvanization	450.00	KG	75	33750.0
9	40mm nominal bore GI pipe (medium gauge) earthing device with 3 Mtr .Long	60.00	EA	1,050	63000.0
10	7/10 SWG G I stay wire (10Kg. / Set)	1,800.00	KG	75	135000.0
11	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	240.00	EA	12	2839.2
12	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	180.00	EA	366	65880.0
13	100 Sqmm All Alloy Aluminium Conductor AAAC	450.00	M	55	24750.0
14	HT stay set complete	120.00	No	1,050.00	126000.0
15	HT Stay insulator	120.00	No	50.00	6000.0
16	HT Stay clamp	120.00	Pair	125.00	15000.0
17	7/10 SWG stay wire	1,200.00	KG	75.00	90000.0
18	ANTICLIMBING DEVICE	60.00	EA	415.80	24948.0
19	BOARD DANGER	60.00	EA	80.00	4800.0
20	PIPE HDPE SIZE 25 MM	180.00	M	28.00	5040.0
21	150X 150mm RS joist (11 Mtr long)(34.6 kg Per meter)(Each 380.6kg)	60.00	No	24,739.00	1484340.0
22	GI PLATE BASE SIZE	60.00	EA	1,500.00	90000.0
23	Materials for Massionary work for Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2"x2") and RCC slab cover	60.00	LS	1,600.00	96000.0
	11KV pin insulator polymer	180.00	EA	200.00	36000.0
Subtotal Material(A)					2,34,83,347
Stock, Storage and Insurance@3% of A					704500.42
Sub- Total-B					24187847.62
T & P Charges @ 2% of B					483756.95
Contingency @ 3% of B					725635.43
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					2414904.79
Transportation Charges@7.5% of B					1814088.57
A	Cement concreting for support with C.C. 1:3:6 by using 4cm size hard granite metal=(0.45Mx0.45Mtrx1.5)M3=0.3cum	60.00	No.	2,124	127440.00
B	Cement concreting for Stud & Stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal=(0.45Mx0.45Mtrx1.5)M3=0.3cum	120.00	No.	1,270	152400.00

Detailed Project Report Capex Plan FY 22-23

	Sub-Total C		29906073.36
	Over Head Charges (Including Supervision charges) @6% of C		1794364.40
	Total D		31700437.76
	Gross Cost		33494802.16
	OR Say		33494802.00
	GST @18%		6029064.36
	CESS 1%	-	334948.02
	Gross Cost (Inc. GST)		39858814.38
	Total(In Crores)		3.99
	Escalation of 3 years with 18% of grand Total		4.70

C. Cost Estimate for Supply and Installation of 4 Way RMU O/D at 11 kV

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	RMU 11KV 4 WAY 2X630 BKR O/D	35.00	EA	5,32,991	18654685.0
2	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	1,750.00	KG	75	131250.0
3	50x6 mm G I flat	2,100.00	KG	75	157500.0
4	25x6 mm G I flat	350.00	KG	75	26250.0
5	BOARD DANGER	175.00	EA	80	14000.0
6	40mm nominal bore GI pipe (medium gauge) earthing device with 3 Mtr .Long	140.00	EA	1,050	147000.0
7	BOLT & NUT GI 16MMX75M HEX	70.00	KG	78	5460.0
8	BOLT & NUT GI 12MMX50MM HEX	70.00	KG	78	5460.0
9	WASHER GI SIZE 16MM DIA	17.50	KG	114	1998.9
10	WASHER GI SIZE 12MM DIA	17.50	KG	114	1998.9
11	CABLE 11KV AL 3CX400 SQMM XLPE ARM	2,800.00	M	1,468	4110400.0
12	Heat shrinkable jointing kit for 3C x 400 mm ² 33 KV XLPE Cable(outdoor type)	105.00	EA	33,255	3491775.0
13	Heat shrinkable jointing kit for 3C x 400mm ² 33 KV XLPE Cable(indoor type)	105.00	EA	20,503	2152815.0
14	PIPE G.I.100MM DIA HEAVY CLASS PLAIN END	420.00	M	773	324503.4
15	PIPE HDPE SIZE 25 MM	210.00	M	31	6415.7
16	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	140.00	EA	8	1091.5
17	7/10 SWG G I stay wire (10Kg. / Set)	700.00	KG	75	52500.0

Detailed Project Report Capex Plan FY 22-23

18	125 Sqmm All Alloy Aluminium Conductor AAAC	210.00	M	77	16142.7
19	Materials for Massionary work for Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2"x2") and RCC slab cover	140.00	LS	1,600	224000.0
20	FRP Fencing (3x2.4x2.0)	700.00	Sq.M	2,615	1830678.0
21	RMU Plinth	35.00	EA	23,760	831616.8
Subtotal Material(A)					3,21,87,541
Stock, Storage and Insurance@3% of A					965626.22
Sub- Total-B					33153166.99
T & P Charges @ 2% of B					663063.34
Contingency @ 3% of B					994595.01
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					2454059.92
Transportation Charges@7.5% of B					2486487.52
Sub-Total C					39751372.78
Over Head Charges (Including Supervision charges) @6% of C					2385082.37
Total D					42136455.15
Gross Cost					42136455.15
OR Say					42136455.00
GST @18%					7584561.90
CESS 1%					421364.55
Gross Cost (Inc. GST)					50142381.45
Total(In Crores)					5.01
Escalation of 3 years with 18% of grand Total					5.92

D. Cost Estimate for Supply and Installation of 3 Way RMU O/D at 11 kV

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	RMU 11KV 3 WAY 2X630 BKR O/D	32.00	EA	4,84,749	15511968.0
2	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	1,600.00	KG	75	120000.0
3	50x6 mm G I flat	1,920.00	KG	75	144000.0
4	25x6 mm G I flat	320.00	KG	75	24000.0
5	BOARD DANGER	160.00	EA	80	12800.0
6	40mm nominal bore GI pipe (medium gauge) earthing device with 3 Mtr .Long	128.00	EA	1,050	134400.0

Detailed Project Report Capex Plan FY 22-23

7	BOLT & NUT GI 16MMX75M HEX	64.00	KG	78	4992.0
8	BOLT & NUT GI 12MMX50MM HEX	64.00	KG	78	4992.0
9	WASHER GI SIZE 16MM DIA	16.00	KG	114	1827.5
10	WASHER GI SIZE 12MM DIA	16.00	KG	114	1827.5
11	CABLE 11KV AL 3CX400 SQMM XLPE ARM	2,560.00	M	1,468	3758080.0
12	Heat shrinkable jointing kit for 3C x 400 mm ² 33 KV XLPE Cable(outdoor type)	96.00	EA	33,255	3192480.0
13	Heat shrinkable jointing kit for 3C x 400mm ² 33 KV XLPE Cable(indoor type)	96.00	EA	20,503	1968288.0
14	PIPE G.I.100MM DIA HEAVY CLASS PLAIN END	384.00	M	773	296688.8
15	PIPE HDPE SIZE 25 MM	192.00	M	31	5865.8
16	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	128.00	EA	8	998.0
17	7/10 SWG G I stay wire (10Kg. / Set)	640.00	KG	75	48000.0
18	125 Sqmm All Alloy Aluminium Conductor AAAC	192.00	M	77	14759.0
19	Materials for Massionary work for Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2"x2") and RCC slab cover	128.00	LS	1,600	204800.0
20	FRP Fencing (3x2.4x2.0)	640.00	Sq.M	2,615	1673762.7
21	RMU Plinth	32.00	EA	23,760	760335.4
Subtotal Material(A)					2,78,84,865
Stock, Storage and Insurance@3% of A					836545.94
Sub- Total-B					28721410.65
T & P Charges @ 2% of B					574428.21
Contingency @ 3% of B					861642.32
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					2159438.94
Transportation Charges@7.5% of B					2154105.80
Sub-Total C					34471025.92
Over Head Charges (Including Supervision charges) @6% of C					2068261.56
Total D					36539287.48
Gross Cost					36539287.48
OR Say					36539287.00
GST @18%					6577071.66
CESS 1%					- 365392.87
Gross Cost (Inc. GST)					43481751.53
Total(In Crores)					4.35
Escalation of 3 years with 18% of grand Total					5.13

E. Cost Estimate for Supply and Installation of 4 Way RMU O/D at 33 kV

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	Supply of 33kV, 630A, 25kA 4 Way NON Extensible, Motorized Outdoor Consisting of 2 Load Break Switch & 2 Vacuum Circuit breaker Type LLVV Model	5.00	EA	24,50,000	12250000.0
2	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	250.00	KG	75	18750.0
3	50x6 mm G I flat	300.00	KG	75	22500.0
4	25x6 mm G I flat	50.00	KG	75	3750.0
5	BOARD DANGER	25.00	EA	80	2000.0
6	40mm nominal bore GI pipe (medium gauge) earthing device with 3 Mtr .Long	25.00	EA	1,050	26250.0
7	BOLT & NUT GI 16MMX75M HEX	10.00	KG	78	780.0
8	BOLT & NUT GI 12MMX50MM HEX	10.00	KG	78	780.0
9	WASHER GI SIZE 16MM DIA	2.50	KG	114	285.6
10	WASHER GI SIZE 12MM DIA	2.50	KG	114	285.6
11	CABLE 11KV AL 3CX400 SQMM XLPE ARM	400.00	M	1,468	587200.0
12	Heat shrinkable jointing kit for 3C x 400 mm ² 33 KV XLPE Cable(outdoor type)	20.00	EA	33,255	665100.0
13	Heat shrinkable jointing kit for 3C x 400mm ² 33 KV XLPE Cable(indoor type)	20.00	EA	20,503	410060.0
14	PIPE G.I.100MM DIA HEAVY CLASS PLAIN END	60.00	M	773	46357.6
15	PIPE HDPE SIZE 25 MM	30.00	M	31	916.5
16	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	20.00	EA	8	155.9
17	7/10 SWG G I stay wire (10Kg. / Set)	100.00	KG	75	7500.0
18	125 Sqmm All Alloy Aluminium Conductor AAAC	30.00	M	77	2306.1
19	Materials for Massionary work for Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2"x2") and RCC slab cover	25.00	LS	1,600	40000.0
20	FRP Fencing (3x2.4x2.0)	100.00	Sq.M	2,615	261525.4
21	RMU Plinth	5.00	EA	23,760	118802.4

Detailed Project Report Capex Plan FY 22-23

Subtotal Material(A)		1,44,65,305
	Stock, Storage and Insurance@3% of A	433959.15
Sub- Total-B		14899264.26
	T & P Charges @ 2% of B	297985.29
	Contingency @ 3% of B	446977.93
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)	903749.22
	Transportation Charges@7.5% of B	1117444.82
Sub-Total C		17665421.52
	Over Head Charges (Including Supervision charges) @6% of C	1059925.29
Total D		18725346.81
Gross Cost		18725346.81
OR Say		18725347.00
	GST @18%	3370562.46
	CESS 1%	187253.47
	Gross Cost (Inc. GST)	22283162.93
Total(In Crores)		2.23
Escalation of 3 years with 18% of grand Total		2.63

F. Cost Estimate for Supply and Installation of Overhead Communicable FPI

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	Non-communicable FPI	474.00	EA	9,328	4421472.0
2	cost to make in Communicable	474.00	EA	4,664	2210736.0
Subtotal Material(A)					66,32,208
	Stock, Storage and Insurance@3% of A				198966.24
Sub- Total-B					6831174.24
	T & P Charges @ 2% of B				136623.48
	Contingency @ 3% of B				204935.23
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				703610.95
	Transportation Charges@7.5% of B				512338.07
Sub-Total C					8388681.97
	Over Head Charges (Including Supervision charges) @6% of C				503320.92
Total D					8892002.89
Gross Cost					8892002.89

Detailed Project Report Capex Plan FY 22-23

	OR Say		8892003.00
	GST @18%		1600560.54
	CESS 1%	-	88920.03
	Gross Cost (Inc. GST)		10581483.57
	Total(In Crores)		1.06
	Escalation of 3 years with 18% of grand Total		1.25

8.18 Annexure 18 Cost Estimate of 33KV and 11KV Voltage Regulators for voltage improvement

Sr. no	Material	Quantity	UOM	Unit Rate	Amount
1	33KV Voltage Regulator (5Nos.)	10	Nos	2000000	20000000
2	11KV Voltage Regulator (10 Nos.)	20	Nos	1100000	22000000
Total					42000000
Total In Cr.					4.2

8.19 Annexure 19 Cost Estimate for LT FLC System - Vehicle Fitted (5 Nos. - 1 for each circle) + Power Analyzer for Transformer workshop (2 Nos.) + Ultrasound Scanner (5 Nos. - 1 for each circle)

Sr. no	Material	Quantity	UOM	Unit Rate	Amount
1	LT FLC System - Vehicle Fitted	5	Nos	5030000	25150000
2	Power Analyser for Transformer workshop (2 Nos.)	2	Nos	1570000	3140000
3	Ultrasound Scanner (5 Nos. -- 1 for each circle)	5	Nos	1380000	6900000
Total					35190000
Total In Cr.					3.52

8.20 Annexure 20 Cost Estimate for Installation of station transformers (PSS)

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	100 KVA,33/0.4 KV(Cu) Transformer with tap changer,BIS Energy level-II	28.00	No	2,72,000	7616000.0
2	150X 150mm RS joist (11 Mtr long)(34.6 kg Per meter)(Each 380.6kg)	56.00	No	24,739.00	1385384.0
3	Channel 100X50X6mm. for straight cross arm (4.5mtr X 02 pcs) (9.2Kg/mtr.) Galvanisation charges @ Rs 10 per Kg for Pressure	2,296.00	Kg	75	172200.0
4	AB Switch & HG fuse mounting channel 75X40X6 mm,4.5mtr.Long 4 Nos.(6.8Kg/mtr)	2,240.00	Kg	75	168000.0
5	Cantilever channel for supporting HG fuse 75X40X6mm MS Angle 1.5 mtr. Long 2 Nos. (6.8Kg/mtr)	980.00	Kg	75	73500.0
6	Cantilever channel for supporting AB Switch 75X40X6mm MS Angle 1.5 mtr. Long 2 Nos. (6.8Kg/mtr)	980.00	Kg	75	73500.0
7	Angle for cantilever arrangement for AB switch and HG fuse 75X40X6mm 3mtr long each, 4Nos(6.8Kg/Mtr)	2,284.80	Kg	75	171360.0
8	Angle for mounting of LT distribution box 75X40X6mm 3mtr long each, (6.8Kg/Mtr)	571.20	Kg	75	42840.0
9	Disc insulator(B&S)120 KN polymer	168.00	No	1,440	241920.0
10	33KV H/W fitting (T & C) type	84.00	No	351	29484.0
11	33KV AB switch 3 Pole, 200A	28.00	Set	15,100	422800.0
12	33KV HG fuse 3 Pole, 200A	28.00	Set	12,970	363160.0
13	33KV Lighting arrestor	84.00	No	10,350.00	869400.0
14	LT Distribution Box with MCCB, Alluminium busbar of two bay with Kit Kat fuse for 100 Kva S/s	28.00	No	24,419.00	683732.0
15	HT Stay Set (Complete) REC Construction standard	56.00	Set	1,050.00	58800.0
16	HT Stay Insulator Type –C	56.00	No	50	2800.0
17	Satay Clamp (1.9 Kg /pair)	56.00	No	125	7000.0
18	7/10 G.I. Stay Wire (Grade -2)	560.00	Kg	75	42000.0
19	G.I Pipe Earthing 40mm Dia medium gauge 3mtr long for Earthing device	140.00	No	1,050	147000.0
20	Earthing for Supports (Coil type)	56.00	No	166	9296.0

Detailed Project Report Capex Plan FY 22-23

21	No.6 G.I wire for earthing	700.00	Kg	75	52500.0
22	GI Flat (25x6mm) for Neutral & body Earthing of DTR	560.00	Kg	75	42000.0
23	GI Bolts, Nuts & washers	700.00	Kg	78	54600.0
24	LT 3 .5 Core ,185 sqmm PVC cable (unarmoured)	336.00	Mtr	635.00	213360.0
25	100SQMM Dog Conductor	8,400.00	Mtr	55.00	462000.0
26	Material for earthing including masonry work for earth pit, salt , charcoal and cement plate cover	140.00	LS	1,500.00	210000.0
27	Base plate for support	56.00	No	1,500.00	84000.0
28	Sundries (Paint, Danger Board, AI Binding tape & wire insulating tape, anti climbing device , Clamp connector, Jumpering materials , Socket & other accessories etc.	28.00	LS	3,000.00	84000.0
Subtotal Material(A)					1,37,82,636
Stock, Storage and Insurance@3% of A					413479.08
Sub- Total-B					14196115.08
T & P Charges @ 2% of B					283922.30
Contingency @ 3% of B					425883.45
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					998628.58
Transportation Charges@7.5% of B					1064708.63
A	Cement concreting for support with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtrx1.5)M3=0.3cum	56.00	No.	2,124	118944.00
B	Cement concreting for Stud & Stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtrx1.5)M3=0.3cum	56.00	No.	1,270	71120.00
Sub-Total C					17159322.04
Over Head Charges (Including Supervision charges) @6% of C					1029559.32
Total D					18188881.36
Gross Cost					18188881.36
OR Say					18188881.00
GST @18%					3273998.58
CESS 1%					181888.81
Gross Cost (Inc. GST)					21644768.39
Total(In Crores)					2.16
Escalation of 3 years with 18% of grand Total					2.55

8.21 Annexure 21 Cost Estimate for Capacitor Bank at PSS for low voltage improvement

Sr. no	Material	Quantity	UOM	Unit Rate	Amount
1	Capacitor Bank at PSS for low voltage improvement (12MVAR)	5	Nos	1760000	8800000
Total					8800000
Total In Cr.					0.88

8.22 Annexure 22 Cost Estimate for Earthing of Power Transformers and Distribution Transformers

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	7/10 SWG G I stay wire, Grade -2	11050.00	KG	75	828750.0
2	40mm nominal bore GI pipe (medium gauge) earthing device with 3 Mtr .Long	1105.00	No	1,050	1160250.0
3	FLAT GI SIZE 25X6 MM	9945.00	KG	75	745875.0
4	Hexagonal Bolts with Nuts(GI)	1657.50	KG	82	135915.0
5	PIPE HDPE SIZE 20 MM	6630.00	Mtr	75	497250.0
6	Aluminium Cable Sockets 95 mm2	4420.00	EA	20	88400.0
7	Materials for Massionary work for Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2"x2") and RCC slab cover	1105.00	No	1,600	1768000.0
Subtotal Material(A)					52,24,440
Stock, Storage and Insurance@3% of A					156733.20
Sub- Total-B					5381173.20
T & P Charges @ 2% of B					107623.46

Detailed Project Report Capex Plan FY 22-23

	Contingency @ 3% of B		161435.20
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)		554260.84
	Transportation Charges@7.5% of B		403587.99
	Sub-Total C		6608080.69
	Over Head Charges (Including Supervision charges) @6% of C		396484.84
	Total D		7004565.53
	Gross Cost		7004565.53
	OR Say		7004566.00
	GST @18%		1260821.88
	CESS 1%	-	70045.66
	Gross Cost (Inc. GST)		8335433.54
	Total(In Crores)		0.834
	Escalation of 3 years with 18% of grand Total		0.98

8.23 Annexure 23 Cost Estimate for Augmentation Power Transformers

Sr.No.	Description	UOM	Qty	Amount
				in Crores
A	Augmentation from 8 MVA to 12.5 MVA Power Transformer	EA	2	3.95
B	Augmentation from 5 MVA to 8 MVA Power Transformer	EA	5	6.01
Total				9.96

A. Cost Estimate for Augmentation from 8 MVA to 12.5 MVA Power Transformer

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
	Part – A				
1	Earthing and Grounding as per applicable TS				
a	GI flat 90X6 mm size underground format	2	MT	75,000	1,50,000
b	GI flat 50X6 mm size for riser	2	MT	75,000	1,20,000
c	GI flat 25X6 mm size for riser	1	MT	75,000	1,05,000
d	8 swg GI wire	0.10	MT	75,000	7,500

Detailed Project Report Capex Plan FY 22-23

2	Busbar, droppers, jumpers and interconnections with all outdoor equipment using 232 sq.mm AAA Conductor , all associated conductor, insulator, hardwares,clamps, 8 SWG wire etc as per applicable TS				
a	33 KV & 11 KV Bus bar with 232 sq.mm AAA Conductor	0.40	km	1,56,500	62,600
b	Equipment jumpering with 232 sq.mm AAA Conductor	0.40	km	1,56,500	62,600
c	3 Bolted(3 pair M-16 U bolts to be used) 33 Kv H/W fitting with 4 nos Insulator (70KN) String Suitable for 232 sq.mm AAA Conductor	18	Set	9,059	1,63,069
d	12 bolted (M-12)"T" clamp, 232 sq.mm AAAC run & 230 mm drop	6	No	960	5,760
e	3 Bolted (M- 16) PG Clamp suitable for 232 sq.mm AAA Conductor	24	No	1,150	27,600
3	33 KV 800 AMP Double break (Turn & twist center rotating) isolator without earth switch with PI(Porcelain)	2	Set	73,500	1,47,000
4	33Kv O/D VCB with CT & In-Door Control Relay Panel (Excluding Foundation) for transformer	0	Set	5,90,000	-
5	33/11 KV, 12.5 MVA 33/11 KV (Cu) Power Transformers with OLTC (Excluding Foundation)	2	No	97,45,700	1,94,91,400
6	33KV post insulator(2X24KV Post insulator Stack)	6	No	1,580	9,480
Subtotal Material(A)					2,03,52,009
Stock, Storage and Insurance@3% of A					610560.28
Sub- Total-B					20962569.48
T & P Charges @ 2% of B					419251.39
Contingency @ 3% of B					628877.08
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					1154361.12
Transportation Charges@7.5% of B					1572192.71
Sub-Total C					24737251.78
Over Head Charges (Including Supervision charges) @6% of C					1484235.11
A	Dismantling of existing transformer	2	EA	50600	101200.00
B	Testing	2	EA	161700	323400.00
Total D					26646086.89
Gross Cost					28130322.00
OR Say					28130322.00
GST @18%					5063457.96
CESS 1%					281303.22
Gross Cost (Inc. GST)					33475083.18
Total(In Crores)					3.35
Escalation of 3 years with 18% of grand Total					3.95

Detailed Project Report Capex Plan FY 22-23

B. Cost Estimate for Augmentation from 5 MVA to 8 MVA Power Transformer

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
	Part - A				
1	Earthing and Grounding as per applicable TS				
a	GI flat 90X6 mm size underground format	5	MT	75,000	3,75,000
b	GI flat 50X6 mm size for riser	4	MT	75,000	2,62,500
c	GI flat 25X6 mm size for riser	4	MT	75,000	2,62,500
d	8 swg GI wire	0	MT	75,000	18,750
2	Busbar, droppers, jumpers and interconnections with all outdoor equipment using 232 sq.mm AAA Conductor , all associated conductor, insulator, hardwares,clamps, 8 SWG wire etc as per applicable TS				
a	33 KV & 11 KV Bus bar with 232 sq.mm AAA Conductor	1.00	km	1,56,500	1,56,500
b	Equipment jumpering with 232 sq.mm AAA Conductor	1.00	km	1,56,500	1,56,500
c	3 Bolted(3 pair M-16 U bolts to be used) 33 Kv H/W fitting with 4 nos Insulator (70KN) String Suitable for 232 sq.mm AAA Conductor	45	Set	9,059	4,07,673
d	12 bolted (M-12)"T" clamp, 232 sq.mm AAAC run & 230 mm drop	15	No	960	14,400
e	3 Bolted (M- 16) PG Clamp suitable for 232 sq.mm AAA Conductor	60	No	1,150	69,000
3	33 KV 800 AMP Double break (Turn & twist center rotating) isolator without earth switch with PI(Porcelain)	5	Set	73,500	3,67,500
4	33Kv O/D VCB with CT & In-Door Control Relay Panel (Excluding Foundation) for transformer	0	Set	5,90,000	-
5	33/11 KV, 8 MVA 33/11 KV (Cu) Power Transformers with OLTC (Excluding Foundation)	5	No	57,00,000	2,85,00,000
6	33Kv Post Insulator	15	No	1,580	23,700
	Subtotal Material(A)				3,06,14,023
	Stock, Storage and Insurance@3% of A				918420.69
	Sub- Total-B				31532443.69
	T & P Charges @ 2% of B				630648.87
	Contingency @ 3% of B				945973.31
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				1777650.60

Detailed Project Report Capex Plan FY 22-23

	Transportation Charges@7.5% of B				2364933.28
	Sub-Total C				37251649.75
	Over Head Charges (Including Supervision charges) @6% of C				2235098.99
A	Dismantling of existing transformer	5	EA	50600	253000.00
B	Testing	5	EA	161700	808500.00
	Total D				40548248.74
	Gross Cost				42783347.73
	OR Say				42783348.00
	GST @18%				7701002.64
	CESS 1%				-
	Gross Cost (Inc. GST)				50912184.12
	Total(In Crores)				5.09
	Escalation of 3 years with 18% of grand Total				6.01

8.24 Annexure 24 Cost Estimate for Augmentation of Distribution Transformers

Sr.No.	Description	UOM	Qty	Amount
				in Crores
A	Augmentation of 200/250 KVA to 400 KVA Distribution Transformers	EA	23	4.32
B	Augmentation of 100 KVA to 250 KVA Distribution Transformers	EA	71	7.03
C	Augmentation of 25/63 KVA to 100 KVA Distribution Transformers	EA	165	9.46
Total				20.81

A. Cost Estimate for Augmentation of 200/250 KVA to 400 KVA Distribution Transformer

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	400 KVA,11/0.4KV(Al) Transformer	23.00	EA	7,49,965.00	17249195.0
2	ACB LT 400A	46.00	EA	39,625.00	1822750.0
3	75x40x6 mm Channel (6.80Kg. / Mtr) With Galvanization	1,150.00	KG	75.00	86250.0
4	AB Switch(11KV,400A,3Pole,50Hz)	23.00	EA	11,850	272550.0
5	Lightening Arrester(9KV,5KA)	69.00	EA	980	67620.0

Detailed Project Report Capex Plan FY 22-23

6	HG Fuse(11KV,3 Pole)	69.00	EA	11,530	795570.0
7	100MMSQ AAA CONDUCTOR FOR JUMPERING	529.00	M	55	29095.0
8	CABLE 1.1KV AL 1CX630 SQMM ARM	368.00	M	618	227424.0
9	GLAND FOR ARM CABLE	92.00	EA	280	25760.0
10	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos (9.2 Kg. / Mtr.) with Galvanization	1,184.96	KG	75	88872.0
11	Transformer Mounting Channel (100x50X6)mm 2.8 Mtr long 2 Nos (9.2 Kg./Mtr.) with Galvanization	1,184.96	KG	75	88872.0
12	AB Switch and HG Fuse Mounting Channel (75x40X6)mm 2.8 Mtr long 4Nos (6.8 Kg./Mtr.) with Galvanization	1,751.68	KG	75	131376.0
13	Transformer Belting angle (50X50X6) mm 2.8mtr long 2 nos. (4.5 Kg./Mtr.)with side angle (total 7mtr) with Galvanization	724.50	KG	75	54337.5
14	Angle for mounting LT distribution box (50X50X6) mm 2.8mtr long 2nos (4.5 Kg./Mtr.)with side angle with Galvanization	310.50	KG	75.00	23287.5
15	11 KV Disc Insulator T & C Type 45 KN POLYMER	69.00	NO	860.00	59340.0
16	11 KV hard ware fitting T & C Type 45KN	69.00	NO	130.00	8970.0
17	50x6 mm G I flat	1,171.16	KG	75	87837.0
18	25x6 mm G I flat	387.32	KG	75	29049.0
19	G.I NUTS,BOLTS & WASHERS	230.00	KG	78	17940.0
20	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	230.00	EA	12	2720.9
21	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	1,242.00	EA	36	44712.0
22	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	184.00	EA	29	5352.6
23	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	69.00	EA	320	22080.0
24	TEMPLETE FOR TRANSFORMER MAINT.RECORD	23.00	EA	68	1564.0
25	TAPE HT SCOTCH 23 25MMX9.1M 66KV	20.93	ROL	540.54	11313.5
26	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	8.28	EA	1,550.75	12840.2
27	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	92.00	EA	1,188.38	109331.0
28	ALNOX 3M (HOT SPOT REDUCING PASTE)	1.61	EA	4,084.64	6576.3
29	3M SCOTCH 1625 SPRAY	9.20	EA	754.98	6945.8

