

RAJASTHAN RAJYA VIDYUT PRASARAN NIGAM LTD.

(Regd. Office: Vidyut Bhawan, Jan Path, Jyoti Nagar, Jaipur - 302 005)
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RR- No. RVPN/SE(P&P)/XEN(Proj.)/AE-1/F.535/D. 669
Dt.-

Jaipur, Dt. 3/8/12

The Chief Engineer (T&C/Civil/MM/LD),
Rajasthan Rajya Vidyut Prasaran Nigam Ltd.,
JODHPUR/JAIPUR.

Sub: Approval of 132kV single circuit Nokha Daiya-Khajuwala line.

The Board of Directors of RVPN in its 209th meeting held on 26th July, 2012 have accorded its administrative and financial approval for construction of 75km long 132kV S/C line from 132kV GSS Nokha Daiya to 132kV GSS Khajuwala having total estimated cost of Rs. 1075.69 lacs (including IDC).

A copy of the Project Estimate Report of the above scheme is enclosed herewith for your kind information and needful. The execution of the above scheme is to be done as per plan provision made in Annual Plan(s) sent to you from time to time. You are requested to kindly endorse the above to all concerned field officers who will supervise/under take the execution of the above scheme.

For entry in the PMICS Module the Scheme Code & Project Code shall be as under:

- Scheme Name:** 132kV S/C Nokha Daiya-Khajuwala Line (Scheme Code 121900).
Project Name : (i) 132kV S/C Nokha Daiya-Khajuwala Line (Project Code 121901)
(ii) One no. 132kV Bay at 132kV GSS Nokha Daiya (Project Code 121902)
(iii) One no. 132kV Bay at 132kV GSS Khajuwala (Project Code 121903)

Encl: As above.

(S.K. Jain)

Chief Engineer (PP&M)

Copy alongwith a copy of the Project Estimate Report of the above scheme to the following for information & necessary action :-

1. The Chief Controller of Accounts, RVPN, Jaipur.
2. The Secretary (Admn.), RVPN, Jaipur.
3. The Superintending Engineer (TCC-IX/400kV Design/TLPC/SSPC/PLCC), RVPN, Bikaner/Jaipur.
4. The TA to Director (Technical/Operation), RVPN, Jaipur. (Without Project Report)
5. The Land Acquisition Officer, RVPN, Jaipur. (Without Project Report)
6. The Company Secretary, RVPN, Jaipur (Item No. 209.11 of BOD). (Without Project Report)
7. The XEN (PSS/Project/Monitoring/Tr.-400kV Design), RVPN, Jaipur. (Without Project Report)

Encl: As above.

Letter for conveying Board's approval

Executive Engineer (C&M-TCC-IX)
RVPN, BIKANER

Chief Engineer (PP&M)

Copy submitted / forwarded to the following for information and n/a

- (1) The XEN - I (C&M-TCC-IX), Bikaner
- (2) The AEN - I (C&M-TCC-IX), Bikaner

Rajasthan Rajya Vidyut Prasaran Nigam Ltd.
(Project, Planning & Monitoring Wing)



PROJECT COST ESTIMATES

FOR

CONSTRUCTION OF

132kV S/C NOKHA DAIYA –KHAJUWALA LINE

PROJECT ESTIMATES OF 132 KV S/C NOKHA DAIYA-KHAJUWALA LINE

1.0 Introduction

Presently, 132 kV S/S Khajuwala is connected to 220 kV GSS Suratgarh via 180 km long 132 kV S/C Suratgarh-Sri Vijaynagar-Anoopgarh-Gharsana-Khajuwala line. 4 nos. Sub-stations viz. Sri Vijaynagar, Anoopgarh, Gharsana & Khajuwala are fed from 132 kV S/C Suratgarh-Sri Vijaynagar-Anoopgarh-Gharsana-Khajuwala line. Following are the recorded peak load at these sub-stations during 2011-12:

Particulars	Agg. Transformation Capacity	Recorded Peak Load
132 kV GSS Srivijaynagar (132/33 kV)	25 MVA (1x20/25 MVA)	10 MVA
132 kV GSS Anoopgarh (132/33 kV)	25 MVA (2x10/12.5 MVA)	17 MVA
132 kV GSS Gharsana (132/33 kV)	25 MVA (2x10/12.5 MVA)	23 MVA
132 kV GSS Khajuwala (132/33 kV)	25 MVA (1x20/25 MVA)	6 MVA
132 kV S/C Suratgarh-Sri Vijaynagar line (49 km)	-	42 MVA
132 kV S/C Sri Vijaynagar-Anoopgarh line (45 km)	-	35 MVA
132 kV S/C Anoopgarh-Gharsana line (24 km)	-	22 MVA
132 kV S/C Gharsana-Khajuwala line (62 km)	-	6 MVA

Under scheduled or unscheduled outages of 132 kV S/C Suratgarh-Srivijaynagar-Anoopgarh-Gharsana-Khajuwala line, 132 kV substations at Srivijaynagar, Anoopgarh, Gharsana, Khajuwala remain without supply. Therefore, 132 kV interconnecting line is required to be constructed so that these radially fed 132 kV sub-stations form a ring system for reliability of supply. Further, a large number of Solar Power Plants are envisaged nearby Gajner & Kolayat. Following are the firmed /anticipated capacity of Solar Power Projects near to Kolayat & Gajner in system condition 2014-15:

S. No.	Name of Sub-station	Proposed Solar Power Projects				
		Phase-I Batch-1	Phase-I Batch-2	REC	Expected	Total
1	132 kV GSS Kolayat	5 MW	20 MW	20 MW	-	45 MW
2	220 kV GSS Kolayat (U/C)	-	-	-	100 MW	100 MW
3	132 kV GSS PS No. 4 (Nokha Daiya)	5 MW	-	-	-	5 MW
4	220 kV GSS Gajner (U/C)	-	20 MW	-	80 MW	100 MW
Total		10 MW	40 MW	20 MW	180 MW	250 MW

220 kV GSS at Gajner is under construction and LILO of 132 kV S/C Pugal Road-PS No. 4 (Nokha Daiya) line is also under construction at 220 kV GSS Gajner. Therefore, in order to strengthen the evacuation of power from proposed Solar Power plants to be installed near to Gajner & Kolayat and to form a ring main supply system in the area, construction of 75 km long 132 kV S/C Nokha Daiya-Khajuwala line has been proposed and considered to carry out the load flow studies.

