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KARNATAKA POWER TRANSMISSION CORPORATION LIMITED

Corporate Identity Number (CIN): U40109KA1999SGC0255221

Regd. Office of the Company: Corporate Office, Kaveri Bhavan, K.G. Road, Bengaluru – 560 009

No: KPTCL/B19/345/84-85

Date: 23 FEB 2024

Encl: Annexure

CIRCULAR

Sub: GIS based asset mapping of Transmission network of KPTCL.

Ref: Note approved by the Managing Director, KPTCL on 11.02.2024.

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Preamble:

1. Geographical Information System (GIS) is a powerful technology that enables us to store, manage and analyze Geo-spatial data to make informed decisions. Thus adopting GIS technology will enable in improving the reliability and efficiency of operations. Capabilities of GIS can be made use of in day to day operations in Asset Maintenance & Management, Network planning & analysis, spatial & non-spatial analysis which gives a better visualization of results and supports in the overall decision making process.

2. In this regard, action has already been initiated in carrying out GIS based asset mapping of Transmission network (Sub-stations/towers/overhead lines/UG cables etc.,) in the jurisdiction of Transmission Zone, Bengaluru. It is now proposed to take up GIS based asset mapping of Transmission network across all Zones, so as to map the entire assets of KPTCL on GIS platform and later migrate the entire data into a common GIS software application.

3. In order to prepare Detailed Project Reports (DPR) for construction of new Transmission lines and Sub-stations, surveying works are carried out using Modern Survey Techniques. Further, during construction of Transmission lines and Sub-stations, the original survey reports are re-examined by conducting check surveys by the construction agency. The construction work will be taken up only upon clearance given to the final check surveys. Furthermore, the construction agency has to submit as-built drawings after completion of the work. As such, KPTCL has the complete survey data of Transmission assets in respect of all the awarded works.

4. It is therefore desired to assimilate all the data in respect of new Transmission network projects in GIS mapping format along with the required attributes, which can be made use to update, validate and integrate with existing GIS network of KPTCL. Hence, it is desirable that a condition be incorporated in the tenders that the construction agency has

SEE (IT & MIS)
KPTCL

to submit all the required data in GIS mapping format before submission of the final bills.

5. Considering the importance of GIS based asset mapping, it was proposed for mandating GIS based asset mapping in respect of all new Transmission networks. Hence this Circular.

Orders thereon:

Considering the importance of maintaining up to date and accurate GIS mapping data of Transmission lines and Sub-stations in the entire state, following guidelines are issued for strict adherence and with immediate effect:

1. The Chief Engineer (Elec), Tendering & Procurement & Chief Engineers (Elec), Transmission Zones, KPTCL shall ensure that GIS mapping data are obtained from the Agencies for all the new Transmission lines and Sub-station projects for which tenders are to be invited. In all the Tender Documents / Detailed Work Awards henceforth shall mandatorily include a condition that **the agency has to submit all the required survey data in GIS mapping format before submission of the final bills.**

2. The attributes required in respect of each Transmission asset shall be submitted to IT section, Corporate office in GIS mapping format as per the annexure to the Circular.

3. In respect of additions / modifications / re-routing of existing Transmission lines, the modified survey details in GIS mapping format are to be obtained from the agency by the Chief Engineers (Elec), Transmission Zones, KPTCL and the same shall be submitted to the IT section as and when the works are taken up for continuous updation of the GIS database.

4. The Chief Engineers (Elec), Transmission Zones, KPTCL shall ensure compliance of the above directions.

General Manager (Tech)
KPTCL

Copy to:

1. The Chief Engineers (Elec), Transmission Zones / T&P, KPTCL for needful.
2. The Chief Engineers (Elec), (P&C)/ (TA&QC) / (RT and R&D), KPTCL.
3. The Financial Advisor (A&R)/ (I/A), Corporate office, KPTCL.
4. The Superintending Engineer (Elec), IT to upload on the KPTCL website.
5. The Superintending Engineer (Elec), P&M, KPTCL to monitor the compliance of the circular regularly.
6. All Superintending Engineers, Transmission (Works, Works & Maintenance), KPTCL.
7. The Superintending Engineer (Civil), KPTCL.
8. All the Controllers, Transmission Zones, KPTCL.
9. All the Executive Engineers, Elec, Major Works/TL&SS Divisions, KPTCL.
10. All the Executive Engineer (Civil), Transmission Zones, KPTCL.
11. All the Deputy Controller of Accounts, Transmission Circles, KPTCL.
12. SPS to MD / DT, KPTCL, Bengaluru to place the same before MD/DT.