Detailed Project Report Capex Plan FY 22-23

30	3M SCOTCH FILL PUTTY	23.00	EA	462.69	10641.9
31	RODENT CAPACITIVE SCREEN GUARD FOR- DT	69.00	EA	2,177.28	150232.3
32	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	46.00	EA	884.00	40664.0
33	SLEEV BLACK POLYOLEFIN	46.00	M	377.41	17360.9
34	40MM NOMINAL BORE GI PIPE (MEDIUM GAUGE) EARTHING DEVICE WITH 3 MTR LONG	115.00	EA	1,050	120750.0
35	PIPE HDPE SIZE 25 MM	529.00	M	28	14812.0
36	7/10 SWG G I stay wire (10Kg. / Set)	460.00	KG	75	34500.0
37	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	115.00	LS	1600.00	184000.0
38	FRP Fencing	644.00	Sq.M	2615.00	1684060.0
39	CONNECTOR MINI WEDGE 25 SQMM TO DOG	69.00	EA	183	12627.0
Subtotal Material(A)					2,36,59,179
Stock, Storage and Insurance@3% of A					709775.38
Sub- Total-B					24368954.65
T & P Charges @ 2% of B					487379.09
Contingency @ 3% of B					731068.64
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					1621668.79
Transportation Charges@7.5% of B					1827671.60
Sub-Total C					29036742.76
Over Head Charges (Including Supervision charges) @6% of C					1742204.57
Total D					30778947.33
Gross Cost					30778947.33
OR Say					30778947.00
GST @18%					5540210.46
CESS 1%					307789.47
Gross Cost (Inc. GST)					36626946.93
Total(In Crores)					3.66
Escalation of 3 years with 18% of grand Total					4.32

B. Cost Estimate for Augmentation of 100 KVA to 250 KVA Distribution Transformer

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	250 KVA,11/0.4KV(Al) Transformer	71.00	EA	2,68,450	19059950.0

Detailed Project Report Capex Plan FY 22-23

2	ACB LT 400A	142.00	EA	39,919.00	5668498.0
3	AB Switch(11KV,400A,3Pole,50Hz)	71.00	EA	11,850	841350.0
4	Lightening Arrester(9KV,5KA)	213.00	EA	980	208740.0
5	HG Fuse(11KV,3 Pole)	213.00	EA	11,530	2455890.0
6	100MMSQ AAA CONDUCTOR FOR JUMPERING	1,633.00	M	55	89815.0
7	CABLE 1.1KV AL 1CX150 SQMM ARM	710.00	M	279	198090.0
8	GLAND FOR ARM CABLE 1CX150 SQ.MM	284.00	EA	280	79520.0
9	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos (9.2 Kg. / Mtr.) with Galvanization	3,657.92	KG	75	274344.0
10	Transformer Mounting Channel (100x50X6)mm 2.8 Mtr long 2 Nos (9.2 Kg./Mtr.) with Galvanization	3,657.92	KG	75	274344.0
11	AB Switch and HG Fuse Mounting Channel (75x40X6)mm 2.8 Mtr long 4Nos (6.8 Kg./Mtr.) with Galvanization	5,407.36	KG	75	405552.0
12	Transformer Belting angle (50X50X6) mm 2.8mtr long 2 nos. (4.5 Kg./Mtr.)with side angle (total 7mtr) with Galvanization	2,236.50	KG	75	167737.5
13	Angle for mounting LT distribution box (50X50X6) mm 2.8mtr long 2nos (4.5 Kg./Mtr.)with side angle with Galvanization	958.50	KG	75.00	71887.5
14	11 KV Disc Insulator T & C Type 45 KN POLYMER	213.00	NO	860.00	183180.0
15	11 KV hard ware fitting T & C Type 45KN	213.00	NO	130.00	27690.0
16	50x6 mm G I flat	3,615.32	KG	75	271149.0
17	25x6 mm G I flat	1,195.64	KG	75	89673.0
18	G.I NUTS,BOLTS & WASHERS	710.00	KG	78	55380.0
19	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	710.00	EA	12	8399.3
20	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	3,834.00	EA	36	138024.0
21	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	568.00	EA	29	16523.1
22	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	213.00	EA	320	68160.0
23	TEMPLETE FOR TRANSFORMER MAINT.RECORD	71.00	EA	68	4828.0
24	TAPE HT SCOTCH 23 25MMX9.1M 66KV	64.61	ROL	540.54	34924.3
25	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	25.56	EA	1,550.75	39637.2
26	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	284.00	EA	1,188.38	337499.9

Detailed Project Report Capex Plan FY 22-23

27	ALNOX 3M (HOT SPOT REDUCING PASTE)	4.97	EA	4,084.64	20300.7
28	3M SCOTCH 1625 SPRAY	28.40	EA	754.98	21441.4
29	3M SCOTCH FILL PUTTY	71.00	EA	462.69	32851.0
30	RODENT CAPACITIVE SCREEN GUARD FOR-DT	213.00	EA	2,177.28	463760.6
31	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	142.00	EA	884.00	125528.0
32	SLEEV BLACK POLYOLEFIN	142.00	M	377.41	53592.2
33	40MM NOMINAL BORE GI PIPE (MEDIUM GAUGE) EARTHING DEVICE WITH 3 MTR LONG	355.00	EA	1,050	372750.0
34	PIPE HDPE SIZE 25 MM	1,633.00	M	28	45724.0
35	7/10 SWG G I stay wire (10Kg. / Set)	1,420.00	KG	75	106500.0
36	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	355.00	LS	1600.00	568000.0
37	FRP Fencing	1,988.00	Sq.M	2615.00	5198620.0
38	CONNECTOR MINI WEDGE 25 SQMM TO DOG	213.00	EA	183	38979.0
Subtotal Material(A)					3,81,18,833
Stock, Storage and Insurance@3% of A					1143564.98
Sub- Total-B					39262397.72
T & P Charges @ 2% of B					785247.95
Contingency @ 3% of B					1177871.93
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					3062439.54
Transportation Charges@7.5% of B					2944679.83
Sub-Total C					47232636.97
Over Head Charges (Including Supervision charges) @6% of C					2833958.22
Total D					50066595.19
Gross Cost					50066595.19
OR Say					50066595.00
GST @18%					9011987.1
CESS 1%					-
Gross Cost (Inc. GST)					59579248.05
Total(In Crores)					5.96
Escalation of 3 years with 18% of grand Total					7.03

C. Cost Estimate for Augmentation of 25/63 KVA to 100 KVA Distribution Transformer

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	100 KVA,11/0.4KV(AI) Transformer	165.00	EA	1,17,000	19305000.0

Detailed Project Report Capex Plan FY 22-23

2	LT Distribution Box for 100 KVA S/S.	165.00	EA	24,419.00	4029135.0
3	AB Switch(11KV,200A,3Pole,50Hz)	165.00	EA	7,350	1212750.0
4	Lightening Arrester(9KV,5KA)	495.00	EA	980	485100.0
5	HG Fuse(11KV,3 Pole)	495.00	EA	6,120	3029400.0
6	100MMSQ AAA CONDUCTOR FOR JUMPERING	3,795.00	M	55	208725.0
7	CABLE 1.1KV AL 1CX150 SQMM ARM	1,650.00	M	279	460350.0
8	GLAND FOR ARM CABLE 1CX150 SQ.MM	660.00	EA	280	184800.0
9	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos (9.2 Kg. / Mtr.) with Galvanization	8,500.80	KG	75	637560.0
10	Transformer Mounting Channel (100x50X6)mm 2.8 Mtr long 2 Nos (9.2 Kg./Mtr.) with Galvanization	8,500.80	KG	75	637560.0
11	AB Switch and HG Fuse Mounting Channel (75x40X6)mm 2.8 Mtr long 4Nos (6.8 Kg./Mtr.) with Galvanization	12,566.40	KG	75	942480.0
12	Transformer Belting angle (50X50X6) mm 2.8mtr long 2 nos. (4.5 Kg./Mtr.)with side angle (total 7mtr) with Galvanization	5,197.50	KG	75	389812.5
13	Angle for mounting LT distribution box (50X50X6) mm 2.8mtr long 2nos (4.5 Kg./Mtr.)with side angle with Galvanization	2,227.50	KG	75.00	167062.5
14	11 KV Disc Insulator T & C Type 45 KN POLYMER	495.00	NO	860.00	425700.0
15	11 KV hard ware fitting T & C Type 45KN	495.00	NO	130.00	64350.0
16	50x6 mm G I flat	8,401.80	KG	75	630135.0
17	25x6 mm G I flat	2,778.60	KG	75	208395.0
18	G.I NUTS,BOLTS & WASHERS	1,650.00	KG	78	128700.0
19	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	1,650.00	EA	12	19519.5
20	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	8,910.00	EA	36	320760.0
21	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	1,320.00	EA	29	38398.8
22	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	495.00	EA	320	158400.0
23	TEMPLETE FOR TRANSFORMER MAINT.RECORD	165.00	EA	68	11220.0
24	TAPE HT SCOTCH 23 25MMX9.1M 66KV	150.15	ROL	540.54	81162.1
25	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	59.40	EA	1,550.75	92114.6
26	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	660.00	EA	1,188.38	784330.8

Detailed Project Report Capex Plan FY 22-23

27	ALNOX 3M (HOT SPOT REDUCING PASTE)	11.55	EA	4,084.64	47177.6
28	3M SCOTCH 1625 SPRAY	66.00	EA	754.98	49828.7
29	3M SCOTCH FILL PUTTY	165.00	EA	462.69	76343.9
30	RODENT CAPACITIVE SCREEN GUARD FOR-DT	495.00	EA	2,177.28	1077753.6
31	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	330.00	EA	884.00	291720.0
32	SLEEV BLACK POLYOLEFIN	330.00	M	377.41	124545.3
33	40MM NOMINAL BORE GI PIPE (MEDIUM GAUGE) EARTHING DEVICE WITH 3 MTR LONG	825.00	EA	1,050	866250.0
34	PIPE HDPE SIZE 25 MM	3,795.00	M	28	106260.0
35	7/10 SWG G I stay wire (10Kg. / Set)	3,300.00	KG	75	247500.0
36	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	825.00	LS	1600.00	1320000.0
37	FRP Fencing	4,620.00	Sq.M	2615.00	12081300.0
38	CONNECTOR MINI WEDGE 25 SQMM TO DOG	495.00	EA	183	90585.0
Subtotal Material(A)					5,10,32,185
Stock, Storage and Insurance@3% of A					1530965.54
Sub- Total-B					52563150.29
T & P Charges @ 2% of B					1051263.01
Contingency @ 3% of B					1576894.51
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					4419796.98
Transportation Charges@7.5% of B					3942236.27
Sub-Total C					63553341.06
Over Head Charges (Including Supervision charges) @6% of C					3813200.46
Total D					67366541.52
Gross Cost					67366541.52
OR Say					67366542.00
GST @18%					12125977.56
CESS 1%					-
Gross Cost (Inc. GST)					80166184.98
Total(In Crores)					8.02
Escalation of 3 years with 18% of grand Total					9.46

8.25 Annexure 25 Cost Estimate for Addition of New LT lines

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	1.1KV LT AB Cable 4x95+1x95+1x16mm2	60,255.00	M	422	25407725.9
1	1.1KV LT AB Cable 4x50+1x50+1x16mm2	60,255.00	M	228	13763447.1

Detailed Project Report Capex Plan FY 22-23

2	300Kg PSC pole 9Mtr long	2,925.00	EA	3,000	8775000.0
3	Base Plate for PSC pole	2,925.00	EA	230	672750.0
4	Danger plate	2,925.00	EA	80	234000.0
5	G I Barbed wire	8,541.00	KG	80	683280.0
6	Pole clamp for EYE hook for XLPE Aerial bunched Cable	2,574.00	Pair	200	514800.0
7	Suspension Clamp with EYE hook for ABC	2,574.00	No.	340	875160.0
8	Eye Hook for AB cable for dead end point	2,574.00	No.	60	154440.0
9	Conductor Dead End Clamp suitable for bare messenger XLPE Aerial bunched cable(25-95 sq mm)	2,106.00	No.	65	136890.0
10	LT Stay set Complete	1,170.00	Set	520	608400.0
11	LT Stay Insulator	1,170.00	No.	30	35100.0
12	LT Stay clamp	1,170.00	Pair	110	128700.0
13	7/10 SWG G I stay wire (10Kg. / Set)	2,340.00	KG	75	175500.0
14	Coil Earthing	2,925.00	EA	166	485550.0
15	Pipe HDPE Size 25MM (3 mtr each)	1,755.00	M	28	49140.0
16	Lug AL 70 SQMM for 7/8 SWG WIRE/EARTHING	2,925.00	EA	36	105300.0
17	LT Distribution Box Polycarbonate	2,340.00	EA	984	2303121.6
18	Cap cable end for ABC Cables	1,872.00	EA	81	151632.0
19	IPC KZ 4X150	2,340.00	EA	52	121141.8
20	IPC EP 95 LT ABC 16-95 & 5-10 SQMM ST.LT	9,360.00	EA	88	826394.4
21	IPC KZ 2x150 LTABC 50-150 & 6-35(50) sqmm	936.00	EA	64	60334.6
22	STEEL STRAP SIZE 20 MMX50 M LONG	234.00	ROL	1,620	378991.1
23	BUCKLES FOR STEEL STRAP (1 EA = 100 NOS)	234.00	EA	491	114816.8
24	CABLE 1.1KV AL 4CX25 SQMM ARM	3,510.00	M	170	595050.3
25	GLAND FOR CABLE 4X25 SQ.MM	2,340.00	EA	48	111963.1
26	LUG AL CRIMPING 25 SQMM XLPE SINGLE HOLE	1,170.00	EA	7	8143.2
27	FLAT GI Size 25x6 MM	5,265.00	KG	75	394875.0

Detailed Project Report Capex Plan FY 22-23

28	BOLT & NUT GI 12MMX50MM HEX	1,755.00	KG	78	136890.0
29	BOLT & NUT GI 16MMX75M HEX	1,170.00	KG	78	91260.0
30	WASHER GI SIZE 12MM DIA	351.00	KG	78	27378.0
31	2Cx4 mm ² LT XLPE Cable	23,400.00	Mtr	48	1123200.0
32	4Cx10 mm ² LT XLPE Cable	11,700.00	Mtr	84	987948.0
33	WASHER GI SIZE 16MM DIA	117.00	KG	78	9126.0
34	TIE PLASTIC BLACK SIZE 7.6 MM X 380 MM	1,170.00	EA	26	30221.1
35	Tie Plastic size 9mmx265mm	1,755.00	EA	22	39189.2
36	40mm dia GI pipe earthing device 3 mtr. Long	585.00	EA	1,050	614250.0
37	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	585.00	LS	1,600	936000.0
Subtotal Material(A)					6,18,67,109
Stock, Storage and Insurance@3% of A					1856013.27
Sub- Total-B					63723122.24
T & P Charges @ 2% of B					1274462.44
Contingency @ 3% of B					1911693.67
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					7467306.59
Transportation Charges@7.5% of B					4779234.17
A	Cement concreting for support with C.C. 1:3:6 by using 4cm size hard granite metal=(0.45Mx0.45Mtrx1.5)M3=0.3cum	2,925.00	No.	2,124	6212700.00
B	Cement concreting for Stud & Stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal=(0.45Mx0.45Mtrx1.5)M3=0.3cum	1,170.00	No.	1,270	1485900.00
Sub-Total C					86854419.11
Over Head Charges (Including Supervision charges) @6% of C					5211265.15
Total D					92065684.26
Gross Cost					97276949.41
OR Say					97276949.00
GST @18%					17509850.82
CESS 1%					972769.49
Gross Cost (Inc. GST)					115759569.31
Total(In Crores)					11.576
Escalation of 3 years with 18% of grand Total					13.660

8.26 Annexure 26 Cost Estimate for Addition of 11 kV Lines (O/H and U/G)

Sr.No.	Description	UOM	Qty	Amount
				in Crores
A	11 kV Addition Line (O/H) -100 sq.mm AAAC	Ckm	163	32.71
B	11 kV Addition Line (U/G) - 3Cx400 sq.mm XLPE Cable	Ckm	2	1.25
Total				33.96

A. Cost Estimate for 11 kV Addition Line (O/H) -100 sq.mm AAAC

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	100 sqmm All Alloy Aluminum Conductor AAAC	503670	M	55.00	2,77,01,850
2	150X 150mm RS joist (11 Mtr long)(34.6 kg Per meter)(Each 380.6kg)	4075	KG	24,739	10,08,11,425
3	BOLT & NUT GI 16MMX75M HEX	4238	KG	82	3,47,516
4	BOLT & NUT GI 16MMX200MM HEX	3912	KG	82	3,20,784
5	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr. length, 6 no's required = (6x2.36x0.280)	1939	KG	65	1,26,021
6	50x50x6 mm M.S Angle (4.50Kg. / Mtr)	13144	KG	65	8,54,381
7	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	18621	KG	65	12,10,373
8	100x50x6 mm MS Channel (9.2Kg. / Mtr)	17930	KG	65	11,65,450
9	50x6 mm G I flat	0	KG	75	-
10	25x6 mm G I flat	5216	KG	75	3,91,200
11	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	326	EA	1,050	3,42,300
12	PIPE HDPE SIZE 25 MM	3586	M	31	1,11,166
13	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	2608	EA	17	44,336
14	WASHER MS SIZE 16MM DIA	489	KG	95	46,335
15	BOARD DANGER 11KV SIZE 8X10 INCH	3586	EA	80	2,86,880
16	G I Barbed wire	7172	EA	80	5,73,760
17	INSULATOR STAY (GUY/EGG) 11KV	1956	EA	50	97,800
18	GI Base Plate (500x500x10mm)for PSC pole (20kg)	4075	EA	1,500	61,12,500
19	HT stay set complete	1956	Set	1,050	20,53,800
20	Disc Insulator(B&S) 70KN Polymer	1956	EA	1150	22,49,400
21	HW FITTING(B&S) 70KN 3 BOLT	1956	EA	350	6,84,600
22	11 KV V cross arm 10.2 Kg each	3423	EA	810	27,72,630
23	7/10 SWG G I stay wire (11Kg. / Set)	21516	KG	75	16,13,700
24	HT stay Clamp (1.9Kg/pair)	1956	Pair	125	2,44,500
25	GI Back Clamp for V cross arm (11KV) (0.85 kg each)	3423	EA	80	2,73,840
26	No. 6 GI wire	7009	KG	75	5,25,675
27	PG clamp for 100 mm ² AAA conductor	2934	EA	580	17,01,720
28	Earthing Coil	4075	No	166	6,76,450

Detailed Project Report Capex Plan FY 22-23

29	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	326	LS	1600.00	5,21,600
30	11KV pin insulator polymer	11247	EA	200	22,49,400
31	Cradle guarding for road/line crossing	326	Ls	11,071	36,09,146
Subtotal Material(A)					15,97,20,538
Stock, Storage and Insurance@3% of A					4791616.13
Sub- Total-B					164512153.72
T & P Charges @ 2% of B					3290243.07
Contingency @ 3% of B					4935364.61
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					11752963.45
Transportation Charges@7.5% of B					12338411.53
A	Cement concreting for support with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtrx1.5)M3=0.3cum@4158.84=@4158.84 =0.3037xRs.4185.84=Rs.1263.03 or Rs.1270.00(Including HT and LT)	4,075.00	No.	2,124	8655300.00
B	Cement concreting for Stud & Stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtrx1.5)M3=0.3cum@4158.84=@4158.84 =0.3037xRs.4185.84=Rs.1263.03 or Rs.1270.00(including HT and LT)	1,956.00	No.	1,270	2484120.00
Sub-Total C					207968556.38
Over Head Charges (Including Supervision charges) @6% of C					12478113.38
Total D					220446669.76
Gross Cost					232924783.14
OR Say					232924783.00
GST @18%					41926460.94
CESS 1%					-
Gross Cost (Inc. GST)					277180491.77
Total(In Crores)					27.72
Escalation of 3 years with 18% of grand Total					32.71

B. Cost Estimate for 11 kV Addition Line (U/G) -3Cx400 sq.mm XLPE Cable

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	3C x 400mm ² 11KV XLPE Cable (Armoured), A2XFY	2000	Mtr	1,500.00	30,00,000
2	Heat shrinkable jointing kit for 3Cx 400mm ² 11 KV XLPE Cable(outdoor type)	4	No	13904	55,616
3	Heat shrinkable jointing kit for 3Cx400 mm ² 11 KV XLPE Cable(straight type)	6	No	25317	1,51,902
4	HDPE Pipe, 8", 10 Mtr, (Spec PE80-PN8, 200MM Dia)	1900	mtr	1785.00	33,91,500

Detailed Project Report Capex Plan FY 22-23

5	Route and joint indicating stones	40	nos	121	4,840
6	PIPE G.I.100MM DIA HEAVY CLASS PLAIN END	60	Mtr	651	39,060
7	40mm nominal bore GI pipe (medium gauge) earthing device with 3 Mtr .Long	4	EA	1050	4,200
8	7/10 SWG G I stay wire, Grade -2	80	KG	75	6,000
9	PIPE HDPE SIZE 20 MM	12	Mtr	37.78	453
10	Aluminium Cable Sockets 95 mm ²	8	EA	20	160
Subtotal Material(A)					66,53,731
Stock, Storage and Insurance@3% of A					199611.94
Sub- Total-B					6853343.30
T & P Charges @ 2% of B					137066.87
Contingency @ 3% of B					205600.30
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					705894.36
Transportation Charges@7.5% of B					514000.75
Sub-Total C					8415905.58
Over Head Charges (Including Supervision charges) @6% of C					504954.33
Total D					8920859.91
Gross Cost					8920859.91
OR Say					8920860.00
GST @18%					1605754.8
CESS 1%					- 89208.6
Gross Cost (Inc. GST)					10615823.40
Total(In Crores)					1.06
Escalation of 3 years with 18% of grand Total					1.25

8.27 Annexure 27 Cost Estimate for Addition of 33 kV Overhead Lines (O/H and U/G)

Sr.No.	Description	UOM	Qty	Amount
				in Crores
A	33 kV Addition Line (O/H) -148 sq.mm AAAC	Ckm	82.8	19.82
B	33 kV Addition Line (U/G) - 3Cx400 sq.mm XLPE Cable	Ckm	2.5	1.92
Total				21.74

Detailed Project Report Capex Plan FY 22-23

A. Cost Estimate for 33 kV Addition Line (O/H) -148 sq.mm AAAC

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	148mm ² All Aluminium Alloy Conductor. AAAC	255852	M	82.00	2,09,79,864
2	150X 150mm RS joist (13 Mtr long)(34.6 kg Per meter)(Each 415.2kg)	2070	KG	29,237	6,05,20,590
3	BOLT & NUT GI 16MMX75M HEX	2153	KG	82	1,76,530
4	BOLT & NUT GI 16MMX200MM HEX	1987	KG	82	1,62,950
5	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr. length, 6 no's required = (6x2.36x0.280)	985	KG	65	64,016
6	50x50x6 mm M.S Angle (4.50Kg. / Mtr)	7452	KG	65	4,84,380
7	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	7783	KG	65	5,05,908
8	100x50x6 mm MS Channel (9.2Kg. / Mtr)	6293	KG	65	4,09,032
9	50x6 mm G I flat	0	KG	75	-
10	25x6 mm G I flat	2650	KG	75	1,98,720
11	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	166	EA	1,050	1,73,880
12	PIPE HDPE SIZE 25 MM	2153	M	31	66,737
13	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	1325	EA	17	22,522
14	WASHER MS SIZE 16MM DIA	248	KG	95	23,537
15	BOARD DANGER 33KV SIZE 8X10 INCH	2070	EA	80	1,65,600
16	G I Barbed wire	4140	EA	80	3,31,200
17	INSULATOR STAY (GUY/EGG) 11KV	994	EA	50	49,680
18	PLATE BASE RCC SIZE 450X450X50MM	828	EA	110	91,080
19	HT stay set complete	994	Set	1,050	10,43,280
20	Disc insulator (B&S) 120KN Polymer	994	EA	1,440	14,30,784
21	33KV H W fitting(B&S)90KN, 3Bolt	994	EA	351	3,48,754
22	V-Cross arm 33 KV 22 KG	1739	EA	1,580	27,47,304
23	7/10 SWG G I stay wire (12Kg. / Set)	11923	KG	75	8,94,240

Detailed Project Report Capex Plan FY 22-23

24	HT stay Clamp (1.9Kg/pair)	994	Pair	125	1,24,200
25	Back Clamp for V cross arm(33KV) 1.7 kg each 950*8 Flat)	1739	EA	150	2,60,820
26	No. 6 GI wire	3560	KG	75	2,67,030
27	PG clamp for 148 mm ² AAA conductor	1490	EA	620	9,24,048
28	Earthing Coil	2070	No	166	3,43,620
29	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	166	LS	1600.00	2,64,960
30	33KV pin insulator polymer	5713	EA	480	27,42,336
31	Cradle guarding for road/line crossing	166	Ls	11,071	18,33,358
Subtotal Material(A)					9,76,50,958
Stock, Storage and Insurance@3% of A					2929528.75
Sub- Total-B					100580486.96
T & P Charges @ 2% of B					2011609.74
Contingency @ 3% of B					3017414.61
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					7242979.77
Transportation Charges@7.5% of B					7543536.52
A	Cement concreting for support with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtrx1.5)M3=0.3cum@4158.84=@4158 .84 =0.3037xRs.4185.84=Rs.1263.03 or Rs.1270.00(Including HT and LT)	2,070.00	No.	2,124	4396680.00
B	Cement concreting for Stud & Stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtrx1.5)M3=0.3cum@4158.84=@4158 .84 =0.3037xRs.4185.84=Rs.1263.03 or Rs.1270.00(including HT and LT)	993.60	No.	1,270	1261872.00
Sub-Total C					126054579.61
Over Head Charges (Including Supervision charges) @6% of C					7563274.78
Total D					133617854.39
Gross Cost					141181129.17
OR Say					141181129.00
GST @18%					25412603.22
CESS 1%					- 1411811.29
Gross Cost (Inc. GST)					168005543.51
Total(In Crores)					16.801
Escalation of 3 years with 18% of grand Total					19.825

Detailed Project Report Capex Plan FY 22-23

B. Cost Estimate for 33 kV Addition Line (U/G) -3Cx400 sq.mm XLPE Cable

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	3Cx 400 mm ² 33KV XLPE Cable(armoured), A2XFY	2500	Mtr	2,032	50,80,000
2	Heat shrinkable jointing kit for 3Cx400 mm ² 33 KV XLPE Cable(outdoor type)	5	No	33,255	1,66,275
3	Heat shrinkable jointing kit for 3Cx400 mm ² 33 KV XLPE Cable(Straight type)	8	No	68,594	5,14,455
4	HDPE Pipe, 8", 10 Mtr, (Spec PE80-PN8, 200MM Dia)	2375	Mtr	1,785	42,39,375
5	Route and joint indicating stones	50	nos	121	6,050
6	Supply & laying of 200 mm Dia 6 mm thick ISI marked GI pipe with jointing sockets (wherever required) & making of proper sealing arrangement at the ends of pipes with petty Massionary work.(As per TPDDL specifications or IS in case TPDDL specifications are not available)	75	Mtr	2,033	1,52,475
7	40mm nominal bore GI pipe (medium gauge) earthing device with 3 Mtr .Long	5	EA	1050	5,250
8	7/10 SWG G I stay wire, Grade -2	100	KG	75	7,500
9	PIPE HDPE SIZE 20 MM	15	Mtr	37.78	567
10	Aluminium Cable Sockets 95 mm ²	10	EA	20	200
Subtotal Material(A)					1,01,72,147
Stock, Storage and Insurance@3% of A					305164.40
Sub- Total-B					10477311.10
T & P Charges @ 2% of B					209546.22
Contingency @ 3% of B					314319.33
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					1079163.04
Transportation Charges@7.5% of B					785798.33
Sub-Total C					12866138.02
Over Head Charges (Including Supervision charges) @6% of C					771968.28
Total D					13638106.30
Gross Cost					13638106.30
OR Say					13638106.00
GST @18%					2454859.08
CESS 1%					136381.06
Gross Cost (Inc. GST)					16229346.14
Total(In Crores)					1.623
Escalation of 3 years with 18% of grand Total					1.915

8.28 Annexure 28 Cost Estimate for Addition of New PTR & New DTRs Along with Associated HT/LT lines

Sr.No.	Description	UOM	Qty	Amount
				in Crores
A	Addition of New DTR along with associated HT / LT Line.	Nos	135	20.77
B	Addition of PTRs	Nos	10	10.38
Total				21.74

A. Addition of New DTR along with associated HT / LT Line.

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
Part - A	Distribution Transformer				
1	100 KVA,11/0.4KV(Al) Transformer	135.00	EA	1,17,000	15795000.0
2	150X150mm RS joist (11 Mtr long)(30.6kg Per meter) (Each 336.6kg)	270.00	NO	24,739	6679530.0
3	LT Distribution Box for 100 KVA S/S.	135.00	EA	24,419.00	3296565.0
4	AB Switch(11KV,200A,3Pole,50Hz)	135.00	EA	7,350	992250.0
5	Lightening Arrester(9KV,5KA)	405.00	EA	980	396900.0
6	HG Fuse(11KV,3 Pole)	405.00	EA	6,120	2478600.0
7	100MMSQ AAA CONDUCTOR FOR JUMPERING	3,105.00	M	55	170775.0
8	CABLE 1.1KV AL 1CX150 SQMM ARM	1,350.00	M	279	376650.0
9	GLAND FOR ARM CABLE 1CX150 SQ.MM	540.00	EA	280	151200.0
10	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos (9.2 Kg. / Mtr.) with Galvanization	6,955.20	KG	75	521640.0
11	Transformer Mounting Channel (100x50X6)mm 2.8 Mtr long 2 Nos (9.2 Kg./Mtr.) with Galvanization	6,955.20	KG	75	521640.0
12	AB Switch and HG Fuse Mounting Channel (75x40X6)mm 2.8 Mtr long 4Nos (6.8 Kg./Mtr.) with Galvanization	10,281.60	KG	75	771120.0
13	Transformer Belting angle (50X50X6) mm 2.8mtr long 2 nos. (4.5 Kg./Mtr.)with side angle (total 7mtr) with Galvanization	4,252.50	KG	75	318937.5

