भारत सरकार / Government of India
विद्युत मंत्रालय / Ministry of Power
केन्द्रीय विद्युत प्राधिकरण / Central Electricity Authority
विद्युत प्रणाली योजना एवं परियोजना मूल्यांकन प्रभाग - I
सेवा भवन आर के पुरम नई दिल्ली–110066 [ISO: 9001:2008]
वेबसाइट : www.cea.nic.in

क॰ सं : 26/10/2016/ वि प्र. यो. & प. मू -I/ 681–694 दिनांक: 30.11.2016

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विषय :– पश्चिमी क्षेत्र विद्युत प्रणाली योजना की स्थाई समिति की 41 वीं बैठक की **कार्यसूची** ।

महोदय / महोदया ,

पश्चिमी क्षेत्र के विद्युत प्रणाली योजना की 41 वीं स्थायी समिति की बैठक की कार्यसूची केन्द्रीय विद्युत प्राधिकरण की वेबसाइट www.cea.nic.in के लिंक http://www.cea.nic.in/compsplanning.html (i.e. Home page-Wings-Power Systems-PSP&PA-I - Standing Committee on Power System Planning-Western Region) पर उपलब्ध है। स्थान एवम दिनांक शीघ्र ही सूचित किया जाएगा।

भवदीय
के के आर्या
(के के आर्या)
मुख्य अभियंता

संलग्न – उपरोक्त

भारत सरकार / Government of India
विद्युत मंत्रालय / Ministry of Power
केन्द्रीय विद्युत प्राधिकरण / Central Electricity Authority
विद्युत प्रणाली योजना एवं परियोजना मूल्यांकन प्रभाग - I
Power System Planning & Project Appraisal Division-I
सेवा भवन आर के पुरम नई दिल्ली–110066
Sewa Bhawan, R. K. Puram, New Delhi-110066 [ISO: 9001:2008]
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No. 26/10/2016/PSP&PA-I/ 681-694 Date: 30.11.2016

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Sub: Agenda notes of 41st meeting of the Standing Committee on Power System Planning of Western Region

Sir / Madam,

The agenda notes of 41st Standing Committee meeting on Power System Planning of Western Region is available on CEA website (www.cea.nic.in at the following link: http://www.cea.nic.in/compsplanning.html i.e. Home page-Wings-Power Systems-PSP&PA-I - Standing Committee on Power System Planning-Western Region). The date and venue would be intimated separately.

Yours' faithfully,

(K K Arya)
Chief Engineer

Enclosures: as above

Agenda notes for the 41st Meeting of Standing Committee on Power System Planning in Western Region

1. Confirmation of the minutes of 40th meeting of the Standing Committee on Power System Planning in Western Region (SCPSPWR) held on 01.06.2016 at NRPC, Katwaria Sarai, New Delhi

1.1. The minutes of the 40th SCPSPWR were issued vide CEA letter No.26/10/2016/PSP&PA-I/ 269 – 282 dated 24.06.2016.

1.2. No comments have been received on the same. Thus the committee confirm the above minutes of 40th SCPSPWR.

2. Review of Progress on Earlier Agreed Transmission Schemes

2.1. The status of implementation of transmission projects under tariff based competitive bidding in Western Region are enclosed at Annexure – 2.1. The status of transmission schemes under implementation by POWERGRID in Western Region is enclosed at Annexure – 2.2.

Members may deliberate.

3. Installation of 400/132 kV transformers at Champa Pooling Station as part of WR – NR HVDC Interconnector for IPP projects in Chhattisgarh- agenda by POWERGRID

3.1. In the 32nd meeting of Standing Committee on power system planning in WR held on 13.05.2011, installation of 400/132/33 kV, 2 X 200 MVA transformers along with 2 nos. 132 kV line bays at Champa Pooling station to facilitate 33 kV auxiliary power supply to ± 800 kV, 6000 MW (initially planned to operate at 3000 MW) HVDC at Champa Pooling Station was agreed. However, its implementation was not taken up by POWERGRID in view of availability of two independent auxiliary supplies for HVDC system available through the tertiary of the two 1500 MVA, 765/400/33 kV transformers at Champa Pooling Station. Therefore, installation of 400/132/33 kV, 2 X 200 MVA transformers along with 2 nos. 132 kV line bays at Champa Pooling station is proposed to be dropped.

Members may deliberate.

4. Connectivity System for Surguja Power Private Limited (4x150MW) at Parsa, Chhattisgarh - agenda by POWERGRID

4.1. Connectivity of Surguja Power Private Limited (SPPL) for 490 MW out of 600 MW Installed Capacity was discussed in the 20th Connectivity/Open Access meeting of WR constituents held on 17.02.2015 and following transmission system for connectivity of M/s SPPL was agreed:

- SPPL Switchyard – Dharamjaygarh 400 kV D/C line along with line bays at either end to be implemented by the generation developer matching with the commissioning schedule of the project.
- 1 x 125 MVAR, 420 kV bus reactor to be provided at the generation switchyard by the generation developer.

4.2. Later, M/s SPPL has applied for revision in the connectivity quantum from 490 MW to 550 MW and the same was discussed in the 23rd Connectivity / Open Access meeting of WR constituents held on 01.06.2016. The connectivity intimations issued vide CTU letters dated 07.05.2015 and 29.07.2016 mentioned the connectivity system as SPPL Switchyard – Dharamjaygarh 400kV D/C line and 1 X 125 MVAR, 420 kV bus reactor to be implemented by the generation developer.

4.3. The connectivity intimation does not mention about scope of implementation of the 400 kV bays at either end of the dedicated line and its implementing agency, PGCIL has proposed that the 2 nos. 400 kV line bays at Dharamjaygarh PS and at SPPL switchyard for the dedicated connectivity line shall be under the scope of the generation developer.

Members may deliberate.

5. Overloading of 400 kV Banaskantha – Sankhari D/C line

5.1. In the 40th SCM of WR held on 01.06.2016, the issue of critical loading of Banaskantha - Sankhari 400 kV D/C under n – 1 contingency was discussed and it was decided to carry out that joint system studies amongst GETCO, PGCIL and CEA on the above issue.

5.2. In line with the decision of the standing committee meeting, a joint study meeting was held on 27.07.2016 & 28.07.2016 amongst CEA, PGCIL & GETCO and various alternatives were evolved. Subsequently, the studies were carried out for other than peak demand scenario in 2018 – 19 timeframe, with Solar maximized scenario (100 %), wind dispatch scenario (40%) and considering the new connectivity applications received from RE projects received at Bhuj and Bhachau. The study report is attached at Annexure – 5. The three alternatives studied are as given below:

(i) LILO of 400 kV Zerda – Ranchodpura one line (2nd circuit) at Banaskantha (PG) PS – 30 km (Estimated Cost – Rs 55 Cr)

(ii) LILO of 400 kV Zerda – Soja S/C (existing) at Banaskantha (PG) PS – 35 km (Estimated Cost – Rs 60 Cr)

(iii) 765 kV Banaskantha – Vadodara D/C - 340 km (Estimated Cost – Rs 1400 Cr)

5.3. The study results show that in all above three alternatives cases, the loading on 400 kV Banskantha – Sankhari D/C line under n-1 contingency is within acceptable limit.

Members may discuss.

6. Progress of downstream network whose terminating bays are under construction by POWERGRID

6.1. As per the 5.4. Proviso (iii) of CERC (IEGC) (Fourth Amendment) Regulations, 2016 dated 06.04.2016 i.e.

"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"

In order to match commissioning of Inter-state transmission assets with the schedule of downstream network, STUs are requested to furnish the execution status of downstream network of following transmission system:

6.2. **Status of unutilized 220kV line bays at Existing Substations in WR**

Sl	ISTS Substation	Voltage ratio in use	Status of Bays	220kV Lines emanating from Substation	No of ckt	Status of 220kV lines
1	Raipur (PG)	3x315MVA, 400/220 kV	2no Bays ready since 01.07.2011 (WRSS-6)	Raipur (PG) – Doma 220 kV D/c	2	CSPTCL may update
2	Mapusa (PG)	3x315MVA, 400/220kV	2 nos Bays ready since : 01.11.2013	Mapusa – Cuncolin 220 kV D/c	2	GED may update
3	Pirana	2x315MVA, 400/220kV	2nos Bays ready since 19.03.15 (WRSS-6)	Pirana – Barjadi 220 kV D/c	2	GETCO may update
4	Boisar	2x315 +500MVA, 400/220kV	1no Bays ready since 30.05.15	Boisar – STU line S/c	1	MSETCL may update
5	Magarwada	2x315MVA, 400/220kV	2nos Bays ready since 03/11/14	Magarwada – Ringanwada 220 kV D/c	2	D&D may update
6	Wardha	2x315MVA, 400/220kV	2 nos Bays ready since 01.02.2011 & 2 nos Bays ready since 01.01.2012	Wardha – Pusad220kV S/c	1	MSETCL may update
				Wardha – Bhugaon 220 kV S/c	1	MSETCL may update
				220 kV 2 circuits	2	MSETCL may update
7	Solapur	2x315 +1x500MVA, 400/220kV	2 nos Bays ready since 01.04.2011 & 2 nos Bays ready since 02.11.2015	Solapur – Bhale (MS) 220kV D/c	2	MSETCL may update
				Solapur – Bhalwane (MS) 220 kV D/c	2	MSETCL may update

6.3. **Status of Under Construction 220 kV line bays at New Substations / Substation Extensions in WR**