1.1 Load Flow Study

Load flow studies have been carried out for the condition corresponding to 2014-15 for the total system load 11422 MW considering the 75 % generation from proposed Solar Power projects to be installed nearby Kolayat & Gajner. Generation schedule for the condition corresponding to 2014-15 is placed at Appendix-I. Additional 3000 MW load has been considered at Zerda (750 MW at 400 kV bus), Sikar (750 MW at 400 kV bus) & Phagi-765 kV GSS (1500 MW at 765 kV bus). Following cases have been considered to carry out the load flow studies:-

- **Base Case (Exhibit-1):** Without proposed 132 kV S/C Nokha Daiya-Khajuwala line.
- **Proposed Case (Exhibit-2):** With 75 km proposed 132 kV S/C Nokha Daiya-Khajuwala line

Power plots of load flow study for Base Case & Proposed Case are placed at respective Exhibits & power flow on some important lines has been tabulated here under:

S. No	Particulars	Base Case	Proposed Case
1.	2x100 MVA, 220/132 kV transformers at Suratgarh	150 MW	132 MW
2.	1x100 MVA, 220/132 kV transformer at Gajner	01 MW	11 MW
3.	132 kV S/C Suratgarh-Sri Vijaynagar line	43 MW	14 MW
4.	132 kV S/C Sri Vijaynagar – Anoopgarh line	32 MW	03 MW
5.	132 kV S/C Anoopgarh-Gharsana line	19 MW	(-) 09 MW
6.	132 kV S/C Gharsana-Khajuwala line	04 MW	(-) 24 MW
7.	132 kV S/C Gajner-Nokha Daiya line	00 MW	30 MW
8.	132 kV S/C Nokha Daiya-Khajuwala line (Proposed line)	-	29 MW
	Total System losses (MW)	450.80	449.68

1.2 Observations

From the aforesaid tabulated results of load flow study, following points are observed:

- In Proposed Case, the total system losses would be reduced from 450.80 MW to 449.68 MW, thus saving of 1.12 MW (42.38 LU/Annum) would be envisaged in Proposed Case, as compared to Base Case.
- Under the Proposed Case, the power flow on 132 kV lines are within permissible limits.
- Proposed 132 kV S/C Nokha Daiya-Khajuwala line would help in evacuation of power from proposed Solar Power plants to be installed around Gajner & Kolayat.
- After the construction of 132 kV S/C Noka Daiya-Khajuwala line, radially fed 132 kV GSS's at Anoopgarh, Srivijaynagar, Raisinghnagar & Khajuwala would also be connected in 132 kV ring main system

1.3 Conclusion

75 km long 132 kV S/C Noka Daiya-Khajuwala line is proposed for condition corresponding to 2014-15 to strengthen the evacuation of power from proposed Solar Power plants to be installed around Gajner & Kolayat and to form a ring main supply system in the area.

1.4 Estimated cost of scheme

The estimated cost for construction of 75km long 132kV single circuit Nokha Daiya-Khajuwala line works out to Rs. 960.11 lacs (without IDC) which further works out to Rs. 1075.69 lacs considering IDC. An abstract cost estimate sheet of the scheme is as per Annex.-I while IDC calculation is as per Annex.-II.

1.5 Financial Analysis of Scheme

The financial analysis of proposed scheme has been carried out comparing cost stream component of depreciation, interest, O&M charges, Return on Equity vis.-a-vis. revenue from sale of energy by Discom. As per the result of the financial analysis of this scheme enclosed at Annex.-III, the scheme of 132kV S/C Nokha Daiya-Khajuwala line is giving positive return from the very first year. Hence the proposal of construction of this line is techno-economically feasible.

GENERATION SCHEDULE FOR THE CONDITION CORRESPONDING TO 2014-15

LOAD FLOW ANALYSIS CONVERGED, ITERATIONS P : 9 Q : 10
CASE NO : 1 CONTINGENCY : C SCHEDULE NO : 0
CONTINGENCY NAME : Basecase RATING CONSIDERED : NOMINAL

