सत्यमेव जयते

भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

केन्द्रीय विद्युत प्राधिकरण

Central Electricity Authority

विद्युत प्रणाली योजना एवं मूल्यांकन - I प्रभाग

Power System Planning & Appraisal-I Division

No. 1 / 9 / 39th / PSP&PA-I /2017 / 376 - 394 **Dated: 24.05.2017**

-As per list enclosed-

विषय: उत्तरी क्षेत्र की विद्युत प्रणाली योजना पर स्थायी समिति की 39वीं बैठक दिनांक 29th तथा 30th मई 2017 को आयोजित किये जाने हेतु – अतिरिक्त एजेंडा.

Sub: 39th Meeting of Standing Committee on Power System Planning of Northern Region(SCPSPNR) to be held on 29th and 30th May, 2017 – Additional Agenda for the meeting.

Sir/ Madam,

In continuation of our letter no. 1/9/39th/PSP&PA – I /2017/347 - 365 dated 18th May 2017, it is to intimate that the additional agenda items for the 39th Standing Committee on Power System Planning of Northern Region(SCPSPNR) is available on CEA website: www.cea.nic.in (path to access – Home Page - Wing specific document/power system related reports/ Standing Committee on Power System Planning/ Northern Region).

Kindly make it convenient to attend the meeting.

Yours faithfully,

24.05.2017

(अवधेश कुमार यादव) /(Awdhesh Kr Yadav)

निदेशक/ Director

Copy to:

PPS to Member (PS), CEA

1.	Member, Secretary, NRPC, 18-A Shajeed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi - 110016 (Fax-011-26865206)	2.	Director (W &P) UPPTCL, Shakti Bhawan Extn,3rd floor, 14, Ashok Marg, Lucknow - 226 001 (Fax:0522-2287822)	3.	Director (Projects) PTCUL, Urja Bhawan Campus, Kanawali Road Dehradun-248001. Uttrakhand Fax-0135-276431
4.	Director (Technical), Punjab State Transmission Corporation Ltd. (PSTCL) Head Office The Mall Patiala -147001 Fax-0175-2304017	5.	Member (Power) BBMB, Sectot-19 B Madhya Marg, Chandigarh-1 60019 (Fax-01 72-2549857	6.	Director (Operation) Delhi Transco Ltd. Shakti Sadan, Kotla Marg, New Delhi-110002 (Fax-01123234640)
7.	Director (Technical) RRVPNL, Vidut Bhawan, Jaipur-302005. Fax-:0141-2740794	8.	Director (Technical) HVPNL Shakti Bhawan, Sector-6 Panchkula-134109 Fax-0172-256060640	9.	Director (Technical) HPSEB Ltd. Vidut Bhawan, Shimla -171004 Fax-0177-2813554
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13.	Chief Engineer (Transmission) NPCIL, 9-S-30, Vikram Sarabahai Bhawan, Anushakti Nagar, Mumbai-400094 Fax-022-25993570	14.	Director (T&RE) NHPC Office Complex, Sector-33, NHPC, Faridabad-121003 (Fax-0129-2256055)	15	Director (Projects) NTPC, NTPC Bhawan, Core 7, Scope Complex-6, Institutional Area, Lodhi Road. New Delhi (Fax-011-24361018)
16.	Director (Technical) THDC Ltd. Pragatipuram, Bypass Road, Rishikesh-249201 Fax: 0135-2431519)	17	Director (Projects) POWERGRID Saudamini Plot no. 2, Sector - 29. Gurgaon-122 001 (Fax-0124-2571809)	18.	CEO, POSOCO B-9, Qutab Institutional Area, Katwaria Sarai New Delhi – 110010 (Fax:2682747)
19.	COO (CTU) POWERGRID, Saudamini, Plot no. 2, Sector -29, Gurgaon-122 001 (Fax-0124-2571809)				

Additional Agenda of the 39th Meeting of Standing Committee on Power System Planning of Northern Region

1.0 400kV bays at 400kV substation Bhinmal and Sikar:

1.1 In the 30th & 38th meeting of Standing committee on Power System Planning of Northern Region held on 19.12.2011 & 30.05.2016 respectively, following was agreed under ISTS:

- 2 nos. of 400 kV line bays at Sikar (PG) substation along with 2 nos. of 50 MVAr line reactors for termination of RVPN's under construction 400 kV D/C Bikaner-Sikar line
- 2 nos. of 400 kV line bays at Bhinmal (PG) substation for RRVPNL for termination of RVPN's under construction 400 kV D/C Barmer-Bhinmal line.

1.2 During the 38th meeting of SCPSPNR, RRVPNL informed that the transmission agreement between RVPN and M/s KEC Bikaner Sikar Transmission Pvt. Ltd.(concessionaire) has been executed on 6.11.2015 for development of 400 kV D/c Bikaner - Sikar (Twin Moose) transmission line through Public Private Partnership (PPP) mode and according to the agreement the completion schedule would be January, 2018. CTU informed that implementation of bays would take about 24-30 months. However, it agreed to expedite the work of commissioning of bays in matching time-frame of the transmission lines and requested RRVPNL to inform time frame in which bays would be required at Bhinmal S/s.

1.3 Also RVPN vide letter dated 6.05.2016 has intimated to PGCIL that completion schedule of 400 kV D/C Barmer- Bhinmal line is May' 2018 and accordingly 2 nos. 400 kV bays at 400 kV GSS Bhinmal are required by May' 2018.

1.4 In spite of repeated requests by RVPN for arranging timely completion of bay work at terminating station, PGCIL has informed that the bay work shall be completed by June 2018.

1.5 Members may like to deliberate.

2.0 Evacuation of power from 1x800 MW supercritical unit- 9 at PTPS, Panipat:

2.1 The power evacuation system for 1x800 MW supercritical unit- 9 at PTPS, Panipat was agreed in the 36th meeting of SCPSPNR, which inter-alia included the implementation of 400 kV PTPS – Jind D/C line. Regarding requirement of two nos. of 400kV bays for termination of this line at Jind (PG) S/s, it was agreed that these works would be carried out by POWERGRID on deposit work on behalf of HVPNL subject to availability of space at Jind.

2.2 HVPNL vide its letter dated 10.4.2017 has requested to defer the requirement of 2 nos. of 400kV bays at Jind S/s as Haryana power Generation Corporation ltd. (HPGCL) has intimated that various activities for setting up of 1x800MW supercritical unit-9 at PTPS, Panipat have been put on hold till further order.

2.3 Members may deliberate.

3.0 Interconnection of Manimajra & Hallomajra 220/66kV substations of UT Chandigarh

3.1 UT Chandigarh has been getting power supply from various generating sources i.e. NTPC, NHPC, BBMB etc. through following three (3) nos. of lines:

1. 66kV Dhulkote – Chandigarh D/c line
2. 66kV Mohali – Chandigarh D/c line
3. 220kV Nalagarh – Kishangarh D/c line

3.2 Further, to improve the supply and to provide ISTS interconnection to Chandigarh area, following transmission system was approved in Standing Committee Meeting of NR and is under implementation by POWERGRID:

- 2x160MVA, 220/66 kV overground GIS at Chandigarh (Hallo Majra)
- Chandigarh-Panchkula(PG) 220kV D/c (including cable in Chandigarh portion)

3.3 Further to increase reliability of the system, 220/66kV Hallomajra S/s may be interconnected with 220/66kV Manimajra considering N-1 reliability criterion in case of outage of 220kV Chandigarh – Panchkula D/c line. However, in order to interconnect both substations 220kV UG cable would be required as 220kV overhead line would not be possible.

3.4 Members may deliberate.

4.0 Connectivity of Railways' TSS with ISTS Network for Delhi – Bharuch route

4.1 Railway Board vide its letter no. 2012 / Elect (G) / 150 / 1 Pt – II dated 09.09.2016 requested for connectivity to railways from various ISTS points (enclosed as **Annexure I(a)**). A meeting was held on 07.10.2016 in CEA (MoM enclosed as **Annexure I(b))**to discuss the connectivity of Railways' TSS (Traction Sub Station) with ISTS network for two routes of Railways i.e. (i) Delhi (NR) – Bharuch (WR) route (ii) Mughal Sarai (NR) – Howrah (ER) route.

4.2 In the meeting, following ISTS substations were preliminarily identified for giving connectivity to the Railways' TSS for its Delhi-Bharuch route:

(i) Ballabhgarh or Tughlakabad (under construction)

(ii) Agra or Bassi (Rajasthan)

(iii) Kota

(iv) Rajgarh (v) Dehgam / Pirana or Vadodara(in WR)

4.3 M/s PGCIL was requested to furnish the information regarding the availability of space for 2 nos. 220 kV bays and margins in transformation capacity at each of the above substation. M/s railways was requested to provide information about its present connectivity (connectivity of TSS along this route) with STUs.

4.4 PGCIL vide its email dated 09.11.2016 intimated that space for two nos. 220 kV line bays (AIS) is available at Rajgarh, Dehgam, Pirana, Kota & Bassi substations and GIS bays at Vadodara.

4.5 Railway board vide its letter no. 2012 / Elect (G) / 150 / 1 Pt – II dated 19.10.2016 (enclosed as **Annexure I(c)**) has furnished the information about its TSS points and their present connectivity with state utilities.

4.6 The above agenda has already been deliberated in the 41st SCM of WR held on 21.12.2016.

4.7 Members may deliberate**.**

5.0 Connectivity of Railways' TSS with ISTS Network for Ludhiana-Delhi-Sonnagar routes.

5.1 Indian Railways is planning to connect its existing TSSs between Ludhiana-Delhi-Sonnagar routes of Railways by way of construction of associated infrastructure including transmission lines and bay extension work at ISTS points preferably at 220 kV.

5.2 Railway Board vide its letter no. 2012 / Elect (G) / 150 / 1 Pt – II dated 28.12.2016 (enclosed as **Annexure II**) has requested for connectivity to railways from various ISTS points. Power requirement of Railways from the nearby proposed ISTS points is as follows:

CONNECTIVITY SCHEME OF TSS ALONG LUDHIANA-DELHI- SONNAGAR ROUTE					
SN	**PGCIL GSS**	**Connectivity required at (kV)**	**Railway TSS to be supplied**	**Grid Voltage at TSS (kV)**	**Tentative load requirment (MW)**
1	Abdullapur	220	Jagadhari-I	220	50
2			Jagadhari-II	220	
3			Tapri	132	
4			Muzaffarnagar	132	
5	Meerut	220	Jarauda Nara	132	50
6			Hapur	132	
7			Gulaothi	132	
8			Wair	132	
9	* Pasauli (Sasaram)	220	Durgaoti	132	75
10			Deoria	132	
11			Chandiapur	132	
12			Gadhion	132	
13			Jeonathpur	132	
14			Chunar	132	
Already advised by MoR to CEA vide letter no. 2012/ Elect (G) /150 / 1/ pt.II dated 09/09/2016.					

5.3 M/s PGCIL is requested to furnish the information regarding the availability of space for 220 kV bays and margins in transformation capacity at each of the above substation.

5.4 A meeting was held in CEA on 20.04.2017 (Copy of MoM enclosed as **Annexure III**), wherein, interalia, Railways was advised to again look into the economics of connectivity to ISTS points as many of the States have already granted/are in process of granting NoC for open access. Railways vide their letter dated 25.04.2017 (copy enclosed as **Annexure IV**) has stated that they would like to get disconnected from existing STU network and shall coneect its TSS to the proposed ISTS transmission network.

5.5 Members may deliberate.

6.0 Second 400kV high capacity India – Nepal cross border corridor viz. New Butwal (Nepal) – Gorakhpur (New)

6.1 The peak load of Nepal is expected to be about 2000MW in 2019-20 time-frame and the power deficit is expected to be about 1000MW. Presently, only one high capacity Muzaffarpur (India) – Dhalkebar (Nepal) cross-border link exists between India and Nepal, which is presently being operated at 132kV and is expected to be operated to 400kV by Aug 2019. In case of outage of this 400kV line, Nepal might experience grid disturbance/blackout. Thus, to supply secure and reliable power to the Nepal, a second High Capacity Cross-Border Interconnection line viz. Gorakhpur New (India) – New Butwal (Nepal) 400kV D/c (Quad Moose) line is proposed. The line has been approved in the 3rd India – Nepal Joint Working Group and Joint Steering Committee meetings held on 27th - 28th June 2016.

6.2 Further, to ensure reliability in Nepal grid, strengthening of East – West Power Highway in Nepal is proposed through construction of New Butwal to New Hetauda 400kV D/c (Quad Moose) line via New Damauli & Naubise (under the scope of Nepal) in matching time-frame of Gorakhpur New (India) – New Butwal (Nepal). It has also been proposed to operate the New Hetauda – New Dhalkebar D/c (Twin Moose) line at 400kV in order to complete the 400kV India – Nepal ring (Gorakhpur New – New Butwal – New Hetauda – Dhalkebar – Muzaffarpur – Gorakhpur – Gorakhpur New).

6.3 The following transmission system for the Gorakhpur (New) – New Butwal has been approved in the JSC/JWG meeting:

Indian Side

(a) Establishment of Gorakhpur-New 400kV switching station
- 4 nos. 400 kV line bays for the termination of LILO of Gorakhpur – Lucknow 400 kV (ckt-3&4)
- 2 nos. 400kV line bays for the termination of Gorakhpur-New – New Butwal 400 kV D/c (Quad) line
- 2 nos. 420 kV, 125 MVAR bus reactors

(b) Indian Portion of Gorakhpur-New – New Butwal 400 kV D/c (Quad) line [approx. 120km]

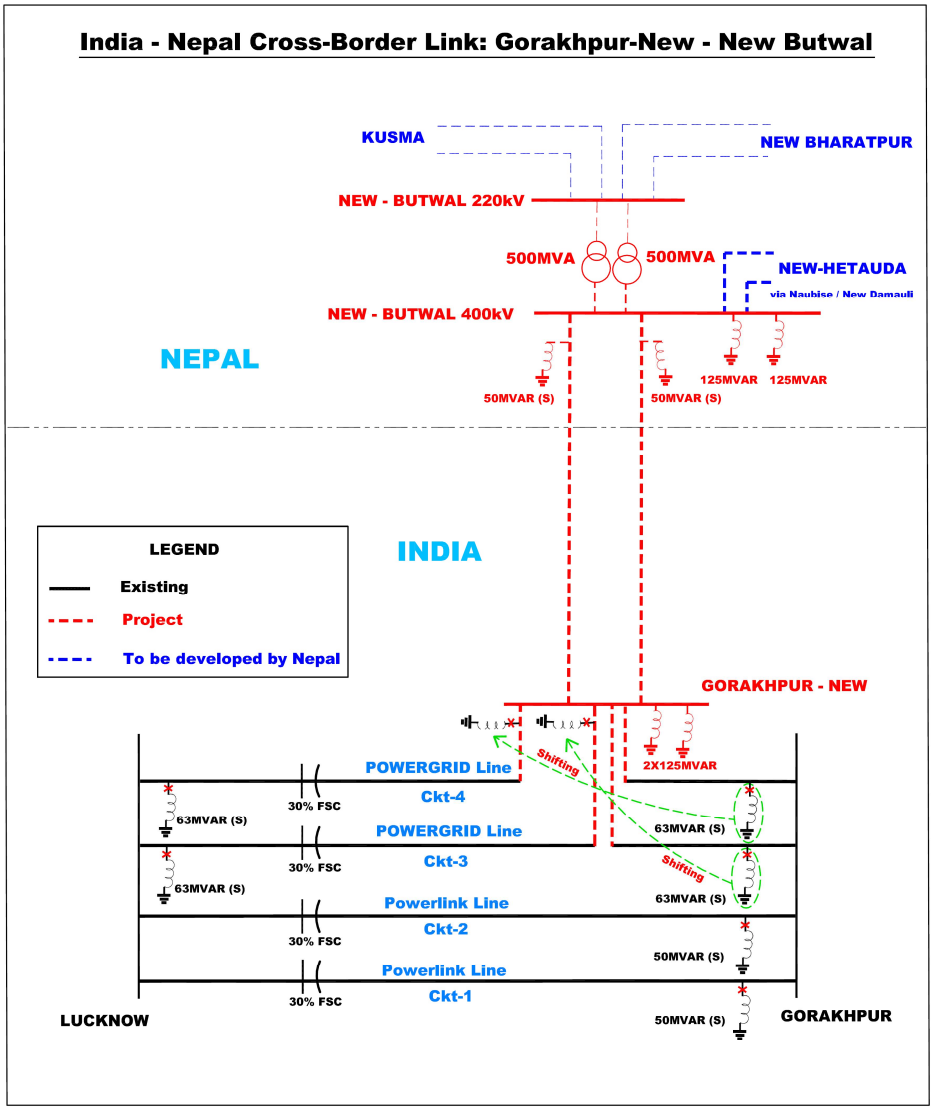
(c) LILO of Gorakhpur – Lucknow 400kV (ckt-3&4) at Gorakhpur-New [approx. 5km]

Nepal Side

(a) Establishment of 400/220 kV 2x500MVA (7x167MVA single phase units) New Butwal Substation
   - 2 nos. 400 kV line bays along with 420 kV, 50 MVAR Switchable Line Reactors for the termination of Gorakhpur-New – New Butwal 400 kV D/c (Quad) line
   - 2 nos. 420 kV,125 MVAR Bus reactors

(b) Nepal Portion of Gorakhpur-New – New Butwal 400 kV D/c (Quad) line [approx. 20km]

6.4 A project report of the above scheme was submitted in the 4th JSC/JWG meeting held on 13th-14th Feb 2017. The schematic of the cross border interconnection is shown below. The detailed scope of works is attached at **Annexure-V.**



6.5 Members may discuss.

7.0 UITP Scheme by PTCUL (in continuation to Agenda item no.24 of the main agenda):

7.1 The Composite Transmission system viz. Uttarakhand Integrated Transmission Project (UITP) as intrastate transmission system was evolved by PTCUL in association with CEA for evacuation of power from various hydro projects in Uttarakhand. This transmission system in Uttarakhand was declared as deemed ISTS system vide CERC order dated 31/1/2013 in Petition no. 133/MP/2012 and the same is being implemented by PTCUL. After this changed status from intra state to deemed ISTS, PTCUL had informed the generators that connectivity/LTA may be applied to CTU, as the scheme is deemed ISTS in nature now. For some of the projects, LTA/LTOA was earlier granted by CTU beyond Kashipur and Connectivity was granted by PTCUL from their system and with the changed status to deemed ISTS the injection points is changed.

7.2 As informed by CTU, 5 Nos. of Connectivity applications have been received for hydro generation projects for Alaknanda basin namely (i) Phata Byung, (ii) Singoli Bhatwari, (iii)Tapovan Vishnugarh, (iv)Vishnugarh Pipalkoti & (v) Devsari HEP. Based on the discussions held in various previous meetings, Connectivity has been granted to Tapovan Vishnugarh HEP (520 MW) of NTPC, Pipalkoti HEP (444 MW) of THDC & Singoli Bhatwari HEP (99 MW) of L&T. In response to the intimations issued by CTU, PTCUL vide letter dated 28/09/2016 has intimated that 400/220kV Srinagar S/s & 400kV Srinagar-Srinagar HEP D/c line should also be included for the transmission system required for grant of Connectivity to Tapovan Vishnugarh & Pipalkoti HEP. CTU vide letter dated 11/11/2016 informed that the connectivity to these three applications had been granted considering that 400/220kV substation at Srinagar & 400kV Srinagar-Srinagar D/c line have already been completed hence, the same was not included into the connectivity intimation granted by CTU. Nevertheless, 400/220kV substation at Srinagar & 400kV Srinagar-Srinagar D/c line are required for effecting the connectivity to first generation project out of 5 generation projects of Alaknanda Basin.

