
**BHARAT HEAVY ELECTRICALS LIMITED
NEW DELHI**

**400kV & 11kV TRANSMISSION LINES AT
SURATGARH, RAJASTHAN**

**400kV DC Transmission Line Route Survey
Report, Tower Schedule, Plan and Profile**

**BHEL DOC. NO: TB-360-316-084
TCE DOC. NO: TCE-7219E-765-RA-6001**



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December 2014



REVISION STATUS SHEET

ISSUE	DATE	DESCRIPTION
R0	30-12-2014	Submitted for Approval

R0	30-12-2014	NK	SCK	RJP	VDB
REVISION	DATE	PREPARED BY	CHECKED BY	CLEARED BY	APPROVED BY

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ROUTE SURVEY REPORT

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1. Introduction

RRVUNL have initiated the activities related to 400kV TRANSMISSION LINES AT SURATGARH, RAJASTHAN. Bharat Heavy Electricals Ltd (BHEL) have been awarded the work as Contractor. M/s Tata Consulting Engineers Limited (TCE) are the Engineering Service Providers for proposed 400kV Double Circuit Transmission Line (DCTL).

The following Report describes the Route Survey of this 400 kV DCTL connection with the optimized routing as practically possible.

2. Scope of Work

- i. Identification of optimum routes
- ii. Selection of shortest and feasible route
- iii. Conducting detailed survey for the selected route using total station and hand held GPS devices with positional accuracy
- iv. Fix and finalize the angle points by using the survey data
- v. Preparation of route alignment survey report in line with the requirement of the Owner and the project specification
- vi. Tower spotting and Tower Types

3. Reconnaissance Survey

This is the initial phase of the route alignment survey.

For this Project, being a small route length, the site layout provided by RRVUNL/BHEL as base map is used. During the survey, all the crossings has been identified and used while planning the route.

4. Route Alignment Survey

The selected route has been demarcated on the Site plan with the details collected from survey with all the angle point coordinates.

a. Walk-over survey

- Walk-over survey was carried out with the hand-held GPS receivers.
- Data acquired from site layout provided by RRVUNL/BHEL has been used as a reference data.
- Tentative angle point coordinates extracted from reconnaissance survey have been used for GPS navigation.
- During this walk-over survey, location/position of all major crossings like those with pipe line / water body, railway, etc. have been recorded and stored in the GPS device.
- In addition to the above mentioned crossings, structures like building, pump house, fire water tanks, etc. have also been recorded.
- Existing features like road, cart track, canal, nallah, electrical tower/pole locations were also recorded.
- All topographical features along and across the route have been recorded.

b. Route Alignment Finalization

After completion of the walk-over survey, all the relevant data has been downloaded and plotted on the geo-referenced Topo sheets, to finalize the route alignment.

5. Selection of Route

Route selection is the combination of reading details from site layout and superimposing the survey data.

Route selection involves processing and analysis of the data collected through the survey. Selected route should be easily approachable from the point of view of ease of construction and maintenance. All the towers in the selected route should be approachable throughout the year.

Route has been finalized by keeping the following points in mind:

- The distance between the terminal points specified shall be kept shortest possible, consistent with the terrain that is encountered.
- The number of angle points shall be kept to a minimum.
- The route should have minimum number of crossings of Major Rivers/water, Railway lines, overhead power line and communication lines.
- Marshy and low lying areas, water bodies, river beds and earth slip zones shall be avoided to minimize risk to the foundations.
- It would be preferable to utilize levelled ground for the alignment.
- Crossing of power lines shall be minimal. Alignment will be kept at a safe distance from power lines to avoid induction problems on the lower voltage lines. The actual horizontal/vertical clearances as per the codal requirements have to be maintained based on the voltage levels of the crossing lines.
- Crossings with communication lines shall be minimized and it shall be preferably at right angle. Proximity and parallelism with telecom lines shall be eliminated to avoid danger of inducing power frequency high voltages on communication lines.
- Areas subjected to flooding such as canal, nallah shall be avoided.
- Restricted areas such as civil and military airfield shall be avoided. Care shall also be taken to avoid aircraft landing approaches.
- The alignment should be easily accessible both in dry and rainy seasons to enable maintenance throughout the year.

6. Major Crossings

For major crossing of route, refer tower schedule.

7. Alternate Route Coordinates

There is no alternate route envisaged as the route length of the proposed 400kV line is very short..

8. Route Description

Route length of the selected Route has been measured as 2019 **m**.

- Entire alignment passes through RRVUNL owned land only.
- For span and tower coordinates, refer tower schedule.

9. Comparative Statement

Sl. No.	Crossing Feature	Details
1	Route Length (m)	2019
2	Power Line Crossings	
	a. 66kV Crossing	-
	b. 110kV Crossing	-
	c. 132kV Crossing	-
	d. 220kV Crossing	-
	e. 400kV Crossing	-
3	Railway Crossing	-
4	NH Crossing	-
5	SH Crossing	-
6	Water Body Crossing	-
7	Forest Crossing	-
8	Mango Plantation	-
9	Number of Angle Points	3
10	No. of Dead end towers	2
11	Total Towers	7

10. Tower Types

For tower types refer tower schedule.