Number	Name	Zone	Area	Owner	Actual-pu	Angle(deg)	Pgen(KW)	Qgen(KVAR)	Qmin(KVAR)	Qmax(KVAR)
52	STPS2200	3	4	1	1.0269	9.1660	450.000	-120.000	-120.000	250.000
53	STPS4000	3	4	1	1.0177	10.9994	900.000	-240.000	-240.000	500.000
60	KTPS#1	5	4	1	1.0000	11.7618	198.000	-17.094	-50.000	100.000
61	KTPS#2	5	4	1	1.0000	12.2370	378.000	-28.541	-90.000	190.000
62	KTPS#3	5	4	1	1.0085	6.1109	0.000	0.000	-45.000	95.000
70	ANTA#1	4	4	1	1.0000	10.5049	240.000	-30.325	-60.000	120.000
71	ANTA#2	4	4	1	1.0127	4.8089	0.000	0.000	-35.000	70.000
80	RAPP#1	4	4	1	1.0134	5.5588	0.000	0.000	-45.000	90.000
81	RAPP#2	4	4	1	1.0300	12.9945	400.000	22.676	-100.000	200.000
92	MAHI#1	5	4	1	0.9969	-2.3756	0.000	0.000	-12.000	24.000
93	MAHI#2	5	4	1	1.0242	-2.5999	0.000	0.000	-22.000	44.000
95	RMGHG	5	4	1	1.0500	22.5626	35.000	10.399	-15.000	15.000
97	RPSG	5	4	1	1.0106	1.5373	0.000	0.000	-40.000	80.000
98	JSG	5	4	1	1.0129	2.2915	0.000	0.000	-24.000	48.000
44	NREB_HYD	4	3	1	1.0300	-1.5066	125.000	73.447	-60.000	125.000
46	NREB_TH	4	3	1	1.0000	0.0000	837.986	-117.028	-150.000	300.000
63	KTPS#4	5	4	1	1.0300	11.5345	350.000	77.102	-80.000	170.000
39	GLTPS_G	3	4	1	1.0300	19.1606	226.000	13.240	-20.000	40.000
37	DGTPS_G	5	4	1	1.0300	3.8324	315.000	33.445	-30.000	45.000
75	BLTPS_G	3	4	1	1.0000	12.0634	226.000	-37.642	-54.000	110.000
82	RAPPC_G	5	4	1	1.0300	14.3956	400.000	36.266	-100.000	200.000
85	CHABRA_G	5	4	1	1.0000	18.7745	900.000	54.282	-220.000	458.256
49	RJWESTG1	5	4	1	1.0300	19.1029	242.000	21.129	-60.000	120.000
45	RJWESTG2	5	4	1	1.0000	16.4441	484.000	-106.949	-120.000	240.000
34	GLTPSGII	6	4	1	1.0237	13.8589	0.000	0.000	-60.000	120.000
74	VSLP_G	6	4	1	1.0300	13.4446	121.000	2.763	-30.000	60.000
87	KALINS_G	5	4	1	1.0000	21.3561	1080.000	163.769	-240.000	490.000
86	CHABR_G2	5	4	1	1.0000	21.1764	660.000	116.042	-115.000	330.000
88	STPS_G3	5	4	1	1.0500	12.0473	660.000	233.132	-115.000	330.000
89	BANSWA_G	2	4	1	0.0000	0.0000	0.000	0.000	-115.000	330.000
79	RAPP_DG	4	4	1	0.0000	0.0000	0.000	0.000	-300.000	630.000
90	KEWAL_G	5	4	1	1.0000	20.7717	1320.000	180.239	-230.000	660.000
99	DHOLF_G2	5	4	1	1.0207	1.1956	110.000	0.000	0.000	78.262
76	RMG_G32	3	4	1	1.0500	25.2866	150.000	28.648	-31.000	62.000
1378	KANASR21	16	1	1	1.0334	16.4132	78.000	0.000	0.000	0.000
1318	PS_5	16	1	1	1.0195	14.5691	26.000	0.000	0.000	0.000
1383	PSNo1	16	1	1	1.0356	16.2028	31.720	0.000	0.000	0.000
1377	PS_2	16	1	1	1.0358	16.7110	33.800	0.000	0.000	0.000
1376	PS_3	16	1	1	1.0367	16.8023	46.800	0.000	0.000	0.000
1197	BAP_1	16	1	1	1.0256	14.4185	128.960	0.000	0.000	0.000
1402	PSNo4_1	16	1	1	1.0312	16.0759	26.000	0.000	0.000	0.000
2387	AAU_21	16	1	1	1.0176	13.4892	78.000	0.000	0.000	0.000
3385	BADISID1	16	1	1	1.0313	15.6022	78.000	0.000	0.000	0.000
3389	RAMDEVN1	16	1	1	1.0419	17.2105	78.000	0.000	0.000	0.000
2384	KOLAYT21	16	1	1	1.0142	8.1278	75.400	0.000	0.000	0.000
2382	PS_1/B21	16	1	1	1.0329	15.7667	78.000	0.000	0.000	0.000
2357	BHADLA41	13	1	1	1.0254	14.4880	52.000	0.000	0.000	0.000
356	RAMGAR42	12	2	1	1.0279	18.4679	312.000	0.000	0.000	0.000
353	AKAL_2	12	2	1	1.0259	18.6451	520.000	0.000	0.000	0.000
36	AMSGR_33	12	4	1	1.0465	24.5552	61.880	0.000	0.000	0.000
94	MADA2	12	2	1	1.0291	19.2464	114.400	0.000	0.000	0.000
345	JAISLI12	12	2	1	1.0164	17.7399	312.000	0.000	0.000	0.000
312	TINW2	13	2	1	1.0195	10.1152	72.800	0.000	0.000	0.000
237	NAMA_2WF	14	5	1	1.0425	-0.1566	52.000	0.000	0.000	0.000
236	KUSH_2WF	14	5	1	1.0427	-0.3924	0.000	0.000	0.000	0.000
2458	RENE_WF	14	1	1	0.9977	-1.5820	31.200	0.000	0.000	0.000
3362	POKENR21	15	1	1	1.0421	18.7549	26.000	0.000	0.000	0.000
2363	CHATRAL1	15	1	1	1.0354	21.3602	130.000	0.000	0.000	0.000
2356	RAMGAR41	15	1	1	1.0287	20.6407	104.000	0.000	0.000	0.000
1381	SHEO1	12	1	1	1.0265	14.4135	24.960	0.000	0.000	0.000
1314	JSLMR	12	1	1	1.0439	21.4303	20.800	0.000	0.000	0.000
481	TEJUWA42	12	1	1	1.0220	20.2908	312.000	0.000	0.000	0.000
1270	KHNVSR	16	1	1	0.9840	0.2442	2.600	0.000	0.000	0.000
1350	BALOT1	15	1	1	0.9885	5.9901	2.600	0.000	0.000	0.000
369	DECHU_2	16	2	1	1.0380	15.1063	58.760	0.000	0.000	0.000
1369	DECHU_21	16	1	1	1.0278	12.7563	5.200	0.000	0.000	0.000
1329	Aau	16	1	1	1.0145	13.3532	2.600	0.000	0.000	0.000
1391	KOLAYT1	16	1	1	1.0111	7.4846	33.280	0.000	0.000	0.000
1291	JAYAL_1	16	1	1	0.9627	-0.5241	20.800	0.000	0.000	0.000