7.3 As per the CERC order, it was directed that as the transmission system beyond the main transmission line/pooling point of Uttarakhand would be considered as a combination of intra-State transmission system and inter-State transmission system and shall be charged accordingly. That is, the Yearly transmission charges of the various elements of such system would be divided into intra-State portion and inter-State portion, based on installed capacity of the generating stations using the common system. Charges for the ISTS would be shared by beneficiaries of ISTS.

7.4 To discuss the various issues associated with UITP scheme of PTCUL, a meeting was held on 25/07/2016 among CEA, CTU, PTCUL and between CTU and PTCUL on 06/12/2016. During the meeting on 06/12/2016, PTCUL representative informed as of now, there is no intra state generation project that would be utilising the UITP scheme. PTCUL may confirm the same.

7.5 In the various meetings, it was also decided that PTCUL shall sign the implementation agreement with these generators as per the CERC guidelines. PTCUL has informed that the implementation agreement has been signed with M/s L&T for Singoli Bhatwari HEP, M/s Lanco for Phatabyung HEP & NTPC for Tapovan HEP. Implementation agreement is yet to be signed by THDC for Vishnugarh Pipalkoti HEP.

7.6 **With the above background, the transmission system for connectivity / LTA for various projects is discussed below:**

(A) Connectivity to Phata Byung Hydro project (76 MW) of M/s Lanco Mandakini Hydro Energy Pvt. Ltd. in Uttarakhand.

(i) Grant of Connectivity was discussed and agreed during the 9th Connectivity & Long Term meeting for Northern Region held on 30/05/2016 from Sep'2018 through following Transmission system:

- Phata Byung generation switchyard - Baramwari substation 220 kV D/c - To be implemented by applicant
- Baramwari (PTCUL) S/s – Srinagar (PTCUL) S/s 220 kV D/c line - To be implemented by PTCUL

(ii) However, during the meeting held on 25/07/2016 among CEA, CTU, PTCUL and generation developers, it was informed as Baramwari Substation is not coming in the required time frame and Rambara HEP has also been dropped, therefore, Phata Byung generation shall be connected to Srinagar through 220 kV D/c line and one circuit of the same shall be looped in looped out at Singoli Bhatwari hydro generation switchyard of M/s L&T.

(iii) During the above said meeting M/s L&T & M/s Lanco Mandakini were requested to confirm if the cables and the bus bar in the switchyard of the generating station are capable to carry power of both generation plants, so as to meet the contingency of outage of one 220 kV circuit. Both the generation developers have confirmed the same.

(iv) Also, it is to mention that LTOA and revised LTA has been granted to Phata Byung HEP in July'2009 & March'2013 respectively through Lucknow-Bareilly-Meerut 765 kV S/c and Bareilly-Kashipur-Roorkee-Saharanpur 400 kV (Quad) D/c lines. However, with respect to the revised load-generation scenario, it has emerged that Lucknow-Bareilly-Meerut 765 kV S/c is not required for grant of Long Term Access to the generator and power can be evacuated through Bareilly-Kashipur-Roorkee-Saharanpur 400 kV (Quad) D/c existing lines only. The final Transmission system to be considered for grant of Connectivity & LTA is as follows:

Transmission system for grant of Connectivity to Phata Byung HEP

- Phata Byung generation switchyard – Proposed site of Baramwari S/s 220 kV D/c - To be implemented by applicant (including 220 kV bays at generation end).

Common transmission system required for Connectivity

- Baramwari (PTCUL) S/s Location – Srinagar (PTCUL) substation 220 kV D/c line - To be implemented by PTCUL
- 400/220kV Substation at Srinagar - (commissioned)
- 400kV Srinagar HEP -Srinagar 400kV D/c line - (commissioned)

Transmission system for revision in grant of Long Term Access

- Srinagar- Kashipur 400kV D/c line along with associated 400 kV bays

  PTCUL to match the implementation of above line with commissioning of generation.

Members may discuss.

(B) Connectivity to Singoli Bhatwari HEP (99MW) of M/s L&T Uttaranchal Hydropower Ltd. in Uttarakhand.

(i) Connectivity to Singoli Bhatwari HEP of M/s L&T Uttaranchal Hydropower Ltd. in Uttarakhand was granted with time frame of Nov'17 vide intimation dated 18/04/2016. Subsequently, PTCUL informed during the meeting held on 25/07/2016 among CEA, CTU, PTCUL and generation developers regarding grant of Connectivity & LTA to various hydro projects in Uttarakhand, that Connectivity to Phata Byung HEP (76MW) shall be connected to Srinagar through 220 kV D/c line and one circuit of the same shall be looped in looped out at Singoli Bhatwari generation switchyard. M/s L&T Ltd. vide letter dated 15/12/2016 has assured that cables & bus-bars at Singoli Bhatwari 220 kV generation switchyard shall meet the power flow from both HEPs.

(ii) It was agreed that the transmission line from Generation switchyard upto the LILO point along with 220 kV bays at Singoli Bhatwari HEP is to be implemented by the applicant & remaining portion of the 220kV line along with 220kV bays at Srinagar Substation is to be implemented by PTCUL. Connectivity has been granted w.e.f Nov'17, however, according to Implementation agreement signed between PTCUL & M/s L&T, the revised commissioning schedule for the project mentioned is October'18.In view of the above, the transmission system to be considered for revised grant of Connectivity shall be:

Transmission system for revised grant of Connectivity to Singoli Bhatwari HEP

Final Arrangement:

- LILO of one circuit of Srinagar-Baramwari 220 kV D/c line at Singoli Bhatwari Generation switchyard. (To be implemented by Applicant)

Interim Arrangement:

- Singoli Bhatwari HEP - Srinagar 220 kV D/c line (As Baramwari 220 kV substation shall not be available in this time frame, therefore upto LILO point 220 kV line is to be implemented by applicant and balance portion by PTCUL)

Common transmission system required for Connectivity

- Location of Baramwari (PTCUL) S/s – Srinagar (PTCUL) substation 220 kV D/c line - To be implemented by PTCUL
- 400/220kV Substation at Srinagar - (commissioned)
- 400kV Srinagar HEP -Srinagar 400kV D/c line - (commissioned)

(iii) Members may deliberate.

(C) Tapovan Vishnugarh Hydro project (520 MW) of NTPC Ltd.

(i) Connectivity to NTPC for Tapovan Vishnigarh HEP was granted based on the discussions held during the Standing Committee and Connectivity/LTA meeting. Subsequently based on the observations from PTCUL In response to the intimations issued by CTU, PTCUL has intimated that 400/220kV Srinagar S/s & 400kV Srinagar-Srinagar HEP D/c line should also be included for the transmission system required for

grant of Connectivity to Tapovan Vishnugarh & Pipalkoti HEP. CTU vide letter dated 11/11/2016 informed that the connectivity to these three applications had been granted considering that 400/220kV substation at Srinagar & 400kV Srinagar-Srinagar D/c line have already been completed hence, the same was not included into the connectivity intimation granted by CTU. Subsequently discussions were held during the meeting held on 06/12/2016 among CEA, CTU & PTCUL, following transmission system for grant of Connectivity & LTA was discussed and agreed:

Tr. system for revised grant of Connectivity to Tapovan Vishnugarh HEP

- Tapovan Vishnugad HEP– Proposed site of Pipalkoti 400 kV substation 400kV D/c (Twin Moose) line

Common transmission system required for Connectivity

- Proposed site of Pipalkoti 400 kV S/s-Srinagar 400kV D/c (Quad Moose) line
- 400/220kV Substation at Srinagar – (commissioned)
- 400kV Srinagar HEP -Srinagar 400kV D/c line – (commissioned)

Transmission system for grant of Long Term Access

- Srinagar- Kashipur 400kV D/c line along with associated 400 kV bays

(ii) It is to mention here that Long Term Open Access has already been granted to NTPC Ltd. for generation plant beyond Kashipur. As discussed under para-7.1,Kashipur-Roorkee-Saharanpur 400 kV (quad) D/c line has been commissioned & shall be adequate for evacuation of Tapovan Vishnugarh HEP power beyond Kashipur..The revised LTA intimation shall be issued to NTPC w.e.f 1st April'2019 accordingly.

Members may deliberate.

(D) Vishnugarh Pipalkoti Hydro project (444 MW) of THDC Ltd.

(i) Connectivity was granted to THDC for Vishnugarh Pipalkoti HEP was granted based on the discussions held during the Standing Committee and Connectivity/LTA meeting. Subsequently based on the observations from PTCUL In response to the intimations issued by CTU, PTCUL has intimated that 400/220kV Srinagar S/s & 400kV Srinagar-Srinagar HEP D/c line should also be included for the transmission system required for grant of Connectivity to Tapovan Vishnugarh & Pipalkoti HEP. CTU vide letter dated 11/11/2016 informed that the connectivity to these three applications had been granted considering that 400/220kV substation at Srinagar & 400kV Srinagar-Srinagar D/c line have already been completed hence, the same was not included into the connectivity intimation granted by CTU. Subsequently discussions were held during the meeting held on 06/12/2016 among CEA, CTU & PTCUL, following transmission system for grant of Connectivity & LTA was discussed and agreed:

Tr. system for revision in grant of Connectivity to Vishnugarh Pipalkoti HEP

(expected commissioning schedule of generation project by Dec.'19)

- Pipalkoti HEP- Pipalkoti switching station 400kV D/c line (twin moose)
- Establishment of the 400kV Pipalkoti Switching station

- Diversion of Tapovan Vishnugad HEP- Proposed site of Pipalkoti 400kV Substation D/c line at Pipalkoti switching station
- Diversion of Proposed site of Pipalkoti 400kV Substation - Srinagar 400kV D/c line at Pipalkoti switching station

Common transmission system required for Connectivity

- Pipalkoti 400 kV S/s-Srinagar 400kV D/c (Quad Moose) line
- 400/220kV Substation at Srinagar - (commissioned)
- 400kV Srinagar HEP -Srinagar 400kV D/c line - (commissioned)

In the above said meeting it was deliberated that it was required to sign Implementation Agreement between applicant & PTCUL in line with 4th amendment to CERC (IEGC) Regulations. However, THDC is yet to sign the implementation agreement.

THDC may update the status.

(ii) Members may deliberate.

(E) Connectivity to Naitwar Mori HEP (2X30MW) of SJVN Ltd. in Uttarakhand

(i) Connectivity application of SJVNL for Naitwar Mori HEP was discussed during the 9th Connectivity/ Long Term Access meeting with NR Constituents held on 30/05/2016 & it was proposed to grant connectivity of 60 MW (plus 10% overload) to Naitwar Mori HEP with effect from Aug'20 or the availability of transmission system whichever is later though system as below:

- Through 220 kV D/c line from Naitwar Mori generation switchyard – Mori 220/132 kV substation (PTCUL) – Khodri (PTCUL) S/s.

(ii) However, it was informed by PTCUL during the meeting held on 25/07/2016 among CEA, CTU, PTCUL and generation developers regarding grant of Connectivity & LTA to various hydro projects in Uttarakhand that Mori 220/132kV (PTCUL) substation is being constructed by PTCUL as a Pooling Station and Khodri 220/132kV substation has been dropped. Accordingly, PTCUL requested for modification in the above said scheme viz. instead of Khodri 220/132 kV (PTCUL) substation, the 220kV D/c line from Mori 220/132 kV (PTCUL) substation may be connected to 400/220kV Dehradun (PG) substation.

(iii) Accordingly, connectivity to SJVNL for Natwar Mori HEP (2x30 MW) is proposed to be granted through following transmission system:

- Naitwar Mori HEP - site of Mori 220/132kV (PTCUL) substation 220 kV D/c line (to be implemented by applicant)
- Site of Mori 220/132 kV(PTCUL) substation – Dehradun 220 kV D/c line (to be implemented by PTCUL)

Note: Mori 220/132 kV substation is not required for connectivity of Naitwar Mori HEP

(iv) Members may deliberate.

(F) Transmission system for transfer of power beyond Srinagar.

(i) Under UITP, power from various generation projects in Uttarakhand is to be pooled at 400/220kV Srinagar (PTCUL) substation and further to Kashipur (PTCUL) substation through Srinagar -Kashipur 400kV (Quad) D/c line to be implemented by PTCUL.

(ii) During the meeting held on 25/07/2016 among CEA, CTU, PTCUL and generation developers regarding grant of Connectivity & LTA to various hydro projects in Uttarakhand, it was informed by PTCUL that the schedule of Srinagar – Kashipur 400kV D/c line is Dec.'2019 and CTU & CEA requested PTCUL to expedite the construction of Srinagar – Kashipur 400kV D/c line to match with the power transfer requirement as discussed above.

(iii) Members may deliberate.

8.0 Down Stream network by State utilities associated with ISTS substations (in continuation of Agenda item 36 of main agenda):

8.1 In addition to the list already given in the agenda there are some more ISTS substations where STUs need to plan and implement 220 kV system in a matching time frame:

Sl. No.	Name of Substation	Capacity	Expected Schedule	Remarks
1	Hamirpur 400/220 kV Sub-station	2x 315 MVA	Commissioned. 04 nos. 220 kV downstream lines commissioned	Status of downstream system for balance 2 Nos 220kV bays.
2	Kaithal 400/220 kV Sub-station	1x 315 MVA	July 2017 (Shifting of Transformer from Ballabhgarh).	Status of downstream system for 2 Nos 220 kV bays.
3	Sikar 400/220kV S/s	1x 315 MVA	Jun-17	Status of downstream system for 2 Nos 220 kV bays
4	400/220kV Jauljivi Sub-station	2x315	December 2019	Uttarakhand to respond
5	400/220kV Kota Sub-station	1 No. of 400 kV Bay	Commissioned for Anta-Kota 400 kV S/c line of RRVPNL	RRVPNL to update

8.2 The issue of implementation of underlying 220 kV network by STUs was discussed in 38th NRPC meeting held on 25/10/2016. During the meeting representative of POWERGRID informed that Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Fourth Amendment) Regulations, came into force with effect from date of publication in Official Gazette i.e. from 29.04.2016.Following new provisions (Clause 4(iii)) have been included w.r.t. transmission

"*Where the transmission system executed by a transmission licensee is required to be connected to the transmission system executed by any other transmission licensee and*

both transmission systems are executed in a manner other than through tariff based competitive bidding, the transmission licensee shall endeavor to match the commissioning of its transmission system with the transmission system of the other licensee as far as practicable and shall ensure the same through an appropriate Implementation Agreement(IA)".

8.3 Considering the above amendment, the issue of non utilization of some of 220 kV bays was also discussed. Members expressed concern that since all the bays provided at the ISTS substations can only be utilised in a phased manner, the bays should also be built in a phased manner. Regarding number of 220 kV bays being providing for each ICT, TCC recommended that the guideline needs to be reviewed by standing committee for power system planning in view of changed scenario.

8.4 Members may deliberate.

9.0 Reactive Power Compensation Requirement Studies in Northern region and High voltage at Kurukshetra (in continuation to Agenda Item No. 27 of main agenda):

9.1 As per the agenda already circulated by CEA vide letter dated 12/05/17, certain additional studies were required to be carried out especially for DTL system. Accordingly, the revised study for reactive power compensation has been carried in consultation with DTL after the validation of network details and load generation scenario for their respective state. Summary of the same is given below:

9.2 **Approach to study**

Light load condition for Year 2018-19 has been simulated in the studies and minimum load of about 1400 MW has been simulated for 2018-19 scenario with load power factor of 0.98 has been considered for Delhi. All Shunt Capacitors at 220kV have been switched off and all the existing/proposed 400 kV and 765 kV reactors have been considered.

9.3 Further study has been carried out to identify the reactive compensation required to maintain 1.0 pu. It has been seen from studies that the requirement of shunt reactors was observed mainly at certain locations, where cable is connected at 220kV, large load centres located far from generating units and connected to many lines, which are lightly loaded under off peak conditions. Accordingly, following reactors at various 400 & 220 kV buses are proposed which may be provided by the owner of the substation.

S. No.	Bus Name	Voltage Level (kV)	Reactor Proposed
1	Maharanibagh	400	125
2	Mundka	400	125
3	Mandola	400	125
4	Narela	220	25
5	R.K Puram-I	220	25

6	Patparganj2	220	2x25
7	Maharanibagh	220	2x25
8	Bamnoli	220	25
9	Sabjimandi	220	2x25
10	Gopalpur	220	2x25
11	Indaraprasth	220	2x25
12	Geetacolony	220	2x25
13	Harsh Vihar	220	2x25
14	Wazirabad	220	2x25
15	Electriclane	220	2x25
16	Mandola	220	25
17	AIIMS	220	2x25
18	Saritavihar	220	25
19	Bawana	220	25
20	Preet Vihar	220	25
21	Mundka	220	25
22	Masjidmoth	220	25

9.4 Also, in the agenda item No.27, PSTCL has also forwarded certain observations regarding reactive compensation at Nakodar and Makhu, in line of which, revised studies have been carried out for Reactive power compensation in Punjab. It has been seen from the studies that after considering 80 MVAR bus reactors at Makhu & Nakodar, the bus reactor at 220 kV at Makhu is not required, however, at Nakodar, requirement of 1 No. of 25 Mvar bus reactor still persists. Therefore, the same is proposed to be installed at Nakodar 220 kV bus.

High Voltage at Kurukshetra

9.5 Kurukshetra is connected to Champa pooling station in Western region through high capacity HVDC link and to Northern region grid through various other A.C links. Details of the same is given below:

- LILO of Abdullapur - Sonepat 400 kV D/C at Kurukshetra (Tripple)
- 400KV D/c Kurukshetra - Jallandhar line (Quad) (one ckt via Nakodar (PSTCL))
- 400KV D/c Kurukshetra –Malerkotla line

- +/- 800KV HVDC Bipole link between Champa Pooling Station - Kurukshetra line

(with provision to upgrade HVDC terminal to 6000MW at later date)

Pole one of Phase-I ie 1500MW pole of this HVDC link has been commissioned in March'17 and is in operation and Phase-II of the same is to be commissioned shortly.

9.6 This HVDC link was commissioned, during seasonal low load conditions in Northern region and during this period, the hydro & thermal generations in Himachal Pradesh, Punjab & Haryana remains out of service most of the times. During commissioning as well as operation HVDC link, increase in the voltage profile at Kurukshetra 400 kV bus has been observed due to addition of filter banks at HVDC terminal. Also, as per the design of TOVC (Temporary Over Voltage Control) protection, whenever the voltage at Kurukshetra bus increases, the filter banks trips to bring down the voltage and automatic reduction in power flow occurs. This reduction of power flow, aggravates the voltage rise at Kurukshetra. Sudden reduction of power flow may also lead to increase the power transfer on Gwalior-Agra 2x S/c lines. Further, after drop in voltage, the filter bank switches on automatically leading to a voltage rise. Due to persistent high volatges, the 125 Mvar Bus Reactor is continuously in service.

It is to mention that Champa-Kurukshetra HVDC link is a very important link for import of power from Western region generations to Northern region load centres as well as to provide control on inter-regional power transfer.

9.7 Considering this high voltage at Kurukshetra, system studies was carried out for smooth and reliable operation of HVDC link considering very low load in Northern region. It has been seen from the studies that with total 1500 MW injection from HVDC link, 450 Mvar reactive power support would be required to sustain the operational constraints as mentioned above.

It is to mention that there is a large seasonal variation in the load demand in Northern region especially in states like Delhi, Punjab & Haryana. It is envisaged that during winter months, the same load generation scenario shall continue in future also. Due to this the operation of HVDC link may lead to serious operational constraints. Therefore, to balance the Mvar requirement on real time basis, it is proposed to provide 500 Mvar TCR (Thyristor Controlled Reactors) which acts as a self-regulating device for Reactive VAR generation and shall improve voltage regulation at Kurukshetra Bus. It has been seen from the studies that the operational constraints faced at HVDC station can be alleviated by using TCR. Therefore, 1 Nos. of TCR (Thyristor Controlled Reactors) of capacity 500 Mvar is proposed to be installed at Kurukshetra 400 kV bus.

