



CAPEX PLAN for FY-2023

T P SOUTHERN ODISHA DISTRIBUTION LIMITED

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	Glossary		Glossary	
AB SWITCH	Air Breaker Switch	МВС	Metering Billing and Collection	
AC	Alternating Current	мсс	Master Control Centre	
ADMS	Advanced Distribution Management System	МССВ	Moulded Case Circuit breaker	
АМС	Annual Maintenance Contract	ММ	Material Management	
АМІ	Automatic Meter Infrastructure	MMG	Meter Management Group	
AMR	Automated Meter Reading	MPG	Maintenance Planning Group	
APS	Area Power System	MPLS	Multi-Protocol Label Switching	
AT&C	Aggregate Technical and Commercial	MRT	Meter Reading & Testing	
BA	Business Associate	MS	Microsoft	
BCC	Backup Control Centre	MTTR	Mean Time to Repair	
во	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	
САРА	Corrective Action and Preventive Action	NABL	National Accreditation Board for Testing and Calibration Laboratories	
CAPEX	Capital Expenditure	NCC	No Current Complaint	
CC	Control Centre	O&M	Operation & Maintenance	
CIS	Customer Information System	ODSSP	Odisha Distribution System Strengthening Project	
Ckt.KM	Circuit Kilo meters	OEM	Original Equipment Manufacturer	
сотѕ	Commercial of the shelf	OERC	Odisha Electricity Regulatory Commission	
COVID	Corona Virus Disease	OFC	Optic Fibre Cable	
CPSCC	Central Power System Control Centre	0/Н	Over head	
CRM	Customer Relationship Management	OMS Outage Management Syste		
CSR	Corporate Social Responsibility	OPEX	Operational Expenditure	
СТ	Current Transformer	OPGW	Optical Ground Wire	
CWIP	Current Work In Progress	OPTCL	Odisha Power Transmission Corporation Limited	

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

	Glossary		Glossary			
HVDS	High Voltage Distribution System		SLMC	System Line Maintenance Crew		
IEC	International Electro technical Commission		SMC	Substation Maintenance Crew		
IED	Intelligent Electronic Devices		SMS	Short Message Service		
IEMS	Input Energy Monitoring System		SOP	Standard Operating Procedure		
IMS	Integrated Management System		STS	Sub Transmission System		
IPDS	Integrated Power development scheme		T&D	Training & Development		
ISU	Industry Specific Solution Utility		ТВЕМ	TATA Business Excellence Model		
ІТ	Information Technology TCO		тсос	TATA Code of Conduct		
ΙΤΙΑ	IT Implementation Agency		TPCODL	TP Central Odisha Distribution Limited		
JE	Junior Engineer		TPNODL	TP Northern Odisha Distribution Limited		
КМ	Kilo meter		TPSODL	TP Southern Odisha Distribution Limited		
ку	Kilo Volt		TPWODL	TP Western Odisha Distribution Limited		
KVA	Kilo Volt Ampere		U/G	Under Ground		
LDMS	Local Data Monitoring System		UPS	Uninterrupted Power Supply		
LT	Low Tension		VPN	Virtual Private Network		
LTCT	Low Tension Current Transformer					
LV	Low Voltage					

1 Introduction

TP Southern Odisha Distribution Limited (TPSODL) incorporated as a joint venture of The Tata Power Company (51%) and Odisha Government (49%) on the Public-Private Partnership (PPP) model, which came into existence on Jan'1,2021 as per the vesting order issued by the Honorable Odisha Electricity Regulatory Commission dated 28.12.2021, TPSODL took over the license to distribute electricity in the southern part of Odisha, which was earlier served by erstwhile SOUTHCO, through a competitive bidding process. The business of TPSODL utility shall be governed by the provisions of license issued by Hon'ble Odisha Electricity Regulatory Commission (OERC) for distribution and retail supply of electricity in South 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. The core business activities of TPSODL are summarized as follows:

- 1. Operation and Maintenance of distribution network
- 2. Expansion of distribution network
- 3. Electricity supply and after sales services
- 4. Connection of new customers to the distribution network
- 5. Meter reading, billing and revenue collection
- 6. Customer complaint resolution
- 7. Restoration of power after interruptions
- 8. General customer care including provision of information on services
- 9. Customer sensitization on energy efficiency, energy losses and safety

As per the guidelines TPSODL has to submit the annual CAPEX proposal for approval of the Hon'ble regulatory Commission. The CAPEX proposal for the FY 2022 was submitted by us and same was approved by the Hon'ble commission for Rs. 184.65 Cr. We are now pleased to submit the CAPEX proposal for FY 2023 of Rs. 358.37 Cr for consideration of the Hon'ble Commission.

The document covers the details of the network assets, their conditions, the inherent challenges in line with the safety & statutory requirements and the proposed action plan to mitigate the above challenges to achieve the performance parameters as per the guidelines of the vesting order. The document also covers the snapshot of the

initiative undertaken during the FY 2022 and improvement against the various initiatives undertaken. The CAPEX DPR for the FY 23 is prepared under following major heads.

- 1. Statutory & Safety
- 2. Loss Reduction
- 3. Reliability
- 4. Load Growth
- 5. Technology
- 6. Civil & Administration

1.1 Geographical Information

TPSODL has a wide geographical area of 48,751 Sq KM. spread across 8 districts of Odisha state namely Ganjam, Gajapati, Boudh, Kandhamala, Rayagada, Koraput, Nabarangpur and Malkangiri and serves the registered consumer base of 2.37 million. For operational simplicity the area is divided into 6 Circles viz. City, Berhampur, Aska, Bhanjanagar, Jeypore & Rayagada Circles. In order to have the smooth operation of electrical network and to provide satisfactory services to its consumers, above circles are further sub divided into 19 Divisions and 51 Sub-division. The details are provided in table below.

Circle Name	Division Name	Sub-Division Name	SDO CODE
		Medical Sub- Division, Berhampur	3411
	BED-I, Berhampur	Industrial Sub- Division, Berhampur	3414
CITY CIRCLE		Gopalpur Sub- Division, Berhampur	3412
		SSD No-I	3421
	BED-II, Bernampul	SSD No-III	3422
		SSD No-IV	3432
	BED-III, Beinampui	Kanisi S/D	3431
		Chatrapur S/D	2111
	GNED, Chatrapur	Rambha S/D	2112
		Khallikote S/D	2113
BERHAMPUR	DOED	Kodala S/D	2143
CIRCLE	PSED, Purusottamput	Purushottampur S/D	2141
	i didoottamput	Polasara S/D	2142
	HED Higiiligut	Sheragada S/D	2152
	י ובט, דווזןוווכענ	Hinjilicut S/D	2151

Circle Name	Division Name	Sub-Division Name	SDO CODE
		Aska S/D	3511
	AED-I, ASKa	Nuagam S/D	3513
		K.S.NAGAR	3522
ASKA URULE	AED-II, K.S.NAGAR	BUGUDA	3523
	CCED Disapahandi	Digapahandi S/D	3531
	GSED, Digapanandi	Chikiti S/D	3532
		No.1, Bhanjanagar Sub-Division	2911
	PNED Phoniopogor	No.2,Bhanjanagar S/D	2915
	DINED, Dhanjahayai	Bellaguntha S/D	2912
		Sorada S/D	2913
BHANJANAGAR		Phulbani S/D	2921
OIROLL	PED , Phulbani	Balliguda S/D	2922
		G.Udayagiri S/D	2923
	PoED Poudb	BOUDH S/D	2931
	DUED, DOUUN	MANMUNDA S/D	2932
		Rayagada S/D	3111
	RED, Rayagada	Therubali S/D	3112
		Bissam Cuttack S/D	3113
		Paralakhemundi S/D	3121
RAYAGADA		Kasinagar S/D	3122
CIRCLE	PKED, Paralakhemundi	Upalada S/D	3124
		R.Udayagiri S/D	3125
		Mohana S/D	3123
ASKA CIRCLE AED-II, K.S.NAGA GSED, Digapaha BNED, Bhanjanag PED, Phulbani BoED, Boudh RED, Rayagada RAYAGADA CIRCLE PKED, Paralakhemundi GED,Gunupur JED, JEYPORE KED, KORAPUT KORAPUT MED, MALKANGIRI NED, NABARANGPUR		Gunupur S/D	3131
	GED,Gunupur	Gumuda S/D	3132
	JED,	JESD-1 JEYPORE	7111
	JEYPORE	JESD-2 JEYPORE	7114
		SDO, BORIGUMMA	7115
	KED,	Koraput S / D	7141
	KORAPUT	Sunabeda S / D	7142
JEYPORE CIRCLE		Laxmipur S / D	7143
	MED,	Malkangiri S / D	7131
	MALKANGIRI	Balimela S/D	7132
	NED,	Nabarangpur S / D	7121
	NABARANGPUR	Umarkote S / D	7123
		Papadahandi S/D	7124

1.2 Network Information

Grid Sub Station

TPSODL receives electrical power at 33kV level from 33 nos. of Grid Substations (GSS) out of which 5 nos. GSSs are rated at 220/132/33kV, 5 nos. at 220/33kV and 23 nos. at 132/33kV located within and in the vicinity of TPSODL operational area.

TPSODL distributes the power at 33kV / 11kV / 440V / 230V depending on the demand of the consumers. Existing OPTCL Grid Substation in TPSODL are as follows:

	List of Grid Sub Stations								
S. No.	Name of Substation	District	Installed Capacity (MVA)	Year of Commissioning					
220/1	32/33KV GSS								
1	Aska New	Ganjam	2x160 MVA, 220/132 kV 1x40 MVA, 132/33 kV	2019					
2	Bhanjanagar	Ganjam	2x160 MVA, 220/132 kV 2x40 + 1x20 MVA, 132/33 kV	1984					
3	Jayanagar	Koraput	2x160 MVA, 220/132 kV 3x20+1x12.5 MVA, 132/33 kV	1980					
4	Narendrapur	Ganjam	2x160 +1x100MVA, 220/132 kV 3x40+1x20 MVA, 132/33 kV	1999					
5	Therubali	Rayagada	2x100+1x160 MVA, 220/132 kV2x12.5 MVA, 132/33 kV	1974					
220/33	3kV GSS								
6	Balimela	Malkangiri	1x40 +1x20 MVA, 220/33 kV	2007					
7	Govindpalli	Malkangiri	2x20 MVA, 220/33 kV	2020					
8	Kasipur	Rayagada	1x20 MVA, 220/33 kV	2019					
9	Malkangiri	Malkangiri	2x40 MVA, 220/33 kV	2017					
10	Laxmipur	Koraput	2x20MVA, 220/33kV	2013					
132/33	3kV GSS								
11	Akhusingh	Rayagada	2x12.5 MVA, 132/33 kV	2001					
12	Aska	Ganjam	3x40, 132/33 kV	1975					
13	Balugaon	Khurda	1x40+1x20+1x12.5 MVA, 132/33 kV	1991					
14	Berhampur	Ganjam	2x40+1x20 MVA, 132/33 kV	1964					
15	Boudh	Boudh	2x20 MVA, 132/33 kV	2015					
16	Chhatrapur	Ganjam	3x20 MVA, 132/33 kV	1982					
17	Chikiti	Ganjam	1x40 MVA, 132/33 kV	2019					
18	Dabugaon	Nabarangpur	2x12.5 MVA, 132/33 kV	2015					
19	Digapahandi	Ganjam	2x20+1x12.5 MVA, 132/33 kV	2004					
20	G. Udaygiri	Kandhamala	1x20 MVA, 132/33 kV	2021					
21	Ganjam	Ganjam	2x12.5 MVA, 132/33 kV	1967					
22	Muniguda	Rayagada	1x12.5 MVA, 132/33 kV	2017					
23	Mohana	Gajapati	2x12.5 MVA, 132/33 kV	1973					

	List of Grid Sub Stations							
S. No.	Name of Substation	District Installed Capacity (MVA)		Year of Commissioning				
24	Paralakhemundi	Gajapati	3x12.5 MVA, 132/33 kV	2001				
25	Patangi	Koraput	1x20 MVA, 132/33 kV	2019				
26	Phulbani	Kandhamala	2x40+1x12.5 MVA, 132/33 kV	1986				
27	Podagada	Koraput	1x12.5 MVA, 132/33 kV	2018				
28	Purusottampur	Ganjam	2x12.5+1X20 MVA, 132/33 kV	2013				
29	Rayagada	Rayagada	1x20+2x12.5 MVA, 132/33 kV	1962				
30	Sonepur	Sonepur	2x40+1x20 MVA, 132/33 kV	2001				
31	Sunabeda	Koraput	1x20+2x12.5 MVA, 132/33 kV	1964				
32	Tentulikhunti	Nabarangpur	2x20+1x12.5 MVA, 132/33 kV	1986				
33	Umerkote	Nabarangpur	2x20 MVA, 132/33 kV	2015				

1.3 Distribution Network

At present, there are 116 numbers of 33 kV feeders with a combined circuit length of approximately 3808 Ckt. KMs supplying power to 244 numbers of 33/11kV Primary Substations The 33kV supply is stepped down to 11kV level through 510 numbers of 33/11kV power transformers with an installed capacity of 2344 MVA at these primary substations, nearly 881 numbers of 11 kV feeders emanates from the 33/11 kV primary substations having cumulative length of approximately 42555 Ckt. KMs and supply power to HT consumers connected at 11 kV level and LT customers connected to 11/0.415 kV & 11/0.230 kV distribution substations. 55717 numbers of distribution transformers are installed in all six circles with an installed capacity of 2402 MVA. The length of the LT network is approximately 39094 Ckt. KMs. These LT feeders supply power to three-phase and single-phase consumers. The information is summarized in the table below.

CIRCLE	Unit	CITY CIRCLE	BERHAMPUR CIRCLE	ASKA CIRCLE	BHANJANAGAR CIRCLE	RAYAGADA CIRCLE	JEYPORE CIRCLE	Total
No. of Consumers	No.	2,22,634	3,29,755	2,45,966	4,34,885	3,90,787	7,44,435	23,68,462
No of 33/11kV Substations	No.	20	30	21	42	51	80	244
Transformers 33/11 KV	No.	45	71	56	91	100	147	510
Transformation Capacity 33/11 KV	MVA	253.8	371.4	260.15	398.28	444.6	615.5	2,344
Transformer Distribution 33/0.415 kV, 11/.415/0.23 KV	No.	2490	5274	4053	13358	8166	22376	55,717
Transformation Capacity 33/0.415 kV, 11/.415/0.230 KV	MVA	284.02	341.92	244.2	406.18	300.49	825.33	2,402



CIRCLE	Unit	CITY CIRCLE	BERHAMPUR CIRCLE	ASKA CIRCLE	BHANJANAGAR CIRCLE	RAYAGADA CIRCLE	JEYPORE CIRCLE	Total
33kV Line - O/H	СКМ	143.47	375.35	239.04	858.35	810.4	1376.47	3,803
33kV Line - U/G	СКМ	3.7		0.9				5
11kV Line - O/H	СКМ	1202.67	3456.91	2683.68	10134.52	8095.71	16892.39	42,466
11kV Line - U/G	СКМ	21.67	12.15	34.06	21.33	0	0	89
LT Line –Bare	CKM	491.21	1088.24	704.13	1520.28	2756.46	2555.61	9,116
LT Line – ABC	CKM	1008.01	3424.33	1645.02	6994.33	3763.26	13142.97	29,978

1.4 Major achievements by TPSODL in FY 2021-22

After taking over, TPSODL have initiated various activities so far to improve the performance parameters in reliability, AT&C, safety and building or strengthening infrastructure. Some of the major activities are mentioned below.

A. Replacement/Repairing/Augmentation of transformer

- > 6 nos. of PTR replaced/augmented (Total Capacity- 25.8MVA)
- 1082 nos. of DTR replaced (Total Capacity- 57.25 MVA) & 76 Nos. of DT augmented
- > Two Station Transformer 33/0.4 kV repaired and Charged
- > 10 PTR repair in progress (35.9 MVA), 5 Already repaired (21.3 MVA)
- > 100 DTR repair in progress (4.94 MVA), 135 DTR repaired (6.28 MVA)

B. Network Reliability improvement initiatives

- Restringing of 33KV line 18 CKM
- Replacement of old/Undersized HT & LT Conductor/Cable 171 CKM
- Strengthening of 33KV Line 432 CKM
- Erection of HT/LT Intermediate Pole, to mitigate the vulnerable location 1297 Nos.
- Replacement of Damaged HT / LT Pole 1755 Nos.
- DC system improvement: 9 Nos.
- > Nos. of LT feeder added in the network 209 CKM
- Improvement of Earthing done– 13 Nos. PSS
- ➢ Silica gel replacement of PTR − 68 nos.
- Thermo vision analysis of substation. 18 PSS completed ,139 hotspots found and are being attended.

- Patrolling and Maintenance plan for 33kV & 11kV lines- Regular Tree trimming and others - 11089CKM
- Maintenance Survey done for 134 nos. of 33 KV lines and 116 nos. 11 KV feeders.
- Vegetation cleaning and accessories arrangement done Under 5T activity 204
 PSS & 8336 DSS.

Snapshot of activities taken for network refurbishment:

VCB		СТ		PT		LA	AB Switch	
Installed	Repaired	Installed	Repaired	Installed	Repaired	Installed	New	Repaired
125	413	85	29	9	32	68	83	307

- > New earthing added in the DSS, 11kV & LT network- 926 Nos.
- LT protection 55 No. of LT Protection repaired & 69 Nos. of New LT Protection installed in the existing substation.
- > Thermo-scanning activity is in progress. 5 No. 500KVA DSS completed.
- Total 7501 No. of LT Pole Cleaning done to remove jumbling of service connections.

C. New, Replacement & Repairing of AB Switch, HG Fuse & LA:

11kV Line AB Switch (No.)			11kV DSS AB Switch (No.)			HG Fuse (No.)			Lightning Arrestor (No.)		
New	Replaced	Repaired	New	Replaced	Repaired	New	Replaced	Repaired	New	Replaced	Repaired
54	84	614	47	75	721	48	841	534	25	149	26

D. Protection activity

- Transformer Testing- 40No.s
- Relay Testing- 85No.s
- > Tripping Investigation and Grid Audit- 43No.s
- Relay Configuration Rectification- 65No.s
- Master Trip Relay Replacement- 41No.s
- Relay settings modification /correction/ reviewed- 78No.s
- > New relay installed in replacement of faulty relays 20 Nos.

E. Technology Infrastructure Work

- > IP MPLS connectivity provided to all offices across TPSODL
- Project for IP MPLS and OFC as a backup for all PSS in the City Circle commenced
- > OT Data Center commissioned at Berhampur
- End to End Integration checks and mapping of 76 ODSSP PSS with Micro SCADA have been completed which would facilitate easy migration to the final SCADA for which work has commenced.
- Order for GIS has been issued for pilot area of 37 Sqkm and Survey of 100% PSS and 33 KV lines have been completed so far.
- SAP MM, PM, PS and FICO fully rolled out and 10 applications developed to improve safety, operational and commercial performance of the organization.

F. Civil Infrastructure work

- > Commercial office, customer care center setup at Berhampur completed
- > 400 Nos. DTR fencing completed
- Centralized Power System Control Center and Call Center building at Ambagada is in advance stage of completion.

G. Customer Services Enhancement

- Setting up of Call Centre and Model Consumer Relationship Centre at Berhampur City.
- Key Account Manager concept for EHT/HT and C&I consumers and adopting customer centric process for activities like multiple bill payment avenues (Physical & Digital), complaint registrations, single window solutions to customers.
- Doorstep services through WSHGs/ Agencies for collection of electricity bills and interactive website and Mobile Application for consumers regarding consumer services and safety developed.
- Setting up of missed call no for new connection services and Creation of dedicated email id for addressing customer concerns.

Photographs of Some initiatives taken last year:

Customer Care Center at Berhampur:









GIS Implementation in TPSODL



Call Center at Ambagada:

Data Center at STPI, Berhampur:





PSCC Room at TPSODL Corporate Office Berhampur:



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MPLS Tower JED, Jeypore:



Network Rack at NED, Nawrangpur



Safety Practice Yard:



Safety Training at Safety Practice Yard:





Safety Award:



Safety Mobile Van:



Mandatory Safety Induction Training:



DSS Fencing:



FRP Fencing at Gopalpur Sub-Station



Power System Control Center Under Construction





Commercial Center & Technology Center at Berhampur







Civil Work at PSS





Aska PSS

Neon Tester:





Suraksha Prahari application of TPSODL:

Hi-Mast Light at TPSODL Store, Berhampur:







CSR Activity by TPSODL (Mobile Health Camp):





New ODSSP PSS Charging: (Marthamput, Pipliguda, Asurabandha)



New Battery & Charger Installation:



Consumer's Feedback:



TPSØDL

1.5 Key Challenges

We mentioned the key Challenges of the network in our CAPEX proposals for FY-22 and the same challenges still exist to greater extent. In the CAPEX proposals for FY 22, the proposals were also submitted to address the above challenges. The CAPEX approved for the FY-22 helped in addressing the key challenges of the network to some extent only due to limitation of the approved budget. This is to mention here that the legacy network handed over to TPSODL was in a very poor state, lacked compliance with respect to maintaining safe clearances, especially the ground clearances of the 33 KV & 11 KV network in line with statutory guidelines. While the long spans of the network, at road crossings, public places and near schools etc. are unsafe for the employees, general public, children and animals, these pose the challenges in maintaining the reliable power supply to our customers. We are detailing the individual network segments in the different sections below

A. 33KV Line

33kV feeders are the main source of power supply from Transmission Substation (TS) to Primary substations (PSS) and some of the distribution transformers (33/0.415 KV) connected on 33 KV lines. We have the following observations on 33 kV feeders.

- i. Most of the 33 KV feeders have long lengths and radially connected. The long overhead feeders are prone to faults and it is difficult to identify the location of the fault. Many of the feeders pass through the dense forest and attending the faults becomes possible during day time only. These leads to the high network downtime and affects the SAIDI.
- ii. At many of the locations these lines are working on damaged, bent and tilted poles which affect the performance and life of the asset as well are unsafe for the general public. Further it is learnt that during breakdown of the conductors, priorities were accorded to restore the feeder with available material. Due to above the capacity of many of the 33 KV feeders has dropped down due to undersized & worn-out bare conductors especially in the main sections of the feeders. Beside this, long span and poorly executed multiple joints are the cause of the high technical losses and conductor snapping causing accidents.

- iii. Most of the locations of feeders do not have guard wire beneath conductors. This becomes critical when these feeders pass through the public places viz, markets, schools, hospitals etc., as snapping of the conductor can cause injuries to a larger section of people. Cradle guard below the lines at such place can avoid such accidents.
- iv. We observed serious violation of the ROW of our 33 KV & 11 KV feeders for maintaining safe clearance as per statutory requirements. We have seen construction of building, houses, shops below 33 kV & 11kV overhead lines at many locations both in urban and rural areas. The horizontal clearances are also observed violated by creating extended balconies. We have started issuing the notice to the concerned building owners to remove the encroachment of the ROW of our lines for safety as well operation & maintenance point of view. The close vertical or horizontal distance from ground or nearby buildings are very unsafe, especially during rainy season. Any leakage of electricity can cause accidents including deaths. This needs a serious resolution mechanism.
- v. At many locations two feeders running on single pole structure. H poles are not provided at appropriate distance. Lack of intermediate H poles create cascading failure in case of speedy winds and cyclones. A proper designed span length and type of poles can avoid such failure.

B. 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 capacities viz. 1.6 MVA, 3.15 MVA, 5 MVA, 8 MVA, 10 MVA. At many of 33/11 kV primary substations, the Power Transformers are not appropriately maintained.

- i. Silica gel, in many 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.
- ii. 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.

- iii. The analysis shows that some of the existing 33/11kV sub-stations are already overloaded or approaching the overload limit. It is anticipated that some of the sub-stations may be overloaded in next 2 to 3 years due to load growth in future years. There is an obvious reliability concern for substations with only one power transformer in service at some substations.
- iv. 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.
- v. Earthing system is most important for safety & protection of men and equipment. Still the existing earthing system is in very bad condition and ineffective.
- vi. 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.
- vii. 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.
- viii. 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.

C. 11 kV Feeders

11kV feeders connect a Primary substation (PSS) to the distribution transformers which supplies the electricity to the end customers through LT network. As per the asset details attached in the document, TPSODL has 881 nos. of 11 KV feeders. We have identified following observations on the 11 kV feeders.

- i. 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. Details of the feeder length wise.
- ii. At many of the locations these feeders are installed on damaged, bent and tilted poles which is unsafe for the asset as well as the general public. There had been no revision of the conductor sizes since their installation even after the load growth every year. As such many of these feeders are observed with undersized & worn-out bare conductor, having extremely long spans, multiple and poorly executed joints and compromised safety clearances.
- iii. These feeders also pass through the crowded public places, especially in urban areas. There have been incidents of injuries and fatality, in past, due to conductor snapping at such places. Most of the locations of feeders do not have guard wire beneath conductors, even in urban areas, to provide safety to the public against injuries and electrocution due to conductor snapping.
- iv. We observed encroachment on RoW i.e., houses / structures constructed below the overhead feeders at many locations both in urban and rural areas. These situations create violation of the desired safety clearances as per the electricity act and become potential source of accidents.
- v. 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.
- vi. The installation of majority of poles is not appropriate to the standards. It is observed that the poles are not installed with appropriate depth and compacting of the soil is not done. Such poles are mostly affected during speedy winds,

cyclones and toppling of one pole may lead to collapse of a considerable length of the feeder.

D. Distribution Substations (DSS)

TPSODL 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 plinth mounted as well as pole mounted.

The DSS are provided protection with HT fuses on primary side whereas, at most of the places, the secondary protection is not provided. At places, kit kat fuses are installed for protection on secondary side, but most of the above fuses are by passed leading to no protection at secondary side of the DT. At many places the thick aluminum wires, without proper design calculations, are used in place of the fuses. These situations are similar to no protection on the secondary side of the distribution transformer and in case of the fault in the LT lines, the fault may be arrested at HT fuse of the DT. These situations can be avoided by providing LT protection on the secondary side of the DT. In some cases, HT fuse and AB switch are bypassed which is compromising the life of the equipment.

The jumpers on the HT side and connections of the LT cables, in the secondary side of the DT, lack the proper crimping of the lugs. This results into hot spots and leads to technical losses in the system. The chances of the breakdown of the such connections leads to breakdown of the power supply to the customers.

E. LT Network

LT feeders emanate from DT secondary side and serve the electrical energy to the end customers. There was 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 was used as fuses on the secondary side of the distribution substations at almost all substations. These fuse units are installed at very low height and many of them have free access which is very unsafe. This needs a requirement of the appropriate protection system and fencing of the DSS to eliminate the access of the general public or animal. 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 general public at large and animals

F. Earthing

Earthing of the electrical installation is very important for safety of the men, animal and equipment. It is observed that the earthing installations are not done with appropriate depth and therefore the earth resistance values in many of the locations are coming too high. The above earth resistances are not effective enough to provide the required protection against faults. The poor earthing can lead to the chances of serious injuries including fatal accidents beside breakdown of the equipment.

G. Service Cable

It is observed that the service cable which connects the meter are very old and have multiple joints may lead to increase in technical loss and also unsafe. Hence replacement of those damaged service cables is necessary.

In FY 20 – 21, against the total input energy of 3599 MU, billed energy was 2768 MU resulting into billing efficiency of around 77%. Out of this 2768 MU billed energy, approximately, 58.7% of the energy billed in a particular year is supplied to Domestic Consumers. Commercial and Industrial Consumers contribute to 10% and 14.2% of the total billed units respectively. Balance 17.1% energy is billed to others like Railways/Public Street Lighting/Public Water Work/Irrigation and Agriculture etc. In terms of Revenues, Domestic Consumers contribute to around 45.8%, Commercial 12.6%, Industrial 26.6% and others 15.1% respectively. Overall input has increased by 4% in FY 20-21 vis a vis FY 19-20.

The graph below represents the share of customer base, their energy consumption and contribution in revenue based on FY 20-21 data.



CAPEX DPR FY23

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H. IT Issues

Current IT landscape is using multiple Decentralized Legacy Billing system for single phase and three phase and Decentralized TALLY system for Accounts payable, Receivable, Asset Accounting. This software is very basic and most of processes and its activities are managed manually outside the system. Also system is not upgradable due to outdated technology. There is only one Oracle database using Oracle 8 version, which is not supported by OEM any more. Many of the mission critical application like call center applications, Cash Collection application, SBM applications are managed by multiple agencies which have a lot of integration issues resulting in data inconsistencies across various systems. Legacy AMR system currently installed is not communicating.

I. Civil Infrastructure & office Administration

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 safe guard the assets, public & animals from the accident and ensuring statutory compliant network.

Besides, TPSODL 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 TPSODL employees and all consumers visiting TPSODL 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 TPSODL and provide them a unique service experience.

Network Challenges:

Requirement of Cradle guard



Requirement of LT Bare to ABC Conversion

Absence of fencing of DSS:



DSS Refurbishment Required:



DSS Refurbishment Required:



DSS Refurbishment Required:





Requirement of LV protection at DSS



Need Intermediate pole due to low ground clearance/long span



By passed VCB at PSS



Tilted Pole



Control Room Required (At 33/11 KV Taratarani PSS)

Control Room Required (At 33/11 KV Khallikote PSS)





PSS Boundary Wall Required



PSS Boundary Wall Required:


2 Proposed CAPEX Plan for FY23

The following table provides the five years CAPEX plan.

Year	FY 22	FY 23	FY 24	FY 25	FY 26	Total
CAPEX (Rs. Cr)	227	316	240	234	149	1166
Cumulative CAPEX (Rs. Cr.)	227	543	783	1017	1166	

As per the above table TPSODL has to submit a plan for a cumulative value of Rs. 543 Cr up to FY23. The Hon'ble commission approved Rs. 184.6 Cr. For the FY22. So, TPSODL has to submit a minimum CAPEX for Rs. 358.35 Cr. For FY23.

In the proposed CAPEX proposals for FY 23, we have tried to address the solutions of the above-mentioned challenges. As TPSODL has a significant network asset spread across vast geographical area, requires a huge investment to meet the desired expectation of the various stakeholders. We have gone through the detailed analysis of the loading of the network equipment, customer expectations, inputs from the divisional teams and identified the priority projects to be considered within the allocated CAPEX amount in the vesting order.

TPSODL has proposed the Capital Investment Plan for FY 23 under the following major heads with the objectives of ensuring compliance to the Statutory & safety, reducing AT&C loss, providing reliable power supply, planning the network considering expected load growth, ensuring best customer services to the consumers through extending technology infrastructure and creating good office for staff and its customers.

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

TPSODL proposes Capital Expenditure of INR 358.37 Crore for FY 23. An additional budget for Rs. 20 Cr. is submitted for approval of Hon'ble commission towards

Unforeseen Projects. We are hopeful that the proposed projects will contribute in achieving the performance target mentioned in the vesting order.

The details of Projects proposed for CAPEX FY23 is provided in below table.

	PROPOSED PROJECTS FOR CAPEX FY-23				
S. No.	Capex Head	Activity	Total proposed Cost (Rs. Cr)		
		Safety & Electrical Testing Equipment	14.89		
	Statutory 8	Cradle guard at major road crossings in Populated area, School area	6.79		
1	Statutory & Safety	Fencing of Distribution substations (DSS) & Boundary wall for PSS	15.30		
		Intermediate poles for unsafe to safe location	6.72		
		Sub Total- Statutory & Safety (1)	43.71		
		Upgradation/refurbishment of 33 KV & 11 KV Line	24.84		
		Feeder Meter for Energy Audit	8.15		
	1.055	LT Bare to ABC Conversion	7.80		
2	Reduction	LT Distribution Polycarbonate Box & Replacement of	E 42		
	Reduction	Damaged Service Cable	5.43		
		GIS Implementation	18.40		
		Sub Total- Loss Reduction (2)	64.62		
		Refurbishment of 33/11kV Primary Substations (Station Transformer, VCB, Isolator, Relay, CT, PT, LA, Illumination, Battery & Chargers, Earthing, etc)	16.45		
		Mitigation of Single PTR (N-1 arrangement) & Replacement of Old PTR	12.52		
		SCADA implementation in Conventional Non ODSSP PSS (Electrical + Automation + Civil)	59.86		
		ADMS Implementation	12.00		
3	Network Boliability	Construction of New 33 KV Lines for GSS Bay Utilisation	7.27		
	Kellability	N-1 arrangement for 33 KV Lines	7.59		
		Life enhancement/Refurbishment of Network (Lines, V-Cross arm, Earthings, LA, UG & Covered Conductor)	8.17		
		Refurbishment of DSS & LV Protection at DSS	18.13		
		33 KV & 11 KV Line AB Switch, FPI, RMU, ARC, Sectionalizer	16.88		
		Trolley mounted Mobile Substation	1.41		
		Sub-Total Network Reliability (3)	160.28		
		New 11KV link Lines	11.52		
		Augmentation of Power Transformer	3.56		
4	Load Growth	Augmentation of Distribution Transformer	19.70		
		Augmentation / addition of LT ABC line	2.67		
		Sub Total- Load Growth (4)	37.45		
		Build & Strengthen end user IT infrastructure	8.05		
1		Strengthen Network Connectivity across TPSODL	7.97		
5	Technology	Augmentation of Data Centre infrastructure – Hardware and Software	15.55		
	innastractare	IT infrastructure for 50-Seater Call Centre.	1.70		
		Sub Total -Technology Infrastructure (5)	33.27		



	PROPOSED PROJEC IS FOR CAPEX FY-23					
S. No.	Capex Head	Activity	Total proposed Cost (Rs. Cr)			
	Civil	Customer Relation Centre (CRC)	2.50			
6 Infrastructure &	Infrastructure for store and offices	10.78				
	Security Surveillance System and Employee Welfare	5.76				
	Administration	Sub Total – Civil Infrastructure & Admin (6)	19.04			
		Total (1+2+3+4+5+6)	358.37			
		Unforeseen CAPEX	20.00			
		GRANDTOTAL	378.37			

- The above project cost is exclusive of Employee Cost & Interest During Construction (IDC) and therefore cost capitalized will be over and above the value of proposed capex plan.
- An additional CAPEX budget of Rs. 20 crore is being proposed to take care of unforeseen projects.

2.1 Funding plan / Capital Structure

Particulars	Amount (Cr)
A. Proposed Capex Plan –	358.37
B. Add- GRIDCO capex (Cash in Kind) (i.e. equivalent to GRIDCO share of 49% in 30% Equity)	61.76
C. Total Capex (A+B)	420.13
Funding of the above Capex	
70% through Debt	294.09
30% through Equity	
- TPC share @ 51% Rs Cr - 64.28	126.04
- GRIDCO share @ 49% Rs Cr - 61.76	

2.2 Capitalization Schedule for FY22

TPSODL submitted the CAPEX Plan FY-22 for Rs. 408.14 Cr to Hon'ble OERC on 12th February'21 for approval. The same was approved by the Hon'ble Commission on Sep'21 for Rs. 184.65 Cr. We have procured the materials for the most of the approved projects and installation work is in progress. Some of the materials are expected in March'22 and delivery of some materials may be in next financial year. We are putting our best efforts to complete maximum projects before close of the financial year of FY22 however as very short time was available for execution of project and the constraints of the vast geographical area it will be challenging to complete all the projects under CAPEX FY22, approved by Hon'ble Commission.

We therefore request the Hon'ble Commission to kindly permit carryforward of the expenditure not incurred but approved for FY 22 to FY23.

2.3 Status of Ongoing Projects

Ongoing Govt funded Projects

	Ongoing Projects (Government Funded Schemes)							
SN	Project Name	Grant received (Net of Fund) in Cr.	Interest Earned till date in Cr.	Total amount in Cr.	Amount spent in Cr.	Asset Handed Over	Total Asset	Executing Organization (PIA)
1	Elephant Corridor	37.15	3.63	40.78	11.46	0	7	Southco Utility
2	School & Anganwadi	10.2	0	10.2	3.07	0	0	Southco Utility
3	DMF	3.03	N.A	3.03	NA	1.9	4.94	Southco Utility & District Administrator
4	IPDS	NIL	NIL	NIL	NIL	211.86	211.86	OPTCL
5	ODSSP	NIL	NIL	NIL	NIL	584.06	584.06	OPTCL
6	SETU	1.04	0	1.04		0	0	Southco Utility
7	BGJY	NIL	NIL	NIL	NIL	177.65	177.65	Respective District Administrator or OPTCL
8	BSVY	NIL	NIL	NIL	NIL	12.89	12.89	Respective District Administrator or OPTCL

Ongoing projects of CAPEX FY-22

S N	CAPEX Head	Approved Amount (Cr)	Status
1	PPEs, Safety & Testing Equipment	9.99	The work order for all PPE, Safety and Testing Equipment placed, most of the material received and 100% of the work is expected to be completed in FY-22.
2	Cradle guard at major road crossings	4.57	Work order has been placed and the project work is in progress.
3	Fencing of Distribution substations (DSS)	9	Work order has been placed and 100 % of the project work is expected to be completed in FY 22
4	Boundary wall for Primary substations (PSS)	5.4	Work order has been placed and Boundary wall for 14 nos. PSS is initiated. It is expected to complete 70% of the project work by FY-22
5	Establishment of Meter Testing Lab	2.47	Meter Test Bench delivered and installation work is in progress. The project is expected to be completed by FY-22
6	Replacement of burnt, Faulty and Electromechanical meters and meter installation at no Meter cases.	8.68	Work order has been placed and approximately 50% of the work is expected to be completed by FY 22.
7	LT Bare to ABC conversion	7.01	Material procurement has been done. Work order for the project work has been awarded and work is under progress. Partial completion of the project is expected in FY 22
8	33 KV Network refurbishment	5.04	Material procurement has been done. Work order for the project work has been awarded and work is under progress. Partial completion of the project is expected in FY 22
9	Installation of 33 KV AB Switch	2.23	Material procurement has been done. Work order for the project work has been awarded and work is under progress. Partial completion of the project is expected in FY 22
10	PSS Refurbishment	6.25	Material procurement has been done. Work order for the project work has been awarded and work is under progress. Partial completion of the project is expected in FY 22

S N	CAPEX Head	Approved Amount (Cr)	Status
11	11 KV Network refurbishment	6.92	Material procurement has been done. Work order for the project work has been awarded and work is under progress. Partial completion of the project is expected in FY 22
12	Installation of 11 KV AB Switch	3.05	Material procurement has been done. Work order for the project work has been awarded and work is under progress. Partial completion of the project is expected in FY 22
13	DSS Refurbishment	4.08	Material procurement has been done. Work order for the project work has been awarded and work is under progress. Partial completion of the project is expected in FY 22
14	Installation of LV protection at DSS	5.08	Material procurement has been done. Work order for the project work has been awarded and work is under progress. Partial completion of the project is expected in FY22
15	Installation of Auto reclosure / Sectionalizers ,RMUs, &FPIs	3.95	Material Procurement for RMU, Auto recloser & Sectionaliser has been completed. 50% RMUs has already been installed and balanced are expected to be completed by FY 22. Work order for Autorecloser, Sectionaliser is placed and material expected by March-FY 22. Procurement Process for FPI is in progress.
16	Trolley Mounted Pad Substations	0.22	The work order has been placed and it is expected to be completed by FY-22
17	Package Distribution Substations	0.65	Work order for Package Distribution Substations has been placed and delivery is expected in March FY 22.
18	Network augmentation / addition to meet load growth/11 KV line, PTR,DTR,LT line	8.74	Material procurement has been done. Work order for the has been placed and work is under progress. Partial completion of the project is expected in FY 22
19	Installation of Smart Meters along with back end IT Infrastructure	14.07	The project is expected to be completed by FY 22.
20	Augmentation of IPDS Software licenses pan TPSODL	12.24	The project is progressing as scheduled. The complete project is expected to be completed by FY 22.
21	IT Infrastructure (H/W & Field office infra for augmentation of IPDS application licenses)	19.26	The project is progressing as scheduled. The complete project is expected to be completed by FY 22.
22	Communication Network	5.38	The project is progressing as scheduled. The complete project is expected to be completed by FY 22.
23	SCADA Implementation	14.71	The project is progressing as scheduled. The approved CAPEX amount in FY 22 is towards partial quantity of the complete Project. The work towards approved CAPEX amount in FY 22 is expected to be completed by FY 22.
24	GIS Implementation	5.46	The project is progressing as scheduled. The approved CAPEX amount in FY 22 is towards Pilot Project in Berhampur City. The work towards approved CAPEX amount in FY 22 is expected to be completed by FY 22.
25	Civil Infrastructure	10	Work order has been placed and 80% work is expected to be completed in FY 22.
26	Civil Work for Meter Test Bench	2	Work order has been placed and work is in progress
27	Civil work for Call center &PSCC	2	Work order has been placed and 85% of work is expected to be completed in FY 22.
28	Upgradation of DT workshop	1	Upgradation of DT workshop is under progress
29	Security system in Central Store	2.25	Work order have been placed. 90% of the works is expected to be completed by FY 22.
30	Assets for Offices	2.95	Work order have been placed. 100% of the works is expected to be completed by FY 22.
	TOTAL	184.65	



STATUTORY & SAFETY

3 Statutory & Safety

Safety is a core value of TPSODL and it holds in deep reverence to the values of lives of its employees as well as public live. Following activities are considered in this head.

- i. Provision of Safety Equipment to workforce.
- ii. Provision of Electrical Testing Equipment to workforce (for STS, DOS,
- Protection, MMG & Enforcement Teams.)
- iii.Cradle guard at major road crossings in Populated area, School area.
- iv.Fencing of 11kV Distribution Substations (DSS).
- v.Boundary wall for PSS and other vital locations.
- vi.Unsafe to Safe Location by intermediate pole.

3.1 Provision of Safety Equipment for Workforce

In order to achieve the goal of making TPSODL free from accident & injuries various steps were initiated since day one itself. Focus was to provide safety resources and develop a positive safety culture among its stake holders. As we all aware that after taking over of erstwhile South Co. Utility by Tata Power Group, safety of the employees of TPSODL as well as public is the prime & foremost objective in front of us. In view of this, TPSODL has taken number of initiatives to improve safety of its employees & public along with animal also.

TPSODL has implemented the Safety Management System of Tata Power from day one to inculcate the safety culture in the DNA of every employee. It is an ongoing process to educate and aware our employees & stake holders on safety aspects to provide safe environment to all. In this context many public safety awareness and initiatives have been formulated to implement safety in a phased manner along with safety assessment and taking necessary control measures which are briefed broadly in the below context.

Setting up Safety Roadmap and Annual Safety Plan

A structured approach for implementation of Safety Management System was adopted by setting a roadmap for actions to be implemented in phased manner.

Deployment of Safety Officers at Circle level for safety awareness & training.

- Creating Safety Awareness through Capability Building, Toolbox Talk (TBT), Display of Safety poster, Mass Meetings.
- Theme Based Safety Drive (Road Safety, Working at Height and Electrical Safety), Distribution of Safety Training Handbooks in Odia, Public Safety awareness initiative, Mass safety awareness through observance of National Safety Week, National Electrical Safety Week, National Fire Service Week, National Road Safety Week.
- Deployment of Safety Governance Structure.
- Assessment of deficiency in system like Removal of creepers around network or no boundary wall around feeder post or substation or conductor at lower height.
- Sourcing of safety Equipment & Tools.
- Recruitment & deployment of safety officer at Divisional level.
- Infrastructure for practical safety in each circle.
- Public Safety Awareness & improvement by covering unsafe location to safe location.
- Development & roll out of Safety Manual.
- Ensuring use of safety Equipment & Tools.
- Fire index, Procurement of Fire Extinguishers.
- Monitoring of Led and Lag Indicators (Safety Performance TPSODL).
- Identify and Implement Best Safety Practices.
- Prepare plan for Joint Drills / Mock drills / Table -top exercise and follow it.
- Development & Implementation of HIRAs, Risk Management Plan.
- Legal Safety Compliance through portal like Legatrix.

Safety Governance Structure

For reviewing the Safety programs and performance a tired safety governance structure has been developed to ensure top down as well as bottom-up approach. Till date more than 150 Safety Committee meetings carried out at various levels.

In addition to above a full-fledged Safety Department has been established with 12 qualified Safety Officers. Safety Officers are also designated from line function in the form of Chief Safety Officer (1), Nodal Safety Officer (6), Designated Electrical Safety Officer (19), Associate Electrical Safety Officer (51) and Safety Marshalls (137). Above structure ensures active participation of more than 500 employees in driving

Safety at TPSODL. For considering the safety plan implementation TPSODL planned to deploy Safety Officer at Division Level which required recruitment of competent manpower and provide required training them to manage the safety management functions effectively.

Safety Training and Awareness

Mass Safety awareness drive was undertaken through various trainings with a coverage of more than 100,000 safety training manhours. Key Safety training programs includes:

- Basic Safety Awareness
- Safety Capability building at Practice Yard
- Action I Can Take (AICT)
- Safety Management Fundamentals (SMF)
- Behavioral Based Safety (BBS)
- Job Safety Analysis (JSA) Workshop
- Emergency Response and Fire Safety
- Basic Driving Safety Awareness
- Safety Zone Creation & Work at Height Safety

To enable effective on the job Safety training 6 numbers of Practice Yards are developed covering every circle. There is a plan to have 19 more practice yards during the upcoming days at each division level to facilitate the Practice yard training for TPSODL & BA employees to enhance safety and operation capability.

To establish effective safety communication various Safety Posters and Banners were displayed at section level and Suraksha Sandesh / Nirdesh circulated to increase the awareness among employees. Safety awareness information had also been shared through various social media platform like TPSODL Facebook, Twitter and WhatsApp & TPSODL website.

For more effective communication and awareness TPSODL team made internal & external arrangement for creation of safety awareness videos by using various resources and manpower. The safety awareness videos are shared through TPSODL SAFETY YouTube Channel which was extensively used by TPSODL employees as an effective medium for safety awareness. Going forward TPSODL

planned to create more videos by hiring external agency for preparing more attractive video which will for safety awareness and incident rate reduction.

Apart from the above TPSODL conducted various public awareness drive to minimize the public & animal poaching by using TPSODL network related electrical accidents and create awareness among the consumers through various initiatives.

The public & animal poaching incidents are still continued due to poor awareness among the public so TPSODL planned various program to make it more effective by continuing existing drives and conceive various new initiatives like village safety committee, painting and display of electrical safety awareness, engagement of various NGO for public awareness, deployment of dedicated digital display van, digital hoarding display at offices, call center and city area in the upcoming days with a target to drive electrical safety mindset to each consumer within the operation area.

Safety Equipment and Tools

TPSODL team conducted Hazard Identification and Risk Assessment (HIRA) by Core Committee Members and various Job Safety Analysis (JSA) workshop had been conducted to explore the hierarchy of risk control to reduce the incident rates and as part of risk control measures provision of safety tools were made for all employees which was not available earlier. For protecting employees by creating Safety Zone modern tools like neon tester (high voltage detection tester), discharge rod, shorting clamps, portable ground and isolation rods are provided to all working team.

With the intervention of modern age technology and improvement strategy TPSODL is working very proactively to source the best advance Safety Tools & Equipment, which can be used by employees to achieve the safety excellency.

Details of Safety Equipment:

Lock out-locks: It is proposed to use the unique locks on the isolating points while issuing the line clearance permits so that safety of the working personnel will be ensured. Such LOTO locks will be provided to the lineman & substation operators to lock the isolating points to avoid the inadvertent charging of the feeders/lines.

Neon Tester & Discharge Rod: It is proposed to provide the set of neon tester & discharge rod with each of the fuse call camp and sections so that the linemen can

easily carry it at the working site to carry out the testing & discharging of the high voltage lines.

FRP ladders will be required to be given to each fuse call camp, substations & section offices to carry out the maintenance work on the poles. Fiber glass ladders of 9 meters & 12 meters will be provided for working at height conditions (greater than 6 feet, i.e. 1.8 mtrs), thus reducing the chances of fall from height accidents.

Porta cabin: TPSODL has already established practice yards to provide the practical trainings to the employees. It is proposed to procure the porta cabins which will be installed in the practice yard so that theoretical trainings will be also imparted at practice yard.

Public Safety Gadgets: Safety of employees and consumers are the top priorities. Prior to start of any activities, it is important to make the locals aware that about the ongoing job. For this purpose, it is proposed to procure public address system, LED display screen for public safety awareness and barricade tape.

Fire Detection Protection System Management

Fire & Emergency situation may occur due to any operational failure or during any incidents, also may happen due to natural calamities like Cyclone, Flood, Lighting etc. To minimize the injury and property loss TPSODL deployed Business Continuity and Disaster Management Plan (BCDMP) by assigning role and responsibility to key personal for management of emergency situations and crises. At the initial stage TPSODL conducted various assessment and survey by engaging internal team and various external expert agency for fire risk and load study and subsequently developed action plan to achieve required compliance.

At current stage 1000 no of DCP fire extinguisher are procured and deployed at various offices, PSS. To further meet the required compliance level fire detection and various advance fire extinguisher system are planned and also incorporated to the new construction and medication works.

Detail plan for FY 23:

The new fiscal has dawned rich with promises for providing a safe workplace and consumer safety at Odisha DISCOM. Every organization is enthusiastically exploring fresh avenues and strategies for further enhancement of safety performance and germinating interesting new approaches to breed a path-breaking safety culture

among the employees by adopting robust safety measures and initiatives towards the aim "Mission Zero Harm" with a collaboration of new edge of technology in transmission and distribution business.

In continuation to current practices, we are in the process of providing best enablers to our employees by adopting additional safety interventions with respect to employees as well as public safety. Prime areas of interventions will be as per the following:

Safety Equipment & Tools:

For prevention of injury during work execution and as part of last line defense to control the workplace risk safety equipment are one of the most important aspects and provision of the same is required for each individual employee. Being a responsible organization TPSODL is committed to provide appropriate mandatory and job specific safety equipment. Based on the risk assessment suitable safety Equipment are considered for FY 23.

Safety Promotional Activities:

For creating awareness among the department employees and BA employee's various awareness programs, promotional activities are required to be carried out along with monthly theme-based awareness drive to motivate employees through reward and recognition system and encourage them for good safety cultural and practices.

Safety Capability Building / Training:

To enhance the safety culture and capability building of employees in different fields, training is an utmost tool. By the capability building of employees through various training programs TPSODL believes that the mission of "Zero Harm" can be achieved by engaging various external faculty and training agency to provide fire safety, basic first aid, BBS to make each employee competent for practicing safety at workplace.

Public Awareness Drive:

In current scenario public incidents is major concern which is due to poor electrical safety awareness among consumers. To prevent the public incidents as well as animal incidents various electrical safety awareness are required to be carried out like hiring of digital display van, display of posters & hoarding, safety jingle play

through All India Radio, safety video on Tv channels and other various program by following previous year implemented public awareness initiatives of TPSODL.

Detail Planned Safety Resources and Activities:

Safety Promotional Activities

Safety Event Management (National Safety Week, Fire Services Week, Road Safety Week, Electrical Safety Week), Theme based campaigning, Gift Items / Vouchers as per R & R Policy – Own Employees, Gift Items / Vouchers as per R & R Policy – BA Employees, Gift Items / Vouchers as per R & R Policy – BA (Best Safety Conscious Award), Participating in Safety Excellence Award event & conference.

Safety Audit

Safety Audit (Internal, External), Certification for ISO 45001(Currently Called OHSAS 18001), Third party audit through NSC, Tata Health & Safety Management System (THSMS) Audit by Corporate, CFT Audit.

Safety Capability Building / Training

Safety Capability Building / Training, Safety skill development training, Safety Training with External Agencies (like: BBS, Safety topics, First Aid and Rescue Training), Internal Trainings, hiring of digital display van with audio visual facility for conducting training & public awareness, Public Awareness drive through TV/Radio/Hoardings/Newspaper, Safety Videos and Short Animation Clips.

Fire and Fire Fighting

Fire and Fire Fighting Equipment's, Fire Detection Systems, AMC for fire service and training

Benefit:

- 1. The implementation of TSHMS will lead to safety of all Stakeholders from Employees to consumers.
- 2. Use of safety gadgets will decrease the chances of accidents and thereby ensure a safe work environment for employees and will also reduce the threats on external stakeholders.
- 3. Safe working culture among our employees and to educate them about the necessity of safety in our work life

SI No	CAPEX Proposed for this scheme	Total Amount
	•	(In Cr.)
1	Provision of Safety Gadgets/ Equipment & Tools for employees	3.35
2	Safety Capability Building / Training and Public Awareness system	1.62
3	Fire Detection and Protection System Management	0.93
	Total	5.90

For FY 2022-23, TPSODL proposes Capital expenditure of Rs 5.90 Cr for safety resources and activities.

Description of Project	Amount (Cr)
Provision of Safety Equipment for workforce	5.90 Cr.
Total	5.90 Cr.

Cost estimate is provided in the annexure number- 9.1.1

3.2 Provision of Electrical Testing Equipment

(For STS, DOS, Protection, MMG & Enforcement Teams.)

TPSODL has been agile in the adoption of latest technology in the power utility sector. Together with its culture of Consumer Service Excellence, Continuous Learning, Performance Orientation, Innovation and Empowerment; we are eager to set benchmarks in accelerated reduction of AT&C losses, improve power reliability, enhance consumer satisfaction and improve employee productivity.

Every DISCOM have its own assets which is costly and these assets have to be inspected and maintained periodically to prevent sudden breakdown and impact the reliability and consumer satisfaction causing revenue loss to company.

TPSODL do periodic maintenance of Lines and equipment and ensure its compliance at all levels to meet Performance Standards.

Testing of transformers, switchgear, and protective equipment in the Distribution System is being carried out at intervals for ensuring their serviceability, safety and efficiency.

We need to maintain Apparatus, Switchgear and electric lines at all times conforming to suitable for being connected to the Distribution System in a safe and reliable manner.

Hence Various Electrical Testing Equipment is needed by field staff during preventive maintenance as well as breakdown occurred due to fault in the system.

Benefits:

- Safety gadgets, equipment and tools protects its user against any physical harm or hazards that the workplace environment may present.
- It is important because it exists as a preventative measure for industries that are known to be more hazardous, like manufacturing, mining and Electricity.
- An employee will be aware on which equipment is required for which tasks, and what it is meant to protect will help employee use of safety equipment that are provided to employee by the employer, which is the best way to ensure no or less injury or illness.
- Use of safety equipment also increases the quality of your workday and reduce the Man-hour lost due to any kind of injuries or illness

For FY 2022-23, TPSODL proposes Capital expenditure of Rs 9 Cr for Electrical Testing Equipment.

Description of Project	Amount (Cr)
Provision of Electrical Testing Equipment	9 Cr.
Total	9 Cr.

Cost estimate is provided in the annexure no- 9.1.2

3.3 Cradle Guard

(At Major Road crossings, in Populated area, School area.)

Risk Analysis and Risk Control is a major process to identify the factors that may affect the operation and consumer safety. At initial stage vulnerable location had been identified and these locations were prioritized. These locations largely include substations fencing, putting intermediate pole, provision of cradle guard etc.

Cradle guards are provided in overhead MV/HV/LV feeders, by which a live conductor, when accidentally gets broken, is prevented to come in contact with public or animals and vehicles. By having cradle guards in place, immediately after a live conductor breaks, it first touches the cradle guard thus completing the electrical circuits necessary for the operation of the protection relays installed at substations.

This in-turn trips the circuit breaker and danger to any living object is averted. AtCAPEX DPR FY2350

present, most of the network is overhead and there is no provision of guard or cradle wire installed beneath the overhead conductors. This poses serious safety threat to the general public and possibility of conductor parting cannot be ruled out. In such a scenario, cradle guard will help in avoiding accidents caused by snapping of conductors of overhead MV feeders. TPSODL proposes to put in place the cradle wire/guard wire.

For FY 2022-23, TPSODL proposes Capital expenditure of Rs 6.79 Cr for Cradle Guard.

Description of Project	Amount (Cr)
Cradle Guard at Major Road crossings in Populated area, School area.	6.79 Cr.
Total	6.79 Cr.

Cost estimate is provided in the annexure no -9.1.3

3.4 Construction of 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 parts which ensures overall first-hand protection of the transformer.

DSS and PSS equipment and to maintain safety clearances is one of the major needs.

Benefits

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

Safety of general public and stray animals

In this proposal, TPSODL intends to carry out new fencings in phased manner. For FY 2022-23, TPSODL proposes Capital expenditure of Rs 10.37 Cr for DSS fencing (900 nos.) and Rs 4.93 Cr for Boundary wall (3000 RM) for PSS.

Description of Project	Amount (Cr)
Construction of fencing for DSS and Boundary wall for PSS	15.30 Cr.
Total	15.30 Cr.

Cost estimate is provided in the annexure no -9.1.4, 9.1.5

3.5 Intermediate poles for unsafe to safe location

Existing System

TPSODL spanning over a geographical area of sq.km has a vast network having 33 KV Network of approximately 3808 Ckt. KMs 11kV network of approximately 42555 CKMs & LT networks of 39094 CKMs. There have been several irregularities in the span length of these networks where the span length also found more than 70 m at some places. These large span lengths have resulted in:

- 1. Sagging of conductors.
- 2. Low ground clearances vertical clearance of conductor from ground is lower than the permissible limits of 5.5 m (for LT Lines) and 5.8 m (for HT Lines).
- 3. Accidents due to sagging & low ground clearances.

Need of Project

To overcome such scenarios, where the span length is on the higher side, it is of utmost importance to provide intermediate poles in between the spans. Addition of intermediate poles will address the issue of sagging, low ground clearances & accidents caused due to this.

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 feeders are in deteriorated 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 / animals since cradle guards are not provided.

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/horizontal clearances of the feeders have been reduced. This is not only causing violation of statutory guidelines but also increasing the chances of accidents.

Proposal for CAPEX Investment

To ensure safe and reliable power supply to end consumers TPSODL proposes intermediate poles in 33kV and 11kV lines in phase manner emphasizing critical areas such as schools, hospitals, markets and other key installations.

Cost Estimate

SI. No.	Description	Qty (nos.)	Amount (Cr.)
1	Intermediate poles for unsafe to safe location (33kv Line)	508	2.98
2	Intermediate poles for unsafe to safe location (11kv Line)	1150	3.74
	Total	1658	6.72

Benefit

In many locations of distribution network of TPSODL, the span length is much more than standard limits. This leads to statutory violations of vertical clearances, as per guidelines. With use of intermediate poles at low clearance locations statutory compliances can be met and hence safety of employee, public and animals will be enhanced, reducing the chances of un toward incident.

Description of the Project	Amount (Cr)
Intermediate pole for Unsafe to Safe Location	6.72 Cr.
Total	6.72 Cr.

Cost estimate is provided in the annexure no -9.1.6, 9.1.7

CAPEX Requirement for Statutory & Safety:

For FY 22-23, TPSODL proposes capital expenditure of **43.71 Cr**. To ensure Safety and Statutory compliant network. 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, TPSODL shall address network deficiencies at critical locations.

Table below suggest the activities to be performed along with funds required under Statutory and Safety Head. Estimate are attached in Annexure of this section.

S. No.	Capex Head	Activity	Total proposed Cost (Cr)
		Safety Equipment	5.90
		Electrical Testing Equipment	9.00
	Statutory & Safety	Cradle guard at major road crossings, Populated area, School area	6.79
1		Fencing of Distribution substations (DSS) and Boundary wall for PSS	15.30
		Intermediate poles for unsafe to safe location	
		Sub Total- Statutory & Safety	43.71



LOSS REDUCTION

CAPEX DPR FY23

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4 Loss Reduction

Technical & Non-Technical Losses (commercial) constitute the AT&C losses of the Distribution company.

The technical losses are due to energy dissipated in the conductors of distribution line and equipment in Network System.

Technical losses are directly dependent on the network characteristics such as lengthy distribution lines, overloading of the Line, inadequate size of conductors, Unequal load distribution on 3 phases of the line, Poor workmanship, old Conductor having multiple joints.

More over in TPSODL It is also observed that, meters are not installed on Feeders & Distribution Transformers leading to no energy accounting. As a result, it is not possible to determine energy input accurately and hence unable to measure AT&C losses at each level. Energy accounting provides the means to identify areas of leakages, wastage and inefficient energy usage.

The consumer meters are directly connected to LV mains (LT Bare/ABC) through old service cables and creates jumbling at Pole.

Therefore, in this head, following activities are proposed:

- I. Upgradation / Refurbishment of 33 kV and 11 kV Line
- II. Feeder Meter for Energy Audit
- III. LT Bare to LT ABC Conversion
- IV. Installation of LT Distribution Box at Pole
- V. Old/Damaged Service Cable Replacement
- VI. GIS Implementation

4.1 Upgradation / Refurbishment of 33 kV &11 kV Line:

33kV or 11kV feeders are important asset for a distribution utility which connects various substations and provide power to end consumers. TPSODL has nearly 3808 Ckt. KMs of 33kV and 42555 Ckt. KMs of 11kV feeders under its operational area.

Proper upkeep of the feeders is important for ensuring safety and reliability of power supply. During site visits, it was observed that the 33kV / 11kV / LV lines are in very poor condition and pose safety threat to the human beings and animals. The feeders have binding wire / multiple joints with mix size of conductor. As a result, there are chances of snapping of conductors and subsequent electrocution of human beings or animals since cradle guards are not provided. Huge number of tripping's are reported on 33 and 11kV feeders. With poor condition of network, 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 multiple sizes is used in different phases which restricts the circuit capacity limiting to the lowest size of the conductor used in the circuit. Moreover, wires with low ground clearance 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.

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.

To improve reliability and technical losses and to ensure safety of equipment and human beings / animals, refurbishment/Upgradation of 33kV, 11kV is urgently required in phase.

Network Refurbishment and Upgradation of Line job would encompass following scope:

- i. Upgradation of Conductor in 33KV & 11KV Line.
- ii. Replacement of damaged, tilted poles, insulators and accessories.
- iii. Restringing of conductor to increase the vertical clearance by reducing the sag.
- iv. Replacement of the conductor in the sections having multiple joints.
- v. Replacement of weak Jumpers and connections.
- vi. Replacement of binding wire joints with wedge connector to remove hotspots.
- vii. Installation of Danger boards, Anti climbing devices, stay sets etc. to ensure safety & statutory compliance.