Detailed Project Report Capex Plan FY 22-23

14	Angle for mounting LT distribution box (50X50X6) mm 2.8mtr long 2nos (4.5 Kg./Mtr.)with side angle with Galvanization	1,822.50	KG	75.00	136687.5
15	11 KV Disc Insulator T & C Type 45 KN POLYMER	405.00	NO	860.00	348300.0
16	11 KV hard ware fitting T & C Type 45KN	405.00	NO	130.00	52650.0
17	50x6 mm G I flat	6,874.20	KG	75	515565.0
18	25x6 mm G I flat	2,273.40	KG	75	170505.0
19	G.I NUTS,BOLTS & WASHERS	1,350.00	KG	78	105300.0
20	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	1,350.00	EA	12	15970.5
21	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	7,290.00	EA	36	262440.0
22	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	1,080.00	EA	29	31417.2
23	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	405.00	EA	320	129600.0
24	TEMPLETE FOR TRANSFORMER MAINT.RECORD	135.00	EA	68	9180.0
25	TAPE HT SCOTCH 23 25MMX9.1M 66KV	122.85	ROL	540.54	66405.3
26	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	48.60	EA	1,550.75	75366.5
27	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	540.00	EA	1,188.38	641725.2
28	ALNOX 3M (HOT SPOT REDUCING PASTE)	9.45	EA	4,084.64	38599.8
29	3M SCOTCH 1625 SPRAY	54.00	EA	754.98	40768.9
30	3M SCOTCH FILL PUTTY	135.00	EA	462.69	62463.2
31	RODENT CAPACITIVE SCREEN GUARD FOR-DT	405.00	EA	2,177.28	881798.4
32	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	270.00	EA	884.00	238680.0
33	SLEEV BLACK POLYOLEFIN	270.00	M	377.41	101900.7
34	40MM NOMINAL BORE GI PIPE (MEDIUM GAUGE) EARTHING DEVICE WITH 3 MTR LONG	675.00	EA	1,050	708750.0
35	PIPE HDPE SIZE 25 MM	3,105.00	M	28	86940.0
36	7/10 SWG G I stay wire (10Kg. / Set)	2,700.00	KG	75	202500.0
37	HT stay set complete	270.00	set	1,050	283500.0
38	HT stay insulator TYPE-C	270.00	No	50	13500.0

Detailed Project Report Capex Plan FY 22-23

39	HT stay Clamp (1.9Kg/pair)	270.00	Pair	125	33750.0
40	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	675.00	LS	1600.00	1080000.0
41	FRP Fencing	3,780.00	Sq.M	2615.00	9884700.0
42	CONNECTOR MINI WEDGE 25 SQMM TO DOG	405.00	EA	183	74115.0
Part - B	HT Line				
1	100 sqmm All Alloy Aluminum Conductor AAAC	125.15	M	55.00	6,883
2	150X 150mm RS joist (11 Mtr long)(34.6 kg Per meter)(Each 380.6kg)	945.00	No.	24,739	2,33,78,355
3	BOLT & NUT GI 16MMX75M HEX	1,215.00	KG	82	99,630
4	BOLT & NUT GI 16MMX200MM HEX	1,755.00	KG	82	1,43,910
5	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr. length, 6 no's required = (6x2.36x0.280)	1,605.74	KG	65	1,04,373
6	50x50x6 mm M.S Angle (4.50Kg. / Mtr)	7,257.60	KG	65	4,71,744
7	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	10,281.60	KG	65	6,68,304
8	100x50x6 mm MS Channel (9.2Kg. / Mtr)	6,955.20	KG	65	4,52,088
9	50x6 mm G I flat	-	KG	75	-
10	25x6 mm G I flat	4,320.00	KG	75	3,24,000
11	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	270.00	EA	1,050	2,83,500
12	PIPE HDPE SIZE 25 MM	2,970.00	M	31	92,070
13	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	1,485.00	EA	17	25,245
14	WASHER MS SIZE 16MM DIA	135.00	KG	95	12,792
15	BOARD DANGER 11KV SIZE 8X10 INCH	945.00	EA	80	75,600
16	G I Barbed wire	1,890.00	EA	80	1,51,200
17	INSULATOR STAY (GUY/EGG) 11KV	270.00	EA	50	13,500
18	PLATE BASE RCC SIZE 450X450X50MM	945.00	EA	110	1,03,950
19	HT stay set complete	270.00	Set	1,050	2,83,500
20	Disc Insulator(B&S) 70KN Polymer	810.00	EA	1150	9,31,500
21	HW FITTING(B&S) 70KN 3 BOLT	810.00	EA	350	2,83,500

Detailed Project Report Capex Plan FY 22-23

22	11 KV V cross arm 10.2 Kg each	675.00	EA	810	5,46,750
23	7/10 SWG G I stay wire (11Kg. / Set)	2,700.00	KG	75	2,02,500
24	GI Back Clamp for V cross arm (11KV) (0.85 kg each)	675.00	EA	80	54,000
25	No. 6 GI wire	1,975.05	KG	75	1,48,129
26	PG clamp for 100 mm ² AAA conductor	1,215.00	EA	580	7,04,700
27	Earthing Coil	945.00	No	166	1,56,870
28	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	270.00	LS	1600.00	4,32,000
29	11KV pin insulator polymer	2,430.00	EA	200	4,86,000
30	HT stay Clamp (1.9Kg/pair)	270.00	Pair	125	33750.0
Part - B	LT Line				
1	1.1KV LT AB Cable 4x95+1x95+1x16mm2	33,750.00	M	422	14231362.5
2	300Kg PSC pole 9Mtr long	675.00	EA	3,000	2025000.0
3	Base Plate for PSC pole	-	EA	230	0.0
4	BOARD DANGER	675.00	EA	80	54000.0
5	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	675.00	KG	75	50625.0
6	ANTICLIMBING DEVICE (3 KG per supprot)	1,620.00	KG	416	673596.0
7	Pole clamp for EYE hook for XLPE Aerial bunched Cable	405.00	pair	200	81000.0
8	Suspension Clamp with EYE hook for ABC	405.00	No.	340	137700.0
9	Eye Hook for AB cable for dead end point	270.00	No.	60	16200.0
10	Conductor Dead End Clamp suitable for bare messenger XLPE Aerial bunched cable(25-95 sq mm)	270.00	No.	65	17550.0
11	LT Stay set Complete	270.00	Set	520	140400.0
12	LT Stay Insulator	270.00	No.	30	8100.0
13	LT Stay clamp	270.00	pair	110	29700.0
14	7/10 SWG G I stay wire (10Kg. / Set)	2,700.00	KG	75	202500.0
15	Coil Earthing	675.00	EA	166	112050.0

Detailed Project Report Capex Plan FY 22-23

16	Pipe HDPE Size 25MM (3 mtr each)	2,025.00	M	28	56700.0
17	Lug AL 70 SQMM for 7/8 SWG WIRE/EARTHING	810.00	EA	36	29160.0
18	LT Distribution Box Polycarbonate	675.00	EA	984	664362.0
19	Cap cable end for ABC Cables	270.00	EA	81	21870.0
20	IPC KZ 4X150	2,700.00	EA	52	139779.0
21	IPC EP 95 LT ABC 16-95 & 5-10 SQMM ST.LT	2,025.00	EA	88	178787.3
22	IPC KZ 2x150 LTABC 50-150 & 6-35(50) sqmm	1,350.00	EA	64	87021.0
23	STEEL STRAP SIZE 20 MMX50 M LONG	135.00	ROL	1,620	218648.7
24	BUCKLES FOR STEEL STRAP (1 EA = 100 NOS)	135.00	EA	491	66240.5
25	CABLE 1.1KV AL 4CX25 SQMM ARM	2,025.00	M	170	343298.3
26	GLAND FOR CABLE 4X25 SQ.MM	675.00	EA	48	32297.0
27	LUG AL CRIMPING 25 SQMM XLPE SINGLE HOLE	1,350.00	EA	7	9396.0
28	FLAT GI Size 25x6 MM	6,075.00	KG	75	455625.0
29	BOLT & NUT GI 12MMX50MM HEX	675.00	KG	78	52650.0
30	BOLT & NUT GI 16MMX75M HEX	540.00	KG	78	42120.0
31	WASHER GI SIZE 12MM DIA	135.00	KG	78	10530.0
32	2Cx4 mm2 LT XLPE Cable	27,000.00	Mtr	48	1296000.0
33	4Cx10 mm2 LT XLPE Cable	13,500.00	Mtr	84	1139940.0
34	WASHER GI SIZE 16MM DIA	135.00	KG	78	10530.0
35	TIE PLASTIC BLACK SIZE 7.6 MM X 380 MM	1,350.00	EA	26	34870.5
36	Tie Plastic size 9mmx265mm	2,025.00	EA	22	45218.3
Subtotal Material(A)					10,21,49,056
Stock, Storage and Insurance@3% of A					3064471.67
Sub- Total-B					105213527.22
T & P Charges @ 2% of B					2104270.54
Contingency @ 3% of B					3156405.82
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					8684144.73
Transportation Charges@7.5% of B					7891014.54
A	Cement concreting for support with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtrx1.5)M3=0.3cum	1,890.00	No.	2,124	4014360.00
B	Cement concreting for Stud & Stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtrx1.5)M3=0.3cum	810.00	No.	1,270	1028700.00
Sub-Total C					132092422.84
Over Head Charges (Including Supervision charges) @6% of C					7925545.37
Total D					140017968.21
Gross Cost					147943513.58
OR Say					147943514.00

Detailed Project Report Capex Plan FY 22-23

	GST @18%		26629832.52
	CESS 1%	-	1479435.14
	Gross Cost (Inc. GST)		176052781.66
	Total(In Crores)		17.61
	Escalation of 3 years with 18% of grand Total		20.77

B. Addition of New PTR along with general arrangement.

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
	Part – A				
1	Earthing and Grounding as per applicable TS				
a	GI flat 90X6 mm size underground format	10	MT	75,000	7,50,000
b	GI flat 50X6 mm size for riser	1.30	MT	75,000	97,500
c	GI flat 25X6 mm size for riser	1.30	MT	75,000	97,500
d	8 swg GI wire	0.5	MT	75,000	37,500
2	Busbar, droppers, jumpers and interconnections with all outdoor equipment using 232 sq.mm AAA Conductor , all associated conductor, insulator, hardwares,clamps, 8 SWG wire etc as per applicable TS				
a	33 KV & 11 KV Bus bar with 232 sq.mm AAA Conductor	2.00	km	1,56,500	3,13,000
b	Equipment jumpering with 232 sq.mm AAA Conductor	2.00	km	1,56,500	3,13,000
c	3 Bolted(3 pair M-16 U bolts to be used) 33 Kv H/W fitting with 4 nos Insulator (70KN) String Suitable for 232 sq.mm AAA Conductor	90	Set	9,059	8,15,346
d	12 bolted (M-12)"T" clamp, 232 sq.mm AAAC run & 230 mm drop	30	No	960	28,800
e	3 Bolted (M- 16) PG Clamp suitable for 232 sq.mm AAA Conductor	120	No	1,150	1,38,000
3	33 KV 800 AMP Double break (Turn & twist center rotating) isolator without earth switch with PI(Porcelain)	0	Set	73,500	-
4	33Kv O/D VCB with CT & In-Door Control Relay Panel (Excluding Foundation) for transformer	10	Set	5,90,000	59,00,000
5	33/11 KV, 5 MVA 33/11 KV (Cu) Power Transformers with OLTC (Excluding Foundation)	10	No	43,15,500	4,31,55,000
6	33Kv Post Insulator	30	No	1,580	47,400
	Subtotal Material(A)				5,16,93,046
	Stock, Storage and Insurance@3% of A				1550791.38

Detailed Project Report Capex Plan FY 22-23

	Sub- Total-B				53243837.38
	T & P Charges @ 2% of B				1064876.75
	Contingency @ 3% of B				1597315.12
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				3560600.55
	Transportation Charges@7.5% of B				3993287.80
	Sub-Total C				63459917.60
	Over Head Charges (Including Supervision charges) @6% of C				3807595.06
A	Foundation of Power transformer (6'x6'x8')	10	LS	120000	1200000.00
B	Testing	10	EA	161700	1617000.00
	Total D				70084512.66
	Gross Cost				73892107.72
	OR Say				73892108.00
	GST @18%				13300579.44
	CESS 1%				-
	Gross Cost (Inc. GST)				87931608.52
	Total(In Crores)				8.79
	Escalation of 3 years with 18% of grand Total				10.38

8.29 Annexure 29 Cost Estimate for Provision for Nua Balasore Project

S. No.	Description	UOM	Quantity	Unit Rate in RS	Amount (INR)
1	Nua Balasore Project	As per the work	As and when required	According to different site requirement	10.0
Total					10.0

8.30 Annexure 30 Cost Estimate for Conversion of 2nos PSS from AIS to GIS

Sr.No.	Description	UOM	Qty	Amount
				in Crores
A	Conversion of Jajpur Town PSS From AIS to GIS	EA	1	8.64
B	Conversion of City PSS From AIS to GIS	EA	1	11.76
Total				20.40

A. Cost Estimate for Conversion of 33/11 KV Jajpur town PSS From AIS to GIS

Detailed Project Report Capex Plan FY 22-23

Sl. No.	DESCRIPTION OF ITEMS	UNIT S	Quantity	Unit price (In Rs.)	Total
SUPPLY OF FOLLOWING EQUIPMENT & MATERIALS (As per Technical Specification)					
33kV Equipment (Indoor Type)					
1	36kV Indoor GIS/SIS Equipment and accessories for 33/11kV GIS Substation as detailed below				
1.1	36KV,1250A,25KA for 3 sec, SF6 gas insulated (SF6 gas monitoring system)/Solid insulated system for line feeder bay module each comprising of SF6 gas insulated vacuum circuit breaker (1250A),Double Busbar (each 1250A) (Copper), inbuilt SA & CT (800-400/1-1A) , PT, bus-bar dis connectors (1250A) with common grounding switch, for complete Line feeder bay as per the technical specification. The module shall be provided with complete Line Feeder protection system to suit for SCADA (BCPU, Multi-function Meter & other provisions as per tech spec).	Set	1.00	25,36,365.25	25,36,365.25
1.2	36KV,1250A,25KA for 3 sec, SF6 gas insulated (SF6 gas monitoring system)/Solid insulated system for Transformer feeder bay module each comprising of SF6 gas insulated vacuum circuit breaker (1250A),Double Busbar (each 1250A) (Copper), inbuilt SA & CT (600-300/1-1-1A) , bus-bar dis connectors (1250A) with common grounding switch, for complete Transformer feeder bay as per the technical specification. The module shall be provided with complete Transformer Feeder protection system to suit for SCADA (BCPU, Numerical Differential Relay having inbuilt of REF protection, Multi-function Meter & other provisions as per tech spec).	Set	3.00	24,75,453.15	74,26,359.44
1.3	36KV,1250A,25KA for 3 sec, SF6 gas insulated (SF6 gas monitoring system)/Solid insulated system for Bus-coupler bay module each comprising of SF6 gas insulated vacuum circuit breaker (1250A),Double Busbar (each 1250A) (Copper), inbuilt CT (800-400/1-1A) , bus-bar dis connectors (1250A) with grounding switches, Each bus bar set shall be provided with inductive voltage transformers(two sets) with disconnecter(s) for both the buses for complete Bus-coupler bay as per the technical specification. The module shall be provided with complete Bus-coupler protection system to suit for SCADA (BCPU, Multi-function Meter & other provisions as per tech spec).	Set	0.00	44,03,929.80	-
11kV Equipment (Indoor Type)					
2	30kV, 10kA, Metal Oxide, Class-2 (Station Class), Surge Arrester (for 33kV Incoming Line, HT side of 2nos. Power Transformers and 33/0.433kV Station Transformer) - Outdoor Type with Surge Counter	Nos.	11.00	10,350.00	1,13,850.00
3	12kV, 10kA, Metal Oxide, Class-2 (Station Class), Surge Arrester with out surge counter(For Transformers & Out Going Feeders) - Outdoor type	Nos.	36.00	3,550.00	1,27,800.00
4	11kV Indoor Air Insulated switchgear Panel consisting of Breaker-630A, Busbar-1250A(Copper) & CT (400-200/1-1-1A) for Transformer Protection Relays to be installed on the panel, Multi-function Meter to be installed above the panel, Energy meter to be installed on the panel	No	3.00	6,41,174.55	19,23,523.64

Detailed Project Report Capex Plan FY 22-23

5	11kV Indoor Air Insulated switchgear Panel consisting of Breaker-630A, Busbar-1250A (Copper), CT (400-200/1-1-1A) for Feeder protection Relays to be installed on the panel, Multi-function Meter to be installed above the panel, Energy meter to be installed on the panel	No	10.00	7,21,808.20	72,18,081.97
6	11kV Bus-Coupler Indoor AIS Panel consisting of Breaker-630A, Bus-bar-1250A (Copper)	No	2.00	5,79,725.65	11,59,451.30
7	11kV, 2 Core, Single Phase, IVT (11/√3 kV / 110/√3-110/√3V), 3nos in a set, in a separate draw out chamber with Digital Voltmeter inside Control Room separately for Bus-1 & Bus-2 plug in type with disconnecter.	Set	3.00	3,67,128.86	11,01,386.57
SCADA					
8	SCADA FOR Primary Substation	Set	1.00	2,60,000.00	2,60,000.00
Transformer and RMU					
9	8.0 MVA, 33/11kV Power Transformer DYn11 (Outdoor Installation) with Accessories	No.	1.00	57,00,000.00	57,00,000.00
10	250 KVA.11/0.4 KV (AL)Transformer with tap changer, BIS Energy level-II	No	1.00	2,68,450.00	2,68,450.00
11	11 KV 4Way RMU	No.	0.00	4,49,500.00	-
Substation Earthing System GI					
12	Earthing Conductor 75X10 mm (5.89 Kg/Mtr.) GI Flat for laying (spacing maximum 2m both ways)	Kg	7951.50	75.00	5,96,362.50
13	Earthing Conductor: 50X6 mm (2.4Kg./Mtr.) GI Flat for Raiser from the burial earth mat to equipment, structure etc.)	Kg	1080.00	75.00	81,000.00
14	Earthing Device & Associated Accessories (Heavy duty GI Perforated Pipe of ID=40mm & OD=50mm with 3000mm long for treated Earth Pit) as per Drawing	No	45.00	1,050.00	47,250.00
33, 11 and Station Trf Structure					
15	(125x70x5) mm RS GI joist 5Mtr (13.3kg / Mtr) (04 nos for one Power Transformer) for supporting of 33kV Cable & 11kV cable (Unit Wt=0.0665 MT) & 10 mm thick MS plate size 250X250 mm at the bottom of the RS Joist duly welded & the MS plate to be suitably grouted to the floor for the rigidity.	Kg	798.00	75.00	59,850.00
16	(100 x 50 x5) mm GI Channel (9.56kg / Mtr) (2Mtr - 06 nos for one Power Transformer) for supporting of 33kV & 11kV power Cable (Unit Wt=0.01912 MT)	Kg	344.16	75.00	25,812.00
17	GI Nuts & Bolts etc. for column and beam & Equipment Structures	Kg	750.00	78.00	58,500.00
18	Supply & Erection of GI Pipe of dia. 150mm, Class-B	Mtr.	75.00	1,607.00	1,20,525.00
19	High Density Polyethylene (HDPE) pipe 160 mm diameter.	KM	0.02	10,91,237.00	16,368.56
20	LT Distribution Box with MCCB, Aluminium Busbar for 6 Bay with kit kat fuse for 500 KVA S/S	Nos	2.00	97,360.00	1,94,720.00
21	Supply and installation of 8way LDB with accessories	Nos.	2.00	8,960.00	17,920.00
33 and 11 kv Power and Control, XLPE cables					
22	3Cx 400 mm ² 33KV XLPE Cable(armoured), A2XFY, Power cable Armored, aluminium conductor, stranded, including their termination materials like glands, lugs, tagging etc. as required as per technical specifications and scope of the works.	KM	0.10	20,32,000.00	2,03,200.00

Detailed Project Report Capex Plan FY 22-23

22.1	Heat shrinkable jointing kit for 3Cx400 mm ² 33 KV XLPE Cable(indoor type) complete with all accessories and tagging etc. as per technical specifications and scope of the works.	Set.	4.00	20,503.00	82,012.00
22.2	Heat shrinkable jointing kit for 3Cx400 mm ² 33 KV XLPE Cable(out door type) complete with all accessories and tagging etc. as per technical specifications and scope of the works.	Set.	4.00	33,255.00	1,33,020.00
23	3C X 400 sqmm, 11 KV, XLPE, 3 phase Power cable Armored, aluminium conductor, stranded, including their termination materials like glands, lugs, tagging etc. as required as per technical specifications and scope of the works.	KM	0.25	15,00,000.00	3,75,000.00
24	11 KV, 3C X 400 sqmm Heat Shrink In Door cable termination kit complete with all accessories and tagging etc. as per technical specifications and scope of the works.	Set.	12.00	9,582.00	1,14,984.00
25	11 KV, 3C X 400 sqmm Heat Shrink Out Door cable termination kit complete with all accessories and tagging etc. as per technical specifications and scope of the works.	Set.	12.00	13,904.00	1,66,848.00
26	Control Cables (Copper Armoured)				
26.1	4 Core x 2.5 mm ²	Km	0.31	1,06,157.22	32,757.08
26.2	7 Core x 2.5 mm ²	Km	0.10	1,67,628.60	17,241.80
26.3	10 Core x 2.5 mm ²	Km	0.21	2,34,997.61	48,342.36
26.4	12 Core x 2.5 mm ²	Km	0.21	2,78,851.73	57,363.78
26.5	1 Core x 16 mm ² Aluminium cable from Battery to Battery Charger & Battery Charger to DCDB	Km	0.06	1,24,606.20	7,689.98
27	1.1 kV XLPE Power Cables				
27.1	XLPE 3 1/2 Core x 120 mm ² (for Station Transformer output)	Km	0.05	4,28,106.97	21,405.35
27.2	XLPE 3 1/2 Core x 95 mm ² (for Oil Filtration Machine Connection)	Km	0.03	3,36,088.92	10,082.67
27.3	XLPE 3 1/2 Core x 25 mm ² (for Switchyard Lighting)	Km	0.03	1,17,045.14	3,511.35
27.4	XLPE 4 Core 16 mm ² (for Switchyard Lighting)	Km	0.03	84,154.55	2,524.64
27.5	XLPE 2 Core 16 mm ² (for Switchyard Lighting)	Km	0.03	50,583.46	1,517.50
	Battery & Battery Charger			-	-
28	48 V, 100 AH, maintenance free VRLA Battery (Set. 4 Nos of 12V Battery)	Set	1.00	58,740.62	58,740.62
29	48V, Float cum Boost Battery Charger (15 A float charging, 20 A boost charging)	No	1.00	1,90,907.01	1,90,907.01
	Sub-station Lighting And Fire Fighting System				
30	Sub-Station Switchyard Lighting , Control Room Lighting (it includes supply of fixtures & Lamps (LED) with switch gear, GI Conduit etc.(120Wx 4 sets and 100Wx6 sets out side the control room, 20 Watt CFL tube-10 sets inside control room .Control Room wiring to be done with Copper wires as per the requirement (Lighting fixtures are to be fixed rigidly on the Column at a suitable height with GI tubular pole so that the required lux as per the technical specification is maintained).	Lot	1.00	11,62,247.82	11,62,247.82
31	1.5 Ton capacity Split Air Conditioning units with Remote control facility: Including supply of split Air conditioner 5 Star	No	4.00	83,017.70	3,32,070.81

Detailed Project Report Capex Plan FY 22-23

	rated, voltage stabiliser, control boxes etc. for completing the A.C scheme. (As per specification) for control room.				
32	1400 mm sweep 250Volt A/C Ceiling Fan	No	5.00	2,905.62	14,528.10
33	300 mm sweep 70W A/C Exhaust Fan (for Battery room and Toilet)	No	4.00	2,158.46	8,633.84
34	Fire Fighting System (portable and wheel mounted sets for control room)				
34.1	Foam type- 5 Ltrs	No	2.00	4,981.06	9,962.12
34.2	CO ₂ - 4.5 Kgs	No	2.00	9,962.12	19,924.25
34.3	Dry powder 4.5 Kg	No	2.00	4,150.89	8,301.77
34.4	Fire Bucket with Stand (4nos. in each Stand)	No	4.00	2,988.64	11,954.55
	AC & DC System for Auxiliary supply				
35	AC System				
35.1	ACDB (as per specification)	Lot	0.00	4,15,088.51	-
35.2	Main Lighting Distribution Board (as per specification)	Lot	1.00	1,66,035.40	1,66,035.40
35.3	Indoor Lighting Distribution Board as per specification	Lot	1.00	46,489.91	46,489.91
35.4	Receptable Panel near Power Transformer	No	1.00	14,943.19	14,943.19
36	DC System				
36.1	48 V DC Distribution Board as per specification .	No	1.00	2,07,544.25	2,07,544.25
37	Water Cooler with water purifier system as per Technical Specification	No	1.00	24,905.31	24,905.31
38	Maintenance Testing Equipment as per Technical Specification	Lot	1.00	9,96,212.42	9,96,212.42
39	Tools and Plants (T&P's) Requirement as per Technical Specification	Lot	1.00	2,49,053.10	2,49,053.10
40	Office Furniture as per Technical Specification	Lot	1.00	8,30,177.01	8,30,177.01
41	Supply of Materials for Installation of Power Transformer on Plinth (as per Drawing)				
41.1	90 lb Rail 5.4 mts (2.7x2) 44.62 kg per mtr / Transformer each (Unit Wt=0.240 MT)	Nos	3.00	20,322.28	60,966.84
41.2	(500x500x10) mm GI plate 6 nos / Transformer each (Unit Wt=0.013 MT)	Nos	9.00	1,145.44	10,308.98
41.3	(65x65x5) mm GI angle of 5.4 mts length.4.9 kg/mtr. / Transformer each (Unit Wt=0.026 MT)	Nos	3.00	2,290.88	6,872.65
42	Chequered plate 1000X300X5.6mm thick for Cable Trench in side Control Room 37 Mtr	Kg	992.00	84.68	83,998.76
	Sub-Total for SUPPLY OF EQUIPMENT & MATERIALS (In Rs.)				3,48,45,855.46
	Material Landed Cost @18%				62,72,253.98
	Total Cost in Cr.				4.11
	<u>ERECTION, TESTING & COMMISSIONING WORKS OF FOLLOWING EQUIPMENT (As per Technical Specification)</u>				

Detailed Project Report Capex Plan FY 22-23

33kV Equipment (Indoor Type)					
1	Erection, Commissioning, Testing of 33kV Equipment for (INDOOR AIS Sub-Station)				
1.1	36KV,1250A,25KA for 3 sec, SF6 gas insulated (SF6 gas monitoring system)/Solid insulated system for line feeder bay module each comprising of SF6 gas insulated vacuum circuit breaker (1250A),Double Busbar (each 1250A) (Copper), inbuilt SA & CT (800-400/1-1A), bus-bar dis connectors (1250A) with common grounding switch, for complete Line feeder bay as per the technical specification. The module shall be provided with complete Line Feeder protection system to suit for SCADA (BCPU, Multi-function Meter & other provisions as per tech spec).	Set	1.00	48,237.78	48,237.78
1.2	36KV,1250A,25KA for 3 sec, SF6 gas insulated (SF6 gas monitoring system)/Solid insulated system for Transformer feeder bay module each comprising of SF6 gas insulated vacuum circuit breaker (1250A),Double Busbar (each 1250A) (Copper), inbuilt SA & CT (600-300/1-1-1A), bus-bar dis connectors (1250A) with common grounding switch, for complete Transformer feeder bay as per the technical specification. The module shall be provided with complete Transformer Feeder protection system to suit for SCADA (BCPU, Numerical Differential Relay having inbuilt of REF protection, Multi-function Meter & other provisions as per tech spec).	Set	3.00	48,237.78	1,44,713.35
1.3	36KV,1250A,25KA for 3 sec, SF6 gas insulated (SF6 gas monitoring system)/Solid insulated system for Bus-coupler bay module each comprising of SF6 gas insulated vacuum circuit breaker (1250A),Double Busbar (each 1250A) (Copper), inbuilt CT (800-400/1-1A), bus-bar dis connectors (1250A) with grounding switches, Each bus bar set shall be provided with inductive voltage transformers(two sets) with disconnecter(s) for both the buses for complete Bus-coupler bay as per the technical specification. The module shall be provided with complete Bus-coupler protection system to suit for SCADA (BCPU, Multi-function Meter & other provisions as per tech spec).	Set	0.00	48,237.78	-
Erection, Commissioning, Testing of 11kV Equipment (Indoor Type)					
2	30kV, 10kA, Metal Oxide, Class-2 (Station Class), Surge Arrester (for 33kV Incoming Line, HT side of 2nos. Power Transformers and 33/0.433kV Station Transformer) - Outdoor Type with Surge Counter	Nos.	11.00	428.00	4,708.00
3	12kV, 10kA, Metal Oxide, Class-2 (Station Class), Surge Arrester with out surge counter(For Transformers & Out Going Feeders) - Outdoor type	Nos.	36.00	128.40	4,622.40
4	11kV Indoor Air Insulated switchgear Panel consisting of Breaker-1250A, Busbar-2000A(Copper) & CT (800-400/1-1-1A) Horizontal draw type for Transformer Protection and Differential Relays to be installed on the panel, Multi-function Meter to be installed above the panel, Energy meter to be installed on the panel	No	3.00	7,490.00	22,470.00
5	11kV Indoor Air Insulated switchgear Panel consisting of Breaker-1250A, Busbar-2000A (Copper), CT (600-300/1-1-1A) for Feeder protection Relays to be installed on the	No	10.00	7,490.00	74,900.00