9.8 POWERGRID may present the studies. Members may deliberate.

10.0 Capacity enhancement of Rihand- Dadri HVDC from 1500MW to 2500MW

10.1 1500MW HVDC Rihand- Dadri Bipole is in operation since 1992 and presently is under R&M. It is an important transmission link for evacuation of bulk power from pit head generating units in Rihand and its vicinity. This HVDC link transfers bulk power from the Rihand–Singrauli-Vindhyachal generation complex to National Capital Region (NCR), which is load centre.

10.2 Based on the operational feedback from POSOCO, CTU had proposed that capacity of the Bipole can be enhanced by 1000MW by utilizing the existing additional loading capability margin available on the HVDC bipolar transmission link. The thermal

capacity of ±500kV HVDC Quad Bersimis conductor line for maximum conductor temperature of 70°C at 45°C ambient temperature is approx. 2350MW. Further, at ambient temperature below 43°C, thermal capacity can be higher than 2500MW.

10.3 The upgradation would provide additional 1000MW from pit head generating station to NCR with no extra land/ transmission corridor. This up-gradation facilitates the System Operator to enable economic despatch function by utilizing the HVDC system to its full capacity for most of the times. Quick load control feature including the run back control in the event of outage of the Rihand generators in the Rihand-Dadri HVDC system in the past has been effectively utilized for enhancing the stability of the underlying AC network during extreme grid loading conditions.

10.4 The proposal was discussed in 36th, 37th & 38th SCM of NR held on 13/07/2015, 20/01/2016, & 30/05/2016 respectively. The proposal was agreed in principle during 36th & 37th Standing Committee meeting of Power System Planning of NR. However, as per the Minutes of 38th Standing Committee meeting, additional studies were required to be carried out.

10.5 Dadri generating station in NCR has an installed capacity of about 2450 MW- (Dadri (thermal) - 840 MW, Dadri (Gas) -830 MW, Dadri-II (980 MW)). However a large quantum of the generation at Dadri does not operate due to economic reasons. Delhi has a very limited generation capacity as on date and also no plan to add generation capacity within the state in near future. Accordingly, the increasing demand in Delhi is required to be met by importing power from outside. In addition, entire Badarpur generation project is planned for permanent closedown.

10.6 Considering this as well as shutdown of generations in NCR area without any future generation addition, capacity enhancement of this bipole by 1000MW has been studied to utilize the loading capability margin available with the existing Quad-Bersimis conductor. From the studies, it has been observed that some of the transmission lines in Singrauli/ Rihand/ Anpara/ Obra complex get critically loaded under contingencies. Further N-1-1 from such a large complex of about 9000 MW has also been studied. Study results are enclosed in powerflow Cases 1-12.

10.7 A summary of the study results is given below:

Cases	N–1–1 Contingency Descriptions	Remarks
Case 1	Low generation in Anpara and Obra complex and 1300MW power flow in Rihand – Dadri HVDC	• Singrauli – Anpara 400kV line(Heavily Overloaded)
Case 2	Case 1 + Rihand – Dadri HVDC one pole + one ckt of Rihand – Singrauli 400kV D/c line Outage	• Singrauli – Anpara 400kV line(Heavily Overloaded) • Remaining Ckt of Rihand – Singrauli 400kV D/c line(Heavily Overloaded)
Case 3	Case 1 + one ckt of Rihand – Singrauli 400kV D/c line + one	• Singrauli – Anpara 400kV line(Heavily Overloaded)

	ckt of Rihand – Allahabad 400kV D/c line Outage	• Remaining Ckt of Rihand – Singrauli 400kV D/c line overloaded
Case 4	Case 1 + one ckt of Rihand – Allahabad 400kV D/c line + Singrauli – Fatehpur 400kV line Outage	• Singrauli – Anpara 400kV line(Heavily Overloaded)
Case 5	Case 1 + Rihand – Dadri HVDC one pole + Singrauli – Fatehpur 400kV line Outage	• Singrauli – Anpara 400kV line(Heavily Overloaded)
Case 6	Case 1 + Rihand – Dadri HVDC one pole + one ckt of 400kV Singrauli – Allahabad [one D/c & one S/c] lines Outage	• Singrauli – Anpara 400kV line(Heavily Overloaded)
	WITH UPGRADATION	
Case 7	Low generation in Anpara &Obra complex and 2500MW power flow in Rihand – Dadri HVDC	--
Case 8	Case 7 + Rihand – Dadri HVDC one pole + one ckt of Rihand – Singrauli 400kV D/c line Outage	• Singrauli– Anpara 400kV (Overloading Reduced by around 200MW as compared to case 2)
Case 9	Case 7 + one ckt of Rihand – Singrauli 400kV D/c line + one ckt of Rihand – Allahabad 400kV D/c line Outage	--
Case 10	Case 7 + one ckt of Rihand – Allahabad 400kV D/c line + Singrauli – Fatehpur 400kV line Outage	• Singrauli–Anpara 400kV line (Overloading Reduced by around 600MW as compared to case 4)
Case 11	Case 7 + Rihand – Dadri HVDC one pole + Singrauli – Fatehpur 400kV line Outage	• Singrauli–Anpara 400kV line (Overloading Reduced by around 200MW as compared to case 5)

Case 12	Case 7 + Rihand – Dadri HVDC one pole + one ckt of Singrauli – Allahabad 400kV lines[1xD/c + 1x S/c] Outage	• Singrauli–Anpara 400kV line (Overloading Reduced by around 250MW as compared to case 6)

10.8 Further, during the 38th meeting of SCPSPNR, studies were enclosed for the dispersal of power beyond Dadri. From the study results, it was observed that there is no constraint for dispersal of power beyond Dadri. Keeping above in view addition of parallel converters of 2x500MW at Rihand and Dadri HVDC station is proposed.

10.9 Members may deliberate.

11.0 Converting Fixed Line Reactors into Switchable Line Reactors in Over Compensated lines

11.1 Due to the reduction in line lengths after LILO of a line at certain substation, the fixed reactive compensation that was initially provided for the parent line (line before LILO) has reached such a value, that there is a requirement of switching of the reactors during different operating conditions. Considering the fact that there is a huge variation in load/generation pattern in Northern Region these line reactors are very much required in the system during light load conditions and need to be taken out of service during peak load conditions. Initially these line reactors were implemented as fixed line reactors (considering the initial line length), switching on/off the line reactor based on requirement is not possible. This has led undesirable voltage scenarios, which in turn, leads to vibration causing damage to windings, core and bushings etc.

11.2 Example of such instances which have affected line Reactors is as follows:

Sl	Element	Effect on Reactors
1	Line Reactors at Hissar in Hissar –Kaithal-II	Core coil assembly shifting/movement
2	Line Reactors at Allahabad in Allahabad-Fatehpur-I&II	Bushing cracked and WTI/OTI damaged
3	Line Reactors at Tirunelvelli in Tirunelvelli-Trivendram line	Reactor vibrations observed and voltages upto 470kV recorded after opening breaker.
4	Line Reactors at Bina in Bina- Shujalpur line	High voltages observed.

11.3 Lines in Northern Region for which reactive compensation has reached such critical value is as below:

Sl. No.	Name of the Line	Length in ckm	Capacity		Switchable (S) / Non-Switchable (F)		%Comp-ensation (Present)
			End I	End II	End I	End II	
1	Sohawal - Ballia I	229	50	63	F	F	81
2	Sohawal - Ballia II	229	50	63	F	F	81
3	Kankroli - Zerda	234	50	50	F	F	71
4	Abdullapur-Panchkula I	63	50	--	F	--	126
5	Abdullapur-Panchkula II	63	50	--	F	--	126
6	Bassi – Kotputli	106	50	--	F	--	71

11.4 DOV studies, (with these reactors are in switched off condition), have also been carried out and from the study results it has been observed that DOV is within limit. Accordingly, it is proposed that fixed Line Reactors installed at Sohawal, Kankroli, Abdullapur and Bassi, in the above mentioned lines be converted to switchable line reactor.

12.0 Ownership of newly installed 63MVAr Reactor, GIS bay & 4X105MVA ICT BBMB Dehar Power House

12.1 In line with the approval of 30th meeting of SCPSPNR held on 19/12/2011, augmentation of transformer capacity was done at Dehar PH BBMB by commissioning 315MVA ICT & 2X63 MVAr bus reactors by POWERGRID under ISTS for system strengthening. During the 133rd OCC meeting of NRPC held on 17/03/2017, BBMB opined that as the transmission elements were replaced for system strengthening under ISTS at 400kV Dehar substation of BBMB, therefore the ownership of 315MVA ICT & 2X63 MVAr reactors shall remain with BBMB only. However POWERGRID mentioned that all the funding /investment has been made by POWERGRID and therefore ownership shall remain with POWERGRID. The tariff petition for the said assets was filed by POWERGRID in CERC. Earlier also BBMB has raised similar issue regarding ownership of LILO portion of Dehar – Bhiwani and Dehar – Panipat 400 kV lines. To resolve the ownership issue meetings were held in CEA and it was decided that the ownership shall remain with POWERGRID as the investment has been made by POWERGRID.

12.2 Members may discuss & resolve the ownership issue of assets at Dehar S/s of BBMB.

13.0 Creation of 400/220kV Substation at Etawah

13.1 The issue of establishment of 400/220 kV substation at Etawah alongwith Morena – Etawah 400 kV D/c line was discussed in 33rd meeting of SCPSPNR held on 23/12/2013 wherein it was decided that the proposal would be studied in detail and put up in subsequent standing committee meeting.

13.2 Etawah is an important load centre in Western Uttar Pradesh and in order to meet the present and future load demand a 400/220 kV substation at Etawah is proposed. Three 400kV circuits viz. Kanpur- Ballabhgarh (PG) S/c line (386km) & Kanpur-Ballabhgarh (PG) D/c lines (370km) are passing near Etawah and to provide connectivity to Etawah LILO of one circuit of Kanpur- Ballabhgarh (PG) S/c line (386km) is proposed.

13.3 Auraiya - Agra (Sikandra) 220 kV D/c line is also passing close to Etawah area. It was considered prudent to LILO this 220 kV D/c ISTS line at Etawah. In view of the above,POWERGRID has proposed the following under ISTS:

(i) Establishment of 2x315MVA, 400/220kV Substation at Etawah through LILO of 400kV Kanpur-Ballabhgarh S/c (386km) line

(ii) LILO of 220kV Auraiya-Agra(Sikandra) D/c at Etawah

Adequate space provision may be kept to provide additional connectivity with the increase in load demand.

13.4 POWERGRID may present the studies. UPPTCL may intimate the existing transmission networks meeting the load demand of Etawah area.

13.5 Members may deliberate.

ADDITIONAL AGENDA PROPOSED BY UPPTCL

14.0 765kV D/c Interconnection of Lalitpur TPS with Bina(PG)

14.1 Lalitpur STPS (3x660 MW) generation project is connected to 765/400 kV Agra (UP) substation via two nos. of 765kV lines. During the dynamic studies, oscillations were observed under certain contingency conditions. In order to overcome the issue of oscillations, various options like LILO of 765kV Jabalpur-Orai line at Lalitpur, Lalitpur-Bina(WR) 765kV S/c, Fixed Series Compensation (FSC), Thyristor controlled series compensation (TCSC), LILO of 400kV Parichha -Orai at Lalitpur and Lalitpur- Orai 765kV D/c line were studied and discussed in the various Standing Committee Meetings of Power System Planning for NR. However, none of the above proposal could be agreed.

14.2 Nevertheless, the issue of providing anchoring of Lalitpur generation needs to be addressed as the oscillations in the Lalitpur system may propagate to the integrated grid. The issue of providing anchoring was also discussed during last Standing Committee meeting wherein it was decided that joint study among CEA, CTU & UP may be carried out.

14.3 In view of above, a joint study for the evacuation system was carried out with UPPTCL in which the option of interconnection of Lalitpur with Bina(PG) in Western Region was also studied. The study indicate that the oscillations are well damped when Lalitpur is connected to Bina 765 kV substation in Western Region. Additionally, the Bina- Lalitpur-Agra(UP) 765kV lines shall also provide an additional NR-WR inter-regional corridor & help in import of power.

14.4 Powergrid has informed that there are space constraints at Bina (PG). Accordingly, it is likely that the extension at Bina may be through GIS. Keeping above in view 765kV D/c interconnection of Lalitpur TPS with Bina (PG) is proposed to be implemented under ISTS as strengthening scheme.

14.5 CTU may present the studies. Members may deliberate.

15.0 Connectivity of UPPTCL Moradnagar-II (new), 400/220 kV, 2X240 MVA sub-station by shifting of 400,220 kV lines from Moradnagar 400 kV UPPTCL S/S to Moradnagar –II

15.1 As proposed by UPPTCL, following connectivity to Moradnagar –II, 400/220 kV 2x240 MVA substation was approved in 37th SCM by way of shifting of some 400,220 kV feeders from existing 400/220 kV, 3x315 MVA Moradnagar substation subject to certain conditions raised by NRLDC:

(A) <u>400 kV Lines shifting :-</u>

(i) Shifting of Agra – Moradnagar 400 kV S/C line to Moradnagar-II (Already shifted, charged and line further LILOed also at Fatehabad, Agra 765kV S/S)

(ii) Shifting of Dadri- Moradnagar 400kV S/C line to Moradnagar-II (Necessary shifting construction work complete but not yet actually shifted)

(B) <u>220 kV Lines shifting :-</u>

(i) Shifting of Moradnagar – Barut 220 kV SC line to Moradnagar –II (Already shifted and charged)

(ii) Shifting of Moradnagar – Loni 220 kV SC line to Moradnagar –II (Yet not shifted)

(iii) Shifiting of Moradnagar – Shamli line to Moradnagar –II (Already shifted, charged and further LILOed at Baghpat 400 PG)

15.2 The above was agreed subject to following :-

(i) Completion of 2x500 MVA Baghpat (PG) S/S with LILO of Meerut (PG) - Kaithal 400 kV S/C line at Baghpat (PG) (Baghpat PG S/S & LILO already completed and charged)

(ii) Completion of 220/132 kV 2x100 MVA Baghpat UP substation with LILO of Moradnagar (II) –Shamli 220 kV S/C line at Baghpat UP. (220 kV Baghpat UP S/S already completed and charged but small LILO portion is under R.O.W)

(iii) Baghpat (PG) – Baghpat UP 220 kV DC line (Already completed and charged)

(iv) Baghpat (PG)- Baraut 220 kV D/c line (Status may be given by UPPTCL)

(v) 765/400/220 kV Hapur S/S with LILO of Moradnagar -Moradnagar 400 kV SC PGCIL line at Hapur (Already completed and charged)

15.3 UPPTCL has informed that the above A (ii) & B (ii) shifting works are held up due to observation by NRLDC in 38th SCM pointing to some pending construction works at the time of SCM meeting. Most of these works have now already been completed.

15.4 In view of **(i)** completed works with additional completion of LILO Moradnagar II – Shamli at Baghpat PG (400) as above **(ii)** High loadings on existing Moradnagar 400 kV S/S **(iii)** existing Moradnagar (II) S/S presently radially connected, UPPTCL proposes before the committee to permit shifting of following pending lines

(i) Dadri – Moradnagar 400 kV SC line to Moradnagar (II)
(ii) Moradnagar –Loni 220 kV SC line to Moradnagar (II)

15.5 UPPTCL has also informed that the existing 400/220 kV, 3x315 MVA Mordanagar S/S is having high loadings while Moradnagar (II) is lightly loaded. Shifting of lines will make both of the Moradnagar related system network and loadings optimal.

15.6 Members may deliberate

16.0 Connectivity of 400/220/33 kV 2x500,3x60 MVA Indirapuram (Ghaziabad) S/Stn :

16.1 Connectivity of 400/220/33 kV 2x500,3x60 MVA Indirapuram an Intra state substation and a part of ring system around Ghaziabad and NCR region has been approved in 26th SCM dated 13.10.2008 & amended in 29th SCM dated 29.12.2010 as follows :-

(i) Hapur (765) – Ataur, Ghaziabad 400 kV DC (Quad) line –(Actual length 52.5km)
(ii) Ataur – Indirapuram 400 kV DC (Quad) line – (Actual length 15.83 km)
(iii) LILO of Muzaffarnagar- Moradnagar 400 kV SC line at Ataur – (Actual length 15km)
(iv) LILO of Moradnagar ,Muradabad 400 kV SC line (PGCIL) at Hapur (765) - (Actual LILO length 2.2 km)
(v) G.Noida – Hapur 765 kV SC line - (Actual length 65.5 km)

16.2 Besides 220/33 kV, 3x60 MVA sub-station at Indirapuram, 220 kV downstream system approved by UPPTCL is as follows :-

- **LILO of Sahibabad – Noida Sec. (62) 220 kV SC line at Indirapuram (Work already completed on Multicircuit Towers)**

16.3 UPPTCL has informed that all the above 400 kV network is nearing completion under PPP except Ataur 400/220 kV substation which is delayed due to some constraints in substation work. However, Indirapuram 400 kV substation alongwith Hapur- Ataur – Indirapuram 400 kV DC Quad line have been fully constructed.

16.4 In order to meet the load around Ghaziabad, Noida and adjoining Delhi region, it is planned to connect 400kV Indirapuram S/S as follows :-

- **Hapur 765 – Indirapuram 400 kV DC line (Routed by passing at outer of Ataur S/S)**
- **LILO of Sahibabad – Noida Sec.62 220kV SC line at Indirapuram**

16.5 220/33 kV capacity and substation is ready to meet around 100MVA load of Discom as per 33 kV feeders already connected to it. Besides 220 kV LILO connectivity will provide support to Sahibabad (220), Noida Sec.62(220), Moradnagar(400) and G.Noida (400) substations. On completion of Ataur 400 kV S/S, the system as approved in 26th & 29th SCM will be connected. UPPTCL proposes to approve the above system for Indirapuram till Ataur 400kV S/stn is commissioned .

16.6 Members may deliberate

17.0 Augmentation of transformation capacity at Gorakhpur & Fatehpur

17.1 Fatehpur, Lucknow and Gorakhpur substations are major load centres in UP. The existing transformation capacities at Fatehpur and Gorakhpur 400/220kV S/Ss, are 2X315MVA and at Lucknow (1x315+1x500)MVA. UPPTCL has proposed augmentation of transformation capacity at these substations of PGCIL. As per the existing loading, the transformation capacity is (n-1) non compliant.

17.2 POSOCO may present the loading details of the above ICTs. UPPTCL may indicate requirement of any additional 220 kV line bay from these substations. POWERGRID to confirm the availability of space for augmentation of ICT capacities.

17.3 Members may deliberate.

18.0 Upgradation of existing 220/132 kV Sahupuri Substation to 400/220 kV, 2x500 MVA.

18.1 UPPTCL vide its letter dated 15.05.2017 has proposed upgradation of existing 220/132 kV, 1X160 + 2X200 MVA UPPTCL Sahupuri (Chandauli) sub-station with 400/220 kV, 2X500 MVA capacity in light of high loadings on existing 220/132 kV, 1X160 + 2X200 MVA UPPTCL Sahupuri (Chandauli) sub-station, 400/220 kV sub-station Varanasi, Pasauli-Sahupuri 220 kV S/c PGCIL line and other 400 kV lines feeding these sub-stations.