1388	GALNER1	16	1.0090	5.2538	3.713	0.000	0.000	0.000
1218	GULABPR	17	0.9831	1.7903	2.600	0.000	0.000	0.000
1385	PUGLRO	16	0.9921	3.2063	5.200	0.000	0.000	0.000
1324	OSTAN	13	1.0053	9.0153	18.460	0.000	0.000	0.000
162	POKARAN2	15	1.0445	17.6455	156.000	0.000	0.000	0.000
1313	POKRAN1	15	1.0428	18.8034	20.800	0.000	0.000	0.000
2352	AVSGR1	12	1.0452	21.8561	104.000	0.000	0.000	0.000
152	AVSGR2	12	1.0387	20.4193	187.200	0.000	0.000	0.000
1195	SANWR2	15	1.0251	12.9156	41.600	0.000	0.000	0.000
2319	BHOPL2	13	0.9760	3.2919	23.400	0.000	0.000	0.000
1316	DECHUL	16	1.0242	12.1300	5.200	0.000	0.000	0.000
1311	BILARA	13	1.0084	0.7558	13.600	0.000	0.000	0.000
2316	BACRI	13	0.9953	5.6686	31.200	0.000	0.000	0.000
2318	P.S.No8	13	1.0343	10.9778	52.000	0.000	0.000	0.000
1327	Chamu	13	1.0136	10.5071	15.600	0.000	0.000	0.000
1282	KHOOD1	14	0.9988	-6.6891	6.240	0.000	0.000	0.000
260	MRT2	14	1.0108	1.8062	26.000	0.000	0.000	0.000
1520	RMGL32	15	1.0432	21.4818	2.600	0.000	0.000	0.000
357	BHADLA_2	16	1.0247	13.6028	234.000	0.000	0.000	0.000
1312	TINWR11	10	1.0123	8.9961	7.800	0.000	0.000	0.000
2413	GALNER21	16	1.0051	5.3642	75.400	0.000	0.000	0.000