ANNEXURE

GIS Mapping Survey of Transmission Network Assets

The Agency has to conduct DGPS/GPS survey with sub-meter accuracy for all transmission network assets such as Sub-stations, Transmission Towers and Transmission Lines (Overhead/Underground) and create Single Line Diagram (SLD) for Sub-stations and Network connectivity.

The Agency has to obtain an empty data model schema from IT section and submit the Survey data & SLD in shape file/ PGDB/ any other GIS format as specified by IT section.

The layers to be created and attributes of assets captured during GIS survey shall be as per the below templates:

(I) LAYERS:

1. Sub-station
2. (a) Sub-station Total Area
   (b) Sub-station Yard Area
3. Transmission Line - OH
4. Transmission Line - UG
5. Tower
6. EHT Consumer
7. Power Transformer
8. Circuit Breaker
9. Isolator
10. Current Transformer
11. Potential Transformer
12. Lightning Arrestor
13. Busbar

(II) ATTRIBUTES:

1. SUB-STATION:

Sl. No.	Field name	Master data values
1	Name of Station	As provided by KPTCL
2	Station Code	As provided by KPTCL
3	District	From district list of Karnataka
4	Taluk	From taluk list of Karnataka
5	Hobli	From Hobli List of Karnataka
6	Postal Address	As provided by KPTCL
7	Survey No.	
8	Type of Land	Government / Private / Forest / Gomala
9	Type of soil	Normal dry soil / Wet soil / Black Cotton soil / Sandy Soil / Fissured Rock / Soft Rock / Hard Rock / Normal Hard Dry Soil
10	Sub-station Total Area [security Fencing (Compound Wall)] Lat /Long (Minimum 4 points)	Lat/Long-1, Lat/Long-2, Lat/Long-3, Lat/Long-4, etc.
11	Sub-station Total Area	Sub-station Total Area computed from Lat/Long.
11	Sub-station Switchyard area Lat /Long (Minimum 4 points)	Lat/Long-1, Lat/Long-2, Lat/Long-3, Lat/Long-4, etc.

Sl. No.	Field name	Master data values
11	Sub-station Switchyard Area in Sq.m	Sub-station Switchyard Area computed from Lat/Long.
12	Image	Multiple image options
13	Type of Station	GIS, Hybrid, AIS
14	Voltage Class	220/66/11kV, 765/400kV, 400/220kV, 220/110kV, 110/33kV, 66/33kV, 66/11kV, 220/66kV
15	Peak Load	As provided by KPTCL every month
16	Station Capacity	Sum of installed Power Transformer Capacity
17	No of Transformer	As provided by KPTCL
18	Transformer Capacity (MVA) of each transformer	500, 166.67, 150, 100, 67.5, 31.5, 20, 12.5, 8, 6.3
19	Date Of Commissioning	As provided by KPTCL
20	No. Of Lines	As provided by KPTCL
21	Name of Lines	As provided by KPTCL
22	Type Of Bus	Rigid, Strung
23	SCADA available	Yes / No
24	SAS available	Yes / No
25	IPP Connected	Yes / No
26	Bus Name	As provided by KPTCL
27	Bus Switching Scheme	Single bus system, Main & Transfer bus system, Double Main & Transfer bus system, Double bus system with bypass isolator, One & half breaker system.
28	Reactor / Capacitor / STATCOM, SVC (if any)	Voltage level, MVAr, Capacity etc.
29	Remarks	