18.2 Further, land adjoining to existing 220 kV Sahupuri sub-station is adequate to upgrade it into 400/220 kV GIS, Varanasi PG (765) – Biharshariff 400 kV D/c (Quad) PGCIL lines are also available at a shorter distance which are considered to feed the sub-station.

18.3 The above upgradation will help to reduce the rising load of 400 kV sub-station Varanasi and meet high load of 220/132 kV Sahupuri sub-station. Other approved 400 kV substations namely Jaunpur, Rasra, Aurai (Bhadohi) in Poorvanchal area of state may take 2-3 years time for completion which are delayed due to non availability of land, other issues and thus may not provide timely relief to 400 kV Sarnath and 220 kV Sahupuri sub-stations.

18.4 Therefore, UPPTCL has proposed to upgrade existing 220/132 kV Sahupuri sub-station to 400 kV levels as follows:

(1) Construction of 400/220 kV, 2X500 MVA GIS sub-station Sahupuri by upgrading existing 220/132 kV, 1X160 + 2X200 MVA GIS substation
(2) LILO of both circuits of Biharshariff-Varanasi PG (765) 400 kV D/C (Quad) PGCIL lines at 400 kV GIS S/s Sahupuri- 30 kms
(3) Extension of 220 kV bus for DC interconnection on Twin Moose conductor to connect Sahupuri 220 kV substation.

18.5 UPPTCL may intimate the existing interconnection at Sahupuri 220/132 kV sub-station. The effect of the proposed Sahupuri 400/220 kV sub-station in terms of power flow needs to be seen by UPPTCL on the already planned 400 kV sub-stations namely Jaunpur, Rasra, Aurai (Bhadohi) in Poorvanchal area along with their 220 kV interconnections.

18.6 Members may deliberate.

Annexure 1 (a)

No. 2012/Elect(G)/150/1 Pt. II
Dated: 07.09.2016.

Chairperson
Central Electricity Authority
Sewa Bhawan, R. K. Puram
Sector-1, New Delhi - 110 066

Sub: Connectivity of Railway TSSs with ISTS network - Approval for Connectivity.

Central Electricity Authority (CEA) in their report on "Energy Plan for Indian Railways" of Feb 2015 has advised that for connecting its existing or future TSSs, Railways as Deemed Transmission Licence are required to communicate their connectivity requirement to CEA & CTU for consideration of integrated planning for ISTS in a coordinated manner.

Pursuant to above, Indian Railways is initially planning to connect its existing TSSs between Mughal Sarai - Howrah and Delhi - Bharuch routes of Railways by way of construction of associated infrastructure including transmission lines and bay extension work at ISTS points preferably at 220kV. Power requirement of Railways from the nearby proposed ISTS points as well as the indicative route diagrams for these sections are enclosed.

It is requested that the connectivity to Railways from these ISTS points for the given load may kindly be communicated at the earliest for planning and execution of transmission line works of Railways.

9.5.16

(Sudhir Garg)
Executive Director(EEM)
Railway Board

Copy to: CMD, PGCIL: - For kind information & n/a please.
CEO, REMCL: - For kind information & n/a please.

Priority

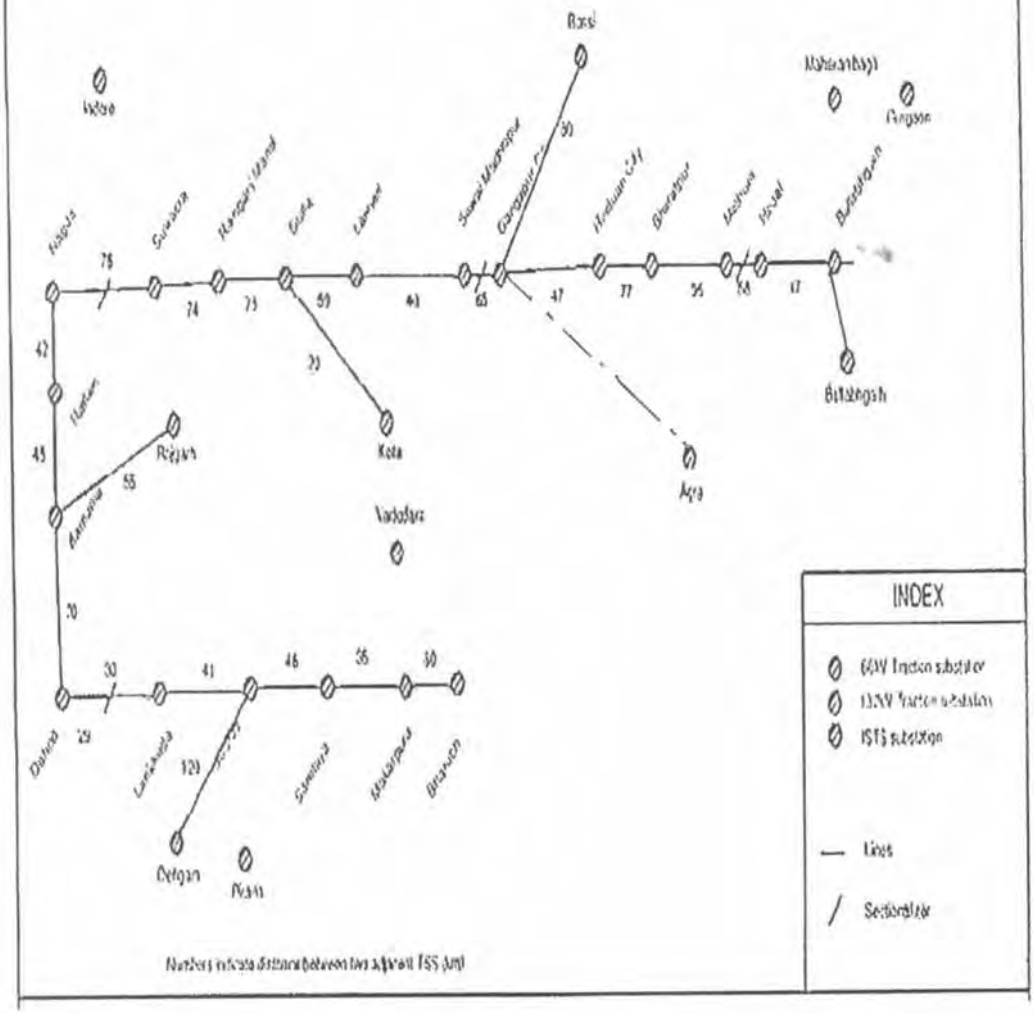
Connectivity scheme of TSS along Delhi - Bharuch route					
Sr.	PGCIL GSS	Connectivity required at (kV)	Railway TSS to be supplied	Grid Voltage at TSS	Tentative load requirement
1	Ballabhgarh	220	Ballabhgarh	66	50
2			Hodal	66	
3	Agra/Bassi	220	Mathura	132	60
4			Bharatpur	132	
5			Hindun city	132	
6			Gangapur city	132	
7	Kota	220	Sawaimadhopur	132	75
8			Lakheri	132	
9			Gudla	132	
10			Ramganj Mandi	132	
11			Suwasra	132	
12	Rajgarh	220	Nagda	132	75
13			Ratlam	132	
14			Bamania	132	
15			Dahod	132	
16	Dehgam	220	Limkheda	220	100
17			Godhra	132	
18			Samlaya	132	
19			Makarpura	132	
20			Bharuch	132	

Connectivity scheme of TSS in Mugalsarai-Howrah route

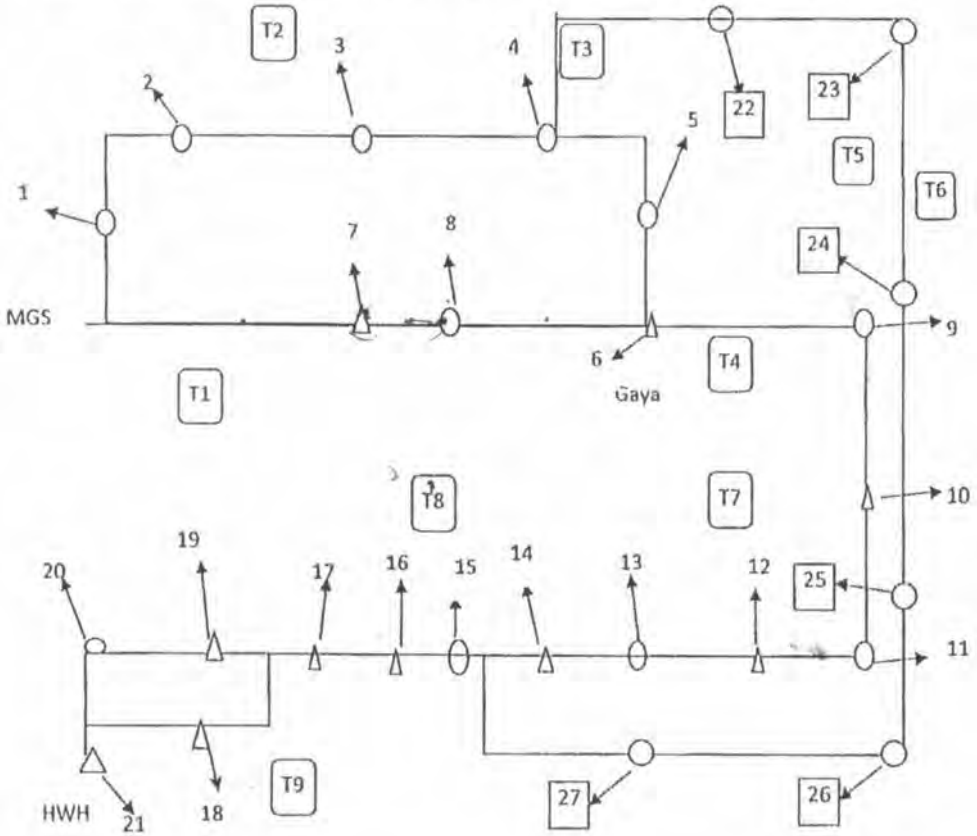
Sr.	Propo-sed ISTS point	Connectl vity required at (kV)	Railway TSS to be supplied	Grid Voltage at TSS	Contarct Demand (MVA)	Tentative load requirement (MW)
1	Arah/ Patna	220/ 132	Zamania	132kV	13.5	60
2			Dumraon		10.8	
3			Ara		10.8	
4			Danapur		10.8	
5			Jahanabad		10.8	
6	Pusauli/Gaya	220	Sonnagar		14	75
7			Rafiqganj		10.8	
8			Gaya		9	
9			Paharpur		9	
10			Koderma		24	
11	Maithon/ Parulia	220	Hazaribag Road		14	75
12			Nimiaghat		19.5	
13			Pradhankunta		18	
14			Kumardhubi		20.5	
15			Kalipahari		New TSS	
16			Waria		25	
19	Shubhas-gram	220	Burddhwan		22	75
17			Bandel		18	
18			Belmuri		16	
20			Dankuni		11.5	
21			Belur		20	
22	Lucklsaral/Bih arsarif	220/132	Khusroopur		10.8	50
23			Mokama		10.8	
24			Luckeesarai.		10.8	
25			Jhajha		10.8	
26			Shankarpur		12.5	
27			Jamtara		12	

Delhi - Bharuch Section

Details of TSS and PGCIL substations



SINGLE LINE DIAGRAM OF TSS/FP IN MGS-GAYA-HWH ROUTE (SONNAGAR ONWARDS)



Indicative list of Railway TSS/FP											
No.	Location		No.	Location of		No.	Location		No.	Location	
1	Zamania	TSS	8	Rafiganj	TSS	15	Kalipahari	TSS	22	Khusroopur	TSS
2	Dumraon	TSS	9	Paharpur	TSS	16	Waria	FP	23	Mokama	TSS
3	Ara	TSS	10	Koderma	FP	17	Barddhman	FP	24	Lucheesarai	TSS
4	Danapur	TSS	11	Hazaribagh Road	TSS	18	Bandel	FP	25	Jhajha	TSS
5	Jahanabad	TSS	12	Nimiaghat	FP	19	Belmuri	FP	26	Shankarpur	TSS
6	Gaya	FP	13	Pradhankunta	TSS	20	Dankuni	TSS	27	Jamtara	TSS
7	Sonnagar	FP	14	Kumardhubi	FP	21	Belur	FP			

Indicative list of Nearest ISTS point							
No.	Location	No.	Location	No.	Location	No.	Location
T1	Sasaram (Pusauli)	T4	Gaya	T7	Maithon	T9	Subhashgram
T2	Arah	T5	Biharsarif	T8	Parulia (Near Durgapur)		
T3	Patna	T6	Luckeesarai				

Annexure 1(b)

भारत सरकार/ Government of India
विद्युत मंत्रालय / Ministry of Power
केंद्रीय विद्युत प्राधिकरण/ Central Electricity Authority
विद्युत प्रणाली योजना एवं मूल्यांकन – II प्रभाग /
Power System Planning & Appraisal - II Division
सेवा भवन, आर.के. पुरम, नई दिल्ली -110066/
Sewa Bhawan, R.K. Puram, New Delhi – 110 066

No. CEA/PS/PSPA-II/200/16/2016 362-63 Dt. 25-Oct-2016

To

1. Sh. J.C.S. Bora
General Manager
REMCL, RITES Bhawan No.1
Sector-29
Gurgaon

2. Dr. Subir Sen,
Chief Operating Officer (CTU),
Power Grid Corporation of India Ltd.,
"Saudamini" Plot No.2, Sector-29,
Gurgaon-122001 Haryana

Subject: Minutes of the meeting held in CEA for connectivity of Railway TSS with ISTS Network, held on 7-10-2016.

Sir,

A meeting was held in CEA on 7th October, 2016 to discuss connectivity of Railway's Traction Sub Stations (TSS) with Inter-State Transmission System (ISTS) network for two routes of Indian railways: - (i) Delhi-Bharuch route, and (ii) Mughal Sarai-Howrah route.

Minutes of the meeting are enclosed.

Yours faithfully,

25/10/2016

(Pardeep Jindal)
Chief Engineer(PSPA-II)
Tel: 26198092

Minutes of the meeting held in CEA for connectivity of Railway TSS with ISTS Network, held on 7-10-2016

1. A meeting was held in the office of CE (PSPA-II) to discuss connectivity of Railway TSS with ISTS for two routes of Railways i.e. (i) Delhi – Bharuch route, and (ii) Mughal Sarai - Howrah route. The meeting was attended by officials from REMCL, CTU i.e. Power Grid and CEA. List of participants is given at **Annexure-I**.

2. Following ISTS Sub-stations were preliminarily identified for the Delhi-Bharuch route for giving connectivity to the Railways TSS with ISTS sub-stations:

   (i) Ballabhgarh or Tughlakabad (under construction).
   (ii) Agra or Bassi (Rajasthan)
   (iii) Kota
   (iv) Rajgarh
   (v) Dehgam / Pirana or Vadodara.

3. Following Sub-Stations were preliminarily identified for the Mughal Sarai-Howrah route for giving connectivity to the Railways TSS with ISTS sub-stations:

   (i) Arah or Patna
   (ii) Gaya or Chandoti
   (iii) Maithon
   (iv) Durgapur
   (v) Lakhisarai
   (vi) Subhashgram

4. It was agreed that POWERGRID will examine the feasibility of taking out connectivity lines from these Sub-Stations to proposed TSS of Railways at 220 kV level along the two routes. For this, they will assess the availability of space for two (2) numbers of 220 kV bays for termination of connectivity line of Railways. They will also study the availability of margins in the transformation capacity at these ISTS sub-stations to meet the traction load. The Railway's traction load that would be incident on an ISTS substation would be of the order of 80 to 150 MW.

5. Railways will inform their present connectivity arrangement with local STUs along the above two routes. Railways (vide their letter dt. 19/10/2016) has sent these arrangements with existing STU points which is enclosed at **Annexure-II**. The need and modalities of disconnecting from existing STU nodes or paralleling with STU network would be decided based on system studies.

6. As Ministry of Power, Government of India has issued clarifications that Railways is a deemed licensee under third proviso of section 14 of the Electricity Act, 2003. Therefore, it would be appropriate, if issues relating to connectivity of TSS with ISTS are dealt by Railways instead of REMCL. It was also agreed that Indian Railways will appoint one nodal officer from Railway Board/Indian Railways for further discussion and correspondence on these matter with CEA/CTU. Railways may take assistance from their associates like REMCL etc., if required.

7. Railways/REMCL representative requested for convening of meeting of Standing Committee on Power System Planning for approval of connectivity at feasible points at the earliest. It was informed that these proposals would be taken up in the Standing Committee for discussion after finalization of technical analysis, including discussion with the respective STU whose system is currently being used for the TSS along above two railway routes.

Annexure-I

List of Participants of the meeting held in CEA for connectivity of Railway TSS with ISTS Network, held on 7-10-2016:

1. Pardeep Jindal, Chief Engineer(PSPA-II), CEA
2. Ravinder Gupta, Director(PSPA-II), CEA
3. Manjari Chaturvedi, Dy. Director(PSPA-I), CEA
4. J.C.S. Bose, GM, REMCL, Indian Railways
5. Mukesh Khanna, AGM(CTU-Plg), POWERGRID
6. Rajesh Kumar, Asstt.GM(CTU-Plg), POWERGRID
7. Bhaskar Wagh, Sr. Engineer(CTU-Plg), POWERGRID

Annexure - 1(c)

GOVERNMENT OF INDIA
MINISTRY OF RAILWAY
RAILWAY BOARD

No. 2012/Elect(G)/150/1Pt.-II

Dt. 19.10.16

To,

Chief Engineer
Central Electricity Authority
Sewa Bhawan, R. K. Puram
Sector-1, new Delhi-110066

(Kind attn: Mr. Pardeep Jindal)

Sub: Connectivity of Railways TSSs with ISTS network approval for connectivity.

Ref: This office's letter no. 2012/Elect(G)/150/1 Pt.-II dt. 09.09.16.

As desired regarding subject matter, detailed information about the connectivity of Railways TSSs with State Utilities is attached.

Encl: As above.

19/10

(Amit Agrawal)
Director Elect. Engg.(PS)
Railway Board

Copy: CEO/REMCL: For information and necessary action please.