4.1.1 Upgradation / Refurbishment of 33 kV Line:

List of Locations of 33 KV lines, proposed for upgradation / refurbishment with technical Justification:

S N	Circle	33kV Feeder Name	From	То	Conside red length (CKM)	Project Cost (in Lac)	Benefit (in Lac)	Payba ck period in Years	Justification
1	Bhanj anag ar	33KV Manmund a Feeder	Sonepu r GSS	Up to Tel River towards Manamu nda PSS	3.5	45.39	48.06	0.94	The 33 KV Manmuda feeder is the main source for Manmuda, Kantamal, Ghantpada & Baunsuni PSS. Presently the peak load of this 33kV feeder is 272A. The trunk section from Sonepur GSS to Manmunda PSS having length of 7 CKM. The above trunk section is with mix conductor size of 3.5 ckm with 100 sq mm conductor and balance 3.5 ckm with 55 sqmm. Being trunk section we have proposed for replacement of above mentioned 55 Sq m conductor with 100 Sq mm conductor. The proposal also comprises of replacement of damaged, poles, cross arms, stay sets and other accessories.
2	Bhanj anag ar	33KV RAIKIA Feeder	G Udayagi ri GSS	Raikia	22	225.69	85.75	2.63	Rakia 33 KV feeder is emanating from G Udaygiri GSS. This feeder supplies power to Raikia, Gutingia, Barakhama, Karada & Daringbadi PSS. The trunk section of the above feeder with length of 22 KM is comprising mix conductor sizes of 55 & 80 sq mm conductors which are quite old. The loading of the feeder, at present is 180 A. Beside above load, in case of exigency, the network connectivity is to enable to extend the power supply to K Nuagaon, Baliguda PSS. The proposal includes the replacement of existing conductor with 100 sq mm along with damaged poles, intermediate poles, cross arms & other accessories.
3	Aska	Dengausta to Pudamari	Dengau sta location	Pudamar i PSS	7	53.12	15.62	3.4	In Pudamari feeder, Bhismagiri & Pudamari PSS loads are getting power supply Digapahandi GSS. This feeder is radially connected to Digapahandi GSS having no N-1 connectivity. The feeder has a total length of 10 Ckm. In elephant corridor, 3 Ckm is already strengthened with 100 sqmm. Remaining 7Ckm is having 55 sqmm having old conductor snapping due to ageing & damaged which needs to upgrade of with 100 sqmm conductor. This line is quite old and constructed with long spans. We have considered replacement of damaged poles, installation of new

S N	Circle	33kV Feeder Name	From	То	Conside red length (CKM)	Project Cost (in Lac)	Benefit (in Lac)	Payba ck period in Years	Justification
									intermediate poles to reduce sag and changing of the V cross arms and other accessories. The loading of 33kV Pudamari feeder is 138 Amps. And very soon some industrial and lift irrigation connections are upcoming in the area.
4	Berha mpur	33kV Malud Feeder	Humma	Malud	24	267.08	38.54	6.93	Malud feeder, emanating from Ganjam GSS, has peak load of 170A. This feeder connects the Humma, Malud & Titipa PSS radially. The 33 KV Line from Humma PSS to Malud PSS (34 CKM) is comprising 10 CKM with 100 sq mm & 24 CKM with 55 Sq mm conductor. The feeder is very close to the sea shore and therefore the current carrying capacity of conductors is very much affected with the saline effect. Besides the poles & insulators are also badly affected. The next PSS after Malud is Titipa, at a distance of 27 Km which is affected with low voltage of approx. 29.8 KV. Therefore, it is proposed to replace the 24 KM section between Humma PSS to Malud PSS with 100 sqmm conductor. This will help in improvement of the voltage at the tail end Titipa PSS. Replacement of conductor at Titipa PSS is not recommended at present being at the tail end. However damaged cross arms, poles, insulators etc. are considered for replacement. In view of the saline effect polymer insulators are proposed for better performance.
5	Berha mpur	33kV Khalikote Feeder	Balugao n GSS	Khalikote PSS	20	270.10	239.23	1.13	Presently the peak load of 33kV Khallikote feeder is 320Amp. In existing condition, the 33kV line from Balugaon GSS to Keshpur PSS is having 12Ckm with conductor size 100sqmm and Keshpur PSS to Khallikote PSS is having 8Ckm with conductor size 80sqmm. Beguniapada, Sankuda, Khallikote, Keshpur PSS are getting power supply from Balugaon GSS. Also, O. Alapur PSS (ODSSP-III) will be charged under this 33kV Khallikote feeder. For which at tail end PSS, there is experiencing low voltage issues. Upgradation of conductor for complete section of the feeder is required as there is multiple size of the conductors which are overloaded with respect to their current carrying capacity and therefore adding technical losses to the system. Moreover, the conductors are old & were snapped and damaged during Cyclone Phailin. Hence, after analysis it is proposed to upgrade the complete feeder length with 148 sqmm conductor which will improve reliability & reduce technical loss.

	S N Circ	cle F	33kV Feeder Name	From	То	Conside red length (CKM)	Project Cost (in Lac)	Benefit (in Lac)	Payba ck period in Years	Justification
	6 Asl	ka Dh F	33kV harakote Feeder	Aska GSS	Dharakot e PSS	10	186.14	62.69	2.97	 33 KV Dharakote feeder, emanating from Aska (old) GSS, has mix conductors of sizes 80 and 100 sqmm. The feeder is currently loaded at 247 A. This feeder supplies power to Dharakote PSS, Balisira PSS, Khariguma & Jahada PSS. This feeder has two Megalift connection i.e., Haripur & Patapur, through Dharakote PSS and Janhibili PHD connection. The conductor is very old and has multiple joints. Due to poor condition of the conductor in the trunk section, maintaining reliable power supply becomes a challenge. In this area load growth is happening due to Mega LI, LI & food processing industries. As per survey, a section of 10 ckm is identified which requires immediate refurbishment. We have proposed replacement of 80 sq. mm conductor with 148 Sq. mm conductor in the above section along with replacement of damaged poles and accessories.
	Bha 7 ana ai	anj ag S r F	33kV Soroda Feeder	Soroda PSS	Kharigu ma PSS	12	170.50	48.77	3.50	Sorada PSS is getting power supply from Bhanjanagar GSS & Khariguma PSS is getting power supply from Aska (Old) GSS. There is a dead 33 KV line between Sorada PSS & khariguma PSS with mix conductor sizes of 34 & 55 sq mm. Presently the peak load of 33kV Sorada feeder (Bhanjanagar GSS-Sorada PSS) is 123A and Dharakote feeder (Aska (old) GSS-Khariguma PSS) is 247A. Analysing the peak load of both the feeder & 33kV conductor size of in between Sorada PSS & kharigoma PSS, it is unable to cater the power in case of outage of GSS or 33kV feeder. So, the restoration of this line will bring N-1 configuration between Dharakote feeder from Aska (old) GSS & Sorada feeder from Bhanjanagar GSS. We have proposed for refurbishment of the dead 33 KV line by replacement of existing conductor with 148 Sq mm conductor, damaged poles, Intermediate poles, v cross arms, stay sets etc. This is important in view of the mega lift & PHD connections already connected on Dharakote feeder.
ľ	8 Cit	ty Ar	/ledical- .mbapua Double Ckt	Ambap ua	Medical	4	46.93	18.22	2.58	The Medical & Ambapua feeders emanate from Narendrapur GSS and provide power supply to important customers in Berhampur town including MKCG medical and commercial establishment. The above two feeders have connectivity to provide N-1 for each other. In normal

SN	Circle	33kV Feeder Name	From	То	Conside red length (CKM)	Project Cost (in Lac)	Benefit (in Lac)	Payba ck period in Years	Justification
									 condition, 33kV Medical feeder carries 162 A & 33kV Ambapua feeder carries 54 A. At the time of exigency both feeders must have the capability to cater approx. 220 A to provide N-1 for each other. Both the 33kV feeders have conductor size of 100 Sqmm except following section with conductor size of 55 sqmm. with multiple joints. • 33kV Medical feeder-2.5km • 33kV Ambapua feeder-1.5km At many places the feeders have inadequate ground clearance, long span, bent & broken 33KV V Cross Arms and low Phase-phase clearance due to which there are tripping and unplanned 33kV outages. Hence upgradation of conductor of section having 4CKM conductor size of 55 sqmm to 100 sqmm is proposed. Along with replacement of bent cross arams, poles and other accessories to improve the reliability & N-1 reliability for both the PSS.
9	Aska	New Nuagam Feeder	Aska New (Charmi Ie) GSS	Babanpu r location towards Nuagam PSS	1.5	27.91	46.77	0.60	Presently the peak load of 33kV Nuagam feeder, emanating from Aska GSS (old), is 240A. The Nuagam PSS is having single source of supply. An old 33 KV dead circuit is available between Aska (Old) & Aska New (Charimile) GSS. The circuit has damaged poles, cross arms, accessories and needs refurbishment before it can be taken into operation. To provide backup power source to Nuagam PSS, we have proposed a link line from the above mentioned 33 KV line at Babanpur location to Nuagam PSS. The proposal is useful for utilization of dead 33kV line for providing N-1 reliable network. This will also make effective utilisation of the bay at Aska new (Charimile) GSS. The proposal comprises replacement 1.5CKM having old 80 Sq. mm conductor with 148 sq. mm conductor with required poles and accessories.
				TOTAL	104	1292.85			

Description of Project	Amount (Cr)
Upgradation / Refurbishment of 33 kV Line	12.93 Cr.
Total	12.93 Cr.

Cost estimate is provided in the annexure no -9.2.1

4.1.2 Upgradation / Refurbishment of 11 kV Line:

Circle wise total estimated cost for Upgradation / Refurbishment of 11 kV Line

SI NO	Circle	Amount (Cr.)					
1	Aska	0.36					
2	Berhampur	1.78					
3	City	3.08					
4	Bhanjanagar	0.62					
5	Jeypore	3.75					
6	Rayagada	2.33					
	Total						

Description of Project	Amount (Cr)
Upgradation / Refurbishment of 11 kV Line	11.91 Cr.
Total	11.91 Cr.

Cost estimate is provided in the annexure no - 9.2.2, 9.2.3, 9.2.4

Scheme-wise details with name and section of 11 KV lines, proposed for upgradation / refurbishment is provided in the annexure no -9.2.5

technical justification is provided in the annexure no -9.2.6

4.2 Feeder Meter for Energy Audit

As per the, Gazette of India notification, Bureau of Energy Efficiency, Ministry of Power, Government of India issued for Conduct of Energy Audit in Electricity Distribution Companies under the purview of Energy Conservation Act, 2001, **Notification Number 18/1/BEE/DISCOM/2021 dated: 06th Oct 2021 (Mentioned in the annexure No- 9.2.7),** which requires TPSODL to install meters on all feeders and provides broad framework for conduct of Annual Energy Audit and Quarterly Periodic Energy Accounting with necessary Pre-requisites and reporting requirements to be met.

As per section 5 of above-mentioned notification, one of the pre-requisites is to ensure the installation of functional meters for all consumers, transformers and

feeders and verification of accounted energy flow submitted by electricity distribution company at all applicable voltage levels of the distribution network.

The notification also provides us the Trajectory for Meter Installation under first schedule, which states "100% Communicable Feeder Metering integrated with AMI, by 31st December 2022 along-with replacement of existing non-communicable feeder meters."

As per section 7 of above-mentioned notification, manner to conduct energy audit includes verification of accounted energy flow submitted by TPSODL at all applicable voltage levels of the distribution network.

As per these regulations, TPSODL shall conduct an annual energy audit for every financial year and submit the annual energy audit report to the Bureau of Energy Efficiency (BEE) and respective State Designated Agency and also be made available on the website of TPSODL within a period of four months from the expiry of the relevant financial year.

- TPSODL would need feeder metering and DSS metering to ensure the complete distribution network is metered at all receiving as well as sending end. This would enable TPSODL to generate energy audit reports feeder-wise for all the feeders. These reports will provide detailed information about electricity consumption by different categories of consumers & the transmission and distribution losses in various sub-divisions, divisions and circles.
- Currently since not all the 33KV and 11KV feeders are metered, and the consumer-wise mapping to respective feeders for various categories of consumers is not updated / accurate, it is difficult to generate accurate energy audit reports to get specific insights about the distribution network to identify areas of high loses and theft and enable corrective action (as required).
- A good and effective Energy Audit system would need all the 33KV and 11KV outgoing feeders as well as Distribution Transformers to be metered with relevant metering system. This would allow TPSODL to have a very comprehensive and effective EA system which would help TPSODL, as corrective actions can be planned & implemented to ensure that technical and financial losses are minimized.
- Energy accounting would consider all energy inflows at various voltage levels in the distribution network, including renewable energy generation (solar) and open access consumers, as well as energy consumption by the end consumers.

Energy audit would help TPSODL to identify areas of high loss and pilferage, and thereafter focused efforts to take corrective action; as well as help to take informed decisions about augmenting the network after insights about overloaded network segments.

Benefits:

- To help develop comprehensive energy accounting system to quantify and determine actual losses in the power distribution system, segregated across technical and commercial losses.
- II. Identify areas of leakage, theft, wastage or inefficient use, thereby further helping to reduce high Transmission and Distribution (T&D) losses.
- III. To enable TPSODL to undertake targeted efficiency improvement activities to reduce T&D losses in target areas / customer segments.
- IV. Identification of overloaded feeders, sections / DTs of the network for necessary capacity additions in future.
- V. It can provide insights for TPSODL to further prioritize energy capital investments and help budget more accurately to achieve maximum results.
- VI. Energy Audit monitoring system would enable TPSODL to assess correct and accurate distribution loss levels
- VII. Appropriate corrective actions can be planned & implemented to ensure that technical and financial losses are minimized

In this CAPEX FY23 TPSODL is considering metering of all remaining 33 KV feeders and 126 nos. out of 184 nos. remaining 11 KV feeders. Metering for energy accounting of remaining 11 KV feeders and DTRs will be considered in phased manner in future planning.

Five Year Energy Audit Metering Roadmap											
Voltage Level	Meter Point	Requirement	FY 22-23	FY 23-24	FY 24-25						
	33 KV GSS Feeders	21	21	-	-						
	33 KV PSS Feeders	117	117	-	-						
33 KV	33 KV PSS Feeders (Alternative Incoming +Outgoing point)	145		145	-						
11 KV	11 KV Feeders	217	130	87	-						
	11 KV Tapping Meter	1000		300	700						
	Three Phase DTR	16000	-	16000	-						
	TOTAL	17500	268	16532	700						

Voltage Level	Meter Point	Total Points (Nos.)	Metered (Nos.)	Unmetered (Nos.)	Total Points Considered to be metered	Unit Cost (In Cr)	Total Cost (Cr)
22 1/1/	33 KV GSS Feeders	116	95	21	21	0.0324	0.68
33 KV	33 KV PSS Feeders	244	127	117	117	0.0324	3.80
11 KV	11 KV Feeders	881	664	217	130	0.0283	3.67
						TOTAL	8.15

The cost Summary for the proposal is given below:

Cost Benefits Analysis for Installation of Meters at Feeder for Energy Audit:

Cost Benefits Analysis for Installation of Meters at Feeder for Energy Audit						
Benefits to DISCOM						
Particular	Value	Quantity	Annual Saving (INR/Lacs)	Scheme Proposal (in Lac)		
Annual savings due to reduction in AT&C losses (considering INR 5.32 as avg. tariff). This includes energy accounting	Reduction in AT&C losses due to energy accounting considered as 0.1%;	Avg. monthly billed energy as 258.02 MU (Avg. from Apr 2021- Dec 2021) and billing efficiency as 78%	211.176	815.17		
	211.176	815.17				
Рау	back Period (in Yea	ars)	3.86			

Description of Project	Amount (Cr)
Feeder Meter for Energy Audit	8.15 Cr.
Total	8.15 Cr.

4.3 LT Bare Line to ABC conversion

In TPSODL, LT network plays important role of the Power supply distribution system and spread across TPSODL licensed area for power distribution. The bare overhead conductor used i 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 bare cables exists in the system of 9116 CKM out of total 39094 CKM and the total LT network across TPSODL is mentioned in below table.

CIRCLE	Unit	CITY CIRCLE	BERHAMPUR CIRCLE	ASKA CIRCLE	BHANJANAGAR CIRCLE	RAYAGADA CIRCLE	JEYPORE CIRCLE	Total
LT Line –Bare	CKM	491.21	1088.24	704.13	1520.28	2756.46	2555.61	9,116
LT Line – ABC	CKM	1008.01	3424.33	1645.02	6994.33	3763.26	13142.97	29,978

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 resulting 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.

Frequent tripping can be avoided by use of aerial bunched insulated cables instead of bare conductors. The same resulted in reduced direct 'hooking' done on bare LT conductor lines thereby reducing commercial losses drastically in theft prone areas which leads to reduce in AT&C losses LT Bare Line to ABC conversion would encompass following scope:

1. LT Bare shall be replaced with LT ABC.

2. Installation of Distribution Box and removing of jumbling of service line cables During LT bare to ABC conversion TPSODL shall look into reusing the healthy replaced bare conductor.

Benefits:

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 close 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.

Total estimated cost for LT Bare to AB Conversion

S No.	Description	UOM	Considered in Capex 22-23	Unit Cost (INR)	Total (In Cr)
1	LT Bare to ABC conversion 95 SQMM ABC	Ckm	27	1555173	4.20
2	LT Bare to ABC conversion 50SQMM ABC	Ckm	30	1199219	3.60

Description of Project	Amount (Cr)
LT Bare to ABC Conversion	7.80 Cr.
Total	7.80 Cr.

Cost estimate is provided in the annexure no -9.2.8, 9.2.9

4.4 Installation of LT Distribution Box

Problem Identification-

- > High number of No supply complaint
- Repeated No supply complaint
- > High mean time to restore No supply Complaint
- Unsafe Pole /situation
- Unbalancing of Power
- Poor workmanship
- Jumbling of Service Cable
- > Difficult to work by field staff due to Jumbling Network & Unsafe situation.
- We also found in some cases where supplies of other consumers were affected during identification process. Also result into disconnection of wrong consumer during execution of DO of default consumers

Proposal: TPSODL Proposes to install LT Distribution BOX at pole and all service cables to individual meters at consumer premises shall be connected through LT DB instead of directly connected to LT Line to minimize the jumbling of Service cable and will reduce the unsafe situation.

Benefit:

- > Field staff can quickly restore the supply working at the pole safely.
- It will also help to avoid unbalancing of load by properly distributing load at all phases of the LT line.
- > Field team can easily restore the fault during odd hours.
- > Unsafe location will be converted into safe location.
- > Jumbling of Service Cable at pole will be mitigated.
- > Maintenance can be done easily.
- New Service connection can be released from the cleaned pole with LTDB safely.
- No supply complaint will be reduced and repeated No supply complaint will be minimized. Mean time to restore power supply will be improved.
- > Hot spot will be minimized.
- > It also helps in improving AT&C losses.

Photographs of LT Distribution Box:



Total estimated cost for LT Distribution Box for Service Connection.

Description	UOM	Considered in Capex 22-23	Unit Cost (INR)	Total (In Cr)
LT Distribution Polycarbonate Box	Nos.	500	26425	1.32

Description of Project	Amount (Cr)
Installation of LT Distribution Box at Pole for Service connection	1.32 Cr.
Total	1.32 Cr.

Cost estimate is provided in the annexure no- 9.2.10

4.5 Damaged Service Cable Replacement

This section covers the requirement for replacement of damaged service cable. While replacement of defective, mechanical meters and inspections during enforcement activities, it is found that cables are having joints / damaged which becomes a potential source of theft of electricity by consumers and is a safety hazard (electrocution of consumers). This budget is required for replacement of such identified damaged cables.

It is expected that in majority of cases will be there in which cable replacement will be required on account of defective or poor condition of cable:

At present PVC un armored cable used for providing service connections and theft from the service cable is quite easy. We therefore propose to use the armored cable to as these cables will be helpful in avoiding theft from the service cable as they are more robust, and their failure rate is less as compared to unarmored cable

Considered	in	CAPEX	FY23
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XLPE Armoured Cable Size (Sq mm)	No. Of Connection Need to Rectify/Replacement of Meter	Required Qty.(Mtr)	Unit Cost per meter (INR)	Unit Installation cost per connection (INR)	Cost of Cable / Supply Cost (Cr.)	Total Inst cost (Cr.)	Total Amount (Cr.)	Total Amount (In Cr.)	Total Amount Including GST (In Cr)
2*4	23000	345000	48	322	1.66	0.74	2.40	2.40	2.83
4*10	2350	60000	98	492	0.59	0.12	0.71	0.71	0.83
4*25	150	4000	170	492	0.07	0.01	0.08	0.08	0.09
4*50	150	4500	266	1056	0.12	0.02	0.14	0.14	0.16
4*95	85	2550	475	1056	0.12	0.01	0.13	0.13	0.15
4*150	16	500	741	1056	0.04	0.00	0.04	0.04	0.05
Grand Total	25751	416550	1797	4473.20	2.59	0.89	3.48	3.48	4.11



Benefit

- Replacement of old damaged cable having multiple joints, will help in reducing AT&C loss level
- > It will convert the unsafe to safe location, which will help to mitigate any untoward incident near the consumer premises.
- Armored service cable will be used as they are more robust and their failure rate is less as compared to unarmored cable. This will help to reduce customer complaints and enhance customer satisfaction.
- In case of PVC unarmored service cable, consumer can easily tap the PVC unarmored service cable illegally indulged in theft by bypassing the meter. This armored cable has advantages of mechanical strength and help to reduce the theft by consumer.

Description of Project	Amount in (Cr)
Damaged Service Cable Replacement	4.11 Cr.
Total	4.11 Cr.

4.6 GIS Implementation

- A. In FY-22, GIS shall be implemented in 37 square kilometers of Berhampur city which is part of City Circle.
- To implement GIS system, PO has been placed on vendor in Aug-21 which includes,
- Survey and Mapping of land base (37 sqkm), PSS (9 nos.), HT network (290 kms), DTR (850 nos.), LT (500 kms) and consumers (1.2 lacs)

Project has been started and is on schedule.

- B. In FY-23, as part of above PO, GIS shall be integrated with other Enterprise systems like ERP, Network planning and MBC system. Integration helps to keep GIS system updated with meter and network data which enables to do network analysis, new scheme creation, energy audit, consumer analysis to serve the customer better and reduce AT&C losses.
- C. In FY-23, the solution is proposed to be extended to all areas under 3 (three) electrical circles namely City, Berhampur, Aska and 1 no. of division of Bhanjanagar which has an area of approx. 8200 sqkms having 80 nos. of PSS, HT, and LT network of 22,300 kms and consumer base of 9,10,000. It also covers 17 nos. of NACs
- D. In FY-2024,_the solution is proposed to be extended to 2 nos. of electrical circles namely Jeypore, Rayagada and remaining 2 divisions of Bhanjanagar which has an area of approx. 40,000 sqkms having consumer base of approx. 15,00,000. Estimated Capex requirement is approx. between 40 to 45 Crs.

The proposal for the scheme is as follows:

Description of Project	Amount (Cr)
GIS Implementation	18.4
Total	18.4

Estimated Capex requirement is mentioned in the annexure no -9.2.11.

Benefits: -

- > GIS system will help to serve customer better for resolution of complaints
- > GIS system ensures proper asset management.
- GIS System will strengthen various other business processes viz. energy audit process, technical feasibility, dues verification, network planning.
- GIS will be backbone for implementation of outage management system in coming years.
- GIS System will enable mapping of all the assets & customers, enables quick services in case of breakdown of network.
- GIS applications will aid in collection, monitoring and management and consequently reduce the non-technical losses
Photograph:



CAPEX requirement for AT&C Loss Reduction

To summarize, TPSODL proposes capital expenditure of 64.62 Crores for Loss reduction.

S. NO	Capex Head	Activity	Total proposed Cost (Cr.)
		Network refurbishment/Upgradation of 33 KV Line	12.93
		Network refurbishment/Upgradation of 11 KV Line	11.91
	Loss Reduction	Feeder Meter for Energy Audit	8.15
		LT Bare to ABC Conversion (95 sq.mm)	4.20
2		LT Bare to ABC Conversion (50 sq.mm)	3.60
		LT Distribution Polycarbonate Box for service	1 22
		connection	1.52
		Damaged Service Cable Replacement	4.11
		GIS Implementation	18.40
		Total Cost	64.62



NETWORK RELIABILITY

5 Network Reliability

TPSODL have 116 numbers of 33 KV feeders emanating from 33 Nos. of GSS having total length of 3808 CKM. These feeders are connecting directly or by tapping/LILO to 244 numbers of 33/11kV Primary Substations.

Out of 244 numbers of PSS, 174 numbers are connected through Single source and 20 nos. of PSS where Single PTR is existing. TPSODL carried out site visit and gathered information that 20 Nos of PTR are old out of which 13no's having more than 30 years of age and 07no's are more than 40 years of age.

881 numbers of 11KV feeders are emanating from these PSS which are spread across 48751 Sq. KM of vast distribution area of TPSODL which are feeding supply to 23.68 lacs of consumer. Hence large nos. of these feeders are lengthy.

The present power distribution network is in bad condition resulting into frequent tripping's and as a result end consumer are not getting reliable and quality power supply.

The key issues observed in old type PSS are as follows:

- 1. Single PTR existing at PSS
- 2. PSS at Single source and Bays at GSS are underutilized.
- 3. Absence of incoming Line breakers and protection relays.
- 4. Absence of Primary and secondary protection for Power Transformer.
- 5. Absence of CT, PT and AB switches and Isolators.
- 6. Non-Functional Battery and Battery Chargers.
- 7. Earthing, Lightening Arrestors are damaged.
- 8. Absence of Yard lighting and ACDB at PSS

Due to shortage of above equipment and absence of necessary protection coordination have been observed causing interruption in power supply to the end consumers.

Circle wise and Division wise momentary and sustained tripping's are given in the table below:

Faults on overhead lines fall into following two categories:

- 1. Momentary (Less than 5 minutes duration)
- 2. Sustained. (More than 5 minutes duration)

SL.NO	CIRCLE	NAME OF THE DIVISION	Total no of interruptions each longer than 5 Min in the feeder (Ai)	Total Duration of interruption in the feeder in minute (Bi)	Total Number of interruptions each lesser than 5 minutes in the feeder (Ci)
		BED-1	1784	35274	596
1	BERHAMPUR CITY	BED-2	831	15336	219
		BED-3	2707	61475	354
		GNED	4840	153791	291
2	BERHAMPUR	PSED	5164	200731	115
		HED	3848	99208	612
		GSED	6499	166699	108
3	ASKA	AED-1	4739	125687	126
		AED-2	3621	101496	58
		BNED	6703	144148	314
4	BHANJANAGAR	PED	4671	246559	85
		BOED	8718	324764	219
		RED	6486	209561	1488
5	RAYAGADA	GED	1692	48235	342
		PKED	6358	231915	258
		JED	2797	111067	375
c		KED	2722	110583	464
6	JETPORE	NED	6777	262701	349
		MED	8875	402660	544
	GRAND TOT/	AL .	89832	3051890	6917

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

- Identification has been carried out and replacement of faulty / old equipment causing frequent tripping is proposed.
- > Bays lying underutilized at Grid Substation is proposed to be utilized.
- > N-1 arrangement for feeders
- Additional PTR at PSS having Single PTR is proposed to ensure N-1 arrangement at PTR level
- 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. TPSODL intends to use auto reclosers, sectionalizes, 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, TPSODL 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

- i. Refurbishment of 33/11KV Primary Substations (PSS)
- ii. Mitigation of Single PTR (N-1 arrangement) & Replacement of Old PTR at PSS
- iii. SCADA System Implementation in TPSODL
- iv. Construction of New 33 KV Lines for GSS Bay Utilization
- v. N-1 arrangement for 33 KV Lines
- vi. DSS Refurbishment and LV protection at DSS
- vii. Life enhancement/Refurbishment of Network
- viii. 33 KV & 11 KV Line AB Switch, FPI, RMU, ARC & Sectionaliser
- ix. Trolley mounted Mobile Substation

5.1 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.

Installation of New/ Replacement of defective components in PSS

To strengthen the existing network, it is suggested to replace the old 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 old/nonfunctional equipment replacement to improve reliability of Power supply for which detailed cost estimate is attached in annexure. Also, to ensure better operation & control of the network & faster restoration of supply in case of interruptions. PSS being vital installation following activities are planned to improve reliability.

- 1. Replacement of the old/ nonfunctional equipment CT/PT, Isolator, in PSS.
- Replacement of the old / nonfunctional equipment 33 KV,11KV VCB and CRP etc. in PSS.
- Replacement/addition of Lightening Arrestors (LA) and provision of earthing at PSS.
- 4. Addition of PTR at PSS where Single PTR exists.
- 5. Replacement of Old PTR in PSS.
- 6. Replacement of Station Transformers-33/0.4 KV 100 KVA TRF
- Replacement of damaged support structure at PSS. This includes MS / GI structure, channels etc.

- 8. Dismantling of existing structure and erection of new structure at same location has been considered in scope of the work.
- 9. Replacement of Battery and Charger with Control Cables.
- 10. Provision of ACDB and replacement of defective relay with numerical relay for better protection coordination
- 11. Replacement of old Power cable at Secondary of PTR
- 12. Illumination of PSS

Description of Project	Amount (Cr)
Refurbishment of Primary Substations (PSS)	16.45 Cr.
Total	16.45 Cr.

Cost estimate is provided in the annexure no -9.3.1, 9.3.2

5.2 Mitigation of Single PTR & Replacement of Old PTR

i) Addition of PTR at PSS with Single PTR (N-1 arrangement at PSS)

20 numbers of PSS are identified which have only one PTR installed in each of these PSS. There is no arrangement of N-1 at PTR level in these PSS. Multiple feeders are emanating from each of these PTR.

These 11 kv feeders have no n-1 arrangement at PTR level as well as at 11 kv feeder level with feeders emanating from other sources. These 11 kv feeders are also lengthy.

During site visit we have also found that these PSS also have nonfunctional assets like CTs, VCB, etc. which needs to be replaced to improve the operational efficiency.

Load growth in these areas in future is also expected more due to electrification of major village areas resulting in increased number of new consumers.

Due to non-availability of N-1 arrangement at PTR level, during preventive maintenance and breakdown at these PSS, large nos. of consumers are affected for long duration. The details of PSS are mentioned below:

SI. No	Circle	Division	Sub Division	PSS	Existing PTR Rating (In MVA)
1	CITY	BED - I	Industrial	Ankuli	1x5
2	CIT	BLD - I	Medical	Medical	1x5
3	BERHAMPLIR	GNED	Rambha	Titipa	1x5
4	DEITHAWFUI	HED	Hinjilicut	Gandala	1x5
5	ASKA		Pudamari	Bhismagiri	1x5
6	ASKA	DIGAFAHANDI	Bomakei	Dekhali	1x5
7	BHANJANAGAR	BNED	Bhanjanagar - I	Badagada	1x5
8			Gunupur Rural	Bikrampur	1x5
9		GED	Gumuda	Gumuda	1x5
10	1		Guinuda	Minajhola	1x3.15
11			Rayagada	MITS Megafood	1x3.15
12	NATAGADA	RED	Thorubali	Sorisapadar	1x5
13			Therubali	Nuapada	1x3.15
14	1	DKED	Kasinagar	Khandava	1x5
15		PRED	R. Udayagiri	Badapada	1x5
16		KED	Sunabeda	Pottangi	1x3.15
17		MED	Balimela	K Gumma	1x5
18	JEYPORE		Danadahandi	Tandaguda	1x5
19			Fapauananu	Papadahandi	1x5
20		JED		Lamtaput	1x5

Hence Additional PTR of 5 MVA rating is proposed at each of these PSS. We have proposed to install additional power transformer in 6 nos. of PSS, with Single PTR, in the CAPEX 22-23.

Scope:

- > Additional PTR with Civil foundation
- > Addition of 33 KV & 11KV Bay and shifting of existing 11 KV feeders
- > Replacement of defective assets in PSS.

Benefits:

- 1. Uninterrupted power supply system
- 2. N-1 arrangement at PTR Level
- 3. Segregation of Consumer to improve Reliability.
- 4. To cater the future load growth in these areas,
- 5. Improve Operational efficiency.
- 6. Prevention of revenue Loss

S. No	Circle	Division	PSS	Total Cost (in Crore)
1	CITY	BED - I	Ankuli	1.62
2	BERHAMPUR	HED	Gandala	1.63
3	ASKA	Digapahandi	Bhismagiri	1.72
4	BHANJANAGAR	BNED	Badagada	1.65
5	RAYAGADA	GED	Gumuda	1.63
6	JEYPORE	NED	Tandaguda	1.78
	10.03			

Proposed Cost Estimate of Single PTR PSS for N-1 arrangement

Technical Justification for addition of PTR in Single PTR PSS (N-1 arrangement at PSS):

S No	Circle	Division	PSS Name	Proposed PTR Rating (In MVA)	Technical Justification
1	CITY	BED - I	Ankuli	1X5	Ankuli PSS of Industrial Subdivision of City Circle having single PTR of one No. 5 MVA only, supplying power to 6500 nos. of Consumers .There is no N-1 arrangement at PTR level . Ankuli feeder(Load -150 Amps, Consumer -6500 Nos.) are emanating from this PSS supplying power to industries(1.7 MVA), Commercial establishment in city of Berhampur. The conductor of the 11 kv feeder are of mix sizes of 55/80 sq.mm.In case of Breakdown due to fault or shut down for maintenance work at the PTR there are no back up supply available at the PSS and affecting 6500 consumers till fault restored. 11 kv Lanjipali Feeder from Good shed PSS provides N-1 connectivity to Ankuli feeder. Lanjipali Feeder has conductor sizes of 34/ 55 Sq. MM and load of 190 Amps and 6000 Nos of Consumers also feeding power supply in city of Berhampur . Therefore cannot back fed the Ankuli feeder .As a result all consumers of 6500 nos. will be affected due to no power supply. Hence New additional PTR is proposed at Ankuli PSS. The proposal will enable N-1 redundancy.
2	BERHAMPUR	HED	Gandala	1X5	Gandala PSS (3 nos. 11 kv feeders) having single PTR of 5 MVA only ,supplying power to 6497 nos. of Consumers. There is no N-1 arrangement at PTR level . Gandala Feeder(Length - 12 ckm,Load -45 Amps, Consumer - 2807 Nos.), Bhabandha Feeder(Length -14 ckm,Load - 50 Amps, Consumer - 2662 Nos.) Pattapur Feeder (Length -4 ckm, Load - 25 Amps, Consumer - 1028 Nos.) are emanating from this PSS . In case of Breakdown due to fault or shut down for maintenance work at the PTR there are no back up supply available at the PSS due to only Single PTR existing in the PSS and the 11 kv feeders have no N-1 arrangement available with different PSS .As a result all consumers of 6497 nos. will be affected due to no power supply. Hence New additional PTR is proposed at Gandala PSS. N-1 arrangement between outgoing 11 kv feeders of Gandala PSS will be available to improve the reliablity.
3	ASKA	GSED	Bhismagiri	1X5	Bhismagiri PSS (2 nos. 11 kv feeders) having single PTR of 5 MVA only, supplying power to 11202 nos. of Consumers. There is no N-1 arrangement at PTR level. Nimakhandi Pentha feeder(Length -90 ckm,Load -65 Amps, Consumer -7701 Nos.), Bhismagiri New feeder(Length -70 ckm,Load - 45 Amps, Consumer -3501 Nos.) are emanating from this Bhismagiri PSS. In case of Breakdown due to fault or shut down for maintenance work at the PTR there are no back up supply available at Bhismagiri PSS due to only Single PTR existing in the PSS and both the 11 kv feeders have no N-1 arrangement available. As a result, all consumers of 11202 nos. will be affected due to no power supply. Hence New additional PTR is proposed at Gumuda PSS.N-1 arrangement between outgoing 11 kv feeders of Bhismagiri PSS will be available. Another 11 kv feeder Bhismagiri old feeder(Length -45 ckm,Load -50 Amps, Consumer 3050) is
					emanating from PSS Pudamari.in this capex 23 we have also proposed link line under "Load Growth - New 11 kv Lines" for interconnection between Bhismagiri old feeder(PSS Pudamari) and Bhismagiri New feeder(Bhismagiri PSS).

S No	Circle	Division	PSS Name	Proposed PTR Rating (In MVA)	Technical Justification
					By proposing the new link line N-1 arrangement can be achieved by Ring connectivity for these two feeders of different PSS and reliability will be improved. Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction. The connectivity also reduce the length of the feeder and reduce the technical loss and improve the voltage profile enhancing customer satisfaction
4	BHANJANAGAR	BNED	Badagada	1X5	Badagada PSS (4 nos. 11 kv feeders) having single PTR of 5 MVA only, supplying power to 15550 nos. of Consumers. There is no N-1 arrangement at PTR level. Badagada Town Feeder(Length - 8 ckm,Load - 30 Amps, Consumer - 2050 Nos.), Sidhapur Feeder(Length - 65 ckm,Load - 45 Amps, Consumer - 4100 Nos.) Gangapur Feeder (Length - 60 ckm,Load - 30 Amps,Consumer - 2900 Nos.) Goudagotha (Length - 277 ckm,Load - 70 Amps, Consumer - 6500 Nos.) are emanating from this PSS. In case of Breakdown due to fault or shut down for maintenance work at the PTR there are no back up supply available at the PSS due to only Single PTR existing in the PSS and the 11 kv feeders have no N-1 arrangement available with different PSS. As a result all consumers of 15550 nos. will be affected due to no power supply. Hence New additional PTR is proposed at Badagada PSS. N-1 arrangement between outgoing 11 kv feeders of Badagada PSS will be available.
5	RAYAGADA	GED	Gumuda	1X5	Gumuda PSS (2 nos. 11 kv feeders) having single PTR of 5 MVA only, supplying power to 4000 Consumers. There is no N-1 arrangement at PTR level . 11kv feeder -Gumuda feeder(Load -30 Amps, Consumer 1200,Lenth-12 ckm) and Naira feeder (Load -45 amps, Consumers 2800, Length-115 ckm) are emanating from this Gumuda PSS. In case of Breakdown due to fault or shut down for maintenance work at the PTR there are no back up supply available at Gumuda PSS due to only Single PTR existing in the PSS and both the 11 kv feeders have no N-1 arrangement available with feeders of different PSS.As a result all consumers of 4000 nos. will be affected due to no power supply. Hence New additional PTR is proposed at Gumuda PSS. N-1 arrangement between outgoing 11 kv feeders of Gumuda PSS will be available. Another 11kv feeder Subhadraapur feeder from Ukkumba PSS are of 30 CKM length having Consumers of 1500 (IOAD-25 AMPS). In this CAPEX 23 " Load Growth -New 11 kv Lines" we have also proposed for Interconnection of Gumuda feeder with Subhadraapur feeder by construction of this proposed linkline.By proposing the new link line N-1 arrangement can be achieved by Ring connectivity between theses feeder of different PSS and reliability will be improved.
6	JEYPORE	NED	Tandaguda	1X5	Both Tandaguda PSS(3 NOS. 11 KV feeders, Consumer-13601 nos.) and Papada Handi PSS(2 nos. 11 kv feeders, Consumers -3200 Nos) having single PTR only at each of these PSS, supplying power to more than 16000 Consumers. There is no N-1 arrangement available at PTR level at both PSS. There is also space constraint at PAPADA HANDI PSS. In case of Breakdown at each PSS due to fault or shut down for maintenance work at the PTR there are no back up supply available at both PSS due to only

S No	Circle	Division	PSS Name	Proposed PTR Rating (In MVA)	Technical Justification
					Single PTR existing in each of the PSS and 11 kv feeders have no N-1 arrangement available with feeders of different PSS. As a result all consumers of 13601 nos. of Tandaguda PSS and consumers of 3200 nos. of Papada Handi PSS will be affected due to no power supply due to breakdown at these PSS occurredHence additional PTR at Tandaguda PSS is proposed in this year CAPEX 23. N-1 arrangement between outgoing 11 kv feeders of Tandaguda PSS will be available. Due to space constraint additional PTR could not be proposed at PAPADA HANDI PSS Hence In this CAPEX 23 under " Load Growth -New 11 kv Lines" we have also proposed new link 11 KV feeder to be constructed from tandaguda PSS . It will be Connected with Papahandi Town feeder of Papdahandi PSS for back feeding N-1 arrangement between outgoing 11 kv feeders of Tandaguda PSS and Papada Handi PSS By proposing the new link line load diversion/Consumer segregation shall be done. N-1 arrangement can be achieved by Ring connectivity and reliability will be improved and After proposal technical loss also be reduced Existing consumers shall be bifurcated which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.

Description of Project	Amount (Cr)
Addition of PTR at PSS with Single PTR (N-1 arrangement)	10.03 Cr.
Total	10.03 Cr.

ii) Replacement of Old PTR at PSS

Teams deployed at field gathered information that 20 Nos of PTR are old out of which 13no's having more than 30 years of age and 07 No's are more than 40 years of age, which are not giving satisfactory performance. TPSODL proposed to replace these old PTR in a phase manner.

Out of these PTR 03 nos. PTRs are proposed to be replaced in this CAPEX FY 2022-23.

Description of Project	Amount (Cr)
Replacement of Old PTR at PSS	2.49 Cr
Total	2.49 Cr

Cost estimate is provided in the annexure no -9.3.3

The total cost for Mitigation of Single PTR & Replacement of Old PTR is given below

Description of Project	Amount (Cr)
Mitigation of single PTR & Replacement of Old PTR	12.52 Cr
Total	12.52 Cr

5.3 SCADA System Implementation in TPSODL

Scada implementation will help in better network management triggered by remote operations & monitoring of the sub-stations. TPSODL area being prone to frequent natural disasters viz. cyclone, flooding, etc.

SCADA implementation shall not only help in efficiently managing the load but also reduce the system downtime. Moreover, to harness the remote management capabilities of these sub-stations, they should be integrated to SCADA. With this, all the sub-stations shall be connected to a centralized control center for the purpose of remote monitoring, control & operations.

All the PSS are proposed to be automated and shall be remotely monitored by SCADA Centre in a phased manner. In addition to SCADA System implementation in ODSSPPSS, the conventional old substations are also planned to be augmented

with state of art CRP Panel, replacement of faulty / obsolete equipment, Transformer Monitoring Unit, RMU, Isolator, FPI, FRTU and RTUs for remote monitoring & control through SCADA System for

- 1. Quick decision making for restoration of faults
- 2. FACT based energization/ restoration
- 3. Centralized PSCC taking all the decisions for charging/ restoration
- 4. Human intervention free system at sub-station level
- 5. The unmanning substation provided required manpower for manning other stations as per statutory requirement
- 6. Safety for operators/ public who were visiting sub-stations for complaint/ operation/ commercial purposes.

Primary substation automation requires replacement of 33 / 11 KV control and relay panel with new panels fitted with state-of-art IEDs and data concentrator. These stations shall be equipped with devices to make all control, monitoring and protection signal available at remote control Centre for efficient control and monitoring of electrical network.

Implementation of SCADA in TPSODL categorized into following

- i. SCADA implementation in Conventional Non ODSSP PSS
- ii. SCADA / ADMS Implementation

SCADA is implemented for selected 33/11KV Primary Substation in TPSODL.

PSS SCADA Work Year Wise Proposal									
S No	Phases	Substation Type	Nos of imp	PSS for Sole for Sole for Sole for Sole for Sole for the second s	Total Nos of				
	1 114000		Urban	Rural	NAC	Covered			
1	Phone 1 EV 21 22	ODSSP	0	80	0	80			
1	FIIdSe F1 21-22	Conventional	10	0	0	10			
	Phone 2 EV 22 22	ODSSP	0	19	0	19			
2	F11456 2 F1 22-25	Conventional	13	0	22	35			
2	Dhaga 2 EV 22, 24	ODSSP	0	0	0	0			
3	Phase 3 F 1 23 -24	Conventional	0	45	15	60			
4	Phone 4 EV 24 25	ODSSP	0	0	0	0			
	FildSe 4 F 1 24-25	Conventional	0	53	0	53			
		TOTAL	23	197	37	257			



5.4.1 SCADA implementation in Conventional Non ODSSP PSS

To improve the reliability of the system, it is recommended to Refurbish the old conventional primary substations by replacement of faulty equipment and make the substation SCADA compatible so that it can be monitored and controlled through SCADA resulting into faster restoration in case of any interruption.

In FY 2023 TPSODL proposed to consider 35 nos. of Old conventional PSS for revamping to make it operationalization of SCADA. Phase wise SCADA implementation plan in Old PSS is mentioned below.

PSS Automation Plan	FY22	FY23	FY24	FY25
No of PSS (NON ODSSP Total nos.158)	10	35	60	53

Detailed site visit has been carried out and scope of work for these 35 nos. of old PSS is captured and key activities are mentioned below. Detailed BOQ estimate is provided in annexure.

Scope of work:

Scope of work for the scheme can be divided into 3 categories:

- a. Revamping/Retrofitting/addition of components in Conventional old Non ODSSP PSS.
- b. Automation of old Non ODSSP PSS
- c. Civil works in Old Non ODSSP PSS

a. Revamping / Retrofitting/addition of components in Conventional Non ODSSP PSS:

Capital investment is proposed to replace the faulty / defective equipment and addition of components at these substations along with provision of bus section is also considered. These substations are manned at present and operation is being taken care by the substation operators stationed at these primary substations.

Implementation of SCADA will help in better network management triggered by remote operations & monitoring of the substations. SCADA will help in controlling network operations from one central location thus minimizing equipment downtime and chances of any accident.

All these PSS are proposed to be revamped, automated and shall be remotely monitored by SCADA Centre.

Circuit breakers, CRP, Isolator, AB Switch, CTs/PTs, DCDB, ACDB, Battery and Chargers are found defective or Nonfunctional which needs to be replaced or there are many PSS at which there are new requirements of such equipment. The existing earthing system is in very bad condition. This puts the basic protection system at bay and there are chances of major damage to substation capital intensive equipment if the defects are not attended / addressed urgently. To make these 35 nos. substations operational from SCADA, certain refurbishment jobs are considered which includes:

- 1. Replacement/addition of 33KV and 11 KV Circuit Breakers.
- 2. Replacement/addition of 33KV Indoor/Outdoor Control & Relay Panel
- 3. Replacement/addition of 33KV and 11KV CT, PT
- 4. Replacement/addition of 33KV and 11KV Isolator, AB Switches, LA.
- 5. Addition of Transformer monitoring units (TMU) for 8 MVA & Above PTRs
- 6. Addition of OTI, WTI & TPI
- 7. Replacement/addition of Battery and Battery Charger.
- 8. Replacement/addition of DCDB/ACDB.
- 9. Earthing System revamping
- 10. Replacement/addition of Mounting Structure
- 11. Control/Power Cables

b. Automation of old Non ODSSP PSS:

It is planned to implement RTU based Automation System for Conventional Substations to integrate with SCADA & ADMS System at the Main Control Center (MCC) and Backup Control Centre (BCC) for remote monitoring and control. The proposed Remote Terminal Unit (RTU) shall communicate with the SCADA and ADMS System through ethernet switches over IEC 60870-5-104 protocol for real time status of the switchyard and other accessories in the substation. All IEDs/Relays communicate on IEC 61850 protocol with RTU which optimizes the hard-wired signals so that copper wiring is reduced to a large extent.

Scopes includes Installation of communicable devices to communicate with Remote terminal unit and Installation of Ethernet switches to make them communicable with SCADA.

- 1. Master Trip Relay.
- 2. Ethernet Switch (16 Port & 24 Port).
- 3. RTU
- 4. MFT/MFM
- 5. CMR (Contact Multiplier Relay)
- 6. Local /Remote Switch
- 7. Router
- 8. Communication link establishment (2 MBPS)
- 9. Integration of CRP and RTU Panels

c. Civil works in Old Non ODSSP PSS:

At many 33/11 KV primary substations (Structures or PSS), boundary walls are either not existing or lying broken and there is no fencing between the substation premises and 33KV outdoor switchyard. Some PSS even don't have weather-proof control room structure to house the operating personnel & valuable equipment's This makes the PSS highly unsafe as there are chances of entry of unauthorized persons and animals into the live switchyard and undue accident / incident. As TPSODL is prone to natural disaster, water logging at switch yard & its periphery is one of the reasons for degradation of outdoor panels & costly Substation equipment. Hence complete overhauling of the drainage system at these PSS are the need of the hour. The metal gravelling at some PSS also needs to be done.

Civil work Includes as given below:

- 1. Control Room Building renovation or new building
- 2. Switchyard boundary wall
- 3. Drainage System to eliminate water logging in switchyard and other areas
- 4. Switchyard development and spreading of gravels
- 5. Cable Trench for Cable laying from switchyard to control room

Circle and division wise name and Nos. of PSS considered are given below:

Circle	Name & Nos. of PSS Division wise				
	GNED	HED	P	SED	
	GANJAM	ADAPADA	TAR	ATARINI	
Berhampur	KHALIKOTE	SHERAGADA	POI	ASARA	
	2	2		2	
	BNED	BOED	I	PED	
	BELLAGUNTHA	BOUDH	BAL	LIGUDA	
	SORADA		PH	ULBANI	
Bhanjanagar	BADAGADA		G. UE	DAYAGIRI	
			PH	IRINGIA	
	3	1		4	
	AED-1	AED-2	G	SED	
	BUGUDA	K.S. NAGAR	CHIKITI		
A cko	DHARAKOTE	BUDHAMBA	DIGAPAHANDI		
Азла	NUAGAON				
	3	2	2		
	BED-1		В	ED-3	
	BHANJAVI	HAR	К	ANISI	
City	ANKUL				
	2		1		
	RED	GED	P	KED	
	BISAMCUTTACK	GUDARI	KAS	INAGAR	
Rayagada	MUNIGUDA				
	2	1		1	
	JED	KED	MED	NED	
levnore	KOTPAD	OMP	MALKANGIRI	NABARANGPUR	
Jeypore	BORIGUMMA		KALIMELA	UMERKOTE	
	2	1	2	2	

Description of Project	Amount (Cr)
SCADA System Implementation in TPSODL	59.86 Cr
Total	59.86 Cr

5.4.2 SCADA / ADMS Implementation

Currently there are total 257 numbers of 33/11 kV substations in TPSODL areas out of which 99 no. of substations are developed/being developed under ODSSP scheme and at present 86 ODSSP PSS are taken into service.

These substations are equipped with capabilities of being remotely managed with the help of communicable devices viz. relays, IEDs, RTUs, etc. These new substations shall bring in higher levels of operational efficiency and system performance. TPSODL area is prone to frequent disaster situations such as cyclone, etc. and these substations shall not only help in managing the load efficiently but also reduce system downtime. Further, to harness the remote management capabilities of these substations these substations are being integrated to Supervisory Control and Data Acquisition (SCADA) System. Through this system, all these substations shall be connected to a centralized control Centre for the purpose of remote monitoring, control & operations.

Advanced distribution management system (ADMS) is also planned for distribution management and optimization. An ADMS includes functions that automate outage restoration and optimize the performance of the distribution grid. ADMS functions for electric utilities include fault location, isolation and restoration; volt/volt-ampere reactive optimization; conservation through voltage reduction; peak demand management etc.

The SCADA/ADMS will collect field data from Data Concentrator Units (DCU) / Remote Terminal Units (RTUs) and will interface to Impending system like GIS, OMS and future technology like AMI, Asset management systems etc.

S. No.	Item Descreption	Amount (Cr.)
1	SCADA implementation – ADMS Software (Carry forward against PO awarded in FY 22)	8.93
2	ADMS Hardware (4 Servers)	1.00
3	Project Implementation	2.07
	Total	12.00

Accordingly following is being proposed in FY 23:

The proposal for scheme is as follows:

Benefits of Refurbishment of substations:

- I. Improvement of voltage profile.
- II. Reduction in number of outages
- III. Increase in vertical clearances
- IV. Reduction in equipment downtime
- V. Reduction in unserved energy
- VI. Enhanced reliability of power supply
- VII. Reduction in number of accidents.
- VIII. Ease of Operation and Operational flexibility

Benefits of SCADA:

Centralized operation would ensure optimum resource utilization of the hardware and software and functionalities used in the SCADA System. Other benefits include:

- This will ensure efficient operation & monitoring under steady state, dynamic & transient condition of the system.
- To achieve improvement in operations considering complex Load- Demand cycle changes to bring in better and holistic visibility while making critical decisions.
- > Optimize on unscheduled power interchange, maximize utilization of the assets
- > Better Inventory management, low maintenance cost
- > Multi-skilling of operational and maintenance personals
- Enhanced operational safety
- Using the latest Operating systems, with enhanced functionalities, enabling Analysis and Power System studies/event analysis including Integrated Graphical User Interface (GUI) for SCADA, ADMS and other applications, which would be uniform across all substations and would be cyber security compliant for IT/OT integration requirements of the future.
- With common system interfaces, it brings in optimized resource management, common training platform for systems, and maintenance of assets. Avoidance of multiple systems in OS and software is also affected.

- > Data exchange with redundancy to any external system
- Better Control on Cyber Security Management, optimization of cyber security measures implementation
- Better Data Synchronization between MCC, APSCC, ensuring data accuracy, availability and reliability
- N-2 Communication redundancy will be provided at critical location for communication by using advanced MPLS Technology
- Improved reliability of service
- Reduction in restoration time of outage
- Better Integration and coordination with enterprise system to provide relevant information to those internal & external users that rely on accurate information in a timely manner
- > Better control of power quality and enhanced use
- Monitoring the potential quality problems and the reliability problems due to supply
- > Reduction in MU loss due to unwanted tripping's.
- > Significant reduction in equipment failure due to repetitive charging.

Description of Project	Amount (Cr)
ADMS Implementation in TPSODL	12 Cr.
Total	12 Cr.

5.4 Construction of New 33 KV Lines for GSS Bay Utilization

As informed by M/s OPTCL, 44 nos. of Bays at GSS were available for utilization. Out of which 16 nos. Bays are already utilized and 12 numbers bays are either proposed or under execution stage in various government and deposit schemes viz ODSSP- Ph I,II,III,DDUGJY, IPDS and Deposit Scheme.

Seven numbers of Bays are proposed to be constructed in ODSSP Ph IV. We have proposed construction of 4 nos. of new 33 KV lines in CAPEX 22-23 for utilization of bay at GSS and balance proposals for remaining bays will be taken up in future CAPEX Plans.



SI. No.	Name of GSS	Bays Available (Nos.)	Bay utilized (Nos.)	Proposed/Work in Progress in ODSSP Ph - I, Ph - II & Ph - III, DDUGJY, IPDS and Deposit schemes (Nos.)	Proposed in ODSSP Ph - IV scheme (Nos.)	Proposed in Capex FY 22 - 23 (Nos.)	To be considered in future CAPEX Plans
1	G. Udayagiri	5	2	1	1		1
2	Govindpalli	5		5			
3	Muniguda	4		2	1	1	
4	Malkangiri	4	3	1			
5	Podagada	4	2	2			
6	Chikiti	5	2	1	1	1	
7	Aska New	5	2	0	2	1	
8	Kasipur	4	1	0	1		2
9	Potangi	4	4	0			
10	Gunupur	4		0	1	1	2
	Total	44	16	12	7	4	5

Existing and Proposed Scenario:

1. Construction of 33kV New line from Babanpur location to Nuagam PSS Existing Scenario:

33kV Nuagam feeder is emanating from Aska (Old) GSS which is feeding to Nuagam PSS and it is radially connected to the PSS having no backup supply. The 33kV feeder length is 3 Ckm (Appx). The peak load of the feeder is 14.1MVA. The 33kV Nuagam feeder is very old with conductor size 100sqmm. The feeder is overloaded during peak load.



Proposed Scenario:

To mitigate overloading of the Nuagam feeder & provide N-1 arrangement at Nuagam PSS, it is proposed to construct a new line of 2.5Ckm from Babanpur location towards Nuagam PSS having conductor size of 148 sqmm AAAC. After this proposal Nuagam PSS can also avail power supply from Aska New (Charimile) GSS.

Benefits

1) 33kV feeder overloading can be mitigated.

2) Technical loss will be reduced.

3) Feeder reliability will improve by providing N-1 power supply at Nuagam PSS.

2. Construction of 33kV New line from Chikiti GSS to Patrapur PSS

Existing Scenario:

Existing 33kV Patrapur feeder is emanating from Chikiti GSS and feeding radially to Patrapur, Pitatali & Jarada PSS having no alternate(N-1) supply feeding to these PSS. The 33kV feeder length is 21Ckm (Appx). The peak load of the feeder is 10.1MVA. The 33kV Patrapur feeder is tapped from Chikiti feeder. All these PSS (Patrapur, Jarada, Pitatali) is facing shutdown if there is any fault/breakdown occur in Chikiti feeder.

More over there is one bay available at Chikiti GSS.



Proposed Scenario:

It is proposed to construct a new line from Chikiti GSS (utilizing the available bay) to Patrapur PSS of length 7Ckm (Appx) with conductor size 148sqmm.

After the proposal, Patrapur PSS & Jarada PSS can avail dedicated power supply from Chikiti GSS.

Benefits

1) Low voltage problem will be solved at tail end PSS.

2) Technical loss will be reduced.

3) The reliability will be improved.

3. Construction of 33kV New line from Muniguda GSS to Dangasarada Feeder (Near Siva Temple Location)

Existing Scenario:

33kV Bissam Cuttack feeder is emanating from Theruvalli GSS. Muniguda, Dangasarada & Chandrapur PSS are getting power supply radially from Theruvalli GSS. The feeder length is approx. 57Ckm and its presently the peak load is 105A. 33kV Baliguda feeder is emanating from Phulbani GSS. The 33kV Line from Phulbani GSS to Baliguda PSS is approx 78 Ckm and Baliguda PSS to its tail end Kotagarh PSS is 67Ckm. Its presently the peak load is 186A.

Both feeders are lengthy from grid source, so there is low voltage issues at the tail end PSSs.

Moreover there is one bay available at Muniguda GSS



Proposed Scenario:

To mitigate low voltage issue & to provide quality power supply, it is proposed to construct a new line of 7Ckm (Appx) with 148sqmm AAAC from Muniguda GSS to proposed tapping point Near Siva Temple Location (in between 33kV line from Muniguda-Dangasarada Feeder).

Also, in ODSSP-IV, there is proposal for connectivity from Dangasarada to Kotagarh PSS.

After the proposal ,33kV Dangasarada Feeder will become trunk feeder and the length of the feeder will be reduced,.

Benefits

- 1) Technical loss will be reduced.
- 2) Feeder reliability will be improved by providing N-1 power supply.
- 3) Low Voltage issues will be mitigated

4. Construction of 33kV New line from Gunupur GSS to Dombasara PSS Existing Scenario:

33kV Gunupur feeder is emanating from Akhusingh GSS. The feeder length is approx. 28Ckm. There is also a 33kV connectivity to avail power supply from Paralakhemundi GSS through 33kV Kasinagar feeder which is lengthy(approximately 55Ckm) to provide power supply to tail end PSS Gunupur, Bikrampur,Jaltar(Connected on 33kV Gunupur feeder) at the time of exigency. PSSs are experiences low voltage issues.

Moreover Bay is available at Gunupur GSS



Proposed Scenario:

To mitigate low voltage issue, utilize the bay of Gunupur GSS and to provide quality power supply, it is proposed to construct a new line of 15Ckm with 148sqmm AAAC from Gunupur GSS to Dombasara PSS.

It is also to be metioned here that Gunupur GSS is recently commissioned. As per connectivity plan, the Gunupur PSS will be connected from Gunupur GSS as per proposal in ODSSP-IV.

Benefits

- 1) Low voltage issues will be mitigated
- 2) Technical loss will be reduced.

3) Feeder reliability will improve by providing N-1 power supply.

Total estimated Cost for bay utilization:

S No	Circle	Division	GSS Name	Name of PSS	From	То	Length Considered (Ckm)	Project Cost (in Cr.)
1	Aska	AED-1	Aska New (Charimile)	Nuagam	Babanpur	Nuagam PSS	2.5	0.53
2	Aska	GSED	Chikiti	Patrapur	Chikiti GSS	Patrapur PSS	7	1.50
3	Rayagada	RED	Muniguda	Muniguda	Muniguda GSS	Dangasarada Feeder (Near Siva Temple Location)	7	1.50
4	Rayagada	GED	Gunupur	Dombasara	Gunupur GSS	Dombasara PSS	15	3.74
				TOTAL			31.5	7.27

Description of Project	Amount (Cr)
Construction of New 33 KV Lines for GSS Bay Utilization	7.27 Cr
Total	7.27 Cr

Cost estimate is provided in the annexure no - 9.3.4

5.5 N-1 arrangement for 33 KV Line

In TPSODL, 33kV network is the back one of power supply system and spread across vast area of TPSODL and connected with various 33/11kV structures from where the power is transformed at 11kV for further distribution. 33kV network is lengthy and radial in nature at most of the places.

To summarize, we found following areas where interventions can be made to strengthen the existing network.

- Lengthy and radial connectivity of the network.
- Absence of N-1 redundancy at least to critical installations.

• Circuit capacity restricted to lower size of conductor in existing line.

During contingency, it is not possible for the field teams to transfer the load to the healthy section and thus all consumers connected to the affected feeders remain out of service till the field team locate and repair the fault.

To strengthen existing 33kV network, it is proposed to augment the particular undersized section of existing conductor size to make the system more reliable by ring connectivity.

In order to provide the reliable and uninterrupted power supply to the consumers in TPSODL'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 circuit.

However, 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.

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.

Benefit

- i. This proposal will help in N-1 arrangement for 33 kv feeder.
- ii. Further, this proposal would help in managing the load in case of any exigency and mitigate the issue of overloading.
- iii. Thus, will lead into lower interruption and good quality power hence leading to satisfaction of our consumers.
- iv. Reliability will be improved.