11. Conclusion

- By keeping all technical specifications and scope of this project in mind, it is recommended to consider the indicated Route in the drawing as the final route.
- The entire alignment passes through RRVUNL owned land only.
- **Note:** As informed by RRVUNL that existing 220 kV line crossing the 400 kV interconnection line shall be relocated by RRVUNL.

NAME OF PROJECT :- 400kV D/C TRANSISSION LINE AT SURATGARH																															
NAME OF CLIENT: RAJASTHAN RAJYA VIDYUT UTPADAN NIGAM LIMITED																															
NAME OF CONTRACTOR :- M/S BHARAT HEAVY ELECTRICALS LIMITED																															
NAME OF CONSULTANT :- M/S TATA CONSULTING ENGINEERS LIMITED																															
TOWER SCHEDULE (GANTRY - GANTRY)																															
Sl. No	Loc No.	Tower Type	Deviation Angle	Span (m)	Section Length (m)	Cum. Chainage (m)	Wind Span (m)	Adjacent Span (m)			Weight Span (Cold)			Weight Span (Hot)			Major Crossings / Remarks (With in ROW)	UTM Coordinates (Zone - 43)			Twr Extn	Spherical Coordinates		Local Co-Ordinates							
								Left	Right	Total	Left	Right	Total	Left	Right	Total		Easting	Northing	Elevation		Longitude	Latitude	Southing	Easting						
1	Gantry(unit 7 & 8 switchward)	GANTRY				0	62	0	124	124	0	66.2	66.23	0	65.04	65.04		405054.23	3226278.75	194.34	0	74°01'25.3" E	29°09'41.6" N	3683	1267						
				124																											
2	AP1	DD+00	85°58'20" (LT)		124	124	187	124	250	374	57.77	49.5	107.3	58.96	70.69	129.7		405177.97	3226270.73	194.09	0	74°01'29.9" E	29°09'41.4" N	3683	1391						
				250													BT Road, 11KV Line														
3	AP2	DC+09	3°13'18" (LT)		250	374	315.5	250	381	631	200.5	190.3	390.8	179.3	190.4	369.7		405211.62	3226518.46	194.09	9	74°01'31.1" E	29°09'49.4" N	3433.617	1408.6						
				381													11KV Line														
4	2/1	DA+09				755	375	381	369	750	190.7	201.7	392.4	190.6	196.9	387.5		405241.62	3226898.43	194.12	9	74°01'32.1" E	29°10'01.8" N	3052.655	1413.9						
				369													11KV Line														
5	AP3	DC+06	0°07'53" (LT)		750	1124	310	369	251	620	167.3	100.4	267.7	172.1	107.5	279.6		405270.65	3227266.13	194.09	6	74°01'33.0" E	29°10'13.7" N	2683.691	1419.1						
				251													BT Road,Compound Wall,Pipe line														
6	AP4	DC+09	1°20'52" (LT)		251	1375	251.5	251	252	503	150.6	79.7	230.3	143.5	92.7	236.2		405289.8	3227515.94	194.09	9	74°01'33.7" E	29°10'21.8" N	2433.162	1422.1						
				252													BT Road,Compound Wall,11KV Line,Pipe Line														
7	4/1	DA+09				1627	257.5	252	263	515	172.3	247.6	419.8	159.3	215.0	374.3		405303.14	3227767.55	199.65	9	74°01'34.1" E	29°10'30.0" N	2181.18	1419.1						
				263													BT Road,Compound Wall,11KV Line,Pipe Line														
8	AP5	DD+00	89°19'36" (LT)		515	1890	196.5	263	130	393	15.4	65.0	80.4	48.0	65.0	113.0		405317.08	3228030.42	194.09	0	74°01'34.5" E	29°10'38.6" N	1918	1416						
				129																											
9	Gantry(unit 6 switchyard)	GANTRY			129	2019	65	130	0	130	65	0	65	65	0	65		405187.85	3228038.79	194.09	0	74°01'29.7" E	29°10'38.8" N	1918	1286						

Abstract of Towers for 400kV D/C TRANSMISSION LINE AT SURATGARH							
Tower Type \ Extn	+0	+3	+6	+9	+18	+25	Total
DA	0	0	0	2	0	0	2
DC	0	0	1	2	0	0	3
DD	2	0	0	0	0	0	2
Gantry	2	0	0	0	0	0	2
Total	4	0	1	4	0	0	9
Net Total (Excluding Gantry)							7

Note :

DD type tower to be used in place of DC.

Considering very small route length and requirement of only 7 number of Towers, type testing will not be conducted and additional design margin of 10 % in tower design will be considered .