Number of generators : 90

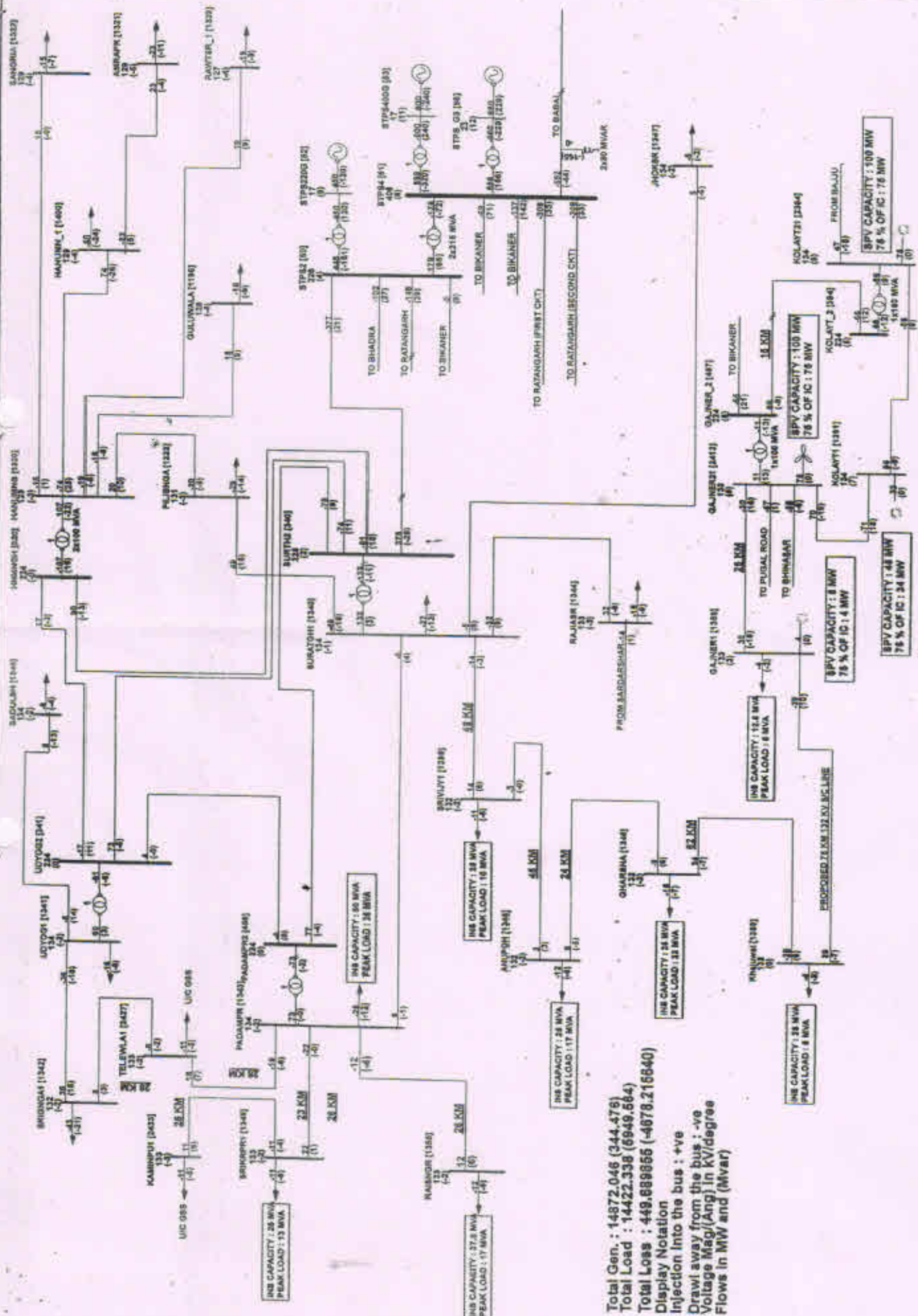
Summary of results

TOTAL REAL POWER GENERATION	: 14873.159 MW
TOTAL REAL POWER INJECT, -ve L	: 0.000 MW
TOTAL REACT. POWER GENERATION	: 368.801 MVAR
GENERATION pf	: 1.000
TOTAL SHUNT REACTOR INJECTION	: 0.000 MW
TOTAL SHUNT REACTOR INJECTION	: -7090.432 MVAR
TOTAL SHUNT CAPACIT. INJECTION	: 0.000 MW
TOTAL SHUNT CAPACIT. INJECTION	: 4085.613 MVAR
TOTAL SHUNT FACTS. INJECTION	: 0.000 MVAR
TOTAL SHUNT FACTS. DRAWAL	: 0.000 MVAR
TOTAL REAL POWER LOAD	: 14422.338 MW
TOTAL REAL POWER DRAWAL -ve g	: 0.000 MW
TOTAL REACTIVE POWER LOAD	: 5949.564 MVAR
LOAD pf	: 0.924
TOTAL COMPENSATION AT LOADS	: 0.000 MVAR
TOTAL HVDC REACTIVE POWER	: 0.000 MVAR
TOTAL REAL POWER LOSS (AC+DC)	: 450.800788 MW (450.800788+ 0.000000)
PERCENTAGE REAL LOSS (AC+DC)	: 3.031
TOTAL REACTIVE POWER LOSS	: -4657.036899 MVAR

Exhibit-1

EXHIBIT-2

Exhibit-2



Total Gen.: 14372.046 (344.476)
Total Load : 14422.338 (6949.664)
Total Loss : 449.689855 (-4679.216540)
Display Notation
Injection into the bus : +ve
Drawl away from the bus : -ve
Voltage Mag(Ang) in Kv(degree
Flows in MW and (Mvar)

Annex.-I

ABSTRACT COST ESTIMATE

SCHEME : Construction of 132kV S/C Nokha Daiya - Khajuwala Line

132KV LINE LENGTH (in km)= 75 S/C

S.No.	Particulars	Amount (Rs. in lacs)
1	Preliminary expenses	20.25
2	Land	0.00
3	Civil Works	0.00
4	Office Equipments	0.00
5	Social Infrastructure & Community services	1.00
6	PLCC & Telephones	28.02
7	Sub-station equipments	106.84
8	Transmission lines	804.00
9	Workshop & Laboratory Test equipments	0.00
10	Vehicle	0.00
TOTAL=		<u>960.11</u>

Capital cost of scheme (without IDC)= Rs. 960.11 lacs.

Capital cost of scheme (including IDC)= Rs. 1075.69 lacs.

Note: The provision for items at Sr. no. 6 to 8 above are inclusive of overhead charges as per order no. RVPN/CCOA/Estt.-Cont./F.51/D. 455 dt. 22.2.2008 (Control-139), whereas, for other items; lump sum provision have been shown.

Annex-II

I. D. C. CALCULATION:

SCHEME : Construction of 132kV S/C Nokha Daiya - Khajuwala Line

PROJECT COST = 960.11 lacs.

(All figures are in Rs. lacs.)

Year	% Loan during the year	Opening Balance	Loan during the year	Interest @ 13.0% Opening balance	Interest % 6.50% loan during the year	Total I.D.C. (5+6)	Loan during the year with IDC (4+7)	Closing Balance with IDC (3+4+7)
1	2	3	4	5	6	7	8	9
I	40%	0.00	384.04	0.00	24.96	24.96	409.01	409.01
II	60%	409.01	576.07	53.17	37.44	90.62	666.68	1075.69
Total	100%		960.11	53.17	62.41	115.58	1075.69	

TOTAL PROJECT COST INCLUDING I.D.C.= 1075.69 lacs.

FINANCIAL ANALYSIS FOR 132kV SUBSTATION SCHEME (BASED ON NPV)

SCHEME : Construction of 132kV S/C Nokha Daiya - Khajuwala Line

Cost of Scheme(c)= Rs. 960.11 lacs.
 Saving in Energy loss (s)= 42.38 LUs per annum.

Assumptions :

Debt/Loan (80% Project Cost)=	768.09	lacs.	Return on Equity (ROE)=	8.00%	p.a.
Equity (20% Project Cost)=	192.02	lacs.	O&M Charges (o) =	1.50%	p.a.
Depreciation (d) (For first 12 years)=	5.28%	p.a.	Cost of Service (CoS) =Rs.	4.48	per unit
Depreciation (d) (For Remaining years)=	2.08%	p.a.			
Interest (i) =	13.00%	p.a.	Discount Rate (dr) =	10.0%	p.a.
Repayment Period =	10	years	Life of Project =	25	years