Name and Locations of 33 KV lines, proposed for N-1 Connectivity:

SN	Circle	33kV Feeder Name	From	То	Project Cost (in Lac.)
1	City	Lochapada PSS to Berhampur-I Feeder	Suraj Vihar	Subham Vihar	9.82
2	City	Bhanjabihar	Narendrapur GSS	Bhanjabihar PSS	61.86
3	City	MES	220/132/33 kV grid s/s, Narendrapur	33/11 kV PSS MES	33.26
4	Berhampur	DigapahandiGSS- Sheragada feeder	Adapada Tapping Point	Sheragada PSS	13.57
5	Berhampur	DigapahandiGSS- AdapadaTAP Line	Adapada Tapping Point	Sheragada PSS	30.74
6	Bhanjanagar	33kV Balisira Feeder	KB Pur PSS	Balisira PSS	51.57
7	Bhanjanagar	33KV Boudh Feeder	Phulbani GSS	Charichhak PSS	77.46
8	Rayagada	33kV Kasinagar feeder	Kasinagar PSS	Bathaba location on the way to Khandaba PSS	104.40
9	Rayagada	33kV Dangasarada Feeder	Muniguda	Dangasarada (Phulbani-	190.92

SN	Circle	33kV Feeder Name	From	То	Project Cost (in Lac.)
				Chandrapur Junction Chhak)	
10	Jeypore	Kundra-Kusumi Feeder	Kundra PSS	Kusumi PSS	185.28
				TOTAL	758.87

Technical Justification of 33 KV lines, proposed for N-1 Connectivity:

SN.	Circle	33kV Feeder Name	Project Cost (inLac.)	Technical Justification
1	City	Lochapada PSS to Berhampur-I Feeder	9.82	The Berhampur-1 feeder emanates from Ambagada GSS having ckt length approx. 8 km with overhead conductor size of 148 sqmm. However, in between, a small section of only 300 mtr is with XLPE UG cable which is old & damaged. There is interconnectivity between Berhampur-1 & Berhampur-2 feeders. The above mentioned UG cable is installed in the interconnecting circuit. Above UG cable is faulty since quite a long time. and due to faulty UG cable section, the interconnectivity between two feeders is not achieved. Hence, it is proposed to replace the 0.3 CKM of UG section with overhead 148 sqmm bare conductor. The proposal will improve reliability and provide N-1 configuration between Berhampur-1 & Berhampur-2 feeders.
2	City	Bhanjabihar	61.86	The 33 KV Bhanjabihar feeder is emanating from Narendrapur GSS. This feeder is providing power supply to Bhanjabihar PSS, Dura PSS & Gopalpur PSS. Beside normal load growth, we are expecting new projects viz. Swasti project(1MVA), Spectrum Tower (0.5 MVA). There is another MES feeder from Narendrapur GSS connected radially. During 33kV fault in MES feeder, the power supply to MES is provided through Bhanjabihar feeder. In view of the above the feeder should have the capability to cater 280A load. The Bhanjabihar feeder is having 148 sq. mm conductor except for following sections with conductor size of 100 sqmm which is aged and having multiple joints. • Narendrapur site section (Truck section) - 1.5 km, • Near Bhanjabihar PSS section - 1.5km Because of the undersized conductor in the trunk section, the feeder loading capacity is compromised. as such it is proposed to replace the existing section of 3CKM having 100 sq. mm conductor with 148 sqmm conductor. The feeder is passing through the crowded area and violating ground clearance & cradle guards at road crossings. Therefore, the proposal also includes the Intermediate pole to mitigate long span, low ground clearance and safety requirements.
3	City	MES	33.26	MES is an important consumer fed radially from Narendrapur GSS. The feeder has a total length of 12 ckm, out of which 10 ckm is with 80 sqmm and a small section of 2 ckm is with old 55 sq.mm conductor. Because of ageing of the conductor and speedy winds, there were snapping of the conductor during Cyclone Phailin. The breakdown of the power supply to MES affects the national security and as

SN.	Circle	33kV Feeder Name	Project Cost (inLac.)	Technical Justification
				such it is proposed to replace the sick undersized section of
4	Berhampur	Digapahandi GSS- Sheragada feeder	13.57	Presently Adapada-Sheragada 33kV feeder emanating from Digapahandi GSS is having loading is 220A. The Sheragada, MJ Pur, K Karaadakan feeder are connected on this feeder through T-off before Adapada PSS. Existing feeder has long spans and damaged cross arms & poles which require immediate replacement.
5	Berhampur	Digapahandi GSS- Adapada TAP Line	30.74	Due to radial 33kV connectivity, in case of tripping/ maintenance all the PSS are forced to remain on outage. The alternate 33 KV source for Adapada & Sheragada PSS are already planned from Hinjicut GSS under ODSSP-IV. After the implementation of the 33 KV feeder under ODSSP-IV, the network will be used for providing N-1 for Digapaahandi GSS. Therefore, strenghthening of the existing feeder is very important.
6	Bhanjanagar	33kV Balisira Feeder	51.57	KB Pur PSS has its incoming power source from Bhanjanagar GSS. There is a dead 33 KV line available between KB Pur PSS & Balisira PSS. The restoration of this line will bring N-1 configuration for Dharakote feeder from Aska (old) GSS. We have proposed for refurbishment of the dead 33 KV line by replacing damaged poles, Intermediate poles, v cross arms, stay sets etc.
7	Bhanjanagar	33KV Boudh Feeder	77.46	Charichak PSS is availing power supply from Boudh Grid and has a backup supply available from Phulbani Grid. The 33 KV feeder from Charichak PSS (from Boudh GSS) acts as a backup feeder for Phulbani PSS. The important offices of Phulbani HQ and medical are affected in case of breakdown of Phulbani GSS. Therefore, strengthening of the interconnecting 33 KV line between Charichak PSS and Phulbani is very important so that power supply to the above-mentioned important institutions is restored from 33 KV line sourced from Boudh GSS. The proposal is comprising of replacement of damaged poles, intermediate poles, damaged V cross arms and associated accessories. After the implementation of above network refurbishment work, this 33kV feeder will become more reliable to provide N-1 power supply in the time of exigency. Therefore, strengthening of the existing feeder is very important.
8	Rayagada	33kV Kasinagar feeder	104.40	The 33kV Kasinagar feeder, from Paralakhemundi GSS is supplying power to Kharada, Kasinagar & Khandava PSS. The length of the 33 KV network between kasinagar & khandava PSS is 18 KM with mix of conductor sizes of 34 & 55 Sq mm. The site survey identified that there is requirement of refurbishment of 8 CKM of the above network. The proposal includes upgradation of existing conductor with 100 Sqmm along with replacement of damaged poles, intermediate poles, cross arms, stay sets etc. This is to mention here that Gunupur GSS is recently commissioned . As per connectivity plan, the Gunupur PSS will be connected from Gunupur GSS . Gunupur PSS already has an existing connectivity with Khandava PSS and after connecting Gunupur PSS from Gunupur GSS, the

SN.	Circle	33kV Feeder Name	Project Cost (inLac.)	Technical Justification
				feeder under discussion will become trunk feeder and provide N-1 for Kasinagar feeder.
9	Rayagada	33kV Dangasarada Feeder	190.92	Muniguda, Dangasarada & Chandrapur PSS are getting power supply from Theruvalli GSS. The 33 KV Line from Theruvalli GSS to Dangasarada PSS is approx 57 Ckm and its presently the peak load is 105A. Baliguda, Tumudibandh & Kotagarh are getting power supply from Phulbani GSS. The 33 KV Line from Phulbani GSS to Baliguda PSS is approx 78 Ckm and its presently the peak load is 186A. Also from 33kV line from Baliguda PSS to its tail end Kotagarh PSS is 67 Ckm. Due to both feeders are so lengthy from grid source, so at the tail end PSSs are experiences low voltage issues.In ODSSP-IV, there is proposal for connectivity from Dangasarada to Kotagarh PSS. In bay utilization proposal, there is a 33kV link line plan to connect Muniguda GSS to in between 33kV line from Muniguda-Dangasarada Feeder (ie Near Siva Temple Location) which is consindered in this CAPEX scheme. After this proposal Muniguda GSS will fed power to Dangasarada, Kotagarh, Chandrapur, Tumudibandh & Baliguda PSS. The length of the 33 KV network between Muniguda & Dangasarada PSS is 30 CKM . The site survey identified that out of total 30 CKM, after refurbishment of 20 CKM, this 33kV Dangasarada Feeder under discussion will become trunk feeder and provide N-1 for Baliguda feeder The proposal includes upgradation of 20CKM existing conductor with 100 Sqmm along with replacement of damaged poles, intermediate poles, cross arms , stay sets etc.
10	Jeypore	Kundra- Kusumi Feeder	185.28	The 33kV Kundra-Kusumi Feeder, from Jayanagar GSS is supplying power to Kunda, Kusumi, SB Nuagaon & Kotpad PSS. Presently the peak load of 33kV Kundra-Kusumi feeder is 70A. 33kV feeder is approx. 40 Ckm from Grid source, for which these above PSSs experience low voltage issues. There is a proposal of 33kV link line from newly commissioned Nabrangpur GSS to Sanamasigaon PSS in ODSSP-IV. Due to this proposal, at the time of exigency this 33kV line from Kundra-Kusumi Feeder will act as dual 33kV connectivity for Nabrangpur GSS & Jayanagar GSS. The length of the 33KV network between Kundra-Kusumi PSS is 16 CKM with mix of conductor sizes of 34 & 55 Sq mm. Analysing the present condition, the intermediate 33kV line cannot effectively utilise for N-1 arrangement without strengthening the 33kV feeder. The proposal includes upgradation of existing conductor with 100 Sqmm along with replacement of damaged poles, intermediate poles, cross arms, stay sets etc.
		TOTAL	758.87	

Description of Project	Amount (Cr)	
N-1 arrangement for 33 KV Lines	7.59 Cr.	
Total	7.59 Cr.	

5.6 Life enhancement/Refurbishment of Network

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.

With poor condition of network, it is difficult for utility to ensure delivery of reliable and quality power supply to the end users. TPSODL area being prone to frequent natural disasters viz. cyclone, flooding, etc. and Major of the distribution license area of TPSODL falls near the coastal belt.

During site visits, it has been observed that old lines V cross arm are moisted, and damaged in very old 33kv as well as 11 kv line. Moreover, over sagged wires in 33kV and 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.

Hence there is need to maintain and strengthen these feeders to improve the reliability and safety.so we proposed below activity to enhance the life of the Network

- > Network Refurbishment of 33 KV Line
- > Replacement of damaged V- Cross Arm for 33 kv as well as 11 kv Line.
- Provision of Lightening and earthing in 33 kv,11kv Line & DSS
- > Replacement of Open Conductor with Covered Conductor

Sub Head	Activity	UOM	Qty.	Total proposed Cost (Rs. Cr)
	Network refurbishment of 33 KV Line	Nos.of Feeder	7	3.95
	V- Cross arm for 33 KV	Nos.	500	0.42
	V- Cross arm for 11 KV Line	Nos.	1700	0.75
l ife enhousement	Lightening arrestor at 33kv Lines	Nos.	50	0.24
/Refurbishment of	Lightening arrestor at DSS	Nos.	479	0.61
Network	Lightening arrestor at 11kv Lines	Nos.	110	0.14
	Earthing At 33kv Lines	Nos.	235	0.19
	Earthing At DSS	Nos.	285	0.23
	Earthing At 11kv Lines	Nos.	550	0.45
	Covered Conductor	CKM	2.5	1.18
Total				8.17

Name and Locations of 33 KV lines, proposed for refurbishment are given below table

SN	Circle	33kV Feeder Name	From	То
1	Berhampur	33kV Rambha Feeder	Kali Dhaba near Chhatrapur GSS	Ganjam GSS
2	Aska	33kV Dharakote Feeder	4P Str. Balisira Tapping Point	Balisira PSS
3	Bhanjanagar	33kV jagannath prasad Feeder	Belangutha PSS	Jagannathprasad PSS
4	Bhanjanagar	33kV Soroda Feeder	Bhanjanagar GSS	Soroda PSS
5	Bhanjanagar	33KV Kantamal Feeder	Manamunda PSS	Kantamal PSS
6	Jeypore	33kV Chitrakunda Feeder	BSF Tap Point-DAM Tap Point	Chitrakunda PSS
7	Jeypore	Laxmipur PSS to Bandhugaon PSS via Narayanpatna PSS	Laxmipur PSS	Narayanpatna PSS

Technical justification for above lines is provided in the annexure no -9.3.5

Description of Project	Amount (Cr)		
Life enhancement/Refurbishment of Network	8.17 Cr.		
Total	8.17 Cr.		

5.7 DSS Refurbishment and LV protection at DSS

5.8.1 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. TPSODL, 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.

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 general 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 exist 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 and Boundary wall for PSS 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 & Boundary wall of PSS 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. TPSODL proposes for activities under Refurbishment of Distribution Substation:

- > 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.
- > Replacement of all undersize conductors with standard size to remove hotspot.
- Replacement / provision of AB switch, DD Fuse units, 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.

5.8.2 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 on SAIFI and SAIDI and more consumers are being affected by the fault, which in turn reduces the reliability of the system.

In order to reduce the effect of LT fault on 11kV System, it is recommended to install the MCCB and on these Distribution Substations.

Benefits

- 1. Refurbishment of DSS helps in improving the overall efficiency and safety by removing all old joints with new one, crimping of Lugs through Crimping tool, new earthing of the substation, replacement of faulty AB switches and corn out jumpers, provision of LT protection through MCCB etc.
- 2. Reliable power supply to consumers
- 3. Ease of operation to the field teams
- 4. Location where no LT Protection at DT end , any fault occurred during 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 effected by the fault, which in turn reduces the reliability of the system. Hence by providing LT protection there will be Improvement in



Reliability Indices like SAIDI & SAIFI with very few nos. of consumers will be affected.

- 5. Enhance Customer delight.
- 6. Safety to workforce and improve operation efficiency
- 7. Safety of the Equipment in DSS and reduces its failure rate. Distribution transformer is major and costly item of our distribution system by using the LT Protection we can save our transformer to go into faulty condition.
- 8. By using the LT Protection, we can enhance the life of LT lines.

Sub Head	Activity	υοм	Qty	Total proposed Cost (Rs. Cr)
	DSS Refurbishment - 25 KVA	Nos.	100	2.16
	DSS Refurbishment - 63 KVA	Nos.	100	3.77
	DSS Refurbishment - 100 KVA	Nos.	50	1.94
	DSS Refurbishment - 250 KVA	Nos.	19	0.85
	DSS Refurbishment - 500 KVA	Nos	5	0.27
DSS Refurbishment	Installation of LV protection at DSS- Switch Fuse unit (Hanging Feeder Pillar)	Nos.	511	3.18
and LV protection	Installation of LV protection at DSS- MCCB for 63 KVA	Nos.	200	1.17
	Installation of LV protection at DSS- MCCB for 100 KVA	Nos.	200	1.40
	Installation of LV protection at DSS- MCCB for 250 KVA	Nos.	100	1.15
	Installation of LV protection at DSS- MCCB for 500 KVA	Nos.	100	2.24
Total				18.13

Description of Project	Amount (Cr)
DSS Refurbishment and LV protection at DSS	18.13 Cr.
Total	18.13 Cr.

Cost estimate is provided in the annexure no - 9.3.6, 9.3.7, 9.3.8, 9.3.9, 9.3.10, 9.3.11, 9.3.12, 9.3.13, 9.3.14, 9.3.15

5.8 33 KV & 11 KV Line AB Switch, FPI, RMU, ARC, Sectionalizer

5.9.1 Installation of AB switches in 33kV & 11 KV Line

AB Switch - Benefits:

- The major advantage of installing AB switches in 33kV and 11kV feeders is that field engineers would have flexibility to isolate the section locally instead of switching off entire feeder.
- 2. In case of any tripping, maintenance engineer can isolate the faulty section and restore the supply of remaining consumers thereby improving the reliability.

Installation of FPI on 33 KV & 11 Line

Fault Passage Indicator (FPIs): Installation of overhead Fault Passage Indicators (O/H FPIs) is proposed for faster identification and restoration of faults on long 33 KV and 11kV feeders with multiple sections., 900 sets of communicable FPIs are proposed for installation on 33 KV and 11 KV Line

Benefits

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 flash light.
- 6. Reduction in supply restoration time by 1-2 hrs.
- Reduction in unserved Energy Enhancing customer satisfaction

5.9.2 Installation of Auto reclosure / Sectionalizers, RMU

Auto-reclosures 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.
TPSODL currently has a large number of 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. In order 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. Total 10 numbers of auto reclosers and 20 numbers of sectionalizer have been proposed for installation.

TPSODL is also planning to install 10 numbers of RMUs to improve reliability.

AB switches are proposed at lengthy 33kV & 11kV Feeders to have provision of isolation of section during any planned / unplanned outages. This will help in improving the reliability since currently entire feeder is forced tripped for such outages.

Auto-Recloser and Sectionalizer Benefits

- 1. Continuity of power supply for the consumers resulting in less complaints from citizens.
- 2. Reduce the time of power supply disconnection in cases of transient faults.
- 3. Reduce the unsold energy due to faults.
- 4. Reduce the cost of manpower operating in managing disconnected lines.
- 5. Maximum utilization of the network components.
- 6. Event Log and Remote control.
- 7. 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.

Sub Head	Activity	UOM	Qty.	Total proposed Cost (Cr)
	Installation of 33 KV Line AB Switch	Nos.	80	1.99
	Installation of 33 KV Line FPI	SET	400	3.58
33 KV & 11 KV Line AB	Installation of 11 KV Line AB Switch	Nos.	90	1.87
Switch, FPI,	Installation of 11 KV Line FPI	SET	500	3.74
RMU, ARC & Sectionalizer	Installation of ARC	Nos.	10	1.4
Ocolionanzei	Installation of Sectionalizer	Nos.	20	2.82
	Installation of 4way RMU	Nos.	10	1.47
Total				16.88

Description of Project	Amount (Cr)
Installation of 33 KV & 11 KV Line AB Switch, FPI, RMU, ARC, Sectionalizer	16.88 Cr.
Total	16.88 Cr.

Cost estimate is provided in the annexure no - 9.3.21, 9.3.22, 9.3.23, 9.3.24, 9.3.25, 9.3.26

5.9 Trolley Mounted Mobile Sub-Station

In case of Refurbishment of a DSS or Distribution Transformer failure, about 10-12 hrs. are required to complete the total job of DSS refurbishment or change of DT for which the supply remains off for whole durations leads to customer dissatisfaction and loss of revenue.

TPSODL is spread over vast area of 48,751 Sq KM. in 8 districts and 6 Circles and 19 Division.

Year wise DTRs Failure in TPSODL is as mentioned below:

Transformer Type	FY 18-19	FY 19-20	FY 20-21	FY 21-22
Distribution Transformers (Nos.)	1656	1425	1302	1336

Hence Mobile trolley mounted substations is proposed so that it can be placed at strategic location to restore electrical service rapidly

Mobile trolley mounted 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 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, TPSODL intends to procure 6 Nos. 500 kVATrolley Mounted Sub-Station on priority basis.

In this scheme, TPSODL 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.

Benefits

In this scheme, TPSODL proposes trolley mounted mobile substations to make the process

- 1. This will reduce the restoration time, apart from lowering the requirement of man hours.
- 2. Faster power restoration at time of DT failure.
- 3. Reliability improvement and Prevention of MU loss.

4. Immediate power restoration at the time of natural calamities like storms and cyclones more flexible.

5. Quality of service and Customer delightment.

6. This can also be used to supply power in case of failure in Critical S/STN in Hospital, Govt offices, PSCC, etc.

- 7. Public Safety
- 8. Lesser Road Congestion.

Cost Estimate for 6 Nos. 500 kVA Trolley Mounted Sub-Station

Item Description	Unit Cost	Quantity	Total Cost (In Crores)
500 kVA/ 0.433 kV Mobile Substation- Outdoor Type with complete accessories	2350000	6	1.41

Summary of CAPEX requirement for Network Reliability

S No.	Capex Head	Activity	Total proposed Cost (Cr)
		Refurbishment of 33/11kV Primary Substations (Station Transformer, VCB, Isolator, Relay, CT, PT, LA, Illumination, Battery & Chargers, Earthing, etc.	16.45
		Mitigation of Single PTR (N-1 arrangement) & Replacement of Old PTR 5 MVA	12.52
		Implementation of SCADA in Old Conventional Non-ODSSP and ODSSP PSS	71.86
2	Network	Construction of New 33 KV Lines for GSS Bay Utilization	7.27
3	Reliability	N-1 arrangement for 33 KV Lines	7.59
		Life enhancement/Refurbishment of Network	8.17
		Refurbishment and LV protection at DSS	18.13
		33 KV & 11 KV Line AB Switch, FPI, RMU, ARC & Sectionalizer	16.88
		Trolly Mounted Mobile Sub-station	1.41
		Sub-Total (3)	160.28



LOAD GROWTH

CAPEX DPR FY23

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6. Load growth

Every year DISCOM have to release applied new connection and in this FY 21-22 till December 33690 Nos. of new connections are released.

In order to meet this load growth, both network infrastructure needs to be extended, strengthened or augmented so that new connection can be released timely.

Some of the connections can be released from the existing network and some may require augmentation/addition/extension before release of new connection.

For projecting the consumption of different categories, the Licensee has analyzed and relied on the past trends of consumption pattern and actual sales data for the first six months of FY 2021-22, the impact of electrification of new villages under the RGGVY, Biju Saharanchal, Biju Grama Jyoti Yojana, Universal electrification under Saubhagaya Scheme, Lift Irrigation, Mega Lift irrigation Projects and Deep Borewell Project of GoO and actual addition/reduction of loads and other factors such as recession due to Covid-19 Pandemic situation. The category- wise consumption under different category for FY 2019-20(Actual), FY 2020-21(Actual), FY 2021-22(Estimated) & FY 2022-23 (Projected) is provided below.

LT Category

	FY	FY	FY	FY
Sales (In MUs)	2019-20	2020-21	2021-22	2022-23
	(Actual)	(Actual)	(Estimated)	(Projected)
Domestic	1336.7	1625	1645.2	1797
General Purpose<100 kw	243.1	235.75	250.81	255.82
Specified public purpose	40.126	31.466	35.311	35.5
Irrigation	81.985	84.242	121.5	130
Allied Agro Activities	10.591	12.713	13	14
Allied Agro Industrial	0.812	0.785	0.893	0.983
LT Industrial	36.579	35.162	34.754	35.781
Public water works	40.995	48.951	49.227	50.439
Public Lighting	27.054	34.817	34.276	34.94
Total	1817.9	2108.9	2185	2354.5

The summary of sales projections for LT category is given in following:

HT Category

The summary of sales projections for HT category is given in following:

	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23
Sales (IN MO)	(Actual)	(Actual)	(Estimated)	(Projected)
Large Industry	161.36	90.162	123.17	125.5
Medium Industry	48.403	32.956	32.409	33
General Purpose	47.552	43.093	54.808	56
Others	56.194	55.401	69.131	77.95
Total	313.51	221.61	279.51	292.45

EHT Category

The summary of sales projections for EHT category is given in following:

Sales (in MU)	FY 2019-20 (Actual)	FY 2020-21 (Actual)	FY 2021-22 (Estimated)	FY 2022-23 (Projected)
Large Industry	104.181	105.451	139.66	140.63
Railway Traction	197.067	208.287	208.287 240	
Power Intensive	185.591	122.714	84	88.2
Emergency supply to CGP	1.688	1.975 1.3		0.96
Total	488.527	438.427	464.96	480.79

The summary of the sales for all consumer categories has been shown in table below.

Sales (in MU)	FY 2019-20 (Actual)	FY 2020-21 (Actual)	FY 2021-22 (Estimated)	FY 2022-23 (Projected)
LT	1772.12	2108.903	2184.971	2354.467
HT	327.644	221.612	279.513	292.45
EHT	456.116	438.427	464.96	480.79
Total	2555.88	2768.942	2929.444	3127.707

Year wise PTRs and DTRs Failure:

Transformer Type	FY 18-19	FY 19-20	FY 20-21	FY 21-22
Power Transformers (HT)	7	5	4	13
Distribution Transformers	1656	1425	1302	1336

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.

- I. Addition of new 11 KV link line (N-1 arrangement)
- II. Augmentation of PTR

- III. Augmentation of DTR
- IV. Augmentation / addition of LT ABC line

Benefit

- 1. Better the availability of materials on time.
- 2. Faster will be process of providing new connection hence more will be the customer satisfaction.
- 3. Life of the assets will be enhanced.
- 4. Reliability of the system will improve.
- 5. Failure of assets will be reduced.

6.1 11kV New Link Line

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. Loading of feeders are also analyzed with existing size of the conductor, it is found that the conductors of feeders are undersized hence needs upgradation

Circle wise Length and Cost of 11 KV new Line with Estimated Cost:

0.110	0 inclu	Total			
5 NU	Circle	Length (Ckm)	Amount (Cr.)		
1	Aska	7.55	1.48		
2	Berhampur	8.70	1.71		
3	City	10.55	2.09		
4	Bhanjanagar	15.90	3.13		
5	Jeypore	8.25	1.62		
6	Rayagada	7.57	1.49		
	Total	58.52	11.52		

List of Locations and Technical justification for 11 KV New Line:

	SN	DIV.	11KV FEEDER Name	Location (From)	Location (To)	Length Considered (CKM)	Conductor Size considered	Project Cost (Cr.)	Technical Justification
	1	GED	Bikrampur	Bandhuguda	Ukkamba Road	2	80	0.39	Bikrampur PSS (3 nos. 11 kV feeders) having single PTR of 5 MVA only, supplying power to 4650 Consumers. There is no N-1 arrangement at PTR level in this PSS. One of the feeders-Bikram feeder (LOAD -45 AMPS) emanating from this Bikrampur PSS has two SECTIONS. 1 towards Bikrampur, 2nd towards Bharsingh. Kujendri feeder (Ukkumba PSS) are lengthy feeder of 95 CKM having Consumers of 3000 (IOAD-40 AMPS)approximately. Interconnection of Bikram feeder (Bikrampur PSS) to Kujendri feeder (Ukkumba PSS) will be done by construction of this proposed link line.By proposing the new link line N-1 arrangement can be achieved between these two feeders of different PSS and in case of Breakdown/shutdown at single PTR at Bikrampur PSS ,11 kV feeders can be back fed and hence reliability will be improved.
	2	GED	Panasaguda	Panasaguda feeder	Kujendri	0.07	80	0.01	Bikrampur PSS (3 nos. 11 kv feeders) having single PTR of 5 MVA only, supplying power to 4650 Consumers. There is no N-1 arrangement at PTR level. One of the feeders-Panasaguda feeder (Bikrampur PSS) (Load -50 Amps, Consumer 1050) emanating from this Bikrampur PSS .Kujendri feeder(Ukkumba PSS) is lengthy feeder of 95 CKM having Consumers of 3000(IOAD-40 AMPS) approximately. Interconnection of Panasaguda feeder(Bikrampur PSS) to Kujendri feeder(of Ukkamba PSS) will be done by construction of this proposed link line.By proposing the new link line N-1 arrangement can be achieved between these two feeders of different PSS and in case of Breakdown/shutdown at single PTR at Bikrampur PSS ,11 kV feeders can be back fed and hence reliability will be improved.
	3	GED	Gumuda	Gumuda feeder	Subhadraapur feeder	0.2	80	0.04	Gumuda PSS (2 nos. 11 kV feeders) having single PTR of 5 MVA only, supplying power to 4000 Consumers. There is no N-1 arrangement at PTR level. New additional PTR is proposed at Gumuda PSS in CAPEX FY 23. 11kv feeder -Gumuda feeder (Load -30 Amps, Consumer 1200, Lenth-12 ckm) and Naira feeder (Load -45 amps, Consumers
APE	K DPI	R FY23					117		

SN	DIV.	11KV FEEDER Name	Location (From)	Location (To)	Length Considered (CKM)	Conductor Size considered	Project Cost (Cr.)	Technical Justification
								2800, Length-115 ckm) are emanating from this Gumuda PSS. Subhadrapur feeder (Ukkumba PSS) are of 30 CKM length having Consumers of 1500 (IOAD-25 AMPS). Interconnection of Gumuda feeder with Subhadrapur feeder will be done by construction of this proposed link line. By proposing the new link line N-1 arrangement can be achieved by Ring connectivity between theses feeder of different PSS and reliability will be improved.
4	GED	Tandikona	Palupai	Tandikona chakka	0.8	80	0.16	Minojhola PSS (3 nos. 11 kv feeders) having single PTR of 3.15 MVA only, supplying power to 4600 Consumers. There is no N-1 arrangement at PTR level. Bankili feeder (Load -25 Amps, Consumer 950), Tandikona feeder(Load -21 Amps, Consumer 1150), Jhoradi feeder(Load -11 Amps, Consumer 2500) are emanating from Minojhola PSS. Tandikona feeder (Minojhola PSS) will be connected with Palupai feeder of Ramnaguda PSS by construction of this proposed link line. By proposing the new link line, N-1 arrangement can be achieved by Ring connectivity between these feeders of different PSS and in case of Breakdown/shutdown at single PTR at Minojhola PSS, 11 kv feeders can be back fed and hence and reliability will be improved.
5	PKED	Khandava	Kirting	Vanna	1.5	80	0.29	Khandava PSS (2 nos. 11 kV feeders) having single PTR of 5 MVA only, supplying power to 2789 Consumers. There is no N-1 arrangement at PTR level. Khandava feeder (Load -16 Amps, Consumer 1779 nos.), Allada feeder(Load -22 Amps, Consumer 1010 nos.) are emanating from this Khandava PSS. Bothava feeder(Load -42 Amps, Consumer 1955 nos.) from PSS Kasinagar is lengthy of 132 CKM. Khandava feeder will be connected with Bothava feeder of Kasinagar PSS by construction of this proposed link line. By proposing the new link line, N-1 arrangement between two feeders of different PSS can be achieved by Ring connectivity and in case of Breakdown/shutdown at single PTR at Khandava PSS ,11 kV feeders can be back fed and hence reliability will be improved. The connectivity also reduce the length of the bothava feeder to 110 CKM appx and reduce the technical loss and will improve voltage profile of the consumer enhancing customer satisfaction.

SN	DIV.	11KV FEEDER Name	Location (From)	Location (To)	Length Considered (CKM)	Conductor Size considered	Project Cost (Cr.)	Technical Justification
								Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.
6	PKED	Alada	Ankarada	Binjiguma	2.5	80	0.49	Khandava PSS (2 nos. 11 kV feeders) having single PTR of 5 MVA only, supplying power to 2789 Consumers. There is no N-1 arrangement at PTR level. Khandava feeder (Load -16 Amps, Consumer 1779), Allada feeder (Load -22 Amps, Consumer 1010) are emanating from this Khandava PSS. Bothava feeder (Load -42 Amps, Consumer 1955) from PSS Kasinagar is lengthy of 132 CKM. Allada feeder will be connected with Bothava feeder of Kasinagar PSS (different PSS) by construction of this proposed link line. By proposing the new link line N-1 arrangement can be achieved by Ring connectivity between two different PSS and reliability will be improved. The connectivity also reduce the length of the feeder and reduce the technical loss and improve the voltage profile enhancing customer satisfaction. Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.
7	PKED	Alada	Binjiguma	Alada	0.5	80	0.10	Khandava PSS (2 nos. 11 kV feeders) having single PTR of 5 MVA only, supplying 2789 Consumers. There is no N-1 arrangement at PTR level. Khandava feeder (Load -16 Amps, Consumer 1779 NOS.), Allada feeder (Load -22 Amps, Consumer 1010). Bothava feeder (Load -42 Amps, Consumer 1955) from PSS Kasinagar is lengthy of 132 CKM. Proposal of interconnection of Allada feeder (Khandava PSS) and Bothava feeder of Kasinagar PSS is proposed in this year CAPEX 23 to provide N-1 arrangement between these two feeders. But a section of Allada feeder is having two phase circuit in the 11 kV line. This two-phase line needs to be converted to 3-phase Line which will be done by this proposal.

SN	DIV.	11KV FEEDER Name	Location (From)	Location (To)	Length Considered (CKM)	Conductor Size considered	Project Cost (Cr.)	Technical Justification
8	BNED	Gamundi	Nuagam ignati feeder	Jamapali village	1	80	0.20	New PSS G Nuagaon is under construction in ODSSP which will be commissioned within 4 months approximately. Nuagam ignati 11 kV feeder is one of the proposed feeder from this new PSS G Nuagaon. Gumandi 11kv feeder of Bhanjanagar PSS is having load of 120 amps,Consumers-3680 nos. feeding supply to town as well as rural. This link line is proposed to connect Gumandi feeder (Bhanjanag PSS) with new proposed 11 kv Nuagam ignati feeder (G Nuagaon PSS) at Jamapali Location.N-1 arrangement can be achieved by Ring connectivity between 11kv feeders of Bhanjanagar and new proposed G Nuagaon PSS. The proposal will divert 30 amps Load from Gumandi feeder to newly constructed Nuagam ignati feeder(G Nuagaon PSS). The connectivity also reduces the length of the feeder and reduce the technical loss and improve the reliability. Existing consumers shall be bifurcated between two feeders whic will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.
9	BNED	Gangaput	Badapada Square	Saluapali	2	80	0.39	 New PSS Govindpur is commissioned and charged in ODSSP ar one of the feeders is Jilundi (length-9.5 ckm) which is underloade (load -12 amps, Consumer-1192 Nos) at present. Gangapur feeder from Bhanjanagar PSS (Length-26 ckm) having load of 4 amps,consumers-2891 Nos. feeding supply to 3 nos. sections. This link line is proposed to connect Gangapur feeder from Bhanjanagar PSS with Jilundi (newly constructed Govindpur PSS). N-1 arrangement can be achieved by Ring connectivity between feeders of different PSS i.e Govindpur and Bhanjanagar PSS. The proposal will divert 15 amps Load and approx. 800 Consumers from Gangapur feeder (Bhanjanagar PSS) to Jilund newly constructed Govindpur PSS). The connectivity also reduce the length of the feeder and reduce the technical loss and impro- the reliability. Existing consumers shall be bifurcated between two feeders whic will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.

Name	Location (From)	Location (To)	Considered (CKM)	Size considered	Cost (Cr.)	Technical Justification
Bhagabanpur	Kathagada	Perju	1.2	80	0.24	Bhagbanpur 11kv feeder from Asurabandha PSS (recently charged under ODSSP) is underloaded (2 Amps) at present and The Asurabandha feeder from Asurabandha PSS is lengthy and tripping prone. Hence by proposing the new link line load diversion/Consumer segregation (500 NOS. appx) of Asurabandha feeder to Bhagabanpur feeder shall be done. This proposal will enable N-1 arrangement between Bhagbanpur and Asurabandha feeder of Same Asurabandha PSS and also with Gajalbari feeder of different PSS i.e. Soroda. The connectivity also reduces the lengt of the feeder and reduce the technical loss and improve the reliability. Existing consumers shall be bifurcated between two feeders whic will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.
Kulada	Kuji vereda	with feeder of G Nuagaon	5	80	0.98	New PSS G Nuagaon is under construction in ODSSP. This link line is proposed to connect Kulada feeders (Bhanja Nagar PSS) having load of 80 amps, Consumers-4091 Nos with new proposed 11 kv feeder of G Nuagaon PSS. The proposed feeder will divert 20 A Load and 1000 consumers approx from Kulada feeders (Bhanja Nagar PSS) to new proposed feeders of newly constructed G Nuagaon PSS.N-1 arrangement can be achieved by Ring connectivity between 11 kV feeders of different PSS. The connectivity also reduces the lengt of the feeder and reduce the technical loss. Existing consumers shall be bifurcated between two feeders whicl will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.
Puruna cuttack	Puruna cuttack	Charichhaka town feeder	1.2	80	0.24	Puruna cuttack 11 kV feeder from Charichhaka PSS is very lenghty feeder of 135 Ckm (40 Amps load,) feeding power supply to town as well as rural. Frequent interruption occurs in this feede Charichhaka town feeder from Charichhaka PSS which is underloaded, (present loading is 2 Amp). Hence by proposing the new link line load diversion/Consumer segregation shall be done. N-1 arrangement can be achieved by Ring connectivity. The connectivity also reduces the length of the feeder and reduce the technical loss and improve the voltage profile.
	Bhagabanpur Kulada Puruna cuttack	BhagabanpurKathagadaKuladaKuji veredaPuruna cuttackPuruna cuttack	Bhagaban purKathagadaPerjuKuladaKuji veredawith feeder of G NuagaonPuruna cuttackPuruna cuttackCharichhaka town feeder	BhagabanpurKathagadaPerju1.2KuladaKuji veredawith feeder of G Nuagaon5Puruna cuttackPuruna cuttackCharichhaka town feeder1.2	BhagabanpurKathagadaPerju1.280KuladaKuji veredawith feeder of G Nuagaon580Puruna cuttackPuruna cuttackCharichhaka town feeder1.280	BhagabanpurKathagadaPerju1.2800.24KuladaKuji veredawith feeder of G Nuagaon5800.98Puruna cuttackPuruna cuttackCharichhaka town feeder1.2800.24

SN	DIV.	11KV FEEDER Name	Location (From)	Location (To)	Length Considered (CKM)	Conductor Size considered	Project Cost (Cr.)	Technical Justification
								Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.
13	PED	Dasingbadi	Spare bay of daringbadi PSS	Green badi of Dasingbadi feeder	2	80	0.39	Dasingbadi 11 kv feeder from Daringbadi PSS is lengthy feeder of 310 Ckm(appx). One No. 11kv unutilised/Spare Bay is also available at this Daringbadi PSS. New Link line from this bay (at Daringbadi PSS) shall be connected to tail end section of the Dasingbadi feeder and the feeder will be bifurcated with Isolator. After execution of the proposal the length of the two feeders will be appx. 170 and 142 Ckm. This will enable improvement of the voltage profile, reliability through N-1 arrangement. Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.
14	PED	Chahali	Chakapada	Police station chakapada	3	80	0.59	Chahali feeder from Chakapada PSS is very lengthy feeder of 115 Ckm having load of town (all essential offices i.e. Chakapada fire station, Police station, Tahasil Office are being fed power supply through this feeder) as well as rural area. Frequent interruption occurs in this 11 kV feeder. Chakapada town feeder from same PSS which is underloaded. Hence by proposing the new link line load diversion/Consumer segregation shall be done from Chahali feeder to Chakapada feeder. N-1 arrangement can be achieved by Ring connectivity. Load will be diverted from chahali feeder to Chakapada feeder and reliability will be improved. Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction. Bifurcation of Town and rural consumers are being done by this proposal for better operational efficiency.
15	PED	Simanbadi	Simanbadi	Sarangiripi	0.5	80	0.10	Simanbadi 11 kV feeder (100 amps loading) from Daringbadi PSS is very lengthy feeder of 205 Ckm. Rukanbadi feeder from same Daringbadi PSS which have loading of 50 Amps. Hence by proposing the new link line load diversion shall be done from Simanbadi feeder to Rukanbadi feeder. N-1 arrangement can be achieved by Ring connectivity to improve the reliability. Existing consumers shall be bifurcated between two feeders which

SN	DIV.	11KV FEEDER Name	Location (From)	Location (To)	Length Considered (CKM)	Conductor Size considered	Project Cost (Cr.)	Technical Justification
								will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction. The connectivity will reduce the technical loss and improve the voltage profile.
16	AED- II	Karchuli of Buguda PSS	Buguda PSS	Manitara	3	80	0.59	Buguda PSS (2x5 MVA+2x3.15 MVA) are supplying power to 25878 nos. consumers. Karchuli feeder is having peak load of 92 Amps and Motabadi feeder having peak load of 52 Amps are emanating from the PSS. Karchuli 11kV feeder is supplying power to approx. 11883 no. of consumers (approximately half of the total consumers of Buguda PSS) including consumers of Manitara area. Presently in Manitara area, approx. 7000 domestic consumers are existing besides HT consumers like two nos. of Stone Crusher, one rice mill & one Fly Ash industries are also existing in this feeder and more HT consumers are expected in future. Hence 11kV link line is proposed to bifurcate load of Karchuli 11kV feeder into two feeders i.e., existing Karchuli & proposed Manitara 11kV feeder by construction of this link line. The proposal will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction. N-1 arrangement can also be achieved by Ring connectivity to improve the reliability.
17	AED- II	Feeder from NUAGAON PSS	NUAGAON PSS	Existing mukundapur feeder	3.5	80	0.69	Nuagaon PSS Having 4 nos. of PTRs (3 *5 MVA and 1* 1.6 MVA) and have 5 nos. of 11 kV feeders (College Square- Load -185 amps, Nuagam- 190 amps, Bhetanai-108 amps ,Mukundapur- 225 amps, A.C.S.I (Sugar Factory)- 30 amps)supplying power to total consumers of 15970 .Nuagaon PSS is 85% loaded and is also expected load growth in future. One of the 11kv feeder Mukundapur have load of 225 amps and feeding supply to 6400 nos. of consumers including HT consumers like OLIC, RWSS & Rice mill .Hence PTR 1.6 MVA at Nuagaon PSS is proposed to be augmented in CAPEX 23 to 5 MVA and thereby addressing mitigation of PSS loading and by this proposal of link line enable mitigation of feeder loading. In this proposal new 11 kV feeder is to be constructed by laying the link line from proposed Augmented 5 MVA PTR at Nuagaon PSS to existing Mukundapur feeder to divert load of 1000 nos. of consumers and 100 Amps approximately to new feeder. Existing

SN	DIV.	11KV FEEDER Name	Location (From)	Location (To)	Length Considered (CKM)	Conductor Size considered	Project Cost (Cr.)	Technical Justification
								consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction. N-1 arrangement can be achieved by Ring connectivity between 11 kV feeders and at PTR level to improve the reliability. Mitigation of overloaded PTR and 11 kV feeders will also be achieved to better operational efficiency.
18	GSED	Bhismagiri Old feeder	Chhanameri	Dengausta	0.25	80	0.05	Bhismagiri PSS (2 nos. 11 kV feeders) having single PTR of 5 MVA only, supplying power to 11202 nos. of Consumers. There is no N-1 arrangement at PTR level . Nimakhandi Pentha feeder(Length- 90 ckm, Load -65 Amps, Consumer -7701 Nos.), Bhismagiri New feeder(Length -70 ckm, Load - 45 Amps, Consumer- 3501 Nos.) are emanating from this Bhismagiri PSS. New additional PTR is proposed at Bhismagiri PSS in this CAPEX FY23. In this proposal, Bhismagiri old feeder(Length-45 ckm, Load -50 Amps, Consumer 3050) from PSS Pudamari shall be connected with Bhismagiri New feeder(Bhismagiri PSS). By proposing the new link line N-1 arrangement can be achieved by Ring connectivity for these two feeders of different PSS and reliability will be improved. Existing consumer shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction. The connectivity also reduce the length of the feeder and reduce the technical loss and improve the voltage profile enhancing customer satisfaction
19	GSED	Nuapada	Ratneswari Temple	Kalingadola IB	0.8	80	0.16	Dekhali PSS (2 nos. 11 kV feeders) have single PTR of 5 MVA only is supplying power to 6162 nos. of Consumers. There is no N- 1 arrangement at PTR level . Bomkai feeder(Length - 32 ckm, Load -35 Amps, Consumer -2649 Nos.), Jakar Dumula feeder(Length - 66 ckm, Load - 40 Amps, Consumer- 3513 Nos.) are emanating from this Dekhali PSS. In this proposal, Nuapada feeder(Length - 42 ckm, Load - 45 Amps, Consumer 3235) from PSS Chikiti shall be connected with Jakar Dumula feeder (Dekhali PSS) By proposing the new link line N-1 arrangement can be achieved

SN	DIV.	11KV FEEDER Name	Location (From)	Location (To)	Length Considered (CKM)	Conductor Size considered	Project Cost (Cr.)	Technical Justification
								by Ring connectivity of Nuapada feeder and Jakar Dumula feeder of different PSS and reliability will be improved. Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction. This connectivity will also reduce the length of the feeder and reduce the technical loss and improve the voltage profile enhancing customer satisfaction
20	JED	DORAGUDA	Baipariguda PSS	TAHASHIL OFFICE	0.5	80	0.10	The Doraguda 11 kv feeder (from Baipariguda PSS) is feeding power supply to 1500 nos. of consumers of length 42 ckm(Load-45 amps). A small section of approx 300 mts of overhead line is passing over populated congested slum area. In case of break down field staff is facing difficulty in tracing and attending the fault. Besides unsafe situation arises due to violation of safe clearances and the line passing over the slum and may cause any untoward incident. Hence by proposing rerouting of this feeder by constructing New line of 500 mts, the overhead 11KV line will be rerouted up to Tahashil office along side the road to improve the operation efficiency. This proposal will enables improvement in reliablity by quicker restoration of faults in case of breakdown.
21	JED	Town-2	From town hall	New Bus stand	0.6	80	0.12	The Town-211kv feeder(Jeypore old Control Room PSS) is feeding power supply to 6314 nos. of consumers(Load -155 amps) including critical customer in town areas including Tehsil office, Hospital,etc. Jepore town 11 kv feeder is having Load of 100 Amps and consumers-1700 nos. emanating from New Bus stand PSS. Interlinking between Jepore town 11 kv feeder & Town No 2 feeders will be done. N-1 arrangement can be achieved by Ring connectivity between these two feeders of different PSS and reliability will be improved.
22	KED	KORAPUT NO-1	Koraput OLD PSS	Tapping point of Rural section	2.55	80	0.50	Koraput Town-1 feeder(Length-40ckm,Load-145 amps,Consumers-5792 Nos.) from Koraput Old PSS is feeding to both urban (all essential offices) and rural. One spare bay is available at Koraput Old PSS.

SN	DIV.	11KV FEEDER Name	Location (From)	Location (To)	Length Considered (CKM)	Conductor Size considered	Project Cost (Cr.)	Technical Justification
								New link line is proposed from this spare bay to tapping point of rural section for segration of town and rural feeder. Hence by proposing the new link line load diversion/Consumer segregation shall be done. Load of 50 amps,2000 nos. of consumers will be shifted from Koraput Town-1 feeder to new proposed feeder. N-1 arrangement can be achieved by Ring connectivity and reliability will be improved. Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction. The connectivity also reduce the length of the feeder and reduce the technical loss and improve the voltage profile enhancing customer satisfaction
23	NED	Town 1&2	Town-1	Town-2	0.6	80	0.12	11 kv feeder Town 1 (Length-35ckm, Load-140 amps, Consumers-5210 Nos) & Town No 2 (Length-41 ckm,Load-155 amps,Consumers-6950 Nos) are emanating from Nabarangpur PSS. Town 1 feeder is supplying power to critical consumers of Nabarangpur town including Collector office,District Medical,etc. Interlinking between Town 1 and Town 2 11 kv feeders will be done by constructing new proposed link line. N-1 arrangement can be achieved by Ring connectivity and reliability will be improved.
24	NED	Feeder from Tandaguda PSS Bay	Tandaguda PSS Bay	Papada handi PSS	4	80	0.79	Both Tandaguda PSS (3 NOS. 11 KV feeders) and Papada Handi PSS(2 nos. 11 kv feeders) having single PTR only at each of these PSS, supplying power to more than 16000 Consumers.There is no N-1 arrangement available at PTR level and there is space constraint at PAPADA HANDI PSS. Hence additional PTR at Tandaguda PSS is proposed in this year CAPEX 23. But due to space constraint additional PTR could not be proposed at PAPADA HANDI PSS The new link 11 KV feeder is proposed to be constructed from tandaguda PSS . It will be Connected with Papahandi Town feeder of Papdahandi PSS for back feeding N-1 arrangement between these feeders of two different PSS. By proposing the new link line load diversion/Consumer

SN	DIV.	11KV FEEDER Name	Location (From)	Location (To)	Length Considered (CKM)	Conductor Size considered	Project Cost (Cr.)	Technical Justification
								segregation shall be done. N-1 arrangement can be achieved by Ring connectivity and reliability will be improved.
25	GNED	BADAMADHAPUR	RANGAMATIA	GOBA	3	80	0.59	Interlinking between Solaghara feeder(23 ckm,30 Amps, consumers-3425 Nos.) of Taratarini PSS and Badamadhapur feeder(47 ckm,Load -45 Amps,Consumers-3551 Nos) of Balugoan PSS is proposed by constructing this new link line. By proposing the new link line load diversion/Consumer segregation shall be done. N-1 arrangement can be achieved by Ring connectivity of these two feeders of different PSS. Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.
26	HED	Pitala	Podingi PSS	Podingi Chhak	1.5	80	0.29	Pitala feeder(Length-28 ckm, Load-82 Amps, consumers-4915 Nos.) emanating from Podingi PSS is supplying power to Aska GP & Pitala GP. Unutilised/spare 11 kv bay is available at Kodingi PSS . New link line is proposed from this spare bay to tapping point at Narendrapur section to divert load.By proposing the new link line load diversion/Consumer segregation shall be done andLoad of approximately 40 amps,2350 nos. of consumers will be shifted from existing Pitala feeder to new proposed feeder.N-1 arrangement can be achieved by Ring connectivity. Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.
27	HED	Pitala	Chonduli	Khandara	1	80	0.20	Interlinking of Pitala feeder(Length-28 ckm, Load-82 Amps, consumers-4915 Nos.) from Podingi PSS and underloaded Burupada(length-9 ckm,Load -20 Amps,Consumers-1531 Nos) from Hinjili PSS is proposed by construction of this proposed new link line. By proposing the new link line, N-1 arrangement can be achieved

SN	DIV.	11KV FEEDER Name	Location (From)	Location (To)	Length Considered (CKM)	Conductor Size considered	Project Cost (Cr.)	Technical Justification
								by Ring connectivity for these two feeders of different PSS. Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.
28	HED	Saru	RWSS Kanchuru	Chaitanya Pada Petrol Pump	1	80	0.20	Interlinking of Saru feeder(Length-27 ckm, Load 80 Amps, consumers-7000 Nos.) from Hinjili PSS and underloaded Balujhola(22 ckm,Load - 31 Amps,Consumers-2000 Nos) from Kukudakhandi PSS is proposed by construction of this proposed new link line.By proposing the new link line, N-1 arrangement can be achieved by Ring connectivity for these two feeders of different PSS. Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.
29	HED	Darubhadra	Mohanapalli	Godharapalli Chhak	1.5	80	0.29	Interlinking of Saru feeder (Length -27 ckm,Load- 80 Amps, consumers-7000 Nos.) from Hinjili PSS and underloaded Darubhadra feeder (10 ckm,Load -30 Amps,Consumers-1678 Nos) from S. Ambagaon PSS is proposed by construction of this proposed new link line.Load diversion shall be done in this proposal and Load of appx. 25 amps and 1500 nos. of consumers will be shifted from Saru feeder to Darubhadra feeder. N-1 arrangement can be achieved by Ring connectivity for these two feeders of different PSS. Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.
30	GNED	KARATALI	KARATALI FISH FARM S/S	PATTAPUR FISH FARM S/S	0.7	80	0.14	Small section of Karatali feeder emanating from Balugaon PSS (71 CKM,Load-50 amps,Consumers-4527 nos.) is passing through jungle area,agricultural land. Illegal hooking of line is also done by miscreants for Animal Hunting.Frequent interruption occurs.In case of break down field staff is facing difficulty in tracing and attending the fault. This link line of 700 mts approx. is proposed to reroute the feeder. This proposal will enables improvement in reliability by quicker restoration of faults in case of breakdown.
31	BED- 3	Tulu	Dumdumi chowak (Tulu feeder)	Perapentha Village	1.25	80	0.25	Tulu feeder from Kanisi PSS is Lengthy 11 kv fedder(length of 53 CKM load -100 Amps) and Randha feeder(Length-10ckm,Load- 30 amps) is emanating from same Kanisi PSS which is

		(Randha feeder)				underloaded. Hence by proposing the new link line load diversion from Tulu feeder to Randha feeder shall be done and loading of both the feeders will become 70 Amps and 60 Amps respectively. This proposal will enable N-1 arrangement between Tulu and Randha feeder. This will reduce the technical loss and improve the reliability. Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage
						and enhance customer satisfaction.
11 KV MAHUDA	Mahuda Pharmaceutical College	Gram Vikas	0.6	80	0.12	Mahuda feeder (length-72 ckm,58 Amps, consumers-2718 Nos.) is emanating from Lathi PSS which is lengthy feeder.This feeder is passing through jungle area .Frequent interruption occurs.Field staff is facing difficulty in tracing and attending fault during breakdown. Hence by proposing rerouting of this feeder by constructing New line of 600 mts, the overhead 11KV line will be rerouted to improve the operation efficiency. This proposal will enables improvement in reliability by quicker restoration of faults in case of breakdown.
Sukunda	Anantei	Dakhinapur	1.5	80	0.29	11 kv Sukunda feeder from Lathi PSS is having load of 62 Amps(Consumers- 2905 nos,Length-45 ckm) is proposed to be interlinked with 11 kv Balipada feeder of Ambagada PSS having load of 120 Amps(Consumers- 5388 nos,length of 13 CKM). This proposal will enable N-1 arrangement between Sukunda feeder and Balipada feeder of different PSS and will improve the reliability.
Lathi	Model School Lathi	Bada Kusumi (Mahuda feeder)	1	80	0.20	Mahuda 11KV feeder (load -58 Amps, consumers- 2718 Nos.) emanating from Lathi PSS is passing through jungle area and is lengthy feeder of 72 ckm. Frequent interruption occurs.Lathi feeder from Lathi PSS is having load of 49 amps, (length 30 ckm,consumers 2296 Nos). It is proposed to construct a new link line to connect Lathi feeder with Mahuda feeder.The proposed feeder will divert 10 Amps Load from Mahuda feeder to Lathi feeder. This proposal will enable N-1 arrangement between Mahuda feeder and Lathi feeder and will improve the reliablity . Existing consumers shall be bifurcated between two feeders
	Sukunda Lathi	Lathi Model School Lathi	CollegeSukundaAnanteiDakhinapurLathiModel School LathiBada Kusumi (Mahuda feeder)	College College Sukunda Anantei Dakhinapur Lathi Model School Bada Kusumi (Mahuda feeder) 1	College Image Sukunda Anantei Dakhinapur 1.5 Lathi Model School Lathi Model School Bada Kusumi (Mahuda feeder) 1 80	College College Image: College Image: College Sukunda Anantei Dakhinapur 1.5 80 0.29 Lathi Model School Lathi Bada Kusumi (Mahuda feeder) 1 80 0.20

SN	DIV.	11KV FEEDER Name	Location (From)	Location (To)	Length Considered (CKM)	Conductor Size considered	Project Cost (Cr.)	Technical Justification
								which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.
35	BED- 3	Lochapada	Basant Vihar	Nimakhandi	1	80	0.20	Lochapada feeder (Nimakhandi PSS) is having peak load of 180 Amps (Consumers-6284 nos) to Lochapada-I & Lochapada-II. Nimakhandi feeder (Nimakhandi PSS) is having load of 30 Amps(Consumers 2226 Nos).It is proposed to construct a new link line to connect Lochapada feeder with Nimakhandi feeder and 70 Amps Load, 2000 consumers appx from Lochapada feeder will be diverted to Nimakhandi feeder. After bifurcation Nimakhandi feeder and Lochapada feeder will have 100 Amps and 110 Amps respectively. This proposal will enable N-1 arrangement between Nimakhandi feeder and Lochapada feeder and will improve the reliability. This connectivity will reduce the technical loss and Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.
36	BED- 2	Gandhi Nagar-2	Rukmani square	Sai complex	1	100	0.20	Gandhi Nagar-2 feeder from N.K Nagar PSS is having load of 260 Amps (length of 16 ckm) and supply power to 6517 no of consumers in town. Urban bank Road feeder of Corporation road PSS is having load of 140 Amps (length of 4 CKM) supplying power to 2631 no of consumers in town including Hospital and PHDs. Interlinking between Gandhi Nagar-2 feeder and Urban 11 kv feeders will be done by constructing new proposed link line. The proposal will divert 50 Amps Load from Gandhi Nagar 2 feeder to Urban bank road feeder and after execution, load of these feeder will be 210 and 190 amps respectively. This proposal willenable N-1 arrangement between Gandhi Nagar-2 feeder and Urban bank Road feeder of different PSS and will improve the reliability . This connectivity will reduce the technical loss and Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.

SN	DIV.	11KV FEEDER Name	Location (From)	Location (To)	Length Considered (CKM)	Conductor Size considered	Project Cost (Cr.)	Technical Justification
37	BED- 1	Raghunathpur	Mandiapalli santoshi mandira	Transformer factory	0.6	80	0.12	Raghunathpur Feeder is emanating from Narendrapur PSS is having load of 50 amps, (length 12 CKM consumers -1920 Nos.) University Feeder from Bhanjabihar PSS is having load of 55 Amp, (length 11.7 CKM, consumers -1203 nos.) It is proposed to interlink Raghunathpur Feeder (Narendrapur PSS) with University Feeder (Bhanjabihar PSS) by constructing new proposed link line. This proposal will enable N-1 arrangement between Raghunathpur Feeder and University Feeder of different PSS and will improve the reliability
38	BED- 1	Raghunathpur	Gopalpur Junction	Bharat Benzz	1.5	80	0.29	Dura feeder (length-6.5 CKM,Load-20 Amps, consumers -1200 nos.) is emanating from Dura PSS. Raghunathpur Feeder (length 12 CKM,Load-50 amps consumers 1920 Nos. is emanating from Narendrapur PSS. It is proposed to interlink Dura Feeder (Dura PSS) with Raghunathpur Feeder by constructing new proposed link line. This proposal will enable N-1 arrangement between Dura Feeder and Raghunathpur Feeder of different PSS and will improve the reliability.
39	BED- 1	Tata benz	Medical MSS	Medical Backside gate	1.5	100	0.30	Presently Tata benz feeder from old Medical PSS have load of 240 Amps(Consumers-4600 nos,Length -16 ckm) is supplying power to critical consumers in town. New link line is proposed from Medical PSS to bifurcate tata benz feeder into two 11 kv feeders.After execution of the proposal, Diversion of 60 amps load approximately from existing Tata benz feeder to new proposed feeder will be done. Existing Tata Benz feeder and new tata benz feeder will have 180 and 60 amps load respectively after bifurcation. Further this new feeder will be interlinked with Kamapali feeder for N-1 supply. This proposal will enable N-1 arrangement between existing Tata benz and new feeder and will improve the reliability . The connectivity will reduce the technical loss and improve the reliability. Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.

SN	DIV.	11KV FEEDER Name	Location (From)	Location (To)	Length Considered (CKM)	Conductor Size considered	Project Cost (Cr.)	Technical Justification
40	BED- 1	karapalli	Berjispentho	Parvatipur square	0.6	80	0.12	 11 KV karapalli feeder (from Bhanjabihar PSS) is having load of 60 amps (Length -29 CKM,Consumers- 3800 Nos.) 11 KV Gopalpur Feeder (from Bhanjabihar PSS) having load of 110 Amp, (Length -32.5 CKM, Consumers- 5706 Nos.) It is proposed to Interlink 11 KV karapalli feeder with 11 KV Gopalpur Feeder. After execution of the proposal Diversion of 25 amps load approximately from Gopalpur Feeder to Karapalli feeder will be done. This proposal willenable N-1 arrangement between karapalli feeder and Gopalpur Feeder and will improve the reliablity . Existing consumers shall be bifurcated between two feeders which will affect less nos. of consumers in case of breakdown/outage and enhance customer satisfaction.
				GRAND TOTAL	58.52		11.52	

Description of Project	Amount (Cr)
11kV New Link Line	11.52 Cr.
Total	11.52 Cr.

Cost estimate is provided in the annexure no -9.4.1, 9.4.2

6.2 Augmentation of Power Transformers

To avoid any overloading issues TPSODL has undertaken the assessment of the loading of the power transformers and found that to meet the estimated peak load, it is required to augment few of the power transformers which are overloaded or may get overloaded considering the current peak and load growth for the next two years and the present capacity of transformers will not suffice the N-1 criteria.

To carry out the detailed Study of the PTR, inputs were collected from each 33/11 kV substations. Then we analyzed the loading pattern of PTR.

Hence based on the survey reports and discussion with the field teams, few proposals have been identified where we need to augment the Power transformers to have trouble free summer.

To mitigate the same, various proposals are put forth for approval where we have considered:

- 1. Power Transformer augmentation
- 2. Load shifting from one transformer to other transformers within the substation

Very Few of PTR found overloaded and also to cater the increasing load demand, augmentation of PTR is required to avoid any overloading, PTR failure 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 where the load growth is high, it is required to augment some of the power transformers which may get overloaded considering load growth for the next two years. It will give benefit to consumers as follows:

Benefit

1. Reliable power supply by ensuring N-1 reliability at PTR level. Further, this proposal would help in managing the load in case of any exigency and mitigate

the issue of overloading. Thus, will lead into lower interruption and good quality power hence leading to satisfaction of our consumers.

- 2. Reduce over-burdening of existing PTRs thereby reducing power cuts.
- 3. Optimization of PTR loading.
- 4. Reduction of technical loss.
- 5. Reliability will be improved.
- 6. Reduction of PTR failure which is costly asset.
- 7. Improve the operational efficiency
- Existing PTR freed after Augmentation shall be repaired and will be used at other location of PSS for mitigation of PTR after testing and overhauling. This will help in Multiple swapping and Cost optimization.

List of location for Augmentation of PTR to 5 MVA:

S. No	Circle	Division	Sub Division	Section	PSS	Existing PTR Rating (MVA)	Proposed PTR Rating (MVA)
1	BERHAMPUR	GNED	RAMBHA	MALUD	MALUD	3.15	5
2	ASKA	AED-1	ASKA	DHARAKOTE	DHARAKOTE	3.15	5
3	RAYAGADA	RED	B. CUTTACK	MUNIGUDA	MUNIGUDA	3.15	5

List of location for Augmentation of PTR to 8 MVA:

S. No	Circle	Division	Sub Division	Section	PSS	Existing PTR Rating (MVA)	Proposed PTR Rating (MVA)
1	ASKA	AED-1	NUAGAON-I	NUAGAON	NUAGAON	5	8

Technical Justification for Augmentation of Power Transformer:

SI. No.	PSS Name	Augmentation From - To	Total cost of scheme (Lacs)	Pay Back Period (Years)	Remarks
1	MALUD PSS	3.15MVA to 5 MVA	83.16	5.5	 Existing scenario Malud PSS have 2nos.of PTR of rating 3.15 MVA and 5 MVA. Total 4 nos. of 11kV feeders are emanating from this PSS and have total consumers of 6602 nos. Bajrakote 11kV feeder (loading- 85 Amps) & K.P Gada 11kV feeder (loading- 140 Amps) on 5MVA PTR and have total consumers of 4493 nos. Murada 11kV feeder (Loading- 50A) mps & Fatepur 11kV feeder (loading- 45Amps) on 3.15MVA PTR and have total consumers of 2109 nos. Considering 2 yrs. load growth on existing Loading of 5 MVA PTR, loading becomes 96%. At exigency of 5MVA PTR, loading becomes 193% on 3.15MVA PTR. At exigency of 3.15MVA PTR, loading becomes 193% on 3.15MVA PTR. At exigency of 3.15MVA PTR, loading becomes 122% on 5MVA PTR For mitigation of the above-mentioned issues and to provide uninterrupted power supply at the time of N-1 condition at PTR, it is proposed to augment the existing 3.15MVA PTR to 5MVA PTR. Benefits • N-1 Reliability at PTR level will be improved. • In case of breakdown/outage, existing consumers shall be provided uninterrupted power supply. • Optimum loading at both the PTR can also be achieved. • It will also help to prevent PTR failure due to overloading. • It will enhance customer satisfaction.
2	NUAGAON PSS	5MVA to 8 MVA	106.91	2.9	Existing scenario Nuagaon PSS has 4 nos. of PTRs (3 nos. of 5 MVA and one no of 1.6 MVA) and has 5 nos. of 11 kV feeders supplying power to total consumers of 15970. At present PTR-1 (5MVA), is loaded with 70.5%, PTR-2 (5MVA), is loaded with 113.5% & PTR-3 (5MVA), is loaded with 85.7%. In case of 5MVA PTR failure or shutdown i.e., at exigency other two nos. 5MVA PTR could not able to cater the load of whole PSS. For mitigation of the above-mentioned issues and to provide uninterrupted power supply at the time of N-1 condition at PTR and to provide reliability at PTR level, it is proposed to augment the existing 5MVA PTR to 8MVA PTR. Benefits
PEX DF	PR FY23				135

			 N-1 Reliability at PTR level will be improved. In case of breakdown/outage, existing consumers shall be provided uninterrupted power supply. Optimum loading at both the PTR can also be achieved. It will also help to prevent PTR failure due to overloading. It will enhance customer satisfaction.
3.15MVA to 5 MVA	83.16	1.6	 Existing scenario Muniguda PSS have 2nos.of PTR of rating 3.15 MVA. Total 4 nos. of 11kV feeders are emanating from this PSS and have total consumers of 10395 nos. Muniguda 11kV feeder (loading- 90 Amps) & Kurtagada 11kV feeder (loading- 80 Amps) on one 3.15MVA PTR and have total consumers of 7245 nos. At present this PTR is loaded with 103%. Considering 2 yrs. load growth on existing Loading of the PTR, it becomes 116%. For mitigation of the above-mentioned issues and to provide uninterrupted power supply at the time of N-1 condition at PTR, it is proposed to augment the existing 3.15MVA PTR to 5MVA PTR. Benefits N-1 Reliability at PTR level will be improved. In case of breakdown/outage, existing consumers shall be provided uninterrupted power supply. Optimum loading at both the PTR can also be achieved. It will also help to prevent PTR failure due to overloading.
3.15 MVA to 5 MVA	83.16	6.9	Existing Scenario Dharakote PSS have PTR capacity of (2x5 + 1x3.15) MVA . Total 4 nos. of 11kV feeders are emanating from this PSS and have total consumers of 13675 nos. Dharakote Town & Baharpur 11kV feeder are connected to 3.15MVA PTR and have total consumers of 4563 nos. Rugume 11kV feeder (Loading- 90 Amps) connected to one 5MVA and have total consumers of 4553 nos. & Mundamarei 11kV feeder (loading- 135Amps) on another 5MVA PTR and have total consumers of 4559 nos. Apart from that, LI & OLIC consumers are also getting power supply from Dharakote PSS. Considering load growth for 2 years, At exigency of one 5MVA PTR, other two PTR (3.15 and 5 MVA) becomes loaded with 93%. For mitigation of the above-mentioned issues and to provide uninterrupted power supply at
	3.15 MVA to 5 MVA 3.15 MVA to 5 MVA	3.15 MVA to 5 MVA 83.16 3.15 MVA to 5 MVA 83.16	3.15 MVA to 5 MVA 83.16 1.6 3.15 MVA to 5 MVA 83.16 6.9

SI. No.	PSS Name	Augmentation From - To	Total cost of scheme (Lacs)	Pay Back Period (Years)	Remarks
					the time of N-1 condition at PTR, it is proposed to augment the existing 3.15MVA PTR to 5MVA PTR. Benefits
					 N-1 Reliability at PTR level will be improved. In case of breakdown/outage, existing consumers shall be provided uninterrupted power supply.
					 Optimum loading at both the PTR can also be achieved. It will also help to prevent PTR failure due to overloading. It will enhance customer satisfaction.



Cost	benefit	Analysis	of PTR:
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Name of the Proposal	Cost Benefit analysis of Distribution Transformer Augmentation.								
Particulars of Power Transformer									
Existing PTR Rating	19450	KVA							
Existing loading of PTR	16102	KVA							
Proposed loading of PTR after 2 years	18093	KVA							
Rating of PTR after Proposal	28000	KVA							
Total cost of scheme	356.40	Rs. Lac							
Annual Revenue Return (A)									
Total units consumed (Load x days x Hrs x	3883300	(КѠН)							
load factor)	3002390								
Average Cost of Supply Per Unit	2.35	Rs.							
Average Sale costper unit	5.32	Rs.							
Difference (Sale-purchase)	2.97	Rs.							
Net Revenue Collected (A)	115.31	Rs. Lac							
% Revenue return	32.4	%							
Pay Back Period	3.09	Years							

Description of Project	Amount (Cr)
Augmentation of Power Transformers	3.56 Cr.
Total	3.56 Cr.