Detailed Project Report Capex Plan FY 22-23

	panel, Multi-function Meter to be installed above the panel, Energy meter to be installed on the panel				
6	11kV Bus-Coupler Indoor AIS Panel consisting of Breaker-1250A, Bus-bar-2000A (Copper), for Bus protection Relays to be installed on the panel, Multi-function Meter to be installed above the panel, Energy meter to be installed on the panel	No	2.00	7,490.00	14,980.00
7	11kV, 2 Core, Single Phase, IVT (11/√3 kV / 110/√3-110/√3V), 3nos in a set, in a separate draw out chamber with Digital Voltmeter inside Control Room separately for Bus-1 & Bus-2 plug in type with disconnecter.	Set	3.00	7,490.00	22,470.00
Erection, Commissioning, Testing of SCADA					
8	SCADA FOR Primary Substation	Set	1.00	0.00	0.00
Erection, Commissioning, Testing of Transformer and RMU					
9	12.5 MVA, 33/11kV Power Transformer DYn11 (Outdoor Installation) with Accessories	No.	1.00	85,600.00	85,600.00
10	500 KVA.11/0.4 KV (Cu)Transformer with tap changer, BIS Energy level-II	No	1.00	5,350.00	5,350.00
11	11 KV 4Way RMU	No.	0.00	4,813.00	-
					-
Erection, Laying of Substation Earthing System GI					
12	Earthing Conductor 75X10 mm (5.89 Kg/Mtr.) GI Flat for laying (spacing maximum 2m both ways)	Kg	1080.00	15.00	16,200.00
13	Earthing Conductor: 50X6 mm (2.4Kg./Mtr.) GI Flat for Raiser from the burial earth mat to equipment, structure etc.)	Kg	720.00	15.00	10,800.00
14	Earthing Device & Associated Accessories (Heavy duty GI Perforated Pipe of ID=40mm & OD=50mm with 3000mm long for treated Earth Pit) as per Drawing	No	30.00	2,675.00	80,250.00
Erection of System GI 33, 11 and Station Trf Structure					
15	(125x70x5) mm RS GI joist 5Mtr (13.3kg / Mtr) (04 nos for one Power Transformer) for supporting of 33kV Cable & 11kV cable (Unit Wt=0.0665 MT) & 10 mm thick MS plate size 250X250 mm at the bottom of the RS Joist duly welded & the MS plate to be suitably grouted to the floor for the rigidity.	Kg	798.00	30.00	23,940.00
16	(100 x 50 x5) mm GI Channel (9.56kg / Mtr) (2Mtr - 06 nos for one Power Transformer) for supporting of 33kV & 11kV power Cable (Unit Wt=0.01912 MT)	Kg	344.16	30.00	10,324.80
17	GI Nuts & Bolts etc. for column and beam & Equipment Structures	Kg	750.00	30.00	22,500.00
18	GI Pipe of dia. 150mm, Class-B	Mtr.	0.00	-	-
19	High Density Polyethylene (HDPE) pipe 160 mm diameter.	KM	0.02	1,04,114.67	1,561.72
20	LTDB for 100KVA, 33/0.433kV Station Transformer	Nos	2.00	1,000.00	2,000.00
Laying of 11kV 33 and 11 kv Power and Control cables					
21	3Cx 400 mm ² 33KV XLPE Cable(armoured), A2XFY, Power cable Armored, aluminium conductor, stranded, including their termination materials like glands, lugs, tagging etc. as required as per technical specifications and scope of the works.	KM	0.10	2,80,497.64	28,049.76

Detailed Project Report Capex Plan FY 22-23

22.1	Heat shrinkable jointing kit for 3Cx400 mm ² 33 KV XLPE Cable(indoor type) complete with all accessories and tagging etc. as per technical specifications and scope of the works.	Set.	4.00	1,959.72	7,838.88
22.2	Heat shrinkable jointing kit for 3Cx400 mm ² 33 KV XLPE Cable(out door type) complete with all accessories and tagging etc. as per technical specifications and scope of the works.	Set.	4.00	2,327.04	9,308.16
23	3C X 400 sqmm, 11 KV, XLPE, 3 phase Power cable Armored, aluminium conductor, stranded, including their termination materials like glands, lugs, tagging etc. as required as per technical specifications and scope of the works.	KM	0.25	2,08,229.35	52,057.34
24.1	11 KV, 3C X 400 sqmm Heat Shrink In Door cable termination kit complete with all accessories and tagging etc. as per technical specifications and scope of the works.	Set.	12.00	1,470.29	17,643.48
24.2	11 KV, 3C X 400 sqmm Heat Shrink Out Door cable termination kit complete with all accessories and tagging etc. as per technical specifications and scope of the works.	Set.	12.00	1,837.61	22,051.32
25	Control Cables (Copper Armoured)				-
25.1	4 Core x 2.5 mm ²	Km	0.31	21,400.00	6,603.43
25.2	7 Core x 2.5 mm ²	Km	0.10	21,400.00	2,201.14
25.3	10 Core x 2.5 mm ²	Km	0.21	26,750.00	5,502.86
25.4	12 Core x 2.5 mm ²	Km	0.21	26,750.00	5,502.86
25.5	1 Core x 16 mm ² Aluminium cable from Battery to Battery Charger & Battery Charger to DCDB	Km	0.06	16,050.00	990.51
26	Laying of 1.1 kV XLPE Power Cables				-
26.1	XLPE 3 1/2 Core x 120 mm ² (for Station Transformer output)	Km	0.05	32,100.00	1,605.00
26.2	XLPE 3 1/2 Core x 95 mm ² (for Oil Filtration Machine Connection)	Km	0.03	29,960.00	898.80
26.3	XLPE 3 1/2 Core x 25 mm ² (for Switchyard Lighting)	Km	0.03	27,820.00	834.60
26.4	XLPE 4 Core 16 mm ² (for Switchyard Lighting)	Km	0.03	25,680.00	770.40
26.5	XLPE 2 Core 16 mm ² (for Switchyard Lighting)	Km	0.03	25,680.00	770.40
Erection, Commissioning , Wiring & Testing of Battery & Battery Charger					
27	48 V, 100 AH, maintenance free VRLA Battery (Set. 4 Nos of 12V Battery)	Set	1.00	5,350.00	5,350.00
28	48V, Float cum Boost Battery Charger (15 A float charging, 20 A boost charging)	No	1.00	5,350.00	5,350.00
	Erection, Commissioning , Wiring & Testing of Sub-station Lighting And Fire Fighting System				-
29	Sub-Station Switchyard Lighting , Control Room Lighting (it includes supply of fixtures & Lamps (LED) with switch gear, GI Conduit etc.(120Wx 4 sets and 100Wx6 sets out side the control room, 20 Watt CFL tube-10 sets inside control room .Control Room wiring to be done with Copper wires as per the requirement (Lighting fixtures are to be fixed rigidly on the Column at a suitable height with GI tubular pole so that the required lux as per the technical specification is maintained).	Lot	1.00	32,100.00	32,100.00

Detailed Project Report Capex Plan FY 22-23

30	1.5 Ton capacity Split Air Conditioning units with Remote control facility: Including supply of split Air conditioner 5 Star rated, voltage stabiliser, control boxes etc. for completing the A.C scheme. (As per specification) for control room.	No	4.00	1,498.00	5,992.00
31	1400 mm sweep 250Volt A/C Ceiling Fan	No	5.00	107.00	535.00
32	300 mm sweep 70W A/C Exhaust Fan (for Battery room and Toilet)	No	4.00	107.00	428.00
33	Erection, Commissioning of Fire Fighting System (portable and wheel mounted sets for control room)				
33.1	Foam type- 5 Ltrs	No	2.00	53.50	107.00
33.2	CO ₂ - 4.5 Kgs	No	2.00	53.50	107.00
33.3	Dry powder 4.5 Kg	No	2.00	53.50	107.00
33.4	Fire Bucket with Stand (4nos. in each Stand)	No	4.00	107.00	428.00
	Erection, Commissioning , Wiring & Testing of AC & DC System				
34	AC System				-
34.1	ACDB (as per specification)	Lot	0.00	4,280.00	-
34.2	Main Lighting Distribution Board (as per specification)	Lot	1.00	2,140.00	2,140.00
34.3	Indoor Lighting Distribution Board as per specification	Lot	1.00	2,140.00	2,140.00
34.4	Receptable Panel near Power Transformer	No	1.00	1,605.00	1,605.00
35	DC System				-
35.1	48 V DC Distribution Board as per specification .	No	1.00	2,140.00	2,140.00
36	Erection, Commissioning of Water Cooler with water Purifier System	No	1.00	802.50	802.50
37	Commissioning & Testing of Maintenance Testing Equipment	Lot	1.00	2,140.00	2,140.00
38	Commissioning Tools and Plants (T&P's) Requirement	Lot	1.00	535.00	535.00
39	Commissioning Office Furniture	Lot	1.00	1,070.00	1,070.00
	Laying of Materials for Installation of Power Transformer on Plinth (as per Drawing)				-
40	90 lb Rail 5.4 mts (2.7x2) 44.62 kg per mtr / Transformer each (Unit Wt=0.240 MT)	Nos	3.00	856.00	2,568.00
41	(500x500x10) mm GI plate 6 nos / Transformer each (Unit Wt=0.013 MT)	Nos	9.00	74.90	674.10
42	(65x65x5) mm GI angle of 5.4 mts length.4.9 kg/mtr. / Transformer each (Unit Wt=0.026 MT)	Nos	3.00	80.25	240.75
43	Construction of Cable Trench : 2 tier 2 rows U-Type RCC Cable trench with M-20 Grade concrete: The internal width 2000 mm, depth 1005 mm, with 75X75X6 mm support angles fixed RCC wall of 175 X 175 mm, Raft of 175mm & with ladder type cable tray (45X45X5)mm two angles at both side having welded flats of 25X5 mm at a gap of 150mm) for Power & control Cable with RCC Trench Cover Slab as per technical Specification, approved drawing and Direction of Engineer Incharge. Complete work including earth work in excavation in all kind of soil & rock and refilling the cavity by selective soil,	Mtr	71.85	23,041.98	16,55,566.26

Detailed Project Report Capex Plan FY 22-23

	leveling the surface around the pit with disposal of surplus earth.				
44	Chequered plate 1000X300X5.6mm thick for Cable Trench in side Control Room 12 Mtr	Metric Ton	0.64	6,420.00	4,095.96
	Sub-Total for ERECTION, TESTING & COMMISSIONING WORKS (In Rs.)				24,84,478.57
	Total Cost in Cr.				0.25
-					
<u>Civil Works with supply of all materials like Cement, MS tor rod, Brick, Coarse & Fine Agregrates & Labour,T&P etc.</u>					
1	Contour survey (50 mts.x 5 mts.), plotting the contour on graph sheet and marking the finished ground level	Sqr Mtr	250.00	16.05	4,012.50
2	Cutting for Levelling and disposal of excess earth either in low laying area in sub-station or outside.	Cum	143.00	192.60	27,541.80
3	Filling of S/S area with borrowed earth (rolling & compacting of filled up soil before taking measurement).	Cum	700.00	374.50	2,62,150.00
4	OUT DOOR DRAIN to DISCHARGE SWITCHYARD/ WATER FROM WASH BASIN AND CONTROL ROOM ROOF (10 mts		-	-	-
4.1	Excavation in all type soil (1.35x10x0.7)	Cum	9.45	214.00	2,022.30
4.2	PCC (1:3:6) (1.35x10x0.1)	Cum	1.35	4,708.00	6,355.80
4.3	PCC (1:2:4) (0.3x10x0.05)	Cum	0.15	5,778.00	866.70
4.4	Brick Masonary with cement mortar (1:5) (0.25x10x0.925+1/2x0.15x0.93x10)+(0.25x10x0.925)	Cum	5.32	3,905.50	20,775.63
4.4	Plastering with Cement mortar(1:6) (2x0.25x10+2x0.925x10+1x0.925x10+1x1.0x10)	Sq. mtr.	42.75	107.00	4,574.25
5	Switch Yard and COMPOUND WALL as per Drawing Schedule and Specification. For PILE Foundation for SBC Upto 10		-	-	-
5.1	Construction of Compound-wall (with RCC column & beam with M-20 Grade concrete) along the property line of the sub-station as per technical specification and instruction of the Engineer in Charge.(the size of the bricks shall be 250mm having 1st class Fly-ash brick having compressive strength with 75kg/cm ²). This also includes excavation in all types of soil or rocks, backfilling ,and disposal of excess earth . (Brick works rested on RCC Beam and RCC Column & footings , including Cement Plastering, Cement wash, Wall Painting two coats with weather coat. Provision of the boundary wall Fencing with M.S Grill of 700 mm height fixing at the top of the wall. It includes supply of all the materials & two coats of synthetic enamel paintings after primer application of the fencing .	Run. Mtr.	140.00	16,990.55	23,78,677.00
5.2	Switch Yard GI Chain Linking Fencing with 2.4 Mtr Height.	Run. Mtr.	60.00	5,000.00	3,00,000.00
6	Power Transformer Foundation / One (8 MVA)		-	-	-

Detailed Project Report Capex Plan FY 22-23

6.1	Excavation in all type soil per Tfr.(3X3X1.1 mtr)	Cum	29.70	214.00	6,355.80
6.2	PCC (1:3:6) per Tfr.(3X3X0.075 mtr)	Cum	2.03	4,708.00	9,533.70
6.3	RCC (1:1.5:3) per Tfr. As per drawing	Cum	15.78	6,420.00	1,01,307.60
6.4	RRHG stone grouting with sand per Tfr.	Cum	12.00	1,926.00	23,112.00
7	Construction of 500kVA 11/0.4 kV station Trf. Plinth		-	-	-
7.1	Excavation in all type soil (2.5X2.5X0.750 mtr)	Cum	4.69	214.00	1,003.13
7.2	PCC (1:3:6) (2.5X2.5X0.075 mtr)	Cum	0.47	4,708.00	2,206.88
7.3	RCC (1:1.5:3) (1.5X1.5X0.1 mtr)	Cum	0.23	6,420.00	1,444.50
7.4	Brick Masonary work (2.5x2.5x.925+2x(.5 x1.5x2.25) (1:5)	Cum	61.19	3,905.50	2,38,967.78
7.5	Cement Plastering (1:6) (1.5x2.25x4)+(1.5x1.5) 20mm thick	Sq Mtr	15.75	107.00	1,685.25
8	Construction of oil sump pit for Transformer (1.6 X 1.6 X 2.3)		-	-	-
8.1	Excavation of Earth(2.0x2.0x2.1)	Cum	25.20	214.00	5,392.80
8.2	PCC (1:3:6) 2X2X0.1	Cum	1.20	4,708.00	5,649.60
8.3	RCC(1:1.5:3) 1.6X1.6X0.1 for Top Slab	Cum	0.77	6,420.00	4,930.56
8.4	Brick Masonary work(2x2.1+2x1.6)x0.25x2.3 (1:5)	Cum	12.77	3,905.50	49,853.71
8.5	Cement Plastering (1:6) 2.3 (4x2.1+ 4x1.6)+ 1.6x1.6	Sq.mtr	41.72	107.00	4,464.04
8.6	Drainage for Oil sump pit with 250 dia hume pipe	Mtr	36.00	749.00	26,964.00
9	ROAD (5 Mtrs wide) Length of the road 20 mtrs as per Drawing Schedule- OPTCL/CIVIL/11-REV-B.		-	-	-
9.1	Excavation in all type soil 0.5mx1mx5m	Cum	50.00	214.00	10,700.00
9.2	Boulder Packing 0.5mx1mx5m	Cum	50.00	1,926.00	96,300.00
9.3	Water base course -I 0.075mx1mx5m	Cum	7.50	2,140.00	16,050.00
9.4	Water base course -II 0.075mx1mx5m	Cum	7.50	2,140.00	16,050.00
9.5	PCC (1:2:4) 0.1mx1mx5m	Cum	10.00	5,778.00	57,780.00
10	(125x70x5) mm RS GI joist 5Mtr (STATION) as per Drawing Schedule- OPTCL/CIVIL/2-REV-B.		-	-	-
10.1	Excavation with back filling L 1m x W 1 x D 2	Cum	8.00	214.00	1,712.00
10.2	PCC (1:3:6)	Cum	0.40	4,708.00	1,883.20
10.3	RCC (1:1.5:3)	Cum	12.00	6,420.00	77,040.00
11	Baffle Wall		-	-	-

Detailed Project Report Capex Plan FY 22-23

11.1	Excavation with back filling 4.2mx0.75mx0.5m	Cum	3.15	214.00	674.10
11.2	PCC 1:3:6 4.2mx0.75mx0.1m	Cum	0.63	4,708.00	2,966.04
11.3	RCC 1:1.5:3 0.75x3.8x0.2+0.5x3.4x0.2+2.5x3x0.15	Cum	11.59	6,420.00	74,407.80
12	PCC (1:4:8) With cement For S/S area(75 mm) per Sq. mts.(8x16x0.075)	Cum	19.20	4,066.00	78,067.20
13	Metal Spreading 100 mm. per Sq. mts. Area of spreading.	Cum	25.60	1,605.00	41,088.00
	Switchgear Cum Control Room (22x10Mts) (column & beam based) (as per specification & Inclusive of doors, windows, collapsible gate, PHD fittings, electrification, inner cable trench, Two nos main doors with concrete pillars, beams) etc. as per Technical specification in Civil section. Layout Drawing		-	-	-
14	Switchgear Cum Control Room For Pile foundation in FLOOD AREA (with SBC upto 10)		-	-	-
14.1	Boring and casting 300 mm dia single under reamed pile of 5.00 m. long with R.C.C. M-20 using 20 mm down graded chips with cost of all materials, labours, T&P etc. & all other machinaries required for the work etc. Complete in all respect as per latest specification & direction of the Engineer in charge.	Nos	252.0 0	6,420.00	16,17,840.00
14.2	Earth work in excavation of foundation trenches in all kinds of soil including moorum, stony earth and earth mixed with boulders except sheet rock and boulders requiring blasting including dressing of sides and leveling the bed up to the required depth and depositing the excavated materials away from the work site within initial leads and lifts, including shoring, shuttering & dewatering (if required) with cost of labour,cess, hire & running charges of water pumps sundries , T & P & all other machinaries required for the work etc. Complete in all respect as per latest specification & direction of the Engineer in charge.	Cum	470.8 0	235.40	1,10,826.32
14.3	Supplying and filling in foundation and plinth with good river sand well watered and rammed in layers not exceeding 23 cm in each layer including all leads and lifts, cost of all materials, labour,cess, sundries, T&P required for the work etc. Complete in all respect as per latest specification & direction of the Engineer in charge.	Cum	791.6 0	770.40	6,09,848.64
14.4	Providing and lying plain cement concrete of proportion (1:3:6) in foundation and plinths using approved quality cement , 40 mm. size black hard crusher broken granite stone metal and screened, washed sharp sand for mortar of approved quality and from approved quarry, including hoisting, lowering, laying concrete, ramming, watering and curing etc. complete to required levels laid in layers not exceeding 15 cm. thick in each layer including cost, conveyance, loading, unloading, royalties and taxes of all materials and cost of all labours, cess, sundries, T&P & all other machinaries required for the work including shoring, shuttering and dewatering if required including hire & running charges of water pump etc. Complete in all respect as per latest specification & direction of the Engineer in charge.	Cum	156.8 0	4,708.00	7,38,214.40

Detailed Project Report Capex Plan FY 22-23

14.5	K.B. Brick masonry in cement mortar (1:6) using the bricks of size 10" x 5" x 3" of crushing strength not less than 100 kg / centimeter square with dimensional tolerance 3% after immersing the bricks for 6 hours in water before use including hoisting to required height placing in position scaffolding, splays cutting, circular moulding, corbelling, chamfering and similar such type of work watering and curing etc. including cost, conveyance, royalty, cess, and taxes of all other materials machinaries scaffolding all labour T&P articles required for the work etc. complete in all respect as per the latest specification confirming to relevant IS Specification and direction of the Engineer-in-charge.			-	-	-
14.5.1	In Foundation and Plinth	Cum	108.0 0	4,494.00		4,85,352.00
14.5.2	Ground Floor	Cum	222.8 0	4,494.00		10,01,263.20
14.6	RCC work M-20 grade as per approved designs and drawings having a minimum compressive strength (in work test) 200 Kg./ Sqcm.in 15 cm. cubes at 28 days after mixing and test conducted in accordance with I.S.456 and I.S 516 using 12 mm. to 20 mm. size black hard crusher broken granite stone chips, screened and washed sharp sand for mortar of approved quality from approved quarry, to be mixed in concrete mixture with approved quality cement including hoisting, lowering, laying and compacting concrete by using vibrators, watering and curing for 28 days, centering and shuttering and finishing the exposed surface smooth providing grooves or beads wherever necessary including cost, conveyance, loading, unloading, royalties and taxes and cess of all materials, cost of all labours, sundries, T&P & all other machinaries required for the work but excluding cost and conveyance of M.S. or Tor steel and binding wires etc. Complete in all respect as per latest specification & direction of the Engineer in charge.			-	-	-
14.6.1	Pile cap & Grade beam	Cum	300.0 0	6,420.00		19,26,000.00
14.6.2	R.C.C. wall	Cum	70.80	6,420.00		4,54,536.00
14.6.3	Plinth Beam	Cum	24.40	6,420.00		1,56,648.00
14.6.4	Column & Beam- Ground Floor	Cum	144.0 0	6,420.00		9,24,480.00
14.6.5	Lintel-Ground Floor	Cum	8.80	6,420.00		56,496.00
14.6.6	65mm thick R.C.C.Chajja- Ground Floor	Sqm	88.40	588.50		52,023.40
14.6.7	Roof slab - Ground Floor	Cum	147.2 0	6,420.00		9,45,024.00
14.6.8	Staircase- Ground Floor	Cum	23.60	6,420.00		1,51,512.00

Detailed Project Report Capex Plan FY 22-23

14.7	Cutting, Straightening coiled or bent up M.S. rods or Tor steel welding or jointing if necessary, bending, binding, tying the grills as required for R.C.C. works, providing fan hooks where necessary and hoisting, lowering and placing in proper position according to approved designs and drawings including cost, conveyance, loading, unloading, taxes of M.S. rods or Tor steel and binding wires of 18 to 20 gauge required for the work and cost of all labour, sundries, T&P and scaffolding complete in all respect as directed by the Engineer in charge (payment will be made according to the actual weight of M.S. rod / Tor steel consumed in the work and no separate payment will be made towards weight of binding wires which is to be borne by the contractor at his own cost etc. complete in all respect as per direction of the Engineer-in-charge.		-	-	-
14.7.1	Ground Floor	MT	72.00	58,850.00	42,37,200.00
14.8	Supplying, fitting and fixing vitriified tile 60x60cm plain Ivory 8 to 10 mm thick in floors of approved make with application of polymer modified cement based water resistant adhesive bed of required thickness of 10mm and filling joints with epoxy grout of approved quality including cost of all materials, takes labour T&P etc. required for the work etc. complete in all respect as per the latest specification and direction of the Engineer-in-charge.	Sqm	416.0 0	963.00	4,00,608.00
14.9	Supplying, fitting and fixing vitriified tile 60x60cm plain Ivory 8 to 10 mm thick in dado of approved make with application of polymer modified cement based water resistant adhesive bed of required thickness of 10mm and filling joints with epoxy grout of approved quality including cost of all materials, takes labour T&P etc. required for the work etc. complete in all respect as per the latest specification and direction of the Engineer-in-charge.	Sqm	36.80	963.00	35,438.40
14.10	Supplying, fitting and fixing Floor tile of size 40cmx40 cm / 30cmx30cm in floors on 25mm thick bed of cement mortar 1:1 (1cement : 1sand) jointed with neat cement slury mixed with pigment to match the shades of the tiles of required thickness of approved quality including cost of all materials, takes labour T&P etc. required for the work.etc complete in all respect as per the latest specification and direction of the Engineer-in-charge.	Sqm	20.40	856.00	17,462.40
14.11	Providing fitting fixing Glazed /Ceramic tiles of size 20cmX30cm & 6.5 to 6.7mm thick of size up to 0.10sqm in wall dados skirting and on 12mm thick cement plaster (1:3) jointed with neat cement slurry mixed with pigments to match the shade of the tiles including rubbing and polishing complete including cost of precast tiles etc. complete in all respect as per the latest specification and direction of the Engineer-in-charge.	Sqm	107.2 0	802.50	86,028.00
14.1	Supplying, fitting and fixing 5"x2½" size Dressed seasoned Sal wood chaukaths including cost, conveyance royalty taxes of all materials. labour, all other machinaries, T & P articles required for the work complete in all respect as per the direction of the Engineer-in-Charge.	Cum	1.00	80,250.00	80,250.00

Detailed Project Report Capex Plan FY 22-23

14.13	Supplying, fitting and fixing 30mm/32mm flush door shutter (Non-Sal hard wood frame fixed with 4mm BWR ply on both sides of frame.including cost conveyance royalty taxes of all materials. labour, all other machinaries, T & P articles required for the work complete in all respect as per the direction of the Engineer-in-Charge.	Sqm	57.60	1,605.00	92,448.00
14.1	Providing and fixing of sliding windows of approved make to be fabricated from roll formed sections made of pre-painted steel (base steel as per IS-513 of 0.6 mm thick "D" quality, galvanized as per IS-277 with zinc of 120 Gm/ Sqm.) including cost conveyance royalty taxes of all materials. labour, all other machinaries, T & P articles required for the work complete in all respect as per the direction of the Engineer-in-Charge. DOUBLE SHUTTER SLIDING WINDOW	Sqm	124.00	2,354.00	2,91,896.00
14.15	Providing and fixing of FRP door frame including cost conveyance royalty taxes of all materials. labour, all other machinaries, T & P articles required for the work complete in all respect as per the latest specification and direction of the Engineer-in-Charge.	Mtr	40.80	481.50	19,645.20
14.2	Providing and fixing of FRP door shutter including cost conveyance royalty taxes of all materials. labour, all other machinaries, T & P articles required for the work complete in all respect as per the latest specification and direction of the Engineer-in-Charge.	Sqm	15.20	3,745.00	56,924.00
14.17	Providing 16mm. thick cement plaster with cement mortar of mix (1:6) with approved quality cement with screened and washed sharp sand for mortar and finished smooth to the surface over brick work after racking out the joints including watering and curing, rounding of corners etc. complete with cost, conveyance, loading, unloading, royalties, cess, and taxes of all materials and cost of all labours, sundries, T&P and scaffolding required for the work etc. complete in all respect as desired by the Engineer in charge		-	-	-
14.17.1	Ground Floor	Sqm	2,499.60	128.40	3,20,948.64
14.18	Providing 12mm. thick cement plaster with cement mortar of mix (1:6) with approved quality cement and screened and washed sharp sand for mortar and finished smooth to the surface over brick work after racking out the joints including watering and curing, rounding of corners etc. complete with cost, conveyance, loading, unloading, royalties and taxes, cess, of all materials and cost of all labours, sundries, T&P and scaffolding required for the work etc. complete in all respect as desired by the Engineer in charger in charge		-	-	-
14.18.1	Ground Floor	Sqm	1,588.40	107.00	1,69,958.80
14.19	Providing 12mm. thick cement plaster with cement mortar of mix (1:3) with approved quality cement with screened and washed sharp sand for mortar and finished smooth to the surface in ceiling and R.C.C. surface after chipping the surface in all floors including watering and curing, rounding of corners etc. complete with cost, conveyance, loading, unloading, royalties, cess, and taxes of all materials and cost of		-	-	-