2. Transmission Line - OH:

Sl. No.	Field name	Master data Values
1	Name Of Line	As provided by KPTCL
2	Type of conductor	Squirrel, Owl, Copper, Cat, Drake, ACSR, HTLS, Rabbit, AAAC, Coyote, Lynx, Partridge, Quad-Moose, Double Moose, Polymer, AAAC Moose, Kundha.
3	Conductor Material	Aluminum, Copper, Cadmium – Copper Alloy, Phosphor Bronze, Galvanized Steel, Steel Core Copper, Steel Core Aluminum, ACSR, CFC
4	Zone	As provided by KPTCL
5	Circle	As provided by KPTCL
6	Division	As provided by KPTCL
7	District	District List of Karnataka
8	Taluk	Taluk List of Karnataka
9	Hobli	Hobli List of Karnataka
10	Voltage Level Code	765kV, 400kV, 220 kV, 110kV, 66kV, 33kV
11	Originating Substation	As provided by KPTCL
12	Terminating Substation	As provided by KPTCL
13	Length of line	Sum of all segments of a route in meters
14	Date of commissioning	As provided by KPTCL at the time of commissioning
15	Line type	OH / UG / OH + UG
16	Line Configuration	Single Circuit, Double Circuit, Multi Circuit (with Voltage Class)

Sl. No.	Field name	Master data Values
17	Bundling type	Single, Twin, Triple, Quad, Hexa
18	OPGW	Yes / No
19	OPGW type	12F, 24F, 48F

3. Transmission Line - UG:

Sl. No.	Field name	Master data values
1	District	District List of Karnataka
2	Taluk	Taluk List of Karnataka
3	Hobli	Hobli List of Karnataka
4	Zone	As provided by KPTCL
5	Circle	As provided by KPTCL
6	Division	As provided by KPTCL
7	Sub-Division	As provided by KPTCL
8	Name Of Line	As provided by KPTCL
9	Voltage	66kV, 110kV, 220kV, 400kV
10	Line Type	UG, OH+UG"
11	Ownership of Cable	KPTCL, EHT
12	Origination Source	Station, Tower
12.a	Originating Station Name	As provided by KPTCL
12.b	Originating tower No	As provided by KPTCL
13	Termination Source	Station, Tower
13.a	Terminating Station Name	As provided by KPTCL
13.b	Terminating tower No	As provided by KPTCL
14	Size Of Cable (in Sq.mm)	2000, 1200, 1000, 630, 240
15	Type of laying	Flat, Trefoil
16	Type of conductor	Copper, Aluminum
17	Current Carrying Capacity	As provided by KPTCL
18	No Of Circuits	SC, DC, MCMV
19	Cable Make	As per survey
20	Date Of Commissioning	As provided by KPTCL at the time of commissioning
21	Joint Bay Details	As per survey
21.a	Lat/Long	As per survey
21.b	Joint ID	As per survey provided by KPTCL.
21.c	Depth In meter	As per survey
21.d	Remarks.	As per survey on Joint Bay.
22	Lat/Long of cable route	As per survey for every 20 Meters
23	Depth Of Cable	As per survey
24	OFC Cable	Yes/No
25	OFC Type	12F, 24F, 48F
26	Cumulative Length	Sum of all segments of a route
27	HDD (Horizontal Directional Drilling)	To be collected from field.
28	No of core	Single core, three core
29	Asset Value	As provided by KPTCL