S. No.	ISTS Substation	Proposed Bays	Commissioning Schedule	220kV Lines emanating from Substation	No of ckt	Status of 220kV lines	Remarks
1	Betul GIS 2x315 MVA, 400/220 kV	4	Sep'16 (Mauda-II)	STU line	2	UC	MPPTCL may update
				STU line	2	UC	

2	Morena (TBCB) 2 x 315, 400/220 kV	4	May'18 (Chhattisgarh & WR SS)	STU line	4	Planned	MPPTCL may update
3	NaviMumbai 2 x 315, 400/220 kV	4	Bays ready since Mar'14 (WRSS-V)	STU line	4	Planned	MSETCL may update
4	Indore (PG) 2x500 MVA, 400/220 kV	6	Jul'18 (WRSS-14)	Indore (PG) – Indore (MP) 220 kV D/c	2	UC	MPPTCL may update
				Indore (PG) – Ujjain (MP) 220 kV D/c	2	UC	
				Future	2	To be planned by MP	
5	Itarsi (PG) 1x500 MVA, 400/220 kV	2	Jul'18 (WRSS-14)	Future	2	To be planned by MP	MPPTCL may update
7	Parli (PG) 2x500 MVA, 400/220 kV	6	Jun/Jul'18 (WRSS-16)	Parli (PG) - Harngul 220 kV D/c	2	UC	MSETCL may update
8	Parli (PG) 2x500 MVA, 400/220 kV	6	Jun/Jul'18 (WRSS-16)	Parli (PG) - Parli (MS) 220 kV D/c	2	UC	MSETCL may update
				Parli (PG) - Parli (MS) 220 kV S/c	1	UC	
				Osmanabad (MS) - Parli (PG) 220 kV S/c	1	UC	
9	Mapusa (PG) 3X315 MVA, 400/220	2	Jun/Jul'18 (WRSS-16)	Mapusa - Tuem 220kV D/c	2	UC	GED may update
10	Satna (PG) 1x500MVA, 400/220kV	2	Jun/Jul'18 (WRSS-16)	Future	2	To be planned by MP	MPPTCL may update
11	Damoh 1 x 500 MVA 400/220 kV	2	July'16	STU line	2	To be planned by MP	MPPTCL may update
12	Vadodara GIS 2 x 500 MVA, 400/220 kV	4	July'16	220 kV Venkatpura-Vadodara D/C Line 220 KV Jambua – Vadodara D/C Line	4	Lines planned by GETCO	GETCO may update
13	Bijawar (TBCB) 2 x 500 MVA, 400/220 kV	4	RfQ stage	LILO of Tikamgarh – Chhattarpur 220kV D/c line at Bijawar	4	Planned	MPPTCL may update

Utilities are requested to adhere to the time lines intimated for implementation. For the new schemes implementation agreement needs to be signed between POWERGRID and the STU, as per the CERC amendment mentioned above.

STU/ POWERGRID may update the implementation schedule and signing of the Implementation Agreement for the new schemes.

Members may discuss.

7. Measures to control fault level at Wardha Substation

7.1. The issue of measures to control the fault level at Wardha sub station was discussed in the 40th SCM of WR held on 01.06.2016 and following scheme was agreed in principle:

- Split of 400 kV Wardha substation into two sections, Section –A and Section-B as per following figure, with necessary switching arrangement.
- Warora – Koradi II 400 kV (Quad) line [formed after disconnection of Koradi-II - Wardha 400 kV (Quad) line and connecting it with Warora – Wardha 400 kV (Quad) line at outskirt of Wardha substation].
- All necessary arrangement for Change in termination of Warora Pool - Wardha 400 kV D/C (Quad) line by disconnecting it from Wardha 400kV BUS Section A and terminating in vacant 400 kV bays of Warora and Koradi II 400 kV (Quad) lines at Wardha 400kV BUS Section B.
- 12 Ohm fault limiting reactor to connect 400kV BUS Section A and BUS Section B of Wardha 400 kV BUS.
- 2 X 63MVAr line reactors at Wardha end of Wardha – Warora Pool 400kV D/c (quad) line to be used as bus reactors at Wardha S/s - section A (by using the two nos. of 400 kV bays which shall be vacant in Wardha Bus Section-A after shifting of Warora pool- Wardha 400 kV D/C line from Section-A to Section-B)
- Necessary modification at Wardha substation like change of some elements including CTs if those are not designed for 50kA fault level.

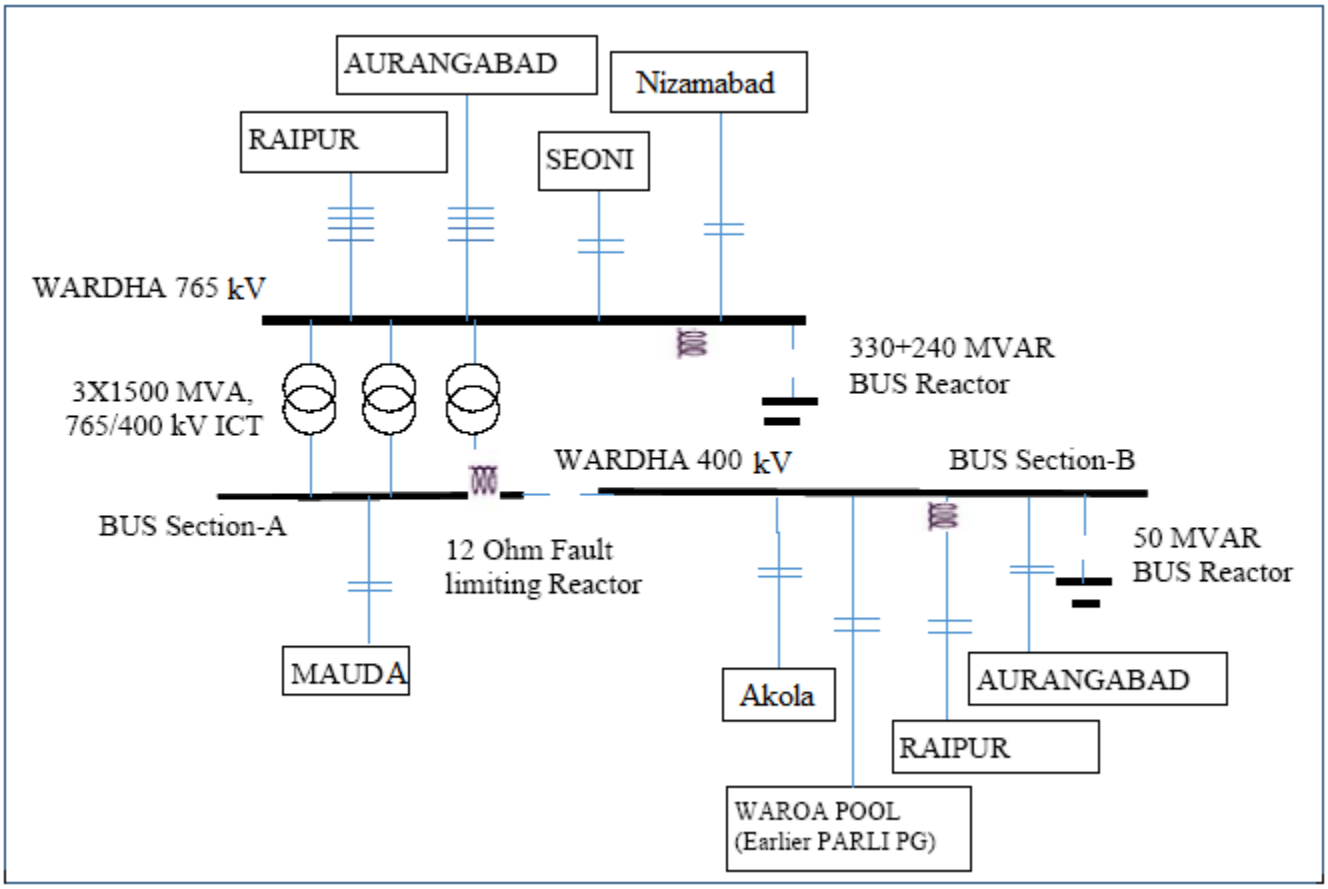


Fig: Wardha S/s with the proposed scheme

7.2. In the 40th SCM meeting, it was observed that the short circuit level of 74 kA at Koradi was reducing to 56 kA with implementation of the above proposal at Wardha, which was still higher than its design limit of 40 kA. Therefore, it was decided to carry out joint studies among CEA, CTU and MSETCL for limiting the high fault level in Koradi complex.

7.3. In line with the above decision, a joint studies meeting was held on 10.08.2016 among CEA, CTU, POSOCO and MSETCL to discuss issues regarding utilization of Navi Mumbai substation and High fault currents in Koradi complex. In the meeting, it was agreed that MSETCL shall examine the case of high fault current at Koradi (MSETCL) S/s and would evolve feasible alternatives in consultation with CEA, CTU and POSOCO. However, no further communication has been received in this regard from MSETCL.

MSETCL may update on the feasible alternatives to control high fault levels in Koradi complex.

Members may discuss.