Detailed Project Report Capex Plan FY 22-23

	all labours, sundries, T&P and scaffolding required for the work etc. complete in all respect as desired by the Engineer in charge.				
14.19.1	Ground Floor	Sqm	1,603 .60	107.00	1,71,585.20
14.20	Providing and finishing the wall surface with two coat of cement wash including scaffolding, all labour, cost, conveyance, cess, taxes of all materials, T&P articles, brushes all other machineries required for the work complete in all respect confirming to relevant I.S. Specification and direction of the Engineer-in-Charge		-	-	-
14.20.1	Ground Floor	Sqm	5,655 .20	6.42	36,306.38
14.21	Supplying fitting and fixing of M.S shutter made out of M.S Angle 40mmx40mmx6mmm, M.S.Flat 19 mm x 5 mm size, M.S. guide, top hood cover etc. as per design provided including cost, conveyance, royalties of all materials, cost of all labour, T&P articles required for the work etc. complete in all respect confirming to relevant I.S specification and direction of the Engineer-in Charge.	Kg	3,166 .80	80.25	2,54,135.70
14.22	Supplying fitting and fixing of M.S grill made out of M.S M.S.Flat 19 mm x 5 mm size, as per design provided including cost, conveyance, royalties of all materials, cost of all labour, T&P articles required for the work etc. complete in all respect confirming to relevant I.S specification and direction of the Engineer-in Charge.	Kg	2,848 .40	80.25	2,28,584.10
14.23	Wall painting 2 coats with acrylic distemper over one coat of wall primer of approved shade on new work to give an even shade in all floors at all height including scaffolding cost of brushes including cost of paint cost conveyance royalty of all materials labour,T&P articles required for the work etc. complete in all respect as per the latest specification and direction of the Engineer-in-charge.		-	-	-
14.23.1	Ground Floor	Sqm	3,725 .20	10.70	39,859.64
14.24	Painting two coats with weather coat on exterior walls surface of approved quality and approved shade over a coat of primer in all floors at all height of approved quality and shade including cleaning and sand papering the surface and making the surface smooth with cost, conveyance, loading, unloading, and taxes of all materials, cost of all labour, sundries, T&P, scaffolding etc. required for the work complete in all respect as directed by Engineer-in-charge		-	-	-
14.24.1	Ground Floor	Sqm	1,930 .00	16.05	30,976.50
14.25	Painting two Coats with approved colour synthetic enamel paint on wood / iron work in all floors at all height including scaffolding cost conveyance royalty of all materials labour,T&P articles required for the work etc. complete in all	Sqm	418.4 0	32.10	13,430.64

Detailed Project Report Capex Plan FY 22-23

	respect as per the latest specification and direction of the Engineer-in-charge.				
14.26	Providing cement concrete (1:1.5:3) using 12mm size black hard crusher broken granite stone chips, screened & washed sharp sand for mortar of approved quality and from approved quarry, including hoisting, lowering, laying concrete, ramming, watering and curing etc. complete to required levels laid in layers not exceeding 15 cm. thick in each layer including cost, conveyance, loading, unloading, royalties and taxes of all materials and cost of all labours, cess, sundries, T&P & all other machinaries required for the work including shoring, shuttering and dewatering if required including hire & running charges of water pump etc. Complete in all respect as per latest specification & direction of the Engineer in charge.	Cum	123.6 0	6,420.00	7,93,512.00
14.27	Supplying, fitting and fixing of stainless steel of 304 grade in hand railing using 50mm dia of 2mm thick circular pipe with Balustrade of size 32mm x 32mm x 2mm @ 0.90mtr. C/C and stainless square pipe bracing of size 32mm x 32mm x 2mm in 3 rows in stair case as per approved design and specification, buffing, polishing etc. with cost, conveyance, taxes of all materials, labour, T&P etc. required for the complete in all respect.	Mtr	68.00	1,605.00	1,09,140.00
14.28	Providing and fixing M.S. fan clamp type-I of 16mm dia M.S. bar bent to shape with hooked ends in R.C.C. slab during laying including painting the exposed portion of loop as per standard design complete as directed by the Engineer-in-charge.	Nos	120.0 0	160.50	19,260.00
14.29	Providing 12mm. thick cement plaster in cement mortar of mix (1:4) with neat cement punning with approved quality cement with screened and washed sharp sand for mortar and finished smooth to the surface in ceiling and R.C.C. surface after chipping the surface in septic tank including watering and curing, rounding of corners etc. complete with cost, conveyance, loading, unloading, royalties, cess, and taxes of all materials and cost of all labours, sundries, T&P and scaffolding required for the work etc. complete in all respect as desired by the Engineer in charge.	Sqm	48.40	107.00	5,178.80
14.30	Providing neat cement punning with approved quality cement finished smooth to the surface etc. complete with cost, conveyance, loading, unloading, royalties, cess, and taxes of all materials and cost of all labours, sundries, T&P and scaffolding required for the work etc. complete in all respect as desired by the Engineer in charge.	Sqm	958.0 0	16.05	15,375.90
14.31	40 mm thick grading concrete with cement concrete (1:2:4) using 12mm and down graded b.h.g. chips to the roof surface with water proofing cement compound finished smooth over RCC slab including hoisting and laying in position watering and curing for required number of days finished to smooth surface and desired slope including cost conveyance, royalty and taxes of all materials, labour T&P articles required for the work etc. complete in all respect confirming to relevant I.S specification and direction of the Engineer-in-Charge.	Sqm	550.8 0	235.40	1,29,658.32
15	P.H. Fitting (Internal & External) to Switch-Gear -Cum - Control Room		-	-	-

Detailed Project Report Capex Plan FY 22-23

15.1	Supplying all materials , labours , taxes and tools and plants for fitting and fixing of PVC pipes of following nominal bore conforming to ASTM-D-1785 (Schedule-80) including fittings and laying as per the site requirement etc., all complete including testing as per the direction and specification of Engineer-in-charge		-	-	-
15.1.1	15 mm dia	Mtr	15.00	107.00	1,605.00
15.1.2	20 mm dia	Mtr	20.00	133.75	2,675.00
15.1.3	25 mm dia	Mtr	15.00	187.25	2,808.75
15.1.4	40 mm dia	Mtr	20.00	214.00	4,280.00
15.1.5	50 mm dia	Mtr	20.00	267.50	5,350.00
15.2	Supplying all material, labour , T&P & fitting ,fixing the following different water supply fittings of approved make with including supply of all necessary jointing materials etc. all complete as directed by the Engineer-in-charge.		-	-	-
15.2.1	25 mm dia Ball valve	Nos	2.00	695.50	1,391.00
15.2.2	50 mm dia Ball valve	Nos	2.00	1,070.00	2,140.00
15.2.3	25 mm dia F.W. valve	Nos	2.00	695.50	1,391.00
15.2.4	50 mm dia F.W. valve	Nos	2.00	1,070.00	2,140.00
15.3	Supplying all labour T&P and cutting holes in brick masonry wall for taking pipes through and mending good the damages with supply of all required materials etc. complete as per the direction of the Engineer-incharge		-	-	-
15.3.1	For 15mm to 50mm CPVC pipe to pass in 125mm to 250mm thick wall	Nos	10.00	133.75	1,337.50
15.4	Supplying all labour T&P and materials and making grooves in brick walls vertically and horizontally to the required depth and width for fixing pipes & fittings of sizes 15mm dia to 25mm dia in the grooves, testing the pipe line against leakage, and filling the grooves with cement mortar(1:4) to bring the surface to original level including cost of mortars, curing and conveyance of materials etc. complete as per direction of the Engineer-in-charge.	Mtr	10.00	53.50	535.00
15.5	Supplying all materials , labour T&P and fittings of approved quality required for fixing of NP or CP Brass or GM fixtures of following sizes and specification with leak proof threaded joints tightened with spun yarn and white zinc or any tightened with spun yarn and white zinc or any including testing and rectification of detects, after testing complete as per direction of Engineer-in-charge.		-	-	-
15.5.1	Bibcock	Nos	5.00	160.50	802.50
15.5.2	Long Body Bibcock	Nos	2.00	321.00	642.00
15.5.3	Pillar cock	Nos	2.00	428.00	856.00

Detailed Project Report Capex Plan FY 22-23

15.5.4	Angular stop cock	Nos	4.00	588.50	2,354.00
15.5.5	Soap Holder	Nos	2.00	80.25	160.50
15.5.6	Towel ring	Nos	2.00	160.50	321.00
15.5.7	Toilet paper holder	Nos	2.00	80.25	160.50
15.5.8	Glass self 22"	Nos	2.00	321.00	642.00
15.5.9	Towel rail 24"	Nos	2.00	374.50	749.00
15.5.10	Shower arm 190mm long light	Nos	2.00	749.00	1,498.00
15.5.11	CP Grating	Nos	2.00	80.25	160.50
15.5.12	Concealed stop cock	Nos	4.00	535.00	2,140.00
15.5.13	Connecting Pipe	Nos	2.00	160.50	321.00
15.5.14	Basin with pedestal	Nos	2.00	3,210.00	6,420.00
15.5.15	Providing and fixing vitreous China water closet (European with seat and lid), of Cerra Cascade "CASINO", CP brass buffers, 10 liter cascade dual flushing cistern hinges & rubber with fittings and brackets, 40 mm flush bend of CP brass, 20 mm overflow pipe with specials & mosquito proof coupling complete, painting on brackets and making good the walls and floors wherever required.	Nos	1.00	16,050.00	16,050.00
15.5.16	Providing and fixing vitreous China water closet Indian type of Orissa pattern size (580mmx440mm) of approved quality with PVC Slimeline (Parryware make) 12.5 ltr capacity low level cistrn with hinges & rubber with fittings and brackets, 40 mm flush bend of CP brass, 20 mm overflow pipe with specials & mosquito proof coupling complete, painting on brackets and making good the walls and floors wherever required.	Nos	1.00	4,494.00	4,494.00
15.5.17	Providing and fixing vitreous China water urinal of Cerra/Parry ware with fittings and brackets, flush bend of CP brass, and making good the walls and floors wherever required.	Nos	2.00	2,675.00	5,350.00
15.6	Supply of all materials, labour, T&P , fitting and fixing in all floors fixed type bevelled plate glass mirror of size 600mm x 450mm x 5.5mm thick best Indian make ,supply of 13mm thick asbestos backing and CP Brass screw including cost conveyance, taxes of all materials complete as per specification and direction of Engineer-in-charge(Make-Modi Guard/Belgium)	Nos	2.00	802.50	1,605.00
15.7	Supply of all materials, joining materials ,labour and T&P and laying UPVC SWR PIPES of Standard make with ISI Mark duly approved by the Engineer-in-charge including jointing, earthwork in excavation of trenches in all kind of soil to the required depth and refilling of pipe line trenches in 0.3048 mtrs layers with 300 mm deep sand around cushion duly watered and rammed or fixing to walls, floors with supply of necessary clamps, nails and cutting the pipe to length with		-	-	-

Detailed Project Report Capex Plan FY 22-23

	wastage including supply of all Clamps, Clips, Endcaps & jointing materials etc., complete as per standard specification and direction of Engineer-in-charge.				
15.7.1	100mm dia (ISI Marked)	Mtr	10.00	535.00	5,350.00
15.7.2	150mm dia (ISI Marked)	Mtr	25.00	642.00	16,050.00
15.8	Supplying all materials, labour T&P for jointing of the UPVC SWR SEWER pipe fittings of standard make duly approved by the Engineer-in-charge with joining material etc. suitably required for fixing on 100mm dia soil waste pipe complete with requisite testing as directed by Engineer-in-charge.		-	-	-
15.8.1	100mm dia "P" Trap	Nos	2.00	428.00	856.00
15.8.2	100mm dia Bend Plain	Nos	3.00	181.90	545.70
15.8.3	100mm Door Bend	Nos	3.00	160.50	481.50
15.8.4	100 mm dia Single Junction with Door	Nos	3.00	374.50	1,123.50
15.8.5	100 mm dia double Junction with Door	Nos	3.00	428.00	1,284.00
15.8.6	100mm dia Terminal Guard	Nos	2.00	214.00	428.00
15.8.7	100mm dia. Floor trap	Nos	3.00	267.50	802.50
15.9	Supplying all materials, labor T&P for jointing of the UPVC SWR SEWER pipes & fittings of standard make duly approved by the Engineer-in-charge suitably required for fixing on 100mm dia soil waste pipe complete with requisite testing as directed by Engineer-in-charge.		-	-	-
15.9.1	100mm Pipe	Nos	10.00	321.00	3,210.00
15.10	Fixing of UPVC vent pipes Including labour & T&P all complete as directed by the Engineer-in-charge.		-	-	-
15.10.1	100mm Pipe	Mtr	4.00	428.00	1,712.00
15.10.2	100mm Vent Cowl	No	2.00	107.00	214.00
15.11	Supplying all materials labour T&P and constructing inspection chamber C.C.(1:4:8) on bed with hard stone metal size 40mm and 250mm K.B.Bricks work having crushing strength 75 Kg to 99 Kg/cm ² in cement mortar (1:4), R.C.C. roof slab with 500mm dia light pattern factory made SFRC M.H cover with frame, moulding and shaping the channel and benching with C.C. 1:2:4 with hard granite chips 12mm size, 12mm thick C.P 1:3 including cement punning inside, Cement plaster (1:3) outside the chamber, earth work in excavation in all kinds of soil and refilling the cavity around the chamber as per detail drawing & design and specification including cost, conveyance, taxes etc. all complete as directed by Engineer-in-charge.		-	-	-

Detailed Project Report Capex Plan FY 22-23

15.11.1	750mmx 750mm x450mm	No	1.00	4,815.00	4,815.00
15.12	Providing and fixing 2000 litres capacity P.V.C Over head (Sintex make) tank with all piping and valve arrangement with all labour & materials ,including cost, T&P , scaffolding etc., complete as directed by the Engineer-in-charge.		-	-	-
15.12.1	2000 Ltr Capacity	No	1.00	18,190.00	18,190.00
15.13	Supplying all material, labour, T&P and constructing manhole chamber of size as mentioned below with 250mm nominal size K.B. Brick having crushing strength 75kg to 99kg /cm ² in CM 1:4 over a bed of 150mm thick C.C(1:4:8) using 40mm size HG metal, plastering with 12mm thick cement mortar (1:3) on internal and external surface, inside finish with neat cement punning, providing & fixing step iron of appropriate quality & size with 3 coats anticorrosive paint, RCC (1:1.5:3) cover slab using 20m & down size graded HG chips along with factory made reinforced concrete cover with frame including breaking of pipe line where ever necessary and earth work in excavation in all kind of soil & rock and refilling the cavity by selective soil, leveling the surface around the chamber with disposal of surplus earth if any to a distance of 50mt as per specification, design & drawing including cost of curing and all taxes , royalty , cost , conveyance etc. all complete as directed by the Engineer-in-charge.	No	1.00	10,700.00	10,700.00
15.14	Supplying all material, labour, T&P and constructing 1.80m dia x 2.60m deep soak way pit with dry brick walling upto 2.00m height and 1st class K.B. Brickwork in cement mortar (1:6) for the remaining 06.60m height at top, 12mm thick cement plaster (1:4) inside and outside , 100mm thick gravel backing in the rear of well staining, 125mm thick RCC cover slab fitted with with iron lifting handles including earth work in excavation in all kind of soil & rock and refilling the cavity by selective soil, leveling the surface around the pit with disposal of surplus earth if any to a distance of 50mt including cost of curing and all taxes , royalty , cost , conveyance etc. all complete as directed by the Engineer-in-charge.	No	1.00	12,840.00	12,840.00
16	Watering system like 150 mm dia, 100 Mtr deep bore well (PVC pipe to be used) 1 HP submersive pump, switch yard water hydrant system for pouring water into the earth pits, tap for garden, including PVC pipes & other accessories required etc.	LS	1.00	1,60,500.00	1,60,500.00
17	Small wicket (GI) gate one in between Main Gate & Security shed & another in front of Customer Care room of size 1.5 mtr width X 2 mtrs height single leaf with locking arrangement etc. as per above.	No.	2.00	5,350.00	10,700.00
18	RRHG retaining wall with 1:5 cement mortar Considering 0.6 mt height of retaining wall above the existing ground level per Meter as per Drawing TOTAL 74 Mtrs		-	-	-
18.1	Excavation in all type of soil(0.8 Cum / Mtr)	Cum	105.6 0	267.50	28,248.00
18.2	PCC (1:4:8) 200 mm thick. With cement (0.2 Cum / Mtr)	Cum	26.40	4,280.00	1,12,992.00
18.3	PCC (1:2:4) 50 mm thick With cement (0.02 Cum / Mtr)	Cum	1.58	5,778.00	9,152.35

Detailed Project Report Capex Plan FY 22-23

18.4	RRHG Cement Masonary (1:5) With cement (0.86 Cum / Mtr)	Cum	63.64	3,745.00	2,38,331.80
19	Prefabricated RCC Foundation for RMU	Nos.	1.00	10,265.00	10,265.00
20	Design & providing Galvanised Chain Linking Fencing with 2 Mtr Height around RMUs, as per TPCODL specification.	Sq. mtr.	-	4,668.00	-
	Sub-Total for CIVIL WORKS with supply of all materials like Cement, MS tor rod, Brick, Coarse & Fine Agregrates & Labour,T&P etc. (In Rs.)				2,15,69,610.85
	Total Cost in Cr.				2.16
-					
-				All Prices in Cr.	
A	Total Cost for SUPPLY OF EQUIPMENT & MATERIALS (In Cr.)				4.11
B	Stock , Storage & Insurance @ 3 % of A				
C	Sub - Total (A+B)				4.11
D	Contingency @ 3 % of C				
E	Tools &Plants Charges @ 2% of C (NOT CONSIDERED)				-
F	Transportation @ 7.5% of C				0.31
G	Sub - Total (C+D+E+F)				4.42
H1	Total Cost for ERECTION, TESTING & COMMISSIONING WORKS (In Cr.)				0.25
H2	Total Cost for CIVIL WORKS with supply of all materials like Cement, MS tor rod, Brick, Coarse & Fine Agregrates & Labour,T&P etc. (In Cr.)				2.16
H3	Total Cost for Erection & Civil works (H1+H2)				2.41
H4	GST @ 18% of Erection & Civil works				0.43
I	Total Cost of Erection & Civil works in Cr.(H3+H4)				2.84
J	Total Cost (G+I)				7.26
K	Other Overhead /(including Supervision Charges) @ 6 % of J				
L	Total Estimated Capital Cost i.e. J+K				7.26
M	GST @ 18% of L				1.31
N	CESS @ 1% of L				0.07
O	Inspection Charges (As per Gov. Notification)				0.00050
P	Total Estimate to be deposit in Cr @ L+M+N+O (In Cr.)				8.64

Detailed Project Report Capex Plan FY 22-23

B. Cost Estimate for Conversion of 33/11 KV City PSS From AIS to GIS

Sl. No.	DESCRIPTION OF ITEMS	UNITS	Quantity	Unitprice (In Rs.)	Total
SUPPLY OF FOLLOWING EQUIPMENT & MATERIALS (As per Technical Specification)					
33kV Equipment (Indoor Type)					
1	36kV Indoor GIS/SIS Equipment and accessories for 33/11kV GIS Substation as detailed below				
1.1	36KV,1250A,25KA for 3 sec, SF6 gas insulated (SF6 gas monitoring system)/Solid insulated system for line feeder bay module each comprising of SF6 gas insulated vacuum circuit breaker (1250A),Double Busbar (each 1250A) (Copper), inbuilt SA & CT (800-400/1-1A) , PT, bus-bar dis connectors (1250A) with common grounding switch, for complete Line feeder bay as per the technical specification. The module shall be provided with complete Line Feeder protection system to suit for SCADA (BCPU, Multi-function Meter & other provisions as per tech spec).	Set	6.00	25,36,365.25	1,52,18,191.50
1.2	36KV,1250A,25KA for 3 sec, SF6 gas insulated (SF6 gas monitoring system)/Solid insulated system for Transformer feeder bay module each comprising of SF6 gas insulated vacuum circuit breaker (1250A),Double Busbar (each 1250A) (Copper), inbuilt SA & CT (600-300/1-1-1A) , bus-bar dis connectors (1250A) with common grounding switch, for complete Transformer feeder bay as per the technical specification. The module shall be provided with complete Transformer Feeder protection system to suit for SCADA (BCPU, Numerical Differential Relay having inbuilt of REF protection, Multi-function Meter & other provisions as per tech spec).	Set	3.00	24,75,453.15	74,26,359.44
1.3	36KV,1250A,25KA for 3 sec, SF6 gas insulated (SF6 gas monitoring system)/Solid insulated system for Bus-coupler bay module each comprising of SF6 gas insulated vacuum circuit breaker (1250A),Double Busbar (each 1250A) (Copper), inbuilt CT (800-400/1-1A) , bus-bar dis connectors (1250A) with grounding switches, Each bus bar set shall be provided with inductive voltage transformers(two sets) with disconnecter(s) for both the buses for complete Bus-coupler bay as per the technical specification. The module shall be provided with complete Bus-coupler protection system to suit for SCADA (BCPU, Multi-function Meter & other provisions as per tech spec).	Set	2.00	44,03,929.80	88,07,859.60
11kV Equipment (Indoor Type)					
2	30kV, 10kA, Metal Oxide, Class-2 (Station Class), Surge Arrester (for 33kV Incoming Line, HT side of 2nos. Power Transformers and 33/0.433kV Station Transformer) - Outdoor Type with Surge Counter	Nos.	27.00	10,350.00	2,79,450.00
3	12kV, 10kA, Metal Oxide, Class-2 (Station Class), Surge Arrester with out surge counter(For Transformers & Out Going Feeders) - Outdoor type	Nos.	42.00	3,550.00	1,49,100.00
4	11kV Indoor Air Insulated switchgear Panel consisting of Breaker-630A, Busbar-1250A(Copper) & CT (400-200/1-1-1A) for Transformer Protection Relays to be installed on the panel, Multi-function Meter to be installed above the panel, Energy meter to be installed on the panel	No	3.00	6,41,174.55	19,23,523.64

Detailed Project Report Capex Plan FY 22-23

5	11kV Indoor Air Insulated switchgear Panel consisting of Breaker-630A, Busbar-1250A (Copper), CT (400-200/1-1-1A) for Feeder protection Relays to be installed on the panel, Multi-function Meter to be installed above the panel, Energy meter to be installed on the panel	No	11.00	7,21,808.20	79,39,890.17
6	11kV Bus-Coupler Indoor AIS Panel consisting of Breaker-630A, Bus-bar-1250A (Copper)	No	2.00	5,79,725.65	11,59,451.30
7	11kV, 2 Core, Single Phase, IVT (11/√3 kV / 110/√3-110/√3V), 3nos in a set, in a separate draw out chamber with Digital Voltmeter inside Control Room separately for Bus-1 & Bus-2 plug in type with disconnecter.	Set	3.00	3,67,128.86	11,01,386.57
SCADA					
8	SCADA FOR Primary Substation	Set	1.00	2,60,000.00	2,60,000.00
Transformer and RMU					
9	12.5 MVA, 33/11kV Power Transformer DYn11 (Outdoor Installation) with Accessories	No.	0.00	97,45,700.00	-
10	500 KVA.11/0.4 KV (Cu)Transformer with tap changer, BIS Energy level-II	No	2.00	5,80,000.00	11,60,000.00
11	11 KV 4Way RMU	No.	0.00	4,49,500.00	-
Substation Earthing System GI					
12	Earthing Conductor 75X10 mm (5.89 Kg/Mtr.) GI Flat for laying (spacing maximum 2m both ways)	Kg	7951.50	75.00	5,96,362.50
13	Earthing Conductor: 50X6 mm (2.4Kg./Mtr.) GI Flat for Raiser from the burial earth mat to equipment, structure etc.)	Kg	1080.00	75.00	81,000.00
14	Earthing Device & Associated Accessories (Heavy duty GI Perforated Pipe of ID=40mm & OD=50mm with 3000mm long for treated Earth Pit) as per Drawing	No	45.00	1,050.00	47,250.00
33, 11 and Station Trf Structure					
15	(125x70x5) mm RS GI joist 5Mtr (13.3kg / Mtr) (04 nos for one Power Transformer) for supporting of 33kV Cable & 11kV cable (Unit Wt=0.0665 MT) & 10 mm thick MS plate size 250X250 mm at the bottom of the RS Joist duly welded & the MS plate to be suitably grouted to the floor for the rigidity.	Kg	798.00	75.00	59,850.00
16	(100 x 50 x5) mm GI Channel (9.56kg / Mtr) (2Mtr - 06 nos for one Power Transformer) for supporting of 33kV & 11kV power Cable (Unit Wt=0.01912 MT)	Kg	344.16	75.00	25,812.00
17	GI Nuts & Bolts etc. for column and beam & Equipment Structures	Kg	750.00	78.00	58,500.00
18	Supply & Erection of GI Pipe of dia. 150mm, Class-B	Mtr.	75.00	1,607.00	1,20,525.00
19	High Density Polyethylene (HDPE) pipe 160 mm diameter.	KM	0.02	10,91,237.00	16,368.56
20	LT Distribution Box with MCCB, Aluminium Busbar for 6 Bay with kit kat fuse for 500 KVA S/S	Nos	2.00	97,360.00	1,94,720.00
21	Supply and installation of 8way LDB with accessories	Nos.	2.00	8,960.00	17,920.00
33 and 11 kv Power and Control, XLPE cables					
22	3Cx 400 mm ² 33KV XLPE Cable(armoured), A2XFY, Power cable Armored, aluminium conductor, stranded, including their termination materials like glands, lugs, tagging etc. as required as per technical specifications and scope of the works.	KM	0.80	20,32,000.00	16,25,600.00

Detailed Project Report Capex Plan FY 22-23

22.1	Heat shrinkable jointing kit for 3Cx400 mm ² 33 KV XLPE Cable(indoor type) complete with all accessories and tagging etc. as per technical specifications and scope of the works.	Set.	10.00	20,503.00	2,05,030.00
22.2	Heat shrinkable jointing kit for 3Cx400 mm ² 33 KV XLPE Cable(out door type) complete with all accessories and tagging etc. as per technical specifications and scope of the works.	Set.	10.00	33,255.00	3,32,550.00
23	3C X 400 sqmm, 11 KV, XLPE, 3 phase Power cable Armored, aluminium conductor, stranded, including their termination materials like glands, lugs, tagging etc. as required as per technical specifications and scope of the works.	KM	0.90	15,00,000.00	13,50,000.00
24	11 KV, 3C X 400 sqmm Heat Shrink In Door cable termination kit complete with all accessories and tagging etc. as per technical specifications and scope of the works.	Set.	14.00	9,582.00	1,34,148.00
25	11 KV, 3C X 400 sqmm Heat Shrink Out Door cable termination kit complete with all accessories and tagging etc. as per technical specifications and scope of the works.	Set.	14.00	13,904.00	1,94,656.00
26	Control Cables (Copper Armoured)				
26.1	4 Core x 2.5 mm ²	Km	0.31	1,06,157.22	32,757.08
26.2	7 Core x 2.5 mm ²	Km	0.10	1,67,628.60	17,241.80
26.3	10 Core x 2.5 mm ²	Km	0.21	2,34,997.61	48,342.36
26.4	12 Core x 2.5 mm ²	Km	0.21	2,78,851.73	57,363.78
26.5	1 Core x 16 mm ² Aluminium cable from Battery to Battery Charger & Battery Charger to DCDB	Km	0.06	1,24,606.20	7,689.98
27	1.1 kV XLPE Power Cables				
27.1	XLPE 3 1/2 Core x 120 mm ² (for Station Transformer output)	Km	0.05	4,28,106.97	21,405.35
27.2	XLPE 3 1/2 Core x 95 mm ² (for Oil Filtration Machine Connection)	Km	0.03	3,36,088.92	10,082.67
27.3	XLPE 3 1/2 Core x 25 mm ² (for Switchyard Lighting)	Km	0.03	1,17,045.14	3,511.35
27.4	XLPE 4 Core 16 mm ² (for Switchyard Lighting)	Km	0.03	84,154.55	2,524.64
27.5	XLPE 2 Core 16 mm ² (for Switchyard Lighting)	Km	0.03	50,583.46	1,517.50
	Battery & Battery Charger				
				-	-
28	48 V, 100 AH, maintenance free VRLA Battery (Set. 4 Nos of 12V Battery)	Set	1.00	58,740.62	58,740.62
29	48V, Float cum Boost Battery Charger (15 A float charging, 20 A boost charging)	No	2.00	1,90,907.01	3,81,814.01
	Sub-station Lighting And Fire Fighting System				
30	Sub-Station Switchyard Lighting , Control Room Lighting (it includes supply of fixtures & Lamps (LED) with switch gear, GI Conduit etc.(120Wx 4 sets and 100Wx6 sets out side the control room, 20 Watt CFL tube-10 sets inside control room .Control Room wiring to be done with Copper wires as per the requirement (Lighting fixtures are to be fixed rigidly on the Column at a suitable height with GI tubular pole so that the required lux as per the technical specification is maintained).	Lot	1.00	11,62,247.82	11,62,247.82
31	1.5 Ton capacity Split Air Conditioning units with Remote control facility: Including supply of split Air conditioner 5 Star rated, voltage stabiliser, control boxes etc. for completing the A.C scheme. (As per specification) for control room.	No	4.00	83,017.70	3,32,070.81