Details of TSS along Delhi - Bharuch route

Sr. No.	Proposed ISTS Location	Location of TSS/FP	Coordinates		Existing STU point				
			Lattitude	Longitude	Location	State	State Utility	Highest Voltage Level(kV)	Approx. Distance from TSS (km)
1	Bassi (PGCIL) (Raj.)/ Agra	Mathura	27.47948	77.673561	Mathura	UP	UPPCL	132	6.20
2		Bharatpur	27.236305	77.488417	Bharatpur	Raj.	JVVNL	220	1.40
3		Hindaun city	26.755726	77.03145	Hindaun	Raj.	JVVNL	220	1.50
4		Gangapurcity	26.468502	76.527469	Gangapur	Raj.	JVVNL	132	2.20
5	Kota (PGCIL) (Raj.)	Sawaimadhopur	26.019077	76.357241	Sawaimad hopur	Raj.	JVVNL	220	1.50
6		Lakheri	25.640532	76.192401	Lakheri	Raj.	JVVNL	132	1.10
7		Gurla	25.270958	75.885826	Sakatpura	Raj.	JVVNL	220	12.50
8		Ramganj Mandi	24.643331	75.939128	Morak	Raj.	JVVNL	220	8.50
9		Suwasra	24.070519	75.648657	Suwasra	MP	MPPTCL	132	1.90
10	Rajgarh (PGCIL) (MP)	Nagda	23.45578	75.412474	Nagda	MP	MPPTCL	220	1.80
11		Ratlam	23.340562	75.050409	Ratlam	MP	MPPTCL	220	3.00
12		Bamania	23.095907	74.758689	Ratlam	MP	MPPTCL	220	45.00
13		Dahod	22.844095	74.254539	Dahod	Guj.	MGVCL	132	1.54
14		Limkheda	22.835043	73.983611	Limkheda	Guj.	DGVCL	132	2.50
15	Dehgam/ Pirana (PGCIL) (Guj.)	Godhra	22.77691	73.606149	Godhara	Guj.	MGVCL	220	7.00
16		Samlaya	22.884588	73.30251	Asoj	Guj.	MGVCL	400	14.30
17		Mehamadabad	22.81935	72.752112	Mehamada bad	Guj.	MGVCL	132	3.00
18		Anand	22.561686	72.966306	Ode	Guj.	MGVCL	132	17.30
19		Makarpura	22.233282	73.175857	Jambuva	Guj.	MGVCL	400	2.20
20		Bharuch	21.704389	72.99928	Bharuch	Guj.	DGVCL	400	1.50

Details of TSS along Mughal Sarai - Howrah route

Sr. No.	Proposed ISTS Location	Location of TSS/FP	Coordinates		Existing STU point				
			Lattitude	Longitude	Location	State	State Utility	Highest Voltage Level	Approx. Distance from TSS (in KM)
1	2	4			11	12	13	14	15
1	Arah/ Patna	Zamania	25.374231	83.544083	Gajipur	U.P	UPPCL	132 KV	57
2		Dumraon	25.571685	84.142882	Dumraon	Bihar	SBPDCL	132 KV	4
3		Ara	25.550561	84.67292	Arah	Bihar	SBPDCL	132 KV	4
4		Danapur	25.582015	85.04564	Khagoul	Bihar	SBPDCL	132 KV	1
5		Jahanabad	25.186422	84.984907	Jehanabad	Bihar	SBPDCL	132 KV	0
6	Lukhisarai	Khushroopur	25.485244	85.387659	Fatuha	Bihar	SBPDCL	132 KV	15
7		Mokama	25.392106	85.91419	Hatidah	Bihar	SBPDCL	132 KV	0
8		Luckeesarai	25.173039	86.092171	Luckhisarai	Bihar	SBPDCL	132 KV	4
9		Jhajha	24.767951	86.391983	Jamui	Bihar	SBPDCL	132 KV	38
18		Shankarpur	86.6377979	24.4391859	Baidyanath Dham	jharkhand	JUSNL	132 KV	8.80
19		Jamtara	23.956994	86.812246	Jamtara	jharkhand	JUSNL	132 KV	0.90
10	Pusauli/ Gaya	Gaya	24.803242	84.999769	Bodhgaya	Bihar	BSPTCL	220kV	6
11		SonNagar	24.882665	84.230187	Sonnagar	Bihar	BSPTCL	220kV	3
12		Rafiganj	24.820701	84.636464	Kaikaf	Bihar	BSPTCL	220 KV	10
13		Paharpur	24.627119	85.204086	Bodhgaya	Bihar	SBPDCL	132 KV	35
14		Koderma	24.439814	85.517085	Koderma	jharkhand	DVC	132 KV	0.5
15	Maithon/Durgapur	Hazaribagh Rd	24.181143	85.886921	Konar	jharkhand	DVC	132 KV	35
16		Nimiaghat	23.933776	86.075386	Nimiaghat	jharkhand	DVC	132 KV	0.5
17		Pradhankhanta	23.772310	86.516885	Sindri	jharkhand	DVC	132 KV	20
20		Kumardhubi	23.747561	86.793549	Kumardhubi	jharkhand	DVC	132 KV	0.65
27		Kali Pahari	23.665212	87.016251		W.B	Under construction		
21		Waria	23.538278	87.246715	DTPS	W.B	DVC	132 KV	0.87
22	Subhashgram	Bardhman	23.249832	87.869508	Bardhman	W.B	DVC	132 KV	1.9
23		Belmuri	22.936608	88.150029	Belmuri	W.B	DVC/WBSEB	132 KV	0.6
24		Dankuni	22.678228	88.290773	Liluah	W.B	WBSEB	132 KV	10.5
25		Bandel	22.922770	88.377676	Adisapatgram	W.B	WBSEB	132 KV	0.3
26		Belur	22.635744	88.3398	Liluah	W.B	WBSEB	132 KV	2.5

Annexure II

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

No.2012/Elect(G)/150/1 Pt.II Dated: 28.12.2016

Chairperson
Central Electricity Authority
Sewa Bhawan, R.K.Puram
Sector-1, New Delhi-110066

Sub.: Connectivity of Railway TSSs with ISTS network – approval for connectivity.

Central Electricity Authority (CEA) in their report on " Energy Plan for Indian Railways" of Feb 2015 has advised that for connecting its existing or future TSSs, Railways as Deemed Transmission Licensee are required to communicate their connectivity requirement to CEA & CTU for consideration of integrated planning for ISTS in a coordinated manner.

2. Pursuant to above, Indian Railways is initially planning to connect its existing TSSs between Ludhiana – Delhi- Sonnagar routes of Railways by way of construction of associated infrastructure including transmission lines & bay extension work at ISTS points preferably at 220kV. Power requirement of Railways from the nearby proposed ISTS points is enclosed herewith.

3. It is requested that the connectivity to Railways from these ISTS points for the given load may kindly be communicated at the earliest for planning & execution of transmission line works of Railways.

28/12/16
(Punit Agrawal)
Director Electrical Engg.(PS)
Railway Board

Copy to: (i) CMD, PGCIL: - for kind information & n/a please.
(ii) CEO, REMCL: - for kind information & n/a please.
(iii) MD,DFCCIL:- for kind information & n/a please.

SN-33/1

CONNECTIVITY SCHEME OF TSS ALONG LUDHIANA – DELHI-SONNAGAR ROUTE

SN	PGCIL GSS	Connectivity required at (kV)	Railway TSS to be supplied	Grid Voltage at TSS (kV)	Tentative load requirement (MW)
1	Abdullapur	220	Jagadhari-I	220	50
2			Jagadhari-II	220	
3			Tapri	132	
4			Muzaffarnagar	132	
5	Meerut	220	Jarauda Nara	132	50
6			Hapur	132	
7			Gulaothi	132	
8			Wair	132	
9	*Pasauli (Sasaram)	220	Durgaoti	132	75
10			Deoria	132	
11			Chandiapur	132	
12			Gadhion	132	
13			Jeonathpur	132	
14			Chunar	132	

* Already advised by MoR to CEA vide letter no. 2012/Elect(G)/150/1 Pt.II dated 09/09/2016.

Annexure III

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केंद्रीय विद्युत प्राधिकरण
Central Electricity Authority
विद्युत प्रणाली योजना एवं मूल्यांकन प्रभाग-II
Power System Planning & Appraisal Division-II

No: 200/16/PSPA-II/2017/ 373-381 Dated: 11 .05.2017

To

As per address list

Subject: Minutes of the meeting related to Connectivity of Railway TSSs with ISTS network in Mughalsarai-Howrah Railway Route.

Sir,

The minutes of the meeting held on 20.04.2017 at CEA, Sewa Bhawan, R K Puram, New Delhi regarding above subject is enclosed.

Yours faithfully,

Jindal 11/5/2017

(Pardeep Jindal)
Chief Engineer (PSPA-II)

सेवा भवन, आर. के. पुरम-I, नई दिल्ली-110066 टेलीफोन : 011-26198092 ईमेल: ceatransplan@gmail.com वेबसाइट: www.cea.nic.in
Sewa Bhawan, R.K Puram-I, New Delhi-110066 **Telephone**: 011-26198092 **Email**:ceatransplan@gmail.com **Website**: www.cea.nic.in

List of addressee:

1. Executive Director(EEM), Railway Board, Room No. 102-A, Rail Bhawan, New Delhi- 110001	2. General Manager, Railway Energy Management Co. Ltd.(REMCL) Ground floor, Central wing, Plot No-1, Sector 29, Gurgaon-122001
3. COO (CTU), PGCIL, Saudamini, Plot No. 2, Sector-29, Gurgaon-122001. Fax No. 0124-2571760/62)	4. CEO, POSOCO B-9, Qutub Institutional Area, Katwaria Sarai, New Delhi-110016
5. Executive Director (System), Damodar Valley Corporation DVC Towers, VIP Road, Kolkata-700054. Tel. 033-23557939 Fax No. 033-23554841	6. Managing Director, Bihar State Power Transmission Company, Vidyut Bhavan, Baily Road, Patna-800021. Tel. 0612-2504442 Fax No. 0612-2504557
7. Managing Director, Jharkhand Urja Sancharan Nigam Limited Engineering Building, H.E.C., Dhurwa, Ranchi-834004. Fax-0651-2400799	8. Director (System Operation), West Bengal State Electricity Transmission Company Ltd, Vidyut Bhavan, 5th Floor, Block-D, Bidhannagar, Sector-II, Kolkata-700091. Fax No.033-23342243
9. Managing Director, Uttar Pradesh Power Corporation Limited (UPPCL), Shakti Bhavan, Ashok Marg, Lucknow, Uttar Pradesh	

Minutes of the meeting related to Connectivity of Railway TSSs with ISTS network in Mughalsarai-Howrah Railway Route, held on 20.04.2017 at CEA.

List of participants is enclosed at Annexure-1.

Member (Power System), CEA welcomed the participants and stated that in an earlier meeting held in CEA on 07.10.2016, in regard to connectivity of Railways with ISTS network for the Mughalsarai - Howrah and the Delhi - Bharuch routes, it was decided that the issue of disconnection or paralleling of Railway TSS with STU network, would be further studied. To discuss the matter, the meeting was being held.

The following were discussed in the meeting:

1. CE (PSPA-II), CEA informed that Railways has proposed to connect their Traction Sub-stations (TSS) with ISTS points in Mughalsarai-Howrah route. The identified ISTS substations are Patna, Gaya, Maithon, Durgapur, Lakhisarai and Subhashgram. He expressed that simultaneously paralleling of Railway TSS with STU and ISTS network may increase the fault level and would result in stranded infrastructure. He stated that, at present, Railways are getting supply from STU network on this route. He asked Railways about the necessity of another infrastructure for Railways, when they are able to draw power from STU network in a reliable manner.
2. Director (Railways) informed that the decision of Railways to get connected to ISTS network and disconnection from STU network is purely based on economics of getting cheaper power from other sources through ISTS network. He, however, confirmed that they are getting reliable power from STU network. He further informed that the infrastructure for Railways connectivity to STU network was funded by Railways and built by respective STUs as a deposit work for Railways. As per the contract agreement with STUs, the assets are maintained by STUs.
3. Member (Power System), CEA requested Railways to share the economic analysis of shifting of Railway load from STUs/DVC to ISTS in this route. Director (Railways) said that he would send the report immediately.
4. D.C.E (DVC) stated that Railways connectivity to DVC network (from generator point upto 25 kV system) was created and funded by DVC and not by Railways. At present total Railway load of DVC is about 320MW, which they supply to Railway, at an average cost of Rs.4.80/ unit. Which is quite competitive price considering the higher reliability of power supply from two sources specially for Railways. He also stated that DVC has already tied up for generation projects and made investment in transmission considering recent specific request from the Railways. Hence, proposal of Railways to disconnection from DVC would result these infrastructure, as redundant

and investment as non-performing asset for DVC. Before agreeing to Railways proposal based on their economic consideration, economic aspects of DVC/STUs should also be considered.

5. Director (Railways) agreed with the DVC statement and stated that considering above facts, the case of DVC would be resolved mutually. However, he further added that the scheme for disconnection in Mughalsarai-Howrah route have been planned in a holistic way and as per plan , Railway would be disconnected from DVC also on this route. He said that these disconnections would be carried out in accordance with the agreements between Railways and the STUs/DVC. He indicated that Railways can disconnect from STU/DVC, giving legal notice as per these agreements.
6. Chief Engineer (PSPA-II), CEA stated that Railways may intimate the STUs and DVC regarding the date from which Railways would likely to disconnect, so that they plan for utilization of those network for other purposes, if possible. Representative of Railways replied that the disconnection may takes place in around (3-5) years time. Railways said that they can send advance intimation to STUs for disconnection, once the scheme of connection with ISTS gets agreed in the Standing Committee of CEA.
7. Director(BSPTCL) stated that Railways connectivity network with STU were built as deposit work by STU for Railways, however as per the legal agreement, the infrastructure belongs to the STU. He added that the load of Railways TSS would be around 80 to 100 MW at each 220 kV point and this would lead to under-utilisation of bays/lines/space at each ISTS points and thus is not an optimal planning as per the Electricity Act. He added that space for 2 No. 220kV Bays at ISTS S/s have been kept for future expansion of states and in this case the user would be only the Railways and thus no space would be left for STUs to meet their future requirement.. He also informed that there is no space at Patna and Gaya ISTS S/s for Railways connectivity.
8. Chief Engineer (UPPTCL) stated that the infrastructure for Railways was created considering Railways as important customer in UP. Now after disconnections, bays etc would have to be utilised for other purposes. In future, if railways again requires connectivity from STUs, this would not again be allotted to them.
9. AGM (POSOCO) expressed that for reliable supply to Railways, the STU and ISTS network may be kept in parallel. This would be, as per CEA's Planning Criteria of Power System Planning for important loads. Chief Engineer (PSPA-I), CEA stated that generally connectivity from two points i.e both STU and ISTS are not recommended. Two connectivity's for Railways, however can be considered either from STU or ISTS. GM(REMCL) Railways stated that they have planned their connectivity to TSS from two ISTS supply points and shared their scheme (a copy of which is given at Annex-II)

10. Director (BSPTCL) stated that Railways load at Bihar would be around 200MW. Recently, Bihar have allowed open access for 50MW to Railways and the remaining may be granted gradually. He stated that state network would become stranded after building Railway network with ISTS. This would be national wastage of resources and Public money. He added that Railways may be advised to again look into the economics of connectivity to ISTS points, as many of the states have already granted/ are in the process of granting NOC for open access and as such there is no justification for getting connected with ISTS.
11. Regarding control area for scheduling, metering and deviation, AGM(POSOCO) informed that as per CERC order, there would be two control areas, in each state i.e.one for RLDC and the other for SLDC(if they have connections from STUs also) for above purposes.
12. It is noted that no representative from West Bengal and Jharkhand was present in the meeting.
13. On the basis of above following was concluded.

i. Railways has to share the economic analysis of shifting of Railway load from STUs/DVC to ISTS in this route, which is basis of their proposal. Representative of Railways intimated that they would soon send the report.

ii. As the transmission system is planned in an integrated manner, Railways were advised to again look into the economics of connectivity to ISTS points, as many of the states have already granted /are in the process of granting NOC for open access.

iii. Transmission system for delivery of power to Railways need to be planned in according with the Electricity Act 2003 and thus taken up for discussion with Standing Committee constituted by CEA.

iv. No representative from West Bengal and Jharkhand was present in the meeting.

Meeting ended with vote of thanks to the Chair.

Annexure-I

List of the participants of the meeting held on 20.04.2017 at CEA

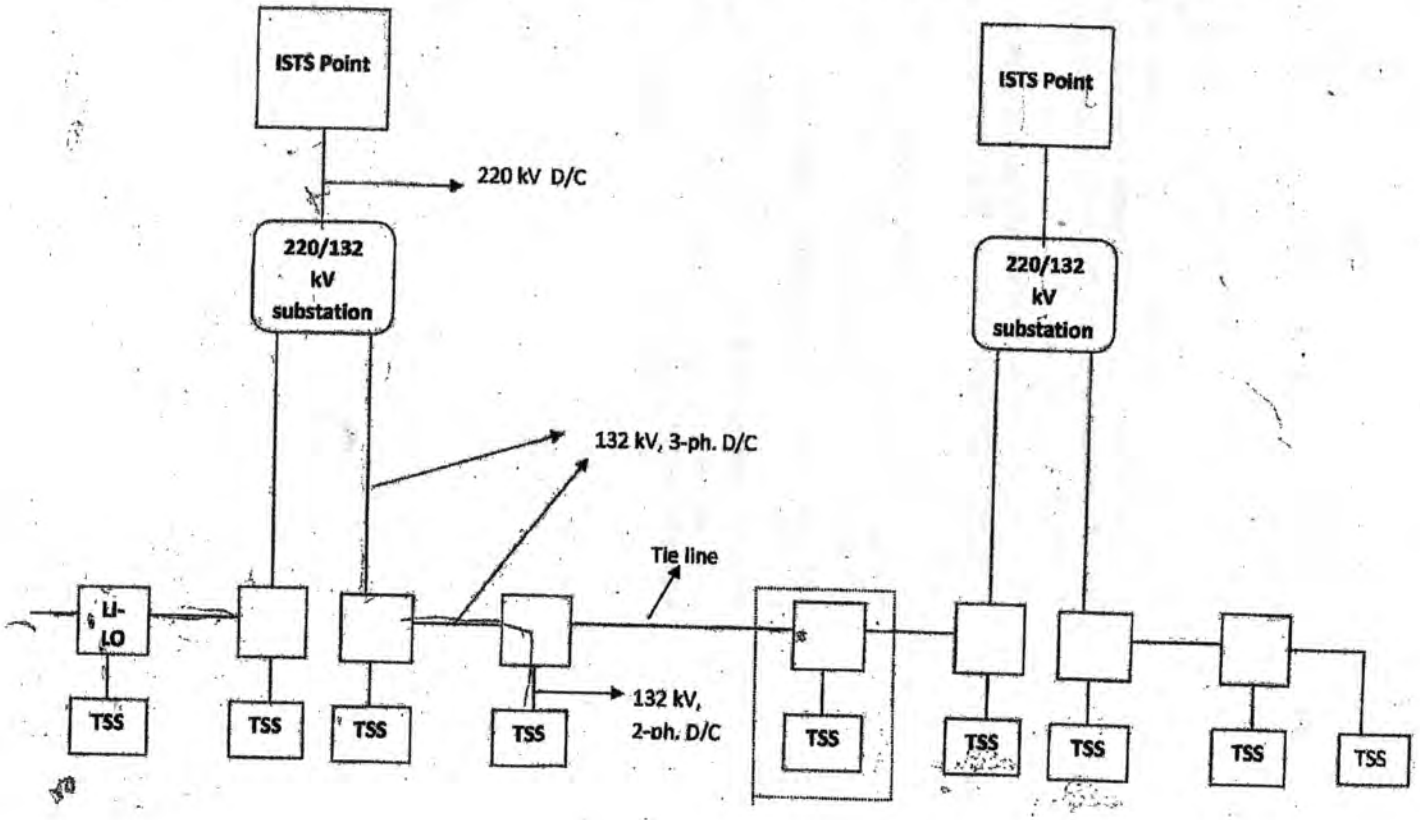
Sl. No.	Name of the Participant	Designation	Organization
1	K.K.Arya (**In chair**)	Member(Power System)	CEA
2	Pardeep Jindal	Chief Engineer, (PSPA-II)	CEA
3	Rishika Sharan	Director, (PSPA-II)	CEA
4	U.M.Rao	Dy. Director, (PSPA-II)	CEA
5	S.A.Verma	Asst. Director-I	CEA
6	Punit Agrawal	Director(Power Supply)	Ministry of Railways
7	J.C.S.Bora	G.M.	REMCL
9	Bhaskar Sharma	Director(Project)	BSPTCL
10	Suman Guchh	C.E.(Transmission)	UPPTCL
11	Subir Bhada	D.C.E (E)	DVC
12	Sangita Sil	S.E.(E)	DVC
13	S.S.Barpanda	AGM, NLDC	POSOCO
14	Ram Chandra	DGM(CTU-Plg)	POWERGRID

Summary of proposed transmission scheme is as under:

- Supply from the PGCIL substation shall be taken at 220 kV (or at 132 kV if available) through 2 no. bays.
- Supply from PGCIL substation shall be taken to 220/132 kV substation (to be constructed) through D/C lines. Land of size about 240x60 m shall be required for the 220/132 kV substation.
- From 220/132 kV substation, 132 kV supply shall be extended to up as well as down directions of the Railway line through D/C lines.
- On one direction 132 kV line shall feed about 3 TSS. Loop in Loop out arrangement shall be made at the existing TSS for extending supply to next TSS. Alternatively (in case of ROW problem near existing TSS) 2-Φ, 132 kV Supply from the above 3-Φ, 132 kV line shall be extended to the TSS from a Tee-off point to be constructed at open space near the TSS.
- One 220/132 kV substation and group of TSSs supplied through it shall be controlled through SCADA centre at the 220/132 kV substation.
- Group of two TSSs shall be protected by a common numerical distance protection relays to be provided at the 220/132 kV substation or at the selective TSS.
- Two Hot line communication channels shall be made available between each of the 220/132 kV substation and the TSS in that element and nodal Traction power control (TPC) of the element. Two Hot line links shall also be made available between two adjacent 220/132 kV substations and respective ISTS point.