Cost estimate is provided in the annexure no -9.4.3, 9.4.4

6.3 Augmentation of Distribution Transformer & LT feeders

To cater the increasing load demand, especially with the introduction of schemes like 5T and others DT augmentation 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 so as 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 considered to be "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 so as 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 is proposed for locations, where loading is exceeding the rated value.

In this proposal, TPSODL intends to carry out Distribution Transformer's augmentation for those DTs which are identified as overloaded at various locations. Total 267 nos. of Transformers are proposed for Augmentation / addition of DTs are at different locations as mentioned below.

Benefit

- The proposal will help in Mitigation of overloading DTs. Thus, it will lead into lower interruption and good quality power hence leading to satisfaction of our consumers.
- 2. Reduce over-burdening of existing DTs thereby reducing power cuts.
- 3. Optimization of DTR loading.
- 4. Reduction of technical loss
- 5. Reliability will be improved.
- 6. Reduction of DTR failure which is costly asset.
- 7. Improve the operational efficiency
- Existing DTR freed after augmentation shall be repaired and will be used at other location of DSS for mitigation of DTR after testing and overhauling. This will help in Multiple swapping and thus Cost optimization.

SN	Capex Head	Activity	UOM	Proposed QTY	Total proposed Cost (Cr)
4	Load Growth	Augmentation of DTR - 63 KVA	Nos.	135	7.04
		Augmentation of DTR 100 KVA	Nos.	35	2.05
		Augmentation of DTR- 250 KVA	Nos.	90	9.55
		Augmentation of DTR- 500 KVA	Nos.	7	1.07
	Total				19.70

Summary of DTR Augmentation Proposed in CAPEX FY23

Cost Benefit analysis of DTR:

Name of the Proposal	Cost Benefit analysis of Distribution Transformer Augmentation.				
Particulars of Distribution Transformer					
Existing DT Rating	16590	KVA			
Existing loading of DT	16462	KVA			
Proposed loading of DT after 2 years	18496	KVA			
Rating of proposed new DT	38135	KVA			
Total cost of scheme	1970.41	Rs. Lac			
Annual Revenue Return (A)					
Total units consumed (Load x days x Hrs x load factor)	8008707	(KWH)			
Average Cost of Supply Per Unit (in Rs.)	2.35	Rs.			
Average Sale costper unit (in Rs.)	5.32	Rs.			
Difference. (Sale-purchase) (in Rs.)	2.97	Rs.			
Net Revenue Collected (A)	237.86	Rs. Lac			
% Revenue return	12.1	%			
Pay Back Period	8.28	Years			

Description of Project	Amount (Cr)
Augmentation of Distribution Transformer	19.70 Cr
Total	19.70 Cr

LT AB Cable

The LT AB cable has been proposed for augmentation / addition of LT feeders due to augmentation of distribution transformers. The CAPEX Plan considers the total project cost of Rs. 2.67 Crs. for above 19 CKM lines.

The total cost for augmentation / addition of LT feeders is given below:

Description of Project	Amount (Cr)	
Augmentation of LT feeders	2.67 Cr	
Total	2.67 Cr	

Cost estimate for Distribution transformer and LT feeders is provided in the annexure no -9.4.5, 9.4.6, 9.4.7, 9.4.8, 9.4.9

Summary of CAPEX Requirement for Load Growth

S No.	Capex Head	Activity	Total proposed Cost (Cr)
	Load Growth	New 11 KV line-Link	11.52
4		Augmentation Power Transformer	3.56
4		Augmentation of Distribution Transformer	19.7
		Augmentation / addition of LT ABC	2.67
	Total		37.45



TECHNOLOGY INFRASTRUCTURE

CAPEX DPR FY23

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7. Technology Infrastructure

7.1 Background

Technology commenced its journey in FY 22, the very first year of TPSODL, by initiating large scale computerization & digitalization efforts in the Company. For year 2021-2022, Technology was given Rs 71.12 Cr towards CAPEX by honorable Commission towards six schemes namely building IT Infra, Augmentation of IPDS Licenses, Network Infra, SCADA implementation, GIS implementation and building Smart Metering Infrastructure. The journey of technology adoption, introduction of different technologies which are pillars of any modern Distribution Company like SCADA, GIS, network connectivity etc to leverage its benefits to bring in operations efficiencies and gains through major interventions began last year. The journey will continue to ensure large scale adoption across TPSODL, scale up the pilots which began in FY 2022 and train more and more people to the new initiatives and introduce pathbreaking applications built to take advantage of the new interventions so as to maximize the operational gains and efficiencies which would ultimately help reduce the AT&C levels and enhanced Consumer Experience.

Technology projects has total approved capex of Rs. 71.12 Crores by Hon'ble Commission against FY 22 as given below:

- IT Infrastructure: Rs. 19.26 Crores (The project is expected to be completed in in FY 22)
- Augmentation of IPDS Licenses: Rs. 12.24 Crores (The project is expected to be completed in FY 22)
- Network Infra: Rs. 5.38 Crores (The project is expected to be completed in FY 22)
- SCADA & Automation: Rs. 14.71 Crores (The project is progressing as scheduled. The approved CAPEX amount in FY 22 is towards partial quantity of the complete Project. The work towards approved CAPEX amount in FY 22 is expected to be completed by FY 22)
- GIS Implementation: Rs. 5.46 Crores (The project is progressing as scheduled. The approved CAPEX amount in FY 22 is towards Pilot Project in Berhampur City. The work towards approved CAPEX amount in FY 22 is expected to be completed by FY 22.)
- Smart metering Infrastructure: Rs. 14.07 Crores (The project is expected to be completed by FY 22.)



7.2 Pillars for FY 22

The proposed CAPEX plans for FY 23 revolve around the same themes which were introduced last year. The idea is to scale up, strengthen and build redundancies in the schemes which have commenced operations in FY 22. The Technology CAPEX for FY 23 will have following four pillars:

- Build & Strengthen end user IT infrastructure Availability of end user infrastructure will enable TPSODL employees to effectively use the business critical applications which will result in better service
- Strengthen Network Connectivity across TPSODL- Availability of reliable communication network will facilitate smooth operation of PSS as well as enable TPSODL employees to effectively use the business-critical applications.
- 3. Augmentation of Data Center infrastructure Hardware and Software -Augmentation of Datacenter will facilitate uninterrupted operation of SCADA, AMI and GIS systems which will result in better service
- 4. **IT infrastructure for 50-seater Call Center** A full-fledged call center will enable TPSODL to resolve consumer complaints in a timely manner resulting in better quality of service

The detail proposals are as follows:

7.2.1 Build & Strengthen end user IT infrastructure:

In FY 22, TPSODL procured and distributed IT hardware assets viz laptops, desktops and printers to users across all offices of TPSDOL. In order to improve the communication among offices and to reduce the heavy dependency on mobile communication, TPSODL introduced IP phone connectivity among offices on pilot basis last year. The IP phone technology is the latest fixed line connectivity option rich with features.

There are many officers and locations where the computerization & connectivity has to reach even now. With the roll out of more and more IT solutions, it is imperative that the end users are equipped with necessary IT infrastructure for smoothly performing day to day works.

For maintaining proper attendance records as well as implementation of access control, bio-metric attendance machines (both finger as well as retina scan) need to be installed in all offices across TPSODL.

The proposal for scheme 1 is:

Description of Project	Amount (Cr)
Build & Strengthen end user IT infrastructure	8.05
Total	8.05

Cost estimate is provided in the annexure No- 9.5.1

Benefits

- 1) Build a culture of following online processes and less of paper movement
- 2) Maintain proper attendance record and implementation of access control
- Availability of end user computing devices up to section level for proper use of various IT applications towards more effective and transparent execution of business processes.
- 4) Build a more robust and reliable communication platform based on our own network as an alternate to cell phone communication
- 5) Enable seamless real time communication across TPSODL
- 6) To equip each section office with fully functional, modern infrastructure including reliable communication
- 7) Enhancing the reach of computerization across the organization

7.2.2 Strengthen Network Connectivity across TPSODL

When we commenced the journey in FY 22, very few offices of TPSODL were having reliable network connectivity. In last one year, TPSODL identified around 170 Office locations and co-locations and have ensured IP MPLS connectivity to each of these. This was Phase 1 of the Network Connectivity Drive that was undertaken in FY 22. It involved installing a network rack, router, switch, carrying out LAN cabling throughout the office set up and ultimately connecting the location through MPLS link to the nearest base station of the service provider. Additionally, around 90 PSS were connected on IP-MPLS link in this year. Moreover, in order to build redundancy via a secure and alternate network, all PSS and offices within 50 sq km of Berhampur town area are proposed to be connected via OFC network within FY 22. WiFi connectivity was implemented for all Offices having more than 20 users in FY 22.

In order to further strengthen the network connectivity of PSS which would help build a reliable SCADA system, it is proposed to connect 35 numbers of PSS over IP MPLS connectivity thus taking the total number of PSS to around 135 which would get connected over IP-MPLS link and can be brought on to SCADA.

TPSODL is planning to implement SCADA in all PSS in a phased manner. This will enable TPSODL to operate the Sub-Stations in unmanned mode thereby increasing operational efficiency as well as reduce manpower cost. For successful implementation of the same, reliable redundant communication is necessary. OFC is planned for providing primary connectivity in the PSS with MPLS being the backup connectivity option.

Additionally, due to difficult geographical terrain, many of the PSS locations have been marked as technically not feasible by the established MPLS service providers. For the 100 numbers of PSS covered in the first phase of SCADA execution, 25% of the locations have been found to be technically not feasible by the service provider. Hence, for such locations, OFC is the only option for connectivity.

TPSODL is in discussion with OPTCL regarding leasing OFC from BHARATNET for its PSS in the project are. It is understood that BHARATNET OFC is established up to Gram Panchayet level. In order to connect our PSS from the Gram Panchayets, on an average 3 Km of OFC is estimated to be laid per PSS by TPSODL. The proposal for the same is included in this DPR against 50 numbers of PSS for FY 22.

For all new office buildings/extension of office buildings coming up in FY 23, necessary extension of LAN connectivity and new MPLS connectivity, if required, shall also be planned.

For extending Wi-Fi connectivity to remaining offices, it is proposed to bring all sections under Wi-Fi connectivity in FY 23 which will help SBM and collection app users to sync in/sync out their data effectively on daily basis which would help MIS generation as well as stringent monitoring of these users.

The proposal for scheme 2 is as follows

Description of Project	Amount (Cr)
Strengthen Network Connectivity across TPSODL	7.97
Total	7.97

Cost estimate is provided in the annexure No- 9.5.2, 9.5.3, 9.5.4

Benefits: -

- OFC and IP-MPLS connectivity in PSS and offices will create a reliable redundant network which can be used for SCADA enablement of PSS as well as critical IT applications across TPSODL.
- 2) The majority of consumers under TPSODL are being billed via SBM app. Additionally, Sangrah collection app is used for door to door revenue collection from consumers. Both these vital apps require daily sync in/sync out activities over the internet. WiFi connectivity at section level will enable users of the above apps to sync in/sync out effectively without being dependent upon mobile service providers.

7.2.3 Augmentation of Data Center infrastructure

Augmentation of Data Center infrastructure is required in order to cater to extended GIS and AMI implementation, compliance to cyber security guidelines as well as hosting of additional IT applications. OT Data Center at Berhampur has been commissioned in FY 22 which will host GIS and AMI solutions. For catering to second phase of GIS implementation to be undertaken in FY 23, the OT Data Center infra shall have to be suitably augmented. In case of extension of smart metering landscape in TPSODL, further augmentation of OT Data Center infrastructure will be required.

MBC and ERP solutions of all utilities of Odisha are hosted at IPDS Datacenter at Bhubaneswar. All other IT applications (in addition to MBC and ERP solutions) of all four utilities of Odisha (TPCODL, TPNODL, TPWODL and TPSODL) are planned to be hosted from the same IPDS Data Center at Bhubaneswar. Consequently, TPSODL shall have to procure necessary IT infrastructure in FY 23, required for hosting its applications in the IPDS data center, as mentioned above.

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 procured in the OT Data Center as well as the IPDS Data Center in FY 23.

For FY 23, CIS licenses shall have to be procured from M/s Fluentgrid for running the application. Microsoft OS licenses shall have to be procured for additional laptops and desktops proposed for FY 23. Database License is proposed to be procured for additional IT applications in FY 23.

In order to attain the objective of a paperless office, it is proposed to implement eoffice application in all offices of TPSODL. This will ensure proper maintenance of records and audit trail as well as reduced turnaround time in respect of day-to-day official works.

The proposal for scheme 3 is as follows:

Description of Project		
Augmentation of Data Center infrastructure – Hardware and Software		
Total	15.55	

Cost estimate is provided in the annexure No- 9.5.5, 9.5.6, 9.5.7, 9.5.8

Benefits: -

- Augmentation of OT Datacenter infrastructure will enable extension of GIS and AMI landscape leading to better asset and outage management as well as reduction of AT&C loss respectively.
- 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.
- Compliance of cyber security guidelines published by MoP will ensure safety of IT/OT applications and data.
- 4) CIS application shall be used for MBC activities of entire TPSODL. CIS ensures digitization of the entire MBC process leading to accuracy and transparency.

- 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.
- 6) Database licenses shall be required for various bespoke IT applications which will increase productivity and transparency in various business processes.
- 7) E-Office application will ensure proper maintenance of records and audit trail as well as reduced turnaround time in respect of day-to-day official works.

7.2.4 IT infrastructure for 50-seater call center

Under IPDS, a 6 (six) seater call center was set up for TPSODL at Berhampur. However, in order to effectively cater to the entire consumer base of TPSODL, the existing 6-seater call center shall have to be extended. Necessary IT infrastructure shall have to be arranged in FY 23 for the extension as mentioned above.

The items mentioned in this proposal are capital assets and hence the same has been considered under CAPEX. The same approach is being followed by Tata Power in other discoms like Tata Power Delhi Distribution Limited and Tata Power Mumbai.

The proposal for scheme 4 is as follows:

Description of Project	Amount (Cr)
IT Infrastructure for 50-seater Call Center	1.7
Total	1.7

Cost estimate is provided in the annexure No- 9.5.9

Benefits: -

- 1) Ensure customer satisfaction by reducing hold time at call center
- 2) Increased manpower shall help in quick resolution of complaints/grievances in an effective manner

CAPEX Requirement for Technology Infrastructure

SN	Capex Head	Activity	Total Cost (Cr)
		Build & Strengthen end user IT infrastructure	8.05
5	Toobhology	Strengthen Network Connectivity across TPSODL	7.97
5	Infrastructure	Augmentation of Data Center infrastructure	15.55
		IT infrastructure for 50-seater Call Center.	1.70
		Total	33.27



CIVIL INFRASTRUCTURE & ADMINISTRATION

CAPEX DPR FY23

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8. Civil Infrastructure & Administration

TPSODL currently have offices in all the six circles, divisions, subdivisions & section office spread across 48751 Sq. Km area of TPSODL. Some of them are owned and others are on rented property. The condition of most of the existing civil structures is bad due to aging and requires immediate attention to strengthen its life. Few of the offices are strengthened as part of FY 22 budget and as a continuing endeavor towards providing safe, hygienic & reasonably good working environment with appropriate ventilation to staff, the proposed expenditure is a necessity.

TPSODL 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 TPSODL employees and all consumer visiting TPSODL offices for one or the other work. Many of the office buildings are very old and need urgent strengthening to avoid mishap.

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. In view of more people joining the office, it is becoming difficult to accommodate the extra manpower in the same arrangement.

8.1 Infrastructure for Customer Care Center

TPSODL is committed to provide the best services to its customers. Providing reliable power supply to its customers is the top most objectives of the company, the customer complaints must also be attended promptly. Therefore, there is need for creating the Customer Care Centers at strategic locations of Division, which are convenient for the customers to visit personally and get resolution of their grievances viz. new connections, bill payments, bill corrections and other unique services.

Further, the existing Customer interaction points, under operation at Customer Care Centre / Divisions / Sub-divisions / Sections, lack the basic amenities and require renovation or revamping to make it convenient for customers. Considering the vast geography and diversified consumer segments, existing Call Centre and Customer Care Centers are required to be revamped to improve the customer experience.

In CAPEX proposal for FY-23, we have proposed Customer Care Centers at four locations of Circle - City, Berhampur, Aska and Jeypore.

Benefit

Quick resolution of customer grievances viz. new connections, bill payments, bill corrections and other unique services.

Description of Projects	Amount (Cr)
Infrastructure for Customer Care Centre	2.50 Cr.
Total	2.50 Cr.

8.2 Infrastructure for store and offices

In this geographical area & tropical climate the growth of vegetation is very high which involves repetitive maintenance and also obstructs routine functional operations. The drainage system for storm water as well as in general weather does not exist or the existing drainage system is not adequate meeting the requirement. As a continuing endeavor towards environment and providing safe, hygienic work place, Paving & drains as per necessity are required.

With increasing staff, need realization for replenishing of the old furniture and bringing in uniformity / standardization across all offices new furniture is required to be installed in offices.

Benefit

Providing safe, hygienic work place for its employees.

Closed shed with hard top base and storage racks at CSD Berhampur

Need for the Close Shed

Central Stores Division Berhampur is the key nodal hub for receiving material from all vendors across the country. The material received is classified both as outdoor and indoor material.

Currently, the indoor material is forced to be kept outdoor due to unavailability of adequate closed sheds. The material like meters, meter boxes etc. are very important materials which are supposed to be stored in the close shed but are stocked in open yard due to unavailability of the close sheds. Due to rain and

uneven ground, these materials are degraded and even rusted thereby resulting in loss of usable service life which is a financial loss to the company.

STATEMENT OF CASE

- Central Stores Division is the main operating store hub for stocking of all major material utilized for O&M, CAPEX and Administrative functions of TPSODL. A large number of such material needs to be mandatorily stored under roof as it is Indoor and gets spoiled and degraded if stored in open.
- 2. At present, all the limited indoor shed space at CSD Berhampur is fully utilized by stocking material like Metering units, VCBs, meters etc.
- All the material reaching CSD Berhampur is being stacked within the store boundary utilizing the very limited closed shed space. Currently this space is exhausted.
- 4. There is a very limited shed space available for storing indoor materials like Metering units, meters, meter boxes, VCBs, relays and distribution transformers. As mentioned above that the existing closed shed space is fully occupied, there is no option but to stack all indoor material in the open.
- 5. The heavy rainfall in monsoons degrades the life cycle of Indoor material which are being forced to be stacked in the open. This also has its resultant implications on financial expenditure and the performance of the equipment. The business associates supplying these materials, may take excuse of the improper handling of the equipment in case of warranty matters.
- For CAPEX FY- 23, it is proposed to construct a closed shed of 5000 sq.ft size with hard top base and storage racks in CSD Berhampur to preserve the life cycle of all Indoor material as well as ensure no material is damaged due to rain.

Roads Inside Store

Introduction

TPSODL has five operational store locations which receive and issue material on a daily basis. The existing mobility within the all the stores is severed hampered due to non-availability of roads. Muddy tracks exist for movement of Trucks, Cranes, Fork Lifts and light vehicles.

Statement of the Case

- 1. The monsoon season in Odisha is prolonged and intense. The season is also interspersed with regular cyclones which bring immense rainfall.
- 2. The muddy tracks existing in all five store locations currently develop large and deep potholes which make the mobility of all mechanical transport as well as movement of the workforce dangerous due to the slippery contact surface.
- 3. The deep potholes are filled with mud and sand but these are temporary stopgap solutions as the next bout of heavy rain washes off the filling earthwork.
- 4. The situation becomes worse during cyclones. There have been instances when the transport vehicles including material laden trucks and cranes are unable to enter the store and material has to be unloaded outside the store. This practice is counter-productive and increases the work load. Moreover, the material safety and security are also compromised.

Conclusion

The mobility of mechanical transport and workforce inside store for loading and unloading and stocking of material is essential for daily operations. The present scenario in all five stores of TPSODL does not address this basic requirement as only muddy tracks exist. These tracks form deep potholes and slippery surface during heavy rains and Cyclones. It is therefore essential that metallic hard-top roads be made in all stores.

HARD TOP BAY AREA IN ALL STORES OF TPSODL

INTRODUCTION

TPSODL has five stores located at Berhampur, Bhanjanagar, Jeypore, Rayagada and Phulbani which are the key nodal hubs for receiving material from all vendors across the country and issuing the same to the field for carrying out Maintenance and Project activities. The material received is classified both as outdoor and indoor material.

Currently, the outdoor material is being stored and stacked on the uneven ground available in stores. The material like Transformers, VCBs, Metering Units etc. are stocked on uneven ground. Due to rain and uneven ground, there is severe water logging and these materials are degraded and even rusted thereby resulting in loss of usable service life of the equipment which is a financial loss to the company.

Statement of the Case

- The Stores department function as the main operating store hubs for stocking of all major material utilized for O&M, CAPEX and Administrative functions of TPSODL beside materials for other government schemes. A large number of materials are stored in open area.
- At present, the outdoor materials are stored on uneven ground. This space is uneven and soft thereby causing the material to sink in at places. In addition, there is severe water logging due to which loading, unloading and stacking of material becomes very challenging.
- 3. All the materials reaching CSD Berhampur are being stacked within the store boundary utilizing the very limited open spaces.
- 4. The heavy rainfall in monsoons degrades the life cycle of outdoor material which are affected by the uneven ground and water logging. This also has its resultant implications on financial expenditure as most of the materials are very expensive. The business associates supplying these materials, may take excuse of the improper handling of the equipment in case of warranty matters.
- 5. For CAPEX FY-23, it is proposed to construct a hard top bay open space with adequate drainage with a cumulative total of approx. 10000 sq.ft size in all five

store locations to preserve the life cycle of all outdoor material as well as ensure no material is damaged due to rain.

In order to monitor the effective implementation of the various initiatives, undertaken by the management, for providing efficient services to our esteemed customers, the senior management and other team members, from different departments, are expected to visit the various districts and ensure close coordination with the field teams and provide required support. Considering the area spread across the districts and distance to be travelled by the concerned staff to reach out to remote location in TPSODL it may be prudent to have own rest houses at strategic locations which will be onetime expenses for developing the facility but would optimize on repetitive expenses on staff accommodation in hired facilities during their visits to various sites. Hence there is requirement of developing rest houses at few strategic locations of TPSODL for improving operational efficiency and cost optimization. In CAPEX proposal for FY-23, the rest house have been proposed at Jeypore, Bhanjanagar and Rayagada Circle

Summary of Estimated cost for Infrastructure for store and offices:

Description of Project	Estimated Cost (Cr.)
Infrastructure for renovation of offices	5.75
Infrastructure for store	5.03
Total	10.78

Cost estimate is provided in the annexure no - 9.6.1, 9.6.2, 9.6.3

8.3 Security Surveillance System and Employee Welfare

Security Surveillance System will help in surveillance in sensitive area to keep check upon theft and monitor unauthorized access. This will avoid chances of vandalism and enable to keep camera footage for evidence which can be helpful in claiming insurance in case of any theft or damage.

In TPSODL, 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 TPSODL using current buildings and

infrastructure is to accommodate more employees and providing a hygienic, wellventilated environment to them. In order 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 work place. TPSODL also initiated to adopt 5S culture at work location.

Provision of Drinking water at Division / sub-division/ section offices:

Making availability of the potable water for the staff is very essential to meet the one of the major requirements of basic amenities. Water Coolers, Dispensers and ROs are to be provided at each of the office locations. Some of the locations, at present, don't have the adequate water facility, hence there is immense need of making appropriate arrangements to make availability of potable water facility at all TPSODL offices.

Development of Training Center and Record room:

Many of the current office locations are occupied with old files and occupy a lot of working space. Moreover, the above documents create a shortage of sitting space for new staff. The record rooms are required for keeping erstwhile record kept in Almirahs so that existing space will be free and therefore seating space can be created for employees.

To enhance the competency of employee, training is necessary to enhance the capability of the workforce thereby increasing their efficiency in working. Hence development of Training Center is required.

LED video Wall Display for Customer Initiative:

TPSODL want to increase reach amongst TPSODL customers by displaying various initiatives already rolled out & planned to be rolled out. We can always release those initiatives at any point of time without any hinderance/delay for benefit of customer.

These initiatives are communication related to safety awareness, digitalization, DSM programs, Energy conservation & various other programs rolled out by Govt. of India & Odisha time to time. Considering this platform would provide a wider coverage with all-time availability & control.

Summary of Estimated Cost- Security Surveillance System and Employee Welfare					
SI No	Particulars	Unit	Qty.	Total cost (Cr.)	
4	Water facility through borewell (at Division / Sub-division/ Section offices)	No.	20	4.05	
I	Commercial RO	No.	100	1.05	
	Water coolers / dispenser	No.	150		
2	DG sets	No.	1	0.27	
2	Invertor & Batteries	No.	10	0.27	
3	Development of Training center and Record Room at TPSODL office locations	No.	1	1	
4	LED video Wall (7'.5" X5') at TPSODL	No.	10	1.88	
5	High Mast	No.	5	0.25	
6	Security system in stores by camera surveillance system	Location No.	2	0.31	
7	Air Conditioning system for Offices at different locations.	Nos.	50	0.2	
TOTAL					

Description of Project	Amount (Cr)
Security Surveillance System and Employee Welfare	5.76 Cr
Total	5.76 Cr

Capex for Civil Infrastructure & Administration

Summary of the total estimated proposals under CAPEX

Summary of Estimated Cost- Civil Infrastructure & Administration						
SI No	Capex Head	ipex Head Activity				
	Civil	Infrastructure for Customer Center (CRC)	2.50			
6	Infrastructure & Administration	Infrastructure for store and offices	10.78			
		Security Surveillance System and Employee Welfare	5.76			
	19.04					

9. Annexures

9.1 Annexures-Safety & Statutory

Cost Estimate – Safety & Statutory

9.1.1 Total estimated cost – Provision of Safety Equipment for workforce

SN	CAPEX Proposed	Item Description	Unit	Unit Qty.	Unit rate	Total Amount
	-				(In Rs)	(In Rs)
1		Ladder Fiber Glass-2 Fold 9 Mtr Length	NOS	100	11000	1100000
2		Ladder Fiber Glass-3 Fold 12 Mtr Length	INOS	100	14000	1400000
3		Electrical LOTO KIT for operation field staff	Set	320	1299	415680
4		Rubber mat 33KV 3mm Thick	NOS	500	3320	1660000
5		Iraffic Cone HDPE with reflective	Nos	300	798	239400
6	Provision of	Road barrier HDPE with reflective	Nos	300	3650	1095000
7	Sarety Gadgets/	Discharge Rod for 11-33-66 KV	Nos	1500	9500	14250000
8	Equipment &	industrial Neon Tester 11-33-66 KV	Nos	570	12003	6841710
9	Tools for	Shorting Clamp for safety zone creation	Nos	320	500	160000
10	employees	Retractable fall arrester SS-10Mtr Lanyard	Nos	30	23065	691950
11		Lux Meter	Nos	20	3099	61980
12		ELCB Testing Kit	Nos	52	25098	1305096
13		Arc Flash suit	Nos	19	47876	909644
14		Foldable Stretcher	Nos	350	7650	2677500
15		Multipurpose Rescue Kit	Nos	7	102387	716709
16		Porta Cabin with amenities for practice yard	Nos	16	590850	9453600
17	Safety	Audio System	Nos	7	7000	49000
18	Building /	Projector with Screen & Stand	Set	20	49000	980000
19	Training	Battery operated public addressing system	Nos	25	4500	112500
20	and Public Awareness	Digital Mobile Van	Nos	1	3300001	3300001
21	Drive	Surakhya Sambad falak (Notice Board)	Nos	350	5987	2095450
22		Mani queen for safety display	Nos	23	8850	203550
23		Emergency siren with hooter	Nos	10	2000	20000
24		Fire Extinguisher DCP 50 Kg	Nos	50	14799	739950
25		Fire Extinguisher ABC 6Kg	Nos	320	1959	626880
26		Fire Extinguisher CO2 4.5Kg	Nos	320	5798	1855360
27	Fire Detection	Fire Extinguisher CO2 9Kg	Nos	320	6754	2161280
28	and Protection	Fire Extinguisher Mechanical Foam 9Ltr	Nos	320	1340	428800
29	Management	Fire Extinguisher Mechanical Foam 50Ltr	Nos	30	6987	209610
30		Fire Detection and Alarm System for offices, stores and control rooms	Nos	300	5050	1515000
31		Fire Bucket	Nos	600	350	210000
32		Fire Bucket Stand with canopy	Nos	300	3454	1036200
33		Multi Gas detector	Nos	7	65000	455000
		Total				58976850

S No	Item Description	Unit	Total Qty	Unit Rate (INR)	Total Amount (INR)
1	DIGITAL INSULATION TESTER 0.5KV/1.0KV/2.5KV/5KV	EA	3	34,229	102687.03
2	DIGITAL EARTH TESTER	EA	3	8,968	26904
3	CONTACT RESISTANCE METER (CRM)	EA	6	3,50,000	2100000
4	TRANSFORMER RATIO METER	EA	6	4,96,485	2978910
5	DIGITAL MULTIMETER AC/DC 40mA to 20A	EA	6	10,266	61596
6	THREE PHASE SECONDARY CURRENT INJECTION WITH TIMER WITH CABLE ACCESSORIES AND SOFTWARE(Advance differential harmonic restraint and advance differential operating characteristics) including transportation case	EA	3	27,00,000	8100000
7	TOOL KIT HD COMPLETE WITH CANVAS BAG	EA	12	20,000	240000
8	Breaker Timer	EA	9	11,21,000	10089000
9	Tong Tester AC/DC 1000A	EA	10	29,500	295000
10	mA Tester 200mA (Leakage Tester AC)	EA	10	31,860	318600
11	DD Fuse OPERATING ROD	EA	187	4,720.00	882640
12	Smart Tool (Spanner, Crimper)	EA	2	3,540	7080
13	Infrared Camera	EA	50	75,000	3750000
14	DRILL M/C HAMMER BATTERY OPERATED CRH	EA	20	48,380	967600
15	DRILLING MACHINE	EA	27	5,000	135000
16	CT ANALYZER	EA	4	7,31,500	2926000
17	CABLE CUTTER MECHANICAL TYPE	EA	6	48,461	290766
18	OIL MOISTURE TESTER	EA	1	3,50,000	350000
19	CLAMP ON EARTH RESISTANCE TESTER	EA	19	2,500	47500
20	TRANSF.WINDING RESISTANCE METER	EA	12	3,83,500	4602000
21	PRIMARY INJECTION TEST SET 0-2000A	EA	12	7,37,500	8850000
22	CRIMPING TOOL HAND OPERATED 50-400 SQMM	EA	10	1,30,560	1305599.2
23	CHART SHOCK TREATMENT LAMINATED	EA	150	54	8142
24	Respirator	EA	10	41	407.8
25	OIL PUMP HAND OPERATED	EA	7	1,699	11894.4
26	ULTRASONIC INSPECTION KIT	EA	6	12,00,000	7200000
27	BATTERY OPERATED TREE PRUNER	EA	19	35,000	665000
28	PORTABLE DGA ANALYSER KIT FOR T/R OIL	EA	2	30,00,000	6000000
29	RATCHET SPANNER SET SIZE 6MM TO 32MM	EA	140	2,655	371700
30	CROCODILE CLAMP FOR O/H LINE L-10 MTR	ST	930	4,472	4159146
31	TORQUE WRENCH INSULATED 20 Nm	EA	155	1,735	268863
32	CABLE SPIKING TOOL HYDRAULIC	EA	3	2,77,300	831900
33	BOX SPANNER SET IN INCH	ST	155	1,416	219480
34	TAN DELTA	EA	2	22,00,000	4400000
35	CRIMPING TOOL PLIER CAP 10-185 SQMM	EA	60	11,000	660000
36	TREE PRUNER TELESCOPIC	EA	51	1,045	53295

9.1.2 Total Cost Estimate for Electrical Testing Equipment

S No	Item Description	Unit	Total Qty	Unit Rate (INR)	Total Amount (INR)
37	TORQUE WRENCH SIZE 14 - 68 NM	EA	60	5,753	345150
38	HI-POT TEST SET AC/DC 0-40 KV AC 50 mA.	EA	14	57,200	800800
39	DIGITAL MULTIMETER	EA	40	5,000	200000
40	Oil filter machine	EA	2	6,00,000	1200000
41	GROUNDING SET FOR O/H LINE PORTABLE	EA	6	38,645	231870
42	Oil sample collection bottle for DGA	EA	200	800	160000
43	Power Tools - Battery Operated for tightening and loosing of the nut/bolts	EA	51	3,000	153000
44	Power Tools battery operated for Drilling purpose	EA	51	3,000	153000
45	HT-CTPT testing equipment	EA	6	10,00,000	6000000
46	TRMS Value Measuring Multi meter with high Accuracy and High Insulation Class	EA	38	14,000	532000
47	TRMS Value Measuring Clamp on Meter With high Accuracy and High Insulation Class	EA	38	3,840	145920
48	CMRI with Bluetooth, Memory 500 MB	EA	51	50,000	2550000
49	IR+PI Value Measurement in Step of 500V to 5KV (Megger)	EA	10	14,000	140000
50	Accucheck single phase	EA	51	40,000	2040000
51	Accucheck three phase	ΕA	20	1,00,000	2000000
52	Clamp-on meter/ Tong Tester	EA	25	1,000	25000
	Total (with GST)				89953450

9.1.3 Unit cost estimate for Cradle guard at major road crossings

SI No	Description of Materials	Unit	Qty	Unit Rate (in Rs.)	Amount (in Rs.)
1	Guarding cross arm of 100x50x6mm MS Channel 2.21mtr long 2Nos @9.2Kg/mtr (With Galvanization)	Kg	41	75	3,050
2	Back clamp for guarding cross arm	No	2	80	160
3	HT Stay set Complete	Set	2	1050	2,100
4	7/10 SWG GI Stay Wire (0.455Kg/mtr)	Kg	20	75	1,500
5	HT Stay clamp	pair	2	125	250
6	HT Stay Insulator	No	4	50	200
7	GI Nuts, Bolts & washers	Kg	2	78	156
8	40mmDdia GI pipe earthing device 3.0mtr long	No	2	1050	2,100
9	Materials for Masonry work for Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2"x2") and RCC slab cover	LS	2	1600	3,200
10	WPB 160x152 (13Mtr. Long, 30.44KG/Mtr.)	Nos.	1	30443.22	30,443
11	GI Base Plate (500x500x10mm) (20kg)	EA	1	1500	1,500
12	Eyehook	No	8	60	480
13	No. 6 GI wire ((2x72.1mtr) Guard wire+ (2x10mtr long earth wire)) (0.146Kg/mtr)	Kg	24	75	1,798
14	No. 8 GI wire (37x2.55mtr long) cross lacing (0.103Kg/mtr)	Kg	10	75	729
15	Danger Plate	EA	2	80	160
16	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	Kg	1	75	45

SI No	Description of Materials	Unit	Qty	Unit Rate (in Rs.)	Amount (in Rs.)	
17	GI barbed wire anticlimbing device 3 Kg. Per support	KG	3	80	240	
18	Sundries	Ls	1	500	500	
	Total cost of the material				48,611	
	Stock, storage and insurance @ 3% of A:				1,458	
	Subtotal-C = (A+B)				50,069	
	T & P charges @ 2% of C				1,001	
	Contingency charges @ 3% of C				1,502	
	Transportation charges @ 7.5 % of C				3,755	
	Erection Charges @ 5% of RS Joist				1,568	
	Erection Charges @ 20% of PSC Pole				· · · ·	
	Erection Charges @ 10% of other items except RS.				1,871	
	Erection Charges Sub Total:				3,439	
	Cement concreting for stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= 0.45Mtrx0.45Mtrx1.5Mtr= 0.3Cum	No	2	1270	2,540	
	Cement concreting for support with C.C. 1:3:6 by using 4cm size hard granite metal= (0.45Mx0.45Mtrx1.5) <u>M3=0.3cum@4158</u> .84=@4158.84 =0.3037xRs.4185.84=Rs.1263.03 or Rs.1270.00(Including HT and LT)	No	1	1270	1,270	
	Sub-Total H(C+D+E+F+G)				63,577	
	Over Head charges/Departmental including Supervi	sion Ch	arges	@ 6% of H	3,815	
	Total Estimated Cost i.e. J=(H+I)				67,392	
	GST 18%				12,131	
	CESS 1%				673.92	
	Total of Estimate(K+L+M)				80196.1	
	Inspection Fee					
	Drawing Approval					
	Grand Total					
	Escalation of 2 years with 12.36% of grand Total				90,558	
	Total (In Crores)				0.009	

9.1.4 Fencing of Distribution Substations (DSS)

Unit Cost Estimate for DSS Fencing

S. No.	Brief Item Description	QTY	Unit	Unit Rate (INR)	Total Amount (INR)
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 meters as directed for a depth from 0.0 to 1.5 meters	408	МЗ	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	М3	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	51	M3	6000	306000

S. No.	Brief Item Description	QTY	Unit	Unit Rate (INR)	Total Amount (INR)
	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, steel scaffolding wherever required etc. complete. (Min cement content 300 Kg/m3)				
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 down graded 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
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 166 approx.166 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	М	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	2.785	MT	75000	208875

S. No.	Brief Item Description	QTY	Unit	Unit Rate	Total Amount
	complete as directed by using High yield strength deformed			(INK)	(INK)
	bars conforming to IS 1786 - HYSD Bars				
10	Providing cartage service and transporting, excavated soil, debris, bricks, concrete, scrap wood 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 dismantled qty. (Voids to be deducted as applicable whenever heap / truck measurements are taken))	325	МЗ	450	146250
11	Providing , stretching and fixing Galvanized 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 thick. 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%	1580447.79
	Grand Total including GST			1705	10360713.3
	Costfor Lotal RM(Running Meter)			1700	10360713.3
	Cost Per RM offencing				6094.54
	Costion One unitor SW X4W Fencing				109701.67
				Rs.	0.0115

9.1.5 Unit Cost Estimate for Boundary wall for PSS and other vital locations

S no	Item Description	Unit	Qty	Unit Rate (in Rs)	Total Amount (in Rs)
1	Excavation	Cum	34	235	7990
2	PCCM-10	Cum	2	6300	12600
3	RCC Raft M-25	Cum	3.5	7800	27300
4	RCC Column M-25	Cum	2.5	8000	20000
5	RCC For Beam M-25	Cum	1.5	8000	12000
6	Brick Masonry 1:5	Cum	6	6500	39000
7	External Plaster in CM 1:4	Sqm	70	450	31500

S no	Item Description	Unit	Qty	Unit Rate (in Rs)	Total Amount (in Rs)
8	Structural Steel	MT	0.2	89890	17978
9	Barb wire	Rm	60	30	1800
10	Concertina Coil	Rm	20	475	9500
11	Reinforced Steel	MT	0.8	75000	60000
12	Painting with Cement based paint	Sqm	70	160	11200
	Total Amount for 18 M				250868
	Add GST			18%	45156.24
	Total cost Incl GST				296024.2
	Rate for 1 M (in Rs.)				16445.79
	Rate for 1 M (in Crore)				0.0016

Total Estimated Cost Summary of Cradle guard, DSS Fencing & PSS Boundary Wall

Activity	Unit Cost (In Rs)	UOM	Proposed QTY	Total proposed Cost (Cr.)		
Cradle guard at major road crossings, Populated area, School area	90,558	Location Nos.	750	6.79		
Fencing of Distribution substations (DSS)	115,187	Nos.	900	10.37		
Boundary wall for PSS and Other vital locations	16,446	RM	3000	4.93		
Total						

Unsafe to safe location

9.1.6 Estimated cost - Intermediate poles for vulnerable location (33 KV Line)

S No.	Item Description	Qty.	Unit	Unit Rate (In Rs)	Amount (In Rs.)
1	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.)	300	Nos.	25,824	7747119
2	WPB 160x152 (13Mtr. Long, 30.44KG/Mtr.)	208	Nos.	30,443	6332190
3	33KV pin insulatorpolymer	1524	EA	480	731520
4	F Clamp	508	Nos.	300	152400
5	BOLT & NUT GI 16MMX75M HEX	508	KG	78	39624
6	Coil type earthing	508	EA	166	84328
7	PIPE HDPE SIZE 25 MM	1524	М	28	42672
8	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	1016	EA	36	36576
9	WASHER MS SIZE 16MM DIA	508	KG	78	39624
10	WIRE GI 8 SWG for earthing	508	KG	75	38100
11	BOARD DANGER	508	EA	80	40640
12	ANTICLIMBING DEVICE	508	EA	416	211226
13	GI BASE PLATE SIZE 500x500x10MM	508	EA	1500	762000
14	V CROSS ARM(22Kg for Each)(With Galvanization) for 33 KV	508	EA	1800	914400
15	Back Clamp for V cross arm(33KV)	508	EA	150	76200
Α	Total cost of the material				17248619
В	Stock, storage and insurance @ 3% of A:				517459
С	Subtotal-C = $(A+B)$				17766078
D	T & P charges @ 2% of C				
E	Contingency charges @ 3% of C				
F	Transportation charges @ 7.5 % of C				1332456
	Erection Charges @ 5% of RS Joist & WPB pole				725084

S No.	Item Description	Qty.	Unit	Unit Rate (In Rs)	Amount (In Rs.)
	Erection Charges @ 20% of PSC Pole				
	Erection Charges @ 10% of other items except RSJ				326439
G	Erection Charges Sub Total:				1051523
	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	508 127		1270.00	645160
Н	Sub-Total H(C+D+E+F+G)				21038361
I	Over Head charges/Departmental including Supervision Cl	narges @	0% of ⊳	1	1262302
J	Total Estimated Cost i.e. J=(H+I)				22300663
K	GST 18%				4014119
L	CESS 1%				223007
	Total of Estimate(J+K+L)				26537789
	InspectionFee				200
	Drawing Approval				200
	Grand Total				26538189
	Escalation of 2 years with 12.36% of grand Total				29818309
	Total (In Crores)				2.98

9.1.7 Estimated cost - Intermediate poles for vulnerable location (11 KV Line)

S N o	Item Description	Qty.	Uni t	Unit Rate (In Rs)	Amount (In Rs.)
1	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.)	550	Nos	25824	14,203,052
2	300Kg PSC pole9 Mtr long	600	EA	3000	1,800,000
3	11KV pin insulatorpolymer	3450	EA	200	690000
4	F Clamp	1150	Nos	240	276,000
5	BOLT & NUT GI 16MMX75M HEX	1150	KG	78	89700
6	Coil type earthing	1150	EA	166	190900
7	PIPE HDPE SIZE 25 MM	3450	М	28	96600
8	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	2300	EA	36	82800
9	WASHER SIZE 16MM DIA	1150	KG	78	89700
10	WIRE GI 8 SWG for earthing	5	KG	75	375
11	BOARD DANGER	1150	EA	80	92000
12	ANTICLIMBING DEVICE	1150	EA	416	478170
13	GI BASE PLATE	550	EA	1500	825000
14	RCC BASE PLATE	600	EA	230	138,000
15	V CROSS ARM(10.2Kg for Each)(With Galvanization)	1150	EA	912	1048800
16	Back Clamp for V cross arm(11KV)	1150	EA	80	92000
Α	Total cost of the material	-			20193097.00
В	Stock, storage and insurance @ 3% of A:				605792.91
С	Subtotal-C = $(A+B)$				20798889.91
D	T & P charges @ 2% of C				415977.80
Е	Contingency charges @ 3% of C				623966.70
F	Transportation charges @ 7.5 % of C				1559916.74
	Erection Charges @ 5% of RS Joist & WPB pole				731457.15
	Erection Charges @ 20% of PSC Pole				370800.00
	Erection Charges @ 10% of other items except RSJ				431574.69
G	Erection Charges Sub Total:				1533831.84
	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=@415 8.84 =0.3037xRs.4185.84=Rs.1263.03 or	1150	No	1270.00	1460500.00
	Rs.1270.00(Including HT and LT)				
Н	Sub-Total H(C+D+E+F+G)				26393082.99
	Over Head charges/Departmental including Supervi	sion Char	ges @ 6	<u>% of H</u>	1583584.98

S N o	Item Description	Qty.	Uni t	Unit Rate (In Rs)	Amount (In Rs.)		
J	Total Estimated Cost i.e. J=(H+I)				27976667.97		
Κ	GST 18%						
L	CESS 1%						
	Total of Estimate(J+K+L)				33292234.88		
	Inspection Fee				200		
	Drawing Approval				200		
	Grand Total				33292634.88		
	Escalation of 2 years with 12.36% of grand Total						
	Total (In Crores)				3.74		

Total Estimated Cost Summary of Cradle guard, DSS Fencing & PSS Boundary Wall

Activity	Unit Cost (In Rs)	UOM	Proposed QTY	Total proposed Cost (Cr)			
Cradle guard at major road crossings, Populated area, School area	90,558	Location Nos.	750	6.79			
Fencing of Distribution substations (DSS)	115,187	Nos.	900	10.37			
Boundary wall for PSS and Other vital locations	16,446	RM	3000	4.93			
Total							

9.2 Annexures-Loss Reduction

Cost Estimate - Loss Reduction

9.2.1 (A) Unit BOQ for Augmentation of 33kV OH Line with 148 sq.mm AAAC

S No.	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)
1	148 sqmm All Alloy Aluminium Conductor AAAC	3050	М	82	250100
2	WPB 160x152 (13Mtr. Long, 30.44KG/Mtr.) (Guarding pole)	4	Nos.	30443	121773
3	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.) (intermediatepole)	6	Nos.	25824	154942
4	GI BASE PLATE SIZE 500x500x10MM	10	EA	1500	15000
5	33 KV V Cross Arm	5	EA	1800	9000
6	Back Clamp for V cross arm(33 KV)	5	EA	150	750
7	33 KV Pin Insulator Polymer	30	Nos.	480	14400
8	F Clamp for 33 KV Pin Insulator	10	Nos.	300	3000
9	100x50x6 mm M.S Channel (9.2 Kg. / Mtr) with Galvanization	138	KG	75	10350
10	Fish Plate (0.97/piece)	19	KG	75	1455
11	PG Clamp148 sqmm All Alloy Aluminium Conductor AAAC	30	Nos.	620	18600
12	Disc Insulator(B&S) 120 KN Polymer	30	EA	1150	34500
13	HW FITTING (B&S) 90KN 4 BOLT	30	EA	500	15000
14	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long (At Guarding Pole)	4	Nos.	1050	4200
15	Coil Type Earthing	10	Nos.	166	1660
16	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	20	EA	36	720
17	8 SWG GI Wire for earthing (1.31 Kg/Pole) for earthing	13	KG	75	983
18	Concreting of support C.C. 1:3:6, using 40mm HBG metal=0.45Mtrx0.45Mtrx1.5Mtr= 0.3037Cum. @4158.84=0.3037x4158.84=1263.03 or 1270.00	10	Nos.	1270	12700
19	Couping with C.C. 1:3:6 by using 12mm size hard broken granite chips=0.3Mtrx0.3Mtrx0.45Mtr =0.0405Cum @ Rs.4754.71/Cum =0.405xRs.4754.71=Rs.192.57 or Rs.193.00	10	Nos.	193	1930
20	HT Stay Set Complete	18	Set	1050	18900
21	HT Stay clamp stay	18	Pair	125	2250
22	INSULATOR STAY (GUY/EGG) 11KV	36	EA	50	1800
23	7/10 SWG G I stay wire (10Kg. / Set)	180	KG	75	13500
24	Cement concreting for stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= 0.45Mtrx0.45Mtrx1.5Mtr= 0.3Cum	18	EA	1270	22860
25	Guarding Materials (Excluding Pole, earthing, Stay) per 50 mtr	2	EA	6217	12433
26	BOLT & NUT Gi different sizes	20	KG	78	1560
27	WASHER GI different sizes	5	KG	78	390
28	BOARD DANGER 11KV SIZE 8X10 INCH	10	EA	80	800
29	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	10	KG	75	750
30	ANTICLIMBING DEVICE FOR 11 M Joist POLE (3 KG per support)	30	KG	80	2400
31	PIPE HDPE SIZE 25 MM	12	М	31	372
32	SLEEV BLACK POLYOLEFIN -16MM	30	М	10	305
33	MONKEY SCARE- ONE LAYER	10	EA	64	636
34	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	30	EA	38	1140
35	GUARD POLIPRO FOR OVERHEAD COND.	30	М	295	8865
36	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	4	LS	1600	6400

S No.	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)	
37	CAUTION TAPE DANGER HDPE 100MM WIDTH	200	М	1	278	
38	Sundries for survey tree cutting, Aluminium Binding wire / PVC tape etc	1	EA	1518	1518	
Α	Total cost of the material				768219	
В	Stock , storage and insurance @ 3% of A:				23047	
С	Sub total-C = (A+B)				791266	
D	T & P charges @ 2% of C				15825	
E	Contingency charges @ 3% of C				23738	
F	Transportation charges @ 7.5 % of C				59345	
	Erection Charges @ 5% of RS Joist				14251	
	Erection Charges @ 20% of PSC Pole				0	
	Erection Charges @ 10% of other items except RSJ				50625	
G	Erection Charges Sub Total :				64876	
Н	Sub-Total H(C+D+E+F+G)				955050	
1	Over Head charges/Departmental including Supervision	ion Cha	rges @	6% of H	57303	
J	Total Estimated Cost i.e. J=(H+I)	-		-	1012353	
39	Dismantling of Conductor and transporting to nearest store of TPSODL for 3 Km of Conductor	1	EA	27000	27000	
	Sub Total				1039353	
Κ	GST 18%				187084	
L	CESS 1%				10394	
М	Total of Estimate(J+K+L)				1209830	
Ν	Inspection Fee					
0	Drawing Approval					
Ρ	Grand Total				1210110	
Q	Escalation of 2 years with 12.36% of grand Total				1359680	
R	Total (In Crores)				0.14	

9.2.1 (B) Unit BOQ for 33 KV OH Line Upgradation / Refurbishment with 100 sq.mm AAAC

S No.	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)
1	100 sqmm All Alloy Aluminium Conductor AAAC	3050	М	55	167750
2	WPB 160x152 (13Mtr. Long, 30.44KG/Mtr.) (Guarding pole)	4	Nos.	30443	121773
3	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.) (Intermediate pole)	6	Nos.	25824	154942
4	GI BASE PLATE SIZE 500x500x10MM	10	EA	1500	15000
5	33 KV V Cross Arm	5	EA	1800	9000
6	Back Clamp for V cross arm(33 KV)	5	EA	150	750
7	33 KV Pin Insulator Polymer	30	Nos.	480	14400
8	F Clamp for 33 KV Pin Insulator	10	Nos.	300	3000
9	100x50x6 mm M.S Channel (9.2 Kg. / Mtr) with Galvanization	138	KG	75	10350
10	Fish Plate (0.97/piece)	19	KG	75	1455
11	PG Clamp100 sqmm All Alloy Aluminium Conductor AAAC	30	Nos.	580	17400
12	Disc Insulator(B&S) 120 KN Polymer	30	EA	1150	34500
13	HW FITTING (B&S) 90KN 4 BOLT	30	EA	500	15000
14	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long (At Guarding Pole)	4	Nos.	1050	4200
15	Coil Type Earthing	10	Nos.	166	1660
16	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	20	EA	36	720
17	8 SWG GI Wire for earthing (1.31 Kg/Pole) for earthing	13	KG	75	983
18	Concreting of support C.C. 1:3:6, using 40mm HBG metal=0.45Mtrx0.45Mtrx1.5Mtr= 0.3037Cum. @4158.84=0.3037x4158.84=1263.03 or 1270.00	10	Nos.	1270	12700

S No.	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)
19	Couping with C.C. 1:3:6 by using 12mm size hard broken granite chips=0.3Mtrx0.3Mtrx0.45Mtr =0.0405Cum @ Rs.4754.71/Cum =0.405xRs.4754.71=Rs.192.57 or Rs.193.00	10	Nos.	193	1930
20	HT Stay Set Complete	18	Set	1050	18900
21	HT Stay clamp stay	18	Pair	125	2250
22	INSULATOR STAY (GUY/EGG) 11KV	36	EA	50	1800
23	7/10 SWG G I stay wire (10Kg. / Set)	180	KG	75	13500
24	Cement concreting for stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= 0.45Mtrx0.45Mtrx1.5Mtr= 0.3Cum	18	EA	1270	22860
25	Guarding Materials (Excluding Pole, earthing, Stay) per 50 mtr	2	EA	6217	12433
26	BOLT & NUT Gi different sizes	20	KG	78	1560
27	WASHER GI different sizes	5	KG	78	390
28	BOARD DANGER 11KV SIZE 8X10 INCH	10	EA	80	800
29	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	10	KG	75	750
30	ANTICLIMBING DEVICE FOR 11 M Joist POLE (3 KG per support)	30	KG	80	2400
31	PIPE HDPE SIZE 25 MM	12	М	31	372
32	SLEEV BLACK POLYOLEFIN -16MM	30	М	10	305
33	MONKEY SCARE- ONE LAYER	10	EA	64	636
34	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	30	EA	38	1140
35	GUARD POLIPRO FOR OVERHEAD COND.	30	М	295	8865
36	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	4	LS	1600	6400
37	CAUTION TAPE DANGER HDPE 100MM WIDTH	200	М	1	278
38	Sundries for survey tree cutting, Aluminium Binding wire / PVC tape etc	1	EA	1518	1518
Α	Total cost of the material				684669
В	Stock, storage and insurance @ 3% of A:				20540
C	Subtotal-C = (A+B)				705210
D	T & P charges @ 2% of C				14104
	Contingency charges @ 3% of C				21156
	Fransportation charges @ 7.5 % of C				32691
	Frection Charges @ 20% of PSC Pole				14201 N
	Erection Charges @ 10% of other items excent RS	.I			42019
G	Erection Charges Sub Total:	~			56270
H	Sub-Total H(C+D+E+F+G)				849631
Ι	Over Head charges/Departmental including Super	vision C	harges @ 69	% of H	50978
J	Total Estimated Cost i.e. J=(H+I)	-	-	-	900609
39	Dismantling of Conductor and transporting to nearest store of TPSODL for 3 Km of Conductor	1	EA	27000	27000
	Sub Total				927609
K	GST 18%				166970
	CESS 1%				9276
NI N	I otal of Estimate(J+K+L)				10/6854
	Inspection ree Drawing Approval				00
P	Grand Total				200 107713/
0	Escalation of 2 years with 12.36% of grand Total				1210268
R	Total (In Crores)	L	•	·	0.12

9.2.2 Unit BOQ for 11 KV OH Line Upgradation / Refurbishment with 100 sq.mm AAAC

S No.	Item Description	Quantity	Unit	Unit Rate (INR)	Amount (INR)
1	100 sqmm All Alloy Aluminium Conductor AAAC	3050	М	55	1,67,750
2	WPB 160x152 (13Mtr. Long, 30.44KG/Mtr.) (Guarding pole)	2	Nos.	30,443	60,886
3	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.) (Intermediate pole)	8	Nos.	25,824	2,06,590
4	GI BASE PLATE SIZE 500x500x10MM	10	EA	1,500	15,000
5	11KV V Cross Arm	5	EA	810	4,050
6	Back Clamp for V cross arm(11KV)	5	EA	80	400
7	11 KV Pin Insulator Polymer	30	Nos.	200	6,000
8	F Clamp for 11 KV Pin Insulator	10	Nos.	240	2,400
9	75x40x6 mm M.S Channel (6.80Kg. / Mtr) for 5 nos. Cut Point (With Galvanization)	73	KG	75	5,457
10	Fish Plate (0.97/piece)	19.4	KG	75	1,455
11	PG Clamp 80 sqmm All Alloy Aluminium Conductor AAAC	0	Nos.	530	-
12	PG Clamp 100 sqmm All Alloy Aluminium Conductor AAAC	30	Nos.	580	17,400
13	PG Clamp 148 sqmm All Alloy Aluminium Conductor AAAC	0	Nos.	620	-
14	Disc Insulator(B&S) 90 KN Polymer (for 5 nos. Cut Point)	30	EA	1,150	34,500
15	HW FITTING (B&S) 90KN 4 BOLT	30	EA	500	15,000
16	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr. Long (At Guarding Pole)	2	Nos.	1,050	2,100
17	Coil Type Earthing	10	Nos.	166	1,660
18	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	20	EA	36	720
19	8 SWG GI Wire for earthing (1.31 Kg/Pole) for earthing	13.1	KG	75	983
20	HT Stay Set Complete (4 nos. at guarding, 5 nos. at 5 cut Point)	9	Set	1,050	9,450
21	HT Stay clamp for 9 nos.stay	9	Pair	125	1,125
22	INSULATOR STAY (GUY/EGG) 11KV	18	EA	50	900
23	7/10 SWG G I stay wire (10Kg. / Set)	90	KG	75	6,750
24	Guarding Materials (Excluding Pole, earthing, Stay) per 50 mtr	1	EA	6,217	6,217
25	BOLT & NUT Gi different sizes	30	KG	78	2,340
26	WASHER GI different sizes	5	KG	78	390
27	BOARD DANGER 11KV SIZE 8X10 INCH	10	EA	80	800
28	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	3	KG	76	229
29	ANTICLIMBING DEVICE FOR 11 M Joist POLE (3 KG per support)	30	KG	80	2,400
30	PIPE HDPE SIZE 25 MM	30	М	28	840
31	SLEEV BLACK POLYOLEFIN -16MM	90	М	10	915
32	MONKEY SCARE- ONE LAYER	20	EA	64	1,271
33	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	30	EA	38	1,140

S No.	Item Description	Quantity	Unit	Unit Rate (INR)	Amount (INR)
34	GUARD POLIPRO FOR OVERHEAD COND.	30	М	295	8,865
35	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	2	LS	1,600	3,200
36	CAUTION TAPE DANGER HDPE 100MM WIDTH	200	М	1	278
37	Sundries for survey tree cutting, Aluminium Binding wire / PVC tape etc	2	EA	1,518	3,036
Α	Total cost of the material				5,92,496
В	Stock, storage and insurance @ 3% of A:				17,775
С	Subtotal-C = (A+B)				6,10,271
D	T & P charges @ 2% of C				12,205
E	Contingency charges @ 3% of C				18,308
F	transportation charges @ 7.5 % of C				45,770
	Erection Charges @ 5% of RS Joist				13,775
	Erection Charges @ 20% of PSC Pole				-
	Erection Charges @ 10% of other items except RSJ				33,477
G	Erection Charges Sub Total :				47,252
	Cement concreting for stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= 0.45Mtrx0.45Mtrx1.5Mtr= 0.3Cum	9	EA	1,270	11,430
	Concreting of support C.C. 1:3:6, using 40mm HBG metal=0.45Mtrx0.45Mtrx1.5Mtr= 0.3037Cum. @4158.84=0.3037x4158.84=1263.03 or 1270.00	10	Nos.	1,270	12,700
Н	Sub-Total H(C+D+E+F+G)				7,57,937
I	Over Head charges/Departmental including Supervision Charges @ 6% of H				45,476
J	Total Estimated Cost i.e. J=(H+I)				8,03,413
35	Dismantling of Conductor and transporting to nearest store of TPSODL for 3 Km of Conductor	1	EA	27,000	27,000
K	Sub Total				8,30,413
L	GST 18%				1,49,474
M	CESS 1%				8,304
<u> </u>	Total of Estimate(K+L+M)			ļ	9,88,192
	Inspection Fee				200
	Grand Total				200 9 88 502
	Escalation of 2 years with 12 36% of grand Total				11 10 782
	Localation of 2 years with 12.50% or grand Total				11,10,702
	Total (In Crores)				0.1111

9.2.3 Unit BOQ for 11 KV OH Line Upgradation / Refurbishment with 80 sq.mm AAAC

S No.	Item Description	Quantity	Unit	Unit Rate (INR)	Amount (INR)
1	80 sqmm All Alloy Aluminium Conductor AAAC	3050	М	43	131150
2	WPB 160x152 (13Mtr. Long, 30.44KG/Mtr.) (Guarding pole)	2	Nos.	30,443	60886
3	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.) (Intermediate pole)	8	Nos.	25,824	2,06,590
4	GI BASE PLATE SIZE 500x500x10MM	10	EA	1500	15000
5	11KV V Cross Arm	5	EA	810	4050
6	Back Clamp for V cross arm(11KV)	5	EA	80	400
7	11 KV Pin Insulator Polymer	30	Nos.	200	6,000
8	F Clamp for 11 KV Pin Insulator	10	Nos.	240	2,400

S No.	Item Description	Quantity	Unit	Unit Rate (INR)	Amount (INR)
9	75x40x6 mm M.S Channel (6.80Kg. / Mtr) for 5 nos. Cut Point(With Galvanization)	73	KG	75	5457
10	Fish Plate (0.97/piece)	19.40	KG	75	1,455
11	PG Clamp 80 sqmm All Alloy Aluminium Conductor AAAC	30	Nos.	530	15,900
14	Disc Insulator(B&S) 90 KN Polymer (for 5 nos.	30	EA	1150	34500
15	HW FITTING (B&S) 90KN 4 BOLT	30	EA	500	15000
	40mm nominal bore GI pipe (medium gauge)				
16	earthing device with 3 mtr. Long (At Guarding Pole)	2	Nos.	1050	2100
17	Coil Type Earthing	10	Nos.	166	1,660
18	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	20	EA	36	720
19	8 SWG GI Wire for earthing (1.31 Kg/Pole) for earthing	13.10	KG	75	983
20	HT Stay Set Complete (4 nos. at guarding, 5 nos. at 5 cut Point)	9	Set	1050	9,450
21	HT Stay clamp for 9 nos stay	9	Pair	125	1,125
22	INSULATOR STAY (GUY/EGG) 11KV	18	EA	50	900
23	7/10 SWG G I stay wire (10Kg. / Set)	90	KG	75	6750
24	Guarding Materials (Excluding Pole, earthing, Stay) per 50 mtr	1	EA	6217	6,217
25	BOLT & NUT Gi different sizes	30	KG	78	2340
26	WASHER GI different sizes	5	KG	78	390
27	BOARD DANGER 11KV SIZE 8X10 INCH	10	EA	80	800
28	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0 59x0 510)	3	KG	76	229
29	ANTICLIMBING DEVICE FOR 11 M Joist	30	KG	80	2400
30	PIPE HDPE SIZE 25 MM	30	М	28	840
31	SLEEV BLACK POLYOLEFIN -16MM	90	M	10	915
32	MONKEY SCARE- ONE LAYER	20	EA	64	1271
33	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	30	EA	38	1140
34	GUARD POLIPRO FOR OVERHEAD COND.	30	М	295	8865
35	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	2	LS	1600	3,200
36	CAUTION TAPE DANGER HDPE 100MM WIDTH	200	М	1.39	278
37	Sundries for survey tree cutting, Aluminium Binding wire / PVC tape etc	2	EA	1518	3,036
Α	Total cost of the material				554396.29
В	Stock, storage and insurance @ 3% of A:				16631.89
С	Sub total-C = $(A+B)$				571028.18
D	T & P charges @ 2% of C			ļ	11420.56
<u> </u>	contingency charges @ 3% of C				17130.85
F F	transportations charges @ 7.5 % of C				42827.11
	Erection Charges @ 5% of RS Joist				13//5.03
	Erection Charges @ 20% of PSC Pole Erection Charges @ 10% of other items except				29552.76
G	ROJ Frection Charges Sub Total :				12227 70
	Cement concreting for stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= 0.45Mtrx0.45Mtrx1.5Mtr= 0.3Cum	9	EA	1270	11430.00
	Concreting of support C.C. 1:3:6, using 40mm HBG metal=0.45Mtrx0.45Mtrx1.5Mtr= 0.3037Cum.	10	Nos.	1270	12700.00