Year	Loan			Expenditures						Savings		Net PV
				Intt. on Loan	Return on Equity	O&M Expenses	Depreciation	Total Exp. (Cost)	Cummulative PV	Saving	Cummulative PV	
	Op. Bal.	Cl. Bal.	Avg. Bal.	IOL	ROE							
1	2	3	4	5	6	7	8	9	10	11	12	13
				4'r	EqROE	c'e	c'd	5+6+7+8		s*(CoS)		12-10
1	768.09	691.28	729.68	94.66	15.36	14.40	50.69	175.32	159.38	189.8624	172.60	13.22
2	691.28	614.47	652.87	84.87	15.36	14.40	50.69	165.33	296.02	189.8624	329.51	33.50
3	614.47	537.66	576.07	74.89	15.36	14.40	50.69	155.35	412.73	189.8624	472.16	59.43
4	537.66	460.85	499.26	64.90	15.36	14.40	50.69	145.38	512.01	189.8624	601.84	89.83
5	460.85	384.04	422.45	54.92	15.36	14.40	50.69	135.38	596.07	189.8624	719.73	123.66
6	384.04	307.24	345.84	44.93	15.36	14.40	50.69	125.39	666.85	189.8624	826.90	160.05
7	307.24	230.43	268.83	34.95	15.36	14.40	50.69	115.41	726.07	189.8624	924.33	198.26
8	230.43	153.62	192.02	24.96	15.36	14.40	50.69	105.42	775.25	189.8624	1012.90	237.65
9	153.62	76.81	115.21	14.98	15.36	14.40	50.69	95.43	815.72	189.8624	1093.42	277.70
10	76.81	0.00	38.40	4.99	15.36	14.40	50.69	85.45	846.87	189.8624	1166.62	317.95
11	0.00	0.00	0.00	0.00	15.36	14.40	50.69	80.46	876.87	189.8624	1233.17	356.30
12	0.00	0.00	0.00	0.00	15.36	14.40	50.69	80.46	902.50	189.8624	1293.66	391.16
13	0.00	0.00	0.00	0.00	15.36	14.40	19.97	49.73	916.91	189.8624	1346.66	431.75
14	0.00	0.00	0.00	0.00	15.36	14.40	19.97	49.73	930.01	189.8624	1396.66	468.65
15	0.00	0.00	0.00	0.00	15.36	14.40	19.97	49.73	941.91	189.8624	1444.11	502.20
16	0.00	0.00	0.00	0.00	15.36	14.40	19.97	49.73	952.74	189.8624	1485.43	532.69
17	0.00	0.00	0.00	0.00	15.36	14.40	19.97	49.73	962.58	189.8624	1522.99	560.42
18	0.00	0.00	0.00	0.00	15.36	14.40	19.97	49.73	971.52	189.8624	1557.14	585.62
19	0.00	0.00	0.00	0.00	15.36	14.40	19.97	49.73	979.65	189.8624	1588.18	606.53
20	0.00	0.00	0.00	0.00	15.36	14.40	19.97	49.73	987.04	189.8624	1616.41	629.36
21	0.00	0.00	0.00	0.00	15.36	14.40	19.97	49.73	993.77	189.8624	1642.06	648.30
22	0.00	0.00	0.00	0.00	15.36	14.40	19.97	49.73	999.88	189.8624	1665.39	665.51
23	0.00	0.00	0.00	0.00	15.36	14.40	19.97	49.73	1005.43	189.8624	1686.59	681.16
24	0.00	0.00	0.00	0.00	15.36	14.40	19.97	49.73	1010.48	189.8624	1705.87	695.39
25	0.00	0.00	0.00	0.00	15.36	14.40	19.97	49.73	1015.07	189.8624	1723.39	708.32
Total				499.26			867.94					

2.0 HEADWISE DETAILS OF PROJECT PROVISIONS IN PROJECT REPORT

2.1 PRELIMINARY EXPENSES.

A provision of Rs. 20.25 lacs has been made under the head Preliminary Expenses to cover the cost of survey of transmission line under the scheme and Crop compensation for the land under transmission line towers, as per the details:-..

S. No.	Particulars	Line Length (in km)	Amount (Rs. in lacs)
1.	Survey of 132kV transmission line associated with the scheme @ Rs.12000/- per km	75 S/C	9.00
2	Crop compensation for the land under transmission line towers @ Rs.15000/- per km for 132kV line associated with the scheme	75 S/C	11.25
Total			20.25

2.2 LAND

No provision is required under this head.

2.3 CIVIL WORKS

No provision is required under this head.

2.4 OFFICE EQUIPMENTS

No provision is required under this head.

2.5 SOCIAL INFRASTRUCTURE & COMMUNITY SERVICES

A provision of Rs. 1.0 lacs has been made for under the head "Social Infrastructure & Community Services" to meet out the expenses towards arrangements of temporary sheds, lat-bath, drinking water, first aid medical facility etc. for labour/workers involved in construction of line during construction stage.

2.6 PLCC & TELEPHONES

A provision of Rs. 28.02 lacs has been made under the head PLCC & Telephones to cover the cost of indoor, outdoor telephone equipments, local telephone and power line carrier equipments or telecommunication carrier protection and V.H.F. equipments etc. for communication facilities as per Appendix-A.

2.7 GRID SUB-STATION EQUIPMENTS

A provision of **Rs 106.84 lacs** has been made under the head Grid Sub-Station equipments. These equipments include bay equipments for 1 no. 132kV extension bay each at 132kV Nokha Daiya & Khajuwala GSS. The provision of various substation equipments at 132kV GSS will be as per General Electrical Layout/Single Line Diagram for 132kV extension bay enclosed at **Appendix-B1**. Detailed cost estimates of the equipments is as per **Appendix-B**. The cost break-up of the substation equipments are as under :

(Rs. in lacs.)

S. No.	Particulars	Amount
1.	1 no. 132kV extension bay each at 132kV Nokha Daiya & Khajuwala GSS (2x 53.42 lacs)	106.84
	Total	106.84

2.8 TRANSMISSION LINE

A provision of **Rs. 804.00 lacs.** has been made under this head towards cost of 132kV transmission line under the scheme using ACSR Panther conductor as per following details :

S. No.	Associated 132kV Line	Route Length (in km)	Rate per km. (lacs/kM.)	Amount (in Rs.lacs)
1.	132kV S/C Nokha Daiya - Khajuwala Line	75 S/C	10.72	804.00
	Total			804.00

The above per km estimates of 132kV single ckt. Line is as per **Appendix-T (i)**.

2.9 WORKSHOP & LABORATORY TESTING EQUIPMENT.

No provision is required under this head.

2.10 VEHICLE. *

No provision is required under this head.