PROPOSED SCHEME OF CONNECTIVTY OF TSS WITH ISTS POINT

Note: LILO can be within the TSS or out of TSS based on Land and ROW availabiliy



GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
RAILWAY BOARD

No.2012/Elect(G)/150/1 Pt.II New Delhi, Dated: 25.04.2017

Central Electricity Authority,
Ministry of Power, Government of India,
Power System Planning & Appraisal Division-II,
Sewa Bhawan, R.K.Puram, New Delhi-110066

Sub: Connectivity for availing power supply of 220 kV at ISTS points on Delhi-Bharuch and MGS-HWH routes of Indian Railways.
Ref: CEA's letter No. 200/16/PSPA-II/2017/290 dt. 10.04.17.

In reference to above opinion of Indian Railways regarding disconnection/paralleling of TSS on these two routes from existing STU has been sought. On the matter of disconnection of TSS from existing STU network, a meeting was held in CEA on 20.04.17 at CEA wherein these issues were discussed in detail. In this reference railway will like to get disconnected from existing STU network and shall connect its TSS to the proposed ISTS transmission line network of railways. Matter may be examined for identification of suitable ISTS locations connecting TSS on these two routes.

Details of the proposed transmission scheme is attached as Annexure-I for appreciation.

25/4/17

(Punit Agrawal)
Director Electrical Engg. (PS)
Railway Board

Copy to: CEO/REMCL- for kind information please.

Annexure-I
Page 1

Summary of proposed transmission scheme is as under:

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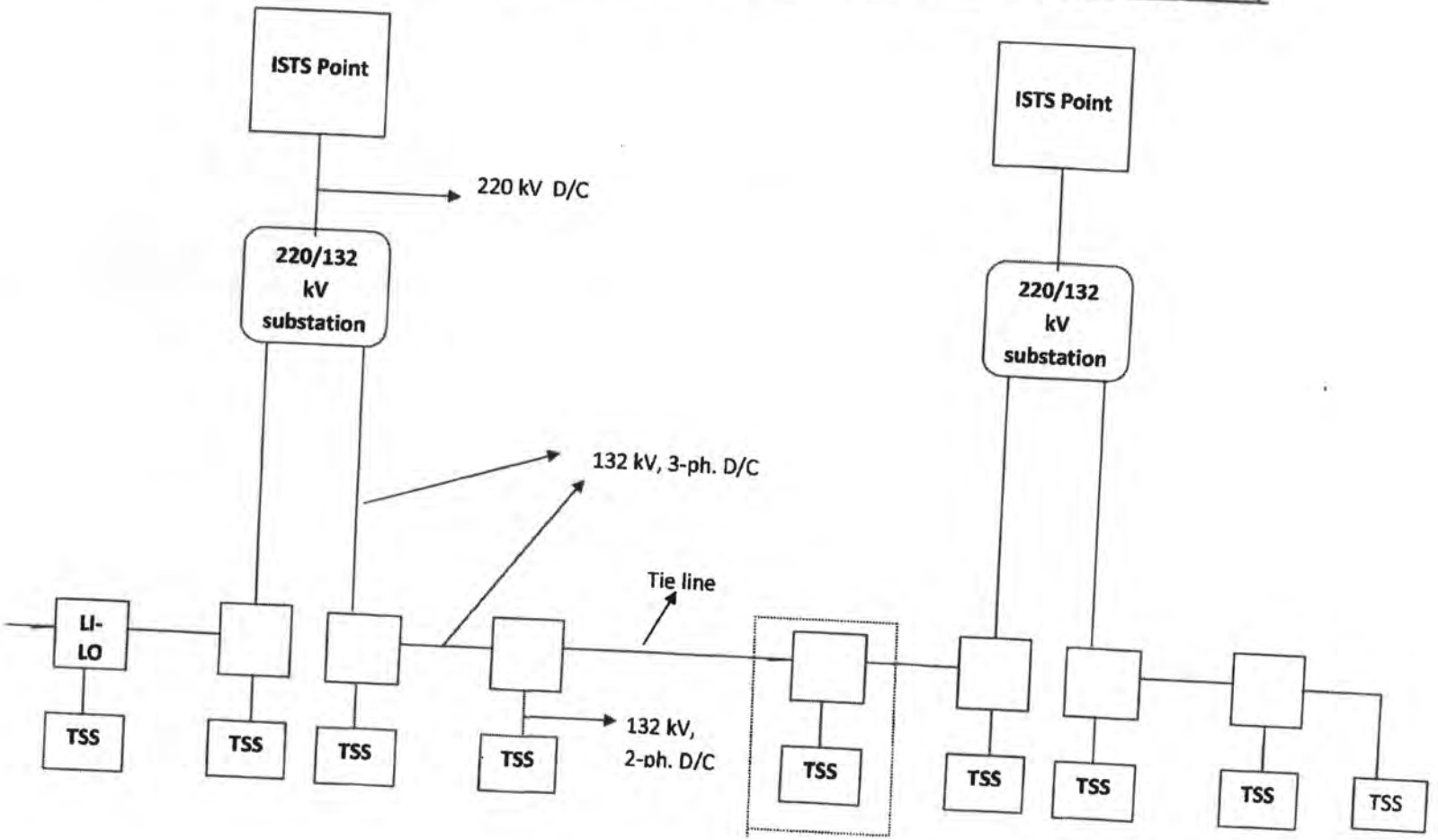

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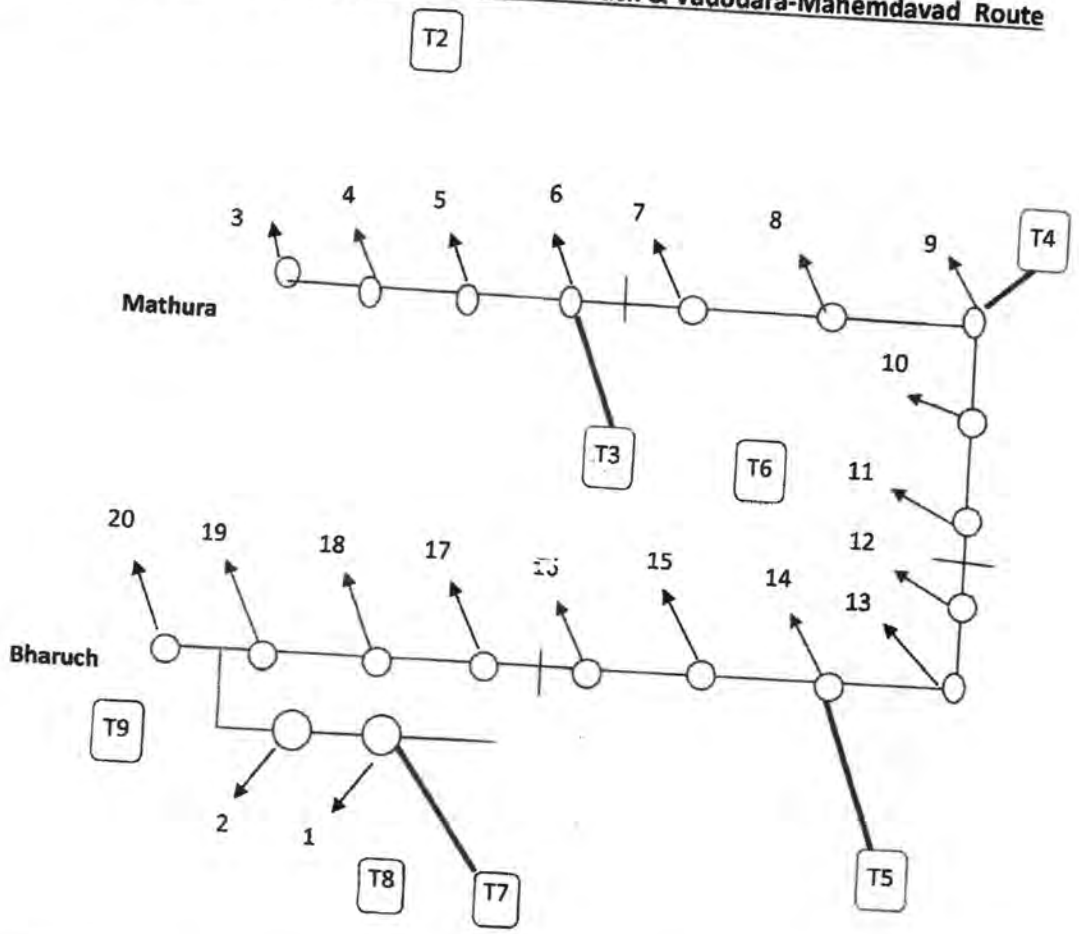
Annexure-I

Page 3

Indicative Single Line Diagram of TSS in Mathura-Bharuch & Vadodara-Mahemdavad Route



List of TSS in DLI-BH route								
No.	Location	Voltage	No.	Location of	Voltage	No.	Location	Voltage
1	Mahmedabad	132	8	Lakheri	132	15	Dahod	132
2	Anand	132	9	Gudla	132	16	Limkedha	132
3	Mathura	132	10	Ramganjmandi	132	17	Godhra	132
4	Bharatpur	132	11	Suwasra	132	18	Samlaya	132
5	Hinduan City	132	12	Nagda	132	19	Makarpura	132
6	Gangapur City	132	13	Ratlam	132	20	Bharuch	132
7	Sawaimadhopur	132	14	Bamania	132			132

Nearby ISTS points					
No.	Location	No.	Location	No.	Location
T1	Ballabhgarh	T4	Kota	T7	Dehgam
T2	Agra	T5	Rajgarh	T8	Pirana
T3	Bassi	T6	Indore	T9	Vadodara

Annexure-V

Indian Side

Transmission Line

(a) Gorakhpur New – New Butwal 400kV D/c (Quad Moose) line (Indian Portion) – 120km

(b) LILO of Gorakhpur – Lucknow 400kV D/c line (**ckt-3 & 4**) at Gorakhpur-New – 5km

Substation

(a) Establishment of **Gorakhpur-New** 400kV Switching station

- **400kV Line bays: 6 nos.**
- 4 nos. 400kV line bays for the termination of LILO of Gorakhpur – Lucknow 400kV D/c line (**ckt-3 & 4**)
- 2 nos. 400kV line bays for the termination of Gorakhpur New – New Butwal 400kV D/c (Quad) line
- **Reactive Compensation**
- 420kV, 2x125 MVAR bus reactors along with associated bays
- Shifting of 63MVAR switchable line reactor at Gorakhpur end of Gorakhpur – Lucknow 400kV D/c line (**ckt-3 & 4**) to Gorakhpur-New end (to be installed as switchable line reactor) of Gorakhpur-New – Lucknow 400kV D/c line [formed after LILO mentioned at 1.1 (b)]
- **Space for future**
- 400kV line bays (incl. space for sw. line reactor): 10 nos.
- 400/220kV, 3x500MVA ICT
- 400kV ICT bays: 3 nos.
- 220kV ICT bays: 3 nos.
- 220kV line bays: 12 nos.

Nepalese Side

Transmission Line

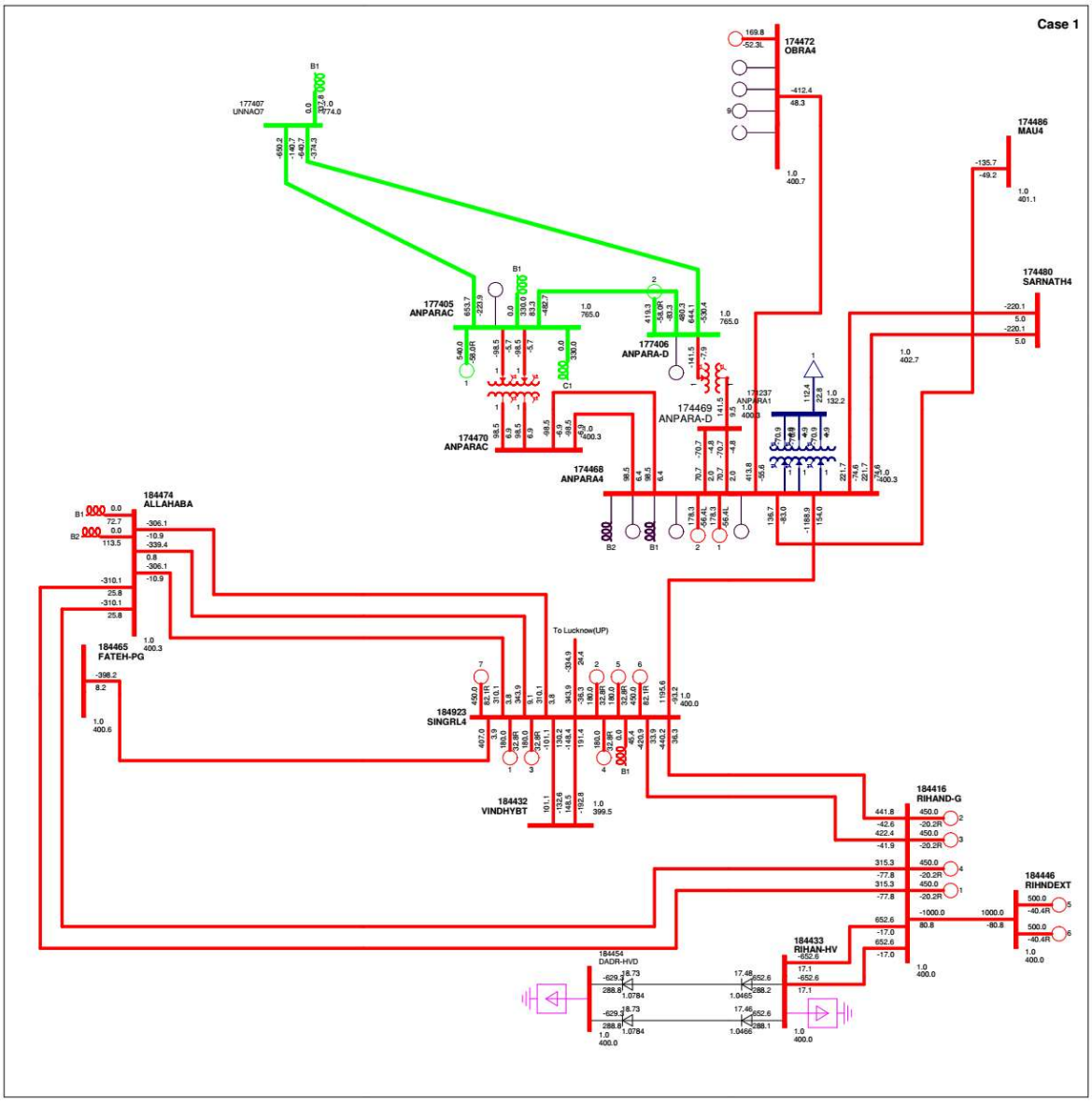
(a) Gorakhpur New – New Butwal 400kV D/c (Quad Moose) line (Nepalese Portion) – 20km

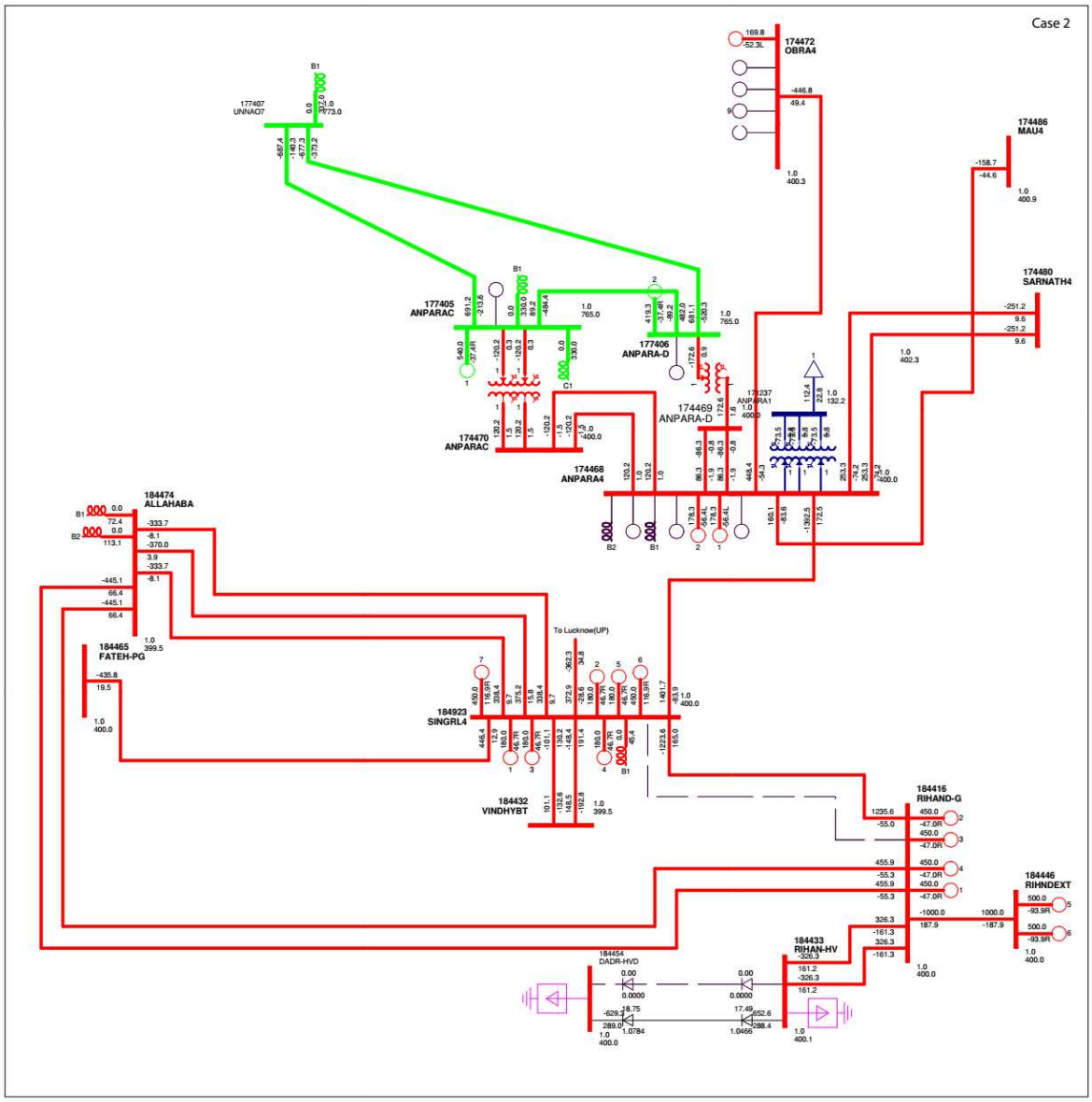
Substation

(a) Up-gradation of **New Butwal** S/s to 400kV

- Creation of 400kV level and Installation of 400/220kV, 2x500MVA ICT along with associated bays
- **400kV Line bays: 2 nos.**
- 2 nos. 400kV line bays along with 420kV, 50MVAR switchable line reactors in each bay for the termination of Gorakhpur New – New Butwal 400 kV D/c (Quad) line
- **Reactive compensation**
- 420kV, 2x125 MVAR Bus reactors along with associated bays
- **Space for future**
- 400kV line bays (incl. space for sw. line reactor): 8 nos.
- 400/220kV, 2x500MVA ICT
- 400kV ICT bays: 2 nos.
- 220kV ICT bays: 2 nos.
- 220kV line bays: 8 nos.