S No.	Item Description	Quantity	Unit	Unit Rate (INR)	Amount (INR)
	@4158.84=0.3037x4158.84=1263.03 or 1270.00				
Н	Sub-Total H(C+D+E+F+G)				709864.49
I	Over Head charges/Departmental including Supervision Charges @ 6% of H				42591.87
J	Total Estimated Cost i.e. J=(H+I)				752456.36
35	Dismantling of Conductor and transporting to nearest store of TPSODL for 3 Km of Conductor	1	EA	27000	27000.00
K	Sub Total				779456
L	GST 18%				140302.14
М	CESS 1%				7794.56
	Total of Estimate(K+L+M)				927553.06
	Inspection Fee				200.00
	Drawing Approval				200.00
	Grand Total				927953.06
	Escalation of 2 years with 12.36% of grand Total				1042648.06
	Total (In Crores)				0.1043

9.2.4 Unit BOQ for 11 KV OH Line Upgradation / Refurbishment with 55 sq.mm AAAC

S No.	Item Description	Quantity	Unit	Unit Rate (INR)	Amount (INR)
1	55 sqmm All Alloy Aluminium Conductor AAAC	3050	М	30	91500
2	WPB 160x152 (13Mtr. Long, 30.44KG/Mtr.) (Guarding pole)	2	Nos.	30,443	60886
3	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.) (Intermediate pole)	8	Nos.	25,824	206590
4	GI BASE PLATE SIZE 500x500x10MM	10	EA	1500	15000
5	11KV V Cross Arm	5	EA	810	4050
6	Back Clamp for V cross arm(11KV)	5	EA	80	400
7	11 KV Pin Insulator Polymer	30	Nos.	200	6000
8	F Clamp for 11 KV Pin Insulator	10	Nos.	240	2400
9	75x40x6 mm M.S Channel (6.80Kg. / Mtr) for 5 nos. Cut Point (With Galvanization)	73	KG	75	5457
10	Fish Plate (0.97/piece)	19.40	KG	75	1455
11	PG Clamp 80 sqmm All Alloy Aluminium Conductor AAAC	30	Nos.	530	15900
14	Disc Insulator(B&S) 90 KN Polymer (for 5 nos. Cut Point)	30	EA	1150	34500
15	HW FITTING (B&S) 90KN 4 BOLT	30	EA	500	15000
16	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr. Long (At Guarding Pole)	2	Nos.	1050	2100
17	Coil Type Earthing	10	Nos.	166	1660
18	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	20	EA	36	720
19	8 SWG GI Wire for earthing (1.31 Kg/Pole) for earthing	13.10	KG	75	983
20	HT Stay Set Complete (4 nos. at guarding, 5 nos. at 5 cut Point)	9	Set	1050	9450
21	HT Stay clamp for 9 nos stay	9	Pair	125	1125
22	INSULATOR STAY (GUY/EGG) 11KV	18	EA	50	900
23	7/10 SWG G I stay wire (10Kg. / Set)	90	KG	75	6750
24	Guarding Materials (Excluding Pole, earthing, Stay) per 50 mtr	1	EA	6217	6217
25	BOLT & NUT Gi different sizes	30	KG	78	2340

S No.	Item Description	Quantity	Unit	Unit Rate (INR)	Amount (INR)
26	WASHER GI different sizes	5	KG	78	390
27	BOARD DANGER 11KV SIZE 8X10 INCH	10	EA	80	800
28	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	3	KG	76	229
29	ANTICLIMBING DEVICE FOR 11 M Joist POLE (3 KG per support)	30	KG	80	2400
30	PIPE HDPE SIZE 25 MM	30	М	28	840
31	SLEEV BLACK POLYOLEFIN -16MM	90	М	10	915
32	MONKEY SCARE- ONE LAYER	20	EA	64	1271
33	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	30	EA	38	1140
34	GUARD POLIPRO FOR OVERHEAD COND.	30	М	295	8865
35	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	2	LS	1600	3200
36	CAUTION TAPE DANGER HDPE 100MM WIDTH	200	М	1.39	278
37	Sundries for survey tree cutting, Aluminium Binding wire / PVC tape etc	2	EA	1518	3036
Α	Total cost of the material				514746
В	Stock, storage and insurance @ 3% of A:				15442
С	Sub total-C = $(A+B)$				530189
D	T & P charges @ 2% of C				10604
L <u>E</u>	contingency charges @ 3% of C				15906
F	transportation charges @ 7.5 % of C				39764
	Erection Charges @ 5% 01RS J0ISt				13/75
	Erection Charges @ 10% of other items except RS1				25469
G	Frection Charges Sub Total:				39244
	Cement concreting for stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= 0.45Mtrx0.45Mtrx1.5Mtr= 0.3Cum	9	EA	1270	11430
	Concreting of support C.C. 1:3:6, using 40mm HBG metal=0.45Mtrx0.45Mtrx1.5Mtr= 0.3037Cum. @4158.84=0.3037x4158.84=1263.03 or 1270.00	10	Nos.	1270	12700
Н	Sub-Total H(C+D+E+F+G)				659836
I	Over Head charges/Departmental including Supervision Charges @ 6% of H				39590
J	Total Estimated Cost i.e. J=(H+I)				699426
35	Dismantling of Conductor and transporting to nearest store of TPSODL for 3 Km of Conductor	1	EA	27000	27000
K	Sub Total				726426
L	GST 18%				130757
М	CESS 1%				7264
L	Total of Estimate(K+L+M)				864447
	InspectionFee				200
<u> </u>	Drawing Approval				200
<u> </u>	Grand Lotal Escalation of 2 years with 12 26% of grand Tatal				071740
<u> </u>					3/1/4Z
	i otal (in Grores)				0.10

9.2.5 Name and Locations of 11 KV feeders, proposed for upgradation / refurbishment in CAPEX FY23:

S N O	CIRCL E	DIV.	11KV FEEDER	Refurbishment required Location from	Refurbishment required Location TO	Length conside red (CKM)	Upgrada tion Size From-To	Projec t Cost (Cr.)
1	Rayag ada	RED	TOWN NO III	Tumbiguda Junction NH	Resonal Statebank offc	0.37	55 to 80	0.049
				Sai international traffic jounction	Jain Dharmashala	0.41	55 to 80	0.070
				Gandhinagar 6- pole	Old sub post offc	0.35	55 to 80	0.063
				Balaji Sweets kasturi nagar Road	LIC offc	0.4	55 to 80	0.064
2	Rayag ada	RED	TOWN NO IV	DIC Junction	Co-operative 1 st lane PHD	0.25	55 to 80	0.027
				Gajalaxmi puja junction	Bamsikrishna Hotel Lane	0.2	55 to 80	0.026
				Ring road	Antariguda village	1	34 to 80	0.105
3	Rayag ada	GED	GUNUPU R COURT FEEDR	GUNUPUR COLEGE	GIET	2.6	55 TO 80	0.232
				NARSINGHMUND A colonyentry	NARSINGHMUN DA colonyexit	0.4	55 TO 80	0.060
				BITS COLLEGE	OMPERA	3.5	55 TO 80	0.308
				BYPASS	KALKINAGAR	0.6	55 TO 80	0.128
4	Rayag ada	GED	GUNUPU R TOWN FEEDER	TELEPHONE EXCHANGE	OLD GUNUPUR CHOWK	0.8	55 TO 80	0.186
				OLD GUNUPUR CHOWK	BALAJI TEMPLE	0.8	55 TO 80	0.122
				OLD GUNUPUR CHOWK	BANSADHARA RIVER	2	55 TO 80	0.222
	Rayag ada	PKE D	TOWN 4	seri sahi	makatotama	0.8	34 to 80	0.109
5				Dolatank	makatotama	0.4	55 TO 80	0.051
				Nutty corner	keut street	0.5	55 TO 80	0.073
				college chawk	Jangam street	1.1	34 to 80	0.123
				Fire station	Gandhi Nagar	3.5	55 TO 80	0.312
6	City	BFD-I	Tata	PSS	Bus Stand	1	80 to 100	0.121
	0.1.9		Benz	Kali mandir square	Giri Road	8	80 to 100	0.865
7	City	BED-I	Old Busstand	Gokarneswar Temple	Khalasi Sahi	6	80 to 100	0.670
	City	BED-I	Ambapua	PSS	Police Colony	0.2	55 TO 80	0.027
8				Vasanta Vihar chowk	Vasanta Vihar 4 ^m Lane	0.6	34 & 55 to 80	0.097
				Saradhavalli 1 st Lane	Saradhavalli 6 st Lane	0.4	34 & 55 to 80	0.064
				Kalinganagr Pump House	Sibapadma	0.7	34 & 55 to 80	0.078
9	City	BED-I	Nilachaln agar	Gajapati Nagar Main Road	LIG Colony	0.4	34 to 80	0.064
				Nilachalnagar Main Road	5th Lane	0.3	34 to 80	0.043
				Gajapati Nagar 7th Iane	Basudev nagar	0.6	34 & 55 to 80	0.070
				Gajapati Nagar Bridge	Gajapati Nagar 12th Lane	0.2	55 to 100	0.041
10	City	BED-I	Courtpeta	SP residence	IDBI Bank	0.8	55 TO 80	0.132
				Biogas	Medical RDC	0.7	34 to 80	0.078
11	City	BED-I	Medical	MKCG Main road	SMT and Medical College	0.6	34 to 80	0.076
12	City	BED-I	Sidharth Nagar	Gautamnagar AB Switch	Jena Bandha	2	34 & 55 to 100	0.235

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S N O	CIRCL E	DIV.	11KV FEEDER	Refurbishment required Location from	Refurbishment required Location TO	Length conside red (CKM)	Upgrada tion Size From-To	Projec t Cost (Cr.)
				PSS	Sidhharthnagar Hanuman Temple	0.2	55 to 100 sq mm	0.033
	Komonell		Kamanall	Bus stand (BDO Complex)	Bhaba Nagar	1.8	34,55 to 80	0.220
13	City	BED-I	у	Bhaba Nagar	Ashok Nagar 1st Lane Near Sauchalaya	1.1	34,55 to 80	0.169
14	JEYP	KED	No2	Gandhinagar	Housing board	5	34 to 80	0.489
17	ORE	RED	1102	Koraput OLD PSS	Vikash Diagonasis	5	55 to 80	0.276
15	JEYP	KED	No 1	Koraput Old PSS	Pujariput	5	34 to 80	0.489
15	ORE	RED	INO I	Koraput OLD PSS	Jahannath mandir	5	55 to 80	0.340
16	JEYP ORE	NED	Nabarang purno-2	Nawrangpur PSS	Majhiguda chakka	5	55 to 80	0.361
17	JEYP ORE	NED	Nabarang purno-1	Nawrangpur PSS	Planning office	7	55 to 100	0.501
18	JEYP ORE	NED	Bharandi	Purla AB Switch	Bakadabeda	5	34 to 80	0.453
19	JEYP ORE	MED	Micro	Malkangiri PSS	MV-42	8	55 to 80	0.495
20	JEYP ORE	MED	Kalimela	Kalimela PSS	Market	2	34 to 80	0.172
21	JEYP ORE	MED	Balimela Town	Nala Chhaka	Machha Market	1.8	34 to 80	0.173
22	ASKA	AED- II	K.S.Naga r Town	KS Nagar PSS	Gudiali Chakka	4	55 to 80	0.360
23	ASKA	AED-I	College Square	Kunbhari	Golapalli	4	55 to 80	0.223
24	Bhanja nagar	BNE D	Kuloda	Bijeput PSS	Dhipadahala	15	34 to 55	0.616
25	Berha mpur	GNE D	11KV AGASTI NUAGAO N	KALI DHABA NH- 16	TELUGU NUAGAON	19.1	34,55 to 80	0.639
26	Berha mpur	GNE D	11kv Paluru	Prayagi Chhak	Lighthouse	1.2	34 to 80	0.104
27	Berha mpur	GNE D	NARAYA NI	BHEJIPUT ODIA STREET	BAGALPUR	4	34 to 80	0.274
28	Berha	GNE	KESHPU	DAKA PATRA	KHALLIKOTE STATION	3	34 to 80	0.225
	mpur	U	к	MOHONPUR	HARIDAMULA	2.5	34 to 55	0.126
29	Berha	GNE	KANHEIP	BADAKHETA AB SWITCH	LAKHAPADA	2.5	34 to 55	0.145
	mpur	U	UK	Kanheipur	Gurunthi	0.5	34 to 55	0.042
					TOTAL	150.18		11.91

9.2.6 Technical Justification of 11 KV lines, proposed for Upgradation / Refurbishment in CAPEX FY23:

S NO	CIRCLE	DIVISION	11KV FEEDER	Length Considered CKM	Project Cost (Cr.)	Justification of the proposal
1	Rayagada	RED	RYGD TOWN NO-3	1.53	0.2462	Rayagada Town 3 feeder emanates from Autonagar PSS. Total Length of the feeder is 22 CKM and supplying to 8452 nos. of consumers of urban area including commercial load & critical consumer like govt. office, Police station, collector office, etc. Peak load of the feeder is 220 amps. It is one of the high revenue based feeder. During field visit it is also observed that poles are tilted and conductor sag is not is maintained. Hence, keeping in view of the mentioned points and considering the future load growth, refurbishment and upgradation of only part of section with conductor size of 55 sqmm size to 80 sqmm is proposed.
2	Rayagada	RED	RYGD TOWN NO-4	1.45	0.1575	Rayagada Town 4 feeder emanates from Autonagar PSS. Total Length of the feeder is 21.4 CKM, supplying to 9545 nos. of consumers of urban area including commercial load & critical consumers like govt office, medical etc. Peak load of the feeder is 210 amps. It is one of the high revenue based feeder. During field visit it is also observed that poles are damaged and conductor sag is not maintained, insulator of some poles are damaged. Hence also considering the future load growth, refurbishment and upgradation of only part of section with conductor size of 34 & 55 sqmm size to 80 sqmm is proposed.
3	Rayagada	GED	COURT	7.1	0.7270	Gunupur Court feeder emanates from Gunupur PSS. Total Length of the feeder is 25 CKM and supplying to 5687 nos of consumers of urban area including commercial load and critical consumer like educational institution, residential colony, Court etc. Peak load of the feeder is 150 amps. It is one of the high revenue based feeder. During field visit it is also observed that some poles are tilted and some are damaged. There are multiple joints in the conductor and sag is not maintained with propoer clearance. The conductor is very aged and frequent tripping occurs in this feeder. Hence also considering reliability and future load growth, refurbishment and upgradation of only part of section with 55 sqmm size to 80 sqmm is proposed.
4	Rayagada	GED	GUNPUR TOWN	3.6	0.5291	Gunupur Town feeder emanates from Gunupur PSS. Total Length of the feeder is 55 CKM and supplying to 5865 nos of consumers of urban area including commercial load and critical consumer like govt. offices, medical, Collector office, residential colony etc Peak load of the feeder is 170 amps. It is one of the high revenue based feeder. During field visit it is also observed that poles are tilted. Some V cross arms and in insulators are damaged. There are multiple joints in the conductor and sag is not maintained with propoer clearance. Conductor is aged. Frequent tripping occurs in this feeder. Hence also considering reliability

S NO	CIRCLE	DIVISION	11KV FEEDER	Length Considered CKM	Project Cost (Cr.)	Justification of the proposal				
						and future load growth, refurbishment and upgradation of only part of section with 55 sqmm size to 80 sqmm has been proposed.				
5	Rayagada	PKED	PKD TOWN- 4	6.3	0.6681	Paralakhemundi Town- 4 feeder emanates from Paralakhemundi New PSS. Total Length of the feeder is 13.5 CKM. supplying to 5052 nos of consumers of urban area including paralakhemundi market and critical consumer like educational institution, Jail, PHD, govt offc etc. Peak load of the feeder is 200 amps. It is one of the high revenue based feeder. During field visit it is also observed that major part of trunk section is of 55 sqmm conductor. Besides this poles are tilted and conductor sag is not maintained. HT stays of some poles are damaged. Hence also considering the future load growth, refurbishment and upgradation of only part of section with conductor size of 55 sqmm size to 80 sqmm is proposed.				
6	City Circle	BED-I	TATA BENZ	9	0.9856	Tata Benz feeder emanates from Medical PSS. Total length of the feeder is 16 CKM. Supplying to 4600 nos. of consumers of urban region of Berhampur including commercial load & critical consumers like Govt office, residential colony etc. Peak load of the feeder is 240 amps. It is one of the high revenue based feeder. During field visit it is also observed that some poles are tilted. Conductor joints are there. Hence also considering the future load growth and reliability, refurbishment and upgradation of only part of section with conductor size of 80 sqmm size to 100 sqmm is proposed.				
7	City Circle	BED-I	OLD BUS STAND	6	0.6696	Old Bus stand feeder emanates from Medical PSS. Total length of the feeder is 14 CKM. Supplying to 4000 nos. of consumers of urban area of Berhampur. Peak load of the feeder is 180 amps. It is one of the high revenue-based feeder. During field visit it is also observed that conductor sagging is there along with pole tilting. Some HT stays and pin insulators are damaged. Hence also considering the future load growth and reliability, refurbishment and upgradation of only part of section to 100 sqmm is proposed.				
8	City Circle	BED-I	AMBAPUA	1.9	0.2664	Ambapua feeder emanates from Ambapua PSS. Total length of the feeder is 24 CKM. Supplying to 3392 nos. of consumers. of urban area of Berhampur including some commercial load & critical consumers like residential apartment / colony etc Peak load of the feeder is 180 amps. It is one of the high revenue-based feeder. During field vist it is also observed that poles are tilted and some poles are damaged. Conductor sag is not maintained with proper clearance. Conductor is aged. Some disc insulators and V cross arm are damaged. Hence also considering the future load growth and reliability, refurbishment and upgradation of only part of section to 100 sqmm is proposed.				

S NO	CIRCLE	DIVISION	11KV FEEDER	Length Considered CKM	Project Cost (Cr.)	Justification of the proposal
9	City Circle	BED-I	NILACHAL NAGAR	1.5	0.2184	Nilachalnagar feeder emanates from Bidyutpuri Colony PSS. Total length of the feeder is 12 CKM. Supplying to 3778 nos. of consumers of urban area of Berhampur including some critical consumers like educational institution, LIC office, govt offices, commercial load, residential apartment / colony etc. Peak load of the feeder is 170 amps. It is one of the high revenue based feeder. During field visit it is also observed that poles are tilted along with conductor sagging. There are nos. of joints in the conductors. Some stays and V cross arm are damaged. Size of the conductor at the proposed location is under sized. Hence also considering the future load growth and reliability, refurbishment and upgradation of only part of section with conductor size of 34 sgmm size to 80 sgmm is proposed.
10	City Circle	BED-I	COURTPETA	0.8	0.1320	Courtpeta feeder emanates from Medical PSS. Total length of the feeder is 6 CKM. Supplying to 1800 nos. of consumers. of urban area of Berhampur city including some critical consumers like, LIC office, govt offices Govt residential quarters, Court, TPSODL corporate office, commercial load, residential apartment / colony ect. Peak load of the feeder is 140 amps. It is one of the high revenue-based feeder. During site visit it is also observed that some pin insulators and stay sets are damaged. Conductor sagging is there in some portions. Hence also considering the future load growth and reliability, refurbishment and upgradation of only part of section with conductor size of 34 sqmm size to 80 sqmm is proposed.
11	City Circle	BED-I	MEDICAL	1.3	0.1538	Medical feeder emanates from medical PSS. Total length of the feeder is 3.5 CKM. Supplying consumers of urban area of Berhampur along with the MKCG Hospital . Peak load of the feeder is 110 amps. It is one of the high revenue based and critical feeder as it supplying power to district headquarter hospital (MKCG). During field visit it is also observed that, some HT stays and pin insulators are damaged in some locations. Size of the conductor at the proposed location is 34 sqmm. Hence also considering the future load growth and reliability, refurbishment and upgradation of only part of section with conductor size of 34 sqmm size to 80 sqmm is proposed.
12	City Circle	BED-I	SIDHARTH NAGAR	2.2	0.2676	Sidharth Nagar feeder emanates from Medical PSS. Total length of the feeder is 8 CKM. Supplying to 2500 nos. of consumers. of urban area of Berhampur including some critical consumers like sidharth nagar market, Bank, commercial load, Residential colony etc. Peak load of the feeder is 130 amps. It is one of the high revenue-based feeder. During field visit it is also observed that some poles are damaged. multiple joints are in the conductor. Some V cross arm and pin insulator are damaged. Hence also considering the future load growth and

S NO	CIRCLE	DIVISION	11KV FEEDER	Length Considered CKM	Project Cost (Cr.)	Justification of the proposal
						reliability, refurbishment and upgradation of only part of section with conductor size of 34 sqmm size to 80 sqmm is proposed.
13	City Circle	BED-I	KAMAPALI	2.9	0.3892	Kamapalli feeder emanates from Medical PSS. Total length of the feeder is 3.2 CKM. Supplying to 2300 nos. of consumers. of Urban area of Berhampur including some critical consumers private hospital, commercial load, pertol pump, commercial complex etc. Peak load of the feeder is 100 amps. It is one of the high revenue-based feeder. During site visit it is also observed that some poles are damaged. Some disc insulators and HT stays are damaged. Hence also considering the future load growth and reliability, refurbishment and upgradation of only part of section with conductor size of 34 sqmm size to 80 sqmm is proposed.
14	JEYPORE	KED	KORAPUT NO-2	10	0.7644	Koraput No-2 feeder is emanates from Korapit Old PSS. Total length of the feeder is 35 Ckm. and supplying to 4892 nos of consumers of urban area including critical consumer like govt. office, Police station, commercial load etc Peak load of the feeder is 170 amps. It is one of the high revenue based feeder. During field vist it is also observed that some poles are damaged and conductor sag is not maintained with proper clearance. The conductor is under sized. Hence, considering the mentioned points, refurbishment and upgradation of only part of section with conductor size of 55 sqmm size to 80 sqmm is proposed.
15	JEYPORE	KED	KORAPUT NO-1	10	0.8287	Koraput No-1 feeder emanates from Korapit Old PSS of KED, Koraput. Total length of the feeder is 40 Ckm. and supplying to 5792 nos. of consumers. including critical consumers like commercial load, industrial load, Railway platform of Koraput etc. Peak load of the feeder is 140 amps. During field vist it is also observed that Poles are tilted and conductor sag is not maintained with propoer clearance. Some disc insulators are damaged. Hence also considering the reliability and future load growth, refurbishment and upgradation of only part of section with conductor size of 55 sqmm size to 80 sqmm is proposed.
16	JEYPORE	NED	NABARANG PUR TOWN-2	5	0.3614	Nawrangpur town-2 feeder emanates from Nawrangpur PSS of. Total length of the feeder is 41 CKM and supplying to 6950 nos of consumers of urban area including critical consumer like commercial loads, district head quarter office, hospital ets. Peak load of the feeder is 135 amps. It is one of the high revenue-based feeder. During field vist it is also observed that Some poles are tilted and conductor sag is not maintained with proper clearance. This feeder is to be interconnected with Nawrangpur town-1 feeder (peak load 125 amps), for N-1 connectivity purpose. A scheme is also proposed for above interconnector in CAPEX FY23 under " New 11 KV Line". Hence also considering the reliability and future load growth,

S NO	CIRCLE	DIVISION	11KV FEEDER	Length Considered CKM	Project Cost (Cr.)	Justification of the proposal			
						refurbishment and upgradation of only part of section of main line with conductor size of 55 sqmm size to 80 sqmm is proposed.			
17	JEYPORE	NED	NABARANG PUR TOWN-1	7	0.5010	Nawrangpur town-1 feeder emanates from Nawrangpur PSS. Total length of the feeder is 35 CKM and supplying to 5210 nos of consumers of urban area including critical consumer like commercial loads, small scale industries etc. Peak load of the feeder is 125 amps. It is one of the high revenue-based feeder. During field vist it is also observed that Some poles are tilted and conductor sag is not maintained with proper clearance. some HT stays and pin insulators are damaged. This feeder to be interconnected with Nawrangpur town-2 feeder (peak load 135 amps), for N-1 connectivity purpose. A scheme is also proposed for above interconnector in CAPEX FY23 under "New 11 KV Line". Hence also considering the reliability and future load growth, refurbishment and upgradation of only part section of main line with conductor size of 55 sqmm size to 80 sqmm is proposed.			
18	Jeypore	NED	BHARANDI	5	0.4529	Bharandi feeder emanates from Umarelote PSS of NED, Nawrangpur. The feeder is very lengthy having total length of 210 Ckm. Supplying to 10345 nos. of consumers. Peak load of the feeder is 170 amps. During the filed visit it is also observed that the conductor is under sized in some portions of trunk section. There are multiple joints, conductor sagging and pole tilting is there. Some poles are also damaged. Hence frequent snapping and tripping occurs in the feeder. Hence also considering the present overloading condition, future load growth and reliability, refurbishment and upgradation of only part of section of the trunk line with conductor size of 34 sgmm size to 80 sgmm is proposed.			
19	JEYPORE	MED	MICRO	8	0.4947	Micro feeder emanates from malkangiri PSS of MED, Malkangiri. Total trunk line of the feeder is 12 CKM. Conductor size of the trunk line is 55 sqmm. supplying 1470 nos. of consumers including new small-scale industries, which have been commissioned in recent year. During field visit it is also observed that some poles are damaged /tilted and conductor sag is not maintained with propoer clearance. Hence also considering the future load growth, refurbishment and upgradation of only part of section with conductor size of 55 sqmm size to 80 sqmm is proposed.			
20	JEYPORE	MED	KALIMELA TOWN	2	0.1720	Kalimela town feeder emanates from Kalimela PSS of MED, Malkangiri. Total length of feeder is 8 ckm. supplying to 1550 nos of consumers of Kalimela Town. Peak load of the feeder is 90 amps. Kalimela town feeder is the high revenue feeder of MED. During field visit it is also observed that some poles and pin insulators are damaged. conductor sagging is there. Conductor is aged. Due to multiple joint in conductor, frequent snapping occurs. Hence			

S NO	CIRCLE	DIVISION	11KV FEEDER	Length Considered CKM	Project Cost (Cr.)	Justification of the proposal		
						considering the reliability refurbishment and upgradation of only part of section with conductor size of 34 sqmm size to 80 sqmm is proposed.		
21	JEYPORE	MED	BALIMELA TOWN	1.8	0.1727	Balimela town feeder emanates from Balimela PSS of MED, Malkangiri . Total length of the feeder is 11 Ckm. supplying to 2600 nos. consumer of Balimela town. Peak load of the feeder is 110 amps. Balimela town feeder is the high revenue feeder of MED. During field visit it is also observed that tilted poles and conductor sag is not maintained with propoer clearance. Conductor is aged. Due to multiple joint in conductor, frequent snapping occurs. Hence considering the reliability refurbishment and upgradation of only part of section with conductor size of 34 sqmm size to 80 sqmm is proposed.		
22	ASKA	AED-II	KS.NAGAR TOWN	4	0.3597	KS Nagar town feeder emanates from KS Nagar PSS of AED-II, Aska. Total Length of the feeder is 17 Ckm. supplying to 4744 nos. consumers of urban area. including critical consumer like commercial load, Govt office, medical, police station etc. Conductor life of the feeder is more than 20 years. Peak load of the feeder is 110 amps. It is one of the high revenue-based feeder. During field visit it is also observed that Some poles are tilted. HT styas and V cross arms are damaged in some locations. Conductor is aged. hence multiple joints are there in conductor. Hence considering the reliability and future load growth, refurbishment and upgradation of only part of section of the trunk line with 55 sqmm size to 80 sqmm is proposed.		
23	ASKA	AED-I	COLLEGE SQUARE	4	0.2229	College square feeder emanates from Nuagaon PSS. Total Length of the feeder is 38 Ckm and supplying to 5214 nos consumers. including critical consumer like educational institution, residential chilling plant for milk factory, Rice mill etc Peak load of the feeder is 185 amps. During field visit it is also observed that, Some poles are tilted and some are damaged. Some pin insulator and V cross arm are damaged. Hence considering the reliability and future load growth condition, upgradation of only part of section with 55 sqmm size to 80 sqmm is proposed.		
24	Bhanjanagar	BNED	KULADA	15	0.6162	Kuloda feeder emanates from Bhanjanagar PSS. Total length of the feeder is 42 Ckm. and supplying 4091 nos. of consumers including some small scale industries and rice mills. Peak load of the feeder is 99 amps. During field visit it is also observed that. Some poles are damaged and conductor sag is not maintained with proper clearance. Some Pin insulators, HT stays and V cross arms are damaged. There are multiple joints in the conductor. Frequent tripping occurs in ths feeder due to conductor snapping. Hence considering reliability, refurbishment and upgradation of only part of section with conductor size of 34 sqmm size to 55 sqmm has been proposed.		

S NO	CIRCLE	DIVISION	11KV FEEDER	Length Considered CKM	Project Cost (Cr.)	Justification of the proposal
25	Berhampur	GNED	AGASTI NUAGAM	19.1	0.6391	Agastinuagam feeder emanates from chatrapur PSS of GNED. Total length of the feeder is 20 Ckm and supplying to 2971 nos. of consumers. Peak load of the feeder is 70 amps. During field visit it is also observed that, conductor is aged. condition of the conductor is very bad. There are multiple joints in the conductor. Hence frequent tripping occurs fue to conductor snapping. Poles are tilted in some places and V cross arms and HT stays are damaged. Hence considering reliability, refurbishment and upgradation of the trunk line with 34 sqmm size to 80 sqmm has been proposed.
26	Berhampur	GNED	PALUR	1.2	0.1044	Palur feeder emanates from Humma PSS of GNED, Ganjam. Total length of the feeder is 72 ckm and supplying to 3215 nos. consumers, including some industrial load like casew factory and irrigation load etc. Peak load of the feeder is 130 amps. During field visit it is also observed that, poles are tilted and some are also cracked / bad condition. Conductor sagging is there with multiple joints. Hence considering the reliability and future load growth upgradation of only part of section of the trunk line with conductor size of 34 sqmm size to 80 sqmm is proposed.
27	Berhampur	GNED	NARAYANI	4	0.2743	Narayani feeder emanates from kanheipur PSS. Total length of the feeder is 24 Ckm. and supplying 4228 nos. consumers. Peak load of the feeder is 75 amps. conductor is aged. During field visit it is also observed that the feeder is very near to the sea shore and due to coming under saline affected area, condition of the conductor is very bad. Frequent tripping and conductor snapping occurs espicially during summer and rainy season. Poles are tilted and conductor sag is there in some location. Hence considering reliability, refurbishment and upgradation of only part of section of the trunk line with conductor size of 34 sqmm size to 80 sqmm is proposed.
28	Berhampur	GNED	KESHPUR	5.5	0.3506	Keshpur feeder emanates from Kanheipur PSS of GNED, Ganjam. Total length of the feeder is 17 ckm. supplying to 4236 nos. consumers. including critical consumers like industrial load, GP offices etc. Peak load of the feeder is 125 amps. During field visit it is also observed that, some Poles are tilted and conductor sagging is there along with some V cross arm damaged. Hence considering the reliability and future load growth refurbishment and upgradation of only part of section of the trunk line with conductor size of 34 sqmm size to 80 sqmm is proposed.
29	Berhampur	GNED	KANHEIPUR	3	0.1868	Kanheipur feeder emanates from Kanheipur PSS of GNED, Ganjam. Total length of the feeder is 61 ckm. supplying to 5588 nos. of consumers including critical consumer like GP office, medium scale industries etc. Peak load of the feeder is 210 amps. As per the present loading the feeder is overloaded.

S NO	CIRCLE	DIVISION	11KV FEEDER	Length Considered CKM	Project Cost (Cr.)	Justification of the proposal
						During field visit it has been found that some poles are tilted and conductor sagging is there some places. Hence considering the reliability and future load growth refurbishment and upgradation of only part of section of the trunk line with 34 sqmm size to 80 sqmm is proposed.

9.2.7 Snapshot of guide lines of Bureau of Energy Efficiency for feeder meter

BUREAU OF ENERGY EFFICIENCY

NOTIFICATION

New Delhi, the 6th October, 2021

No. 18/1/BEE/DISCOM/2021.—Whereas the draft regulations namely, the Bureau of Energy Efficiency (Manner and Intervals for Conduct of Energy Audit (Accounting) in Electricity Distribution Companies) Regulations, 2021, were published vide notification No.18/1/BEE/DISCOM/2021, dated the 15th April, 2021 in the Gazette of India, Extraordinary, Part III, Section 4, as required under sub-section (1) of section 58 of the Energy Conservation Act, 2001 (52 of 2001) inviting objections and suggestions from all persons likely to be affected thereby within forty-five days from the date of publication of the Notification in the Official Gazette;

AND WHEREAS objections and suggestions received with respect to the said draft regulations within the specified period aforesaid have been duly considered;

NOW, THEREFORE, in exercise of the powers conferred by clause (g) of sub-section (2) of section 58, read with clause (q) of sub-section (2) of section 13 of the Energy Conservation Act, 2001 (52 of 2001), the Bureau of Energy Efficiency, with the previous approval of the Central Government, hereby makes the following regulations, namely:--

- 5. Pre-requisites for annual energy audit and periodic energy accounting Save as otherwise provided, every electricity distribution company shall undertake all actions as may be required for the annual energy audit and periodic energy accounting before the start of the relevant financial year, including the following actions, namely:—
 - (a) the identification and mapping of all of the electrical network assets;
 - (b) the identification and mapping of high tension and low-tension consumers;
 - (c) the development and implementation of information technology enabled energy accounting and audit system, including associated software;
 - (d) the electricity distribution company shall ensure the installation of functional meters for all consumers, transformers and feeders:

Provided that meter installation may be done in a phased manner within a period of three financial years from the date of the commencement of these regulations in accordance with the trajectory setout in the First Schedule;

- (e) all distribution transformers (other than high voltage distribution system upto 25kVA and other distribution system below 25 kVA) shall be metered with communicable meters. And existing noncommunicable distribution transformer meters shall be replaced with communicable meters and integrated with advanced metering infrastructure;
- (f) the electricity distribution company shall establish an information technology enabled system to create energy accounting reports without any manual interference:

Provided that such system may be established-

- (i) within a period of three years from the date of the commencement of these regulations in case of urban and priority area consumers; and
- (ii) within five years from the date of the commencement of these regulations in case of rural consumers;
- (g) the electricity distribution company shall create a centralized energy accounting and audit cell comprising of—
 - a nodal officer, an energy manager and an information technology manager, having professional experience of not less than five years; and
 - (ii) a financial manager having professional experience of not less than five years;
- (h) any other requisite that Bureau may direct for energy audit and accounting purpose.

- 7. Manner of annual energy audit and periodic energy accounting.- (1) Every annual energy audit and periodic energy accounting under these regulations shall be conducted in the following manner, namely:—
 - (a) verification of existing pattern of energy distribution across periphery of electricity distribution company; and
 - (b) verification of accounted energy flow submitted by electricity distribution company at all applicable voltage levels of the distribution network,—
 - (i) energy flow between transmission and 66kV/33kV/11kV incoming distribution feeders;
 - energy flow between 66kV/33kV outgoing and 11kV/6.6kV incoming feeders;
 - (iii) energy flow between 11 kV/6.6kV feeders and distribution transformers, or high voltage distribution system;
 - (iv) energy flow between distribution transformer, or high voltage distribution system to endconsumer, including ring main system;
 - (v) energy flow between Feeder to end-consumer; and
 - (vi) energy flow between 66/33/11 kV directly to consumer.

(2) The accredited energy auditor, in consultation with the nodal officer of the electricity distribution company shall,--

- (a) develop a scope of work for the conduct of energy audit required under these regulations;
- (b) agree on best practice procedures on accounting of energy distributed across the network; and
- (c) collect data on energy received, and distributed, covered within the scope of energy audit.

(3) The accredited energy auditor shall-

- (a) verify the accuracy of the data collected in consultation with the nodal officer of the electricity distribution companies as per standard practice to assess the validity of the data collected; and
- (b) analyse and process the data with respect to-
 - (i) consistency of data monitoring compared to the collected data;
 - (ii) recommendations to facilitate energy accounting and improve energy efficiency; and
 - (iii) with respect to the purpose of energy accounting in reducing losses for the electricity distribution company.

LT Bare Line to ABC conversion:

9.2.8 Unit BOQ for Conversion of LT Bare conductor to 4x95+1x95+1x16mm2

S No.	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)
1	1.1KV LT AB Cable 4x95+1x95+1x16mm2	1030	М	422	4,34,320
2	300Kg PSC pole9Mtr long	10	EA	3000	30,000
3	Base Plate for PSC pole	10	EA	230	2,300
4	BOARD DANGER	10	EA	80	800
5	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	3.009	KG	75	226
6	ANTICLIMBING DEVICE (3 KG per support)	30	KG	416	12,474
7	Pole clamp for EYE hook for XLPE Aerial bunched Cable	35	pair	200	7,000
8	Suspension Clamp with EYE hook for ABC	22	No.	340	7,480
9	Eye Hook for AB cable for dead end point	13	No.	60	780
10	Conductor Dead End Clamp suitable for bare messenger XLPE Aerial bunched cable (25-70 sq mm)	13	No.	65	845
11	LT Stay set Complete	13	Set	520	6,760
12	LT Stay Insulator	13	No.	30	390
13	LT Stay clamp	13	pair	110	1,430
14	7/10 SWG G I stay wire (10Kg. / Set)	130	KG	75	9,750
15	Coil Earthing	20	EA	166	3,320
16	Pipe HDPE Size 25MM (3 mtr each)	30	М	28	840

S No.	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)					
17	Lug AL 70 SQMM for 7/8 SWG WIRE/EARTHING	40	EA	36	1,440					
18	LT Distribution Box Polycarbonate	20	EA	984	19,685					
19	Cap cable end for ABC Cables	20	EA	81	1,620					
20	IPC KZ 4X150	80	EA	52	4,142					
21	IPC EP 95 LT ABC 16-95 & 5-10 SQMM ST.LT	60	EA	88	5,297					
22	IPC KZ 2x150 LTABC 50-150 & 6-35(50) sqmm	100	EA	64	6,446					
23	STEEL STRAP SIZE 20 MMX50 M LONG	4	ROL	1620	6,478					
24	BUCKLES FOR STEEL STRAP (1 EA = 100 NOS)	4	EA	491	1,963					
25	CABLE 1.1KV AL 4CX25 SQMM ARM	60	M	170	10,172					
26	GLAND FOR CABLE 4X25 SQ.MM	20	EA	48	957					
27	LUG AL CRIMPING 25 SQMM XLPE SINGLE HOLE	20	EA	7	139					
28	FLAT GI SIZE 50X6 MM	480	KG	75	36,000					
29	FLAT GI Size 25x6 MM	200	KG	75	15,000					
30	FRP CROSS ARM 10/0MM 415V	40	EA	981	39,260					
31	ISA-50^50^6 GI Angel (4.6KG/M)	210	KG	75	15,750					
32		210	KG	75	15,750					
24		12	KG	70	930					
35		<u>24</u>	KG	78	312					
36	2Cv/ mm2 T XI PE Cable	1800	Mtr	/8	86.400					
37	4Cx10 mm2 LT XL PE Cable	400	Mtr	84	33 776					
38	WASHER GLSIZE 16MM DIA	- 1 00 6	KG	78	468					
30	TIE PLASTIC BLACK SIZE 7.6 MM X 380 MM	40	FA	26	1 033					
40	Tie Plastic size 9mmx265mm	60	ΕΔ	20	1,000					
Δ	Total cost of the material	00	L/\	22	824950					
B	Stock storage and insurance @ 3% of A				24749					
C	Subtotal-C = (A+B)									
D	T & P charges @ 2% of C									
E	Contingency charges @ 3% of C									
F	Transportation charges @ 7.5 % of C				63727					
	Erection Charges @ 5% of RS Joist									
	Erection Charges @ 20% of PSC Pole				6180					
	Erection Charges @ 10% of other items except RSJ				81880					
G	Erection Charges Sub Total:				88060					
-	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	13	No.	1270	16510					
	=0.3037xRs.4185.84=Rs.1263.03 or Rs.1270.00(including									
	HT and LT)									
	Cement concreting for support with C.C. 1:3:6 by using 4cm									
	SIZE nard granite metal= (0.45) M2-0.20 mm @ 4158.84 = @ 4158.84	10	No	1070	12700					
	M3=0.3037xBs 4185 84-Bs 1263 03 or Bs 1270 00/Including	10	INO.	1270	12700					
	=0.50577((3.4165.64=((3.1265.65° 61 ((3.1276.66(including									
Н	Sub-Total H(C+D+E+F+G)				1073181					
	Over Head charges/Departmental including Supervision Char	aes @ 6	% of H		64391					
J	Total Estimated Cost i.e. J=(H+I)	<u> </u>			1137572					
	Dismantling of Conductor and transporting to nearest store	4		05000	05000					
	of TPSODL for 1 ckt Km	1	LS	25200	25200					
к		Sub Total			1162772					
L	GST 18%	10101			209299					
M	CESS 1%				11628					
	Total of Estimate(K+L+M)				1383698					
	InspectionFee				200					
	Drawing Approval				200					
	Grand Total				1384098					
	Escalation of 2 years with 12.36% of grand Total				1555173					
	Total (In Crores)				0.1555					

9.2.9 Unit BOQ for Conversion of LT Bare conductor to 4x50+1x50+1x16mm2

1 2 3 4	1.1KV LT AB Cable 4x50+1x50+1x16mm2 300Kg PSC pole 9Mtr long Base Plate for PSC pole BOARD DANGER Pack Clamp for danger Plate 25Y2 mm_flat_0.50Kg/Mtr	1030 10 10	M EA	228	235273
2 3 4	300Kg PSC pole 9Mtr long Base Plate for PSC pole BOARD DANGER Back Clamp for danger Plate 25X2 mm flat: 0.50Kg/Mtr	10 10	EA	2000	
3 4	Base Plate for PSC pole BOARD DANGER Back Clamp for danger Plate 25Y2 mm flat: 0.50Ka/Mtr	10		3000	30000
4	BOARD DANGER		EA	230	2300
	Back Clamp for dapager Plate 25X2 mm flat 0 50Kg/Mtr	10	EA	80	800
5	Flat of 0.510mtr length 1 no's = $(1x0.59x0.510)$	3.009	KG	75	226
6	ANTICLIMBING DEVICE (3 KG persupport)	30	KG	416	12474
7	Pole clamp for EYE hook for XLPE Aerial bunched Cable	35	pair	200	7000
8	Suspension Clamp with EYE hook for ABC	22	No.	340	7480
9	Eye Hook for AB cable for dead end point	13	No.	60	780
10	Conductor Dead End Clamp suitable for bare messenger XLPE Aerial bunched cable (25-70 sq.mm)	13	No.	65	845
11	LT Stay set Complete	13	Set	520	6760
12	LT Stay Insulator	13	No.	30	390
13	LT Stay clamp	13	pair	110	1430
14	7/10 SWG G I stay wire (10Kg. / Set)	130	KG	75	9750
15	Coil Earthing	20	EA	166	3320
16	Pipe HDPE Size 25MM (3 mtr each)	30	М	28	840
17	Lug AL 70 SQMM for 7/8 SWG WIRE/EARTHING	40	EA	36	1440
18	LT Distribution Box Polycarbonate	20	EA	984	19685
19	Cap cable end for ABC Cables	20	EA	81	1620
20	IPC KZ 4X150	80	EA	52	4142
21	IPC EP 95 LT ABC 16-95 & 5-10 SQMM ST.LT	60	EA	88	5297
22	IPC KZ 2x150 LTABC 50-150 & 6-35(50) sqmm	100	EA	64	6446
23	STEEL STRAP SIZE 20 MMX50 M LONG	4	ROL	1620	6478
24	BUCKLES FOR STEEL STRAP (1 EA = 100 NOS)	4	EA	491	1963
25	CABLE 1.1KV AL 4CX25 SQMM ARM	60	M	1/0	101/2
26	GLAND FOR CABLE 4X25 SQ.MM	20	EA	48	957
27	LUG AL CRIMPING 25 SQMM XLPE SINGLE HOLE	20	EA	/	139
28	FLAT GESIZE 50X6 MM	480	KG	75	36000
29		200	KG FA	75	15000
30		40	EA	981	39260
22	ISA-50 50 6 GI Anger (4.6KG/M)	210	KG	75	15750
32		210	KG	75	15750
33		12	KG	78	930
34		<u> </u>	KG	70	1072
30	20x4 mm2 LT XLEE Cablo	4	NG M+r	18	31Z 96400
27		400	Mtr	40	22776
38	WASHER GLSIZE 16MM DIA	400	KG	78	468
30		40	FΔ	26	1033
40	Tie Plastic size 0mmy265mm	60		20	1340
40 Δ	Total cost of the material	00	LA	22	625903
R	Stock storage and insurance @ 3% of A				18777
C C	Sub total-C = (A+B)				644680
D	T & P charges @ 2% of C				12894
F	Contingency charges @ 3% of C				19340
F	Transportation charges @ 7.5 % of C				48351
\vdash	Frection Charges @ 5% of RS loist				
├	Erection Charges @ 20% of DSC Data				6100
┣──╉	Election Charges @ 10% of other items except PS1				010U 61270
	Fraction Charges Sub Total:				67550
	Compart concreting for Stud & Stoy and a relate with C.C.				01000
	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)	13	No.	1270	16510

S No.	Item Description	Qty.	Unit	Unit Rate (In Rs)	Amount (In Rs)	
	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)	10	No.	1270	12700	
Н	Sub-Total H(C+D+E+F+G)					
I	Over Head charges/Departmental including Supervision Charges @ 6% of H					
J	Total Estimated Cost i.e. J=(H+I)				871355	
	Dismantling of Conductor and transporting to nearest store of TPSODL for 1 ckt Km	1	Ls	25200	25200	
K		Sub To	otal		896555	
L	GST 18%				161380	
Μ	CESS 1%				8966	
	Total of Estimate(K+L+M)				1066901	
	InspectionFee				200	
	Drawing Approval					
	Grand Total					
	Escalation of 2 years with 12.36% of grand Total				1199219	
	Total (In Crores)				0.1199	

9.2.10 Unit BOQ for Installation of Distribution Box for Service Connection

S No.	Item Description	Unit	Qty.	Unit Rate (INR)	Amount (INR)
1	STEEL STRAP SIZE 20 MMX50 M LONG	ROL	0.06	1,620	97
2	BUCKLES FOR STEEL STRAP (1 EA = 100 NOS)	EA	0.04	490.67	20
3	LT Distribution Box Polycarbonate	EA	1	984.24	984
4	2Cx4 mm2 LT XLPE Cable	Mtr	100	48	4,800
5	4Cx10 mm2 LT XLPE Cable	Mtr	60	84.44	5,066
6	Board Danger	EA	1	80	80
7	ANTICLIMBING DEVICE	EA	1	415.8	416
8	CABLE 1.1KV AL 4CX25 SQMM ARM	Mtr	3	181.37	544
9	GLAND FOR CABLE 4X25 SQ.MM	EA	1	47.84	48
10	LUG AL CRIMPING 25 SQMM XLPE SINGLE HOLE	EA	4	13.5	54
11	IPC EP 95 LT ABC 16-95 & 5-10 SQMM ST.LT	EA	4	88.29	353
12	IPC KZ 2x150 LTABC 50-150 & 6-35(50) sqmm	EA	4	64.46	258
13	Coil Earthing	No	1	166	166
14	FLAT GI Size 25x6 MM	KG	2	75	150
15	FRP CROSS ARM 1070MM 415V	EA	1	1139	1,139
16	BOLT & NUT GI 12MMX50MM HEX	KG	1	78	78
17	BOLT & NUT GI 16MMX75M HEX	KG	1	78	78
18	WASHER GI SIZE 12MM DIA	KG	1	78	78
19	WASHER GI SIZE 16MM DIA	KG	1	78	78
Α	Total cost of the material				14,487
В	Stock, storage and insurance @ 3% of A:				435
С	Sub total-C = $(A+B)$				14,922
D	T & P charges @ 2% of C				298
E	Contingency charges @ 3% of C				448
F	Transportation charges @ 7.5 % of C				1,119
	Erection Charges @ 5% of RS Joist				
	Erection Charges @ 20% of PSC Pole				-
	Erection Charges @ 10% of other items except RSJ				1,492
G	Erection Charges Sub Total:				1,492
Н	Sub-Total H(C+D+E+F+G)				
I	Over Head charges/Departmental including Supervision Charges @ 6% of H				
J	Total Estimated Cost i.e. J=(H+I)				
	Dismantling of Service Cable & Transport to Store for 1 mtr 1 50				
K	Sub-Total				
L	GST 18%	-	-		3,497
М	CESS 1%				194
	Total of Estimate(K+L+M)				23.118

S No.	Item Description	Unit	Qty.	Unit Rate (INR)	Amount (INR)
	Inspection Fee				200
	Drawing Approval				200
	Grand Total				23,518
	Escalation of 2 years with 12.36% of grand Total				26,425
	Total (In Crores)				0.0026

9.2.11 Estimated cost for GIS Implementation:

SN	Туре	Description	Total (Rs)
1	Satellite Image procurement for approx. 8200 sq. kms	Procurement of satellite image for Base map creation of TPSODL for approx. 8163 sq. kms	16,00,000
2	GIS Software system Implementation Phase 2	Firm PO has already been issued to vendor. As per T&Cs of PO, vendor is supposed to complete development of major applications and integration with other systems in FY-23	3,47,13,613
3	Software, Subscription and licenses	Citrix Subscription with RDS Subscription for 3 years (approx. 30 nos.), Google Map plugin (approx. 30 nos.), any other software development like mobile application and any other software licenses	91,27,938
4	Mapping Services	Survey and mapping of City Circle, Asks & Berhampur and Bhanjanagr Circle excluding Phulbani and Boudh (Approx. 8163 Sqkm). Benchmark of TPCODL and TPSODL are used is used. 20% escalation is considered for FY23. Refer Annexure- Survey Cost Excl. Boudh & Phulbani	13,53,38,185
5	Manpower for Training , QC,QA, project related activities	Business Associates for Survey and digitization QC, training and project related activities	27,00,000
6	Material	Projector, Mobile/Tablets(10" screen & latest OS) for Delta Updation, LED TV for map display, DGPS equipment's	5,31,000
		TOTAL	18,40,10,736

9.3 Annexures-Network Reliability

Cost Estimate - Network Reliability

9.3.1 Refurbishment of Primary Substations (PSS)

S No.	Item Description	Qty.	Unit	Unit Rate (In Cr.)	Amount (INR)
1	33 KV Outdoor VCB-1600A with indoor CR panel & without PT, with outdoor CT (CTR-600-300-150/1- 1A,15VA,STC 25 KA/3 Sec,class:0.5 & 5P10)for feeder protection	3	EA	540000	1,620,000
2	33 KV Oil Cooled CT with CTR (200-100/5-5) A. Burdon of 15VA, MCT 0.5 class, protection 5P10, STC 25KA/3 Sec & ISF<5	3	No	28800	86,400
3	33 KV Single phase PT (33 KV/ $\sqrt{3}$ /110 V/ $\sqrt{3}$)(oil cooled) class 0.5 with O/P burden of 100VA	3	No	25420	76,260
4	11 KV Outdoor VCB with 2 Core CT & indoor CR panel & without PT, with CT(CTR-600-300-150/1- 1A,STC 25 KA/3 Sec,class:0.5 & 5P10)feeder protection with numerical relay	9	EA	250,000	2,250,000
5	11 KV multicore 3PH CT (600-300-150/1-1 A) for 3 Core	9	EA	18,000	162,000
6	11 KV Oil Cooled 3 Ph PT (11000V/110V), class 0.5/3P,with O/P burden of 30 VA	3	No	18930	56,790
7	11KV Control relay panel	3	EA	285877.6	857,632.8
8	33 KV 630 AMP Double break (Turn & twist center rotating) isolator with earth switch with PI(Porcelain)	5	Set	67740.	338,700
9	11 KV 800 AMP isolator with earth switch with PI(Porcelain)	5	Set	52850	264,250.00
10	Lightning Arrester(30KV,10KA) station class, Class- 2 for incoming 33 KV feeder	180	No	10350	1863000
11	Lightning Arrester (12 KV,10KA) for 11 KV Out going feeder (for 2 feeders)	450	No	3550	1597500
12	Earthing for Supports (Coil type)	180	No	166	29880
13	19 C 2.5 mm sq Cu Control Cable, un armored	500	Mtr.	493.43	246,715
14	10 C 2.5 mm sq Cu Control Cable, un armored	500	Mtr.	293.20	146,600
15	7 C 2.5 mm sq Cu Control Cable, un armored	800	Mtr.	201.03	160,824
10	Battery (49)	8Z 20		25000	2,050,000
10	Battery Charger	70		40000	31 600 000
10	Control Cable 2Cx 50 Sq mm	2000	Mtr	400000 871.65	1 743 300
20	ACDB	67	FA	252 968	16 948 822 5
21	Numerical relav	135	EA	99.209	13.393.215
22	Numerical relay ITC	135	EA	12,708	1,715,580
23	40mm Nominal bore GI pipe (medium gauge) earthing device with 3mtr long	692	No	1050	726,600
24	25X6mm GI Flat (@1.2Kg/mtr)	7683.6	Kg	75.00	576,270
25	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	692	No	1600	1,107,200
26	Sundries (Clamp, connector, danger board, Insulation tape etc)	117	LS	2000	234,000
27	3C x 300 mm ² 33KV XLPE Cable(Armored),A2XFY	720	Mtr	1756	1,264,320
28	3C x 150 mm ² 11KV XLPE Cable (Armored),A2XFY	1200	Mtr	735	882,000
29	Yard Lighting at PSS(Including 9mtr. PSC Pole)	300	EA	7460.32	2,238,096
A	Total cost of the material				86185955
В	Stock, storage and insurance @ 3% of A:				2585579
C	Sub total-C = $(A+B)$				88771534
D	T & P charges @ 2% of C				1775431
<u> </u>	Contingency charges @ 3% of C				2663146



S No.	Item Description	Qty.	Unit	Unit Rate (In Cr.)	Amount (INR)	
F	Transportation charges @ 7.5 % of C	6657865				
G	Erection Charges @ 5% for Breaker				199305	
G	Erection Charges @ 10% of other items				8478543	
Н	Erection Charges Sub Total :				8677848	
	Sub-Total H(C+D+E+F+H)				108545824	
J	Over Head charges/Departmental including Supervis	ion Charg	jes @ 6	% of H	6512749	
К	"Dismantling of faulty Equipment like CB, CT, PT <(>&<)> Isolator Loading, Transportation within 30 Kms, Unloading of same PTR if Require ed. Insurance during transportation shall be in TPSODL scope."	12	EA	17600	211200	
L	Total Estimated Cost i.e. L=(I+J+K)				115269773	
	GST 18%				20748559.22	
	CESS 1%				1152697.734	
	Total of Estimate(J+K+L)				137171030	
	Inspection Fee					
	Drawing Approval				200	
	Grand Total				137171430	
	Escalation of 2 years with 12.36% of grand Total				154125819	
	Total (In Crores)				15.41	

9.3.2 Unit BOQ of Plinth Mounted 33/0.4 KV 100 KVA Station Transformer

S No	Description Of materials	Unit	Qty.	Unit Rate (INR)	Amount (INR)
1	100 KVA,33/0.4 KV(Cu) Transformer with tap changer, BIS Energy level-II	No	1	272000	272000
2	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.)	No	2	25824	51647
3	Channel 100X50X6mm. for straight cross arm (4.5mtr X 02 pcs) (9.2Kg/mtr.) Galvanisation charges @ Rs 10 per Kg for Pressure	Kg	82.8	75	6210
4	AB Switch & HG fuse mounting channel 75X40X6 mm,4.5mtr.Long 4 Nos.(6.8Kg/mtr)	Kg	122.4	75	9180
5	Cantilever channel for supporting HG fuse 75X40X6mm MS Angle 1.5 mtr. Long 2 Nos. (6.8Kg/mtr)	Kg	20.4	75	1530
6	Cantilever channel for supporting AB Switch 75X40X6mm MS Angle 1.5 mtr. Long 2 Nos. (6.8Kg/mtr)	Kg	20.4	75	1530
7	Angle for cantilever arrangement for AB switch and HG fuse 75X40X6mm 3mtr long each, 4Nos(6.8Kg/Mtr)	Kg	81.6	75	6120
8	Angle for mounting of LT distribution box 75X40X6mm 3mtr long each, (6.8Kg/Mtr)	Kg	20.4	75	1530
9	Discinsulator(B&S)120 KN polymer	No	6	1440	8640
10	33KV H/W fitting (T & C) type	No	3	351	1053
11	33KV AB switch 3 Pole, 200A	Set	1	15100	15100
12	33KV HG fuse 3 Pole, 200A	Set	1	12970	12970
13	33KV Lighting arrestor	No	3	10350	31050
14	LT Distribution Box with MCCB, Aluminium busbar of two bay with Kit Kat fuse for 100 Kva S/s	No	1	24419	24419
15	HT Stay Set (Complete) REC Construction standard	Set	2	1050	2100
16	HT Stay Insulator Type -C	No	2	50	100
17	Satay Clamp (1.9 Kg /pair)	No	2	125	250
18	7/10 G.I. Stay Wire (Grade -2)	Kg	20	75	1500
19	G.I Pipe Earthing 40mm Dia medium gauge 3mtr long for Earthing device	No	5	1050	5250
20	Earthing for Supports (Coil type)	No	2	166	332
21	No.6 G.I wire for earthing	Kg	25	75	1875

S No	Description Of materials	Unit	Qty.	Unit Rate (INR)	Amount (INR)		
22	GI Flat (25x6mm) for Neutral & body Earthing of DTR	Kg	20	75	1500		
23	GI Bolts, Nuts & washers	Kg	25	78	1950		
24	LT 3 .5 Core ,185 sqmm PVC cable (unarmoured)	Mtr	12	635	7620		
25	100SQMM Dog Conductor	Mtr	300	55	16500		
26	Material for earthing including Masonry work for earth pit, salt, charcoal and cement plate cover	LS	5	1500	7500		
27	Base plate for support	No	2	1500	3000		
28	Sundries (Paint, Danger Board, Al Binding tape & wire insulating tape, anti-climbing device, Clamp connector, Jumpering materials, Socket & other accessories etc.	LS	1	3000	3000		
Α	Total cost of the material				4,95,456		
В	Stock, storage and insurance @ 3% of A:				14,864		
С	Sub total-C = (A+B)				5,10,320		
D	T & P charges @ 2% of C				10,206		
E	Contingency charges @ 3% of C						
F	Transportation charges @ 7.5 % of C				38,274		
	Erection Charges @ 5% of RS Joist & WPB pole& D	ΓR			16,668		
	Erection Charges @ 20% of PSC Pole						
	Erection Charges @ 10% of other items except RSJ				17,696		
G	Erection Charges Sub Total :			-	34,364		
	Cement concreting for stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= 0.45Mtrx0.45Mtrx1.5Mtr= 0.3037Cum. @ 4158.84=0.3037x4158.84=1263.03 or 1270.00		2	1270	2,540		
	Concreting of support C.C. 1:3:6, using 40mm HBG metal=0.45Mtrx0.45Mtrx1.5Mtr= 0.3037Cum. @4158.84=0.3037x4158.84=1263.03 or 1270.00		2	1270	2,540		
Н	Sub-Total (C+D+E+F+G)				6,13,554		
I	Over Head charges/Departmental including Supervis	ion Char	ges @ 6%	of H	36,813		
J	Total Estimated Cost i.e. L=(J+K)				6,50,368		
K	GST 18%				1,17,066		
L	CESS 1%				6,504		
	Total of Estimate(J+K+L)				7,73,937		
	InspectionFee				200		
	Drawing Approval				200		
	Grand Total				7,74,337		
	Escalation of 2 years with 12.36% of grand Total				8,70,046		
	Total (In Crores)				0.08700		

9.3.3 Unit BOQ for Replacement of Old 5 MVA PTR

S No.	Item-Description	Unit	Qty.	Unit Rate	Amount (INR)
	Part-A				
1	Earthing and Grounding as per applicable TS				
а	GI flat 90X6 mm size underground format	MT	1	75,000	75,000
b	GI flat 50X6 mm size for riser	MT	0.3	75,000	22,500
С	GI flat 25X6 mm size for riser	MT	0.3	75,000	22,500
d	8 SWG GI wire	MT	0.05	75,000	3,750
2	Busbar, droppers, jumpers and interconnections with all outdoor equipment using 232 sq.mm AAA Conductor, all associated conductor, insulator, hardware, clamps, 8 SWG wire etc as per applicable TS				
а	33 KV & 11 KV Bus bar with 232 sq.mm AAA Conductor	km	0.2	1,60,500	32100
b	Equipment jumpering with 232 sq.mm AAA Conductor	km	0.2	1,60,500	32100
с	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	Set	9	9,059	81535

S No.	Item-Description	Unit	Qty.	Unit Rate	Amount (INR)		
d	12 bolted (M-12)"T" clamp, 232 sq.mm AAAC run & 230 mm drop	No	3	960	2880		
е	3 Bolted (M- 16) PG Clamp suitable for 232 sq.mm AAA Conductor	No	12	1,150	13800		
3	33Kv Isolator without earth switch	Set	1	61,200	61200		
4	33/11 KV, 5 MVA 33/11 KV (Cu) Power Transformers with OLTC (Excluding Foundation)	No	1	43,15,500	4315500		
5	33Kv Post Insulator	No	3	1,580	4740		
Α	Total cost of the material				4667605		
В	Stock, storage and insurance @ 39	% of A:			140028		
С	Subtotal-C = (A+B)				4807633		
D	T & P charges @ 2% of C				96153		
E	Contingency charges @ 3% of C				144229		
F	transportation charges @ 7.5 % of C						
	Erection Charges @ 5% of RS Joist & WPB pole				222248		
	Erection Charges @ 20% of PSC Pole						
	Erection Charges @ 10% of other items except RSJ				36267		
G	Erection Charges Sub Total:				258515		
Н	Sub-Total H(C+D+E+F+G)				5667102		
Ι	Over Head charges/Departmental including Supervision (Charge	s @ 6%	of H	340026		
J	Total Estimated Cost i.e. J=(H+I)				6007129		
	Dismantling of 3.15 MVA Transformer and transporting nearest store of TPSODL 1 No	g to	1	50,600.00	50600		
	Testing		1	1,61,700.00	161700		
K	Sub-Total				6219429		
L	GST 18%				1119497		
М	CESS 1%				62194		
	Total of Estimate(K+L+M)				7401120		
	Inspection Fee						
	Drawing Approval				200		
	Grand Total				7401520		
	Escalation of 2 years with 12.36% of grand Total				8316348		
	Total (In Crores)				0.83		

9.3.4 Unit BOQ for 33 kV New Line for GSS Bay utilization using 148 SQ.MM.

-AAA Conductor

	No. of 22 KV/ DD required With out loolotor			Rale	Amount
	No. of 33 KV DP required without isolator		2	2	
	MATERIALS FOR 33 KV DP V	Nithout Is	<u>solator</u>		
1	WPB 160x152 (13Mtr. Long, 30.44KG/Mtr.)	No	4	31200	1,24,800
2	Top Channel 100X50X6mm, 9.56 KG/Mtr., each channel length 3.25 mtr., 2 no's channel required =(2x9.56x3.25)	KG	124.28	76	9,445
3	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr. length, 6 no's required = (6x2.36x0.280)	KG	7.93	76	603
4	Double Pole Belting Channel 75X40X 4.8mm., 7.14KG/Mtr., each channel length 1.96 Mtr., 5 no's channel required =(5x7.14x1.96)	KG	139.94	76	10,636
5	50x50x6mm.GI Bracing Angle, 4.5Kg./mtr., each angle length 3.432 mtr., 4 nos angle required = (4*4.5*3.432)	KG	123.55	76	9,390
6	Danger Plate, 2 no's.	No.	4	80	320
7	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 2 no's = (2x0.59x0.510)	KG	1.20	76	91
8	H.T. Stay set (Complete)	Set	4	1050	4,200