8. Progress of dedicated transmission lines of IPPs which are connected through interim arrangement

8.1. The progress of dedicated transmission lines of IPPs in Western Region, which were connected through interim arrangement was reviewed in 40th SCM held on 01.06.2016. The status of the dedicated transmission lines as reported by IPPs in WR during the last meeting is as summarized below:

Sl. No.	Name of IPP/ Ownership	Dedicated Connectivity line	Interim Connectivity Arrangement	On interim since	Target Completion of dedicated line (as informed by developer)
1	RKM Powergen Pvt. Ltd. (RKMPPL) (4x360MW) M/s RKMPPL	RKMPPL-Raigarh PS (Near Kotra) 400kV D/c (Quad) line	LILO of 3rd ckt of Raigarh - Raipur 400kV 2nd D/c line (Presently Raigarh-RKM-KMPCL-Raipur)	Sep'14	15.06.2016
2	Korba West Power Co. Ltd. (KWPCL) (1x600MW) M/s Avantha Power & Infrastructure Ltd.	KWPCL - Raigarh PS (near Kotra) 400kV D/c line	LILO of 2nd ckt of Raigarh - Raipur 400kV 1st D/c line (Presently Raigarh – KWPCL- Raipur)	Feb'13	Already commissioned in Apr'16
3	KSK Mahanadi Power Co. Ltd. (KMPCL) (6x600MW) M/s KMPCL	KMPCL – Champa PS 2xD/c (Quad) line	LILO of Raigarh - Raipur 400kV 2nd D/c line	Aug'12	30.06.2016 (1st D/c); 31.12.2016 (2nd D/c)
4	Bharat Aluminium Co. Ltd. (BALCO) (2010 MW) M/s Vedanta	BALCO – Dharamjaygarh PS 400kV D/c (Triple / Quad) line	LILO of 2nd ckt of Korba - Birsinghpur 400kV D/c line	Oct'11	15.06.2016
5	Vandana Vidyut Ltd. (VVL) (2x135+270MW) M/s VVL	VVL – Dharamjaygarh PS 400kV D/c line	LILO of 1st ckt of Korba - Birsinghpur 400kV D/c line	July'12	Not present. As informed by M/s BALCO, work on dedicated line has not yet started.
6	Essar Power M.P. Ltd (EPMPL) (2x600MW) M/s Essar Power Ltd.	EPMPL - Bilaspur PS 400kV D/c (triple) line	LILO of 1st ckt of Korba STPS – Vindhyachal STPS 400kV D/c line	Dec'11	Dec'16 (5 – 6 months)

8.2. A meeting was held in CEA on 16.09.2016 to review the status of implementation of the implementation of the dedicated transmission lines of the IPPs connected through interim arrangement. In the meeting it was decided that

(i) M/s RKMPPL & KMPCL would submit PERT chart regarding the commissioning of transmission line on weekly basis.

(ii) M/s VVL would submit its progress regarding approval of the financial restructuring proposal by the bank every fortnight. M/s VVL to submit the schedule of their dedicated transmission line after approval of financial restructuring.

(iii) Since there is no progress / slow progress in the dedicated transmission line of M/s EPMPL for the past 2 – 3 months (as only 3 months was left for completion of the line), target of completion as committed by M/s EPMPL is December 2016 and no representative of M/s EPMPL was present in the meeting, CEA would write to M/s EPMPL regarding the progress of its dedicated transmission line.

The summary of the progress status of the dedicated transmission lines as intimated in the 40th SCM and in the review meeting is given below:

Sl. No.	**Name of IPP/ Ownership**	**Dedicated/ Interim Connectivity line**	**On interim since**	**Target Completion of dedicated line**	
				as on 01.06.2016(40th SCM of WR)	**As on 16.09.2016 (review mtg.)**
1	RKM Powergen Pvt. Ltd. (RKMPPL) (4x360MW) M/s RKMPPL	**Dedicated:** RKMPPL- Raigarh PS (Near Kotra) 400kV D/c (Quad) line **Interim:** LILO of 3rd ckt of Raigarh - Raipur 400kV 2nd D/c line (Presently Raigarh-RKM-KMPCL-Raipur)	Sep'14	15.06.2016	31.10.2016
2	Korba West Power Co. Ltd. (KWPCL) (1x600MW) M/s Avantha Power & Infrastructure Ltd.	**Dedicated:** KWPCL - Raigarh PS (near Kotra) 400kV D/c line **Interim:**LILO of 2nd ckt of Raigarh - Raipur 400kV 1st D/c line (Presently Raigarh –KWPCL- Raipur)	Feb'13	Already commissioned in Apr'16	Commissioned in April 2016
3	KSK Mahanadi Power Co. Ltd. (KMPCL) (6x600MW) M/s KMPCL	**Dedicated:** KMPCL – Champa PS 2xD/c (Quad) line **Interim:**LILO of Raigarh - Raipur 400kV 2nd D/c line	Aug'12	30.06.2016 (1st D/c); 31.12.2016 (2nd D/c)	10.10.2016 31.12.2016 (2nd D/c)
4	Bharat Aluminium Co. Ltd. (BALCO) (2010 MW) M/s Vedanta	**Dedicated:** BALCO – Dharamjaygarh PS 400kV D/c (Triple / Quad) line **Interim:**LILO of 2nd ckt of Korba - Birsinghpur 400 kV D/c line	Oct'11	15.06.2016	Commissioned in June 2016

5	Vandana Vidyut Ltd. (VVL) (2x135+270MW) M/s VVL	**Dedicated:** VVL – Dharamjaygarh PS 400kV D/c line **Interim:**LILO of 1st ckt of Korba - Birsinghpur 400kV D/c line	July'12	Not present. As informed by M/s BALCO, work on dedicated line has not yet started.	Target date would be intimated after loan approval ie. latest by 31.10.2016
6	Essar Power M.P. Ltd (EPMPL) (2x600MW) M/s Essar Power Ltd	**Dedicated:** EPMPL - Bilaspur PS 400kV D/c (triple) line **Interim:**LILO of 1st ckt of Korba STPS – Vindhyachal STPS 400kV D/c line	Dec'11	Dec'16 (5 – 6 months)	31.10.2016 (no representative was present in the meeting, CEA would take up with M/s EPMPL)

8.3. The interim arrangement of M/s RKM and M/s KSK has already removed and they connected with the through their dedicated transmission lines. POSOCO/ WRLDC may confirm the same. M/s EPMPL and M/s VVL are still connected through their interim arrangement.

Members may discuss this.

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

9.1. 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 9.1). A meeting was held on 07.10.2016 in CEA 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.

9.2. In the meeting, following ISTS substations were preliminarily identified for giving connectivity to the Railways' TSS for its Delhi-Bharuch route (MoM enclosed as annexure – 9.2):
(i) Ballabhgarh or Tughlakabad (under construction) (ii) Agra or Bassi (Rajasthan) (iii) Kota (iv) Rajgarh (v) Dehgam / Pirana or Vadodara

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.

9.3. 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.

9.4. The margins in transformation capacity at above substations / transmission system for drawl of traction load of about 80 to150 MW by Railways may be assessed after receipt of connectivity / LTA application by Railways.

9.5. Railway board vide its letter no. 2012 / Elect (G) / 150 / 1 Pt – II dated 19.10.2016 (enclosed as annexure 9.3) has furnished the information about its TSS points and their present connectivity with state utilities.

Members may deliberate.

10. Additional 400 kV feed to Goa – Reactive Compensation

10.1. In 40th SCM of WR held on 01.06.2016, the reactive power compensation for transmission scheme "Additional 400 kV feed to Goa" was discussed. Subsequently, Additional 400 kV feed to Goa was discussed and approved by Empowered Committee on Transmission held on 26.07.2016. In the meeting of Empowered Committee, it was agreed that PGCIL shall provide 1X 80 MVAR, 420 kV switchable line reactor along with 500 Ohms NGR and its auxiliaries at Narendra (New) S/s *(for Narendra (New) –Xeldem 400kV (quad) line formed after LILO of one ckt of Narendra (existing) – Narendra (New) 400kV D/c quad line at Xeldem)*

10.2. PGCIL vide its letter no. dated intimated that Narendra (New) substation is being a Gas Insulated Substation, does not have sufficient space for conversion of existing "line module" into "line with switchable reactor bay module". However, the space available would be sufficient for installation of 1 X 80 MVAr fixed line reactor. (This fixed line reactor may not be used as bus reactor without opening the line jumper physically on line side due to layout constraints in existing GIS S/s).

10.3. In view of space constraints at Narendra (New) GIS substation, it is proposed to convert the switchable line reactor to fixed line reactor.

Members may discuss.

11. Alternative utilization of Essar Power Gujarat Ltd (EPGL) - Bhachau 400 kV D/C (Triple) line of POWERGRID:

11.1. M/s EPGL had planned to develop coal based power plant at Salaya, Gujarat in three phases (2 X 600 MW + 4 X 660 MW + 4 X 150 MW). The first phase i.e. 2 X 600 MW has been commissioned and is connected to GETCO network through EPGL Phase I – Rajkot 400 kV D/C line and its second evacuation transmission system is EPGL Phase I – Amreli 400 kV D/C is under implementation by GETCO. M/s EPGL (3040 MW - Phase II & III) has a PPA of 800 MW with GETCO, for which GETCO has planned EPGL – Halvad 400 kV D/C and also applied for ISTS connectivity for remaining 2240 MW, for which EPGL – Bhachau 400 kV D/C (Triple) line was planned and under implementation by M/s PGCIL. The phase II & III of the generation project are yet to take off. However, EPGL – Bhachau 400kV D/C (Triple) line is almost completed by PGCIL and only 9 no tower foundation, 10 nos tower erection and 3.5 km stringing is held up due to non-finalization of gantry by EPGL.