Capacity enhancement of Rihand- Dadri HVDC from 1500MW to 2500MW

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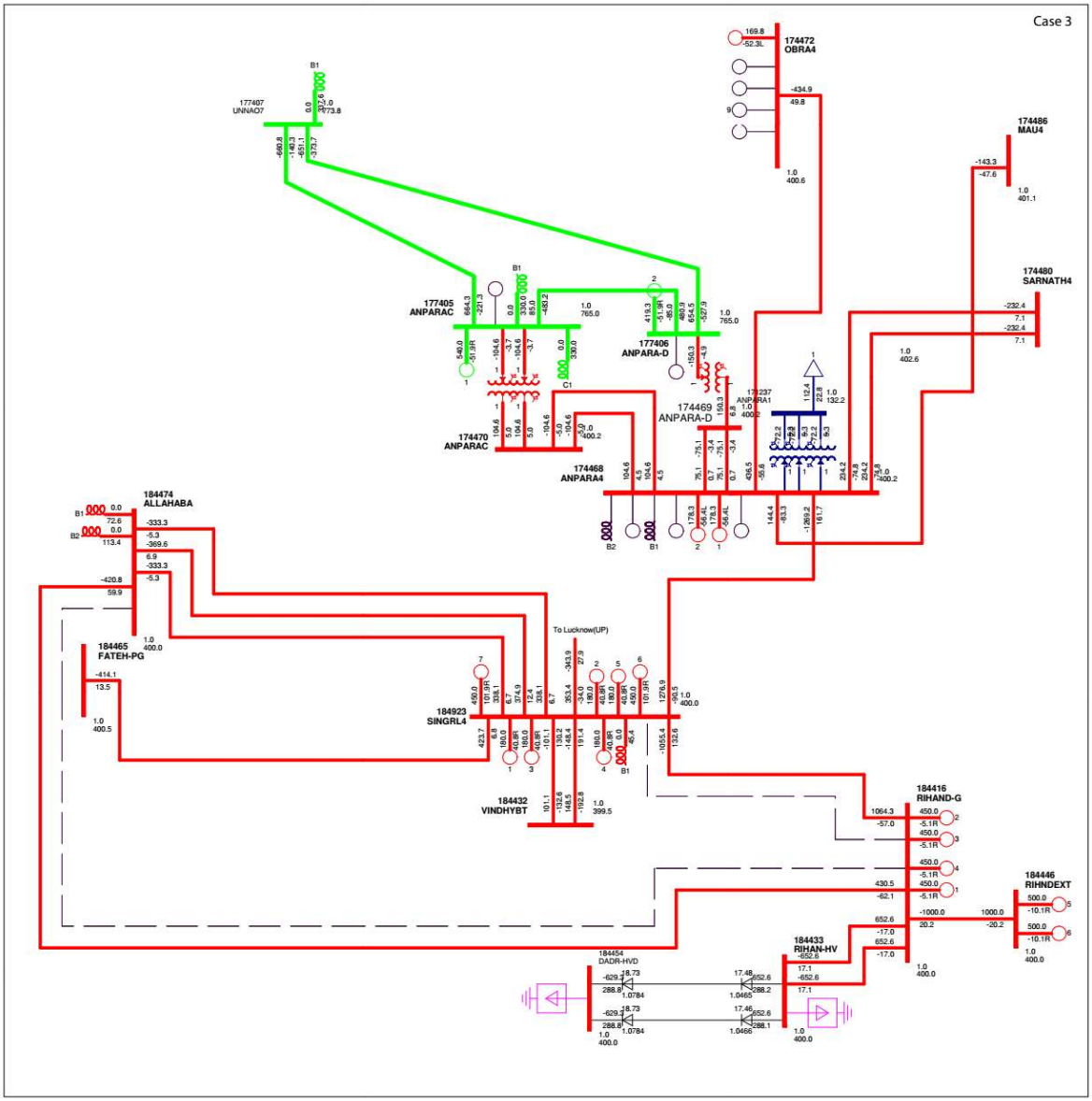
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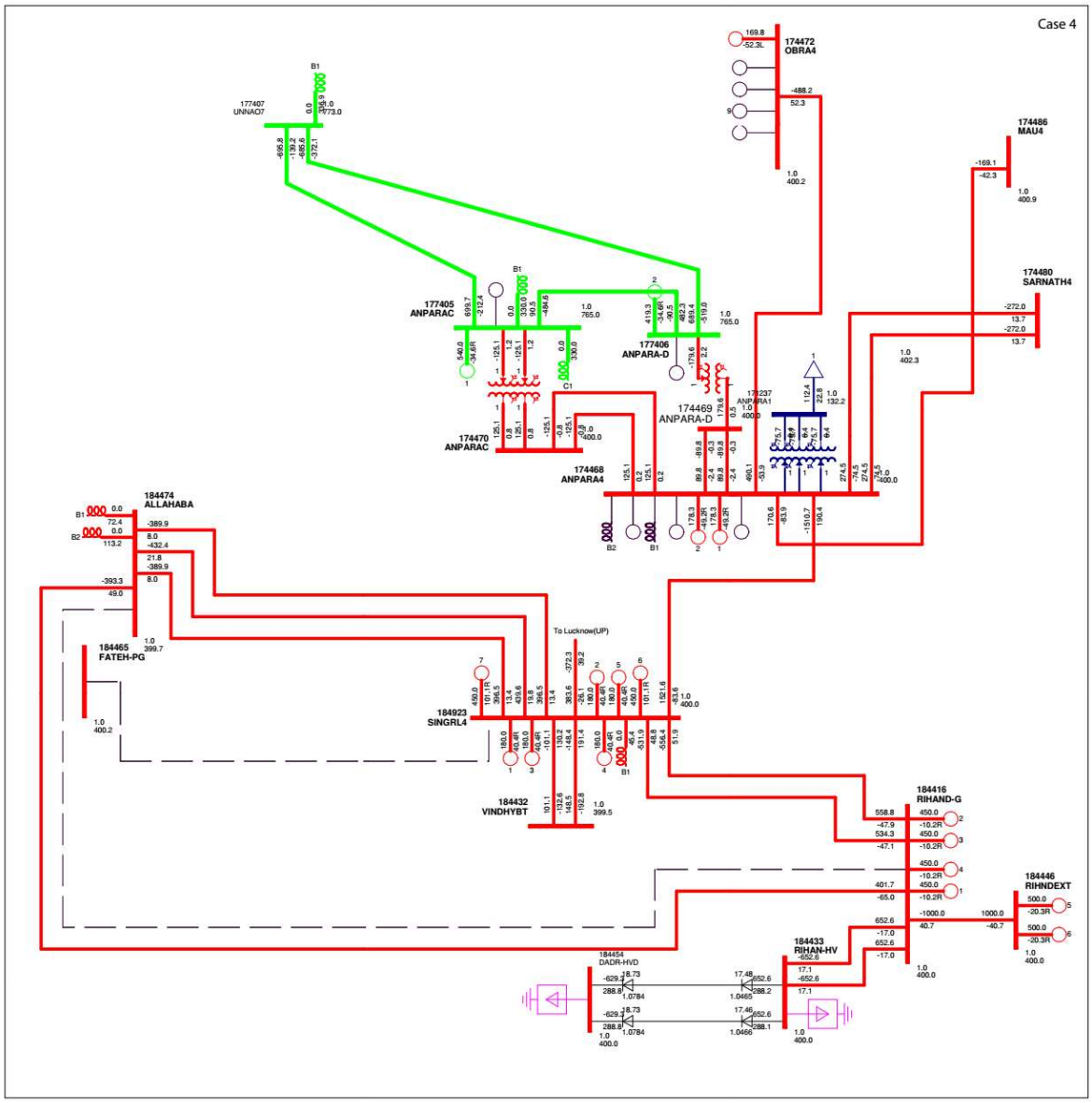
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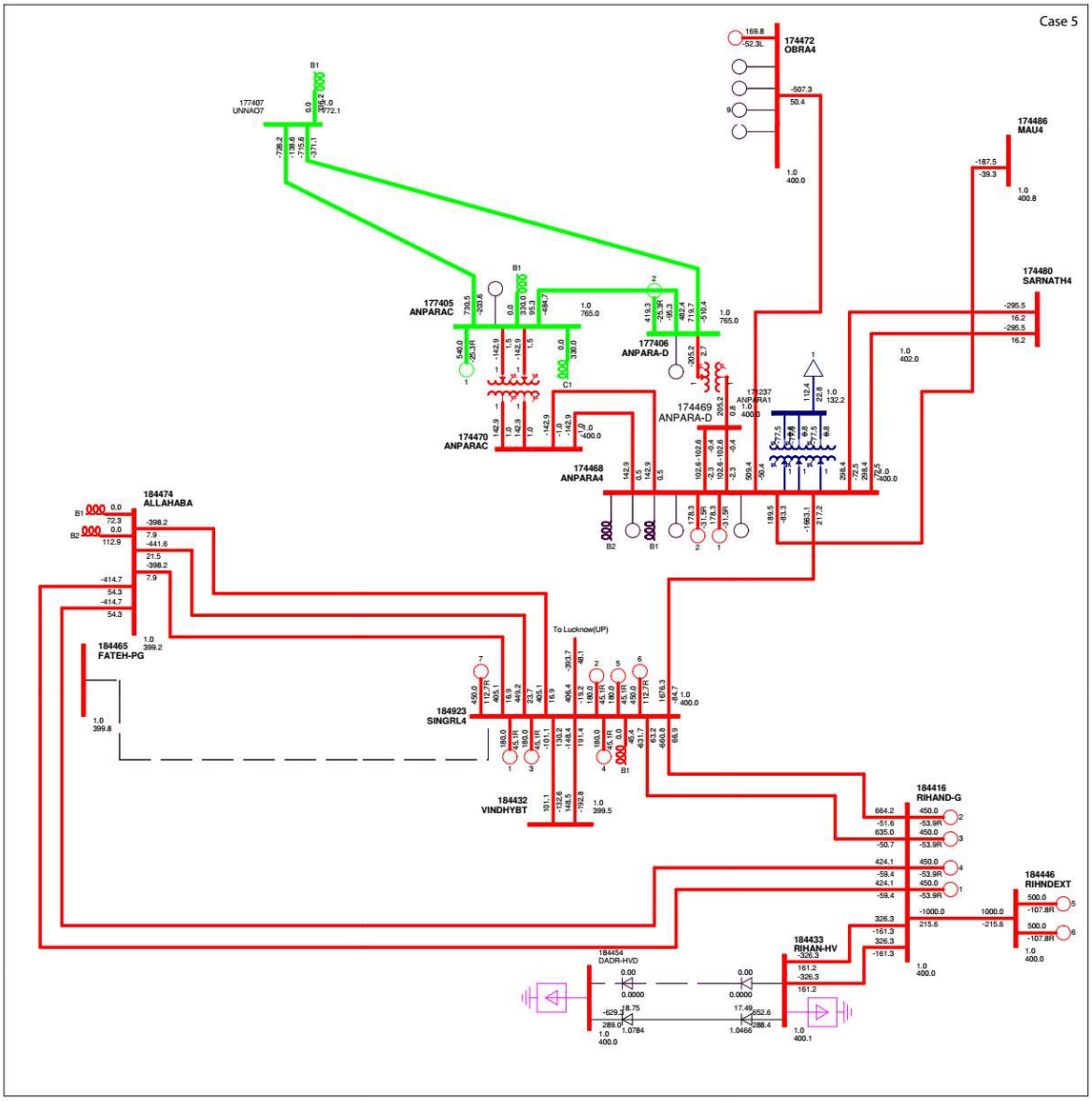
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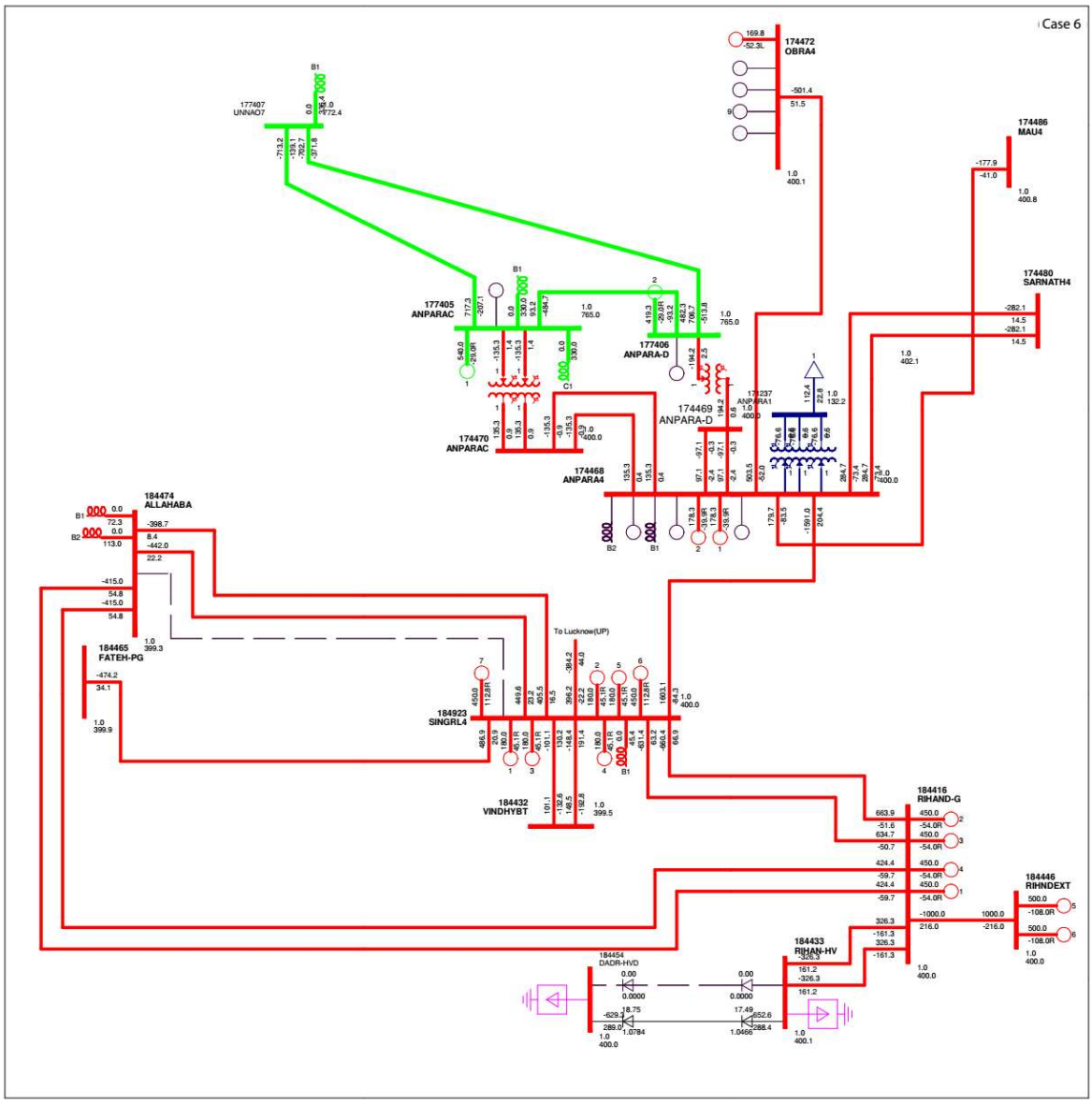
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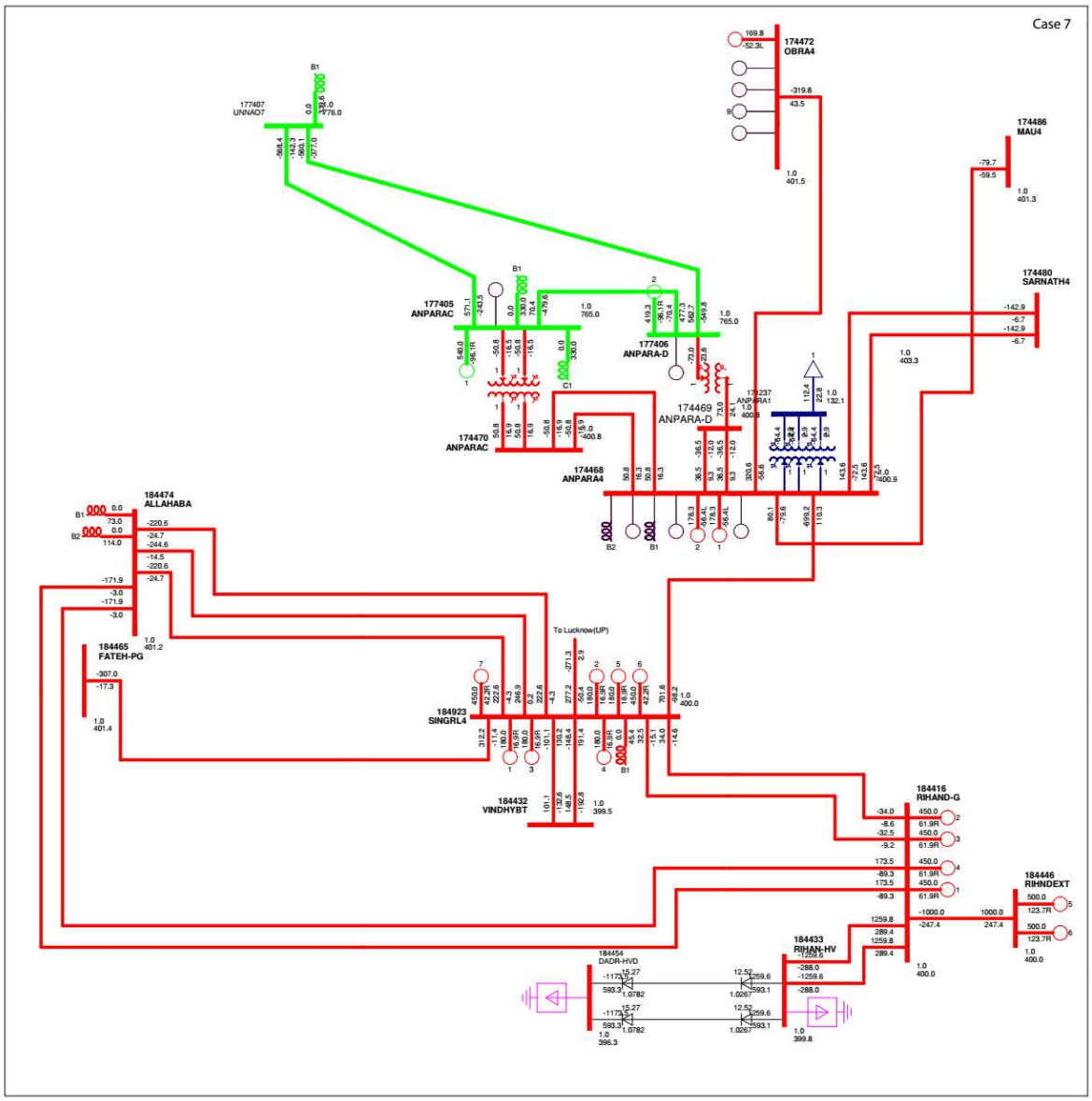
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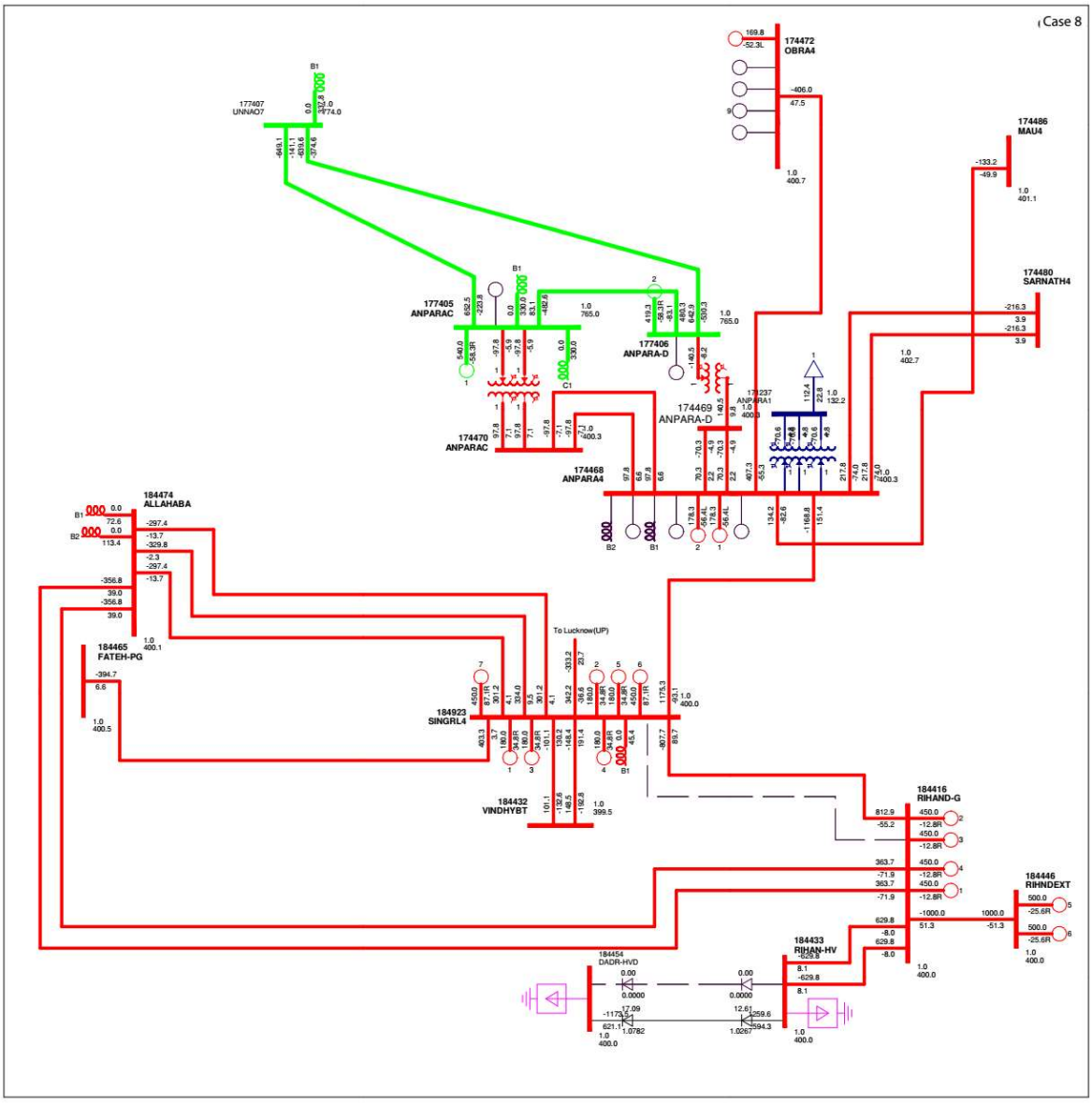