4. Towers:

Sl. No.	Field name	Master data values
1	Zone	As provided by KPTCL
2	Circle	As provided by KPTCL
3	Division	As provided by KPTCL
4	District	As provided by KPTCL
5	Taluk	As provided by KPTCL
6	Hobli	As provided by KPTCL
7	Survey No.	
8	Type of Land	Government / Private / Forest / Gomala
9	Type of soil	Normal dry soil / Wet soil / Black Cotton soil / Sandy Soil / Fissured Rock / Soft Rock / Hard Rock / Normal Hard Dry Soil
10	Image	Multiple images option
11	Tower No.	As provided by KPTCL (Unique No.), **Note: Gantry Towers are to be considered as Tower No:0.**
12	Latitude	As per survey
13	Longitude	As per survey
14	Voltage Level	765kV, 400kV, 220 kV, 110kV, 66kV, 33kV
15	Tower Configuration	SC, DC, MC, MCMV
16	Tower Design Code	As provided by KPTCL
17	Tower Design Make	As provided by KPTCL
18	Type Of Tower	A, B, C, D, Monopole, Dwarf, GI Tower, H Frame, NBT, CTT, 4 Pole Structure,3 Pole Structure,2 Pole Structure,6 Pole Structure,8 Pole Structure,10 Pole Structure, 12 Pole Structure,
19	Tower Extension Details	As provided by KPTCL
20	Originating Substation-1	As provided by KPTCL
21	Terminating Substation-2	As provided by KPTCL
22	Line Names	As provided by KPTCL
23	Tapping /LILO station	Tap/LILO/None
24	Location Name	As provided by KPTCL / Nearest Village Name.
25	Land Mark	As per survey
26	HEIGHT OF TOWER	As per tower drawing.
27	Base width of tower	As per tower drawing
28	Date Of Commissioning	As provided by KPTCL at the time of commissioning
29	Phase Plate	Yes/No
30	Circuit Plate	Yes/No
31	Number Of Circuits	Single, Double, Multi
32	Existing string	As per survey
33	Angle Of Deviation	As per survey
34	Span	As Calculated by software
35	Span Line Type	OH/UG
36	Crossing if any	Yes/No
37	Crossing Name	As per survey
37.a	Is Crossing Line Strengthened	Yes/No
38	Cumulative length from originating station	Sum of all segments of a route
39	Percentage	Auto after survey completes
40	Type of earthing	Pipe, Plate

Sl. No.	Field name	Master data values
41	Soil Classification.	Dry, Wet, Rock, Black Cotton, Sand, Other
42	Insulator Type	Porcelain, Glass, Anti fog, Polymer
43	Insulator Make	As per survey
44	Insulator strength	70kN, 90kN, 120kN, 160kN for Polymer Insulator: 66kV, 110kV, 220kV
45	Number of Insulator per string	As per survey
46	Anti climbing device	Yes/No
47	Danger Board	Yes/No
48	Ground wire	Yes/No
48.a	Ground Wire Type	G.I Wire, OPGW,
48.b	OPGW Type	12F, 24F, 48F
49	Spacers	Yes/No
50	Vibration dampers	Yes/No
51	Retaining Wall Available	Yes/No
52	Lightning Arrestor Provided for CTT	Yes/No
53	Tower Land Type	lake, hilly, plantation, private, government, forest, agriculture, others
54	Ground clearance to middle span	Asper survey
55	Step bolts	Yes/No
56	Asset Value	As provided by KPTCL
57	Real/Shared Tower	Real/Shared
58	Tower Code	As provided by KPTCL
59	Remarks	To preserve the history

5. EHT Consumer Layer:

Sl. No.	Field name	Master data values
1	Zone	As provided by KPTCL
2	Circle	As provided by KPTCL
3	Division	As provided by KPTCL
4	Voltage	765 kV, 400 kV, 220kV, 66kV
5	Contract Demand in KVA	As provided by KPTCL
6	Date Of Commissioning	As provided by KPTCL
7	Installed Capacity in KVA	As provided by KPTCL
8	Firm name & Contact No	As provided by KPTCL
9	Incoming Line	As provided by KPTCL

6. Power Transformer Layer:

Sl. No.	Field name	Master data values
1	Sub-station Name	As provided by KPTCL
2	Voltage Class	220/66/11 (kV), 220/66/33 (kV), 220/66/11 (kV), 220/33 (kV), 66/11 (kV), 220/110 (kV), 66/33 (kV), 400/110 (KV), 220/66 (kV), 765/400 (kV), 110/33 (kV), 400/220 (kV), 33/11 (kV), 110/33/11 (kV), 110/66 (kV), 110/11 (kV)
3	Type	As per name plate
4	Name	As provided by KPTCL