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount		
9	H.T. Stay clamp, 50x8 mm. flat, 3.14Kg/Mtr., 0.511 Mtr. Length, 2 no's gty. required (1 Pair)	Pair	4	125	500		
10	H.T. Stay Insulator Type-C (2 No's.)	No.	8	50	400		
11	7/8 SWG Stay Wire 15kg /stay	K.g.	60	75	4,500		
12	Gi Pipe Earthing 40mm. 3 Mtr. Long	No.	2	1050	2,100		
13	50x6mm GI Flat for earthing, 2.36kg/mtr., (2.5 mtr. For mesh formation and 2.5 mtr. For raising)= 5x2.36	KG	23.60	76	1,794		
14	GI barbed wire anticlimbing device 3 Kg. Per support	Kg	12	80	960		
15	Back Clamp for anticlimbing device 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 8 no's = (8x0.59x0.510)	KG	4.81	76	366		
16	33KV pin insulatorpolymer	No.	6	480	2,880		
17	H W fitting(B&S) 90KN,4 Bolt	No.	12	500	6,000		
18	Disc insulator (B&S) 90 KN polymer	No.	12	1150	13,800		
19	PG Clamp for 148 sq.mm AAA conductor	NO.	12	620	7,440		
20	GI Nut, Bolt & Washer of different sizes (12.261 Kg each DP without Isolator)	K.g.	24.52	78	1,913		
21	Black Paint	Ltr	2	220	440		
22	Yellow Colour Paint for Background	Ltr	4	220	880		
Α	Total Cost of materials				2,03,457		
В	Stock, Storage & Insurance i.e 3% of A						
С	Sub Total (A+B)						
D	Contingency @ 3% of C				6,287		
<u> </u>	Tools & Plants @ 2% of C						
	I ransportation @ 7.5% of C				15,717		
G	Erection Charges @ 5% on Tri/Breaker/WPB/ H-Pole				6,427		
-	Erection Charges @ 10% of Other items	d for 22ku			7,113		
⊢ ¦	Sum of (C to I)	U 101 33KV			- 2 45 105		
5	Civil & Service	s			2,43,103		
		<u> </u>	_	Unit	Total		
SN	Description of Materials	Unit	Qty.	Rate	Amount		
1	Fixing of 33KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts, including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material (Excavation of earth will be done of size 500X500X1500 mm.)	No.	4	2250	9,000		
2	Concreting ratio 1:1.5:3 (500mmX500mmX2200mm) = 0.55Cu.mtr	Cu.mtr	2.20	6500	14,300		
3	Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr	Cu.mtr	0.45	6500	2,925		
4	Installation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover	No.	2	2407	4,814		
К	Total Civil & Services						
L	. Total (J+K)						
М	Other overheads (Including 6% supervision charges) of L						
N	SubTotal (L+M)						
0	Total GST @ 18% of (N)						
Р	Gross Total Material +Services (N+O) for 33 KV DP	Without	Isolator		3,45,401		
No	af 22 KV DB required With lealater						
I INO.	UI JJ INV DE TEQUITEU VVILIT ISUIALUE				-		

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
	MATERIALS FOR 33 KV DF	With Isc	lator		
SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
1	WPB 160x152 (13Mtr. Long, 30.44KG/Mtr.)	No	0	31200	-
2	Top Channel 100X50X6mm, 9.56 KG/Mtr., each channel length 4.3 mtr., 2 no's channel required =(2x9.56x4.3)	KG	0.00	76	-
3	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr. length, 6 no's required = (6x2.36x0.280)	KG	0.00	76	-
4	Insulator Support Cahnnel 75X40X 4.8mm., 7.14KG/Mtr., each channel length 4.3 Mtr., 1 no's channel required =(1x7.14x4.3)	KG	0.00	76	-
5	Isolator Support Cahnnel 75X40X 4.8mm., 7.14KG/Mtr., each channel length 4.3 Mtr., 2 no's channel required =(2x7.14x4.3)	KG	0.00	76	-
6	Double Pole Belting Channel 75X40X 4.8mm., 7.14KG/Mtr., each channel length 4.3 Mtr., 4 no's channel required =(4x7.14x4.3)	KG	0.00	76	-
7	50x50x6mm.GI Bracing Angle, 4.5Kg./mtr., each angle length 4.927 mtr., 4 nos angle required = (4*4.5*4.927)	KG	0.00	76	-
8	Isolator Operating Down Pipe Support Cahnnel 75X40X 4.8mm., 7.14KG/Mtr., each channel length 0.8 Mtr., 1 no's channel required =(1x7.14x0.8)	KG	0.00	76	-
9	Down Pipe Diagonal Support Angle, 4.5Kg./mtr., each angle length 0.388mtr., 1 nos angle required = (1*4.5*0.388)	KG	0.00	76	-
10	Down Pipe Base Support Angle, 4.5Kg./mtr., each angle length 0.34mtr., 1 nos angle required = (1*4.5*0.340)	KG	0.00	76	-
11	Isolator Support Side Cahnnel 100X50X6mm, 9.56 KG/Mtr., each channel length 0.5 mtr., 2 no's channel required =(2x9.56x0.5)	KG	0.00	76	-
12	Danger Plate, 2 no's.	No.	0	80	-
13	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 2 no's = (2x0.59x0.510)	KG	0.00	76	-
14	H.T. Stay set (Complete)	Set	0	1050	-
15	H.T. Stay clamp, 50x8 mm. flat, 3.14Kg/Mtr., 0.511 Mtr. Length, 2 no's qty. required (1 Pair)	Pair	0	125	-
16	H.T. Stay Insulator Type-C (2 No's.)	No.	0	50	-
17	7/8 SWG Stay Wire 15kg /stay	K.g.	0	75	-
18	Gi Pipe Earthing 40mm. 3 Mtr. Long	No.	0	1050	-
19	50x6mm GI Flat for earthing, 2.36kg/mtr., (15 Mtr. For L.A, 4 Mtr for Isolator Body, 2.5 mtr. For mesh formation and 2.5 mtr. For raising)=24x2.36	KG	0.00	76	-
20	GI barbed wire anticlimbing device 3 Kg. Per support	Kg	0	80	-
21	Back Clamp for anticlimbing device 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 8 no's = (8x0.59x0.510)	KG	0.00	76	-
22	Lightning Arrester(30KV,10KA) (Station Class,class- 2)	EA	0	10350	-
23	33 KV 630 AMP Double break (Turn & twist centre rotating) isolator without earth switch with PI(Polymer)	Set	0	71580	-
24	33KV pin insulator polymer	No.	0	480	-
25	H W fitting(B&S) 90KN,4 Bolt	No.	0	500	-
26	Discinsulator (B&S) 90 KN polymer	No.	0	1150	-
27	PG Clamp for 148 sq.mm AAA conductor	NO.	0	620	-

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
28	GI Nut, Bolt & Washer of different sizes (22.15 Kg each DP with Isolator)	K.g.	0.00	78	-
29	Black Paint	Ltr	0	220	-
30	Yellow Colour Paint for Background	Ltr	0	220	-
Α	Total Cost of materials				-
В	Stock, Storage & Insurance i.e 3% of A				-
С	Sub Total (A+B)				-
D	Contingency @ 3% of C				-
E	Tools & Plants @ 2% of C				-
F	Franchar Charges @ 5% of C				-
G U	Election Charges @ 5% on Th/Breaker/WPB/ H-Pole				-
	Election Charges @ 10% of DSC pole-Not to be used	for 33ky			-
	Sum of (C to I)				
U	Civil & Service	s			
	<u></u>	<u> </u>		Unit	Total
SN	Description of Materials	Unit	Qty.	Rate	Amount
1	Fixing of 33KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts, including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material (Excavation of earth will be done of size 500X500X1500 mm.)	No.	0	2250	-
2	Concreting ratio 1:1.5:3 (500mmX500mmX2200mm) = 0.55Cu.mtr	Cu.mtr	0	6500	-
3	Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr	Cu.mtr	0	6500	-
4	Installation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover	No.	0	2407	-
Κ	Total Civil & Services				-
L	Total (J+K)				-
М	Other overheads (Including 6% supervision charges)	ofL			-
N	SubTotal (L+M)				-
0	Total GST @ 18% of (N)				-
Р	Gross Total Material +Services (N+O) for 33 KV DP	With Iso	lator		-
	No. of 33 KV Cut Point with 180 Deg	ree Angle			2
	MATERIALS FOR 33 KV Cut Point v	with 180	, Dearee Anale		۷.
			a a a a a a a a a a a a a a a a a a a	Unit	Total
SN	Description of Materials	Unit	Qty.	Rate	Amount
1	WPB 160x152 (13Mtr. Long, 30.44KG/Mtr.)	No	2	31200	62,400
2	Straight Cross Arm Channel 100 x 50 x 6 mm, 9.56 KG/mtr, each channel length 1.7 Mtr., 2 No's of Channel = (2x 9.56x1.7)	K.g.	65.008	76	4,941
3	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr. length, 8 no's required = (8x2.36x0.280)	K.g.	10.5728	76	804
4	Straight Cross Arm Top Channel 100 x 50 x 6 mm, 9.56 KG/mtr, each channel length 0.306 Mtr., 2 No's of Channel = (2x 9.56x0.306)	K.g.	11.70144	76	889
5	Danger Plate, 1 no's.	No.	2	80	160
6	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	KG	0.6018	76	46

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount			
7	GI barbed wire anticlimbing device 3 Kg. Per support	Kg	6	80	480			
8	Back Clamp for anticlimbing device $25X3$ mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 4 no's =	KG	2.4072	76	183			
٩	(4x0.59x0.510) 33KV/ pip insulator polymer	No	6	480	2 880			
10	H W fitting (B&S)90KN 4 Bolt	No.	12	500	6,000			
11	Discinsulator (B&S)90 KN polymer	No.	12	1150	13 800			
12	Earthing of Support (Coil Type)	FA	2	166	332			
13	No-8 GI wire (Dia 4.6mm) 0.131 KG/ Mtr 2 Mtr. For connecting pole with Coil earthing	K.g.	0.524	75	39			
14	PG Clamp for 148 sq.mm AAA conductor	NO.	0	620	-			
15	GI Nut, Bolt & Washer of different sizes (4.879 Kg each 180 deg. Cut point)	K.g.	9.758	78	761			
16	Black Paint	Ltr	2	220	440			
17	Yellow Colour Paint for Background	Ltr	4	220	880			
Α	Total Cost of materials			-	95,035			
В	Stock, Storage & Insurance i.e. 3% of A				2,851			
С	Sub Total (A+B)				97,886			
D	Contingency @ 3% of C				2,937			
Е	Tools & Plants @ 2% of C							
F	Transportation @ 7.5% of C				7,341			
G	Erection Charges @ 5% on Trf/Breaker/WPB/ H-Pole				3,214			
Н	Erection Charges @ 10% of other items							
I	Erection Charges @ 20% of PSC pole-Not to be use	d for 33kv	,		-			
J	Sum of (C to I)				1,14,739			
	<u>Civil & Service</u>	<u>s</u>	1					
SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount			
1	Concreting ratio 1:1.5:3 (500mmX500mmX2200mm) = 0.55Cu.mtr	Cu.mtr	1.1	6500	7,150			
2	Couping ratio 1:1.5:3 with dimension (Cu.mtr	0.225	6500	1,463			
	500X500X450)= 0.1125 Cu mtr				9.642			
n I					0,013			
	Other everbade (Including 6% supervision charges)	ofl			7 401			
N					1 30 752			
	Total GST @ 18% of (N)				23 535			
P	Gross Total Material +Services (N+O) for 33 KV Cu Angle	t Point w	ith 180 Degre	e	1,54,287			
	No. of 33 KV Cut Point with 90 Degr	ee Angle			-			
	MATERIALS FOR 33 KV Cut Point	<u>with 90 D</u>	egree Angle	-				
SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount			
1	WPB 160x152 (13Mtr. Long, 30.44KG/Mtr.)	No	0	31200	-			
2	Straight Cross Arm Channel 100 x 50 x 6 mm, 9.56 KG/mtr, each channel length 1.7 Mtr., 4 No's of Channel = (4x 9.56x1.7)	K.g.	0	76	-			
3	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr. length, 16 no's required = (16x2.36x0.280)	K.g.	0	76	-			
	Straight Cross Arm Top Channel 100 x 50 x 6 mm.							
4	9.56 KG/mtr, each channel length 0.306 Mtr., 4 No's of Channel = (4x 9.56x0.306)	K.g.	0	76	-			

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount			
	Back Clamp for danger Plate 25X3 mm, flat.			Nate	Amount			
6	0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	KG	0	76	-			
7	GI barbed wire anticlimbing device 3 Kg. Per support	Kg	0	80	-			
8	Back Clamp for anticlimbing device $25X3$ mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 4 no's =	KG	0	76	-			
9	33KV pin insulatorpolymer (4 No's each 90 Deg. Cut point)	No.	0	480	-			
10	H W fitting(B&S)90KN,4 Bolt	No.	0	500	-			
11	Discinsulator (B&S)90 KN polymer	No.	0	1150	-			
12	Earthing of Support (Coil Type)	No.	0	166	-			
13	No-8 GI wire (Dia 4.6mm) 0.131 KG/ Mtr 2 Mtr. For connecting pole with Coil earthing	K.g.	0	75	-			
14	PG Clamp for 148 sq.mm AAA conductor	NO.	0	620	-			
15	H.T. Stay clamp, 50x8 mm. flat, 3.14Kg/Mtr., 0.511 Mtr. Length, 2 no's qty. required (1 Pair)	Pair	0	125	-			
16	H.T. Stay set (Complete)	Set	0	1050	-			
17	H.T. Stay Insulator Type-C (2 No's.)	No.	0	50	-			
18	7/8 SWG Stay Wire 15kg /stay	K.g.	0	75	-			
19	GI Nut, Bolt & Washer of different sizes (11.31 Kg each 90 deg. Cut point)	K.g.	0	78	-			
20	Black Paint	Ltr	0	220	-			
21	Yellow Colour Paint for Background	Ltr	0	220	-			
Α	Total Cost of materials							
В	Stock, Storage & Insurance i.e 3% of A				-			
С	Sub Total (A+B)							
D	Contingency @ 3% of C				-			
Е	Tools & Plants @ 2% of C							
F	Transportation @ 7.5% of C				-			
G	Erection Charges @ 5% on Trf/Breaker/WPB/ H-Pole				-			
н	Erection Charges @ 10% of other items				-			
	Erection Charges @ 20% of PSC pole-Not to be use	d for 33kv	/		-			
J	Sum of (C to I)				-			
	<u>Civil & Service</u>	<u>s</u>		L lucit	Tatal			
SN	Description of Materials	Unit	Qty.	Rate	Amount			
1	= 0.55Cu.mtr	Cu.mtr	0	6500	-			
2	Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr	Cu.mtr	0	6500	-			
3	Fixing of 33KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts, including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material (Excavation of earth will be done of size 500X500X1500 mm.)		0	2250	-			
K	Total Civil & Services							
L	Total (J+K)							
М	Other overheads (Including 6% supervision charges) of L							
N	SubTotal (L+M)							
0	Total GST @ 18% of (N)				-			
Р	Gross Total Material +Services (N+O) for 33 KV Cu	t Point w	ith 90 Degree	e Angle	-			
	22 Kuline Length in KM				1			
	33 KV LINE LENGTH IN KM							

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount	
	MATERIALS FOR 33 KV	Pin Poin	ts			
SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount	
1	WPB 160x152 (13Mtr. Long, 30.44KG/Mtr.)	No	16	31200	4,99,200	
2	33 KV V cross Arm (GI) 22Kg each	No.	16	1580	25,280	
3	Top bracket 100x50x6mm GI channel (2kg each)	No.	16	150	2,400	
4	Danger Plate, 1 no's.	No.	16	80	1,280	
5	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	KG	4.81	76	366	
6	GI barbed wire anticlimbing device 3 Kg. Per support	Kg	48	80	3,840	
7	Back Clamp for anticlimbing device 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 4 no's = (4x0.59x0.510)	KG	19.26	125	2,407	
8	33KV pin insulatorpolymer	No.	48	480	23,040	
9	Earthing of Support (Coil Type)	No.	16	166	2,656	
10	No-8 GI wire (Dia 4.6mm) 0.131 KG/ Mtr 2 Mtr. For connecting pole with Coil earthing	K.g.	4.192	75	314	
11	GI Nut, Bolt & Washer of different sizes (1.45 Kg/ Pin Point)	K.g.	23.20	78	1,810	
12	148 sq.mm AAA conductor	K.M.	3.09	82000	2,53,380	
13	Crimping type Midspan Compression Joint for 148 sq.mm AAA conductor	EA	3		-	
14	Black Paint	Ltr	16	220	3,520	
15	Yellow Colour Paint for Background	Ltr	32	220	7,040	
A	Total Cost of materials				8,26,533	
В	Stock, Storage & Insurance I.e 3% of A				24,796	
	Sub Total (A+B)				6,31,329	
					25,540	
	Transportation @ 7.5% of C				63 850	
G	Frection Charges @ 5% on Trf/Breaker/WPB/ H-Pole				25 709	
н	Frection Charges @ 10% of other items				33,715	
	Erection Charges @ 20% of PSC pole-Notto be use	d for 33kv	,		-	
J	Sum of (C to I)				10,00,143	
	Civil & Service	<u>s</u>				
CN	Description of Materials	l lmit	0.5%	Unit	Total	
SIN		Unit	Qty.	Rate	Amount	
1	Concreting ratio 1:1.5:3 (500mmX500mmX2200mm) = 0.55Cu.mtr	Cu.mtr	8.80	6500	57,200	
2	500X500X450) = 0.1125 Cu mtr	Cu.mtr	1.80	6500	11,700	
K	Total Civil & Services				68,900	
L	Total (J+K)				10,69,043	
M	Other overheads (Including 6% supervision charges)	ofL			64,143	
N	Subiotal (L+M)				11,33,185	
	GIUSS I ULAI MALEITAI +SETVICES (MI+N+U) TOT 33 KV	riii Point	3		14,01,301	
	Gross Total Sum	narv				
1	Gross Total Material +Services (N+O) for 33 KV DP M	/ithout lso	lator	I	3.45.401	
2	Gross Total Material +Services (N+O) for 33 KV DP M	/ith Isolat	or		-	
3	Gross Total Material +Services (N+O) for 33 KV Cut P	oint with	180 Dearee A	Angle	1,54.287	
4	Gross Total Material +Services (N+O) for 33 KV Cut P	oint with 9	90 Degree Ar	ngle	-	
5	Gross Total Material +Services (M+N+0) for 33 KV Pir	n Points		-	14,01,301	
6	Inspection Fee of Over Head Line (HT) - Rs. 200 for 1	st 5 km.			200	

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount		
7	Inspection Fee of Over Head Line (HT) - Rs. 30/ Additional Km						
8	Inspection Fee of Drawing Checking and Approval						
9	Final decision by electrical Inspector						
10	Gross Total Material, Services and Inspection Fees	s (P+Q+R	+S+T)		19,02,090		
				0.19			
		21,37,188					
				0.21			

9.3.5 Technical Justification of 33 KV Lines, proposed for refurbishment under Life enhancement of Network:

SI.No.	Circle	33kV Feeder Name	Project Cost (inLac)	Technical Justification
1	Berhampur	33kV Rambha Feeder	100.97	Presently the 33 KV Rambha feeder is emanating from Chhatarpur GSS to a 4 Pole structre near Ganjam PSS. One section of the feeder, from 4 Pole structure, supplies to Rambha & Sakiri PSS and other section has a provision to provide alternate source to Ganjam, Humma, Malud & Titipa PSS. The Rambha feeder has a load of 80 A and in case of exigency, should be capable of supplying 215 A including load of all the above- mentioned PSS. Out of 10 km of feeder section, from Chhatarpur GSS to four pole structure, a section of approx. 7 Km requires refurbishment of the network. The proposal includes the replacement of damaged poles, installation of intermediate poles , V cross arms, insulators, stay sets and other accessories. We have considered polymer insulators for better performance.
2	Aska	33kV Dharakote Feeder	63.89	Presently Balisira PSS is fed from Aska (Old) GSS through radial network. The length of the 33 KV line for Balisira PSS, from T-Off at 4 pole structure on Aska(old)-Dharakote feeder is app 12 Km. This line is quite old and constructed with long spans.We have considered replacement of damaged poles, installation of new intermediate poles to reduce sag and changing of the V cross arms and other accessories.
З	Bhanjanagar	33kV jagannathprasad Feeder	9.64	33kV Jagannathprasad Feeder is emanating from Bhanjanagar GSS and supplying power to Belaguntha, Jagannathprasad & BD Pur PSS. The 33 KV line from Belaguntha PSS to Jagannathprasad PSS is passing through dense forest & hilly terrain because of which restoration of the breakdown takes long time. The survey of the site reveals that many poles are damaged besides stays sets, and V cross arms are in broken condition. Due to poor condition of the 33 KV line frequent interruptions take place. It is proposed to replace the broken and damaged poles and replacement of damaged V cross arms, Stay sets and other accessories. The refurbishment of the 33 KV line will help in reducing the breakdowns.
4	Bhanjanagar	33kV Soroda Feeder	90.59	The existing 33 KV line from Bhanjanagar GSS to Sorada PSS is with 232 sq.mm conductor installed on double pole structures. The span length of these line is varying from 110 Mtr to 130 Mtr at various locations due to which the ground clearance for 33 KV network is very low (which is 3-4 mtr. from

SI.No.	Circle	33kV Feeder Name	Project Cost (inLac)	Technical Justification
				ground). This is very unsafe for operations. We have proposed the refurbishment of the above feeder by providing intermediate double pole structure and associated accessories.
5	Bhanjanag <i>a</i> r	33KV Kantamal Feeder	18.09	Presently the peak load of 33kV Manmuda- Kantamal feeder is 123A. There is a proposal of new PSS at Khatakhatia in ODSSP which will connected to this feeder. The Solar power (GEDCOL) will also get connected to this feeder having 2MW power. The existing network has damaged poles, Intermediate poles, V cross arms, stay sets etc. By putting intermediate poles, stay set, road crossing guarding, the existing feeder can be strengthening can able to supply the power.
6	Jeypore	33kV Chitrakunda Feeder	43.87	The 33kV Chitrakunda Feeder is emanating from Baliguda GSS. Presently the peak load of this 33kV feeder is 88A. ESSAR 33kV industry is getting power supply from Chitrakunda PSS. Beside normal load growth, in upcoming year ESSAR 33kV industries is going to add another 2MW load(ie 35A). Total 33kV Chitrakunda feeder from Balimela GSS to Chitrokonda PSS is 32 Ckm. Out of total feeder, from BSF tapping Point to DAM tapping Point and DAM tapping Point to Chitrakunda PSS is 3Ckm having lower size of conductor with 55 sqmm which is aged and having multiple joints. For which reliability of power supply to ESSAR industry affect due to lower size & aged conductor. Because of the undersized conductor, the feeder loading capacity is compromised. as such it is proposed to replace the existing section having 55 sq. mm conductor with 100 sqmm conductor. The proposal also comprises of replacement of damaged, poles, cross arms, stay sets and other accessories.
7	Jeypore	Laxmipur PSS to Bandhugaon PSS via Narayanpatna PSS	67.82	The Laxmipur, Bandhugaon & Narayanpatna PSS is getting power supply from Laxmipur GSS & connected radially. 33kV feeder is very old, conductor size 55 sqmm and supported with 9/10 mtr PSC pole and only a few Joist pole with span length of 170 mtr for which frequent breakdown occur. Also this 33kV feeder passing through dense forest & hilly terrain because of which restoration of the breakdown takes long time. The survey of the site revelas that many poles are damaged besides stays sets, and V cross arms are in broken condition. Due to poor condition of the 33 KV line frequent interruptions take place. It is proposed to upgrade the old existing 55 sqmm to 100 sqmm and apart from that replace the broken and damaged poles and replacement of damaged V cross arms, Stay sets and other accessories. The refurbishment of the 33 KV line will help in reducing the breakdowns.
			394.87	

9.3.6 Unit BOQ for 25 kVA Distribution Substation Refurbishment

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs)	Amount (In Rs)
1	25 KVA,11/0.4KV(AI) Transformer	0	EA	53800	0
2	LT Distribution Box for 25 KVA S/S.	1	EA	14930	14930
3	AB Switch(11KV,200A,3Pole,50Hz)	1	EA	7350	7350
4	Lightening Arrester(9KV.5KA)	3	EA	980	2940
5	HG Fuse(11KV.3 Pole)	1	set	6120	6120
6	55MMSQ AAA CONDUCTOR FOR JUMPERING	23	M	30	690
7	CABLE 1 1KV AL 1CX150 SOMM ARM	60	M	279	16740
8	GLAND FOR ARM CABLE	4	FA	280	1120
9	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos (9.2 Kg. / Mtr.) with Galvanization	51.52	KG	75	3864
10	Transformer Mounting Channel (100x50X6) mm 2.8 Mtr long 2 Nos (9.2 Kg./Mtr.) with Galvanization	51.52	KG	75	3864
11	AB Switch and HG Fuse Mounting Channel (75x40X6) mm 2.8 Mtr long 4Nos (6.8 Kg./Mtr.) with Galvanization	76.16	KG	75	5712
12	Transformer Belting angle (50X50X6) mm 2.8mtr long 2 nos. (4.5 Kg./Mtr.)with side angle (total 7mtr) with Galvanization	31.5	KG	75	2363
13	Angle for mounting LT distribution box (50X50X6) mm 2.8mtr long 2nos (4.5 Kg./Mtr.)with side angle with Galvanization	13.5	KG	75	1013
14	11 KV Disc Insulator T & C Type 45 KN POLYMER	3	NO	860	2580
15	11 KV hard ware fitting T & C Type 45KN	3	NO	130	390
16	50x6 mm G I flat	50.92	KG	75	3819
17	25x6 mm G I flat	16.84	KG	75	1263
18	G I NUTS, BOI TS & WASHERS	30	KG	78	2340
19	LUG AL CRIMPING 95 SOMM XLPE SINGLE HOLE	20	FA	11.83	237
20	LUG AL 70 SOMM FOR 7/8 SWG WIRE/FARTHING	54	FA	36	1944
21	LUG AL CRIMPING 150 SOMM XI PE ONE HOLE	16	FA	29.09	465
22	BIRD CAP FOR aKV 5KA SURGE ARRESTER	3	ΕΛ	320	960
23	TEMPLETE FOR TRANSFORMER MAINT RECORD	1	FA	67.5	68
24	TAPE HT SCOTCH 23 25MMX9 1M 66KV	0.91	ROI	540 54	492
25	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	0.36	FA	1550 75	558
26	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	<u> </u>	FΔ	1188 38	4754
27	ALNOX 3M (HOT SPOT REDUCING PASTE)	0.07	FA	4084.64	286
28	3M SCOTCH 1625 SPRAV	0.07	ΕΛ	75/ 98	302
20		1		162.69	463
20		3		2177.28	6532
- 50		5	LA	2177.20	0002
31	DIRD GUARD SPIRE (FLEXIBLE	2	EA	884	1768
32	SLEEV BLACK POLYOLEEIN	2	М	377 41	755
33	40MM NOMINAL BORE GI PIPE (MEDIUM GAUGE) FARTHING DEVICE WITH 3 MTR LONG	5	EA	1050	5250
34	PIPE HDPE SIZE 25 MM	23	М	28	644
35	7/10 SWG G I stay wire (10Kg. / Set)	72.7	KG	75	5453
36	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber	5	LS	1600	8000
27	CONNECTOR MINI WEDGE 25 COMM TO DOC	2	Ε^	100	E 40
37	Total cost of the material	3	EA	163	049 116575
	Stock atorogo and incurrence @ 201 of A				0407
В	Slock, Slorage and Insurance @ 3% OFA:				3497
	Sublotar-C = (A+D)				120072
					2401
	Contingency charges @ 3% of C				3602
F	transportation charges @ 7.5 % of C				9005
	Erection Charges @ 5% of RS Joist & WPB pole				
	Erection Charges @ 20% of PSC Pole				
	Erection Charges @ 10% of other items except RSJ				12007
G	Erection Charges Sub Total:				12007

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs)	Amount (In Rs)	
Н	Sub-Total H(C+D+E+F+G)				147088	
-	Over Head charges/Departmental including Supervision	Charges @	26% of I	4	8825	
J	Total Estimated Cost i.e. J=(H+I)				155913	
	Dismantling of Materials and shifted to Store		1	5000	5000	
K	Sub-Total				160913	
L	GST 18%				28964	
Μ	CESS 1%				1609	
	Total of Estimate(K+L+M)				191487	
	Inspection Fee				200	
	Drawing Approval					
	Grand Total					
	Escalation of 2 years with 12.36% of grand Total				215604	
	Total(In Crores)				0.022	

9.3.7 Unit BOQ for 63 kVA Distribution Substation Refurbishment

S No	Item Description	Quantity	Unit	Unit Rate (In Rs)	Amount (In Rs.)
1	63 KVA,11/0.4KV(AI) Transformer	0	EA	86500	0
2	LT Distribution Box for 63 KVA S/S.	1	EA	18322	18322
3	AB Switch(11KV,200A,3Pole,50Hz)	1	EA	7350	7350
4	Lightening Arrester (9KV,5KA)	3	EA	980	2940
5	HG Fuse (11KV,3 Pole)	1	set	6120	6120
6	55MMSQ AAA CONDUCTOR FOR JUMPERING	23	М	30	690
7	CABLE 1.1KV AL 1CX150 SQMM ARM	60	М	279	16740
8	GLAND FOR ARM CABLE 1CX150 SQ.MM	4	EA	280	1120
9	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos (9.2 Kg. / Mtr.) with Galvanization	51.52	KG	75	3864
10	Transformer Mounting Channel (100x50X6)mm 2.8 Mtr long 2 Nos (9.2 Kg./Mtr.) with Galvanization	51.52	KG	75	3864
11	AB Switch and HG Fuse Mounting Channel (75x40X6) mm 2.8 Mtr long 4Nos (6.8 Kg. /Mtr.) with Galvanization	76.16	KG	75	5712
12	Transformer Belting angle (50X50X6) mm 2.8mtr long 2 nos. (4.5 Kg./Mtr.)with side angle (total 7mtr) with Galvanization	31.5	KG	75	2363
13	Angle for mounting LT distribution box (50X50X6) mm 2.8mtr long 2nos (4.5 Kg./Mtr.)with side angle with Galvanization	13.5	KG	75	1013
14	11 KV Disc Insulator T & C Type 45 KN POLYMER	3	NO	860	2580
15	11 KV hard ware fitting T & C Type 45KN	3	NO	130	390
16	50x6 mm G I flat	50.92	KG	75	3819
17	25x6 mm G I flat	16.84	KG	75	1263
18	G.I NUTS, BOLTS & WASHERS	30	KG	78	2340
19	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	20	EA	11.83	237
20	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	54	EA	36	1944
21	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	16	EA	29.09	465
22	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	3	EA	320	960
23	TEMPLETE FOR TRANSFORMER MAINT.RECORD	1	EA	68	68
24	TAPE HT SCOTCH 23 25MMX9.1M 66KV	0.91	ROL	540.54	492
25	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	0.36	EA	1550.75	558
26	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	4	EA	1188.38	4754
27	ALNOX 3M (HOT SPOT REDUCING PASTE)	0.07	EA	4084.64	286
28	3M SCOTCH 1625 SPRAY	0.4	EA	754.98	302
29	3M SCOTCH FILL PUTTY	1	EA	462.69	463

S No	Item Description	Quantity	Unit	Unit Rate	Amount
200		2		0477.00	(111(3.)
30		3	EA	2177.28	6532
31		2	EA	277.44	755
32		2	IVI	377.41	755
33	EARTHING DEVICE WITH 3 MTR LONG	5	EA	1050	5250
34	PIPE HDPE SIZE 25 MM	23	М	28	644
35	7/10 SWG G I stay wire (10Kg. / Set)	72.7	KG	75	5453
36	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	5	LS	1600	8000
37	CONNECTOR MINI WEDGE 25 SQMM TO DOG	3	EA	183	549
А	Total cost of the material				119967
В	Stock , storage and insurance @ 3% of A:				3599
С	Sub total-C = (A+B)				123567
D	T & P charges @ 2% of C				2471
Е	Contingency charges @ 3% of C				3707
F	Transportation charges @ 7.5 % of C				9267
	Erection Charges @ 5% of RS Joist & WPB pole				0
	Erection Charges @ 20% of PSC Pole				0
	Erection Charges @ 10% of other items except RSJ				12357
G	Erection Charges Sub Total:				12357
	Fencing (5M x 4M)				109702
Н	Sub-Total H(C+D+E+F+G)				261071
Ι	Over Head charges/Departmental including Supervision	Charges @	6% of I	4	15664
J	Total Estimated Cost i.e. J=(H+I)				276735
	Dismantling of Materials and shifted to Store	1		5000	5000
К	Sub-Total				281735
L	GST 18%				50712
М	CESS 1%				2817
	Total of Estimate(K+L+M)				335264
	Inspection Fee				200
	Drawing Approval				200
	Grand Total				335664
	Escalation of 2 years with 12.36% of grand Total				377152
	Total (In Crores)				0.038

9.3.8 Unit BOQ for 100 kVA Distribution Substation Refurbishment

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs)	Amount (In Rs.)
1	100 KVA,11/0.4KV(AI) Transformer	0	EA	117000	0
2	LT Distribution Box for 100 KVA S/S.	1	EA	24419	24419
3	AB Switch(11KV,200A,3Pole,50Hz)	1	EA	7350	7350
4	Lightening Arrester(9KV,5KA)	3	EA	980	2940
5	HG Fuse(11KV,3 Pole)	1	EA	6120	6120
6	55MMSQ AAA CONDUCTOR FOR JUMPERING	23	Μ	30	690
7	CABLE 1.1KV AL 1CX150 SQMM ARM	60	Μ	279	16740
8	GLAND FOR ARM CABLE 1CX150 SQ.MM	4	EA	280	1120
9	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos (9.2 Kg. / Mtr.) with Galvanization	51.52	KG	75	3864
10	Transformer Mounting Channel (100x50X6)mm 2.8 Mtr long 2 Nos (9.2 Kg./Mtr.) with Galvanization	51.52	KG	75	3864

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs)	Amount (In Rs.)	
11	AB Switch and HG Fuse Mounting Channel (75x40X6)mm 2.8 Mtr long 4Nos (6.8 Kg./Mtr.) with	76.16	KG	75	5712	
12	Galvanization Transformer Belting angle (50X50X6) mm 2.8mtr long 2 nos. (4.5 Kg./Mtr.)with side angle (total 7mtr) with	31.5	KG	75	2363	
13	Angle for mounting LT distribution box (50X50X6) mm 2.8mtr long 2nos (4.5 Kg./Mtr.)with side angle with Galvanization	13.5	KG	75	1013	
14	11 KV Disc Insulator T & C Type 45 KN POLYMER	3	NO	860	2580	
15	11 KV hard ware fitting T & C Type 45KN	3	NO	130	390	
16	50x6 mm G I flat	50.92	KG	75	3819	
17	25x6 mm G I flat	16.84	KG	75	1263	
18	G.INUTS, BOLTS & WASHERS	30	KG	78	2340	
19	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	20	EA	11.83	237	
20	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	54	EA	36	1944	
21		10	EA	29.09	465	
22	TEMPLETE FOR TRANSFORMED MAINT RECORD	3		<u>320</u>	960	
20		0.91		540.54	/02	
25	ANTI TRACKING SILICON TAPE SCOTCH 70.3M	0.36	FA	1550 75	558	
26	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	4	FA	1188.38	4754	
27	ALNOX 3M (HOT SPOT REDUCING PASTE)	0.07	FA	4084.64	286	
28	3M SCOTCH 1625 SPRAY	0.4	EA	754.98	302	
29	3M SCOTCH FILL PUTTY	1	EA	462.69	463	
30	RODENT CAPACITIVE SCREEN GUARD FOR- DT	3	EA	2177.28	6532	
31	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	2	EA	884	1768	
32	SLEEV BLACK POLYOLEFIN	2	М	377.41	755	
33	40MM NOMINAL BORE GI PIPE (MEDIUM GAUGE) EARTHING DEVICE WITH 3 MTR LONG	5	EA	1050	5250	
34	PIPE HDPE SIZE 25 MM	23	М	28	644	
35	7/10 SWG G I stay wire (10Kg. / Set)	72.7	KG	75	5453	
36	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	5	LS	1600	8000	
37	CONNECTOR MINI WEDGE 25 SQMM TO DOG	3	EA	183	549	
A	Total cost of the material				126064	
В	Stock, storage and insurance @ 3% of A:				3782	
С	Sub total-C = (A+B)				129846	
D	T & P charges @ 2% of C				2597	
Е	Contingency charges @ 3% of C				3895	
F	Transportation charges @ 7.5 % of C				9738	
	Erection Charges @ 5% of RS Joist & WPB pole					
	Erection Charges @ 20% of PSC Pole				40005	
<u> </u>	Erection Charges @ 10% of other items except RSJ				12985	
G	Erection Charges Sub Total:				12965	
Ц	Sub-Total H(C+D+E+E+C)				268764	
	Ouer Head obstrace/Departmental including Supervision Obstrace @ 00/ at 11					
	Total Estimated Cost i e I=(H+1)					
J	Dismontling of Materials and shifted to Store	1		5000	5000	
к	Sub-Total			5000	289890	
	GST 18%				52180	
M	CESS 1%					
	Total of Estimate(K+L+M)				344969	
	Inspection Fee				200	
	Drawing Approval				200	
	Grand Total				345369	
	Escalation of 2 years with 12.36% of grand Total				388056	
	Total(In Crores)				0.039	

9.3.9 Unit BOQ for 250 kVA Distribution Substation Refurbishment

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs)	Amount (In Rs.)
1	250 KVA,11/0.4KV(Cu) Transformer	0	EA	358898	0
2	LT Distribution Box for 250 KVA S/S.	1	EA	48000	48000
3	AB Switch(11KV,400A,3Pole,50Hz)	1	EA	11850	11850
4	Lightening Arrester(9KV,5KA)	3	EA	980	2940
5	HG Fuse(11KV,3 Pole)	1	EA	11530	11530
6	55MMSQ AAA CONDUCTOR FOR JUMPERING	23	М	30	690
7	CABLE 1.1KV AL 1CX150 SQMM ARM	60	М	279	16740
8	GLAND FOR ARM CABLE 1X150 SQ.MM	4	EA	280	1120
9	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos (9.2 Kg. / Mtr.) with Galvanization	51.52	KG	75	3864
10	Transformer Mounting Channel (100x50X6)mm 2.8 Mtr long 2 Nos (9.2 Kg./Mtr.) with Galvanization	51.52	KG	75	3864
11	AB Switch and HG Fuse Mounting Channel (75x40X6)mm 2.8 Mtr long 4Nos (6.8 Kg./Mtr.) with Galvanization	76.16	KG	75	5712
12	Transformer Belting angle (50X50X6) mm 2.8mtr long 2 nos. (4.5 Kg./Mtr.)with side angle (total 7mtr) with Galvanization	31.5	KG	75	2363
13	Angle for mounting LT distribution box (50X50X6) mm 2.8mtr long 2nos (4.5 Kg./Mtr.)with side angle with Galvanization	13.5	KG	75	1013
14	11 KV Disc Insulator T & C Type 45 KN POLYMER	3	NO	860	2580
15	11 KV hard ware fitting T & C Type 45KN	3	NO	130	390
16	50x6 mm G I flat	50.92	KG	75	3819
17	25x6 mm G I flat	16.84	KG	75	1263
18	G.I NUTS,BOLTS & WASHERS	30	KG	78	2340
19	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	20	EA	11.83	237
20	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	54	EA	36	1944
21	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	16	EA	29.09	465
22	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	3	EA	320	960
23	TEMPLETE FOR TRANSFORMER MAINT.RECORD	1	EA	68	68
24	TAPE HT SCOTCH 23 25MMX9.1M 66KV	0.91	ROL	540.54	492
25	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	0.36	EA	1550.75	558
26	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	4	EA	1188.38	4754
27	ALNOX 3M (HOT SPOT REDUCING PASTE)	0.07	EA	4084.64	286
28	3M SCOTCH 1625 SPRAY	0.4	EA	754.98	302
29	3M SCOTCH FILL PUTTY	1	EA	462.69	463
30	RODENT CAPACITIVE SCREEN GUARD FOR- DT	3	EA	2177.28	6532
31	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	2	EA	884	1768
32	SLEEV BLACK POLYOLEFIN	2	М	377.41	755
33	40MM NOMINAL BORE GI PIPE (MEDIUM GAUGE) EARTHING DEVICE WITH 3 MTR LONG	5	EA	1050	5250
34	PIPE HDPE SIZE 25 MM	23	M	28	644
35	7/10 SWG G I stay wire (10Kg. / Set)	72.7	KG	75	5453
36	Salt etc including construction of earthing chamber	5	LS	1600	8000
37	CONNECTOR MINI WEDGE 25 SOMM TO DOG	3	F۵	183	540
Δ	Total cost of the material	0	<u> </u>	100	159555
B	Stock, storage and insurance @ 3% of A				4787
C C	Sub total- $C = (A+B)$				164342
D	T & P charges @ 2% of C				
E	Contingency charges @ 3% of C				
F	transportation charges @ 7.5 % of C				
	Frection Charges @ 5% of RS Joist & WPB pole				
	Erection Charges @ 20% of PSC Pole				
	Erection Charges @ 10% of other items except RSJ				16434
G	Erection Charges Sub Total :				16434
_	Fencing (5M x4M)				109702

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs)	Amount (In Rs.)		
Н	Sub-Total H(C+D+E+F+G)				311021		
	Over Head charges/Departmental including Supervision	h Charges @	8% of l	4	18661		
J	Total Estimated Cost i.e. J=(H+I)				329682		
	Dismantling of Materials and shifted to Store	1		5000	5000		
K	K Sub-Total						
L	GST 18%				60243		
М	CESS 1%				3347		
	Total of Estimate(K+L+M)				398271		
	Inspection Fee				200		
	Drawing Approval				200		
	Grand Total						
	Escalation of 2 years with 12.36% of grand Total						
	Total(In Crores)				0.045		

9.3.10 Unit BOQ for 500 kVA Distribution Substation Refurbishment

S No	Item Description	Qty	Unit	Unit Rate (In Rs)	Amount (In Rs.)
1	500 KVA,11/0.4KV(CU) Transformer	0	EA	580000	0
~	LT Distribution Box with MCCB Aluminium Busbar of 6		F A	07000	07000
2	Bay with kit kat fuse for 500 KVA S/S	1	EA	97360	97360
3	75x40x6 mm Channel (6.80Kg. / Mtr) With Galvanization	49	KG	75	3675
4	AB Switch (11KV,400A,3Pole,50Hz)	1	EA	11850	11850
5	Lightening Arrester(9KV,5KA)	3	EA	980	2940
6	HG Fuse(11KV,3 Pole)	1	set	11530	11530
7	55MMSQ AAA CONDUCTOR FOR JUMPERING	23	М	30	690
8	CABLE 1.1KV AL 1CX630 SQMM ARM	16	М	618.45	9895
9	GLAND FOR ARM CABLE 1CX630 SQ.MM	4	EA	280	1120
10	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos	51 52	KG	75	3864
10	(9.2 Kg. / Mtr.) with Galvanization	01.02		10	0001
11	Transformer Mounting Channel (100x50X6)mm 2.8 Mtr	51 52	KG	75	3864
	long 2 Nos (9.2 Kg./Mtr.) with Galvanization	01.02		10	0001
	AB Switch and HG Fuse Mounting Channel				
12	(75x40X6)mm 2.8 Mtr long 4Nos (6.8 Kg./Mtr.) with	76.16	KG	75	5712
	Galvanization				
12	I ransformer Beiting angle (50X50X6) mm 2.8mtr long 2	21 5	KC	75	2262
13	Galvenization	31.5	κG	75	2303
	Angle for mounting LT distribution box (50Y50Y6) mm				
14	2 8mtr long 2nos (4.5 Kg /Mtr) with side angle with	13.5	KG	75	1013
14	Galvanization	15.5	NG	75	1013
15	11 KV Disc Insulator T & C Type 45 KN POI YMFR	3	NO	860	2580
16	11 KV hard ware fitting T & C Type 45KN	3	NO	130	390
17	50x6 mm G I flat	50.92	KG	75	3819
18	25x6 mm G I flat	16.84	KG	75	1263
19	G.I NUTS, BOLTS & WASHERS	30	KG	78	2340
20	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	20	EA	11.83	237
21	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	54	EA	36	1944
22	LUG AL CRIMPING 630 SQMM XLPE ONE HOLE	16	EA	164.4	2630
23	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	3	EA	320	960
24	TEMPLETE FOR TRANSFORMER MAINT.RECORD	1	EA	67.5	68
25	TAPE HT SCOTCH 23 25MMX9.1M 66KV	0.91	ROL	540.54	492
26	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	0.36	EA	1550.75	558
27	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	4	EA	1188.38	4754
28	ALNOX 3M (HOT SPOT REDUCING PASTE)	0.07	EA	4084.64	286
29	3M SCOTCH 1625 SPRAY	0.4	EA	754.98	302
30	3M SCOTCH FILL PUTTY	1	EA	462.69	463
31	RODENT CAPACITIVE SCREEN GUARD FOR- DT	3	EA	2177.28	6532
32	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	2	EA	884	1768
33	SLEEV BLACK POLYOLEFIN	2	М	377.41	755

S No	Item Description	Qty	Unit	Unit Rate (In Rs)	Amount (In Rs.)		
34	40MM NOMINAL BORE GI PIPE (MEDIUM GAUGE) EARTHING DEVICE WITH 3 MTR LONG	5	EA	1050	5250		
35	PIPE HDPE SIZE 25 MM	23	М	28	644		
36	7/10 SWG G I stay wire (10Kg. / Set)	72.7	KG	75	5453		
37	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	5	LS	1600	8000		
38	CONNECTOR MINI WEDGE 25 SQMM TO DOG						
Α	Total cost of the material				207910		
В	Stock, storage and insurance @ 3% of A:						
С	Subtotal-C = $(A+B)$						
D	T & P charges @ 2% of C						
Е	Contingency charges @ 3% of C						
F	transportations charges @ 7.5 % of C						
	Erection Charges @ 5% of RS Joist & WPB pole						
	Erection Charges @ 20% of PSC Pole						
	Erection Charges @ 10% of other items except RSJ				21415		
G	Erection Charges Sub Total :				21415		
	Fencing(5M x4M)				109702		
Н	Sub-Total H(C+D+E+F+G)				372032		
-	Over Head charges/Departmental including Supervision Charges @ 6% of H				22322		
J	Total Estimated Cost i.e. J=(H+I)				394354		
	Dismantling of Materials and shifted to Store				5000		
Κ	Sub-Total				399354		
L	GST 18%				71884		
М	CESS 1%						
	Total of Estimate(K+L+M)						
	Inspection Fee						
	Drawing Approval						
	Grand Total				475632		
	Escalation of 2 years with 12.36% of grand Total				534420		
	Total(In Crores)				0.053		

9.3.11 Unit BOQ for LV protection at DSS-Switch Fuse unit

(Hanging Feeder Pillar):

S No	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)
1	LT Feeder Pillar Hanging	EA	1	22000	22000
2	3.5C x 185mm2 LT PVC CABLE	М	15	635	9525
3	LUG AL FOR 185mm2 LT PVC CABLE	Nos	4	80.96	324
4	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	EA	1	1050	1050
5	G.I. Nuts, bolt & Washer	Kg.	1	78	78
6	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	LS	1	1600	1600
Α	Total cost of the material				34577
В	Stock , storage and insurance @ 3% of A:				1037
С	Sub total-C = (A+B)				35614
D	T & P charges @ 2% of C				712
E	Contingency charges @ 3% of C				1068
F	transportation charges @ 7.5 % of C				2671
	Erection Charges @ 5% of RS Joist				0
	Erection Charges @ 20% of PSC Pole				0
	Erection Charges @ 10% of other items except RSJ				3561
G	Erection Charges Sub Total:				3561
	Sub-Total H(C+D+E+F+G)				43627



S No	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)
Ι	Over Head charges/Departmental including Supervision Charges @ 6% of H				2618
J	Total Estimated Cost i.e. J=(H+I)				46245
Κ	GST 18%				8324
L	CESS 1%				462
	Total of Estimate(J+K+L)				55032
	InspectionFee				200
	Drawing Approval				200
	Grand Total				55432
	Escalation of 2 years with 12.36% of grand Total				62283
	Total (In Crores)				0.006

9.3.12 Unit BOQ for LV protection at DSS-MCCB for 63 KVA

S No	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)
1	LT Distribution Box for 63 KVA S/S.	1	EA	18322	18322
2	CABLE 1.1KV AL 1CX150 SQMM ARM	15	М	279	4185
3	GLAND FOR ARM CABLE	4	EA	280	1120
4	ANGLE FOR MOUNTING LT DISTRIBUTION BOX (50X50X6) MM 2.8 MTR LONG 2 NOS (4.5 KG/MTR.)WITH SIDE ANGLE WITH GALVANIZATION	13.5	KG	75	1013
5	50x6 mm G I flat	10	KG	75	750
6	25x6 mm G I flat	5	KG	75	375
7	G.I NUTS.BOLTS & WASHERS	3	KG	78	234
8	LUG AL 70 SQMM FOR 7/8 SWG WIRF/FARTHING	2	FA	36	72
9	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	16	EA	29.09	465
10	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr. Long	1	EA	1050	1050
11	PIPE HDPE SIZE 25 MM	3	М	28	84
12	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	1	LS	1600	1600
13	7/10 SWG G I stay wire (10Kg. / Set)	10	KG	75	750
Α	Total cost of the material				30020
В	Stock, storage and insurance @ 3% of A:				901
С	Subtotal-C = $(A+B)$				30921
D	T & P charges @ 2% of C				618
Е	Contingency charges @ 3% of C				928
F	Transportation charges @ 7.5 % of C				2319
	Erection Charges @ 5% of RS Joist & WPB pole				
	Erection Charges @ 20% of PSC Pole				
	Erection Charges @ 10% of other items except RSJ				3092
G	Erection Charges Sub Total:				3092
Н	Sub-Total H(C+D+E+F+G)				37878
Ι	Over Head charges/Departmental including Supervision Charges @ 6% of H				2273
J	Total Estimated Cost i.e. J=(H+I)				43242
K	GST 18%				7783.630
L	CESS 1%				432
	Total of Estimate(J+K+L)				51458
	InspectionFee				200
	Drawing Approval				200
	Grand Total				51858
	Escalation of 2 years with 12.36% of grand Total				58268
	Total (In Crores)				0.006

9.3.13 Unit BOQ for LV protection at DSS-MCCB for 100 KVA

S No	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)
1	LT Distribution Box for 100 KVA S/S.	1	EA	24419	24419
2	CABLE 1.1KV AL 1CX150 SQMM ARM	15	Μ	279	4185
3	GLAND FOR ARM CABLE	4	EA	280	1120
4	ANGLE FOR MOUNTING LT DISTRIBUTION BOX (50X50X6) MM 2.8 MTR LONG 2 NOS (4.5 KG./MTR.)WITH SIDE ANGLE WITH GALVANIZATION	13.5	KG	75	1013
5	50x6 mm G I flat	10	KG	75	750
6	25x6 mm G I flat	5	KG	75	375
7	G.I NUTS, BOLTS & WASHERS	3	KG	78	234
8	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	2	EA	36	72
9	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	16	EA	29.09	465
10	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr. Long	1	EA	1050	1050
11	PIPE HDPE SIZE 25 MM	3	М	28	84
12	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	1	LS	1600	1600
13	7/10 SWG G I stay wire (10Kg. / Set)	10	KG	75	750
Α	Total cost of the material				36117
В	Stock, storage and insurance @ 3% of A:				1084
С	Subtotal-C = $(A+B)$				37200
D	T & P charges @ 2% of C				744
Е	Contingency charges @ 3% of C				1116
F	transportation charges @ 7.5 % of C				2790
	Erection Charges @ 5% of RS Joist & WPB pole				
	Erection Charges @ 20% of PSC Pole				
	Erection Charges @ 10% of other items except RSJ				3720
G	Erection Charges Sub Total :				3720
Н	Sub-Total H(C+D+E+F+G)				45571
Ι	Over Head charges/Departmental including Supervision Charges @ 6% of H				2734
J	Total Estimated Cost i.e. J=(H+I)				52025
Κ	GST 18%				9364.470
L	CESS 1%				520
	Total of Estimate(J+K+L)				61910
	InspectionFee				200
	Drawing Approval				200
	Grand Total				62310
	Escalation of 2 years with 12.36% of grand Total				70011
	Total (In Crores)				0.007

9.3.14 Unit BOQ for LV protection at DSS-MCCB for 250 KVA

S No	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)
1	LT Distribution Box for 250 KVA S/S.	1	EA	48000	48000
2	CABLE 1.1KV AL 1CX150 SQMM ARM	15	Μ	279	4185
3	GLAND FOR ARM CABLE	4	EA	280	1120
4	ANGLE FOR MOUNTING LT DISTRIBUTION BOX (50X50X6) MM 2.8 MTR LONG 2 NOS (4.5 KG./MTR.)WITH SIDE ANGLE WITH GALVANIZATION	13.5	KG	75	1013
5	50x6 mm G I flat	10	KG	75	750
6	25x6 mm G I flat	5	KG	75	375
7	G.I NUTS, BOLTS & WASHERS	3	KG	78	234
8	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	2	EA	36	72
9	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	16	EA	29.09	465


S No	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)
10	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	1	EA	1050	1050
11	PIPE HDPE SIZE 25 MM	3	М	28	84
12	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	1	LS	1600	1600
13	7/10 SWG G I stay wire (10Kg. / Set)	10	KG	75	750
Α	Total cost of the material				59698
В	Stock, storage and insurance @ 3% of A:				1791
С	Sub total-C = (A+B)				61489
D	T & P charges @ 2% of C				1230
Е	Contingency charges @ 3% of C				1845
F	transportation charges @ 7.5 % of C				4612
	Erection Charges @ 5% of RS Joist & WPB pole				
	Erection Charges @ 20% of PSC Pole				
	Erection Charges @ 10% of other items except RSJ				6149
G	Erection Charges Sub Total :				6149
Н	Sub-Total H(C+D+E+F+G)				75324
I	Over Head charges/Departmental including Supervision Charges @ 6% of H				4519
J	Total Estimated Cost i.e. J=(H+I)				85992
K	GST 18%				15478.600
L	CESS 1%				860
	Total of Estimate(J+K+L)				102331
	Inspection Fee				200
	Drawing Approval				200
	Grand Total				102731
	Escalation of 2 years with 12.36% of grand Total				115428
	Total (In Crores)				0.012

9.3.15 Unit BOQ for LV protection at DSS-MCCB for 500 KVA

S No	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)	
1	LT Distribution Box with MCCB Aluminium Busbar of 6 Bay with kit kat fuse for 500 KVA S/S	1.00	EA	97,360	97,360	
2	CABLE 1.1KV AL 1CX630 SQMM ARM	15.00	М	618	9,277	
3	GLAND FOR ARM CABLE	4.00	EA	280	1,120	
4	ANGLE FOR MOUNTING LT DISTRIBUTION BOX (50X50X6) MM 2.8 MTR LONG 2 NOS (4.5 KG./MTR.)WITH SIDE ANGLE WITH GALVANIZATION	13.50	KG	75	1,013	
5	50x6 mm G I flat	10.00	KG	75	750	
6	25x6 mm G I flat	5.00	KG	75	375	
7	G.I NUTS, BOLTS & WASHERS	3.00	KG	78	234	
8	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	2.00	EA	36	72	
9	LUG AL CRIMPING 630 SQMM XLPE ONE HOLE	16.00	EA	164	2,624	
10	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr. Long	1.00	EA	1,050	1,050	
11	PIPE HDPE SIZE 25 MM	3.00	М	28	84	
12	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	1.00	LS	1600	1,600	
13	7/10 SWG G I stay wire (10Kg. / Set)	10.00	KG	75	750	
Α	Total cost of the material				116308	
В	Stock, storage and insurance @ 3% of A:				3489	
С	Sub total-C = (A+B)					
D	T & P charges @ 2% of C				2396	

S No	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)		
E	Contingency charges @ 3% of C				3594		
F	transportation charges @ 7.5 % of C				8985		
	Erection Charges @ 5% of RS Joist & WPB pole						
	Erection Charges @ 20% of PSC Pole						
	Erection Charges @ 10% of other items except RSJ				11980		
G	Erection Charges Sub Total:						
Н	Sub-Total H(C+D+E+F+G)				146752		
I	Over Head charges/Departmental including Supervision C	Charges (@ 6% of H	1	8805		
J	Total Estimated Cost i.e. J=(H+I)				167537		
K	GST 18%				30157		
L	CESS 1%				1675		
	Total of Estimate(J+K+L)				199369		
	Inspection Fee				200		
	Drawing Approval				200		
	Grand Total				199769		
	Escalation of 2 years with 12.36% of grand Total				224460		
	Total (In Crores)				0.0224		

9.3.16 Unit BOQ for 33kv V Cross Arm installation

S No.	Item Description	Qty.	Unit	Unit Rate (In Rs)	Amount (In Rs)					
1	33KV pin insulator polymer	3	EA	480	1440					
2	V CROSS ARM(22Kg for Each)(With Galvanization) for 33 KV	n)(With 1 No 1800								
3	F Clamp	1	No	300						
4	BOLT & NUT GI 16MMX75M HEX	1	KG	78	78					
5	Coil type earthing	1	EA	166	166					
6	PIPE HDPE SIZE 25 MM	15	М	28	420					
7	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	2	EA	36	72					
8	WASHER SIZE 16MM DIA	1	KG	78	78					
9	Back Clamp for V cross arm(33 KV)	1	EA	150	150					
Α	Total cost of the material									
В	Stock, storage and insurance @ 3% of A:				135					
С	Sub total-C = (A+B)									
D	T & P charges @ 2% of C									
Е	Contingency charges @ 3% of C									
F	transportation charges @ 7.5 % of C				348					
	Erection Charges @ 5% of RS Joist									
	Erection Charges @ 20% of PSC Pole									
	Erection Charges @ 10% of other items except RSJ				464					
G	Erection Charges Sub Total :				464					
Н	Sub-Total I(C+D+E+F+G)				5683					
	Over Head charges/Departmental including Supervis	ion Charges	s @ 6% of	Н	341					
J	Total Estimated Cost i.e. J=(H+I)				6024					
	Dismantling of V-cross Arm and transporting to neare TPSODL	est store of	1	41	41					
		SubTotal			6065					
Κ	GST 18%				1092					
L	CESS 1%				61					
	Total of Estimate(J+K+L)				7218					
	Inspection Fee				200					
	Drawing Approval				0					
	Grand Total				7418					
	Escalation of 2 years with 12.36% of grand Total				8335					
	Total (In Crores)				0.0008					

9.3.17 Unit BOQ for 11 KV V Cross Arm installation

S No.	Item Description	Qty.	Unit	Unit Rate (In Rs)	Amount (In Rs)			
1	11KV pin insulator polymer	3	EA	200	600			
2	V CROSS ARM(10.2Kg for Each)(With Galvanization)	1	No	912	912			
3	F Clamp	1	No	240	240			
4	BOLT & NUT GI 16MMX75M HEX	1	KG	78	78			
5	Coil type earthing	1	EA	166	166			
6	PIPE HDPE SIZE 25 MM	3	М	28	84			
7	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	2	EA	36	72			
8	WASHER SIZE 16MM DIA	1	KG	78	78			
9	Back Clamp for V cross arm(11KV)	1	EA	80	80			
Α	Total cost of the material							
В	Stock , storage and insurance @ 3% of A:				69			
С	Subtotal-C = (A+B)				2379			
D	T & P charges @ 2% of C							
Е	Contingency charges @ 3% of C							
F	transportation charges @ 7.5 % of C				178			
	Erection Charges @ 5% of RS Joist							
	Erection Charges @ 20% of PSC Pole							
	Erection Charges @ 10% of other items except RSJ				238			
G	Erection Charges Sub Total:				238			
H	Sub-Total I(C+D+E+F+G)				2914			
-	Over Head charges/Departmental including Supervision	Charges @	6% of H		175			
J	Total Estimated Cost i.e. J=(H+I)				3089			
	Dismantling of V-cross Arm and transporting to nearest TPSODL	storeof	1	41	41			
		Sub Total			3131			
K	GST 18%				564			
L	CESS 1%				31			
	Total of Estimate(J+K+L)				3725			
	Inspection Fee							
	Drawing Approval				0			
	Grand Total				3925			
	Escalation of 2 years with 12.36% of grand Total				4411			
	Total (In Crores)				0.0004			

9.3.18 Unit BOQ for LA installation at 33 KV Line

S No	Description of the materials	Unit	Qty	Unit Rate (INR)	Amount (INR)		
1	Lightning Arrester (30 KV,10 KA) (Station Class, class-1)	No	3	7,750	23,250		
2	G.I Pipe Earthing 40mm Dia medium gauge, 3mtr long earthing device	No	1	1,050	1,050		
3	Earthing for Supports (Coil type)	No	1	166	166		
4	G.I. Flat 25x6 mm	KG	10	75	750		
5	G.I. Nut-Bolt-Washer	KG	0.5	78	39		
6	PIPE HDPE SIZE 25 MM	М	6	28	168		
7	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	EA	2	36	72		
8	Material for masonry work for earth pit, charcoal, salt etc.	LS	1	1,600	1,600		
Α	Total cost of the material				27095		
В	Stock, storage and insurance @ 3% of A:						
С	Subtotal-C = $(A+B)$						
D	T & P charges @ 2% of C				558		



S No	Description of the materials	Unit	Qty	Unit Rate (INR)	Amount (INR)				
ш	Contingency charges @ 3% of C								
F	transportation charges @ 7.5 % of C								
	Erection Charges @ 5% of RS Joist & WPB pole								
	Erection Charges @ 20% of PSC Pole								
	Erection Charges @ 10% of other items except RSJ				2791				
G	Erection Charges Sub Total:				2791				
Н	Sub-Total H(C+D+E+F+G)				34187				
	Over Head charges/Departmental including Supervision Ch	arges @	6% of H		2051				
J	Total Estimated Cost i.e. J=(H+I)				36238				
К	GST 18%				6523				
L	CESS 1%				362				
	Total of Estimate(J+K+L)				43124				
	Inspection Fee				200				
	Drawing Approval				200				
	Grand Total				43524				
	Grand Total with Escalation of 12.36% for 2 Years				48903				
	Total (In Crores)				0.00489				

9.3.19 Unit BOQ for unit LA installation at. DSS & 11 KV Lines

S No.	Description of the materials	Unit	Qty	Unit Rate (In Rs.)	Amount (In Rs.)			
1	Lightning Arrester(9KV,10KA) for DSS	No	3	1,000	3,000			
2	G.I Pipe Earthing 40mm Dia medium gauge, 3mtr long earthing device	No	1	1,050	1,050			
3	Earthing for Supports (Coil type)	No	1	166	166			
4	G.I. Flat 25x6 mm	KG	10	75	750			
5	G.I. Nut-Bolt-Washer	KG	0.5	78	39			
6	PIPE HDPE SIZE 25 MM	M	6	28	168			
7	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	EA	4	36	144			
8	Material for masonry work for earth pit, charcoal, salt etc.	LS	1	1,600	1,600			
Α	Total cost of the material				6,917			
В	Stock , storage and insurance @ 3% of A:	208						
С	Sub total-C = $(A+B)$							
D	T & P charges @ 2% of C				142			
Е	Contingency charges @ 3% of C				214			
F	transportation charges @ 7.5 % of C				534			
	Erection Charges @ 5% of RS Joist & WPB pole				0			
	Erection Charges @ 20% of PSC Pole				0			
	Erection Charges @ 10% of other items except RSJ				712			
G	Erection Charges Sub Total :				712			
Н	Sub-Total H(C+D+E+F+G)				8.728			
I	Over Head charges/Departmental including Supervision	Charge	es @ 6% of	fH	524			
J	Total Estimated Cost i.e. J=(H+I)	0			9,251			
K	GST 18%				1,665			
L	CESS 1%				93			
	Total of Estimate(J+K+L)				11,009			
	InspectionFee				200			
	Drawing Approval				200			
	Grand Total				11,409			
	Escalation of 2 years with 12.36% of grand Total				12,819			
	Total (In Crores)				0.0013			