11.2. The issue of non-utilization of EPGL – Bhachau 400kV D/C (Triple) line discussed in the 40th SCM in WR held on 01.06.2016 and wherein it was decided to carry out joint technical studies among CEA, CTU, POSOCO and GETCO to finalize the proposal in regard to utilization of EPGL – Bhachau 400 kV D/C (triple) line. Accordingly, joint technical study meeting among CEA, CTU, POSOCO and GETCO was held from 28.07.2016 – 29.07.2016.

11.3. POWERGRID has informed that a meeting between GETCO and CTU was held on 21st Sept,2016 at Vadodara, wherein it was discussed that the Bhachau – Essar 400kV D/c (Triple) line section may be extended to Bhogat substation in downstream of EPGL plant which is already connected to 400 MW wind generation at 220 kV level. As the coastal area in Gujarat is high potential site for wind power generation therefore possibility of development of more wind power generation in vicinity of Bhogat S/s is quite high. Moreover, a 400 MW new wind generation has been planned at Bhogat. Accordingly, GETCO has planned to develop 400kV substation at Bhogat S/s. EPGL – Bhachau 400kV D/c (Triple) line could be extended till Bhogat S/s for its utilization. It was also stated by GETCO that they may encourage all the future RE developers in Bhogat area to apply for connectivity/open access to the ISTS as the RE projects would get a ready corridor for power evacuation to ISTS

11.4. GETCO is also developing a no. of 400 kV and 220 kV substations, like Fedra, Shapar, Halvad etc for feeding power to Saurashtra, Kutch region and other major load centers of the Gujarat. Hence, to utilize the Essar – Bhachau line, Bhachau – Bhogat 400kV D/c line may further be LILOed at Halvad or Shapar substations of GETCO. Load Flow study results are attached at Annexure – 11. A schematic of the proposal is given below:

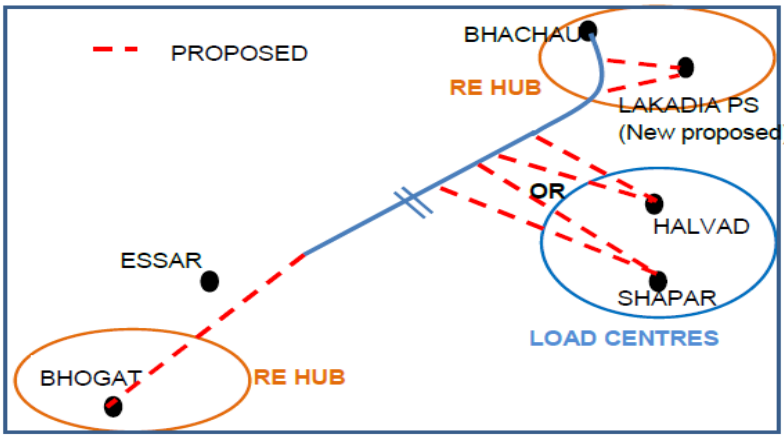


Fig-1 Proposal for Essar-Bhachau utilization

11.5. The following has transmission system strengthening in Gujarat is proposed for utilization of Essar – Bhachau 400 kV D/C line:

i. Extension of Bhachau (PG) – Essar 400 kV D/C (triple) line upto Bhogat Substation of GETCO

ii. LILO of Bhogat – Bhachau 400 kV D/C (triple) line (formed after i) at Halvad / Shapar Substation of GETCO.

iii. The ESSAR – Bhachau 400 kV D/C (triple) line section has also been proposed to be made LILO at Lakadia Pooling Station to provide connectivity to new RE generation projects in WR (proposed in LTA agenda).

11.6. GETCO vide its letter no. GETCO/MD/66 dated 02.11.2016 has requested CEA to include the Essar – Bhachau 400 kV D/C line under Green Energy Corridor, wherein cost of this line is socialized, as it would facilitate transmission of RE from Saurashtra (Jamnagar & Porbandar) and Kutch as these districts have rich potential to ISTS network.

Members may deliberate.

12. Operational feedback of NLDC

The operational feedback of NLDC for the period from July 2016 to September 2016 is as follows:

12.1. **Transmission line constraints**

S. No	Corridor	Constraints	Remarks
1.	**Constraints in Bableshwar - Padghe corridor** **Antecedents** With high Maharashtra Demand of the order of 18500-20000 during morning peak and no generation at Parli, low generation at RGPPL, Jaigad and SSP.	400 kV Bableshwar - Padghe corridors carrying more than 500 MW in each ckt. The corridor is N-1 non-compliant.	765/400 kV Ektuni S/S commissioned along with 2 X 1500MVA ICTs and 400 kV Ektuni - Bableshwar D/C in Apr/May16. However, in real time operation, one circuit of 400 kV Ektuni - Bableshwar is kept open by MSETCL to control the loading on 400 kV Bableshwar-Padghe D/C which is generally loaded above 550 MW each. Commissioning of 400 kV Bableshwar-Kudus D/C and Kudus Sub-station to be expedited by MSETCL. **MSETCL may update the status.**
2.	**765/400 kV ICT at Tirora and 765/400 kV ICT at Akola II** **Antecedents** When generation at Tirora is above 2400 MW and Rattan India (3x270MW) is in service.	The system is not n-1 compliant. It has been observed that tripping of 765 kV Tirora ICT or 765 Akola II ICT would cause sudden increase in the loading of Tirora - Warora lines causing oscillation in the grid.	Single ICT at Tirora and Akola-II is a constraint leading to n-1 non-compliance and at present managed by SPS. M/s MEGPTCL has informed that MERC has issued its order for amendment in MEGPTCL License for inclusion of 1 ICT, 1500 MVA (4 X 500 MVA single phase units with 1 spare) each at Tiroda and Akola-II Substation. And the same would be commissioned in about six to nine months.

S. No	Corridor	Constraints	Remarks
			MSETCL may update the status.
3.	**Transmission system for Koradi St-II (3 x 660 MW) and IEPL (2 x 270 MW)** **Antecedents** Koradi-II S/S is connected to Wardha-Warora one ckt on interim arrangement. At present 2 units of Koradi-II commissioned and Koradi – II-IEPL-Warora S/C and Koradi-II-Wardha S/C is in service.	The present system is N-1 non-compliant.	The evacuation plan for 5 X 660 MW Tirora, 5 X 270 MW RattanIndia, 2 X 500 MW Chandrapur2, 2 X 270 IEPL, 1 X 300 MW Dhariwal need to be studied by the STU in order to check whether the existing plan and available network will provide secure evacuation under various contingency during N-1 criteria. In the studies meeting held on MSETCL stated that it will perform studies. **MSETCL update the status**
4.	**220 kV Navsari (PG) - Navsari (GETCO) D/C** **Antecedents:** With generation at DGEN, UKAI, JHANOR	High loading observed more than 220MW and N-1 non-compliant	Early commissioning of Navsari- Bhesthan (Popada) 220 kV D/C line being implemented under TBCB. **As per the decision of 40th SCM of WR held on 01.06.2016, CE, PSPM, CEA has taken the progress status of the said line a meeting held on 04.11.2016. In the meeting M/s DGENTCL intimated that it would submit its execution plan after resolving of financial issues i.e. Dec' 2016. It was decided that the progress of "Transmission system associated with DGEN TPS (1200 MW)" be reviewed in 1st week of Jan – 2017.**

12.2. **ICT constraints**

S. No	ICT	Description of the constraints	Remarks
1.	**2 x 315 +1 x 500 MVA Bableshwar ICTs** **Antecedents** With Maharashtra demand above 18500 MW.	It is observed that the Bableshwar ICTs are fully loaded and system is n-1 non-compliant. MSETCL has implemented load trimming scheme to take care of overloading.	One ckt of Ektuni – Bableshwar circuit is kept out by MSETCL to control loading on ICTs and Bableshwar – Padghe D/c. **MSETCL may update the status**
2.	**2 X 315 MVA Chakan ICTs**	It is observed that the loading on ICTs at Chakan (2 x 315 MVA) are above 200 MW and	In 40th SCM MSETCL intimated that a proposal for additional ICT at Chakan under

S. No	ICT	Description of the constraints	Remarks
	Antecedents Maharashtra meeting high demand of above 18500 MW	additional ICT has to be proposed. MSETCL has implemented load trimming scheme to take care of overloading.	approval and expected date of Commissioning is March 2017. **MSETCL may update the status.**
3.	**3 X 315 MVA Lonikhand ICTs** **Antecedents** Maharashtra meeting high demand of above 18500 MW	It is observed that the loading on ICTs at Lonikhand 3 x 315 MVA) are above 200 MW and additional ICT has to be proposed or 2 x 500 MVA ICTs at Lonikhand-II are under-utilized and the 220 kV lines from Lonikhand II and Pune(PG) to be expedited. MSETCL has implemented load trimming scheme to take care of overloading.	In 40th SCM MSETCL intimated that load of around 200 MW of Kathapur (Pargaon) has been shifted from Lonikhand to Lonikhand II substation on 07.01.2016. This has relieved the loading on Lonikhand substation ICTs. **MSETCL may update the status.**
4.	**3 X 315 MVA + 600 MVA Padghe ICTs** **Antecedents** Maharashtra meeting high demand of above 18500 MW	It is observed that the Padghe ICTs are fully loaded and system is N-1 non-compliant. MSETCL has implemented load trimming scheme to take care of overloading.	In 40th SCM MSETCL intimated the status of Kudus 400/220 kV substation as Civil work- 65% & Electrical work-20% and expected date commissioning is March 2017. **MSETCL may update.**
5.	**2 x 315 +1 x 500 MVA Parli ICTs** **Antecedents** Maharashtra meeting high demand of above 18500 MW	It is observed that loading on these ICTs are N-1 non-compliant. MSETCL has implemented load trimming scheme to take care of overloading.	Nanded Sub-station with 2x500MVA 400/220 kV ICTs and 220 kV lines commissioned in Mar16 and Parli ICTs are relieved to some extent. In 40th SCM MSETCL intimated that the construction work of 220 kV Sholapur (PG) to 220 kV Bale Line in progress. Completion of this line will further relieve the loading on Parli ICTs. The status of 220kV lines associated with 400/220 kV Parli (PG) ICT is that the survey completed and Estimate preparation is in progress. ICTs and bays at Parli (PG) commissioning schedule by PGCIL is July 2018. **MSETCL / PGCIL may update the status.**