Appendix-A

Estimate for providing P.L.C.C. & carrier protection equipments on a 132kV Line :

(Extension only)

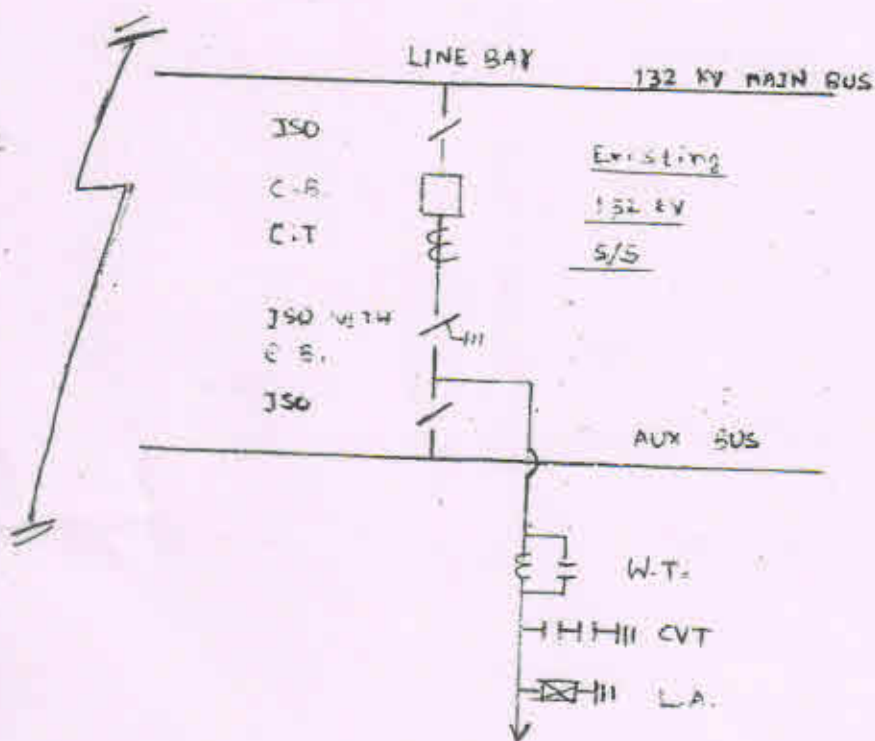
S.No.	Item	Qty.	Unit	Rate in Rs. lacs.	Amount in Rs.lacs
1	Wave Trap (0.2mH, 630 A)	4	Nos.	1.524	6.095
2	Coupling Devices for phase to phase coupling with protective devices & balancing transformer	2	Sets	0.280	0.561
3	S.S.B. Single channel carrier set for speech and superimposed signals alongwith express telephone set & emergency calling set (with 40 W protection coupler)	4	Nos.	3.173	12.691
4	H.F. Armoured Co-axial cable having 125/75 ohms unbalanced impedance	1	kM	0.753	0.753
	Total "A"				20.099
5	Cost of Civil Works @10% on "A"				2.010
	Total "B"				22.109
6	Overhead Charges on "B"				1.66
(i)	Establishment charges including leave, pension, PF etc.@7.5%				0.22
(ii)	Audit & Accounts @ 1%				0.06
(iii)	Losses on stock @0.25%				0.66
(iv)	Spares @3%				1.11
(v)	Labour Charges @5%				1.11
(vi)	Transportation Charges @5%				0.66
(vii)	Contingencies @3%				0.22
(viii)	Tools & Plants, Special T&P and Vehicles @1%				0.22
(ix)	Maintenance during Construction @1%				28.02

Say Rs. 28.02 lacs.

APPENDIX-B

**Estimate of equipments required for extension of one no.
132kV Bay at existing 220/132kV GSS
(Refer Single Line Diagram at Appendix-D1)**

S.No.	Item	Qty.	Rate in Rs. lacs	Amount in Rs. lacs
1	132 kV Isolators (3 Ph)	2 Sets	0.50	1.00
2	132 kV isolators with EB (3Ph)	1 Sets	0.59	0.59
3	132 kV Tandom Isolators (3 Ph)	0 Sets	0.56	0.00
4	132 kV C.B. (3Ph)	1 Set	5.60	5.60
5	132 kV CTs. (1 Ph)	3 Nos.	0.88	2.64
6	132 kV Control & Relay Panels(including BCU/BPU) :-			
	i. for feeder	1 Set	11.00	11.00
7	132 kV C.V.Ts. (1 Ph)	3 Nos.	1.54	4.62
8	132 kV L.A.'s (1 Ph)	3 Nos.	0.29	0.87
9	Earthing material	LS	LS	1.25
10	Bus bar material, clamps & post insulators	LS	LS	2.25
11	Power and control cable	LS	LS	3.25
12	Sub-Station steel Structures.	LS	LS	4.25
13	Treches with material	LS	LS	1.00
	Total "A"			38.32
14	Cost of Civil Works @10% on "A"			3.83
	Total "B"			42.15
15	Overhead Charges on "B"			
(i)	Establishment charges including leave, pension, PF etc.@7.5%			3.16
(ii)	Audit & Accounts @ 1%			0.42
(iii)	Losses on stock @0.25%			0.11
(iv)	Spares @3%			1.26
(v)	Labour Charges @5%			2.11
(vi)	Transportation Charges @5%			2.11
(vii)	Contingencies @3%			1.26
(viii)	Tools & Plants, Special T&P and Vehicles @1%			0.42
(ix)	Maintenance during Construction @1%			0.42
	Grand Total			53.42
	Say Rs.		53.42 lacs.	

SINGLE LINE DIAGRAM FOR EXTENSION OF BAY
AT 132 KV GSS

Standard Cost Estimate per km for a 132 kV S/C Transmission Line :

Conductor size : 0.2 Sq. inch copper equivalent (ACSR Panther Conductor)

Earth wire : G.S. 7/ 3.15 sq.mm

Normal Span : 335 metres.