Sl. No.	Field name	Master data values
5	Make	As per name plate
6	Sl. No.	As provided by KPTCL
7	Rated Voltage	As per name plate
8	Ratio	As per name plate
9	Date of Commission	As provided by KPTCL
10	Year of MFG	As per name plate
11	Phase	R / Y / B

7. Circuit Breakers

Sl. No.	Field name	Master data values
1	Voltage class in kV	765kV, 400kV, 220kV, 66kV, 33kV
2	Make	As per name plate
3	Serial number	As per name plate
4	Manufacturing year	As per name plate
5	Date of commissioning	As provided by KPTCL
6	Operating DC Voltage(V)	As per name plate
7	Highest system voltage(kV)	As per name plate
8	Rated STC	As per name plate
9	Normal current in amps	As per name plate
10	Insulating medium	As per name plate
11	Operating mechanism	As per name plate
12	Status of remote operation(s)	As per name plate
13	Status of electrical operation(s)	As per name plate

8. Isolators

Sl. No.	Field name	Master data values
1	Voltage class in kV	765kV, 400kV, 220kV, 66kV, 33kV
2	Make	As per name plate
3	Serial number	As per name plate
4	Rated STC	As per name plate
5	Rated current in amps	As per name plate
6	Is earth switch provided?	Yes / No

9. Current Transformers:

Sl. No.	Field name	Master data values
1	Substation	As provided by KPTCL
2	Type	As provided by KPTCL
3	Name	As provided by KPTCL
4	Phase	As provided by KPTCL
5	Sl. No.	As per nameplate.
6	Voltage Class	765kV, 400kV, 220kV, 66kV, 33kV

Sl. No.	Field name	Master data values
7	Make	As per nameplate.
8	Date of Commission	As provided by KPTCL
9	Date of De-commission	As provided by KPTCL
10	Ratio	As per nameplate.
11	As per nameplate.	As per nameplate.
12	Secondary Current (A)	As per nameplate.
13	No. Of Secondary Cores	As per nameplate.
14	Highest System Voltage	As per nameplate.
15	Short Time Current	As per nameplate.
16	Year Of Manufacturing	As per nameplate.

10. Potential Transformers

Sl. No.	Field name	Master data values
1	Substation	As provided by KPTCL
2	Voltage Class	765kV, 400kV, 220kV, 66kV, 33kV
3	Type	As per nameplate
4	Name	As per nameplate
5	Make	As per nameplate
6	Sl. No.	As per nameplate
7	Rated Voltage	As per nameplate
8	Ratio	As per nameplate
9	Date of Commission	As provided by KPTCL
10	Year of MFG	As per nameplate
11	Phase	R / Y / B

11. Lightening Arrestor:

Sl. No.	Field name	Master data values
1	Substation	As provided by KPTCL
2	Voltage Class	765kV, 400kV, 220kV, 66kV, 33kV
3	Name	As provided by KPTCL
4	Make	As per nameplate
5	Sl. No.	As per nameplate
6	Phase	R / Y / B
7	Year of MFG	As per nameplate
8	Date of Commission	As provided by KPTCL
9	Maximum continuous operating Voltage in kV	As per nameplate
11	Rated Voltage in kV	As per nameplate
12	Rated Current in Amps	As per nameplate
13	is surge monitor provided?	Yes / No
14	Material Type	As per nameplate
15	Basic Impulse Insulation Level	As per nameplate

12. Busbars:

Sl. No.	Field name	Master data values
1	Sub-station Name	As provided by KPTCL
2	Voltage Class	765kV, 400kV, 220kV, 66kV, 33kV
3	Name Of Asset	As provided by KPTCL.
4	Type Of Busbar	Rigid Busbars and Its size, Twin Bersimis Conductor, Quad Bersimis Conductor, Twin Moose Conductor, Single Moose Conductor, Falcon Single Conductor, Falcon Double Conductor, Single Drake Conductor, Double Drake Conductor, Single Lynx Conductor, Single Coyote Conductor.
5	Conductor Material	Copper, Aluminium, ACSR, CFC, Steel core copper, Steel Core Aluminium, Phosphor Bronze, Cadmium - Copper Alloy.