S. No	ICT	Description of the constraints	Remarks
6.	**2 X 315 MVA Satna ICT** **Antecedents** Madhya Pradesh meeting high demand of above 9000 MW	It is observed that the loading on ICTs at Satna (2x315MVA) are above 200 MW and additional ICT has to be proposed. MPPTCL has implemented Load trimming scheme for overloading of ICTs.	Commissioning of 500 MVA additional ICT is approved. In 40th SCM it was intimated that the installation of 3rd 315 MVA ICT in parallel with existing 315 MVA ICTs at Satna as an interim arrangement under progress till the commissioning of 500 MVA, 400/220 kV ICT at Satna (PGCIL) S/s along with 2 Nos. 220kV bays. The expected commissioning by PGCIL is July 2018. **PGCIL may update the status of interim arrangement.**
7.	**3 X 315 MVA Bhopal ICTs** **Antecedents** Madhya Pradesh meeting high demand of above 9000 MW	It is observed that the loading on ICTs at Bhopal (3x315MVA) are above 200 MW and additional ICT has to be proposed	1 X 315 MVA, 400/220 kV ICT (4th) at Bhopal is under implementation by MPPTCL and is expected to be completed by December 2016. **MPPTCL may update the status.**
9.	**315 MVA Itarsi ICT** **Antecedents** Madhya Pradesh meeting high demand of above 9000 MW	Single ICT with loading above 200 MW for more than 20 % of the time.	1 X 500 MVA 400/220 kV ICT along with two nos. of 220 kV bays at Itarsi (PG) would be commissioned by July 2018. **PGCIL may update the status.**
10.	**2 X 315 MVA Dehgam ICTs** **Antecedents** Gujarat meeting high demand and generation at Wanakbori being low.	It is observed that the loading on ICTs at Dehgam (2 x 315 MVA) are above 180 MW and additional ICT has to be proposed	1 X 500 MVA, 400/220 kV ICT has been planned and its expected commissioning schedule by PGCIL is March 2019. **PGCIL may update the status.**
12	**2 X 315 MVA ICTs at NSPCL** **Antecedents** With Bus split arrangement at 400 kV Raipur coupled with outage of FSC of 400 kV Raipur-Wardha D/C and evacuation of KSK and RKM generation at Raipur.	400 kV Raipur bus under bus split operation from July'15. The 2 X 315 MVA NSPCL ICTs are not n-1 compliant especially when Chhattisgarh demand is high.	**In 40th SCM it was intimated that** KSK and RKM are shifting from LILO of 400 kV Raigarh – Raipur ckt-3&4 to permanent arrangement through dedicated lines to Champa S/s and Kotra S/s respectively. KSK has shifted and connected to Champa on 05.10.2016 & dedicated line of RKM has been charged on 28.10.2016. **CTU / NLDC may confirm the same.**

12.3. **Lines/ICTs opened to control overloading**

S. No	Transmission Element (s) opened	Overloaded corridor	Remarks
1.	400/220 kV Pune(PG) one ICT	To control loading in 220 kV Pune(PG) – Talegaon D/C lines	Additional 220 kV outlets from Pune (PG) to be expedited by MSETCL and in 39th SCM MSETCL intimated that Pune - Hingewadi 220 kV D/C line expected to be commissioned by June 2016. **MSETCL may update the status of Pune – Hingewadi and planning of other 220 kV outlets from Pune (PG).**
3.	400/220 kV 2 x 315 MVA Sholapur(PG) ICTs	2 X 500 MVA Sholapur (MS) ICTs loading will reduce if loads are shifted to Sholapur PG ICTs	In 39th SCM MSETCL intimated that about 50 MW load connected with Solapur (PG) and the around 200 MW load of Solapur (MS) would be transferred to Solapur (PG) by June 2016. MSETCL may update the status.
4.	400/220 kV 2 x 315 MVA Warora ICTs	Idle charged in the absence of 220 kV downstream network.	In 39th SCM MSETCL intimated that Shifting of one ICT to Kalwa and another ICT to Padghe has been planned. **MSETCL may appraise the status of work regarding shifting of ICTs & progress at these locations.**
5.	400 kV Ektuni-Bableshwar one circuit	400/220 kV Bableshwar ICT loading	Additional ICT at Bableshwar and 400 kV Kudus substation and Bableshwar-Kudus ckts are to be commissioned on priority. **MSETCL may update the status.**

12.4. **Delay in transmission lines affecting grid operation adversely**

S. No.	Transmission Corridor	Proposed Commissioning Date	Actual/ Likely Commissioning Date	Transmission Constraint Caused
1.	400 kV Essar Vadinar-Amreli D/C	July'13	Dec'16	Would complete Vadinar evacuation and relieve Hadala-Chorania S/C. However, interim arrangement with completed portion of Amreli-Vadinar one ckt terminated at Jetpur and one ckt at Hadala relieved loading of Chorania –Kasor.
2.	400 kV Amreli – Kasor D/C	June'13	Dec'16	Would relieve Chorania-Kasor S/C. However, interim arrangement with completed portion of Amreli-Vadinar D/C, one ckt terminated at Jetpur and one ckt at Hadala has relieved the loading of Chorania –Kasor.
3.	400 kV Essar Mahan-Bilaspur Pooling station D/C	Mar13	Dec'16	This would complete transmission system planned for evacuation of Essar Mahan (2 X 600 MW) which is on interim connectivity with LILO of 400 kV Korba-V'chal-1. Bilaspur pooling station is commissioned in Mar'12 and dedicated lines from Essar Mahan to Bilaspur are delayed indefinitely by developer causing constraints in the transmission system from Korba.
4.	400 kV Kudus S/s along with 400 kV Bableshwar-Kudus D/C and associated 220 kV system	Mar'16	Mar'17	Due to delay in commissioning of 400 kV Bableshwar –Kudus D/C, heavy loading is observed on 400 kV Bableshwar-Padghe S/s. Further 400 kv Ektuni-Bableshwar only one circuit is kept in service by MSETCL to control the loadings at Bableshwar.

Members may discuss.

13. Provision of 2 no. of 220 kV bays at Raipur (PG) substation for LILO of Khedamara (CSPTCL) – Borjaha S/C line at 220 kV Raipur (PG) Substation

13.1. The issue of provision of 2 no. of 220 kV bays at Raipur (PG) S/s for LILO of Khedamara (CSPTCL) – Borjaha was discussed in 38th, 39th & 40th SCM of WR. CEA stated that 2 no. of 220

kV line bays (along with installation of 1 X 315 additional ICT) at Raipur 400/220 kV S/s were already implemented by M/s PGCIL as part of WRSS – 6. However, these 2 no. of 220 kV line bays are still not utilized by M/s CSPTCL.

13.2. In 39th SCM of WR, CSPTCL had confirmed that the two no. of unutilized 220 kV line bays at Raipur (PG) would be used for termination of 220 kV D/C line from DOMA which is likely to be implemented in 9 months' time. Further, it was intimated that CSPTCL is facing severe RoW problems in implementation of LILO of Khademara – Borjhara 220 kV S/c line at Raipur (PG) thus, it is examining the feasibility of laying cables to overcome the RoW issue and would intimate the same to CEA.

CSPTCL may update the information regarding this.

Members may deliberate

14. High fault level at 400 kV Korba STPS (NTPC)

14.1. In the 40th SCM of WR held on 01.06.2016, the following scheme was agreed to control high fault current at Korba STPS (3 X 200 MW + 4 X 500 MW) of NTPC:

(i) Korba STPS - Korba West 400 kV S/C line to be normally kept open.

(ii) Korba STPS- Sipat STPS 400 kV S/C line and Sipat STPS – Raipur 400 kV S/C line to be rearranged as Korba STPS- Raipur 400 kV S/C line (bypassing at Sipat STPS – bypassing arrangement at Sipat STPS already exists).

14.2. M/s CSPTCL vide its letter no. 02 – 12 / SE (C & RA) / 1016 dated 02.09.2016 has intimated that SLDC (Chhattisgarh) had raised its concern for keeping the Korba STPS - Korba West 400 kV S/C line in normally open conditions as it would cause overloading of the 400 kV & 220 kV lines emanating from Korba (West) power plant under n – 1 – 1 contingency conditions. SLDC (Chhattisgarh) has suggested that:

- The proposal to be reexamined from contingency and stability point of view under full power generation at Marwa Power Plant (2 X 500 MW).
- To carry out contingency (n – 1 – 1) / stability studies under outage of 400 kV lines and considering the load on 220 kV of CSPTCL network.
- To explore the option of bus splitting at Korba STPS (NTPC) and review the recommendations.

Members may deliberate.