S.No.	Item	Qty.		Rate in Rs.	Amount (in Rs.)
1	Tower(Prefabricated/galvanised/ painted tower steel), details in Appendix - T(i)-A	6.898	MT	47675.00	328862.15
2	G.I.Nuts & Bolts,details in Appendix - T(i)-A	0.340	MT	70189.00	23864.26
3	Tower Accessories , details in Appendix - T(i)-B	LS		LS	9387.00
4	Conductor (allowing 1.5 % for sag & wastage)	3.045	kM	98770.00	300754.65
5	Conductor accessories ,details in Appendix - T(i)-C	LS		LS	9669.00
6	Earth Wire (allowing 1.5 % for sag & wastage)	1.015	kM	26260.00	26653.90
7	Earth Wire accessories , details in Appendix - T(i)-D	LS		LS	3910.00
8	<u>Insulators :-</u>				
	i. 45 KN	74	Nos.	296.00	21904.00
	ii. 120 KN	56	Nos.	544.00	30464.00
9	<u>Insulator Hardware Sets :-</u>				
	i. Single suspension	7	Sets.	541.00	3787.00
	ii. Double suspension	1	Set.	1511.00	1511.00
	iii. Single tension.	5	Sets.	1078.00	5390.00
	iv. Double tension.	1	Set.	2457.00	2457.00
			Total "A"		768613.96
10	Cost of Civil Works @10% on "A"				76861.40
			Total "B"		845475.36
	Overhead Charges on "B"				
(i)	Establishment charges including leave, pension, PF etc.@7.5%				63410.6517
(ii)	Audit & Accounts @ 1%				8454.75356
(iii)	Losses on stock @0.25%				2113.68839
(iv)	Spares @3%				25364.26068
(v)	Labour Charges @5%				42273.7678
(vi)	Transportation Charges @5%				42273.7678
(vii)	Contingencies @3%				25364.26068
(viii)	Tools & Plants, Special T&P and Vehicles @1%				8454.75356
(ix)	Maintenance during Construction @1%				8454.75356
			Grand Total		1071640.01

Cost of 132 kV S/C line : Rs.

10.72 lacs./km

Appendix - T(i) A

Calculation regarding Tower weight & weight of Nuts & Bolts for
100 km length for a 132 kV S/C Transmission Line :

S.No	Particulars	Qty. (Nos.)		Unit Weight(MT) Steel		Total weight Steel (MT)	Unit Weight(MT) Nut Bolts		Total weight Nuts/Bolts (MT)
		S/C	D/C	S/C	D/C		S/C	D/C	
1	'A' Type Tower.	225	7	1.719	2.576	404.807	0.084	0.120	19.740
2	'B' Type Tower.	30	2	2.063	3.583	69.056	0.111	0.180	3.690
3	'c' Type Tower.	18	1	2.226	4.078	44.146	0.123	0.199	2.413
4	'D' Type Tower.	27	5	3.149	5.707	113.558	0.152	0.226	5.234
5	+ 3 M Ext. for 'A' Type Tower	23	1	0.306	0.363	7.401	0.016	0.020	0.388
6	+ 6 M Ext. for 'A' Type Tower	13	1	0.622	0.750	8.836	0.033	0.041	0.470
7	+ 3 M Ext. for 'B' Type Tower	3	1	0.734	1.040	3.242	0.027	0.041	0.122
8	Stub Setting template for 'A' Type Tower	10	1	0.220	0.258	2.458	0.017	0.017	0.187
9	Stub Setting template for 'B' Type Tower	2	1	0.279	0.497	1.055	0.017	0.017	0.051
10	Stub Setting template for 'C' Type Tower	1	1	0.298	0.627	0.925	0.017	0.017	0.034
11	Stub Setting template for 'D' Type Tower	1	1	0.444	1.044	1.488	0.020	0.025	0.045
						658.972			32.374
Additional 5% for wastage etc.						32.849			1.619
						689.821			33.993
Total Weight (MT/km) :						6.898 (Steel)			0.340 (Nut-Bolts)

TOWER ACCESSORIES :-

Appendix - T(i)

S.No.	Item	Qty. per 100.km		Rate in Rs.	Amount. (Rs.)
1	Earthing Material:-				
	a. Pipe type earthing	250	Nos.	1044.00	261000.00
	b. Counter poise type	65	Nos.	1795.00	116675.00
2	Danger plate	315	Nos.	159.00	50085.00
3	Number plate	315	Nos.	63.00	19845.00
4	Step Bolt for climbing on tower	7	M.T	67379.00	471653.00
5	Phase plate(set)	330	Sets	59.00	19470.00
6	U.Bolts hangers	315	Nos. }	Included	-
7	Anti-climbing devices	315	Nos. }	in Tower	-
8	Bird guards	945	Nos. }	material.	-
				Total :	938728.00

Cost of tower accessories/km =

Say Rs. 9387.00 per km

9387.28

CONDUCTOR ACCESSORIES :-

Appendix - T(ii)-C

S.No.	Item	Qty. per 100 km		Rate in Rs.	Amount. (Rs.)
1	Performed armour rod with ferrule etc.	717	Nos.	436.00	312612.00
2	Stock bridge vibration dampers	2000	Nos.	292.00	584000.00
3	Mid span compression joints	225	Nos.	297.00	66825.00
4	Repair sleeves	30	Nos.	117.00	3510.00
5	P.G. Clamps	30	Nos.	150.00	4500.00
				Total:-	966947.00

Cost of conductor accessories per km =

Say Rs. = 9669.00 per km

9669.47

EARTH WIRE ACCESSORIES :-

Appendix - T(ii)-D

S.No.	Item	Qty. per 100 km		Rate in Rs.	Amount. (Rs.)
1	Mid span compression joints	70	Nos.	70.00	4900.00
2	Suspension assembly	232	Sets	579.00	134328.00
3	Strain assembly with Earth Bend	150	Sets	541.00	81150.00
4	Vibration dampers	614	Nos.	276.00	169464.00
5	Repair sleeve	10	Nos.	117.00	1170.00
				Total:-	391012.00

Cost of Earth Wire accessories / km =

Say Rs. 3910.00 per km

3910.12

Executive Engineer (C&M-TCC-IX)
BIRLA GROUP