Detailed Project Report Capex Plan FY 22-23

32	1400 mm sweep 250Volt A/C Ceiling Fan	No	5.00	2,905.62	14,528.10
33	300 mm sweep 70W A/C Exhaust Fan (for Battery room and Toilet)	No	4.00	2,158.46	8,633.84
34	Fire Fighting System (portable and wheel mounted sets for control room)				
34.1	Foam type- 5 Ltrs	No	2.00	4,981.06	9,962.12
34.2	CO ₂ - 4.5 Kgs	No	2.00	9,962.12	19,924.25
34.3	Dry powder 4.5 Kg	No	2.00	4,150.89	8,301.77
34.4	Fire Bucket with Stand (4nos. in each Stand)	No	4.00	2,988.64	11,954.55
	AC & DC System for Auxiliary supply				
35	AC System				
35.1	ACDB (as per specification)	Lot	0.00	4,15,088.51	-
35.2	Main Lighting Distribution Board (as per specification)	Lot	1.00	1,66,035.40	1,66,035.40
35.3	Indoor Lighting Distribution Board as per specification	Lot	1.00	46,489.91	46,489.91
35.4	Receptable Panel near Power Transformer	No	1.00	14,943.19	14,943.19
36	DC System				
36.1	48 V DC Distribution Board as per specification .	No	1.00	2,07,544.25	2,07,544.25
37	Water Cooler with water purifier system as per Technical Specification	No	1.00	24,905.31	24,905.31
38	Maintenance Testing Equipment as per Technical Specification	Lot	1.00	9,96,212.42	9,96,212.42
39	Tools and Plants (T&P's) Requirement as per Technical Specification	Lot	1.00	2,49,053.10	2,49,053.10
40	Office Furniture as per Technical Specification	Lot	1.00	8,30,177.01	8,30,177.01
41	Supply of Materials for Installation of Power Transformer on Plinth (as per Drawing)				
41.1	90 lb Rail 5.4 mts (2.7x2) 44.62 kg per mtr / Transformer each (Unit Wt=0.240 MT)	Nos	3.00	20,322.28	60,966.84
41.2	(500x500x10) mm GI plate 6 nos / Transformer each (Unit Wt=0.013 MT)	Nos	9.00	1,145.44	10,308.98
41.3	(65x65x5) mm GI angle of 5.4 mts length.4.9 kg/mtr. / Transformer each (Unit Wt=0.026 MT)	Nos	3.00	2,290.88	6,872.65
42	Chequered plate 1000X300X5.6mm thick for Cable Trench in side Control Room 37 Mtr	Kg	1184.00	84.68	1,00,256.59
	Sub-Total for SUPPLY OF EQUIPMENT & MATERIALS (In Rs.)				5,54,09,884.34
	Material Landed Cost @18%				99,73,779.18
	Total Cost in Cr.				6.54
<u>ERECTION, TESTING & COMMISSIONING WORKS OF FOLLOWING EQUIPMENT</u>					
<u>(As per Technical Specification)</u>					
33kV Equipment (Indoor Type)					
1	Erection, Commissioning, Testing of 33kV Equipment for (INDOOR AIS Sub-Station)				

Detailed Project Report Capex Plan FY 22-23

1.1	36KV,1250A,25KA for 3 sec, SF6 gas insulated (SF6 gas monitoring system)/Solid insulated system for line feeder bay module each comprising of SF6 gas insulated vacuum circuit breaker (1250A),Double Busbar (each 1250A) (Copper), inbuilt SA & CT (800-400/1-1A) , bus-bar dis connectors (1250A) with common grounding switch, for complete Line feeder bay as per the technical specification. The module shall be provided with complete Line Feeder protection system to suit for SCADA (BCPU, Multi-function Meter & other provisions as per tech spec).	Set	6.00	48,237.78	2,89,426.71
1.2	36KV,1250A,25KA for 3 sec, SF6 gas insulated (SF6 gas monitoring system)/Solid insulated system for Transformer feeder bay module each comprising of SF6 gas insulated vacuum circuit breaker (1250A),Double Busbar (each 1250A) (Copper), inbuilt SA & CT (600-300/1-1-1A) , bus-bar dis connectors (1250A) with common grounding switch, for complete Transformer feeder bay as per the technical specification. The module shall be provided with complete Transformer Feeder protection system to suit for SCADA (BCPU, Numerical Differential Relay having inbuilt of REF protection, Multi-function Meter & other provisions as per tech spec).	Set	3.00	48,237.78	1,44,713.35
1.3	36KV,1250A,25KA for 3 sec, SF6 gas insulated (SF6 gas monitoring system)/Solid insulated system for Bus-coupler bay module each comprising of SF6 gas insulated vacuum circuit breaker (1250A),Double Busbar (each 1250A) (Copper), inbuilt CT (800-400/1-1A) , bus-bar dis connectors (1250A) with grounding switches, Each bus bar set shall be provided with inductive voltage transformers(two sets) with disconnecter(s) for both the buses for complete Bus-coupler bay as per the technical specification. The module shall be provided with complete Bus-coupler protection system to suit for SCADA (BCPU, Multi-function Meter & other provisions as per tech spec).	Set	2.00	48,237.78	96,475.57
Erection, Commissioning, Testing of 11kV Equipment (Indoor Type)					
2	30kV, 10kA, Metal Oxide, Class-2 (Station Class), Surge Arrester (for 33kV Incoming Line, HT side of 2nos. Power Transformers and 33/0.433kV Station Transformer) - Outdoor Type with Surge Counter	Nos.	27.00	428.00	11,556.00
3	12kV, 10kA, Metal Oxide, Class-2 (Station Class), Surge Arrester with out surge counter(For Transformers & Out Going Feeders) - Outdoor type	Nos.	42.00	128.40	5,392.80
4	11kV Indoor Air Insulated switchgear Panel consisting of Breaker-1250A, Busbar-2000A(Copper) & CT (800-400/1-1-1A) Horizontal draw type for Transformer Protection and Differential Relays to be installed on the panel, Multi-function Meter to be installed above the panel, Energy meter to be installed on the panel	No	3.00	7,490.00	22,470.00
5	11kV Indoor Air Insulated switchgear Panel consisting of Breaker-1250A, Busbar-2000A (Copper), CT (600-300/1-1-1A) for Feeder protection Relays to be installed on the panel, Multi-function Meter to be installed above the panel, Energy meter to be installed on the panel	No	11.00	7,490.00	82,390.00
6	11kV Bus-Coupler Indoor AIS Panel consisting of Breaker-1250A, Bus-bar-2000A (Copper), for Bus protection Relays to be installed on the panel, Multi-function Meter to be installed above the panel, Energy meter to be installed on the panel	No	2.00	7,490.00	14,980.00
7	11kV, 2 Core, Single Phase, IVT ($11/\sqrt{3}$ kV / $110/\sqrt{3}$ - $110/\sqrt{3}$ V), 3nos in a set, in a separate draw out chamber with Digital Voltmeter inside Control Room separately for Bus-1 & Bus-2 plug in type with disconnecter.	Set	3.00	7,490.00	22,470.00

Detailed Project Report Capex Plan FY 22-23

Erection, Commissioning, Testing of SCADA					
8	SCADA FOR Primary Substation	Set	1.00	0.00	0.00
Erection, Commissioning, Testing of Transformer and RMU					0.00
9	12.5 MVA, 33/11kV Power Transformer DYn11 (Outdoor Installation) with Accessories	No.	0.00	85,600.00	-
10	500 KVA.11/0.4 KV (Cu)Transformer with tap changer, BIS Energy level-II	No	2.00	5,350.00	10,700.00
11	11 KV 4Way RMU	No.	0.00	4,813.00	-
					-
Erection, Laying of Substation Earthing System GI					
12	Earthing Conductor 75X10 mm (5.89 Kg/Mtr.) GI Flat for laying (spacing maximum 2m both ways)	Kg	1080.00	15.00	16,200.00
13	Earthing Conductor: 50X6 mm (2.4Kg./Mtr.) GI Flat for Raiser from the burial earth mat to equipment, structure etc.)	Kg	720.00	15.00	10,800.00
14	Earthing Device & Associated Accessories (Heavy duty GI Perforated Pipe of ID=40mm & OD=50mm with 3000mm long for treated Earth Pit) as per Drawing	No	30.00	2,675.00	80,250.00
Erection of System GI 33, 11 and Station Trf Structure					
15	(125x70x5) mm RS GI joist 5Mtr (13.3kg / Mtr) (04 nos for one Power Transformer) for supporting of 33kV Cable & 11kV cable (Unit Wt=0.0665 MT) & 10 mm thick MS plate size 250X250 mm at the bottom of the RS Joist duly welded & the MS plate to be suitably grouted to the floor for the rigidity.	Kg	798.00	30.00	23,940.00
16	(100 x 50 x5) mm GI Channel (9.56kg / Mtr) (2Mtr - 06 nos for one Power Transformer) for supporting of 33kV & 11kV power Cable (Unit Wt=0.01912 MT)	Kg	344.16	30.00	10,324.80
17	GI Nuts & Bolts etc. for column and beam & Equipment Structures	Kg	750.00	30.00	22,500.00
18	GI Pipe of dia. 150mm, Class-B	Mtr.	0.00	-	-
19	High Density Polyethylene (HDPE) pipe 160 mm diameter.	KM	0.02	1,04,114.67	1,561.72
20	LTDB for 100KVA, 33/0.433kV Station Transformer	Nos	2.00	1,000.00	2,000.00
Laying of 11kV 33 and 11 kv Power and Control cables					
21	3Cx 400 mm ² 33KV XLPE Cable(armoured), A2XFY, Power cable Armored, aluminium conductor, stranded, including their termination materials like glands, lugs, tagging etc. as required as per technical specifications and scope of the works.	KM	0.80	2,80,497.64	2,24,398.11
22.1	Heat shrinkable jointing kit for 3Cx400 mm ² 33 KV XLPE Cable(indoor type) complete with all accessories and tagging etc. as per technical specifications and scope of the works.	Set.	10.00	1,959.72	19,597.20
22.2	Heat shrinkable jointing kit for 3Cx400 mm ² 33 KV XLPE Cable(out door type) complete with all accessories and tagging etc. as per technical specifications and scope of the works.	Set.	10.00	2,327.04	23,270.40
23	3C X 400 sqmm, 11 KV, XLPE, 3 phase Power cable Armored, aluminium conductor, stranded, including their termination materials like glands, lugs, tagging etc. as required as per technical specifications and scope of the works.	KM	0.90	2,08,229.35	1,87,406.42
24.1	11 KV, 3C X 400 sqmm Heat Shrink In Door cable termination kit complete with all accessories and tagging etc. as per technical specifications and scope of the works.	Set.	14.00	1,470.29	20,584.06
24.2	11 KV, 3C X 400 sqmm Heat Shrink Out Door cable termination kit complete with all accessories and tagging etc. as per technical specifications and scope of the works.	Set.	14.00	1,837.61	25,726.54

Detailed Project Report Capex Plan FY 22-23

25	Control Cables (Copper Armoured)				-
25.1	4 Core x 2.5 mm ²	Km	0.31	21,400.00	6,603.43
25.2	7 Core x 2.5 mm ²	Km	0.10	21,400.00	2,201.14
25.3	10 Core x 2.5 mm ²	Km	0.21	26,750.00	5,502.86
25.4	12 Core x 2.5 mm ²	Km	0.21	26,750.00	5,502.86
25.5	1 Core x 16 mm ² Aluminium cable from Battery to Battery Charger & Battery Charger to DCDB	Km	0.06	16,050.00	990.51
26	Laying of 1.1 kV XLPE Power Cables				-
26.1	XLPE 3 1/2 Core x 120 mm ² (for Station Transformer output)	Km	0.05	32,100.00	1,605.00
26.2	XLPE 3 1/2 Core x 95 mm ² (for Oil Filtration Machine Connection)	Km	0.03	29,960.00	898.80
26.3	XLPE 3 1/2 Core x 25 mm ² (for Switchyard Lighting)	Km	0.03	27,820.00	834.60
26.4	XLPE 4 Core 16 mm ² (for Switchyard Lighting)	Km	0.03	25,680.00	770.40
26.5	XLPE 2 Core 16 mm ² (for Switchyard Lighting)	Km	0.03	25,680.00	770.40
Erection, Commissioning , Wiring & Testing of Battery & Battery Charger					
27	48 V, 100 AH, maintenance free VRLA Battery (Set. 4 Nos of 12V Battery)	Set	1.00	5,350.00	5,350.00
28	48V, Float cum Boost Battery Charger (15 A float charging, 20 A boost charging)	No	1.00	5,350.00	5,350.00
	Erection, Commissioning , Wiring & Testing of Sub-station Lighting And Fire Fighting System				-
29	Sub-Station Switchyard Lighting , Control Room Lighting (it includes supply of fixtures & Lamps (LED) with switch gear, GI Conduit etc.(120Wx 4 sets and 100Wx6 sets out side the control room, 20 Watt CFL tube-10 sets inside control room .Control Room wiring to be done with Copper wires as per the requirement (Lighting fixtures are to be fixed rigidly on the Column at a suitable height with GI tubular pole so that the required lux as per the technical specification is maintained).	Lot	1.00	32,100.00	32,100.00
30	1.5 Ton capacity Split Air Conditioning units with Remote control facility: Including supply of split Air conditioner 5 Star rated, voltage stabiliser, control boxes etc. for completing the A.C scheme. (As per specification) for control room.	No	4.00	1,498.00	5,992.00
31	1400 mm sweep 250Volt A/C Ceiling Fan	No	5.00	107.00	535.00
32	300 mm sweep 70W A/C Exhaust Fan (for Battery room and Toilet)	No	4.00	107.00	428.00
33	Erection, Commissioning of Fire Fighting System (portable and wheel mounted sets for control room)				
33.1	Foam type- 5 Ltrs	No	2.00	53.50	107.00
33.2	CO ₂ - 4.5 Kgs	No	2.00	53.50	107.00
33.3	Dry powder 4.5 Kg	No	2.00	53.50	107.00
33.4	Fire Bucket with Stand (4nos. in each Stand)	No	4.00	107.00	428.00
Erection, Commissioning , Wiring & Testing of AC & DC System					
34	AC System				-
34.1	ACDB (as per specification)	Lot	0.00	4,280.00	-

Detailed Project Report Capex Plan FY 22-23

34.2	Main Lighting Distribution Board (as per specification)	Lot	1.00	2,140.00	2,140.00
34.3	Indoor Lighting Distribution Board as per specification	Lot	1.00	2,140.00	2,140.00
34.4	Receptable Panel near Power Transformer	No	1.00	1,605.00	1,605.00
35	DC System				-
35.1	48 V DC Distribution Board as per specification .	No	1.00	2,140.00	2,140.00
36	Erection, Commissioning of Water Cooler with water Purifier System	No	1.00	802.50	802.50
37	Commissioning & Testing of Maintenance Testing Equipment	Lot	1.00	2,140.00	2,140.00
38	Commissioning Tools and Plants (T&P's) Requirement	Lot	1.00	535.00	535.00
39	Commissioning Office Furniture	Lot	1.00	1,070.00	1,070.00
	Laying of Materials for Installation of Power Transformer on Plinth (as per Drawing)				-
40	90 lb Rail 5.4 mts (2.7x2) 44.62 kg per mtr / Transformer each (Unit Wt=0.240 MT)	Nos	3.00	856.00	2,568.00
41	(500x500x10) mm GI plate 6 nos / Transformer each (Unit Wt=0.013 MT)	Nos	9.00	74.90	674.10
42	(65x65x5) mm GI angle of 5.4 mts length.4.9 kg/mtr. / Transformer each (Unit Wt=0.026 MT)	Nos	3.00	80.25	240.75
43	Construction of Cable Trench : 2 tier 2 rows U-Type RCC Cable trench with M-20 Grade concrete: The internal width 2000 mm, depth 1005 mm, with 75X75X6 mm support angles fixed RCC wall of 175 X 175 mm, Raft of 175mm & with ladder type cable tray (45X45X5)mm two angles at both side having welded flats of 25X5 mm at a gap of 150mm) for Power & control Cable with RCC Trench Cover Slab as per technical Specification, approved drawing and Direction of Engineer Incharge. Complete work including earth work in excavation in all kind of soil & rock and refilling the cavity by selective soil, leveling the surface around the pit with disposal of surplus earth.	Mtr	70.85	23,041.98	16,32,524.28
44	Chequered plate 1000X300X5.6mm thick for Cable Trench in side Control Room 12 Mtr	Metric Ton	0.64	6,420.00	4,095.96
	Sub-Total for ERECTION, TESTING & COMMISSIONING WORKS (In Rs.)				30,97,993.27
	Total Cost in Cr.				0.31
-					
Civil Works with supply of all materials like Cement, MS tor rod, Brick, Coarse & Fine Agregrates & Labour,T&P etc.					
1	Contour survey (50 mts.x 5 mts.), plotting the contour on graph sheet and marking the finished ground level	Sqr Mtr	250.00	16.05	4,012.50
2	Cutting for Levelling and disposal of excess earth either in low laying area in sub-station or outside.	Cum	143.00	192.60	27,541.80
3	Filling of S/S area with borrowed earth (rolling & compacting of filled up soil before taking measurement).	Cum	1,400.00	374.50	5,24,300.00
4	OUT DOOR DRAIN to DISCHARGE SWITCHYARD/ WATER FROM WASH BASIN AND CONTROL ROOM ROOF (10 mts		-	-	-
4.1	Excavation in all type soil (1.35x10x0.7)	Cum	9.45	214.00	2,022.30

Detailed Project Report Capex Plan FY 22-23

4.2	PCC (1:3:6) (1.35x10x0.1)	Cum	1.35	4,708.00	6,355.80
4.3	PCC (1:2:4) (0.3x10x0.05)	Cum	0.15	5,778.00	866.70
4.4	Brick Masonary with cement mortar (1:5) (0.25x10x0.925+1/2x0.15x0.93x10)+(0.25x10x0.925)	Cum	5.32	3,905.50	20,775.63
4.4	Plastering with Cement mortar(1:6) (2x0.25x10+2x0.925x10+1x0.925x10+1x1.0x10)	Sq. mtr.	42.75	107.00	4,574.25
5	Switch Yard and COMPOUND WALL as per Drawing Schedule and Specification. For PILE Foundation for SBC Upto 10		-	-	-
5.1	Construction of Compound-wall (with RCC column & beam with M-20 Grade concrete) along the property line of the sub-station as per technical specification and instruction of the Engineer in Charge.(the size of the bricks shall be 250mm having 1st class Fly-ash brick having compressive strength with 75kg/cm ²). This also includes excavation in all types of soil or rocks, backfilling ,and disposal of excess earth . (Brick works rested on RCC Beam and RCC Column & footings , including Cement Plastering, Cement wash, Wall Painting two coats with weather coat. Provision of the boundary wall Fencing with M.S Grill of 700 mm height fixing at the top of the wall. It includes supply of all the materials & two coats of synthetic enamel paintings after primer application of the fencing .	Run. Mtr.	100.00	16,990.55	16,99,055.00
5.2	Switch Yard GI Chain Linking Fencing with 2.4 Mtr Height.	Run. Mtr.	50.00	5,000.00	2,50,000.00
6	Power Transformer Foundation / One (8 MVA)		-	-	-
6.1	Excavation in all type soil per Tfr.(3X3X1.1 mtr)	Cum	29.70	214.00	6,355.80
6.2	PCC (1:3:6) per Tfr.(3X3X0.075 mtr)	Cum	2.03	4,708.00	9,533.70
6.3	RCC (1:1.5:3) per Tfr. As per drawing	Cum	15.78	6,420.00	1,01,307.60
6.4	RRHG stone grouting with sand per Tfr.	Cum	12.00	1,926.00	23,112.00
7	Construction of 500kVA 11/0.4 kV station Trf. Plinth		-	-	-
7.1	Excavation in all type soil (2.5X2.5X0.750 mtr)	Cum	9.38	214.00	2,006.25
7.2	PCC (1:3:6) (2.5X2.5X0.075 mtr)	Cum	0.94	4,708.00	4,413.75
7.3	RCC (1:1.5:3) (1.5X1.5X0.1 mtr)	Cum	0.45	6,420.00	2,889.00
7.4	Brick Masonary work (2.5x2.5x.925+2x(.5 x1.5x2.25) (1:5)	Cum	61.19	3,905.50	2,38,967.78
7.5	Cement Plastering (1:6) (1.5x2.25x4)+(1.5x1.5) 20mm thick	Sq Mtr	18.00	107.00	1,926.00
8	Construction of oil sump pit for Transformer (1.6 X 1.6 X 2.3)		-	-	-
8.1	Excavation of Earth(2.0x2.0x2.1)	Cum	25.20	214.00	5,392.80
8.2	PCC (1:3:6) 2X2X0.1	Cum	1.20	4,708.00	5,649.60
8.3	RCC(1:1.5:3) 1.6X1.6X0.1 for Top Slab	Cum	0.77	6,420.00	4,930.56

Detailed Project Report Capex Plan FY 22-23

8.4	Brick Masonary work(2x2.1+2x1.6)x0.25x2.3 (1:5)	Cum	12.77	3,905.50	49,853.71
8.5	Cement Plastering (1:6) 2.3 (4x2.1+ 4x1.6)+ 1.6x1.6	Sq.mtr	41.72	107.00	4,464.04
8.6	Drainage for Oil sump pit with 250 dia hume pipe	Mtr	36.00	749.00	26,964.00
9	ROAD (5 Mtrs wide) Length of the road 20 mtrs as per Drawing Schedule- OPTCL/CIVIL/11-REV-B.		-	-	-
9.1	Excavation in all type soil 0.5mx1mx5m	Cum	50.00	214.00	10,700.00
9.2	Boulder Packing 0.5mx1mx5m	Cum	50.00	1,926.00	96,300.00
9.3	Water base course -I 0.075mx1mx5m	Cum	7.50	2,140.00	16,050.00
9.4	Water base course -II 0.075mx1mx5m	Cum	7.50	2,140.00	16,050.00
9.5	PCC (1:2:4) 0.1mx1mx5m	Cum	10.00	5,778.00	57,780.00
10	(125x70x5) mm RS GI joist 5Mtr (STATION) as per Drawing Schedule- OPTCL/CIVIL/2-REV-B.		-	-	-
10.1	Excavation with back filling L 1m x W 1 x D 2	Cum	8.00	214.00	1,712.00
10.2	PCC (1:3:6)	Cum	0.40	4,708.00	1,883.20
10.3	RCC (1:1.5:3)	Cum	12.00	6,420.00	77,040.00
11	Baffle Wall		-	-	-
11.1	Excavation with back filling 4.2mx0.75mx0.5m	Cum	3.15	214.00	674.10
11.2	PCC 1:3:6 4.2mx0.75mx0.1m	Cum	0.63	4,708.00	2,966.04
11.3	RCC 1:1.5:3 0.75x3.8x0.2+0.5x3.4x0.2+2.5x3x0.15	Cum	11.59	6,420.00	74,407.80
12	PCC (1:4:8) With cement For S/S area(75 mm) per Sq. mts.(8x16x0.075)	Cum	19.20	4,066.00	78,067.20
13	Metal Spreading 100 mm. per Sq. mts. Area of spreading.	Cum	25.60	1,605.00	41,088.00
	Switchgear Cum Control Room (22x10Mts) (column & beam based) (as per specification & Inclusive of doors, windows, collapsible gate, PHD fittings, electrification, inner cable trench, Two nos main doors with concrete pillars, beams) etc. as per Technical specification in Civil section. Layout Drawing		-	-	-
14	Switchgear Cum Control Room For Pile foundation in FLOOD AREA (with SBC upto 10)		-	-	-
14.1	Boring and casting 300 mm dia single under reamed pile of 5.00 m. long with R.C.C. M-20 using 20 mm down graded chips with cost of all materials, labours, T&P etc. & all other machinaries required for the work etc. Complete in all respect as per latest specification & direction of the Engineer in charge.	Nos	252.00	6,420.00	16,17,840.00
14.2	Earth work in excavation of foundation trenches in all kinds of soil including moorum, stony earth and earth mixed with boulders except sheet rock and boulders requiring blasting including dressing of sides and leveling the bed up to the required depth and depositing the excavated materials away from the work site within initial leads and lifts, including shoring, shuttering & dewatering (if required) with cost of labour,cess, hire & running charges of water pumps sundries , T & P & all other machinaries	Cum	470.80	235.40	1,10,826.32

Detailed Project Report Capex Plan FY 22-23

	required for the work etc. Complete in all respect as per latest specification & direction of the Engineer in charge.				
14.3	Supplying and filling in foundation and plinth with good river sand well watered and rammed in layers not exceeding 23 cm in each layer including all leads and lifts, cost of all materials, labour, cess, sundries, T&P required for the work etc. Complete in all respect as per latest specification & direction of the Engineer in charge.	Cum	791.60	770.40	6,09,848.64
14.4	Providing and lying plain cement concrete of proportion (1:3:6) in foundation and plinths using approved quality cement, 40 mm. size black hard crusher broken granite stone metal and screened, washed sharp sand for mortar of approved quality and from approved quarry, including hoisting, lowering, laying concrete, ramming, watering and curing etc. complete to required levels laid in layers not exceeding 15 cm. thick in each layer including cost, conveyance, loading, unloading, royalties and taxes of all materials and cost of all labours, cess, sundries, T&P & all other machineries required for the work including shoring, shuttering and dewatering if required including hire & running charges of water pump etc. Complete in all respect as per latest specification & direction of the Engineer in charge.	Cum	156.80	4,708.00	7,38,214.40
14.5	K.B. Brick masonry in cement mortar (1:6) using the bricks of size 10" x 5" x 3" of crushing strength not less than 100 kg / centimeter square with dimensional tolerance 3% after immersing the bricks for 6 hours in water before use including hoisting to required height placing in position scaffolding, splays cutting, circular moulding, corbelling, chamfering and similar such type of work watering and curing etc. including cost, conveyance, royalty, cess, and taxes of all other materials machineries scaffolding all labour T&P articles required for the work etc. complete in all respect as per the latest specification confirming to relevant IS Specification and direction of the Engineer-in-charge.		-	-	-
14.5.1	In Foundation and Plinth	Cum	108.00	4,494.00	4,85,352.00
14.5.2	Ground Floor	Cum	222.80	4,494.00	10,01,263.20
14.6	RCC work M-20 grade as per approved designs and drawings having a minimum compressive strength (in work test) 200 Kg./ Sqcm. in 15 cm. cubes at 28 days after mixing and test conducted in accordance with I.S.456 and I.S 516 using 12 mm. to 20 mm. size black hard crusher broken granite stone chips, screened and washed sharp sand for mortar of approved quality from approved quarry, to be mixed in concrete mixture with approved quality cement including hoisting, lowering, laying and compacting concrete by using vibrators, watering and curing for 28 days, centering and shuttering and finishing the exposed surface smooth providing grooves or beads wherever necessary including cost, conveyance, loading, unloading, royalties and taxes and cess of all materials, cost of all labours, sundries, T&P & all other machineries required for the work but excluding cost and conveyance of M.S. or Tor steel and binding wires etc. Complete in all respect as per latest specification & direction of the Engineer in charge.		-	-	-
14.6.1	Pile cap & Grade beam	Cum	300.00	6,420.00	19,26,000.00

Detailed Project Report Capex Plan FY 22-23

14.6.2	R.C.C. wall	Cum	70.80	6,420.00	4,54,536.00
14.6.3	Plinth Beam	Cum	24.40	6,420.00	1,56,648.00
14.6.4	Column & Beam- Ground Floor	Cum	144.00	6,420.00	9,24,480.00
14.6.5	Lintel-Ground Floor	Cum	8.80	6,420.00	56,496.00
14.6.6	65mm thick R.C.C.Chajja- Ground Floor	Sqm	88.40	588.50	52,023.40
14.6.7	Roof slab - Ground Floor	Cum	147.20	6,420.00	9,45,024.00
14.6.8	Staircase- Ground Floor	Cum	23.60	6,420.00	1,51,512.00
14.7	Cutting, Straightening coiled or bent up M.S. rods or Tor steel welding or jointing if necessary, bending, binding, tying the grills as required for R.C.C. works, providing fan hooks where necessary and hoisting, lowering and placing in proper position according to approved designs and drawings including cost, conveyance, loading, unloading, taxes of M.S. rods or Tor steel and binding wires of 18 to 20 gauge required for the work and cost of all labour, sundries, T&P and scaffolding complete in all respect as directed by the Engineer in charge (payment will be made according to the actual weight of M.S. rod / Tor steel consumed in the work and no separate payment will be made towards weight of binding wires which is to be borne by the contractor at his own cost etc. complete in all respect as per direction of the Engineer-in-charge.		-	-	-
14.7.1	Ground Floor	MT	72.00	58,850.00	42,37,200.00
14.8	Supplying, fitting and fixing vitrified tile 60x60cm plain Ivory 8 to 10 mm thick in floors of approved make with application of polymer modified cement based water resistant adhesive bed of required thickness of 10mm and filling joints with epoxy grout of approved quality including cost of all materials, takes labour T&P etc. required for the work etc. complete in all respect as per the latest specification and direction of the Engineer-in-charge.	Sqm	416.00	963.00	4,00,608.00
14.9	Supplying, fitting and fixing vitrified tile 60x60cm plain Ivory 8 to 10 mm thick in dado of approved make with application of polymer modified cement based water resistant adhesive bed of required thickness of 10mm and filling joints with epoxy grout of approved quality including cost of all materials, takes labour T&P etc. required for the work etc. complete in all respect as per the latest specification and direction of the Engineer-in-charge.	Sqm	36.80	963.00	35,438.40
14.10	Supplying, fitting and fixing Floor tile of size 40cmx40 cm / 30cmx30cm in floors on 25mm thick bed of cement mortar 1:1 (1cement : 1sand) jointed with neat cement slurry mixed with pigment to match the shades of the tiles of required thickness of approved quality including cost of all materials, takes labour T&P etc. required for the work.etc complete in all respect as per the latest specification and direction of the Engineer-in-charge.	Sqm	20.40	856.00	17,462.40
14.11	Providing fitting fixing Glazed /Ceramic tiles of size 20cmX30cm & 6.5 to 6.7mm thick of size up to 0.10sqm in wall dados skirting and on 12mm thick cement plaster (1:3) jointed with neat cement slurry mixed with pigments to match the shade of the tiles including rubbing and polishing complete including cost of precast tiles etc. complete in all respect as per the latest specification and direction of the Engineer-in-charge.	Sqm	107.20	802.50	86,028.00