15. Status of earlier agreed transmission schemes

15.1. **Navsari – Navi Mumbai 400 kV D/C LILO at Nasik:** In 28th SCM of WR held on 06.12.2008 the Transmission System at 400kV and 765kV in Maharashtra for evacuation system from generating stations (of MSPGCL, MAHADISCOM and IPPs) and intrastate system strengthening was discussed and agreed. Intra state strengthening included creation of new 400 kV substations each at Lonikand-II, Chakan, Hinjewadi, Kesurdi, Nasik, Nanded, Malharpeth (Karad-II) and Padghe-II. Nasik 400 kV substation was proposed to interconnected through LILO of Navsari – Navi Mumbai 400 kV D/C at Nasik (an ISTS line).

It is observed that the LILO of Navsari – Navi Mumbai 400 kV D/C at Nasik is not yet completed. MSETCL may update the implementation status of the same. It is proposed that if the above LILO is not required, the same may dropped from the scope of the above transmission scheme.

15.2. **Aurangabad (Ektuni) – Aurangabad (PG) 765 kV D/C**: In the 32nd SCM of WR held on 13.05.2011, as a part of augmentation of intra state system in Maharashtra at 400 kV & 765 kV level, interconnection of 765/400 kV Aurangabad II and 765/400 kV Aurangabad (PG) through 765 kV D/C was agreed and the same was to be implemented by M/s MSETCL.

MSETCL may update / provide the implementation status of the above transmission line.

Members may deliberate.

16. Revised proposal for 220 kV downstream interconnection with proposed Morena (TBCB) 400/220 kV substation

16.1. Establishment of 400/220 kV substation at Morena and its interconnection with Gwalior (PG) through 400 kV D/C line was approved in 36th meeting of Standing Committee on Power System Planning in WR held on 29.08. 2013. In the meeting, MPPTCL has proposed the following 220 kV outlets from above 400/220 kV Morena S/s.

(i) Morena (TBCB) - Morena (MP) 220 kV DCDS line (20 km)
(ii) Morena (TBCB) - Sabalgarh (MP) 220 kV DCDS line (80 km)

16.2. Subsequently, MPPTCL vide letter no. 04-02/n-171/2525 dated 05.09.2016 has informed that, due to change in the site location of 400 / 220 kV Morena S/s from its earlier envisaged location and severe RoW issues involved in implementation of earlier proposed downstream network from this new site, the downstream 220 kV network from 400 /220 kV Morena has been revised as follows:

(i) LILO of one circuit of Malanpur – Mehgaon 220 kV line at Morena (TBCB) 400/220 kV S/s
(ii) Morena (TBCB) - Sabalgarh (MP) 220 kV DCDS line (92 km) and LILO of one circuit of Morena (TBCB) – Sabalgarh 220 kV line at Morena 220 kV S/s of MPPTCL (0.5 km)

Members may note the same.

17. Incentivizing the early commissioning of transmission projects

17.1. MoP vide their order no. 15/1/2013-Trans dated 15.07.2015 has issued the policy for incentivizing early commissioning of transmission projects (enclosed as Annexure – 17.1). Subsequently, MoP vide its OM No. 15/1/2013-Trans dated 05.10.2016 (enclosed as Annexure- 17.2) constituted a committee to ensure smooth operationalization of the Policy for early commissioning of Transmission Projects.

17.2. Earlier PGCIL vide its letter no. C/CTU-Plg/E/TBCB dated 12.08.2016 (Annexure – 17.3) has intimated CEA that few TSPs had made a request to PGCIL to advance the commissioning schedule, for the scope of works associated with respective TSP. PGCIL had requested CEA

to decide the course of action pertaining to advancement of schedules of transmission projects being implemented through TBCB route. Subsequently, Sterlite Power Grid Ventures Ltd vide letter dated 19.09.2016 has furnished the revised (early) commissioning schedule of transmission projects being implemented by M/s Sterlite and have requested to arrange a meeting with PGCIL for advancing the construction of the associated sub-station bays in matching timeframe (early commissioning schedule) of their transmission line.

17.3. In the first meeting of the committee held on 26.10.2016, to ensure smooth operationalization of the Policy for early commissioning of Transmission Projects, the transmission projects of M/s Sterlite (proposed for early commissioning) were discussed. It was found that the projects do not qualify for consideration for early commissioning as the request from the TSP has not been received well in advance (i.e., 24 months in advance of the intended early SCOD). But, as these schemes were under implementation before the constitution of the committee, it was decided that PSPM Division, CEA may hold the meetings with the TSP and the implementing agencies of the interconnecting (upstream/ downstream) elements so that a mutually agreed early commissioning date (before SCOD) could be arrived at through mutual consultation.

17.4. The projects proposed for early commissioning also included the transmission system for Khargone generation project being implemented by the M/s KTL (Khargone Transmission Limited). NTPC has informed that they were not anticipating any preponing of the Khargone generation project commissioning schedule, therefore they would require the transmission system as per SCOD as indicated in the TSA and no early commissioning was envisaged.

17.5. Further, M/s Sterlite vide its letter dated 10.11.2016 (enclosed as annexure 17.4) has made a request for approval of early commissioning of the Indore- Khandwa pool- Dhule 765 kV D/C line by delinking it from the commissioning schedule of the Khargone generation project.

Members may deliberate.

18. Second 400 kV D/C transmission line for BALCO Complex – proposal by M/s BALCO

18.1. In the 40th SCM of WR M/s BALCO had stated that there is single point of connectivity with the ISTS system (BALCO- Dharamjaygarh 400 kV D/C line) and any exigencies with the dedicated line shall lead to black out at BALCO and non-availability of power from BALCO to the beneficiary states. For having redundancy, the process for second dedicated line has already been started but it would take long time for implementation as there is large forest area involved. Till the completion of the 2nd dedicated line, BALCO had requested that the existing interim connectivity arrangement (LILO of 2nd ckt of Korba - Birsinghpur 400kV D/c line at BALCO switchyard), instead of dismantling, may be retained permanently for power evacuation as a redundant transmission line, in case of any exigency condition. The issue was discussed and committee was of the opinion that interim arrangement line can't be put in parallel to the dedicated line but instead of dismantling it, it can be disconnected from the main line and kept in charged condition with a suitable bypass arrangement, which could be used in exigencies as per the instructions of the Grid Operator. M/s BALCO was requested to submit the bypassing scheme so that the same could be examined by CEA, CTU and POSOCO.

18.2. The installed capacity of BALCO is 2010 MW (4 X 135 MW + 4 X 67.5 MW + 4 X 300 MW) & 5.6 LTPA Aluminium Smelter (about 430 MW load) and industrial load of 950 MW. M/s BALCO has taken LTA for 200 MW and grid connectivity for 2010 MW. M/s BALCO (Vedanta Ltd) vide its letter no. BALCO/CEA/2016/01 dated 19.09.2016 & BALCO/CEA/2016/02 dated 21.10.2016 (enclosed as annexure 18) has proposed to segregate its 2 X 300 MW Power plant from 1410 MW and requested for grant of second grid connectivity (for 1410 MW) and had proposed LILO of Korba – Birsinghpur 400 kV line i.e. interim arrangement as second permanent grid connectivity for the following reasons:

- Grid security for Aluminium smelter
- To fulfill RPO obligation
- Power sale commitment
- Restriction over import of power through BALCO – Dharamjaygarh PS 400 kV D/C line (power would be imported for Aluminium smelter during the generation contingency of its CPP)

Members may deliberate.

19. Requirement of New Substation near Vapi / Ambethi area and Kosamba – Vapi 400 kV D/C line

19.1. In the 38th SCM of WR held on 17.07.2015 it was decided that the requirement of 400 kV Kosamba – Vapi D/C needs to be reviewed through joint studies of CEA, CTU & GETCO, after considering the augmentation of 400 kV network in southern Gujarat to be implemented by GETCO.

19.2. In the 39th SCM of WR held on 30.11.2015, it was suggested that instead of augmenting transformation capacity at both substations i.e. Vapi (existing) & Kala, a new substation may be proposed near Vapi / Ambethi area to cater the demand of DNH and Daman & Diu as there is no space available for putting additional transformers at existing Vapi 400/220 kV substation.

19.3. In the 40th SCM of WR held on 01.06.2016, GETCO representative stated that due to limited outlets at Vapi (PG), many times the power is flowing from Vapi (GETCO) to Vapi (PG), which is resulting in further loading of GETCO network and further requested for 220 kV outlets from proposed Vapi / Ambheti (new) S/s. In view of this, it was agreed to review the above studies during joint system studies among CEA, CTU & GETCO. Accordingly, joint system studies meeting was held from 28.07.2016 – 29.07.2016 among CEA, CTU and GETCO and the study report is enclosed at **Annexure – 19.1.** Based on the results of joint studies, the following inter & intra transmission system is proposed:

<u>Inter-state Transmission System Strengthening Near Vapi Area</u>

i. Establishment of 2 x 500 MVA, 400/220 kV S/s near Vapi / Ambheti (Vapi – II)
ii. LILO of KAPP – Vapi 400 kV D/c line at Vapi – II
iii. 1 x 125 MVAr bus reactor at Vapi – II Substation
iv. 220 kV connectivity from Vapi – II is as follows:

(a) For Gujarat (GETCO)

- Vapi-II – Atul (GETCO) 220kV D/c line
- LILO of Chikhli (Ambetha) – Vapi (GETCO) 220 kV D/c line at Vapi-II

(b) For Dadra and Nagar Haveli (DNHPDCL)

- Vapi-II – Sayali (DNH) 220 kV D/c line (high capacity)
- Vapi-II – New Kharadpada (DNH) 220 kV D/c line (high capacity)

Intra-state Transmission System Strengthening in DNH network at 220 kV level

i. LILO of Vagchipa – Khadoli 2nd 220kV line at Sayali Substation
ii. Kala (PG) – Khadoli 220kV 2nd D/c line (New)
iii. Kharadpada – New Kharadpada 220kV 2nd D/c line (New)
iv. Conversion of New Kharadpada 220kV switching station into 2x160MVA, 220/66 kV substation
v. Augmentation of Transformation capacity at 220/66kV Vagchipa substation by 160 MVA (3rd ICT)

19.4. PGCIL intimated that the above proposed transmission system would able to provide supply of power to Chikhli area thus, the requirement of new the Chikhli area of Gujarat may be dropped. Further, it was also intimated that with the commissioning of Padghe (PG) – Kudus 400 kV D/C line (serves as a strong infeed link to South Gujarat from Maharashtra), the proposal of Kosamba – Vapi 400 kV D/C line may also be dropped.