9.3.20 Unit BOQ for Earthing:

S No.	Description of Materials	Unit	Qty	Unit Rate (In Rs.)	Amount (In Rs.)			
1	GI pipe Earthing 40mm dia medium gauge- 3.0 Mtr long	No.	1	1,050	1,050			
2	25 x 4mm GI Flat for Substation earthing	Kg	6	75	450			
3	25 x 6mm GI Flat for Neutral earthing of Transformer	Kg	4	75	300			
4	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	No.	1	1,600	1,600			
5	Earthing device Coil type	No.	1	166	166			
6	PIPE HDPE SIZE 25 MM	Μ	6	28	168			
7	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	EA	2	36	72			
8	Sundries (Insulation tape, Lugs etc.)	LS	1	500	500			
Α	Total cost of the material				4,306			
В	Stock , storage and insurance @ 3% of A:							
С	Sub total-C = (A+B)							
D	T & P charges @ 2% of C				89			
E	Contingency charges @ 3% of C				133			
F	transportation charges @ 7.5 % of C				333			
	Erection Charges @ 5% of RS Joist & WPB pole							
	Erection Charges @ 20% of PSC Pole							
	Erection Charges @ 10% of other items except RSJ				444			
G	Erection Charges Sub Total :				444			
Н	Sub-Total H(C+D+E+F+G)				5,433			
I	Over Head charges/Departmental including Supervision	Charge	es @ 6% o	fH	326			
J	Total Estimated Cost i.e. J=(H+I)				5,759			
K	GST 18%				1,037			
L	CESS 1%				58			
	Total of Estimate(J+K+L)				6,853			
	Inspection Fee				200			
	Drawing Approval				200			
	Grand Total				7,253			
	Escalation of 2 years with 12.36% of grand Total				8,150			
	Total (In Crores)				0.0008			

9.3.21 Unit BOQ for 33 KV AB Switch

S No.	Item Description	Qty	Unit	Unit Rate (In Rs.)	Amount (In Rs.)		
1	100mm2 sqmm All Alloy Aluminium Conductor AAAC	20	М	55	1,100		
2	WPB 160x152 (13Mtr. Long, 30.44KG/Mtr.)	2	EA	30,443	60,886		
3	AB Switch (33KV, 400A, 3Pole, 50Hz)	1	SET	19,070	19,070		
4	40mm dia GI pipe earthing device 3 mtr. Long	1	EA	1,050	1,050		
5	PIPE HDPE SIZE 25 MM	3	М	28	84		
6	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	4	EA	36	144		
7	Pressure channel (100 X50X6)mm 3.0 Mtr. 2 No. (9.2 Kg. / Mtr.)	55	KG	75	4,140		
8	A.B. Switch mounting channel and Bracing channel (100 X50X6) mm 3.0 Mtr. 4 No. (9.2 Kg. / Mtr.)	110	KG	75	8,280		
9	Cross Bracing (50X50X6) mm angle 3.5Mtr. long 2 No.(4.5 Kg. / Mtr.)						
10	0 HT stay set complete						
11	11 Stay insulator						
12	Stay clamp				500		

S No.	Item Description	Qty	Unit	Unit Rate (In Rs.)	Amount (In Rs.)			
13	7/10 SWG G I stay wire (10Kg. / Set)							
14	GI nuts &bolts				468			
15	Earthing of support (coil type)							
16	25x6 mm G I flat							
17	Disc insulator (B&S) 120KN Polymer							
18	33KV H/W fitting(B&S) 90KN, 4Bolt				2,106			
19	P.G. CLAMP FOR 100 MM2 AAC CONDUCTOR				3,480			
20	BOARD DANGER				160			
21	GIPLATE BASE SIZE				3,000			
22	ANTICLIMBING DEVICE	Juding oor	otructi	on of	832			
23	earthing chamber (Size: 2"x2") and RCC slab cover	ruang cor	ISHUCH	5001	1,600			
А	Total cost of the material				134950			
В	Stock, storage and insurance @ 3% of A:				4,048			
С	Sub total-C = (A+B)				138998			
D	T & P charges @ 2% of C				2,780			
Е	Contingency charges @ 3% of C				4,170			
F	transportation charges @ 7.5 % of C	1			10,425			
	Erection Charges @ 5% of RS Joist & WPB pole				3,136			
	Erection Charges @ 20% of PSC Pole							
	Erection Charges @ 10% of other items except RSJ				7,629			
G	Erection Charges Sub Total :				10,764			
	Cement concreting for stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= 0.45Mtrx0.45Mtrx1.5Mtr= 0.3037Cum. @ 4158.84=0.3037x4158.84=1263.03 or 1270.00	4		1270	5,080			
	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		1270	2,540			
Н	Sub-Total H(C+D+E+F+G)				174757			
I	Over Head charges/Departmental including Supervision Charges @ 6% of H				10,485			
J	Total Estimated Cost i.e. J=(H+I)				185242			
K	GST 18%				33,344			
L	CESS 1%				1,852			
	Total of Estimate(J+K+L)				220438			
	InspectionFee				200			
	Drawing Approval				200			
	Grand Total				220838			
	Escalation of 2 years with 12.36% of grand Total				248134			
	Total (In Crores)				0.025			

9.3.2211 KV Line AB Switch

S No.	Item Description	Qty	Unit	Unit Rate (In Rs.)	Amount (In Rs.)
1	100mm2 sqmm All Alloy Aluminium Conductor AAAC	20	М	55	1,100
2	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.)	2	EA	25,824	51,647
3	AB Switch(11KV, 400A,3Pole,50Hz)	1	SET	11,850	11,850
4	40mm dia GI pipe earthing device 3 mtr. Long	1	EA	1,050	1,050
5	PIPE HDPE SIZE 25 MM	6	М	28	168
6	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	4	EA	36	144
7	100x50x6 mm MS Channel 2.8 mtr long 2Nos for top Pressure Channel @9.2kg/mtr (with Galvanisation)	52	KG	75	3,864

S No.	Item Description	Qty	Unit	Unit Rate (In Rs.)	Amount (In Rs.)
8	75x40x6 mm MS Channel 2.8 mtr long 2 Nos for AB Switch	38	KG	75	2,856
9	75x40x6 mm MS Channel 2.8 mtr long 2 Nos Supporting Cross Bracing @6.8 Kg/mtr at bottom of DP(with Galvanisation)	38	KG	75	2,856
10	50x50x6 mm MS Angle 3.6 mtr long 2 Nos for providing cross bracing at bottom of DP@4.5 Kg/mtr(with Galvanisation)	32	KG	75	2,430
11	HT stay set complete	4	No	1050	4,200
12	Stay insulator	4	No	50	200
13		4	Pair	125	500
14	7/10 SWG G I stay wire (10Kg. / Set)	40	KG	75	3,000
15	GI nuts & bolts	5	KG	78	390
17	25v6 mm C L flot	0	KC	75	675
10	20x0 IIIII G I IIdi	9	KG EA	1150	12 800
10	11KV/ H/W fitting (B&S) 70KN Polymer	6	EA FA	350	2 100
20	P.G. CLAMP FOR 100 MM2 AAC CONDUCTOR	6	FA	580	3 480
21	BOARD DANGER	2	EA	80	160
22	GI PLATE BASE SIZE	2	EA	1500	3,000
23	ANTICLIMBING DEVICE	2	EA	415.8	831.6000
24	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	1	LS	1600	1,600
Α	Total cost of the material				1,12,234
В	Stock , storage and insurance @ 3% of A:				3,367
С	Sub total-C = $(A+B)$				1,15,601
D	T & P charges @ 2% of C		1		2,312
E	Contingency charges @ 3% of C				3,468
г	transportation charges @ 7.5 % of C				8,670
	Election Charges @ 5% of R5 Joist & WPB pole				2,000
	Erection Charges @ 20% of PSC Pole				0.040
	Erection Charges @ 10% of other items except RSJ				6,240
G	Erection Charges Sub Total:				8,900
	Cement concreting for stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= 0.45Mtrx0.45Mtrx1.5Mtr= 0.3Cum	4	No	1270	5,080
	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	No	1270	2,540
Н	Sub-Total H(C+D+E+F+G)				1,46,571
Ι	Over Head charges/Departmental including Supervision Charges @ 6% of H				8,794
J	Total Estimated Cost i.e. J=(H+I)				1,55,366
K	GST 18%				27,966
L	CESS 1%				1,554
	I otal of Estimate(J+K+L)				1,84,885
	Inspection Fee				200
					195005
					00200
	Escalation of 2 years with 12.36% of grand Total				208187
	l otal (In Crores)				0.021



9.3.23 Cost estimate of FPI

Items	Unit Price (In RS)	UOM	Proposed QTY	Proposed Cost (In Cr)
Installation of 33 KV Line FPI	89600	SET	400	3.58
Installation of FPI 11 KV	74824.72	SET	500	3.74

9.3.24 Unit BOQ for 11kV Auto-Recloser

S	Item Description	Unit	Qty	Unit Rate	Amount
1		ст	1	(III KS.)	(III RS.)
2				0,90,000	6,96,036
2		EA	0	980	5,880
3		KG	1	78	78
4	BOLT & NUT GET6MMX75M HEX	KG	3	/8 75	234
5		KG	10	75	750
6	25x6 mm G I flat	KG	15	75	1,125
/	WPB 160X152 (11Mtr. Long, 30.44KG/Mtr.)	EA	2	25,824	51,647
8	75x40x6 mm Channel (6.80Kg. / Mtr) With Galvanization	KG	25	75	1,875
9	100x50x6 mm Channel (9.2Kg./ Mtr) with Galvanization	KG	15	75	1,125
10	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr. Long	EA	2	1050	2,100
11	LUG AL CRIMPING 95MM2 XLPE SINGLE HOLE	EA	8	11.83	95
12	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	EA	6	366	2,196
13	100 sgmm All Alloy Aluminium Conductor AAAC	М	15	55	825
14	ANTICLIMBING DEVICE	EA	2	415.8	832
15	BOARD DANGER	EA	2	80	160
16	GI PLATE BASE SIZE				3.000
17	HT stav set complete	No	4	1050	4.200
18	HT Stay insulator	No	4	50	200
19	HT Stay clamp	Pair	4	125	500
20	7/10 SWG stay wire	KG	40	75	3 000
21	PIPE HDPE SIZE 25 MM	M	6	28	168
	Materials for Masonry work for Earth Pit, Charcoal, Salt etc.		-		
22	including construction of earthing chamber (Size: 2"x2") and	LS	2	1600	3.200
	RCC slab cover				-,
23	11KV pin insulatorpolymer	EA	6	200	1,200.000
Α	Total cost of the material				7,80,448
В	Stock, storage and insurance @ 3% of A:				23,413
С	Sub total-C = $(A+B)$				8,03,861
D	T & P charges @ 2% of C				16,077
Е	Contingency charges @ 3% of C				24,116
F	transportation charges @ 7.5 % of C				60.290
	Erection Charges @ 5% of RS Joist & WPB pole				2,660
	Erection Charges @ 20% of PSC Pole				
	Erection Charges @ 10% of other items except RSJ				75,066
G	Erection Charges Sub Total :				77.726
-	Cement concreting for stay anchor plate with C.C. 1:3:6 by				.,0
	using 4cm size hard granite metal= 0.45Mtrx0.45Mtrx1.5Mtr=		4	1270	5.080
	0.3Cum			-	-,
	Cement concreting for support with C.C. 1:3:6 by using 4cm				
	size hard granite		2	1270	2,540
	metal=(0.45Mx0.45Mtrx1.5)M3=0.3cum@4158.84=@4158.84				

S No.	Item Description	Unit	Qty	Unit Rate (In Rs.)	Amount (In Rs.)
	=0.3037xRs.4185.84=Rs.1263.03 or Rs.1270.00(Including HT				
	and LT)				
Н	Sub-Total H(C+D+E+F+G)				9,89,690
-	Over Head charges/Departmental including Supervision				50 381
1	Charges @ 6% of H				59,501
J	Total Estimated Cost i.e. J=(H+I)				10,49,071
К	GST 18%				1,88,833
L	CESS 1%				10,491
	Total of Estimate(J+K+L)				12,48,395
	InspectionFee				200
	Drawing Approval				200
	Grand Total				12,48,795
	Escalation of 2 years with 12.36% of grand Total				1403146
	Total (In Crores)				0.140

9.3.25 Unit BOQ for 11 KV 3-PH SECTIONALISER

S N o	Item Description	Qt y	Uni t	Unit Rate (In Rs.)	Amount (In Rs.)
1	Sectionalizer 11KV 3Ph Pole mounted	1	EA	696058	696058
2	Lightening Arrester(9KV,5KA)	6	EA	980	5880
3	BOLT & NUT GI 12MMX50M HEX	1	KG	78	78
4	BOLT & NUT GI 16MMX75M HEX	3	KG	78	234
5	50x6 mm G I flat	10	KG	75	750
6	25x6 mm G I flat	15	KG	75	1125
7	75x40x6 mm Channel (6.80Kg. / Mtr) with Galvanization	25	KG	75	1875
8	100x50x6 mm Channel (9.2Kg./Mtr) with Galvanization	15	KG	75	1125
٩	40mm nominal bore GI pipe (medium gauge) earthing	2	FΔ	1050	2100
3	device with 3 mtr. Long	2	LA	1030	2100
10	7/10 SWG G I stay wire (10Kg. / Set)	60	KG	75	4500
11	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	8	EA	12	95
12	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	6	EA	366	2196
13	100 sqmm All Alloy Aluminium Conductor AAAC	15	М	55	825
14	HT stay set complete	4	No	1050	4200
15	HT Stay insulator	-		-	200
16	HT Stay clamp	4	Pai r	125	500
17	7/10 SWG stay wire	40	KG	75	3000
18	ANTICLIMBING DEVICE	2	EA	416	832
19	BOARD DANGER	2	EA	80	160
20	PIPE HDPE SIZE 25 MM	6	М	28	168
21	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.)	2	KG	25824	51647
22	GI PLATE BASE SIZE	2	EA	1500	3000
23	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	2	LS	1600	3200
24	11KV pin insulatorpolymer				1200
Α	Total cost of the material				784948
В	Stock, storage and insurance @ 3% of A:				23548
С	Subtotal-C = (A+B)				808496
D	T & P charges @ 2% of C				16170
Е	Contingency charges @ 3% of C	1			24255
F	Transportation charges @ 7.5 % of C				60637
	Erection Charges @ 5% of RS Joist & WPB pole	1			2660
	Erection Charges @ 20% of PSC Pole				
	Erection Charges @ 10% of other items except RSJ				75530

S N o	Item Description	Qt y	Uni t	Unit Rate (In Rs.)	Amount (In Rs.)
G	Erection Charges Sub Total:				78190
	Cement concreting for stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal=0.45Mtrx0.45Mtrx1.5Mtr= 0.3Cum	4		1270	5080
	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		1270	2540
Н	Sub-Total H(C+D+E+F+G)				995368
Ι	Over Head charges/Departmental including Supervision Charges @ 6% of H				59722
J	Total Estimated Cost i.e. J=(H+I)				1055090
Κ	GST 18%				189916
L	CESS 1%				10551
	Total of Estimate(J+K+L)				1255557
	InspectionFee				200
	Drawing Approval				200
	Grand Total				1255957
	Grand Total with Escalation of 12.36% for 2 Years				1411193
	Total (In Crores)				0.1411

9.3.26 Unit BOQ for 4 Way RMU

S No	Description of Materials	Unit	Quantity	Unit Rate (INR)	Amount (INR)
1	RMU 11KV 4 WAY 630A BKR O/D	EA	1	538300	538300
2	75x40x6 mm G.I Channel (6.80Kg. / Mtr)	KG	50	75	3750
3	50x6 mm G I flat	KG	60	75	4500
4	25x6 mm G I flat	KG	10	75	750
5	BOARD DANGER	No.	5	80	400
6	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr. Long	No.	4	1050	4200
7	BOLT & NUT GI 16MMX75M HEX	KG	2	78	156
8	BOLT & NUT GI 12MMX50MM HEX	KG	2	78	156
9	WASHER GI SIZE 16MM DIA	KG	0.5	78	39
10	WASHER GI SIZE 12MM DIA	KG	0.5	78	39
11	CABLE 11KV AL 3CX300 SQMM XLPE ARM	Mtr.	70	1195	83650
12	Heat shrinkable jointing kit for 3Cx300mm ² 11KV XLPE Cable (indoor type)	No.	4	9995	39980
13	Heat shrinkable jointing kit for 3Cx300mm ² XLPE Cable (outdoor type)	No.	4	18000	72000
4	PIPE G.I.100MM DIA HEAVY CLASS PLAIN END	М	6	1594	9562
15	PIPE HDPE SIZE 25 MM	М	6	28	168
16	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	EA	4	12	47
7	7/10 SWG G I stay wire (10Kg. / Set)	KG	20	75	1500
18	100 sqmm All Alloy Aluminium Conductor AAAC	Mtr	6	55	330
19	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	LS	4	1600	6400
Α	Total cost of the material				765928
В	Stock, storage and insurance @ 3% of A:				22978
С	Subtotal-C = (A+B)				788905
D	T & P charges @ 2% of C				15778
Е	Contingency charges @ 3% of C				23667
F	Transportation charges @ 7.5 % of C				59168

S No	Description of Materials	Unit	Quantity	Unit Rate (INR)	Amount (INR)
	Erection Charges @ 5% of RS Joist & WPB pole				27722
	Erection Charges @ 20% of PSC Pole				
	Erection Charges @ 10% of other items except RSJ				23446
G	Erection Charges Sub Total:				51168
	Fencing (3M x 3M)				73134
	RMU Plinth				23145
Н	Sub-Total H(C+D+E+F+G)				1034966
Ι	Over Head charges/Departmental including Supervision Charges @ 6% of H				62098
J	Total Estimated Cost i.e. J=(H+I)				1097064
Κ	GST 18%				197472
L	CESS 1%				10971
	Total of Estimate(J+K+L)				1305507
	Inspection Fee				200
	Drawing Approval				200
	Grand Total				1305907
	Grand Total with Escalation of 12.36% for 2 Years				1467317
	Total (In Crores)				0.146

9.3.27 Unit BOQ for 11 KV Underground Cable

S No	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (In Rs.)
1	3Cx120mm2 11KV XLPE cable (Armoured) XLPE insulated, armoured cable	Mtr	1000	659	659000
2	HDPE Pipe, 8", 10 Mtr, (Spec PE80-PN, 200mm dia)	Mtr	100	1492.17	149217
3	Heat Shrinkable jointing kit for 3Cx120mm2 11KV XLPE Cable (Outdoor type)	Nos	2	11756	23512
4	Heat Shrinkable jointing kit for 3Cx120mm2 11KV XLPE Cable (Straight Through)	Nos	2	23149	46298
5	GI Flat (25X4 mm)	Kg	20	75	1500
6	GI pipe Earthing 40 mm 3 Mtr long Earthing Device	No	2	1050	2100
7	Lightning arrester (11KV, 5KA) Station class-1	No.	6	1000	6000
8	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including, construction of earthing chamber (Size: 2"x2") and RCC slab cover	LS	2	1600	3200
9	Sundries (Socket, cable termination, cripping, Cu. glanding, & other cable accessories etc.)	LS	1	20000	20000
Α	Total cost of the material				910827
В	Stock, storage and insurance @ 3% of A:				27325
С	Subtotal-C = $(A+B)$				938152
D	T & P charges @ 2% of C				18763
E	Contingency charges @ 3% of C				28145
F	Transportation charges @ 7.5 % of C				70361
	Erection Charges @ 5% of RS Joist				
	Erection Charges @ 20% of PSC Pole				
	Erection Charges @ 10% of other items except RSJ				93815
G	Erection Charges Sub Total:				93815
	Laying, Commissioning, testing of 11kV, 3core, 120sqmm, aluminium, XLPE insulation armoured (extruded type) UG cable in HDD method with HDPE pipe of 110mm dia.	KM	1	1399891	1399891
Н	Sub-Total H(C+D+E+F+G)				2549127

S No	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (In Rs.)
Ι	Over Head charges/Departmental including Supervision Charges @ 6% of H				152948
J	Total Estimated Cost i.e. J=(H+I)				2702074
Κ	GST 18%				486373
L	CESS 1%				27021
	Total of Estimate(J+K+L)				3215469
	Inspection Fee				200
	Drawing Approval				200
	Grand Total				3215869
	Grand Total with Escalation of 12.36% for 2 Years				3613350
	Total (In Crores)				0.361

9.3.28 Unit BOQ for 33KV COVERED CONDUCTOR

S No	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (In Rs.)
1	33 KV V Cross arm (22 Kg each)	No	15	1580	23700
2	GI Back Clamp for 'V' Cros Arm (1.7 KG each)	No	15	150	2250
3	Top Bracket 100X50mm MS channel (02 Kg each)	No	20	150	3000
4	Galvanisation of all RS and MS materials	Kg	8522.7	10	85227
5	33 KV F Clamp	No	20	300	6000
6	Disc Insulator B&S 90 KN Polymer type	No	60	1150	69000
7	Tension fitting for covered Conductor	No	60	2050	123000
8	IPC for Covered Conductor	No	3	870	2610
9	Mid Span Jointing Kit	No	3	4200	12600
10	33KV Pin insulator Polymer	No	60	480	28800
11	33 KV conductor Tag (Helical Ties)	No	60	400	24000
12	H.T Stay set (Complete)	No	5	1050	5250
13	HT Stay Insulator Type -C	No	5	50	250
14	Stay clamp & Stud Clamp 1.9 Kg /pair)	Pair	5	125	625
15	7/8 SWG stay wire	Kg	60	75	4500
16	Earthing for Supports (Coil type),	No	20	166	3320
17	GI Base plate for support	No	20	1500	30000
18	GI Nut, Bolt & washer	Kg	20	78	1560
19	100X50X6mm.Channel for straight cross arm (2.8) (9.2Kg/mtr.) with Galvanization	Kg	515.2	75	38640
20	150X150 RS Joist (34.6 Kg/Mtr) 11 mtr Long 20 nos with Galvanization	Kg	7612	75	570900
21	33KV COVERED CONDUCTOR GOAT/KUNDAH	Km	3.15	847460	2669499
22	No.6 G.I wire for guarding	Kg	0	75	0
23	100X50X6mm. Channel for straight cross arm (1.6m X4 pcs) (9.2Kg/mtr.) for guarding	Kg	0	75	0
24	33 KV Lighting arrestor station class 2	No	0	10350	0
25	Danger Board	No	20	80	1600
26	Pole clamp for XLPE	Pair	4	200	800
27	Material for earthing including masonry work for earth pit, salt, charcoal and cement plate cover	LS	0	1600	0
28	G.I Pipe Earthing 40mm Dia medium gauge 03mtr long	No	0	1050	0
29	25X4 mm GI Flat for earthing of XLPE cable	Kg	0	75	0.000

S No	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (In Rs.)
30	Sundries (Paint, Al Binding tape & wire insulating tape, anti-climbing device (2 Ply,2.5 mm dia., Galvanised 3mtr /pole), Clamp connector, Jumpering materials, Socket & other accessories including survey etc.	LS	1	20000	20000
А	Total cost of the material				3727131
В	Stock, storage and insurance @ 3% of A:				111814
С	Subtotal-C = $(A+B)$				3838945
D	T & P charges @ 2% of C				76779
Е	Contingency charges @ 3% of C				115168
F	Transportation charges @ 7.5 % of C				287921
	Erection Charges @ 5% of RS Joist & WPB pole				29401
	Erection Charges @ 20% of PSC Pole				
	Erection Charges @ 10% of other items except RSJ				325092
G	Erection Charges Sub Total:				354493
	Concreting of support C.C. 1:3:6, using 40mm HBG metal=0.45Mtrx0.45Mtrx1.5Mtr= 0.3037Cum. @4158.84=0.3037x4158.84=1263.03 or 1270.00	20	No	1270	25400
	Cement concreting for stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= 0.45Mtrx0.45Mtrx1.5Mtr= 0.3037Cum. @ 4158.84=0.3037x4158.84=1263.03 or 1270.00	5	No	1270	6350
Н	Sub-Total H(C+D+E+F+G)				4705056
I	Over Head charges/Departmental including Supervision Charges @ 6% of H				282303
J	Total Estimated Cost i.e. J=(H+I)				4987360
К	GST 18%				897725
L	CESS 1%				49873.6
	Total of Estimate(J+K+L)				5934958
	Inspection Fee				200
	Drawing Approval				200
	Grand Total				5935358
	Grand Total with Escalation of 12.36% for 2 Years				6668968
	Total (In Crores)				0.6668

9.3.29 Unit BOQ for 11 KV COVERED CONDUCTOR

S No	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (In Rs.)
1	11 KV V Cross arm (10.2 Kg each)	No	15	810	12150
2	GI Back Clamp for 'V' Cros Arm (.85 KG each)	No	15	80	1200
3	Top Bracket 100X50mm MS channel (02 Kg each)	No	20	150	3000
4	Galvanisation of all RS and MS materials	Kg	8522.7	10	85227
5	11 KV F Clamp	No	20	240	4800
6	Disc Insulator B&S 45 KN Polymer type	No	30	860	25800
7	Tension fitting for covered conductor	No	30	1500	45000
8	IPC for Covered conductor	No	3	475	1425
9	Mid Span Jointing Kit	No	3	3300	9900
10	11KV Pin insulator Polymer	No	60	200	12000
11	11 KV conductor Tag (Helical Ties)	No	60	290	17400
12	H.T Stay set (Complete)	No	5	1050	5250
13	HT Stay Insulator Type -C	No	5	50	250
14	Stay clamp & Stud Clamp 1.9 Kg /pair)	Pair	5	125	625
15	7/8 SWG stay wire	Kg	60	75	4500
16	Earthing for Supports (Coil type),	No	20	166	3320
7	GI Base plate for support	No	20	1500	30000

S No	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (In Rs.)
8	GI Nut, Bolt & washer	Kg	20	78	1560
19	100X50X6mm. Channel for straight cross arm (2.8) (9.2Kg/mtr.)	Kg	515.2	75	38640
20	150X150 RS Joist (34.6Kg/Mtr) 11 mtr Long 20 nos.	Kg	7612	75	570900
21	11KV COVERED CONDUCTOR DOG	Km	3.15	303390	955679
22	No.6 G.I wire for guarding	Kg	0	75	0
23	100X50X6mm. Channel for straight cross arm (1.6m X4 pcs) (9.2Kg/mtr.) for guarding	Kg	0	75	0
24	11 KV Lighting arrestor station class 2	No	0	10350	0
25	Danger Board	No	20	80	1600
26	Pole clamp for XLPE	Pair	0	200	0
27	Material for earthing including masonry work for earth pit, salt, charcoal and cement plate cover	LS	0	1600	0
28	G.I Pipe Earthing 40mm Dia medium gauge	No	0	1050	0
	03mtr long				
29	25X4 mm GI Flat for earthing of XLPE cable	Kg	0	75	0
30	Sundries (Paint, AI Binding tape & wire insulating tape, anti-climbing device (2 Ply,2.5 mm dia., Galvanised 3mtr /pole), Clamp connector, Jumpering materials, Socket & other accessories including survey etc.	LS	1	20000	20000
Α	Total cost of the material				1850226
В	Stock, storage and insurance @ 3% of A:				55507
C	Sub total-C = $(A+B)$				1905732
D	T & P charges @ 2% of C				38115
Е	Contingency charges @ 3% of C				57172
F	Transportation charges @ 7.5 % of C				142930
	Erection Charges @ 5% of RS Joist & WPB pole				29401
	Erection Charges @ 20% of PSC Pole				
	Erection Charges @ 10% of other items except RSJ				131771
G	Erection Charges Sub Total:				161172
	Concreting of support C.C. 1:3:6, using 40mm HBG metal=0.45Mtrx0.45Mtrx1.5Mtr= 0.3037Cum. @4158.84=0.3037x4158.84=1263.03 or 1270.00.	20	No	1270	25400
	Cement concreting for stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= 0.45Mtrx0.45Mtrx1.5Mtr= 0.3037Cum. @ 4158.84=0.3037x4158.84=1263.03 or 1270.00	5	No	1270	6350
Н	Sub-Total H(C+D+E+F+G)				2336871
I	Over Head charges/Departmental including Supervision Charges @ 6% of H				140212
J	Total Estimated Cost i.e. J=(H+I)				2477083
K	GST 18%				445875
L	CESS 1%				24771
	Total of Estimate(J+K+L)				2947729
	Inspection Fee				200
	Drawing Approval				200
	Grand Total				2948129
	Grand Total with Escalation of 12.36% for 2 Years				3312517
	Total (In Crores)				0.3312

9.4 Annexures- Load Growth

Cost estimate – Load Growth:

9.4.1. Unit BOQ for 11 KV new Line - 100 Sqmm. AAAC

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
	No. of DP required Without AB sw	itch			1
	MATERIALS OF DP Withou	it Isolator			
1	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.)	No	2	26517	53,034
2	Top Channel 100X50X6mm, 9.56 KG/Mtr., each channel length 2.3 mtr., 2 no's channel required =(2x9.56x2.3)	KG	43.98	76	3,342
3	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr. length, 6 no's required = (6x2.36x0.280)	KG	3.96	76	301
4	Double Pole Belting Channel 75X40X 4.8mm., 7.14KG/Mtr., each channel length 1.66 Mtr., 4 no's channel required =(7.14x1.66x4)	KG	47.41	76	3,603
5	50x50x6mm.GI Bracing Angle, 4.5Kg./mtr., each angle length 2.671 mtr., 4 nos angle required = (4.5x2.671x4)	KG	48.08	76	3,654
6	Danger Plate, 2 no's.	No.	2	80	160
7	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 2 no's = (2x0.59x0.510)	KG	0.60	76	46
8	H.T. Stay clamp,50x8 mm. flat, 3.14Kg/Mtr., 0.551 Mtr. Length, 2 no's qty. required (1 Pair)	Pair	2	125	250
9	H.T. Stay set (Complete)	Set	2	1050	2,100
10	H.T. Stay Insulator Type-C	No.	2	50	100
11	7/10 SWG Stay Wire 15kg /stay	K.g.	30	75	2,250
12	Gi Pipe Earthing 40mm. 3 Mtr. Long	No.	1	1050	1,050
13	50x6mm GI Flat for earthing, 2.36kg/mtr., (2.5 mtr. For mesh formation and 2.5 mtr. For raising)=5x2.36	KG	11.80	75	885
14	GI barbed wire anticlimbing device 3 Kg. Per support, 2 no's qty. required =(2x3kg)	Kg	6	80	480
15	Back Clamp for anticlimbing device 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 8 no's = (8x0.59x0.510)	KG	2.41	76	183
16	11 KV pin insulator polymer	No.	3	200	600
17	H W fitting(B&S) 70KN, 3Bolt	No.	6	350	2,100
18	Discinsulator (B&S) 70 KN polymer	No.	6	1150	6,900
19	PG Clamp for 100 sq.mm AAA conductor	NO.	6	580	3,480
20	GI Nut, Bolt & Washer of different sizes (12.261 Kg each DP without AB Switch)	K.g.	12.26	78	956
21	Black Paint	Ltr	1	220	220
22	Yellow Colour Paint for Background	Ltr	2	220	440
Α	Total Cost of materials				86,135
В	Stock, Storage & Insurance i.e 3% of A				2,584
С	Sub Total (A+B)				88,719
D	Contingency @ 3% of C				2,662
E	Tools & Plants @ 2% of C				
F	Transportation @ 7.5% of C				6,654
G	Erection Charges @ 5% on Trf/Breaker/WPB/ H-Pole				2,731
н	Erection Charges @ 10% of other items				2,925
\vdash	Erection Charges @ 20% of PSC pole-Notto be used f	or 33kv			-
J	Sum of (C to I) Civil & Services				1,03,690

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
1	Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excvation including excvation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material	No.	2	2250.00	4,500
2	Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr	Cu.mtr	0.90	6500	5,850
3	Couping ratio 1:1.5:3 with dimension(500X500X450)= 0.1125 Cu mtr	Cu.mtr	0.23	6500	1,463
4	Installation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover	No.	1	2407	2,407
κ	Total Civil & Services				14,220
L	Total (J+K)				1,17,910
Μ	Other overheads (Including 6% supervision charges) of	L			7,075
Ν	SubTotal (L+M)				1,24,985
0	Total GST @ 18% of (N)				22,497
Р	Gross Total Material +Services (N+O) for DP Without	Isolator			1,47,482
	No. of DP required With AB Swite	ch			1
	MATERIALS OF DP With	Isolator			
SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
1	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.)	No	2	26517	53,034
2	Top Channel 100X50X6mm, 9.56 KG/Mtr., each channel length 3 mtr., 2 no's channel required =(2x9.56x3)	KG	57.36	76	4,359
3	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr. length, 6 no's required = (6x2.36x0.280)	KG	3.96	76	301
4	AB switch Mounting Channel 75X40X4.8mm, 7.14KG/Mtr, each channel length 3 Mtr., 2 no's channel required =(7.14x3x2)	KG	42.84	76	3,256
5	AB Switch Side Support Channel 100X50X6mm,9.56 KG/Mtr., each channel length 0.35 mtr., 2 no's channel required =(9.56x2x0.35)	KG	6.69	76	509
6	Channel Support for down Pipe 75X40X 4.8mm., 7.14KG/Mtr., each channel length 0.8 Mtr., 1 no's channel required =(7.14x0.8x1)	KG	5.71	76	434
7	Double Pole Belting Channel 75X40X 4.8mm., 7.14KG/Mtr., each channel length 1.66 Mtr., 4 no's channel required =(7.14x3x4)	KG	85.68	76	6,512
8	50x50x6mm.GI Bracing Angle, 4.5Kg./mtr., each angle length 3.512 mtr., 4 nos angle required = (4.5x3.512x4)	KG	63.22	76	4,804
9	Danger Plate, 2 no's.	No.	2	80	160
10	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 2 no's = (2x0.59x0.510)	KG	0.60	76	46
11	H.T. Stay clamp, 50x8 mm. flat, 3.14Kg/Mtr., 0.551 Mtr. Length, 2 no's qty. required (1 Pair)	Pair	2	125	250
12	H.T. Stay set (Complete)	Set	2	1050	2,100
13	H.T. Stay Insulator Type-C	No.	2	50	100
14	7/10 SWG Stay Wire 15kg /stay	K.g.	30	75	2,250
15	Gi Pipe Earthing 40mm. 3 Mtr. Long	No.	2	1050	2,100

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
16	50x6mm GI Flat for earthing, 2.36kg/mtr., (12.5 Mtr. For L.A, 3 Mtr for AB Switch Body, 2.5 mtr. For mesh formation and 2.5 mtr. For raising)=20.5x2.36	KG	48.38	75	3,629
17	GI barbed wire anticlimbing device 3 Kg. Per support, 2 no's qty. required =(2x3kg)	Kg	6	80	480
18	Back Clamp for anticlimbing device 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 8 no's = (8x0.59x0.510)	KG	2.41	76	183
19	Lightning Arrester(11KV,10KA) (Station Class,class-2)	EA	3.00	3550	10,650
20	AB Switch (11KV,400A.3pole,50Hz)	Set	1	11850	11,850
21	11 KV pin insulator polymer	No.	3	200	600
22	H W fitting(B&S) 70KN, 3Bolt	No.	6	350	2,100
23	Disc insulator (B&S) 70 KN polymer	No.	6	1150	6,900
24	PG Clamp for 100 sq.mm AAA conductor	NO.	6	580	3,480
25	GI Nut, Bolt & Washer of different sizes (13.718 Kg each DP with AB Switch)	K.g.	13.72	78	1,070
26	Black Paint	Ltr	1	220	220
27	Yellow Colour Paint for Background	Ltr	2	220	440
Α	Total Cost of materials				1,21,816
В	Stock, Storage & Insurance i.e 3% of A				3,654
С	Sub Total (A+B)				1,25,471
D	Contingency @ 3% of C				3,764
Е	Tools & Plants @ 2% of C				
F	Transportation @ 7.5% of C				9,410
G	Erection Charges @ 5% on Trf/Breaker/Joist				2,731
Н	Erection Charges @ 10% of other items				6,600
1	Erection Charges @ 20% of PSC pole-Not to be used f	or 33kv			-
	Sum of (C to I)				1 17 077
5					1,47,977
J	Civil & Services			l lmit	Tatal
SN	<u>Civil & Services</u> Description of Materials	Unit	Qty.	Unit Rate	Total Amount
SN	<u>Civil & Services</u> Description of Materials Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material	Unit No.	Qty. 2	Unit Rate	4,500
SN 1	<u>Civil & Services</u> Description of Materials Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr	Unit No. Cu.mtr	Qty. 2 0.90	Unit Rate 2250 6500	4,500 5,850
SN 1 2 3	<u>Civil & Services</u> Description of Materials Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr	Unit No. Cu.mtr	Qty. 2 0.90 0.23	Unit Rate 2250 6500 6500	1,47,577 Total Amount 4,500 5,850 1,463
3 SN 1 2 3 4	Civil & ServicesDescription of MaterialsFixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and materialConcreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtrCouping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtrInstallation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 6500 2407	Total Amount 4,500 5,850 1,463 4,814
3 SN 1 2 3 4 K	Civil & ServicesDescription of MaterialsFixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and materialConcreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr0.45Cu.mtrCouping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr1nstallation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab coverTotal Civil & Services	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 6500 2407	Total Amount 4,500 5,850 1,463 4,814 16,627
3 SN 1 2 3 4 K L	Civil & ServicesDescription of MaterialsFixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and materialConcreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtrCouping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtrInstallation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab coverTotal Civil & ServicesTotal (J+K)	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 6500 2407	Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604
3 SN 1 2 3 4 K L M	Civil & ServicesDescription of MaterialsFixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and materialConcreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtrCouping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtrInstallation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab coverTotal Civil & ServicesTotal (J+K)Other overheads (Including 6% supervision charges) of	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 6500 2407	Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604 9,876
3 SN 1 2 3 4 K L M N	Civil & ServicesDescription of MaterialsFixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and materialConcreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtrCouping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtrInstallation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab coverTotal Civil & ServicesTotal (J+K)Other overheads (Including 6% supervision charges) of SubTotal (L+M)	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 6500 2407	Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604 9,876 1,74,480
3 SN 1 2 3 4 K L M N O	Civil & ServicesDescription of MaterialsFixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and materialConcreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr0.45Cu.mtrCouping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr111111111111111111111111111111111	Unit No. Cu.mtr Cu.mtr	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 6500 2407	Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604 9,876 1,74,480 31,406
3 SN 1 2 3 4 K L M N O P	Civil & ServicesDescription of MaterialsFixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and materialConcreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtrCouping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtrInstallation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab coverTotal Civil & ServicesTotal (J+K)Other overheads (Including 6% supervision charges) of SubTotal (L+M)Total GST @ 18% of (N)Gross Total Material +Services (N+O) for DP With Iso	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 2407	Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604 9,876 1,74,480 31,406 2,05,886
3 SN 1 2 3 4 K L M N O P	Civil & ServicesDescription of MaterialsFixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and materialConcreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtrCouping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtrInstallation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab coverTotal Civil & ServicesTotal (J+K)Other overheads (Including 6% supervision charges) of SubTotal (L+M)Total GST @ 18% of (N)Gross Total Material +Services (N+O) for DP With Iso	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 2407	Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604 9,876 1,74,480 31,406 2,05,886
3 SN 1 2 3 4 K L M N O P	Civil & Services Description of Materials Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr Couping ratio 1:1.5:3 with dimension (500X500X450) = 0.1125 Cu mtr Installation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover Total Civil & Services Total (J+K) Other overheads (Including 6% supervision charges) of SubTotal (L+M) Total GST @ 18% of (N) Gross Total Material +Services (N+O) for DP With Iso No. of Cut Point with 180 Degree A	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 6500 2407	Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604 9,876 1,74,480 31,406 2,05,886 1
3 SN 1 2 3 4 K L M N O P	Civil & Services Description of Materials Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr Installation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover Total Civil & Services Total (J+K) Other overheads (Including 6% supervision charges) of SubTotal (L+M) Total GST @ 18% of (N) Gross Total Material +Services (N+O) for DP With Iso No. of Cut Point with 180 Degree A	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2 gree Angle	Unit Rate	Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604 9,876 1,74,480 31,406 2,05,886 1

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
2	Straight Cross Arm 100X50X6mm, 9.56 KG/Mtr., each channel length 1.2 mtr., 2 no's channel required =(2x9.56x1.2)	KG	22.94	76	1,744
3	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr. length, 8 no's required = (8x2.36x0.280)	KG	5.29	76	402
4	Straight Cross Arm 100X50X6mm, 9.56 KG/Mtr., each channel length 1.2 mtr., 2 no's channel required =(2x9.56x0.306)	KG	5.85	76	445
5	Danger Plate, 1 no's.	No.	1	76	76
6	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	KG	0.30	76	23
7	GI barbed wire anticlimbing device 3 Kg. Per support, 2 no's qty. required =(2x3kg)	Kg	3	80	240
8	Back Clamp for anticlimbing device 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 8 no's = (8x0.59x0.510)	KG	2.41	76	183
9	11 KV pin insulator polymer	No.	3	200	600
10	H W fitting(B&S) 70KN, 3Bolt	No.	6	350	2,100
11	Disc insulator (B&S) 70 KN polymer	No.	6	1150	6,900
12	Earthing of Support (Coil Type)	EA	1	166	166
13	No-8 GI wire (Dia 4.6mm) 0.131 KG/ Mtr 2 Mtr. For connecting pole with Coil earthing	K.g.	0.262	75	20
14	PG Clamp for 100 sq.mm AAA conductor	NO.	6.000	580	3,480
15	GI Nut, Bolt & Washer of different sizes (3.55 Kg each Cut Pole)	K.g.	3.55	78	277
16	Black Paint	Ltr	1	220	110
17	Yellow Colour Paint for Background	Ltr	1	220	220
Α	Total Cost of materials				43,501
В	Stock, Storage & Insurance i.e 3% of A				1,305
С	Sub Total (A+B)				44,807
D	Contingency @ 3% of C				1,344
E	Tools & Plants @ 2% of C				
F	I ransportation @ 7.5% of C				3,360
G	Erection Charges @ 5% on Trf/Breaker/Joist				1,366
н	Erection Charges @ 10% of other items	a = 0.01 ··· ·			1,749
<u> </u>	Erection Charges @ 20% of PSC pole- Not to be used f	OF 33KV			-
5	Civil & Services				52,020
SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
1	Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr	Cu.mtr	0.45	6500	2,925
2	Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr	Cu.mtr	0.11	6500	731
K	Total Civil & Services				3,656
L	Total (J+K)				56,282
М	Other overheads (Including 6% supervision charges) of	L			3,377
Ν	SubTotal (L+M)				59,659
0	Total GST @ 18% of (N)				10,739
Р	Gross Total Material +Services (N+O) for 11 KV Cut F	oint with	180 Degre	e Angle	70,398
	No. of Cut Point with 90 Degree Ar	ngle			1
	MATERIALS FOR 11 KV Cut Point wi	th 90 Deg	ree Angle	007/-	
1	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.)	No	1	26517	26,517

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
2	Straight Cross Arm 100X50X6mm, 9.56 KG/Mtr., each channel length 1.2 mtr., 4 no's channel required =(4x9.56x1.2)	KG	45.89	76	3,487
3	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr. length, 16 no's required = (16x2.36x0.280)	K.g.	10.57	76	804
4	Straight Cross Arm 100X50X6mm, 9.56 KG/Mtr., each channel length 1.2 mtr., 4 no's channel required =(4x9.56x0.306)	KG	11.70	76	889
5	Danger Plate, 1 no's.	No.	1	76	76
6	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	KG	0.30	76	23
7	GI barbed wire anticlimbing device 3 Kg. Per support, 2 no's qty. required =(2x3kg)	Kg	3	80	240
8	Back Clamp for anticlimbing device 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 8 no's = (8x0.59x0.510)	KG	2.41	76	183
9	11 KV pin insulator polymer	No.	3	200	600
10	H W fitting(B&S) 70KN, 3Bolt	No.	6	350	2,100
11	Disc insulator (B&S) 70 KN polymer	No.	6	1150	6,900
12	Earthing of Support (Coil Type)	EA	1	166	166
13	No-8 GI wire (Dia 4.6mm) 0.131 KG/ Mtr 2 Mtr. For connecting pole with Coil earthing	K.g.	0.262	75	20
14	PG Clamp for 100 sq.mm AAA conductor	NO.	6.000	580	3,480
15	H.T. Stay clamp, 50x8 mm. flat, 3.14Kg/Mtr., 0.551 Mtr. Length, 2 no's qty. required (1 Pair)	Pair	2	125	250
16	H.T. Stay set (Complete)	Set	2	1050	2,100
17	H.T. Stay Insulator Type-C	No.	2	50	100
18	7/10 SWG Stay Wire 15kg /stay	K.g.	30	75	2,250
19	GI Nut, Bolt & Washer of different sizes (7.433 Kg each Cut Pole)	K.g.	7.43	78	580
20	Black Paint	Ltr	1	220	220
21	Yellow Colour Paint for Background	Ltr	2	220	440
Α	Total Cost of materials				51,425
B	Stock, Storage & Insurance i.e 3% of A				1,543
C	Sub Total (A+B)				52,967
D	Contingency @ 3% of C				1,589
	Tools & Plants @ 2% of C				0.070
F G	Fraction Charges @ 5% on Trf/Proaker/ laist				3,973
Ч	Election Charges @ 5% of Th/Bleaker/Joist				2 081
- ii	Erection Charges @ 20% of PSC pole-Notto be used f	or 33kv			2,001
J	Sum of (C to I)	01 0010			61.976
	Civil & Services				- ,
1	Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material	No.	2	2250	4500
2	Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr	Cu.mtr	0.45	6500	2,925
3	Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr	Cu.mtr	0.11	6500	731
K	Total Civil & Services				8,156

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
L	Total (J+K)				70,132
М	Other overheads (Including 6% supervision charges) of	L			4,208
Ν	SubTotal (L+M)				74,340
0	Total GST @ 18% of (N)				13,381
Р	Gross Total Material +Services (N+O) for 11 KV Cut F	oint with	90 Degree	e Angle	87,721
11 K	V Line Length in KM	nto With			1
	MATERIALS FOR TERV PILLED			Unit	Total
SN	Description of Materials	Unit	Qty.	Rate	Amount
1	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.)	No.	21	26517	556856
2	11 KV V cross Arm (10.2 K.g. each)	No.	21	810	17,010
3	Top bracket 100x50X6 mm GI channel (2kg each)	No.	21	150	3,150
4	Danger Plate, 1 no's. for each pole	No.	21	80	1,680
_	Back Clamp for danger Plate 25X3 mm. flat,				
5	0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0 59x0 510)	KG	6.32	76	480
6	GI barbed wire anticlimbing device 3 Kg. Per support,	Ka	126	80	10.080
	2 ho's qty. required =(2X3kg)	5			
7	0.59Kg/Mtr. Flat of 0.510mtr length 8 no's = $(8x0.59x0.510)$	KG	50.55	76	3,842
8	11 KV pin insulator polymer, 3 Nos. required for each support =(3x25x1)	No.	63	200	12,600
9	Earthing of Support (Coil Type)	No.	21	125	2,625
10	No-8 GI wire (Dia 4.6mm) 0.131 KG/ Mtr 2 Mtr. For connecting pole with Coil earthing	K.g.	5.502	75	413
11	GI Nut, Bolt & Washer of different sizes (1.45 Kg/ Pin Point)	K.g.	30	78	2,375
12	100 mm2 AAAC	K.M.	3.09	55000	1,69,950
13	Crimping type Midspan Compression Joint for 100 sq.mm AAA conductor	EA	3		-
14	Black Paint	Ltr	21	220	4,620
15	Yellow Colour Paint for Background	Ltr	42	220	9,240
Α	Total Cost of materials				7,94,921
В	Stock, Storage & Insurance i.e 3% of A				23,848
С	Sub Total (A+B)				8,18,768
D	Contingency @ 3% of C				24,563
	Tools & Plants @ 2% of C				01.400
	Fraction Charges @ 5% on Trf/Procker/M/DD/11 Date				01,408
<u>ц</u>	Erection Charges @ 10% of other items				20,010
	Erection Charges @ 20% of PSC note-Notto be used f	or 33kv			- 24,321
	Sum of (C to I)				9.57.938
	Civil & Services				0,01,000
1	Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr	Cu.mtr	9.45	6500	61,425
2	Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr	Cu.mtr	2.36	6500	15,356
К	Total Civil & Services			-	76,781
L	Total Material+Services (I+K)				10,34,719
М	Other overheads (Including 6% supervision charges)				62,083
Ν	SubTotal (L+M)				10,96,802
0	Total GST @ 18% of (N)				1,97,424
Р	Gross Total Material +Services (N+O) for 11 KV Pin P	oints Wit	h WPB		12,94,227

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount	
Gross Total Summary						
1	1 Gross Total Material +Services (N+O) for DP Without Isolator					
2	Gross Total Material +Services (N+O) for DP With Isolate	or			2,05,886	
3	Gross Total Material +Services (N+O) for 11 KV Cut Poir	nt with 180) Degree A	ngle	70,398	
4	Gross Total Material +Services (N+O) for 11 KV Cut Poir	nt with 90	Degree An	gle	87,721	
5	Gross Total Material +Services (N+O) for 11 KV Pin Poir	nts With V	/PB		12,94,227	
6	Inspection Fee of Over Head Line (HT) - Rs. 200 for 1st	5 km.			200	
7	Inspection Fee of Over Head Line (HT) - Rs. 30/ Addition	nal Km				
8	Inspection Fee of Drawing Checking and Approval				400	
9	Final decision by electrical Inspector				500	
10	Gross Total Material, Services and Inspection Fees (I	P+Q+R+S	+T)		18,06,814	
			Or in Cr		0.18	
		with es	calation o	f 12.36%	20,30,136	
			In Cr.		0.20	

9.4.2. Unit BOQ for 11 KV New Line - 80 Sqmm. AAAC

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
	No. of DP required Without AB swite	ch			1
	MATERIALS OF DP Without	Isolator			
1	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.)	No	2	26517	53,034
2	Top Channel 100X50X6mm, 9.56 KG/Mtr., each channel length 2.3 mtr., 2 no's channel required =(2x9.56x2.3)	KG	43.98	76	3,342
3	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr. length, 6 no's required = (6x2.36x0.280)	KG	3.96	76	301
4	Double Pole Belting Channel 75X40X 4.8mm., 7.14KG/Mtr., each channel length 1.66 Mtr., 4 no's channel required =(7.14x1.66x4)	KG	47.41	76	3,603
5	50x50x6mm.GI Bracing Angle, 4.5Kg./mtr., each angle length 2.671 mtr., 4 nos angle required = (4.5x2.671x4)	KG	48.08	76	3,654
6	Danger Plate, 2 no's.	No.	2	80	160
7	Back Clamp for danger Plate 25X3 mm. flat, 0.59 Kg/Mtr. Flat of 0.510 mtr length $2 \text{ no's} = (2x0.59x0.510)$	KG	0.60	76	46
8	H.T. Stay clamp, 50x8 mm. flat, 3.14Kg/Mtr., 0.551 Mtr. Length, 2 no's qty. required (1 Pair)	Pair	2	125	250
9	H.T. Stay set (Complete)	Set	2	1050	2,100
10	H.T. Stay Insulator Type-C	No.	2	50	100
11	7/10 SWG Stay Wire 15kg /stay	K.g.	30	75	2,250
12	Gi Pipe Earthing 40mm. 3 Mtr. Long	No.	1	1050	1,050
13	50x6mm GI Flat for earthing, 2.36kg/mtr., (2.5 mtr. For mesh formation and 2.5 mtr. For raising)=5x2.36	KG	11.80	75	885
14	GI barbed wire anticlimbing device 3 Kg. Per support, 2 no's qty. required =(2x3kg)	Kg	6	80	480
15	Back Clamp for anticlimbing device 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 8 no's = (8x0.59x0.510)	KG	2.41	76	183
16	11 KV pin insulator polymer	No.	3	200	600
17	H W fitting(B&S) 70KN, 3Bolt	No.	6	350	2,100
18	Disc insulator (B&S) 70 KN polymer	No.	6	1150	6,900
19	PG Clamp for 100 sq.mm AAA conductor	NO.	6	580	3,480
20	GI Nut, Bolt & Washer of different sizes (12.261 Kg each DP without AB Switch)	K.g.	12.26	78	956
21	Black Paint	Ltr	1	220	220
22	Yellow Colour Paint for Background	Ltr	2	220	440
Α	Total Cost of materials				86,135
В	Stock, Storage & Insurance i.e 3% of A				2,584
С	Sub Total (A+B)				88,719
D	Contingency @ 3% of C				2,662

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
Е	Tools & Plants @ 2% of C				
F	Transportation @ 7.5% of C				6,654
G	Erection Charges @ 5% on Trf/Breaker/WPB/ H-Pole				2,731
н	Erection Charges @ 10% of other items	22107			2,925
┝┼	Election Charges @ 20% of PSC pole- Notio be used for	33KV			-
	Civil & Services				1,03,030
-			•	Unit	Total
5N	Description of materials	Unit	Qty.	Rate	Amount
1	Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material	No.	2	2250	4,500
2	Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr	Cu.mtr	0.90	6500	5,850
3	Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr	Cu.mtr	0.23	6500	1,463
4	Installation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover	No.	1	2407	2,407
Κ	Total Civil & Services				14,220
L	Total (J+K)				1,17,910
M	Other overheads (Including 6% supervision	n charges)	ofL		7,075
N					1,24,985
P	Gross Total Material +Services (N+O) for DP	Without	Isolator		1 47 482
· ·		minout	oolatol		1,47,402
	No. of DP required With AB Switch	1			1
	MATERIALS OF DP With Is	<u>olator</u>		l lmit	Tatal
SN	Description of Materials	Unit	Qty.	Rate	Amount
1	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.)	No	2	26517	53,034
2	Top Channel 100X50X6mm, 9.56 KG/Mtr., each channel length 3 mtr., 2 no's channel required =(2x9.56x3)	KG	57.36	76	4,359
3	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr. length, 6 no's required = (6x2.36x0.280)	KG	3.96	76	301
4	AB switch Mounting Channel 75X40X4.8mm, 7.14KG/Mtr, each channel length 3 Mtr., 2 no's channel required =(7.14x3x2)	KG	42.84	76	3,256
5	AB Switch Side Support Channel 100X50X6mm,9.56 KG/Mtr., each channel length 0.35 mtr., 2 no's channel required =(9.56x2x0.35)	KG	6.69	76	509
6	Channel Support for down Ding 75X40X 4 9mm				
	7.14KG/Mtr., each channel length 0.8 Mtr., 1 no's channel required =(7.14x0.8x1)	KG	5.71	76	434
7	7.14KG/Mtr., each channel length 0.8 Mtr., 1 no's channel required =(7.14x0.8x1) Double Pole Belting Channel 75X40X 4.8mm., 7.14KG/Mtr., each channel length 1.66 Mtr., 4 no's channel required =(7.14x3x4)	KG KG	5.71 85.68	76 76	434 6,512
7	7.14KG/Mtr., each channel length 0.8 Mtr., 1 no's channel required =(7.14x0.8x1) Double Pole Belting Channel 75X40X 4.8mm., 7.14KG/Mtr., each channel length 1.66 Mtr., 4 no's channel required =(7.14x3x4) 50x50x6mm.GI Bracing Angle, 4.5Kg./mtr., each angle length 3.512 mtr., 4 nos angle required = (4.5x3.512x4)	KG KG KG	5.71 85.68 63.22	76 76 76	434 6,512 4,804
7 8 9	7.14KG/Mtr., each channel length 0.8 Mtr., 1 no's channel required =(7.14x0.8x1) Double Pole Belting Channel 75X40X 4.8mm., 7.14KG/Mtr., each channel length 1.66 Mtr., 4 no's channel required =(7.14x3x4) 50x50x6mm.GI Bracing Angle, 4.5Kg./mtr., each angle length 3.512 mtr., 4 nos angle required = (4.5x3.512x4) Danger Plate, 2 no's.	KG KG KG No.	5.71 85.68 63.22 2	76 76 76 80	434 6,512 4,804 160
7 8 9 10	7.14KG/Mtr., each channel length 0.8 Mtr., 1 no's channel required =(7.14x0.8x1) Double Pole Belting Channel 75X40X 4.8mm., 7.14KG/Mtr., each channel length 1.66 Mtr., 4 no's channel required =(7.14x3x4) 50x50x6mm.GI Bracing Angle, 4.5Kg./mtr., each angle length 3.512 mtr., 4 nos angle required = (4.5x3.512x4) Danger Plate, 2 no's. Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 2 no's = (2x0.59x0.510)	KG KG KG No. KG	5.71 85.68 63.22 2 0.60	76 76 76 80 76	434 6,512 4,804 160 46
7 8 9 10 11	 Chaimer supportion down Pipe 75X40X 4.5mm, 7.14KG/Mtr., each channel length 0.8 Mtr., 1 no's channel required =(7.14x0.8x1) Double Pole Belting Channel 75X40X 4.8mm,, 7.14KG/Mtr., each channel length 1.66 Mtr., 4 no's channel required =(7.14x3x4) 50x50x6mm.GI Bracing Angle, 4.5Kg./mtr., each angle length 3.512 mtr., 4 nos angle required = (4.5x3.512x4) Danger Plate, 2 no's. Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 2 no's = (2x0.59x0.510) H.T. Stay clamp, 50x8 mm. flat, 3.14Kg/Mtr., 0.551 Mtr. Length, 2 no's qty. required (1 Pair) 	KG KG KG No. KG Pair	5.71 85.68 63.22 2 0.60 2	76 76 76 80 76 125	434 6,512 4,804 160 46 250
7 8 9 10 11 12	 Chaimer supportion down Pipe 75X40X 4.5mm, 7.14KG/Mtr., each channel length 0.8 Mtr., 1 no's channel required =(7.14x0.8x1) Double Pole Belting Channel 75X40X 4.8mm,, 7.14KG/Mtr., each channel length 1.66 Mtr., 4 no's channel required =(7.14x3x4) 50x50x6mm.GI Bracing Angle, 4.5Kg./mtr., each angle length 3.512 mtr., 4 nos angle required = (4.5x3.512x4) Danger Plate, 2 no's. Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 2 no's = (2x0.59x0.510) H.T. Stay clamp, 50x8 mm. flat, 3.14Kg/Mtr., 0.551 Mtr. Length, 2 no's qty. required (1 Pair) H.T. Stay set (Complete) 	KG KG KG No. KG Pair Set	5.71 85.68 63.22 2 0.60 2 2 2	76 76 76 80 76 125 1050	434 6,512 4,804 160 46 250 2,100

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
14	7/10 SWG Stay Wire 15kg /stay	K.a.	30	75	2.250
15	Gi Pipe Earthing 40mm, 3 Mtr. Long	No.	2	1050	2,100
	50x6mm GI Flat for earthing, 2.36kg/mtr., (12.5 Mtr. For	-			,
16	L.A, 3 Mtr for AB Switch Body, 2.5 mtr. For mesh	KG	48.38	75	3,629
	formation and 2.5 mtr. For raising)=20.5x2.36				
17	GI barbed wire anticlimbing device 3 Kg. Per support, 2	Ka	6	80	490
17	no's qty. required =(2x3kg)	Ny	0	80	400
	Back Clamp for anticlimbing device 25X3 mm. flat,	_			
18	0.59Kg/Mtr. Flat of 0.510mtr length 8 no's =	KG	2.41	76	183
10	(8x0.59x0.510)		0.00	0550	10.050
19	Lightning Arrester(11KV,10KA) (Station Class,class-2)	EA	3.00	3550	10,650
20	AB Switch (TIKV,400A.Spole,50HZ)	No	2	200	11,650
21	H W fitting (B&S) 70KN 3Bolt	No.	6	200	2 100
22	Discinsulator (B&S) 70 KN polymer	No.	6	1150	6 900
23	PG Clamp for 100 sq mm AAA conductor	NO.	6	580	3 480
21	GLNut Bolt & Washer of different sizes (13 718 Kg			000	0,100
25	each DP with AB Switch)	K.g.	13.72	78	1,070
26	Black Paint	Ltr	1	220	220
27	Yellow Colour Paint for Background	Ltr	2	220	440
Α	Total Cost of materials				1,21,816
В	Stock, Storage & Insurance i.e 3% of A				3,654
С	Sub Total (A+B)				1,25,471
D	Contingency @ 3% of C				3,764
Е	Tools & Plants @ 2% of C				
F	Transportation @ 7.5% of C				9,410
G	Erection Charges @ 5% on Trf/Breaker/Joist				2,731
Н	Erection Charges @ 10% of other items				6,600
	Erection Charges @ 20% of PSC pole-Not to be used for	r 33kv			-
J Sum of (C to I)					
J	Sum of (C to I) Civil & Services				1,47,977
J SN	Sum of (C to I) Civil & Services Description of Materials Civil & Services	Unit	Qty.	Unit Rate	1,47,977 Total Amount
J SN 1	Sum of (C to I)Civil & ServicesDescription of MaterialsFixing of complete 11KV line Complete stay set includes1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3)Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts &bolts BA will do the excavation including excavation,supply of 0.5Cum cement concrete foundation 1:2:4 size(500mmx500mmx800mm) using 20mm BHG metal withall labour and material	Unit No.	Qty. 2	Unit Rate 2250	1,47,977 Total Amount 4,500
J SN 1	Sum of (C to I) Civil & Services Description of Materials Example 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr	Unit No. Cu.mtr	Qty. 2 0.90	Unit Rate 2250 6500	1,47,977 Total Amount 4,500 5,850
J SN 1 2 3	Sum of (C to I)Civil & ServicesDescription of MaterialsFixing of complete 11KV line Complete stay set includes1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3)Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts &bolts BA will do the excavation including excavation,supply of 0.5Cum cement concrete foundation 1:2:4 size(500mmx500mmx800mm) using 20mm BHG metal withall labour and materialConcreting ratio 1:1.5:3 (500mmX500mmX1800mm) =0.45Cu.mtrCouping ratio 1:1.5:3 with dimension (500X500X450)=0.1125 Cu mtr	Unit No. Cu.mtr Cu.mtr	Qty. 2 0.90 0.23	Unit Rate 2250 6500 6500	1,47,977 Total Amount 4,500 5,850 1,463
J SN 1 2 3 4	Sum of (C to I) Civil & Services Description of Materials Exing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr Installation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 6500 22407	1,47,977 Total Amount 4,500 5,850 1,463 4,814
J SN 1 2 3 4 К	Sum of (C to I)Civil & ServicesDescription of MaterialsFixing of complete 11KV line Complete stay set includes1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3)Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts &bolts BA will do the excavation including excavation,supply of 0.5Cum cement concrete foundation 1:2:4 size(500mmx500mmx800mm) using 20mm BHG metal withall labour and materialConcreting ratio 1:1.5:3 (500mmX500mmX1800mm) =0.45Cu.mtrCouping ratio 1:1.5:3 with dimension (500X500X450)=0.1125 Cu mtrInstallation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCCslab coverTotal Civil & Services	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 6500 22407	1,47,977 Total Amount 4,500 5,850 1,463 4,814 16,627
J SN 1 2 3 4 К L	Civil & Services Civil & Services Description of Materials Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all abour and material Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = Couping ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr Installation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover Total Civil & Services Total Civil & Services	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 6500 2407	1,47,977 Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604
J SN 1 2 3 4 K L M	Sum of (C to I) Civil & Services Description of Materials Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr Installation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover Total Civil & Services Total (J+K) Other overheads (Including 6% supervision charges) of L	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 6500 2407	1,47,977 Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604 9,876
J SN 1 2 3 4 K L M N	Civil & Services Civil & Services Description of Materials Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = Couping ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr Installation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover Total Civil & Services Total (J+K) Other overheads (Including 6% supervision charges) of L SubTotal (L+M)	Unit No. Cu.mtr Cu.mtr	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 6500 2407	1,47,977 Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604 9,876 1,74,480
J SN 1 2 3 4 K L M N O	Sum of (C to I) Civil & Services Description of Materials Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr Installation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover Total Civil & Services Total (J+K) Other overheads (Including 6% supervision charges) of L SubTotal (L+M) Total GST @ 18% of (N)	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 6500 2407	1,47,977 Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604 9,876 1,74,480 31,406
J SN 1 2 3 4 K L M N O P	Sum of (C to I)Civil & ServicesDescription of MaterialsFixing of complete 11KV line Complete stay set includes1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3)Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts &bolts BA will do the excavation including excavation,supply of 0.5Cum cement concrete foundation 1:2:4 size(500mmx500mmx800mm) using 20mm BHG metal withall labour and materialConcreting ratio 1:1.5:3 (500mmX500mmX1800mm) =0.45Cu.mtrCouping ratio 1:1.5:3 with dimension (500X500X450)=0.1125 Cu mtrInstallation of Earth Pit, Charcoal, Salt etc. includingconstruction of earthing chamber (Size: 2'x2') and RCCslab coverTotal Civil & ServicesTotal (J+K)Other overheads (Including 6% supervision charges) of LSubTotal (L+M)Total GST @ 18% of (N)Gross Total Material +Services (N+O) for DP With Isola	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 6500 2407	1,47,977 Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604 9,876 1,74,480 31,406 2,05,886
J SN 1 2 3 4 K L M N O P	Sum of (C to I) Civil & Services Description of Materials Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr Installation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover Total Civil & Services Total (J+K) Other overheads (Including 6% supervision charges) of L SubTotal (L+M) Total GST @ 18% of (N) Gross Total Material +Services (N+O) for DP With Isola SubTotal Civit Isola	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 6500 2407	1,47,977 Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604 9,876 1,74,480 31,406 2,05,886
J SN 1 2 3 4 K L M N O P	Sum of (C to I) Civil & Services Description of Materials Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr Installation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover Total Civil & Services Total (J+K) Other overheads (Including 6% supervision charges) of L SubTotal (L+M) Total GST @ 18% of (N) Gross Total Material +Services (N+O) for DP With Isola	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2	Unit Rate 2250 6500 6500 2407	1,47,977 Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604 9,876 1,74,480 31,406 2,05,886 1
J SN 1 2 3 4 K L M N O P	Civil & Services Civil & Services Description of Materials Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all abour and material Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = CASCU.mtr Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr Installation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover Total Civil & Services Total (J+K) Other overheads (Including 6% supervision charges) of L SubTotal (L+M) Total GST @ 18% of (N) Gross Total Material +Services (N+O) for DP With Isola No. of Cut Point with 180 Degree Anguardian Material +Services (N+O) for DP With Isola	Unit No. Cu.mtr Cu.mtr No.	Qty. 2 0.90 0.23 2 ee Angle	Unit Rate 2250 6500 6500 2407	1,47,977 Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604 9,876 1,74,480 31,406 2,05,886 1
J SN 1 2 3 4 K L M N O P SN	Sum of (C to I) Civil & Services Description of Materials Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr Installation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover Total Civil & Services Total (J+K) Other overheads (Including 6% supervision charges) of L SubTotal (L+M) Total GST @ 18% of (N) Gross Total Material +Services (N+O) for DP With Isola No. of Cut Point with 180 Degree Am MATERIALS FOR 11 KV Cut Point with	Unit No. Cu.mtr Cu.mtr No. No. 180 Degr Unit	Qty. 2 0.90 0.23 2 2 ee Angle Qty.	Unit Rate 2250 6500 6500 2407	1,47,977 Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604 9,876 1,74,480 31,406 2,05,886 1 1 Total Amount
J SN 1 2 3 4 K L M N O P SN 1	Sum of (C to I) Civil & Services Description of Materials Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr Installation of Earth Pit, Charcoal, Salt etc. including construction of earthing chamber (Size: 2'x2') and RCC slab cover Total Civil & Services Total (J+K) Other overheads (Including 6% supervision charges) of L SubTotal (L+M) Total GST @ 18% of (N) Gross Total Material +Services (N+O) for DP With Isola No. of Cut Point with 180 Degree Antom MATERIALS FOR 11 KV Cut Point with Description of Materials WPB 160x152 (11Mtr Long 30 44KG/Mtr)	Unit No. Cu.mtr Cu.mtr No. itor 180 Degr 180 Degr	Qty. 2 0.90 0.23 2 2 ee Angle Qty.	Unit Rate 2250 6500 6500 2407 2407 Unit Rate 26517	1,47,977 Total Amount 4,500 5,850 1,463 4,814 16,627 1,64,604 9,876 1,74,480 31,406 2,05,886 1 Total Amount 26,517