Detailed Project Report Capex Plan FY 22-23

14.1	Supplying, fitting and fixing 5"x2½" size Dressed seasoned Sal wood chaukaths including cost, conveyance royalty taxes of all materials. labour, all other machinaries, T & P articles required for the work complete in all respect as per the direction of the Engineer-in-Charge.	Cum	1.00	80,250.00	80,250.00
14.13	Supplying, fitting and fixing 30mm/32mm flush door shutter (Non-Sal hard wood frame fixed with 4mm BWR ply on both sides of frame.including cost conveyance royalty taxes of all materials. labour, all other machinaries, T & P articles required for the work complete in all respect as per the direction of the Engineer-in-Charge.	Sqm	57.60	1,605.00	92,448.00
14.1	Providing and fixing of sliding windows of approved make to be fabricated from roll formed sections made of pre-painted steel (base steel as per IS-513 of 0.6 mm thick "D" quality, galvanized as per IS-277 with zinc of 120 Gm/ Sqm.) including cost conveyance royalty taxes of all materials. labour, all other machinaries, T & P articles required for the work complete in all respect as per the direction of the Engineer-in-Charge. DOUBLE SHUTTER SLIDING WINDOW	Sqm	124.00	2,354.00	2,91,896.00
14.15	Providing and fixing of FRP door frame including cost conveyance royalty taxes of all materials. labour, all other machinaries, T & P articles required for the work complete in all respect as per the latest specification and direction of the Engineer-in-Charge.	Mtr	40.80	481.50	19,645.20
14.2	Providing and fixing of FRP door shutter including cost conveyance royalty taxes of all materials. labour, all other machinaries, T & P articles required for the work complete in all respect as per the latest specification and direction of the Engineer-in-Charge.	Sqm	15.20	3,745.00	56,924.00
14.17	Providing 16mm. thick cement plaster with cement mortar of mix (1:6) with approved quality cement with screened and washed sharp sand for mortar and finished smooth to the surface over brick work after racking out the joints including watering and curing, rounding of corners etc. complete with cost, conveyance, loading, unloading, royalties, cess, and taxes of all materials and cost of all labours, sundries, T&P and scaffolding required for the work etc. complete in all respect as desired by the Engineer in charge		-	-	-
14.17.1	Ground Floor	Sqm	2,499.60	128.40	3,20,948.64
14.18	Providing 12mm. thick cement plaster with cement mortar of mix (1:6) with approved quality cement and screened and washed sharp sand for mortar and finished smooth to the surface over brick work after racking out the joints including watering and curing, rounding of corners etc. complete with cost, conveyance, loading, unloading, royalties and taxes, cess, of all materials and cost of all labours, sundries, T&P and scaffolding required for the work etc. complete in all respect as desired by the Engineer in charger in charge		-	-	-
14.18.1	Ground Floor	Sqm	1,588.40	107.00	1,69,958.80
14.19	Providing 12mm. thick cement plaster with cement mortar of mix (1:3) with approved quality cement with screened and washed sharp sand for mortar and finished smooth to the surface in ceiling and R.C.C. surface after chipping the surface in all floors including watering and curing, rounding of corners etc. complete with cost, conveyance, loading, unloading, royalties,		-	-	-

Detailed Project Report Capex Plan FY 22-23

	cess, and taxes of all materials and cost of all labours, sundries, T&P and scaffolding required for the work etc. complete in all respect as desired by the Engineer in charge.				
14.19.1	Ground Floor	Sqm	1,603.6 0	107.00	1,71,585.20
14.20	Providing and finishing the wall surface with two coat of cement wash including scaffolding, all labour, cost, conveyance, cess, taxes of all materials, T&P articles, brushes all other machineries required for the work complete in all respect confirming to relevant I.S. Specification and direction of the Engineer-in-Charge		-	-	-
14.20.1	Ground Floor	Sqm	5,655.2 0	6.42	36,306.38
14.21	Supplying fitting and fixing of M.S shutter made out of M.S Angle 40mmx40mmx6mm, M.S.Flat 19 mm x 5 mm size, M.S. guide, top hood cover etc. as per design provided including cost, conveyance, royalties of all materials, cost of all labour, T&P articles required for the work etc. complete in all respect confirming to relevant I.S specification and direction of the Engineer-in Charge.	Kg	3,166.8 0	80.25	2,54,135.70
14.22	Supplying fitting and fixing of M.S grill made out of M.S M.S.Flat 19 mm x 5 mm size, as per design provided including cost, conveyance, royalties of all materials, cost of all labour, T&P articles required for the work etc. complete in all respect confirming to relevant I.S specification and direction of the Engineer-in Charge.	Kg	2,848.4 0	80.25	2,28,584.10
14.23	Wall painting 2 coats with acrylic distemper over one coat of wall primer of approved shade on new work to give an even shade in all floors at all height including scaffolding cost of brushes including cost of paint cost conveyance royalty of all materials labour,T&P articles required for the work etc. complete in all respect as per the latest specification and direction of the Engineer-in-charge.		-	-	-
14.23.1	Ground Floor	Sqm	3,725.2 0	10.70	39,859.64
14.24	Painting two coats with weather coat on exterior walls surface of approved quality and approved shade over a coat of primer in all floors at all height of approved quality and shade including cleaning and sand papering the surface and making the surface smooth with cost, conveyance, loading, unloading, and taxes of all materials, cost of all labour, sundries, T&P, scaffolding etc. required for the work complete in all respect as directed by Engineer-in-charge		-	-	-
14.24.1	Ground Floor	Sqm	1,930.0 0	16.05	30,976.50
14.25	Painting two Coats with approved colour synthetic enamel paint on wood / iron work in all floors at all height including scaffolding cost conveyance royalty of all materials labour,T&P articles required for the work etc. complete in all respect as per the latest specification and direction of the Engineer-in-charge.	Sqm	418.40	32.10	13,430.64

Detailed Project Report Capex Plan FY 22-23

14.26	Providing cement concrete (1:1.5:3) using 12mm size black hard crusher broken granite stone chips, screened & washed sharp sand for mortar of approved quality and from approved quarry, including hoisting, lowering, laying concrete, ramming, watering and curing etc. complete to required levels laid in layers not exceeding 15 cm. thick in each layer including cost, conveyance, loading, unloading, royalties and taxes of all materials and cost of all labours, cess, sundries, T&P & all other machinaries required for the work including shoring, shuttering and dewatering if required including hire & running charges of water pump etc. Complete in all respect as per latest specification & direction of the Engineer in charge.	Cum	123.60	6,420.00	7,93,512.00
14.27	Supplying, fitting and fixing of stainless steel of 304 grade in hand railing using 50mm dia of 2mm thick circular pipe with Balustrade of size 32mm x 32mm x 2mm @ 0.90mtr. C/C and stainless square pipe bracing of size 32mm x 32mm x 2mm in 3 rows in stair case as per approved design and specification, buffing, polishing etc. with cost, conveyance, taxes of all materials, labour, T&P etc. required for the complete in all respect.	Mtr	68.00	1,605.00	1,09,140.00
14.28	Providing and fixing M.S. fan clamp type-I of 16mm dia M.S. bar bent to shape with hooked ends in R.C.C. slab during laying including painting the exposed portion of loop as per standard design complete as directed by the Engineer-in-charge.	Nos	120.00	160.50	19,260.00
14.29	Providing 12mm. thick cement plaster in cement mortar of mix (1:4) with neat cement punning with approved quality cement with screened and washed sharp sand for mortar and finished smooth to the surface in ceiling and R.C.C. surface after chipping the surface in septic tank including watering and curing, rounding of corners etc. complete with cost, conveyance, loading, unloading, royalties, cess, and taxes of all materials and cost of all labours, sundries, T&P and scaffolding required for the work etc. complete in all respect as desired by the Engineer in charge.	Sqm	48.40	107.00	5,178.80
14.30	Providing neat cement punning with approved quality cement finished smooth to the surface etc. complete with cost, conveyance, loading, unloading, royalties, cess, and taxes of all materials and cost of all labours, sundries, T&P and scaffolding required for the work etc. complete in all respect as desired by the Engineer in charge.	Sqm	958.00	16.05	15,375.90
14.31	40 mm thick grading concrete with cement concrete (1:2:4) using 12mm and down graded b.h.g. chips to the roof surface with water proofing cement compound finished smooth over RCC slab including hoisting and laying in position watering and curing for required number of days finished to smooth surface and desired slope including cost conveyance, royalty and taxes of all materials, labour T&P articles required for the work etc. complete in all respect confirming to relevant I.S specification and direction of the Engineer-in-Charge.	Sqm	550.80	235.40	1,29,658.32
15	P.H. Fitting (Internal & External) to Switch-Gear -Cum - Control Room		-	-	-
15.1	Supplying all materials , labours , taxes and tools and plants for fitting and fixing of PVC pipes of following nominal bore conforming to ASTM-D-1785 (Schedule-80) including fittings and laying as per the site requirement etc., all complete including testing as per the direction and specification of Engineer-in-charge		-	-	-
15.1.1	15 mm dia	Mtr	15.00	107.00	1,605.00

Detailed Project Report Capex Plan FY 22-23

15.1.2	20 mm dia	Mtr	20.00	133.75	2,675.00
15.1.3	25 mm dia	Mtr	15.00	187.25	2,808.75
15.1.4	40 mm dia	Mtr	20.00	214.00	4,280.00
15.1.5	50 mm dia	Mtr	20.00	267.50	5,350.00
15.2	Supplying all material, labour , T&P & fitting ,fixing the following different water supply fittings of approved make with including supply of all necessary jointing materials etc. all complete as directed by the Engineer-in-charge.		-	-	-
15.2.1	25 mm dia Ball valve	Nos	2.00	695.50	1,391.00
15.2.2	50 mm dia Ball valve	Nos	2.00	1,070.00	2,140.00
15.2.3	25 mm dia F.W. valve	Nos	2.00	695.50	1,391.00
15.2.4	50 mm dia F.W. valve	Nos	2.00	1,070.00	2,140.00
15.3	Supplying all labour T&P and cutting holes in brick masonry wall for taking pipes through and mending good the damages with supply of all required materials etc. complete as per the direction of the Engineer-incharge		-	-	-
15.3.1	For 15mm to 50mm CPVC pipe to pass in 125mm to 250mm thick wall	Nos	10.00	133.75	1,337.50
15.4	Supplying all labour T&P and materials and making grooves in brick walls vertically and horizontally to the required depth and width for fixing pipes & fittings of sizes 15mm dia to 25mm dia in the grooves, testing the pipe line against leakage, and filling the grooves with cement mortar(1:4) to bring the surface to original level including cost of mortars, curing and conveyance of materials etc. complete as per direction of the Engineer-in-charge.	Mtr	10.00	53.50	535.00
15.5	Supplying all materials , labour T&P and fittings of approved quality required for fixing of NP or CP Brass or GM fixtures of following sizes and specification with leak proof threaded joints tightened with spun yarn and white zinc or any tightened with spun yarn and white zinc or any including testing and rectification of detects, after testing complete as per direction of Engineer-in-charge.		-	-	-
15.5.1	Bibcock	Nos	5.00	160.50	802.50
15.5.2	Long Body Bibcock	Nos	2.00	321.00	642.00
15.5.3	Pillar cock	Nos	2.00	428.00	856.00
15.5.4	Angular stop cock	Nos	4.00	588.50	2,354.00
15.5.5	Soap Holder	Nos	2.00	80.25	160.50
15.5.6	Towel ring	Nos	2.00	160.50	321.00
15.5.7	Toilet paper holder	Nos	2.00	80.25	160.50
15.5.8	Glass self 22"	Nos	2.00	321.00	642.00
15.5.9	Towel rail 24"	Nos	2.00	374.50	749.00

Detailed Project Report Capex Plan FY 22-23

15.5.10	Shower arm 190mm long light	Nos	2.00	749.00	1,498.00
15.5.11	CP Grating	Nos	2.00	80.25	160.50
15.5.12	Concealed stop cock	Nos	4.00	535.00	2,140.00
15.5.13	Connecting Pipe	Nos	2.00	160.50	321.00
15.5.14	Basin with pedestal	Nos	2.00	3,210.00	6,420.00
15.5.15	Providing and fixing vitreous China water closet (European with seat and lid), of Cerra Cascade "CASINO", CP brass buffers, 10 liter cascade dual flushing cistern hinges & rubber with fittings and brackets, 40 mm flush bend of CP brass, 20 mm overflow pipe with specials & mosquito proof coupling complete, painting on brackets and making good the walls and floors wherever required.	Nos	1.00	16,050.00	16,050.00
15.5.16	Providing and fixing vitreous China water closet Indian type of Orissa pattern size (580mmx440mm) of approved quality with PVC Slimline (Parryware make) 12.5 ltr capacity low level cistrn with hinges & rubber with fittings and brackets, 40 mm flush bend of CP brass, 20 mm overflow pipe with specials & mosquito proof coupling complete, painting on brackets and making good the walls and floors wherever required.	Nos	1.00	4,494.00	4,494.00
15.5.17	Providing and fixing vitreous China water urinal of Cerra/Parry ware with fittings and brackets, flush bend of CP brass, and making good the walls and floors wherever required.	Nos	2.00	2,675.00	5,350.00
15.6	Supply of all materials, labour, T&P , fitting and fixing in all floors fixed type bevelled plate glass mirror of size 600mm x 450mm x 5.5mm thick best Indian make ,supply of 13mm thick asbestos backing and CP Brass screw including cost conveyance, taxes of all materials complete as per specification and direction of Engineer-in-charge(Make-Modi Guard/Belgium)	Nos	2.00	802.50	1,605.00
15.7	Supply of all materials, joining materials ,labour and T&P and laying UPVC SWR PIPES of Standard make with ISI Mark duly approved by the Engineer-in-charge including jointing, earthwork in excavation of trenches in all kind of soil to the required depth and refilling of pipe line trenches in 0.3048 mtrs layers with 300 mm deep sand around cushion duly watered and rammed or fixing to walls, floors with supply of necessary clamps, nails and cutting the pipe to length with wastage including supply of all Clamps, Clips, Endcaps & jointing materials etc., complete as per standard specification and direction of Engineer-in-charge.		-	-	-
15.7.1	100mm dia (ISI Marked)	Mtr	10.00	535.00	5,350.00
15.7.2	150mm dia (ISI Marked)	Mtr	25.00	642.00	16,050.00
15.8	Supplying all materials, labour T&P for jointing of the UPVC SWR SEWER pipe fittings of standard make duly approved by the Engineer-in-charge with joining material etc. suitably required for fixing on 100mm dia soil waste pipe complete with requisite testing as directed by Engineer-in-charge.		-	-	-
15.8.1	100mm dia "P" Trap	Nos	2.00	428.00	856.00
15.8.2	100mm dia Bend Plain	Nos	3.00	181.90	545.70
15.8.3	100mm Door Bend	Nos	3.00	160.50	481.50

Detailed Project Report Capex Plan FY 22-23

15.8.4	100 mm dia Single Junction with Door	Nos	3.00	374.50	1,123.50
15.8.5	100 mm dia double Junction with Door	Nos	3.00	428.00	1,284.00
15.8.6	100mm dia Terminal Guard	Nos	2.00	214.00	428.00
15.8.7	100mm dia. Floor trap	Nos	3.00	267.50	802.50
15.9	Supplying all materials, labor T&P for jointing of the UPVC SWR SEWER pipes & fittings of standard make duly approved by the Engineer-in-charge suitably required for fixing on 100mm dia soil waste pipe complete with requisite testing as directed by Engineer-in-charge.		-	-	-
15.9.1	100mm Pipe	Nos	10.00	321.00	3,210.00
15.10	Fixing of UPVC vent pipes Including labour & T&P all complete as directed by the Engineer-in-charge.		-	-	-
15.10.1	100mm Pipe	Mtr	4.00	428.00	1,712.00
15.10.2	100mm Vent Cowl	No	2.00	107.00	214.00
15.11	Supplying all materials labour T&P and constructing inspection chamber C.C.(1:4:8) on bed with hard stone metal size 40mm and 250mm K.B.Bricks work having crushing strength 75 Kg to 99 Kg/cm ² in cement mortar (1:4), R.C.C. roof slab with 500mm dia light pattern factory made SFRC M.H cover with frame, moulding and shaping the channel and benching with C.C. 1:2:4 with hard granite chips 12mm size, 12mm thick C.P 1:3 including cement punning inside, Cement plaster (1:3) outside the chamber, earth work in excavation in all kinds of soil and refilling the cavity around the chamber as per detail drawing & design and specification including cost, conveyance, taxes etc. all complete as directed by Engineer-in-charge.		-	-	-
15.11.1	750mmx 750mm x450mm	No	1.00	4,815.00	4,815.00
15.12	Providing and fixing 2000 litres capacity P.V.C Over head (Sintex make) tank with all piping and valve arrangement with all labour & materials ,including cost, T&P , scaffolding etc., complete as directed by the Engineer-in-charge.		-	-	-
15.12.1	2000 Ltr Capacity	No	1.00	18,190.00	18,190.00
15.13	Supplying all material, labour, T&P and constructing manhole chamber of size as mentioned below with 250mm nominal size K.B. Brick having crushing strength 75kg to 99kg /cm ² in CM 1:4 over a bed of 150mm thick C.C(1:4:8) using 40mm size HG metal, plastering with 12mm thick cement mortar (1:3) on internal and external surface, inside finish with neat cement punning, providing & fixing step iron of appropriate quality & size with 3 coats anticorrosive paint, RCC (1:1.5:3) cover slab using 20m & down size graded HG chips along with factory made reinforced concrete cover with frame including breaking of pipe line where ever necessary and earth work in excavation in all kind of soil & rock and refilling the cavity by selective soil, leveling the surface around the chamber with disposal of surplus earth if any to a distance of 50mt as per specification, design & drawing including cost of curing and all taxes , royalty , cost , conveyance etc. all complete as directed by the Engineer-in-charge.	No	1.00	10,700.00	10,700.00

Detailed Project Report Capex Plan FY 22-23

15.14	Supplying all material, labour, T&P and constructing 1.80m dia x 2.60m deep soak way pit with dry brick walling upto 2.00m height and 1st class K.B. Brickwork in cement mortar (1:6) for the remaining 06.60m height at top, 12mm thick cement plaster (1:4) inside and outside , 100mm thick gravel backing in the rear of well staining, 125mm thick RCC cover slab fitted with with iron lifting handles including earth work in excavation in all kind of soil & rock and refilling the cavity by selective soil, leveling the surface around the pit with disposal of surplus earth if any to a distance of 50mt including cost of curing and all taxes , royalty , cost , conveyance etc. all complete as directed by the Engineer-in-charge.	No	1.00	12,840.00	12,840.00
16	Watering system like 150 mm dia, 100 Mtr deep bore well (PVC pipe to be used) 1 HP submersive pump, switch yard water hydrant system for pouring water into the earth pits, tap for garden, including PVC pipes & other accessories required etc.	LS	1.00	1,60,500.00	1,60,500.00
17	Small wicket (GI) gate one in between Main Gate & Security shed & another in front of Customer Care room of size 1.5 mtr width X 2 mtrs height single leaf with locking arrangement etc. as per above.	No.	2.00	5,350.00	10,700.00
18	RRHG retaining wall with 1:5 cement mortar Considering 0.6 mt height of retaining wall above the existing ground level per Meter as per Drawing TOTAL 74 Mtrs		-	-	-
18.1	Excavation in all type of soil(0.8 Cum / Mtr)	Cum	105.60	267.50	28,248.00
18.2	PCC (1:4:8) 200 mm thick. With cement (0.2 Cum / Mtr)	Cum	26.40	4,280.00	1,12,992.00
18.3	PCC (1:2:4) 50 mm thick With cement (0.02 Cum / Mtr)	Cum	1.58	5,778.00	9,152.35
18.4	RRHG Cement Masonary (1:5) With cement (0.86 Cum / Mtr)	Cum	63.64	3,745.00	2,38,331.80
19	Prefabricated RCC Foundation for RMU	Nos.	1.00	10,265.00	10,265.00
20	Design & providing Galvanised Chain Linking Fencing with 2 Mtr Height around RMUs, as per TPCODL specification.	Sq. mtr.	-	4,668.00	-
	Sub-Total for CIVIL WORKS with supply of all materials like Cement, MS tor rod, Brick, Coarse & Fine Agregrates & Labour,T&P etc. (In Rs.)				2,11,07,034.10
	Total Cost in Cr.				2.11
-				All Prices in Cr.	
A	Total Cost for SUPPLY OF EQUIPMENT & MATERIALS (In Cr.)				6.54
B	Stock , Storage & Insurance @ 3 % of A				
C	Sub - Total (A+B)				6.54
D	Contingency @ 3 % of C				
E	Tools &Plants Charges @ 2% of C (NOT CONSIDERED)				-
F	Transportation @ 7.5% of C				0.49
G	Sub - Total (C+D+E+F)				7.03
H1	Total Cost for ERECTION, TESTING & COMMISSIONING WORKS (In Cr.)				0.31
H2	Total Cost for CIVIL WORKS with supply of all materials like Cement, MS tor rod, Brick, Coarse & Fine Agregrates & Labour,T&P etc. (In Cr.)				2.11

Detailed Project Report Capex Plan FY 22-23

H3	Total Cost for Erection & Civil works (H1+H2)				2.42
H4	GST @ 18% of Erection & Civil works				0.44
I	Total Cost of Erection & Civil works in Cr.(H3+H4)				2.86
J	Total Cost (G+I)				9.88
K	Other Overhead /(including Supervision Charges) @ 6 % of J				
L	Total Estimated Capital Cost i.e. J+K				9.88
M	GST @ 18% of L				1.78
N	CESS @ 1% of L				0.10
O	Inspection Charges (As per Gov. Notification)				0.00050
P	Total Estimate to be deposit in Cr @ L+M+N+O (In Cr.)				11.76

8.31 Annexure 31 Cost Estimate for Conversion pole mounted DTR to plinth mounted (100 KVA and above)

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	100 KVA,11/0.4KV(Al) Transformer	-	EA	1,17,000	0.0
2	LT Distribution Box for 100 KVA S/S.	85.00	EA	24,419.00	2075615.0
3	AB Switch(11KV,200A,3Pole,50Hz)	85.00	EA	7,350	624750.0
4	Lightening Arrester(9KV,5KA)	255.00	EA	980	249900.0
5	HG Fuse(11KV,3 Pole)	255.00	EA	6,120	1560600.0
6	100MMSQ AAA CONDUCTOR FOR JUMPERING	1,955.00	M	55	107525.0
7	CABLE 1.1KV AL 1CX150 SQMM ARM	850.00	M	279	237150.0
8	GLAND FOR ARM CABLE 1CX150 SQ.MM	340.00	EA	280	95200.0
9	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos (9.2 Kg. / Mtr.) with Galvanization	8,500.00	KG	75	637500.0
10	Transformer Mounting Channel (100x50X6)mm 2.8 Mtr long 2 Nos (9.2 Kg./Mtr.) with Galvanization	7,650.00	KG	75	573750.0
11	AB Switch and HG Fuse Mounting Channel (75x40X6)mm 2.8 Mtr long 4Nos (6.8 Kg./Mtr.) with Galvanization	-	KG	75	0.0
12	Transformer Belting angle (50X50X6) mm 2.8mtr long 2 nos. (4.5 Kg./Mtr.)with side angle (total 7mtr) with Galvanization	2,677.50	KG	75	200812.5

Detailed Project Report Capex Plan FY 22-23

13	Angle for mounting LT distribution box (50X50X6) mm 2.8mtr long 2nos (4.5 Kg./Mtr.)with side angle with Galvanization	-	KG	75.00	0.0
14	11 KV Disc Insulator T & C Type 45 KN POLYMER	255.00	NO	860.00	219300.0
15	11 KV hard ware fitting T & C Type 45KN	255.00	NO	130.00	33150.0
16	50x6 mm G I flat	4,328.20	KG	75	324615.0
17	25x6 mm G I flat	1,431.40	KG	75	107355.0
18	G.I NUTS,BOLTS & WASHERS	850.00	KG	78	66300.0
19	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	850.00	EA	12	10055.5
20	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	4,590.00	EA	36	165240.0
21	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	680.00	EA	29	19781.2
22	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	255.00	EA	320	81600.0
23	TEMPLETE FOR TRANSFORMER MAINT.RECORD	85.00	EA	68	5780.0
24	TAPE HT SCOTCH 23 25MMX9.1M 66KV	77.35	ROL	540.54	41810.8
25	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	30.60	EA	1,550.75	47453.0
26	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	340.00	EA	1,188.38	404049.2
27	ALNOX 3M (HOT SPOT REDUCING PASTE)	5.95	EA	4,084.64	24303.6
28	3M SCOTCH 1625 SPRAY	34.00	EA	754.98	25669.3
29	3M SCOTCH FILL PUTTY	85.00	EA	462.69	39328.7
30	RODENT CAPACITIVE SCREEN GUARD FOR-DT	255.00	EA	2,177.28	555206.4
31	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	170.00	EA	884.00	150280.0
32	SLEEV BLACK POLYOLEFIN	170.00	M	377.41	64159.7
33	40MM NOMINAL BORE GI PIPE (MEDIUM GAUGE) EARTHING DEVICE WITH 3 MTR LONG	425.00	EA	1,050	446250.0
34	PIPE HDPE SIZE 25 MM	1,955.00	M	28	54740.0
35	7/10 SWG G I stay wire (10Kg. / Set)	1,700.00	KG	75	127500.0
36	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	425.00	LS	1600.00	680000.0
37	FRP Fencing	2,380.00	Sq.M	2615.00	6223700.0

Detailed Project Report Capex Plan FY 22-23

38	CONNECTOR MINI WEDGE 25 SQMM TO DOG	255.00	EA	183	46665.0
Subtotal Material(A)					1,63,27,095
Stock, Storage and Insurance@3% of A					489812.84
Sub- Total-B					16816907.64
T & P Charges @ 2% of B					336338.15
Contingency @ 3% of B					504507.23
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					1732141.49
Transportation Charges@7.5% of B					1261268.07
A	Plinth for Transformer (5'x5'x8') Concreting ratio 1:3:6 @6275	85	LS	35297	3000245.00
Sub-Total C					23651407.57
Over Head Charges (Including Supervision charges) @6% of C					1419084.45
Total D					25070492.02
Gross Cost					25070492.02
OR Say					25070492.00
GST @18%					4512688.56
CESS 1%					250704.92
Gross Cost (Inc. GST)					29833885.48
Total(In Crores)					2.983
Escalation of 3 years with 18% of grand Total					3.52

8.32 Annexure 32 Cost Estimate for Height enhancement of the lines at river crossing

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	Cost of G.I PC +6 TYPE Tower super structure (Main + Extention +Stub + Template)	-			0.0
i)	PC Tower (6.214 MT/ Tower)	74.57	MT	75,000.00	5592600.0
ii)	+6 Mtr Extention (2.342 MT/ Tower)	28.10	MT	75,000	2107800.0
iii)	Template (1.904 MT/ Tower)	22.85	MT	75,000	1713600.0
2	Nut Bolts	-			0.0
i)	PC Tower (1.654 MT/ Tower)	19.85	MT	78,000	1548144.0
ii)	+6 Mtr Extention (0.592 MT/ Tower)	7.10	MT	78,000	554112.0
3	Conductor and Accessories	-			0.0
i	33 kV 232sqmm conductor (ACSR)	16.07	Km	1,56,500	2514172.5

Detailed Project Report Capex Plan FY 22-23

ii	Earth wire 7/1.5=300 meter +Tower earthing (50 x 3) = 150 meter + 12 meter wastage = 462 meter	2.77	Km	35,000	97020.0
iii	Double tension Hardware Fittings	144.00	Set	3,460	498240.0
iv	Disc insulator (B&S)120 KN polymer	288.00	Nos	1,440	414720.0
v	Earth wire tension fittings	24.00	Set	450.00	10800.0
iv	Vibration damper for earth wire	24.00	Nos	918.00	22032.0
v	Vibration damper	144.00	Nos	975.00	140400.0
vi	Mid-Span Joint	-	Nos	-	0.0
vii	Repair Sleeve	-	Nos	-	0.0
viii	Copper flexible bond	12.00	Nos	700	8400.0
ix	Phase Plate (R,Y,B)	72.00	Set	150	10800.0
x	Tower Number Plate	24.00	Nos	250	6000.0
xi	Circuit Plate	24.00	Nos	150	3600.0
xii	40 mm Dia. 3Mtr. long G.I Earthing device	24.00	Nos	1,050	25200.0
xiii	GI Flat 50 x 6 mm	1,200.00	kg	75	90000.0
xiv	Danger Board	24.00	Nos	80.00	1920.0
xv	Bird Guard	144.00	Nos	200.00	28800.0
xvi	Anticlimbing Device	1,267.20	kg	80.00	101376.0
xvii	Loop Connector	72.00	Nos	250.00	18000.0
4	232 sqmm All Alloy Aluminum Conductor AAAC	9.27	M	156.50	1450.8
5	150X 150mm RS joist (13 Mtr long)(34.6 kg Per meter)(Each 415.2kg)	72.00	No	29,237.00	2105064.0
6	BOLT & NUT GI 16MMX75M HEX	180.00	KG	82.00	14760.0
7	BOLT & NUT GI 16MMX200MM HEX	348.00	KG	82.00	28536.0
8	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr. length, 6 no's required = (6x2.36x0.280)	713.66	KG	65.00	46388.2
9	50x50x6 mm M.S Angle (4.50Kg. / Mtr)	2,797.20	KG	65.00	181818.0
10	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	4,112.64	KG	65.00	267321.6
11	100x50x6 mm MS Channel (9.2Kg. / Mtr)	3,091.20	KG	65.00	200928.0