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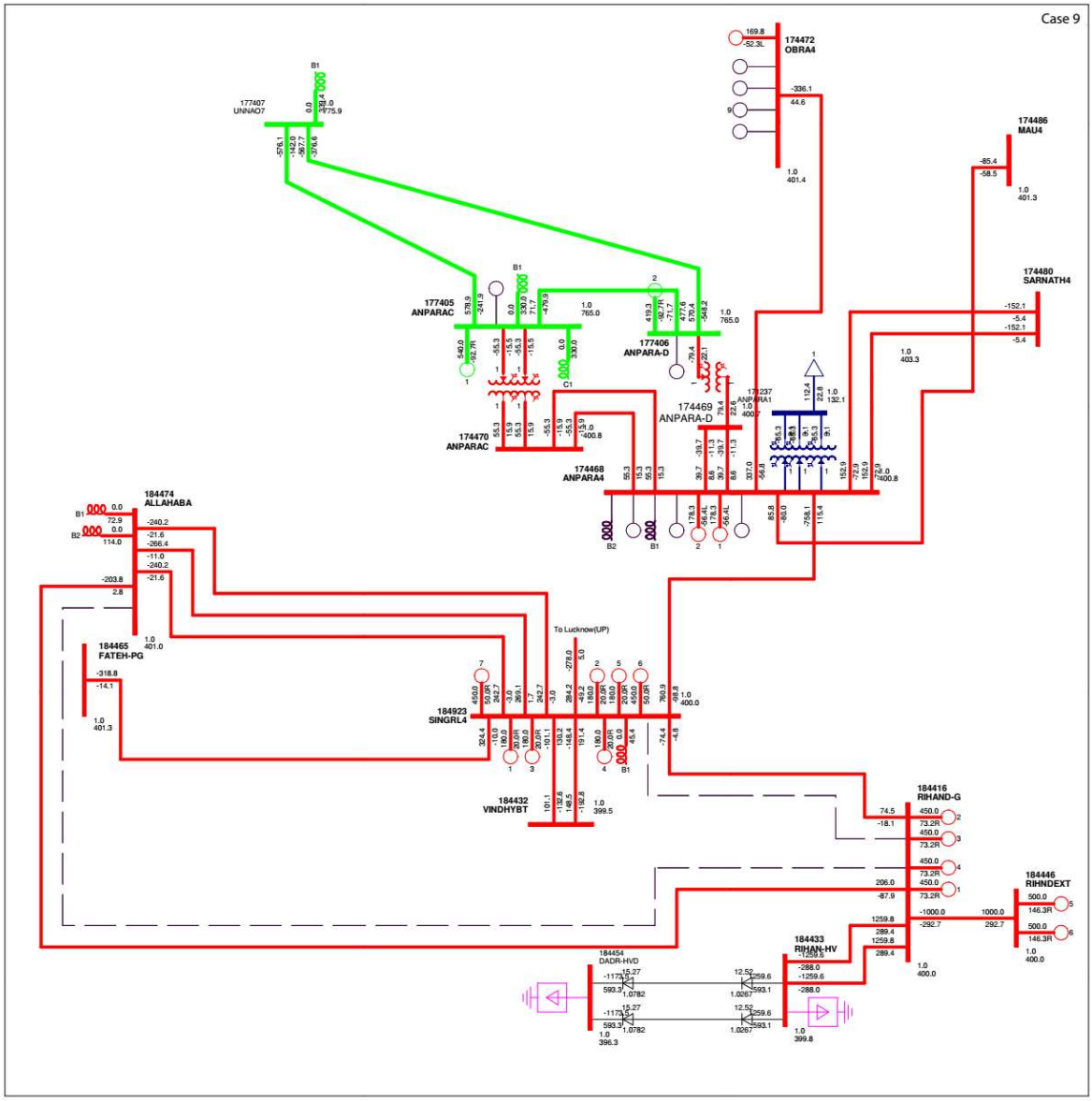
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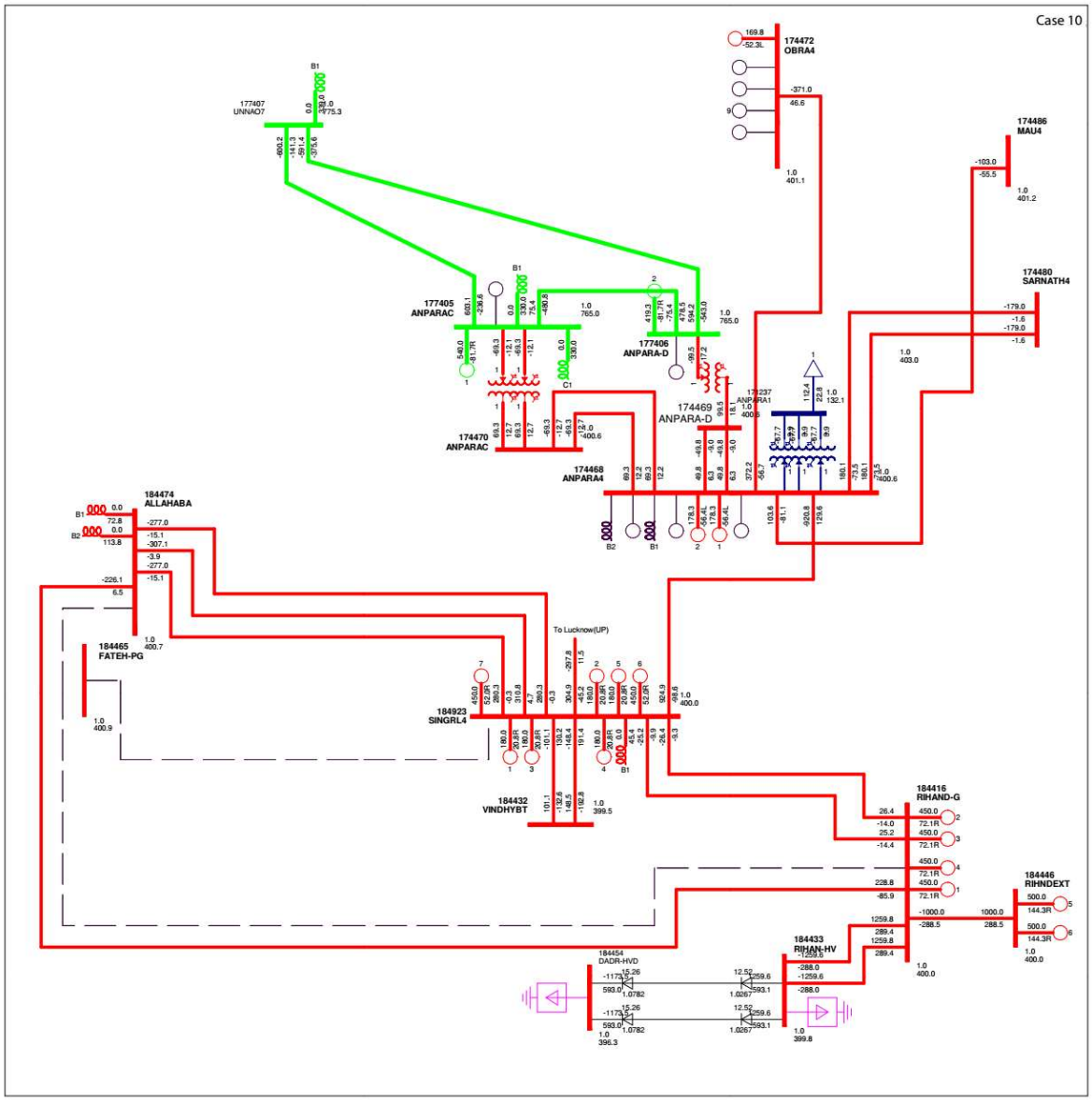
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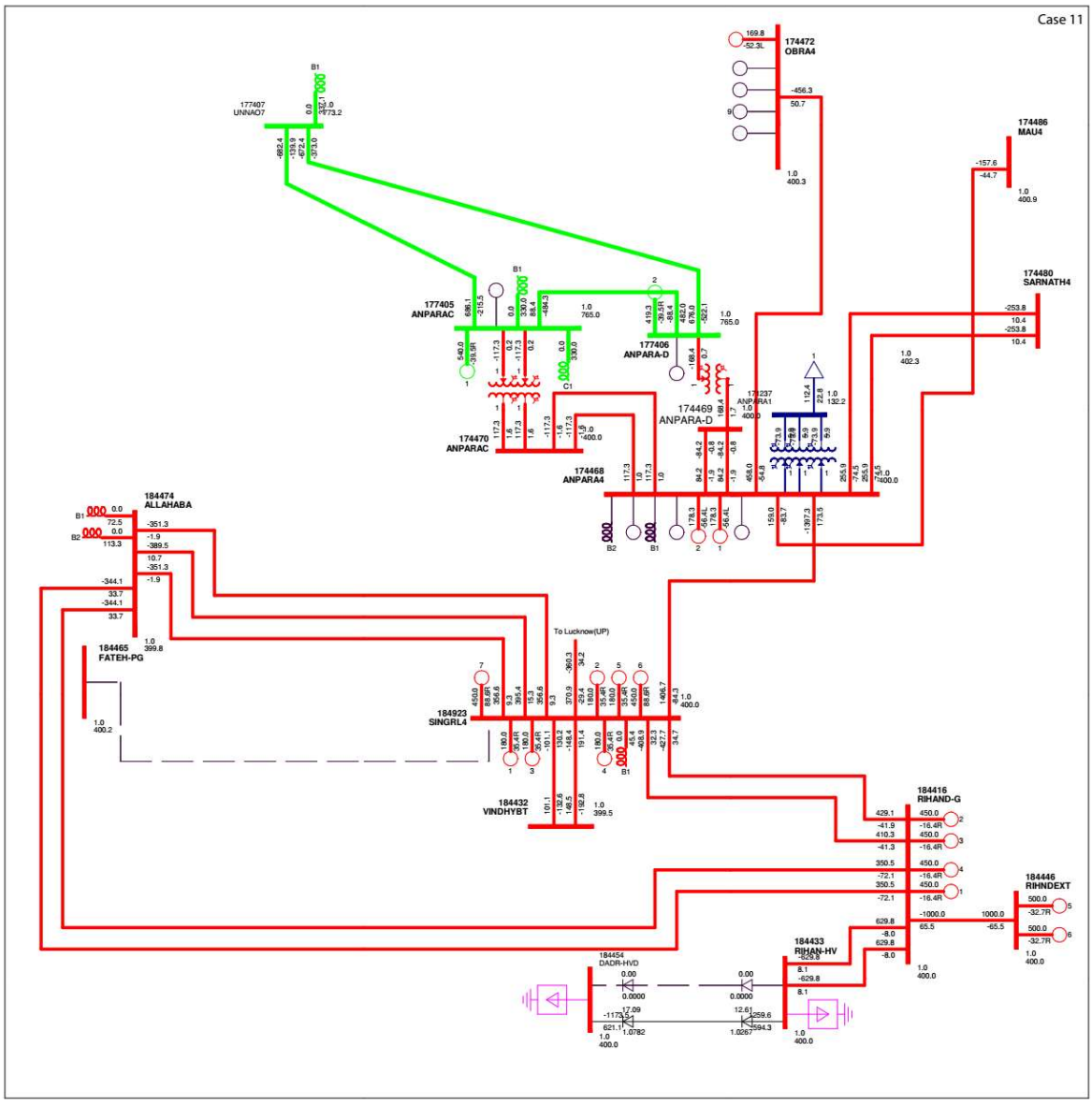
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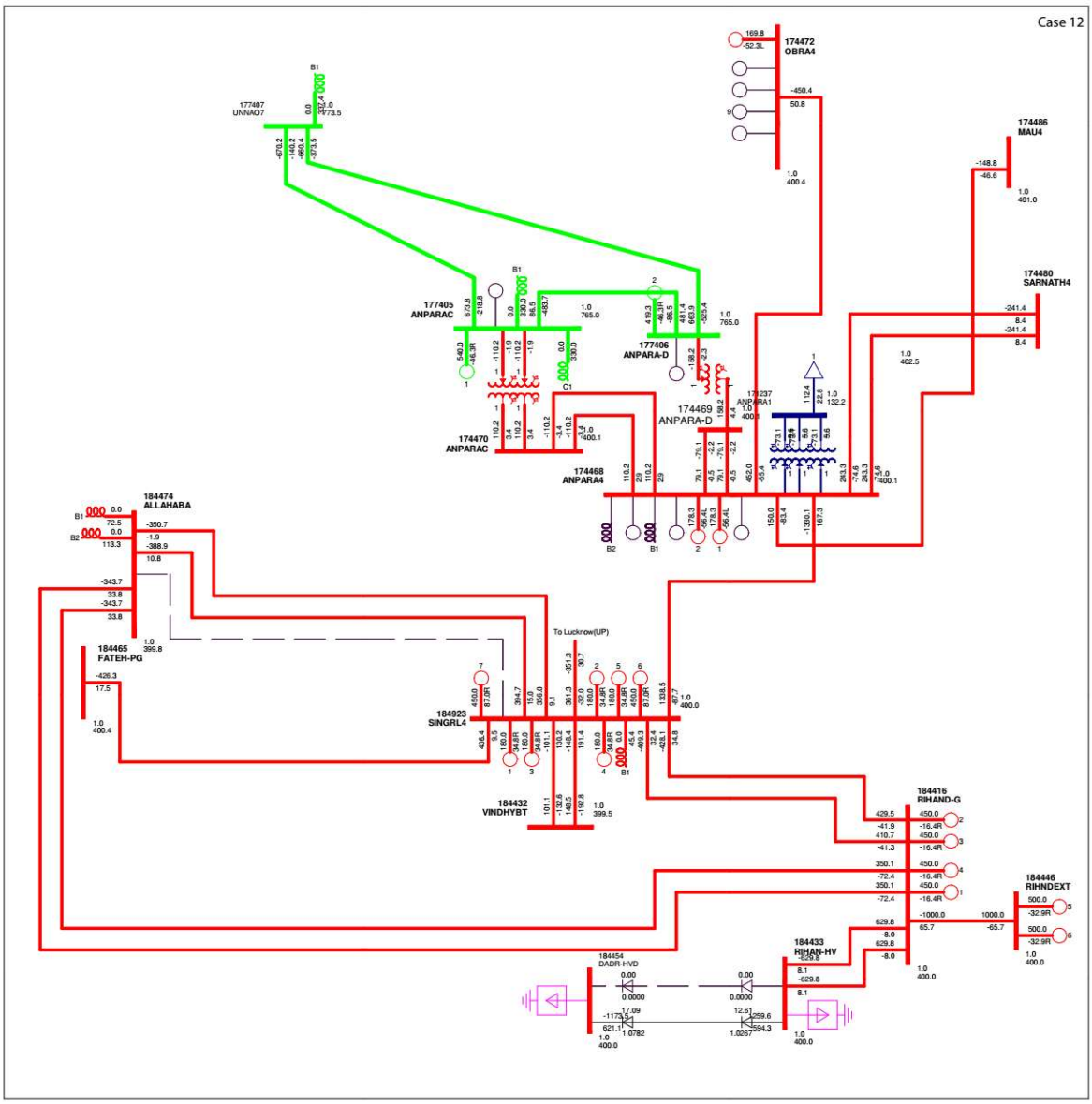
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174472
OBRA4
174486
MAU4
174480
SARNATH4
177405
ANPARAC
177406
ANPARA-D
174469
ANPARA-D
174470
ANPARAC
174468
ANPARA4
184474
ALLAHABA
184465
FATEH-PG
184923
SINGRL4
184432
VINDHYBT
To Lucknow(UP)
184416
RIHAND-G
184446
RIHNDEXT
184433
RIHAN-HV
184454
DADR-HVD