Members may discuss.

20. Additional ISTS feed to Navi Mumbai 400/220 kV substation of POWERGRID

20.1. The transmission scheme 'Western Regional system strengthening scheme (WRSS – V)' with following scope of work was agreed in the 25th SCM of WR held on 30.09.2006 and the scheme was implemented by M/s PGCIL:

(i) 400 kV Vapi – Navi Mumbai D/C line.
(ii) LILO of 400 kV Lonikhand/Pune – Kalwa line S/C – 2 at Navi Mumbai.
(iii) Establishment of 400/220 kV 2 X 315 MVA new (GIS) at Navi Mumbai.
(iv) 220 kV Vapi – Khadoli D/C line.

Along with the above transmission scheme, the following 220 kV downstream network has been planned and was to be implemented by MSETCL:

a) LILO of Apta – Kalwa 220 kV S/c line at Navi Mumbai
b) LILO of Kandalgaon– Kharghar 220 kV S/c line at Navi Mumbai

20.2. In the 35th SCM of WR held on 03.01.2013, LILO of Kharghar – Padghe section of Lonikhand – Kalwa line - 1 at Navi Mumbai was agreed instead of LILO of Lonikhand/ Pune – Kalwa 400 kV S/C line - 2 (which was agreed under WRSSS – V). It was also agreed for laying of 1.5 km of 400 kV underground cable near gantry of Navi Mumbai substation with an estimated

cost of Rs 55 crores to expedite the implementation of LILO arrangement which was held up due to severe RoW issues.

Further, in the same meeting, in view of severe RoW problems, termination of 400 kV Vapi – Navi Mumbai D/C line at Kudus S/s of MSETCL was agreed and PGCIL was to continue their efforts for completing the balance portion of the Vapi – Navi Mumbai 400 kV D/C line i.e. transmission line from Kudus to Navi Mumbai.

20.3. In the 38th SCM of WR held on 17.07.2015, MSETCL had stated that there is no ISTS source to Navi Mumbai and the Vapi - Navi Mumbai 400 kV D/C line is being terminated at Kudus which is about 80 km away from Navi Mumbai. Thus, the LILO of Kharghar – Padghe 400 kV line at Navi Mumbai being presently under implementation will only recirculate the power from intrastate network of MSETCL. It was suggested that, in future also, no ISTS network could be extended to Navi Mumbai 400 kV substation, then it would be better shift Navi Mumbai substation to some other location. In the meeting it was agreed that CEA, CTU and MSETCL would carry out joint studies for exploring effective utilization of Navi Mumbai 400 kV substation and put a proposal in the next standing committee meeting.

20.4. In line with the decision of 38th SCM of WR, the following scheme was proposed in the 40th SCM of WR held on 01.06.2016.

(i) Padghe (765/400 kV) – Navi Mumbai 400kV D/c (Quad) line
(ii) 1 X 500MVA, 400/220 kV 3rd ICT at Navi Mumbai S/s
(iii) Installation of 220/33kV Transformer at Navi Mumbai substation and planning of 33 kV outlets from Navi Mumbai substation in coordination with DISCOM / MSEDCL.

20.5. In the 40th SCM of WR, MSETCL had requested to review the as over loading was observed on 400 kV Kharghar – Navi Mumbai S/C and severe RoW problems involved in implementation of 400 kV Padghe – Navi Mumbai D/C line.

20.6. Accordingly, joint studies were carried out by CEA, CTU and MSETCL from 10.08.2016 to 12.08.2016 in which several alternatives were discussed and the following alternatives were proposed.

i. Padghe (PG) – Navi Mumbai 400 kV D/C (Quad) line
ii. Padghe (PG) – Kharghar 400 kV D/C (Quad) line, bypassing one ckt. at Kharghar and connecting it with one ckt. of Kharghar - Ghatkopar 400 kV D/c line of TPCL so as to form Padghe (PG) – Kharghar 400kV line and Padghe (PG) – Ghatkopar 400kV line
iii. Option (ii) plus LILO of Ghatkopar – Kharghar 400 kV line at Navi Mumbai
iv. Option (ii) plus LILO of Padghe (PG) – Kharghar 400kV line at Navi Mumbai
v. Option (ii) plus LILO of Padghe (PG) – Ghatkopar 400 kV line at Navi Mumbai
vi. 400 kV Padghe – Ghatkopar Switching Station D/C line

20.7. The studies have been carried out with above 6 alternatives and two more new alternatives. The load flow study results are enclosed as Annexure – 20.1. The observations on the above alternatives is as follows:

Sl.	Alternative	Remarks
1	Padghe (PG) – Navi Mumbai 400 kV D/c line (Quad)	High loading observed on Navi Mumbai – Khargar 400 kV S/c
2	Padghe (PG) – Khargar 400kV D/c line with one circuit terminating at Ghatkopar by connecting it to Khargar – Ghatkopar 400kV line bypassing Khargar	Circular Power flows from Padghe (PG) to Ghatkopar to Khargar.
3	Case 2 + LILO of one circuit of Ghatkopar – Khargar 400kV D/c line at Navi Mumbai	Circular Power flows from Padghe (PG) to Ghatkopar to Navi Mumbai & Khargar – Navi Mumbai 400kV D/c line thus formed is seen to be floating.
4	Case 2 + LILO of one circuit of Padghe (PG) – Khargar 400kV line at Navi Mumbai	Circular Power flows from Padghe (PG) to Ghatkopar to Khargar. However, Khargar – Navi Mumbai 400kV D/c line is well utilized (about 760 MW)
5	Case 2 + LILO of Padghe (PG) – Ghatkopar 400kV line at Navi Mumbai	No Circular Power flows. Balanced Flow on Padghe (PG) – Navi Mumbai and Padghe (PG) – Khargar 400kV lines is observed.
6	Padghe (PG) – Ghatkopar 400kV D/c (Quad) line	Heavy power rush from Ghatkopar to Khargar (about 1250MW)
7	Connecting NM - Kharghar line with Kharghar - Kalwa line so as to form NM - Kalwa 400kV S/c bypassing Kharghar S/s + Padghe PG - Kharghar 400kV D/c (Quad) line (one ckt via NM)	Balanced Flow on Padghe (PG) – Navi Mumbai and Padghe (PG) – Khargar 400kV lines is observed.
8	Connecting NM - Kharghar line with Kharghar - Kalwa line so as to form NM - Kalwa 400kV S/c bypassing Kharghar S/s + Padghe PG - Kharghar 400kV D/c (Quad) line + Padghe PG - NM 400kV D/c (Quad) Line	All loadings are fairly balanced and this option provides long term solution for power supply to Mumbai Area. However, RoW issues in construction of 2 D/c lines in Mumbai area need to be looked into.

20.8. In most of the above cases, it is observed that

- Padghe (PG) 765/400 kV, 2 X 1500 MVA ICTs are N-1 noncompliant with any additional feed to Mumbai area
- Khargar (MSETCL) 400/220 kV, 3 X 315MVA ICTs are critically loaded and barely satisfy N-1 criteria in certain cases.

Members may deliberate.

21. Open Access Meeting

The 24th meeting of WR constituents regarding connectivity / open access applications would be followed by Standing Committee meeting. The agenda would be circulated by CTU / PGCIL separately.