SN	Description of Materials	Unit	Qty.	Unit	Total
	Straight Cross Arm 100X50X6mm 9 56 KG/Mtr each		-	Rate	Amount
2	channel length 1.2 mtr., 2 no's channel required =(KG	22.94	76	1.744
	2x9.56x1.2)	_	-	_	,
3	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr.	KG	5 29	76	402
5	length, 8 no's required = (8x2.36x0.280)		5.23	70	402
4	Straight Cross Arm 100X50X6mm, 9.56 KG/Mtr., each		F 0F	70	445
4	$2 \times 95 \times 10^{-3}$	КG	0.60	70	440
5	Danger Plate, 1 no's.	No.	1	76	76
	Back Clamp for danger Plate 25X3 mm. flat. 0.59Kg/Mtr.	1101		70	
6	Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	KG	0.30	76	23
7	GI barbed wire anticlimbing device 3 Kg. Per support, 2	Ka	R	80	240
'	no's qty. required =(2x3kg)	ing		00	240
	Back Clamp for anticlimbing device 25X3 mm. flat,	1/0	0.44	70	100
8	0.59Kg/Mtr. Flat of 0.510mtr length 8 no's =	KG	2.41	76	183
9	11 KV pin insulator polymer	No	3	200	600
10	H W fitting (B&S) 70KN. 3Bolt	No.	6	350	2.100
11	Discinsulator (B&S) 70 KN polymer	No.	6	1150	6,900
12	Earthing of Support (Coil Type)	EA	1	166	166
10	No-8 GI wire (Dia 4.6mm) 0.131 KG/ Mtr 2 Mtr. For	K a	0.060	75	20
13	connecting pole with Coil earthing	ĸ.g.	0.202	75	20
14	PG Clamp for 100 sq.mm AAA conductor	NO.	6.000	580	3,480
15	GI Nut, Bolt & Washer of different sizes (3.55 Kg each	K.g.	3.55	78	277
16	Cut Pole)	l tr	1	220	110
10	Vellow Colour Paint for Background	Lu Itr	1	220	220
Δ	Total Cost of materials	Lu	I	220	43.501
B	Stock, Storage & Insurance i.e 3% of A				1,305
С	Sub Total (A+B)				44,807
D	Contingency @ 3% of C				1,344
Е	Tools & Plants @ 2% of C				
F	Transportation @ 7.5% of C				3,360
G	Erection Charges @ 5% on Trf/Breaker/Joist				1,366
н	Erection Charges @ 10% of other items	- 22101			1,749
	Erection Charges @ 20% of PSC pole- Notto be used to	r 33kv			-
5	Sum of (C to r)				52,020
	Concreting ratio 1:1.5:3 (500 mmX500 mmX1800 mm) =				
1	0.45Cu.mtr	Cu.mtr	0.45	6500	2,925.00
2	Couping ratio 1:1.5:3 with dimension (500X500X450)=	Cumtr	0.11	6500	721.25
2	0.1125 Cu mtr	Cu.mu	0.11	0500	731.25
K	Total Civil & Services				3,656.25
	Total (J+K)				56,282.49
M	Other overheads (Including 6% supervision charges) of L				3,376.95
	SubTotal (L+IVI)				39,039.44
P	Gross Total Material +Services (N+O) for 11 KV Cut Po	int with 1	80 Degree	Angle	70 398 14
			oo Degree	Aligic	70,000.14
	No. of Cut Point with 90 Degree And	ale			1
	MATERIALS FOR 11 KV Cut Point with	90 Degre	e Angle		
SN	Description of Materials	Unit	Qtv.	Unit	Total
4		Nie	4	Rate	Amount
1	VYPD 100X152 (111Vitr. LONG, 30.44KG/Witr.)	INO	1	20517	26,517
2	channel length 1.2 mtr 4 no's channel required =(KG	45 89	76	3 487
	4x9.56x1.2)		10.00		0,107
2	Fish Plate 50x6 mm., 2.36 kg/Mtr., each 0.280 mtr.	K a	10 57	76	001
5	length, 16 no's required = (16x2.36x0.280)	N.y.	10.37	10	004

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
4	Straight Cross Arm 100X50X6mm, 9.56 KG/Mtr., each channel length 1.2 mtr., 4 no's channel required =(4x9.56x0.306)	KG	11.70	76	889
5	Danger Plate, 1 no's.	No.	1	76	76
6	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	KG	0.30	76	23
7	GI barbed wire anticlimbing device 3 Kg. Per support, 2 no's qty. required =(2x3kg)	Kg	3	80	240
8	Back Clamp for anticlimbing device 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 8 no's = (8x0.59x0.510)	KG	2.41	76	183
9	11 KV pin insulator polymer	No.	3	200	600
10	H W fitting(B&S) 70KN, 3Bolt	No.	6	350	2,100
11	Disc insulator (B&S) 70 KN polymer	No.	6	1150	6,900
12	Earthing of Support (Coil Type)	EA	1	166	166
13	No-8 GI wire (Dia 4.6mm) 0.131 KG/ Mtr 2 Mtr. For connecting pole with Coil earthing	K.g.	0.262	75	20
14	PG Clamp for 100 sq.mm AAA conductor	NO.	6.000	580	3,480
15	H.T. Stay clamp, 50x8 mm. flat, 3.14Kg/Mtr., 0.551 Mtr. Length, 2 no's qty. required (1 Pair)	Pair	2	125	250
16	H.T. Stay set (Complete)	Set	2	1050	2,100
17	H.T. Stay Insulator Type-C	No.	2	50	100
18	7/10 SWG Stay Wire 15kg /stay	K.g.	30	75	2,250
19	GI Nut, Bolt & Washer of different sizes (7.433 Kg each Cut Pole)	K.g.	7.43	78	580
20	Black Paint	Ltr	1	220	220
21	Yellow Colour Paint for Background	Ltr	2	220	440
Α	Total Cost of materials				51,425
B	Stock, Storage & Insurance i.e 3% of A				1,543
C	Sub Total (A+B)				52,967
D	Contingency @ 3% of C				1,589
	Tools & Plants @ 2% of C				0.070
	Iransportation @ 7.5% of C				3,973
<u> </u>	Erection Charges @ 5% on Tri/Breaker/Joist				2 081
<u> </u>	Erection Charges @ 20% of PSC pole-Notto be used for	23kv			2,001
	Sum of (C to I)	000			61 976
	Civil & Services				01,070
				Unit	Total
SN	Description of Materials	Unit	Qty.	Rate	Amount
1	Fixing of complete 11KV line Complete stay set includes 1) Turn Buckle Assembly 2) Stay Rod & Stay plate 3) Stay Insulator 4) Stay Wire. 5)Stay clamps with Nuts & bolts BA will do the excavation including excavation, supply of 0.5Cum cement concrete foundation 1:2:4 size (500mmx500mmx800mm) using 20mm BHG metal with all labour and material	No.	2	2250	4,500
2	Concreting ratio 1:1.5:3 (500mmX500mmX1800mm) = 0.45Cu.mtr	Cu.mtr	0.45	6500	2,925
3	Couping ratio 1:1.5:3 with dimension (500X500X450)= 0.1125 Cu mtr	Cu.mtr	0.11	6500	731
K	Total Civil & Services				8,156
L	Total (J+K)				70,132
М	Other overheads (Including 6% supervision charges) of L				4,208
Ν	SubTotal (L+M)				74,340
0	Total GST @ 18% of (N)				13,381
<u> </u>	Gross Total Material +Services (N+O) for 11 KV Cut Po	int with 9	0 Degree	Angle	87,721
				Ļ	
		L. Mitte 14		1	
	MATERIALS FUR TI KV PIN POIN	<u>is vvitn W</u>			

SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
SN	Description of Materials	Unit	Qty.	Unit Rate	Total Amount
1	WPB 160x152 (11Mtr. Long, 30.44KG/Mtr.)	No.	21	26517	5,56,856
2	11 KV V cross Arm (10.2 K.g. each)	No.	21	810	17,010
3	Top bracket 100x50X6 mm GI channel (2kg each)	No.	21	150	3,150
4	Danger Plate, 1 no's.for each pole	No.	21	80	1,680
5	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	KG	6.32	76	480
6	GI barbed wire anticlimbing device 3 Kg. Per support, 2 no's qty. required =(2x3kg)	Kg	126	80	10,080
7	Back Clamp for anticlimbing device 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 8 no's = (8x0.59x0.510)	KG	50.55	76	3,842
8	11 KV pin insulator polymer, 3 Nos. required for each support =(3x25x1)	No.	63	200	12,600
9	Earthing of Support (Coil Type)	No.	21	125	2,625
10	No-8 GI wire (Dia 4.6mm) 0.131 KG/ Mtr 2 Mtr. For connecting pole with Coil earthing	K.g.	5.502	75	413
11	GI Nut, Bolt & Washer of different sizes (1.45 Kg/ Pin Point)	K.g.	30	78	2,375
12	100 mm2 AAAC	K.M.	3.09	43000	1,32,870
13	Crimping type Midspan Compression Joint for 80 sq.mm AAA conductor	EA	3		-
14	Black Paint	Ltr	21	220	4,620
15	Yellow Colour Paint for Background	Ltr	42	220	9,240
Α	Total Cost of materials				7,57,841
В	Stock, Storage & Insurance i.e 3% of A				22,735
С	Sub Total (A+B)				7,80,576
D	Contingency @ 3% of C				23,417
E	Tools & Plants @ 2% of C				
F	Transportation @ 7.5% of C				58,543
G	Erection Charges @ 5% on Trf/Breaker/WPB/ H-Pole				28,678
н	Erection Charges @ 10% of other items				20,701
	Erection Charges @ 20% of PSC pole-Notto be used for	r 33kv			-
J					9,11,910
	Concreting ratio 1:1 5:3 (500mm¥500mm¥1800mm) -				
1	0.45Cu.mtr	Cu.mtr	9.45	6500	61,425
2	0.1125 Cu mtr	Cu.mtr	2.36	6500	15,356
ĸ	Total Civil & Services				/6,781
	I otal Material+Services (I+K)				9,88,697
IVI N	SubTotal (L+M)				59,322 10 48 010
0	Total GST @ 18% of (N)				1 88 643
P	Gross Total Material +Services (N+O) for 11 KV Pin Poi	ints With	WPB		12 36 663
-	Gross Total Summary	/			12,00,000
1	Gross Total Material +Services (N+O) for DP Without Isola	ator			1,47.482
2	Gross Total Material +Services (N+O) for DP With Isolator	•			2.05.886
3	Gross Total Material +Services (N+O) for 11 KV Cut Point	with 180	Degree An	gle	70,398
4	Gross Total Material +Services (N+O) for 11 KV Cut Point	with 90 D	egree Ang	le	87,721
5	Gross Total Material +Services (N+O) for 11 KV Pin Points	s With WF	Ъ		12,36,663
6	Inspection Fee of Over Head Line (HT) - Rs. 200 for 1st 5	km.			200
7	Inspection Fee of Over Head Line (HT) - Rs. 30/ Additiona	al Km			
8	Inspection Fee of Drawing Checking and Approval				400
9	Final decision by electrical Inspector	_			500
10	Gross Total Material, Services and Inspection	Fees (P+0	<u>2+R+S+T)</u>		17,49,250
			In Cr	10.000	0.17
		With E	scalation '	12.36%	19,65,457
<u> </u>		1	In Cr		0.20

9.4.3. Unit BOQ for Augmentation of PTR to 5 MVA:

S No.	Item-Description	Unit	Qty.	Unit Rate (INR)	Amount (INR)
	Part-A			()	()
1	Earthing and Grounding as per applicable TS				
а	GI flat 90X6 mm size under ground format	MT	1	75,000	75,000
b	GI flat 50X6 mm size for riser	MT	0.3	75,000	22,500
С	GI flat 25X6 mm size for riser	MT	0.3	75,000	22,500
d	8 swg GI wire	MT	0.05	75,000	3,750
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				
а	33 KV & 11 KV Bus bar with 232 sq.mm AAA Conductor	km	0.2	1,60,500	32100
b	Equipment jumpering with 232 sq.mm AAA Conductor	km	0.2	1,60,500	32100
С	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	Set	9	9,059	81535
d	12 bolted (M-12)"T" clamp, 232 sq.mm AAAC run & 230 mm drop	No	3	960	2880
е	3 Bolted (M- 16) PG Clamp suitable for 232 sq.mm AAA Conductor	No	12	1,150	13800
3	33Kv Isolator without earth switch	Set	1	61,200	61200
4	33/11 KV, 5 MVA 33/11 KV (Cu) Power Transformers with OLTC (Excluding Foundation)	No	1	43,15,500	4315500
5	33Kv Post Insulator	No	3	1,580	4740
Α	Total cost of the material			·	4667605
В	Stock, storage and insurance @ 3% of A:				140028
С	Sub total-C = (A+B)				4807633
D	T & P charges @ 2% of C				96153
E	Contingency charges @ 3% of C				144229
F	Transportation charges @ 7.5 % of C				360572
	Erection Charges @ 5% of RS Joist & WPB pole				222248
	Erection Charges @ 20% of PSC Pole				
	Erection Charges @ 10% of other items except RSJ				36267
G	Erection Charges Sub Total:				258515
Н	Sub-Total H(C+D+E+F+G)				5667102
I	Over Head charges/Departmental including Supervision Ch	narges	@ 6% o	fH	340026
J	Total Estimated Cost i.e. J=(H+I)			-	6007129
	Dismantling of 3.15 MVA Transformer and transporting to nearest store of TPSODL 1 No		1	50,600.00	50600
	Testing		1	1,61,700.00	161700
Κ	Sub-Total				6219429
L	GST 18%				1119497
М	CESS 1%				62194
	Total of Estimate(K+L+M)				7401120
	InspectionFee				200
	Drawing Approval				200
	Grand Total				7401520
	Escalation of 2 years with 12.36% of grand Total				8316348
	Total (In Crores)				0.83

9.4.4. Unit BOQ for Augmentation PTR to 8 MVA

S No.	Item-Description	Unit	Qty.	Unit Rate	Amount (INR)
	Part-A				
1	Earthing and Grounding as per applicable TS				
а	GI flat 90X6 mm size underground format	MT	1	75,000	75000
b	GI flat 50X6 mm size for riser	MT	0.3	75,000	22500
С	GI flat 25X6 mm size for riser	MT	0.3	75,000	22500
d	8 swg GI wire	MT	0.05	75,000	3750

S No.	Item-Description	Unit	Qty.	Unit Rate	Amount (INR)
	Busbar, droppers, jumpers and interconnections with				
0	all outdoor equipment using 232 sq.mm AAA				
2	Conductor, all associated conductor, insulator,				
	nardwares, clamps, 8 SWG wire etc as per applicable				
-	33 KV & 11 KV Bus bar with 232 sq.mm AAA	luna	0.0	4 60 500	22400
а	Conductor	кт	0.2	1,60,500	32100
b	Equipment jumpering with 232 sq.mm AAA Conductor	km	0.2	1,60,500	32100
	3 Bolted (3 pair M-16 U bolts to be used) 33 Kv H/W				
С	fitting with 4 nos. Insulator (70KN) String Suitable for	Set	9	9,059	81535
	232 sq.mm AAA Conductor				
d	12 boned (M-12) 1 clamp, 232 sq.mm AAAC 10h &	No	3	960	2880
	3 Bolted (M- 16) PG Clamp suitable for 232 sq mm				
е	AAA Conductor	No	12	1,150	13800
3	33Kv Isolator without earth switch	Set	1	61,200	61200
4	33/11 KV, 8 MVA 33/11 KV (Cu) Power Transformers	No	1	57 00 000	5700000
4	with OLTC (Excluding Foundation)	INU	1	57,00,000	3700000
5	33Kv Post Insulator		3	1,580	4740
A	Total cost of the material				6052105
В	Stock, storage and insurance @ 3% of A:				181563
С	Subtotal-C = $(A+B)$				6233668
D	T & P charges @ 2% of C				124673
E	Contingency charges @ 3% of C				187010
F	Transportation charges @ 7.5 % of C				467525
	Erection Charges @ 5% of RS Joist & WPB pole				293550
	Erection Charges @ 20% of PSC Pole				
_	Erection Charges @ 10% of other items except RSJ				36267
G	Erection Charges Sub Total:				329817
H	Sub-Total H(C+D+E+F+G)			- ())	7342693
	Over Head charges/Departmental Including Supervision	n Charg	es @ 6%	OT H	440562
J	Total Estimated Cost i.e. $J=(\Pi+I)$	oaroct			1183200
	store of TPSODI 1 No	learest	1	50600	50600
	Testing		1	161700	161700
к	Sub-Total			101700	7995555
	GST 18%				1439200
M	CESS 1%				79956
	Total of Estimate(K+L+M)				9514711
	Inspection Fee				200
	Drawing Approval				200
	Grand Total				9515111
	Escalation of 2 years with 12.36% of grand Total				10691178
	Total (In Crores)				1.07

9.4.5. Unit BOQ for Augmentation to 63 kVA DT

S No.	Item Description	Qty	Unit	Unit Rate (INR)	Amount (INR)
1	63 KVA,11/0.4KV(AI) Transformer	1	EA	86,500	86,500
2	LT Distribution Box for 63 KVA S/S.	1	EA	18,322	18,322
3	AB Switch(11KV,200A,3Pole,50Hz)	1	EA	7,350	7,350
4	Lightening Arrester(9KV,5KA)	3	EA	980	2,940
5	HG Fuse(11KV,3 Pole)	1	Set	6,120	6,120
6	55MMSQ AAA CONDUCTOR FOR JUMPERING	23	М	30	690
7	CABLE 1.1KV AL 1CX150 SQMM ARM	60	М	279	16,740
8	GLAND FOR ARM CABLE	4	EA	280	1,120
9	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos (9.2 Kg. / Mtr.) with Galvanization	51.52	KG	75	3,864
10	Transformer Mounting Channel (100x50X6)mm 2.8 Mtr long 2 Nos (9.2 Kg./Mtr.) with Galvanization	51.52	KG	75	3,864

S No.	Item Description	Qty	Unit	Unit Rate (INR)	Amount (INR)
11	AB Switch and HG Fuse Mounting Channel (75x40X6)mm 2.8 Mtr long 4Nos (6.8 Kg./Mtr.) with Galvanization	76.16	KG	75	5,712
12	Transformer Belting angle (50X50X6) mm 2.8mtr long 2 nos. (4.5 Kg./Mtr.)with side angle (total 7mtr) with Galvanization	31.5	KG	75	2,363
13	Angle for mounting LT distribution box (50X50X6) mm 2.8mtr long 2nos (4.5 Kg./Mtr.)with side angle with Galvanization	13.5	KG	75	1,013
14	11 KV Disc Insulator T & C Type 45 KN POLYMER	3	NO	860	2,580
15	11 KV hard ware fitting T & C Type 45KN	3	NO	130	390
16	50x6 mm G I flat	16.92	KG	75 75	3,819
17	G I NUTS BOLTS & WASHERS	30	KG	75	2 340
19	LUG AL CRIMPING 95 SOMM XLPE SINGLE HOLE	20	FA	12	2,340
20	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	 54	EA	36	1.944
21	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	16	EA	29	465
22	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	3	EA	320	960
23	TEMPLETE FOR TRANSFORMER MAINT.RECORD	1	EA	68	68
24	TAPE HT SCOTCH 23 25MMX9.1M 66KV	0.91	ROL	541	492
25	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	0.36	EA	1,551	558
26	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	4	EA	1,188	4,754
27	ALNOX 3M (HOT SPOT REDUCING PASTE)	0.07	EA	4,085	286
20		0.4		100	302
29	RODENT CAPACITIVE SCREEN GUARD FOR- DT	3	EA EA	403 2 177	6 532
31	BIRD GUARD SPIKE (ELEXIBLE POLYCORBONAT)	2	FA	884	1,768
32	SLEEV BLACK POLYOLEFIN	2	M	377	755
33	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr. Long	5	EA	1,050	5,250
34	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	5	LS	1,600	8,000
35	PIPE HDPE SIZE 25 MM	23	М	28	644
36	7/10 SWG G I stay wire (10Kg. / Set)	72.7	KG	75	5,453
37	CONNECTOR MINI WEDGE 25 SQMM TO DOG	3	EA	183	549
Α	Total cost of the material				2,06,467
В	Stock, storage and insurance @ 3% of A:				6,194
C	Sub total-C = $(A+B)$				2,12,661
D	T & P charges @ 2% of C				4,253
	Contingency charges @ 3% of C				6,380
Г	Fraction Charges @ 5% of RS loist Transformer & WP	Bnole			15,950
	Erection Charges @ 20% of PSC Pole	Dpole			-,-100
	Erection Charges @ 10% of other items except RSJ				12,357
G	Erection Charges Sub Total :				16,811
	Fencing(5M x4M)	1		1,09,701.67	1,09,702
Н	Sub-Total H(C+D+E+F+G)				3,65,757
I	Over Head charges/Departmental including Super	vision Cha	arges @	6% of H	21,945
J	Total Estimated Cost i.e. J=(H+I)				3,87,702
	Dismantling of Transformer and shifted to store	1	1	1800	1,800
K I					3,89,502
M	CESS 1%				2 805
171	Total of Estimate(K+I +M)				4 63 507
	Inspection Fee				200
	Drawing Approval				200
	Grand Total				4,63,907
	Escalation of 2 years with 12.36% of grand Total				5,21,246
	Total (In Crores)				0.05

9.4.6. Unit BOQ for Augmentation to 100 kVA DT

S No	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)
1	100 KVA,11/0.4KV(AI) Transformer	1	EA	1,17,000	1,17,000
2	LT Distribution Box for 100 KVA S/S.	1	EA	24,419	24,419
3	AB Switch(11KV,200A,3Pole,50Hz)	1	EA	7,350	7,350
4	Lightening Arrester (9KV,5KA)	3	EA	980	2,940
5	HG Fuse(11KV,3 Pole)	1	Set	6,120	6,120
6	55MMSQ AAA CONDUCTOR FOR JUMPERING	23	М	30	690
7	CABLE 1.1KV AL 1CX150 SQMM ARM	60	М	279	16,740
8	GLAND FOR ARM CABLE	4	EA	280	1,120
9	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos (9.2 Kg. / Mtr.) with Galvanization	51.52	KG	75	3,864
10	Transformer Mounting Channel (100x50X6)mm 2.8 Mtr long 2 Nos (9.2 Kg./Mtr.) with Galvanization	51.52	KG	75	3,864
11	AB Switch and HG Fuse Mounting Channel (75x40X6)mm 2.8 Mtr long 4Nos (6.8 Kg./Mtr.) with Galvanization	76.16	KG	75	5,712
12	Transformer Belting angle (50X50X6) mm 2.8mtr long 2 nos. (4.5 Kg./Mtr.)with side angle (total 7mtr) with Galvanization	31.5	KG	75	2,363
13	Angle for mounting LT distribution box (50X50X6) mm 2.8mtr long 2nos (4.5 Kg./Mtr.)with side angle with Galvanization	13.5	KG	75	1,013
14	11 KV Disc Insulator T & C Type 45 KN POLYMER	3	NO	860	2,580
15	11 KV hard ware fitting T & C Type 45KN	3	NO	130	390
16	50x6 mm G I flat	50.92	KG	75	3,819
17	25x6 mm G I flat	16.84	KG	75	1,263
18	G.I NUTS, BOLTS & WASHERS	30	KG	78	2,340
19	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	20	EA	12	237
20	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	54	EA	36	1,944
21	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	16	EA	29	465
22	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	3	EA	320	960
23	TEMPLETE FOR TRANSFORMER MAINT.RECORD	1	EA	68	68
24	TAPE HT SCOTCH 23 25MMX9.1M 66KV	0.91	ROL	541	492
25	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	0.36	EA	1,551	558
26	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	4	EA	1,188	4,754
27	ALNOX 3M (HOT SPOT REDUCING PASTE)	0.07	EA	4,085	286
28	3M SCOTCH 1625 SPRAY	0.4	EA	755	302
29	3M SCOTCH FILL PUTTY	1	EA	463	463
30	RODENT CAPACITIVE SCREEN GUARD FOR- DT	3	EA	2,177	6,532
31	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	2	EA	884	1,768
32	SLEEV BLACK POLYOLEFIN	2	М	377	755
33	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	5	EA	1,050	5,250
34	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	5	LS	1,600	8,000
35	PIPE HDPE SIZE 25 MM	23	М	28	644
36	7/10 SWG G I stay wire (10Kg. / Set)	72.7	KG	75	5.453
37	CONNECTOR MINI WEDGE 25 SQMM TO DOG	3	EA	183	549
Α	Total cost of the material				2,43,064
В	Stock, storage and insurance @ 3% of A:				7,292

S No	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)
С	Sub total-C = (A+B)				2,50,356
D	T & P charges @ 2% of C				5,007
E	Contingency charges @ 3% of C				7,511
F	Transportation charges @ 7.5 % of C				18,777
	Erection Charges @ 5% of RS Joist, Transformer &	WPBpole			6,026
	Erection Charges @ 20% of PSC Pole				
	Erection Charges @ 10% of other items except RS.	J			12,985
G	Erection Charges Sub Total :				19,011
	Fencing(5M x4M)	1		1,09,702	1,09,702
Η	Sub-Total H(C+D+E+F+G)				4,10,363
	Over Head charges/Departmental including Superv	ision Charges	s @ 6%	of H	24,622
J	Total Estimated Cost i.e. J=(H+I)	-		-	4,34,985
	Dismantling of Transformer and shifted to store	1		1800	1,800
Κ	Sub-Total				4,36,785
L	GST 18%				78,621
М	CESS 1%				4,368
	Total of Estimate(K+L+M)				5,19,774
	InspectionFee				200
	Drawing Approval				200
	Grand Total				5,20,174
	Escalation of 2 years with 12.36% of grand Total				5,84,467
	Total (In Crores)				0.06

9.4.7. Unit BOQ for Augmentation to 250 kVA DT

S No.	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)
1	250 KVA,11/0.4KV(Cu) Transformer	1	EA	3,58,898	3,58,898
2	LT Distribution Box for 250 KVA S/S.	1	EA	48,000	48,000
3	AB Switch(11KV,400A,3Pole,50Hz)	1	EA	11,850	11,850
4	Lightening Arrester(9KV,5KA)	3	EA	980	2,940
5	HG Fuse (11KV,3 Pole)	1	Set	11,530	11,530
6	55MMSQ AAA CONDUCTOR FOR JUMPERING	23	М	30	690
7	CABLE 1.1KV AL 1CX150 SQMM ARM	60	М	279	16,740
8	GLAND FOR ARM CABLE	4	EA	280	1,120
9	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos (9.2 Kg. / Mtr.) with Galvanization	51.52	KG	75	3,864
10	Transformer Mounting Channel (100x50X6)mm 2.8 Mtr long 2 Nos (9.2 Kg./Mtr.) with Galvanization	51.52	KG	75	3,864
11	AB Switch and HG Fuse Mounting Channel (75x40X6)mm 2.8 Mtr long 4Nos (6.8 Kg./Mtr.) with Galvanization	76.16	KG	75	5,712
12	Transformer Belting angle (50X50X6) mm 2.8mtr long 2 nos. (4.5 Kg./Mtr.)with side angle (total 7mtr) with Galvanization	31.5	KG	75	2,363
13	Angle for mounting LT distribution box (50X50X6) mm 2.8mtr long 2nos (4.5 Kg./Mtr.)with side angle with Galvanization	13.5	KG	75	1,013
14	11 KV Disc Insulator T & C Type 45 KN POLYMER	3	NO	860	2,580
15	11 KV hard ware fitting T & C Type 45KN	3	NO	130	390
16	50x6 mm G I flat	50.92	KG	75	3,819
17	25x6 mm G I flat	16.84	KG	75	1,263
18	G.I NUTS, BOLTS & WASHERS	30	KG	78	2,340
19	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	20	EA	12	237
20	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	54	EA	36	1,944
21	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	16	EA	29	465

S No.	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)
22	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	3	EA	320	960
23	TEMPLETE FOR TRANSFORMER MAINT.RECORD	1	EA	68	68
24	TAPE HT SCOTCH 23 25MMX9.1M 66KV	0.91	ROL	541	492
25	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	0.36	EA	1,551	558
26	VINYL TAPE SCOTCH 35 YELLOW-BLUE- RED	4	EA	1,188	4,754
27	ALNOX 3M (HOT SPOT REDUCING PASTE)	0.07	EA	4,085	286
28	3M SCOTCH 1625 SPRAY	0.4	EA	755	302
29	3M SCOTCH FILL PUTTY	1	EA	463	463
30	RODENT CAPACITIVE SCREEN GUARD FOR- DT	3	EA	2,177	6,532
31	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	2	EA	884	1,768
32	SLEEV BLACK POLYOLEFIN	2	М	377	755
33	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	5	EA	1,050	5,250
34	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	5	LS	1,600	8,000
35	PIPE HDPE SIZE 25 MM	23	М	28	644
36	7/10 SWG G I stay wire (10Kg. / Set)	72.7	KG	75	5.453
37	CONNECTOR MINI WEDGE 25 SQMM TO DOG	3	EA	183	549
Α	Total cost of the material	•		•	5,18,453
В	Stock, storage and insurance @ 3% of A:				15,554
С	Sub total-C = (A+B)				5,34,007
D	T & P charges @ 2% of C				10,680
E	Contingency charges @ 3% of C				16,020
F	Transportation charges @ 7.5 % of C				40,050
	Erection Charges @ 5% of RS Joist, Transforme	er & WPB pc	ole		18,483
	Erection Charges @ 20% of PSC Pole				
	Erection Charges @ 10% of other items except I	RSJ			16,434
G	Erection Charges Sub Total:	4		4 00 700	34,917
				1,09,702	7.45.276
	Over Head charges/Departmental including Sup	ervision Ch	arnes @ P	% of H	1,45,576
	Total Estimated Cost i.e. I–(H+I)		arges e c	7/0 0111	7 90 099
0	Dismantling of Transformer and shifted to store	1		3189.6	3 190
K		I		5109.0	7 02 290
_ n					1 42 702
	CESS 10/0				7 022
IVI	Total of Estimate(K+L+M)				9 44 014
	Inspection Fee				200
	Drawing Approval				200
	Grand Total				9,44,414
	Escalation of 2 years with 12.36% of grand Tota				10,61,143
	Total (In Crores)				0.11

9.4.8. Unit BOQ for Augmentation to 500 kVA DT

S No	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)
1	500 KVA,11/0.4KV(Cu) Transformer	1.00	EA	5,80,000	5,80,000
2	LT Distribution Box with MCCB Aluminium Busbar of 6 Bay with kit kat fuse for 500 KVA S/S	1.00	EA	97,360	97,360
3	75x40x6 mm Channel (6.80Kg./Mtr) With Galvanization	49.00	KG	75	3,675
4	AB Switch(11KV,400A,3Pole,50Hz)	1.00	EA	11,850	11,850
5	Lightening Arrester(9KV,5KA)	3.00	EA	980	2,940
6	HG Fuse(11KV,3 Pole)	1.00	Set	11,530	11,530
7	55MMSQ AAA CONDUCTOR FOR JUMPERING	23.00	М	30	690
8	CABLE 1.1KV AL 1CX630 SQMM ARM	16.00	М	618	9,895
9	GLAND FOR ARM CABLE	4.00	EA	280	1,120
10	Top Pressure Channel (100X50X6) mm 2.8 Mtr 2 Nos (9.2 Kg. / Mtr.) with Galvanization	51.52	KG	75	3,864
11	Transformer Mounting Channel (100x50X6)mm 2.8 Mtr long 2 Nos (9.2 Kg./Mtr.) with Galvanization	51.52	KG	75	3,864
12	AB Switch and HG Fuse Mounting Channel (75x40X6)mm 2.8 Mtr long 4Nos (6.8 Kg./Mtr.) with Galvanization	76.16	KG	75	5,712
13	Transformer Belting angle (50X50X6) mm 2.8mtr long 2 nos. (4.5 Kg./Mtr.)with side angle (total 7mtr) with Galvanization	31.50	KG	75	2,363
14	Angle for mounting LT distribution box (50X50X6) mm 2.8mtr long 2nos (4.5 Kg./Mtr.)with side angle with Galvanization	13.50	KG	75	1,013
15	11 KV Disc Insulator T & C Type 45 KN POLYMER	3.00	NO	860	2,580
16	11 KV hard ware fitting T & C Type 45KN	3.00	NO	130	390
17	50x6 mm G I flat	50.92	KG	75	3,819
18	25x6 mm G I flat	16.84	KG	75	1,263
19	G.I NUTS,BOLTS & WASHERS	30.00	KG	78	2,340
20	SINGLE HOLE	20.00	EA	12	237
21	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	54.00	EA	36	1,944
22	LUG AL CRIMPING 630 SQMM XLPE ONE HOLE	16.00	EA	164	2,630
23	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	3.00	EA	320	960
24	TEMPLETE FOR TRANSFORMER MAINT.RECORD	1.00	EA	68	68
25	TAPE HT SCOTCH 23 25MMX9.1M 66KV	0.91	ROL	541	492
26	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	0.36	EA	1,551	558
27	VINYL TAPE SCOTCH 35 YELLOW-BLUE- RED	4	EA	1,188	4,754
28	ALNOX 3M (HOT SPOT REDUCING PASTE)	0.07	EA	4,085	286
29	3M SCOTCH 1625 SPRAY	0.4	EA	755	302
30	3M SCOTCH FILL PUTTY	1	EA	463	463
31	RODENT CAPACITIVE SCREEN GUARD	3.00	EA	2,177	6,532
32	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	2.00	EA	884	1,768
33	SLEEV BLACK POLYOLEFIN	2.00	М	377	755
34	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr. Long	5.00	EA	1,050	5,250

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S No	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)	
35	Materials for Masonry work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	5	LS	1,600	8,000	
36	PIPE HDPE SIZE 25 MM	23.00	М	28	644	
37	7/10 SWG G I stay wire (10Kg. / Set)	72.70	KG	75	5,453	
38	CONNECTOR MINI WEDGE 25 SQMM TO DOG	3.00	EA	183	549	
А	Total cost of the material				7,87,910	
В	Stock, storage and insurance @ 3% of A:				23,637	
С	Sub total-C = (A+B)				8,11,547	
D	T & P charges @ 2% of C				16,231	
E	Contingency charges @ 3% of C					
F	Transportation charges @ 7.5 % of C					
	Erection Charges @ 5% of RS Joist & WPB pole					
	Erection Charges @ 20% of PSC Pole					
	Erection Charges @ 10% of other items except RSJ					
G	Erection Charges Sub Total :				51,285	
	Fencing(5Mx4M)		1	1,09,701.67	1,09,702	
Н	Sub-Total H(C+D+E+F+G)				10,73,977	
	Over Head charges/Departmental including Su	upervision Cl	narges @ 6%	of H	64,439	
J	Total Estimated Cost i.e. J=(H+I)			I	11,38,416	
	Dismantling of Transformer and shifted to stor	е	1	5970.6	5,971	
K	Sub-Total				11,44,387	
L	GST 18%				2,05,990	
М	CESS 1%					
	Total of Estimate(K+L+M)					
	Inspection Fee					
	Drawing Approval					
	Grand Total					
	Escalation of 2 years with 12.36% of grand Total					
	Total (In Crores)					

9.4.9. Unit BOQ for Augmentation / addition of LT ABC line (50 to 95 sqmm)

SN	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)
1	1.1KV LT AB Cable 4x95+1x95+1x16mm2	1030	М	422	434320
2	300Kg PSC pole9Mtr long	7	EA	3000	21000
3	Base Plate for PSC pole	7	EA	230	1610
4	BOARD DANGER	7	EA	80	560
5	Back Clamp for danger Plate 25X3 mm. flat, 0.59Kg/Mtr. Flat of 0.510mtr length 1 no's = (1x0.59x0.510)	2.1063	KG	75	158
6	ANTICLIMBING DEVICE (3 KG per support)	21	KG	416	8732
7	Pole clamp for EYE hook for XLPE Aerial bunched Cable	7	pair	200	1400
8	Suspension Clamp with EYE hook for ABC	5	No.	340	1700
9	Eye Hook for AB cable for dead end point	2	No.	60	120
10	Conductor Dead End Clamp suitable for bare messenger XLPE Aerial bunched cable (25-70 sq mm)	2	No.	65	130
11	LT Stay set Complete	2	Set	520	1040
12	LT Stay Insulator	2	No.	30	60
13	LT Stay clamp	2	pair	110	220
14	7/10 SWG G I stay wire (10Kg. / Set)	20	KG	75	1500
15	Coil Earthing	7	EA	166	1162
16	Pipe HDPE Size 25MM (3 mtr each)	21	М	28	588
17	Lug AL 70 SQMM for 7/8 SWG WIRE/EARTHING	28	EA	36	1008
18	LT Distribution Box Polycarbonate	21	EA	984	20669

SN	Item Description	Qty.	Unit	Unit Rate (INR)	Amount (INR)	
19	Cap cable end for ABC Cables	8	EA	81	648	
20	IPC KZ 4X150	56	EA	52	2899	
21	IPC EP 95 LT ABC 16-95 & 5-10 SQMM ST.LT	42	EA	88	3708	
22	IPC KZ 2x150 LTABC 50-150 & 6-35(50) sqmm	70	EA	64	4512	
23	STEEL STRAP SIZE 20 MMX50 M LONG	4	ROL	1620	6478	
24	BUCKLES FOR STEEL STRAP (1 EA = 100 4 EA 491 NOS)					
25	CABLE 1.1KV AL 4CX25 SQMM ARM	63	М	170	10680	
26	GLAND FOR CABLE 4X25 SQ.MM	21	EA	48	1005	
27	LUG AL CRIMPING 25 SQMM XLPE SINGLE	14	EA	7	97	
28	FLAT GI SIZE 50X6 MM	168	KG	75	12600	
29	FLAT GI Size 25x6 MM 140 KG 75				10500	
30	FRP CROSS ARM 1070MM 415V	42	EA	981	41223	
31	ISA-50*50*6 GI Angel (4.6KG/M)	210	KG	75	15750	
32	ISMC-75*40 GI Channel (7.24KG/M)	210	KG	75	15750	
33	BOLT & NUT GI 12MMX50MM HEX	40	KG	78	3120	
34	BOLT & NUT GI 16MMX75M HEX	80	KG	78	6240	
35	WASHER GI SIZE 12MM DIA	15	KG	78	1170	
36	2Cx6 mm2 LT PVC Cable	1800	Mtr	48	86400	
37	4Cx10 mm2 LT PVC Cable	400	Mtr	84	33776	
38	WASHER GI SIZE 16MM DIA	6	KG	78	468	
39	TIE PLASTIC BLACK SIZE 7.6 MM X 380 MM	40	EA	26	1033	
40	Tie Plastic size 9mmx265mm 60 EA 22					
A	Total cost of the material					
В	Stock, storage and insurance @ 3% of A:					
C	Subtotal-C = $(A+B)$					
D	T & P charges @ 2% of C					
F	Contingency charges @ 3% of C					
F	Transportation charges @ 7.5 % of C					
	Erection Charges @ 5% of RS Joist					
	Erection Charges @ 20% of PSC Pole					
	Erection Charges @ 10% of other items except RSJ					
G	Erection Charges Sub Total :				80169	
	Cement concreting for Stud & Stav anchor plate					
	with C.C. 1:3:6 by using 4cm size hard granite					
	metal= (0.45Mx0.45Mtrx1.5)	0	N.	4070	05.40	
	M3=0.3cum@4158.84=@4158.84	2	NO.	1270	2540	
	=0.3037xRs.4185.84=Rs.1263.03 or					
	Rs.1270.00(including HT and LT)					
	Cement concreting for support with C.C. 1:3:6 by					
	using 4cm size hard granite					
	metal=(0.45Mx0.45Mtrx1.5)	7	No	1270	8890	
	M3=0.3cum@4158.84=@4158.84		110.	1210	0000	
	=0.3037xRs.4185.84=Rs.1263.03 or					
·	Rs.1270.00(Including HT and LT)					
H	Sub-Total H(C+D+E+F+G)					
<u> </u>	Over Head charges/Departmental including Supervision Charges @ 6% of H					
J	I Otal Estimated Cost i.e. J=(H+I)					
	of TPSODI 10kt Km	areststore	1	22500	22500	
К		SubTotal			1049814	
L	GST 18%					
М	CESS 1%					
	Total of Estimate(K+L+M)				1249279	
	InspectionFee					
	Drawing Approval					
	Grand Total					
	Escalation of 2 years with 12.36% of grand Total					
	Total (In Crores)					

9.5 Annexure-Technology Infrastructure

S. No	Description	Unit cost (INR, inclusive of tax)	FY22-23		
			Qty	Amt.	
1	Workstation PC with UPS and associated software licenses	98000.00	200.00	19600000.00	
2	Laptops with associated software licenses	107000.00	400.00	42,800,000	
3	IP Phone	16500.00	200.00	3,300,000	
4	Professional software licenses for office work	1829000.00	1.00	1,829,000	
5	MFD Printers	66000.00	130.00	8,580,000	
6	Smart Monitor	40000.00	10.00	400,000	
7	Bio metric Attendance Machines with application	20100.00	200.00	4,020,000	
	Total			8,05,29,000	

9.5.1 Estimated cost for Build & Strengthen end user IT infrastructure

9.5.2 Estimated cost for Locational Network

S No	Description	Unit east (Re inclusive of Tex)	FY23		
5. NO.	Description		Qty (in Nos)	Amount in Rs	
1	Layer -II & III Switch	1,65,000	25	41,25,000	
2	Layer- 3 Router (VPN)	5,50,000	25	1,37,50,000	
3	LAN Cables per node	7,700	250	19,25,000	
4	2/5 kVA UPS	44,000	50	22,00,000	
5	WIFI Access points	49,500	100	49,50,000	
		Total		2,69,50,000	

9.5.3 Estimated cost for OFC Network

0		Unit cost	FY23		
No.	Description	(Rs. Inc. Tax)	Qty in km/no.	Amount in Rs	
1	Under Ground 24C armoured OFC laying	7,70,000	0	0	
2	Overhead 24C unarmoured	2,20,000	150	3,30,00,000	
3	24C OPGW	5,50,000	-	-	
4	MPLS Router	5,50,000	20	1,10,00,000	
		Total		4,40,00,000	

9.5.4 Estimates cost for SCADA PSS Network

C. No.	Description	Unit cost (INR incl. of	FY 23		
5. NO.	Description	Tax)	Qty in No	Amt.	
1	DC Layer -II & III Switch	1,10,000	35	38,50,000	
2	Layer- 3 Router (VPN)	1,10,000	35	38,50,000	
3	LAN Cables per node	8,000	100	8,00,000	
4	MPLS link installation	7,000	35	2,45,000	
		Total		87,45,000	
9.5.5 Estimated cost for datacenter Non-IT Infrastructure

S. No.	Item	Unit Rate (in Rs) incl. of taxes	Qty in No	Amount in Rs.
1	Server Racks	99,000	10	9,90,000
2	Fire Proof Storage for Data Cartridges	2,20,000	2	4,40,000
	Total			14,30,000

9.5.6 Estimated cost for datacenter Hardware

• •		Unit cost	F	Y22-23
5. NO.	Description	(INR incl. of Tax)	Qty in No	Amt.
1	SAN Storage upgrade 50 TB	1,05,60,000	1	1,05,60,000
2	DB Server for Bespoke application	14,77,000	1	14,77,000
3	Application servers for Bespoke applications	8,99,000	2	17,98,000
4	Mail server	8,99,000	1	8,99,000
5	Web Server	8,99,000	1	8,99,000
6	Spine Switch	13,20,000	2	26,40,000
7	Leaf Switch	9,90,000	2	19,80,000
8	EMS/NMS Server with Network Operation Console	8,99,000	2	17,98,000
9	Backup Server	8,99,000	1	8,99,000
10	Backbone MPLS router	13,20,000	2	26,40,000
11	Backup Data Domain	55,00,000	1	55,00,000
	Total			3,10,90,000

9.5.7 Estimated cost for data center Software

		Unit cost	FY	22-23
S. No.	Description	(INR incl. of Tax)	Qty in No and LS	Amount in Rs.
1	MBC software including Energy audit, New connection / disconnection, MIS	2,36,00,000	1	2,36,00,000
2	DB License	22,00,000	1	22,00,000
3	Server OS	3,74,000	6	22,44,000
4	System Security	8,99,000	2	17,98,000
5	EMS /NMS solution	13,20,000	2	26,40,000
6	Mailing solution	5,50,000	1	5,50,000
7	AD software	11,00,000	1	11,00,000
8	SPAM filter	1,10,000	1	1,10,000
9	Virtualization	5,50,000	12	66,00,000
10	E-office system	6,71,00,000	1	6,71,00,000
11	Other Technologies	50,00,000	1	50,00,000
	Total			11,29,42,000

9.5.8 Estimated cost for Hardware and software for cyber security

S. No.	Description	Unit Rate (in Rs) inclusive of taxes	Qty in No	Amount in Rs.
1	Enterprise SIEM	50,00,000	1	50.00,000
2	MPLS firewall	20,00,000	2	40.00,000
3	IT&OT firewall	10,00,000	1	10.00,000
		Total		1,00,00,000

9.5.9 Estimated cost for IT infrastructure for full scale call center

S. No.	Item	Unit cost (INR incl. of Tax)	Qty in Nos	Amt.
1	PC with windows OS & UPS	63800	50	3190000
2	Microsoft office	26,400	50	1320000
3	Anti-Virus	5500	50	275000
4	IP Phone	16500	50	825000
5	IVRS	680000	1	680000
6	soft IP Phone	680000	1	680000
7	voice Broad casting software	680000	1	680000
8	Server OS	188000	1	188000
9	Database License	4322000	1	4322000
10	Application Server	1051000	1	1051000
11	Head set	7000	50	350000
12	Hand set	8000	50	400000
13	Call switching Equipment	436000	1	436000
14	IVRS Server	627000	1	627000
15	CTI server	627000	1	627000
16	Automated Call Distribution Hardware	436000	1	436000
17	Dialer	436000	1	436000
18	Voice Logger	436000	1	436000
	Total			1,69,59,000

9.6 Annexure- Civil Infrastructure & Admin

Cost Estimate - Civil Infrastructure & Admin

BOQ (Civil Infrastructure)

9.6.1 Estimation for Store Shed of Size 50x10x5 Mtr:

S no	Description of Item	UOM	Nos.	L	В	Н	Total	Rate (In Rs)	Amount (In Rs)
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	Cum	22	1.5	1.5	1.5	74.25	235	
		Cum	1	130	0.76	0.4	39.52		
							113.77	235	26736
2	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 dismantled qty. (Voids to be deducted as applicable whenever heap / truck measurements are taken))	Cum					113.77	380	43233
3	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.	Cum	22	1.5	1.5	0.23	11.385		
		Cum	1	50 120	10	0.23	115		
		Cum		120	0.5	0.23	140 19	2000	280370
							. 10.10		
4	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	Cum	22	1.5	1.5	0.08	3.7125		

S no	Description of Item	UOM	Nos.	L	В	н	Total	Rate (In Rs)	Amount (In Rs)
	pits, etc. at any depth with 30 mm downgraded 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)								
		Cum	1	50	10	0.08	37.5		
		Cum	1	120	0.5	0.1	6		
		Cum	1	130	0.76	0.1	9.88	0700	074404
							57.093	6500	371101
5	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.	Cum	22	1.5	1.5	0.35	17.325		
	by the ENGINEER :	Cum	22	0.4	0.35	5	13.475		
		Cum	1	120	0.25	0.4	12		
		Cum	1	120	0.23	0.3	8.28		
		Cum	1	50	10	0.13	62.5		
							113.58	8000	908640
6	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			114	1.50%		1.7037		
		МТ					13374	75000	1003053
<u> </u>							10.07	,0000	1000000

S no	Description of Item	UOM	Nos.	L	В	н	Total	Rate (In Rs)	Amount (In Rs)
7	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.	Cum	1	120	0.23	5	138		
	Ded	Cum	20	1.5	0.23	1.5	10.35		
		Cum	2	4	0.23	3.5	6.44		
		Cum	2	120	0.23	0.3	16.56		
							137.77	6500	895505
	Droviding and plactaring								
8	internal surfaces of concrete and brick work such as walls, ceilings, columns, beams, 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	Sqm	1	120	5		600		
		Sam	20	15	15		45		
		Sqm	2	4	3.5		28		
							527	380	200260
9	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	Sqm	1	120	5		600		
		Sqm	1	130	0.76		98.8		
		Sqm	20	1.5	1.5		45		
		Sqm	2	4	3.5		28	450	004040
							625.8	450	281610
10	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	Sqm					625.8	220	137676

S no	Description of Item	UOM	Nos.	L	В	н	Total	Rate (In Rs)	Amount (In Rs)
	directed. Paint shall be of First Quality Manufactured by Asian / Burger / Shalimar paints Internal quality Plastic Emulsion paint								
11	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	Sqm					625.8	220	137676
12	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 flloring, 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	MT							
	Window						2		
	RoofTruss						20	00000	1077500
							22	89890	1977580
13	Supplying and fixing mechanical gear type rolling shutters, manually operated by means of winding handle and the shutter made out of 18 gauge x 3" (1.10 mm to 1.25 mm) mild steel laths (Primary manufacturer Jindal, Tata) of convex corrugation, complete with build up 4" x 1"		2	4	3.5		28	4500	126000

S no	Description of Item	UOM	Nos.	L	В	Н	Total	Rate (In Rs)	Amount (In Rs)
	side guides, built up bottom rails with angle iron at bottom and flat iron at top, heavy brackets, extra strong door, suspension shaft made out of new pipes leaded with high tension steel springs of best Indian spring steel wire, locking arrangements handles, painted with one coat of primer paint complete in best workmanship with top cover 3 Nos. bearing and including loading, unloading and transportation at our site.								
14	Providing, placing and fixing profile pre-colour coated galvalume RMP sheets or equivalent of 0.5mm total coated thickness to match existing shade (bare galvalume thickness 0.47mm), trough type, zinc aluminium coating not less then 150g/sqm), MS high tensile sheet having minimum yield strength of 550MPa including coating of DFT 20 microns over 5 microns primer on exposed surface of sheeting and DFT 5 microns over 5 micron primer on internal surface of sheeting and including all connections and matching fixtures and accessories such as but not limited to J or L bolts & hooks (8 mm, polymer coated), nuts with polymer washers, self tapping screws, protective polymer cap of matching colour for bolts, should be supplied in suitable length as desired by Engineer in- charge. The sheet shall be fixed using self-drilling /self-tapping GI coated screws of size (5.5x 55 mm) with EPDM seal, complete up to any pitch in horizontal/ vertical or curved surfaces, etc., complete as per manufacturers recommendations for Sheeting for roof/Side etc.		1	52	12		624	800	499200
15	Providing all the materials laying Indian Patent Stone flooring in M15 grade concrete, including finishing the surface & curing etc. complete as directed 37 mm thick with Aluminium strips in panels of 2 x 2 M (Cement Consumption 0.36 Bag/M2)		1	50	10		500	650	325000

S no	Description of Item	UOM	Nos.	L	В	Н	Total	Rate (In Rs)	Amount (In Rs)
16	Washroom with Specific Tank and Soak Pit								400000
17	Electrical Fittings with wiring								750000
									8363640
						(GST @ 18	3%	1505455
						То	tal Estim Amoun	ated t	9869095

9.6.2 Estimation for Road of 100 M X 5M:

Description of Item	UOM	Nos.	L	в	н	Total	Rate (In Rs)	Amount (In Rs)
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	Cum	1	100	5	0.5	250		
Drain		1	200	1	0.6	115.2		
						365.2	235	85822
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 wherever required etc. complete. (Min cement content 300 Kg/m3)	Cum	1	200	1	0.1	19.2	6500	124800
P&L Granular Sub Base Providing & laying, spreading & compacting specified crushed stone in granular subbase course including premixing the material in mechanical mixer (pug mill) transportation of mixed material laying in uniform layer of 150mm (compacted to 100mm thickness each) on prepared murum surface & compacting with 10 tonne vibratory roller to achieve desired density of 97%, including all material, labour, machinery, barricading to and maintenance of diversion as required etc. Complete (metal gradation from 90mm to 75mm.	Cum	1	100	5	0.2	75	1650	123750
	Description of Item 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 Drain 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 wherever required etc. complete. (Min cement content 300 Kg/m3) P&L Granular Sub Base Providing & laying, spreading & compacting specified crushed stone in granular subbase course including premixing the material in mechanical mixer (pug mill) transportation of mixed material laying in uniform layer of 150mm (compacted to 100mm thickness each) on prepared murum surface & compacting with 10 tonne vibratory roller to achieve desired density of 97%, including all material, labour, machinery, barricading to and maintenance of diversion as required etc. Complete (metal gradation from 90mm to 75mm.	Description of ItemUOMExcavation 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 mtrsCumDrainImage: Compact of the section	Description of ItemUOMNos.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 stracking 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 mtrsCum1Drain11Supplying, 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 wherever required etc. complete. (Min cement compacting specified crushed stone in granular subbase course including from laying in uniform layer of 150mm (compacted to 100mm thickness each) on prepared murum surface & compacting with 10 tonne vibratory roller to achieve desired density of 97%, including all material, labour, machinery, barricading to and maintenance of diversion as required etc. Complete (metal gradation from 90mm to 75mm.UOMNos.	Description of ItemUOMNos.LExcavation 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 mtrs1200Drain1200Supplying, 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 wherever required etc. complete. (Min cement content 300 Kg/m3)Image: Supplying in uniform layer of 150mm (compacted to 100mm thickness each) on prepared murum surface & compacting with 10 tonne vibratory roller to achieve desired density of 97%, including all material, labour, machinery, baricading to and maintenance of diversion as required etc. Complete (metal gradation from 90mm to 75mm.Image: Supplemetal in from surface & compacting with 10 tonne wibratory roller to achieve desired density of 97%, including all material, labour, machinery, baricading to and maintenance of diversion as required etc. Complete (metal gradation from 90mm to 75mm.Image: Supplemetal in from surface & compacted to 100 mm to form work wherever end in the surface in the sur	Description of ItemUOMNos.LBExcavation 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 mtrsLum11005Drain12001Supplying, 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 grades, sumps, soak pits, etc. at any depth with 30 mm downgraded coarse aggregates including curing, compacting, de-watering wherever required etc. complete. (Min cement compacting specified crushed shore in granular subbase course including graming in uniform layer of 150mm (compacted to 100mm thickness each) on prepared murum surface & compacting with 10 tonne with consert of diversion as required etc. Complete (metal gradation from 90mm to 75mm.Nos.LB	Description of ItemUOMNos.LBHExcavation 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 memoval of surplus excavated earth within a basic lead of 100 mtrs as directed for a depth from 0.0 to 1.5 mtrsCum110050.5Drain	Description of ItemUOMNos.LBHTotalExcavation 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 depti from 0.0 to 1.5 mtrsCum110050.5250Drain-120010.6115.2Supplying, 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 wherever required etc. complete. (Min cement content 300 Kg/m3)P8L Granular Sub Base Providing specified crushed stone in granular subbase course including compacting specified crushed stone in granular subbase course including transportanion d'inked material laying in uniform layer of 150mm (compacted to 100mm thickness each) on prepared murreriat, labour, machinery, barricading to an maintenance of diversion as required etc. Complete (metal gradation from worm borstor or othered desired density of 97%, including all material, labour, machinery, barricading to and maintenance of diversion as required etc. Complete (metal gradation from worm borstanor of metal gradation from worm borstanor of metal gradat	Description of ItemUOMNos.LBHTotalIn Rate (in Rs)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 spreading or removal of stacking or spreading or removal of stacking or spreading or removal of surplus excavated earth within a basic lead of 100 mtrs as directed for a depth from 0.010 1.5 mtrs110050.5250250Drain–120010.6115.2-Drain–120010.6115.2-Supplying, Providing and laying in position plain cement concrete of grade MTS 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 required etc. complete. (Min cement concret educes aggregates including curing, compacting specified crushed stone in granular subbase course including from work wherever required etc. complete. (Min cement content 300 Kg/m3)Image: Mathematical in mechanical mixer including material in mechanical mixer (pug mill) transportation of mixed material in mechanical mixer (pug mill) transportation of mixed material in mechanical mixer (pug mill) transportation of mixed material laying in uniform layer discussion server including end murrum surface & compacting in addition and material gradation from down material gradation from down material material material in mechanical mixer (pug mill) transportation of mixed material laying in uniform layer discussion form (compacted to

S No	Description of Item	UOM	Nos.	L	в	н	Total	Rate (In Rs)	Amount (In Rs)
4	Providing and laying 200 mm thick compacted kutcha tough layer to be laid in 2 layers of 100 mm compacted thickness of each layer with 80/100 mm size metal and binding the same with murrum , each layer consisting of clean hand broken hard quality metal 80 mm to 100 mm size by rolling with 10 T vibro roller & binding together with lines, grades , cross-section , camber etc. as directed by the engineer. For binding materials grit stone dust must be used. (The plasticity index of which should not exceed 6) include providing all materials, tools, equipment's etc.	Sqm	1	100	5		500	360	180000
5	P&L W B M (150mm consolidated thickness) Providing & Laying 150 mm thick compacted WBM over the kutcha tough base to be laid in 2 layers of 75 mm compacted thickness of each layer with 50/75 mm size metal and binding the same with murrum , each layer consisting of clean hand broken hard quality metal 50 mm to 75 mm size by rolling with 10 T vibro roller & binding together with lines, grades , cross- section , camber etc. as directed by the engineer. For binding materials grit stone dust must be used. (The plasticity index of which should not exceed 6) include providing all materials, tools, equipment's etc.	Sqm	1	100	5		500	250	125000
6	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.	Cum	1	200	0.5	0.4	36.8	6500	239200
7	Providing all materials and carrying out sand faced plaster 18 mm thick in single 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	Sqm	1	200	0.6		122	450	54900
						6	ST @ 1	8%	933472
						Total	11.01.497		
					Tot	A tal_co	26435927		

9.6.3 Estimation for Open Store of 200M X 10M (Consider top layer M-25 RCC):

S N	Description of Item	UOM	Nos.	L	В	н	Total	Rate (In Rs)	Amount (In Rs)
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	Cum	1	200	10	0.5	1000		
	Drain		1	420	0.96	0.6	241.92		
							1241.92	235	291851
2	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 dismantled qty. (Voids to be deducted as applicable whenever heap / truck measurements are taken))	Cum					1241.92	380	471930
3	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.								
	Floor	Cum	1	200	10	0.23	460		
Щ							460	2000	920000
4	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 wherever	Cum	1	420	0.96	0.08	30.24		



S N	Description of Item	UOM	Nos.	L	В	н	Total	Rate (In Rs)	Amount (In Rs)
	required etc. complete. (Min cement content 300 Kg/m3)								
		Cum	1	200	10	0.08	150		
							180.24	6500	1171560
5	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.	Cum	1	200	10	0.25	500	8000	4000000
6	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			500	1.50%		7.5		
							58875		
		MT					58.88	75000	4415625
7	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.	Cum	1	420	0.46	0.4	77.28	6500	502320
8	Providing all materials and carrying out sand faced plaster 18 mm thick in single layer and plastering external surfaces of concrete and brick work such as walls, columns, beams etc. with 1:4 cement	Sqm	1	420	0.61		256.2	450	115290

S N	Description of Item	UOM	Nos.	L	В	н	Total	Rate (In Rs)	Amount (In Rs)
	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								
									11888576
					GST @ 18%			2139944	
					Tota	14028519			