Detailed Project Report Capex Plan FY 22-23

12	PLATE BASE RCC SIZE 450X450X50MM	60.00	EA	110	6600.0
13	HT stay set complete	96.00	Set	1,050	100800.0
14	HT stay insulator TYPE-C	96.00	EA	50	4800.0
15	7/10 SWG G I stay wire (12Kg. / Set)	1,152.00	KG	75	86400.0
16	HT stay Clamp (1.9Kg/pair)	96.00	Pair	125	12000.0
17	Disc insulator (B&S) 120KN Polymer	144.00	EA	1,440	207360.0
18	Single tension HW fitting for 232 sq.mm conductor	144.00	Set	1,680	241920.0
19	T clamp for 232 mm ² conductor	144.00	EA	960	138240.0
20	33KV pin insulator polymer	72.00	EA	480	34560.0
21	BOARD DANGER	72.00	EA	80	5760.0
22	G I Barbed wire	120.00	EA	80	9600.0
23	No. 6 GI wire	148.20	KG	75	11115.0
24	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	72.00	EA	17	1224.0
25	Earthing Coil	72.00	No	166	11952.0
Subtotal Material(A)					1,92,26,334
Stock, Storage and Insurance@3% of A					576790.02
Sub- Total-B					19803124.04
T & P Charges @ 2% of B					396062.48
Contingency @ 3% of B					594093.72
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					1931310.98
Transportation Charges@7.5% of B					1485234.30
A	Civil work (Excavation, Back Filling,PCC, RCC,etc.) for Tower including pile foundation (upto 12 mtr).	12.00	Each	426355	5116260.00
B	Erection of PC + 6 Tower Super Structure including tightening,punching & with transportation etc.	12.00	Nos'	41665	499980.00
C	Stringing of ACSR Panther conductor In cluding earth wire	1.89	C/Km	49500	93555.00
D	Stringing of Earth wire	2.70	R/Km	15000	40500.00
F	Cement concreting for support with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtrx1.5)M3=0.3cum	72.00	No.	2,124	152928.00
G	Cement concreting for Stud & Stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtrx1.5)M3=0.3cum	96.00	No.	1,270	121920.00
Sub-Total C					30234968.51
Over Head Charges (Including Supervision charges) @6% of C					1814098.11
Total D					32049066.62

Detailed Project Report Capex Plan FY 22-23

	Gross Cost		32049066.62
	OR Say		32049067.00
	GST @18%		5768832.06
	CESS 1%	-	320490.67
	Gross Cost (Inc. GST)		38138389.73
	Total(In Crores)		3.814
	Escalation of 3 years with 18% of grand Total		4.500

8.33 Annexure 33 Cost Estimate for Strengthening of poles in the cyclone prone area

Sr. no	Item Description	Unit	QTY	Unit Rate	Total amount
1	Providing all material, tools tackles and consumables for Pole Muffing around existing pole soft size 600mm (Long) x400m (wide) x900mm (deep). The depth of 900 mm shall be 300mm above grounded 600mm below ground. The quoted rate shall include: a. Excavation of pit, levelling and compacting the excavated surface, b. Providing 50mm thk aggregate laying and compacting providing concrete of grade M-15 (1cement:2sand:4Aggregate) for Pole Muffing of Size 600mm(L) x 400mm(W)x900mm(H) (300 above grounded 600 below ground), including providing shuttering , vibrating, curing etc. completed. Back filling around foundation and compacting manually. e. Providing Support to the pole to prevent it from falling, where required. The rates quoted shall also include necessary vegetation cleaning, dewatering local transporting loading, unloading of materials complete as directed by Engineer In Charge (EIC).	Each	10504	1940	20377760
2	Providing all materials, tools tackles and labour, preparing the surface by scrapping / sand papering to remove loose scales, Applying a coat of Primer and Two Coats of Bituminous Black Paint up to 600mm above concrete surface from approved manufacturer. To provide a strip of 200mm yellow paint in the centre of Bituminous Black Paint for visibility, Including following necessary safety standards, complete as directed as directed by EIC.	Each	10504	345	3623880
Total					24001640
Total in Cr.					2.40

8.34 Annexure 34 Cost Estimate for Trolley Mounted Pad Substations

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	Trolley for Mounting TRF	14.00	EA	1,00,000	1400000.0
2	500 KVA.11/0.4 KV (Cu)Transformer with tap changer, BIS Energy level-II	14.00	EA	5,80,000.00	8120000.0

Detailed Project Report Capex Plan FY 22-23

3	ACB LT 400A	28.00	EA	39,919	1117732.0
4	BOARD DANGER 11KV SIZE 8X10 INCH	28.00	EA	94	2643.2
5	LUG AL CRIMPING 55 SQMM XLPE SINGLE HOLE	42.00	EA	12	504.0
6	CABLE 1.1KV AL 1X630 SQMM UNAR XLPE	560.00	M	466	261094.4
7	LUG AL CRIMPING 630 SQMM XLPE ONE HOLE	448.00	EA	136	60793.6
8	CONNECTOR PALM LT BRASS - TRF	56.00	EA	1,144	64067.8
9	ISMC-75*40 GI Channel (7.24KG/M)	2,100.00	KG	121	254310.0
10	ISA-50*50*6 GI Angel (4.6KG/M)	980.00	KG	121	118678.0
11	FLAT GI SIZE 50X6MM	420.00	KG	89	37170.0
12	BOLT & NUT GI 16MMX75M HEX	140.00	KG	82	11480.0
13	BOLT & NUT GI 12MMX75MM HEX	70.00	KG	82.00	5740.0
14	BOLT & NUT GI 16MMX200MM HEX	70.00	KG	82.00	5740.0
15	WASHER GI SIZE 12MM DIA	7.00	KG	82.00	574.0
16	WASHER GI SIZE 16MM DIA	7.00	KG	82	574.0
17	TEMPLATE FOR TRANSFORMER MAINT.RECORD	14.00	EA	80	1115.1
18	CONNECTOR PALM LT BRASS 1000A 630KVA TRF	56.00	EA	1,350	75595.5
19	3Cx 95 mm ² 11KV XLPE Cable (Armoured), A2XFY	252.00	Mtr	571	143892.0
20	Heat shrinkable jointing kit for 3Cx95 mm ² 11 KV XLPE Cable (outdoor type)	28.00	No	10,949	306572.0
21	3x120+1x70+1x16mm ² AB cable,	1.82	KM	4,32,370	786913.4
22	Aluminium Socket-120Sqmm	112.00	No	22	2464.0
23	BOLT & NUT GI 12MMX50MM HEX	14.00	KG	97	1354.6
Subtotal Material(A)					1,27,79,008
Stock, Storage and Insurance@3% of A					383370.23
Sub- Total-B					13162377.89
T & P Charges @ 2% of B					263247.56
Contingency @ 3% of B					394871.34
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					937544.92
Transportation Charges@7.5% of B					987178.34
Sub-Total C					15745220.05

Detailed Project Report Capex Plan FY 22-23

	Over Head Charges (Including Supervision charges) @6% of C		944713.20
	Total D		16689933.25
	Gross Cost		16689933.25
	OR Say		16689933.00
	GST @18%		3004187.94
	CESS 1%	-	166899.33
	Gross Cost (Inc. GST)		19861020.27
	Total(In Crores)		1.99
	Escalation of 3 years with 18% of grand Total		2.34

8.35 Annexure 35 Cost Estimate for Overhead to Underground conversion for Major City

Sr.No.	Description	UOM	Qty	Amount
				in Crores
A	33 kV Conversion (O/H Line) to UG	Ckm	15	11.39
B	11 kV Conversion (O/H Line) to UG	Ckm	14	8.61
Total				20.00

A. Cost Estimate for 33 kV Conversion (O/H Line) to UG with 3Cx400 sqmm XLPE

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	3Cx 400 mm ² 33KV XLPE Cable(armoured), A2XFY	15000	Mtr	2,032	3,04,80,000
2	Heat shrinkable jointing kit for 3Cx400 mm ² 33 KV XLPE Cable(out door type)	30	No	33,255	9,97,650
3	Heat shrinkable jointing kit for 3Cx400 mm ² 33 KV XLPE Cable(Straight type)	45	No	68,594	30,86,730
4	HDPE Pipe, 8", 10 Mtr, (Spec PE80-PN8, 200MM dia)	13950	mtr	1,785	2,49,00,750
5	Route and joint indicating stones	300	nos	121	36,300
6	Supply & laying of 200 mm dia 6 mm thick ISI marked GI pipe with jointing sockets (wherever required) & making of proper sealing arrangement at the ends of pipes with petty messionary work.(As per TPDDL specifications or IS in case TPDDL specifications are not available)	450	Mtr	2,033	9,14,850

Detailed Project Report Capex Plan FY 22-23

7	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	30	EA	1050	31,500
8	7/10 SWG G I stay wire, Grade -2	600	KG	75	45,000
9	PIPE HDPE SIZE 20 MM	90	Mtr	37.78	3,400
10	Aluminium Cable Sockets 95 mm ²	60	EA	20	1,200
Subtotal Material(A)					6,04,97,380
Stock, Storage and Insurance@3% of A					1814921.41
Sub- Total-B					62312301.61
T & P Charges @ 2% of B					1246246.03
Contingency @ 3% of B					1869369.05
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					6418167.07
Transportation Charges@7.5% of B					4673422.62
Sub-Total C					76519506.38
Over Head Charges (Including Supervision charges) @6% of C					4591170.38
Total D					81110676.76
Gross Cost					81110676.76
OR Say					81110677.00
GST @18%					14599921.86
CESS 1%					811106.77
Gross Cost (Inc. GST)					96521705.63
Total(In Crores)					9.652
Escalation of 3 years with 18% of grand Total					11.390

B. Cost Estimate for 11 kV Conversion (O/H Line) to UG with 3Cx400 sqmm XLPE

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	3C x 400mm ² 11KV XLPE Cable (Armoured), A2XFY	14000	Mtr	1,500.00	2,10,00,000
2	Heat shrinkable jointing kit for 3Cx 400mm ² 11 KV XLPE Cable(outdoor type)	28	No	13904	3,89,312
3	Heat shrinkable jointing kit for 3Cx400 mm ² 11 KV XLPE Cable(straight type)	42	No	25317	10,63,314
4	HDPE Pipe, 8", 10 Mtr, (Spec PE80-PN8, 200MM dia)	12838	mtr	1785.00	2,29,15,830
5	Route and joint indicating stones	280	nos	121	33,880
6	PIPE G.I.100MM DIA HEAVY CLASS PLAIN END	420	Mtr	651	2,73,420
7	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	28	EA	1050	29,400
8	7/10 SWG G I stay wire, Grade -2	560	KG	75	42,000
9	PIPE HDPE SIZE 20 MM	84	Mtr	37.78	3,174

Detailed Project Report Capex Plan FY 22-23

10	Aluminium Cable Sockets 95 mm ²	56	EA	20	1,120
Subtotal Material(A)					4,57,51,450
Stock, Storage and Insurance@3% of A					1372543.49
Sub- Total-B					47123993.01
T & P Charges @ 2% of B					942479.86
Contingency @ 3% of B					1413719.79
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					4853771.28
Transportation Charges@7.5% of B					3534299.48
Sub-Total C					57868263.42
Over Head Charges (Including Supervision charges) @6% of C					3472095.81
Total D					61340359.23
Gross Cost					61340359.23
OR Say					61340359.00
GST @18%					11041264.62
CESS 1%					-
Gross Cost (Inc. GST)					72995027.21
Total(In Crores)					7.30
Escalation of 3 years with 18% of grand Total					8.61

8.36 Annexure 36 Cost Estimate for Emergency Preparedness (Life boat and other emergency accessories)

S No.	Item Description	Quantity	Unit	TPNODL/ CDB Rates INCL GST	Total Amount
1	Emergency Preparedness (Life boat and other emergency accessories).	10	No	840000	8400000
2	FDA system at offices	6	No	1600000	9600000
Total		16	No		18000000
Total (In cr.)					1.8

8.37 Annexure 37 Cost Estimate for DC Hardware

S. No.	Description	Unit cost (INR inclusive of Tax)	Qty	Amt.
1	SAN Switch for storage	7500000	2	15000000
2	SAN Storage 100 TB for CIS enhancement	25000000	1	25000000

Detailed Project Report Capex Plan FY 22-23

3	DB Server for Bespoke application & Bio Metrics	3234033	1	3234033
4	IT Infra along with OS/DB Licences for GIS Landscape	40000000	1	40000000
5	Gateway Firewall	5000000	2	10000000
6	Core Switch 48 Port, L3	1320000	2	2640000
7	EMS/NMS Server with Network Operation Console	941620	2	1883240
8	Backup Disc base Appliance	5500000	1	5500000
Total Cost in Cr.				10.33

8.38 Annexure 38 Cost Estimate for Software Licenses for IT Application

S. No.	Description	Unit cost (INR inclusive of Tax)	Qty	Amt.
1	MBC software licences for additional consumers to cover 100% TPNODL area	29100000	1	29100000
2	DB License (SQL for Bespoke Application)	500000	8	4000000
3	EMS /NM solution	1320000	2	2640000
4	Active Directory licences for user creation and single sign on	7000	700	4900000
5	Visual Studio	31211	15	468165
6	Oracle DB + Partition + Cluster Licences for reports & MIS	15000000	1	15000000
7	Backup Software	4500000	1	4500000
8	Other Technologies	5500000	1	5500000
9	E-Governance Software for TPNODL	52500000	1	52500000
10	Mobile App for TPNODL Consumers (M/s SEW)	8000000	1	8000000
Total Cost in Cr.				12.66

8.39 Annexure 39 Cost Estimate for End computing devices

S.No	Description	Unit cost (INR , inclusive of tax)	Qty	Amt.
1	Laptops with OS	68,000	700	47600000
2	Microsoft office for New Laptops for Point No. 1	26,400	700	18480000
3	Microsoft office for IPDS supplied desktop (MS Office was not part of the IPDS deliverables)	26,400	340	8976000
4	Anti-Virus	3600	700	2520000
5	Adobe Licences	25,000	40	1000000
6	Printer for offices	22,000	100	2200000
7	Plotter for GIS	12,00,000	1	1200000
8	High End Printer for GIS	5,00,000	2	1000000
9	MS Project	40,700	10	407000
10	Video Conferencing System	2,50,000	25	6250000
Total Cost in Cr.				8.96

8.40 Annexure 40 Cost Estimate for Cyber Security

S. No.	Description	Unit cost (INR including Tax)	Qty	Amount (INR)
1	Enterprise SIEM	4500000	1	4500000
2	MPLS firewall	2000000	2	4000000
3	IT&OT firewall	3500000	1	3500000
Total Cost in Cr.				1.20

8.41 Annexure 41 Cost Estimate for Automation of non ODSSP PSS

S. No.	Item	Unit cost (INR inclusive of Tax)	Qty	Amt.
1	RTU/Data Concentrator (Old)	832510.06	25	20812752
2	BCPU/Relays	106000	210	22260000
3	Master Trip Relay/Aux Relays	10584	450	4762800
3	Ethernet Switch (12/24 Port)	127550.92	80	10204074
4	Miscellaneous Item (Converter, transducers, Cable, Conduit etc.)	16000	80	1280000
5	Router	118000	80	9440000
6	Earthing (2 no pit per RTU panel)	13000	80	1040000

Detailed Project Report Capex Plan FY 22-23

7	Fire Alarm	250000	80	20000000
8	Integration support for ODSSP PSS	177000	55	9735000
9	33KV Control Relay Panel For Transformer	659628.26	30	19788848
10	33kV and 11KV Control relay Feeder panel	440011.38	65	28600740
11	Revamping of Old control panels (as life enhancement) & integrating with SCADA	56500	91	5141500
Total Cost in Cr.				15.31

8.42 Annexure 42 Cost Estimate for SCADA-ADMS

S. No.	Item	Unit cost (INR inclusive of Tax)	Qty	Amount
1	SCADA - Hardware, Software, Project Implementation, Training & etc	155900000	1	155900000
2	ADMS - Hardware, Software, Project Implementation, Training & etc	25000000	1	25000000
Total Cost in Cr.				18.09

8.43 Annexure 43 Cost Estimate for GIS Software Implementation and Land Base & Network Survey & Digitization for Balasore & Jajpur Circle

Sr.No	Item	Unit cost (INR inclusive of Tax)	Quantity	Unit	Amount
1	Procurement of satellite image for Base map creation of pan TPNODL	300	28000	Sq Km	84,00,000
2	Software licences with warranty for new divisions	67500000	1	Lot	6,75,00,000
3	Google Map Plugin to view Google Images in GE Smallworld	55000	2	No	1,10,000
4	Lanbase Survey and mapping of Balasore & Baripada Circle	2500	6600	Sq Km	1,65,00,000
5	GSS & PSS Survey and mapping	5500	110	No	6,05,000
6	33 Kv Line Survey and mapping with assets	2000	1100	Km	22,00,000
7	11Kv Line Survey and mapping with assets	2000	15000	Km	3,00,00,000
8	LT Network Survey and mapping with assets	2250	27000	Km	6,07,50,000
9	Asset Numbering and Pole Painting	150	897000	No	13,45,50,000

Detailed Project Report Capex Plan FY 22-23

10	Consumer indexing	40	850000	No	3,40,00,000
11	Migration / Updation	500	6600	Sq Km	33,00,000
12	Deployment of Surveyor	200000	2	No	4,00,000
13	Deployment of Digitizer	300000	1	No	3,00,000
14	GPS enabled Mobile/Tablets(10" screen & latest OS) for Delta Updation	50000	2	No	1,00,000
Total Cost in Cr.					35.87

8.44 Annexure 44 Cost Estimate for Civil Infrastructure (Office Buildings, PSS, Stores, Approach Roads, Record room, Cafeteria Canteen, MRT office and others)

Sl .no	Activity	UOM	Total Qty	Unit Rate (RS)	Amount Planned (Rs Lakhs)
B	Civil Infrastructure				
1	Extension / Construction of Buildings				
a	Extension of Building for Office	Sqm	1200	55087	661
b	Construction of Office at Store	Sqm	750	55087	413
c	Construction of Cover shade for Store	Sqm	400	32938	132
2	Section Office & PSS	NOS	50	800330	400
3	SDO Office	NOS	15	1001418	150
4	Customer care	NOS	11	1000107	110
5	Guest House	NOS	2	5001066	100
6	MRT Office	NOS	5	2000085	100
7	Approach Road	RMT	400	10745	44
8	Storage Yard	Sqm	1750	2281	40
9	Record Room	Sqm	310	17485	54
10	Cafeteria Canteen	Sqm	240	45000	108
11	Stores at PSS	No	50	400785	200
Total cost in lakhs					2512
Total Cost in Cr.					25.12

8.45 Annexure 45 Cost Estimate for Security cameras and heavy duty Racking system / Storage solutions for the store

Sr.no	Activity	Estimated Cost
1	Security cameras - Additional 30 cameras at Balasore & Jajpur, 7 new setup at Keonjhar and 5 for scrap stores.	600000
2	Designing, Installation of Industrial heavy duty Racking system / Storage solutions for sheds at Jajpur and Balasore stores	9000000
Total		9600000
Total in Cr.		0.96

8.46 Annexure 46 Cost Estimate for Offices Equipment

S. No.	Major Category	Qty	Unit Price	Total Cost
1	Aicconditioners	100	40000.00	4000000.00
2	Chairs/Executive chairs/Visitors Chairs	1000	10000.00	10000000.00
3	Tables	200	30000.00	6000000.00
4	Other furniture & fixture	Various	3000000.00	250000.00
5	Water Cooler	50	45000.00	2250000.00
6	Water Dispenser	50	10000.00	500000.00
7	RO / Aqua guard	50	18000.00	900000.00
8	Photocopy Machine	10	100000.00	1000000.00
9	Projector and display screen	10	37000.00	370000.00
10	Sanitizer M/c	20	10000.00	200000.00
11	Biometric M/c	223	20000.00	4460000.00
12	Fan celling / Wall mounted / Pedestal Fan/ Exhaust Fan	60	2000.00	120000.00
13	Refrigerator	12	22000.00	264000.00
14	Induction Plate	30	3000.00	90000.00
15	Electric Kettle	200	1200.00	240000.00
16	White Board	72	6000.00	432000.00
17	Notice / Pin up Board	72	3000.00	216000.00
18	Emergency Light	80	1300.00	104000.00
19	TV	15	35000.00	525000.00
20	EPBAX System	72	30000.00	2160000.00
21	Mislanious capex	Various	2000000.00	2000000.00
22	Boom barrier in stores gate	4	400000.00	1600000
23	Metal detector	6	80000.00	480000
24	Walky talky handsets	30	40000.00	1200000
Total Cost in Rs				39361000
Total Cost in Cr.				3.9361

8.47 Annexure 47: Equipment 33KV line Proposed for Conductor upgradation & New Lines.

SN	Scheme Description	length of line (in KM)	From	To	Source of Trigger for the scheme	Linkage with ODSSP / New GSS			Remark
						IPDS/ODS SP 3 schemes	ODSSP 4 Schemes	New GRID of OPTCL	
1	Conductor upgradation	1X 12KM	Basta GSS	Jamsuli PSS	Balasure Circle NW Study : conducted by PRDC	No	No	No	To address the Overloading of First section of Feeder in Summer peak, existing 80 SQmm Conductor will be replaced by higher size 148 Sqmm .
2	New OH Line	2 X 0.5KM	Chandipur GSS (New)	DP installed at Canal near GSS as part of lines (2 Nos) under IPDS : to connect Chandipur Fdr with new Grid	Balasure Circle NW Study : conducted by PRDC	Yes (2 X 1.5 KM Lines constructed under IPDS to connect existing Chandipur line with New Grid Stn.	No	Yes (Chandipur Grid under construction)	1)Overloading of existing Chandipur line from Balasure Grid in Summer Peak will be avoided by feeding part of feeder from Upcoming Chandipur GSS. 2) 2 Nos of Bays at Chandipur GSS will be utilised.
3	Conductor upgradation	1 X 19KM	Jaleswar GSS	Kamarada PSS	Balasure Circle NW Study : conducted by TPNODL team	No	No	No	To address the Overloading of First section of Feeder in Summer peak, existing 80 SQmm Conductore will be replaced by higher size 148 Sqmm .
4	New OH Line	1 x 6.6KM	Tapping Point -Stroke Farrot	NOCCI PSS	Balasure Circle NW Study : conducted by PRDC	No	No	NO	To create separate Feeder for NOCCI from existing Line of Multiple HT Consumers . This will help to create separate Line only for 8 Nos of HT Consumers. 2)To improve reliability of NOCCI PSS which is feeding multiple Ind. Consumers on 11 kV
5	New OH Line	2 X 0.2KM	Balimunda GSS (New)	Tap point (Balimunda)of existing line Basudevpur Fdr : Sec: Bedeipur PSS to Dhamra PSS	Bhadrak Circle NW Study : conducted by TPNODL team	No	No	Yes (Balimunda Grid under construction)	1) Long Feeder of Basudevpur will be partly fed from New GSS "Balimunda". 2) Two Nos of Bays will be utilised at new Grid station "Balimunda" under construction by OPTCL .
6	New OH Line	1 X 3KM	Gadi OSS	Digachiya Bazar	Bhadrak Circle NW Study : conducted by TPNODL team	No	No	No	1) to shift the load of Gadi PSS on Chandabali GSS from Bhadrak GSS 2) to establish interconnection across Bhadrak GSS NW and Chandabali GSS NW
7	Conductor upgradation	1 X 3KM	Chayal sing PSS	Barpada PSS	Bhadrak Circle NW Study : conducted by TPNODL team	No	No	No	1) to shift the load of Barpada PSS from Bhadrak GSS to Agarpada GSS 2) to establish interconnection across Bhadrak GSS NW and Agarpada GSS NW

Detailed Project Report Capex Plan FY 22-23

8	New OH Line	1 X 7kM	Haripur PSS	Sukanda PSS	Jajpur Circle NW Study : conducted by TPDDL team	No	No	No	1) To shift Haripur PSS from Daitary Feedre (long Length) to Sukanda Feeder
9	New OH Line	1 X 7kM	Karanjia GSS	Shaharpada	Baripada Circle NW Study : conducted by TPNODL team	No	No	NO	1) To provide separate feeder for Shaharpada PSS from Karanjia Grid to improve reliability 2) One Outlet 33kv is required at Karanjia GSS
10	New OH Line	1 X 2.4kM	Raghnathpur PSS	Koshta PSS	Baripada Circle NW Study : conducted by TPNODL team	No	No	NO	Interconnecting Old Bangriposi Feeder with Raghnathpur to improve NW reliability
11	New OH Line	1 X 4.2kM	Chancha PSS	Samakhunta PSS	Baripada Circle NW Study : conducted by TPNODL team	No	No	NO	Interconnecting Chancha Fdr with Samakhunta Fdr to improve NW reliability
12	Conductor upgradation	1 X 5kM	Betnoti GSS	Rasgobindpur PSS	Baripada Circle NW Study : conducted by TPNODL team	No	No	NO	1)Overloading of existing Line (55 SQMM) From Betnoti Grid to Rasgobindpur in Summer Peak will be avoided by upgrading the conductor to 232 SQmm
13	Conductor upgradation	1 X 8kM	Rairangpur GSS	Kantabani PSS	Baripada Circle NW Study : conducted by TPNODL team	No	No	NO	1)Overloading of existing Line (100 SQMM) From Rairangpur Grid to Kantabani PSS in Summer Peak will be avoided by upgrading the conductor to 232 SQmm
14	New OH Line	1 X 15kM	Turumunga GSS	Kendeiposi PSS	Keonjhar Circle NW Study : conducted by TPNODL team	No	No	Yes (Turumunga Grid under construction)	1) To reduce the long length of Kenonjhar No 1 Feeder from Ranki GSS, new feed from upcoming Turumunga GSS will be added at Kendeiopsi PSS 2) One bay at Turumunga GSS will be utilised.
15	New OH Line	2 X 1kM	Turumunga GSS	LILO point of Gambharia PSS to Turumunga PSS	Keonjhar Circle NW Study : conducted by TPNODL team	No	No	Yes (Turumunga Grid under construction)	1) To reduce the long length of Kenonjhar No 1 Feeder from Ranki GSS, new feed from upcoming Turumunga GSS will be added at LILO point of Sec. between Gambharia to Trumunga PSS. 2) Two Nos of bays at Turumunga GSS will be utilised.
16	New OH Line	1 X 12kM	Pandpada PSS	Piplia PSS	Keonjhar Circle NW Study : conducted by TPNODL team	No	No	No	Interconnecting Naranpur Fdr of Renki GSS with "Dhenkikote Feeder from Tikira GSS Fdr to improve NW reliability
17	New OH Line	1 X 6.28kM	Basudevpur PSS	Bileipada PSS	Keonjhar Circle NW Study : conducted by TPNODL team	No	No	No	Interconnection between Beliapada Fdr from Joda GSS and Remuli Feeder of Palaspanga GSS to improve NW reliability

Detailed Project Report Capex Plan FY 22-23

18	Conductor upgradation	1 X 8kM	Joda GSS	Rugdi PSS	Keonjhar Circle NW Study : conducted by TPNO DL team	No	No	No	To address the Overloading of First section of Feeder in Summer peak, existing 100 SQmm Conductore will be replaced by higher size 232 Sqmm
19	New OH Line	1x0.7kM	Palaspanga GSS	Jhumpura Taping Point	Keonjhar Circle NW Study : conducted by TPNO DL team	No	No	No	To saparte to remuli f/d from jhumpura feeder "Jhumpur PSS, Ukhunda PSS, Kanjiasola PSS"
20	New OH Line	1x15kM	Jajpur Road GSS	Kuakhia PSS	Jajpur Circle NW Study : conducted by TPDDL team	No	No	No	To required new line from Jajpur road GSS to Kuakhia PSS.
21	Conductor upgradation	1x12.6kM	Jajpur Road GSS	Panikoli	Jajpur Circle NW Study : conducted by TPDDL team	No	No	No	1)Overloading of existing Line (80 SQMM) From Jajpur Town Grid to Panikoli PSS in Summer Peak will be avoided by upgrading the conductor to 148 SQmm

PRAYER:

Pursuant to the direction of Hon'ble Commission vide suo motu proceeding in case no 9/2021 on dated 25.03.2021, para 39, TPNODL is supposed to file the Capital investment plan as per the vesting order.

In compliance to above, I am submitting herewith CAPEX plan to a tune of 442.97 Cr on behalf of TPNODL which may kindly be approved.

Dated:

Chief Executive Officer

TPNODL