Annexure-2.1

Status of TBCB Tr. Projects - Western Region

S.N.	Name of the Project	BPC / Implementing Agency / Milestones	Scope of works	Current Status
1	System Strengthening in NR for import of power from North Karanpura and other projects outside NR and System Strengthening in WR for import of power from North Karanpura and other projects outside Western Region and also for projects within Western Region. Estimated Cost 2700 cr.	REC NKTCL (Reliance Power Transmission Company Ltd) **Milestones:** (i) SPV acquired by Reliance on 20-05-2010 (Effective date) (ii) Approval u/s 164 received on 12.08.2013.	1. Sipat/Korba (Pooling) –Seoni 2. Lucknow-Bareilly 3. Bareilly-Meerut 4. Agra-Gurgaon 5. Gurgaon-Gurgaon (PG) 6. Gurgaon S/S	Matter was in CERC for revision of tariff and extension of date of commissioning. NKTCL filed an appeal in appellate tribunal challenging CERC order of 9.5.2013. Appellate Tribunal has given final judgment on 2.12.13 setting aside CERC order and allowing the appeal. NKTCL is initiating steps for implementing of order. The judgment of Appellate Tribunal accepts delay in clearance under section-164 as force majeure. According NKTCL have requested MoP to extend the validity of section 68 clearance vide their letter dtd 14.1.2014 Beneficiaries have appealed SC. **Work Yet to start.**
2	Transmission System Associated with Krishnapattnam UMPP-Synchronous interconnection between SR and WR (Part-B) Estimated Cost 440 cr	REC RSTCL (Consortium of Patel-Simplex- BSTranscomm) **Milestones:** (i) LOI placed on 16.12.2010 (ii) SPV acquired on 7.1.2011 Trans. license received on 24.8.2011 (iii) Approval u/s 164 received on 29.8.2011. (iv) Tariff adoption on 12.8.2011 (v) Original COD : Jan 2014	(i) Raichur-Sholapur 765 kV S/C line-1-208 ckm	**Commissioned on 30.6.2014**
3	System strengthening common for WR and NR Estimated Cost 1720 cr	PFC JTCL(Sterlite Grid) **Milestones:** (i) LOI placed on 31.01.2011 (ii) Special Purpose Vehicle acquired on 31.03.2011 (iii) Scheduled Completion Date is 31.03.2014. (iv) Transmission License granted on 12.10.2011. (v) Tariff adoption approval on 28.10.2011 (vi) Clearance under Section 164 : received on 12.07.13	(i) Dhramjaygarh-Jabalpur 765 kV D/C 765 kV lines (ii) Jabalpur-Bina 765 kV S/C line	**Line commissioned in 09/15** **Line commissioned in 06/15**

S.N.	Name of the Project	BPC / Implementing Agency / Milestones	Scope of works	Current Status
4	System strengthening for WR Estimated Cost 2900 cr	PFC BDTCL(Sterlite Grid) **Milestones:** (i) LOI placed on 19.1.2011 (ii) SPV acquired on 31.3.2011 (iii) Trans. license received on 12.10.2011 (iv) Approval u/s 164 received on29.01.2013 (v) Tariff adoption on28.10.2011 Original COD : Mar2014	(i) Jabalpur-Bhopal 765 kV S/C line	**Line commissioned in 06/15**
			(ii) Bhopal-Indore 765 kV S/C line	**Line commissioned in 10/14**
			(iii) 2x1500 MVA 765/400 kV substation at Bhopal	**Commissioned in 7/2014**
			(iv) Bhopal-Bhopal (MPPTCL) 400 kV D/c quad line.	**Line Commissioned in 7/2014**
			(v) Aurangabad-Dhule 765 kV S/C line	**Line commissioned in 10/14**
			(vi) Dhule-Vadodara 765 kV S/C line	**Line commissioned on 10/15**
			(vii) 2x1500 MVA, 765/400 kV substation at Dhule	**Commissioned on 11/14**
			(viii) Dhule - Dhule(Msetcl)400 kV D/C Line	**Line Commissioned on 11/14**
5	Transmission System associated with DGEN TPS (1200 MW) of Torrent Power Ltd.	PFC M/s Instalaciones Inabensa, S.A. Spain **Milestones:** (i) LoI issued on 19.05.2014 (ii) **Approval under section 68 on 30.01.2014.** (iii) Approval under Sec 164 of EA,2003 on 24.04.2016	(i) DGEN TPS – Vadodara 400 kV D/C, Twin Moose line. (ii) Navsari – Bhestan 220 kV D/C line	**Completion Target : May 2018**
6	Transmission System associated with Gadarwara STPS (2x800 MW) of NTPC (Part-A)	REC Powergrid Warora Transmisson Limited (A subsidiary of PGCIL) **Milestones:** (i) Date of issuance of RFQ :15.08.2014 (ii) Date of RFP:14.11.2014 (iii) Date of signing of TSA: 09.02.2015	(i) Gadarwara STPS-Jabalpu Pool 765 D/C line (ii) Gadarwara STPS- Warora P.S. (New) 765 D/C line (iii) LILO of both Ckts. Of Wardha-Parli 400 kV D/C at Warora P.S. (2xD/C). (iv) Warora 765/400 kV P.S. (2x1500 MVA).	**Completion Target: November, 2017**
7	Transmission System associated with Gadarwara STPS (2x800 MW) of NTPC (Part-B).	REC Powergrid Parli Transmisson Limited (A subsidiary of PGCIL) **Milestones:** (i) Date of issuance of RFQ :07.08.2014 (ii) Date of RFP:14.11.2014 (iii) Date of signing of TSA: 09.02.2015	(i) Warora P.S.-Parli (New) 765 kV D/C line (ii) Parli(New)-Solapur 765 D/c line (iii) Parli (New)-Parli (PG) 400 kV D/C (Quad) line (iv) 765/400 kV Parli (New) Sub-station (2x1500 MVA).	**Completion Target: January, 2018**
8	Transmission System Strengthening associated with Vindhyachal- V	REC Powergrid Jabalpur Transmisson Limited (A subsidiary of PGCIL) **Milestones:** (i) Date of issuance of RFQ	(i) Vindhyachal P. S- Jabalpur P. S. 765 kV D/C line.	**Completion Target: June,2018**

S.N.	Name of the Project	BPC / Implementing Agency / Milestones	Scope of works	Current Status
		:20.08.2014 (ii) Date of RFP:22.10.14 (iii) SPV has been acquired by the successful bidder on 26.02.2015 (iv) Date of filing of petition for adaptation of tariff and grant of license : 26.02.2015 (v) Approval u/s 164 of EA,2003: September,2016		
9	System strengthening for IPPs in Chhattisgarh and other generation projects in Western Region	PFC Chhattisgarh-WR Transmission Ltd. (A subsidiary of Adani Power Limited) **Milestones:** (i) MoP vide letter dated 15.01.2014 trans dated 15-07-2014 & Gazette Notification dated 09.07.14 appointed PFCCL as BPC. (ii) SPV incorporated on 24.12.2014 (iii) RFQ notice published on 29.12.2015. (iv) LoI issued to the successful bidder Adani Power Ltd on 28.07.2015. (v) Approval u/s 164 of EA,2003: September,2016: October,2016	(i) Gwalior 765/400 kV – Morena 400 kV D/C line 400 kV D/C Length- 50 km (ii) Establishment of substation at Morena 400/ 220 kV 2X315 MVA (iii) Vindhyachal-IV & V STPP – Vindhyachal Pool 400 kV D/C (Quad) 2nd line 400 kV D/C Length-15 km (iv) Sasan UMPP – Vindhyachal Pooling station 765 kV S/C line 765 KV S/C (Length-8 km) (v) LILO of one circuit of Aurangabad – Padghe 765 kV D/C line at Pune 765 kV D/C Length-50 km	**Scheduled Date of Completion: 22.03.2019** **Anticipated Date of Completion: May'18**
10	Additional System Strengthening for Sipat STPS	PFC Sipat Transmission Ltd (A subsidiary of Adani Power Limited) **Milestones:** (i) MoP vide letter dated 15.01.2014 trans dated 15-07-2014 & Gazette Notification dated 09.07.14 appointed PFCCL as BPC. (ii) SPV incorporated on 23.12.2014 (iii) RFQ issued on 01.01.2015. (iv) LoI issued to the successful bidder Adani Power Ltd on 28.07.2015 (v) Approval u/s 164 of EA,2003: September,2016: August,2016	(i) Sipat – Bilaspur Pooling Station765 kV S/C line 765 kV S/C Length-25 km (ii) Bilaspur Pooling Station - Rajnandgaon765 kV D/C line 765 kV D/C Length-180 km	**Scheduled Date of Completion: 22.03.2019** **Anticipated Date of Completion: Jul'18**
11	Additional System Strengthening Scheme for Chhattisgarh IPPs – Part B	PFC Raipur – Rajnandgaon - Warora Transmission Ltd (A subsidiary of Adani Power Limited) **Milestones:** (i) MoP vide letter dated 15.01.2014 trans dated 15-07-2014 & Gazette Notification dated	(i) Raipur (Pool) – Rajnandgaon 765 kV D/C line 765 KV D/C Length-60 KM (ii) Rajnandgaon – New Pooling station near Warora 765 kV D/C line 765 KV D/C Length- 270 KM (iii) Establishment **of new substation** near Rajnandgaon 765/400kV 2x1500 MVA	**Scheduled Date of Completion: 22.11.2018** **Anticipated Date of Completion: Jul'18**

S.N.	Name of the Project	BPC / Implementing Agency / Milestones	Scope of works	Current Status
		09.07.14 appointed PFCCL as BPC. (ii) SPV incorporated on 23.12.2014 (iii) RFQ notice published on 01.01.2015. (iv) LoI issued to the successful bidder Adani Power Ltd on 28.07.2015 (v) Approval u/s 164 of EA,2003: September,2016: June,2016		
12	Additional inter-Regional AC link for import into Southern Region i.e. Warora – Warangal and Chilakaluripeta - Hyderabad - Kurnool 765kV link	PFC Warora Kurnool Transmission Ltd (A subsidiary of Essel Infraprojects Limited) **Milestones:** (i) MoP vide Gazette Notification dated 06.02.15 appointed PFCCL as BPC. (ii) SPV incorporated on 20.04.20155RFQ notice published on 23.04.2015. (iii) RfQ responses received and opened on 22.05.2015. RfQ evaluation completed. (iv) The revised RfQ has been re-issued on 11.09.2015 with submission of response due on 12.10.2015. (v) 5 nos. RfQ responses received on schedule date i.e 12.10.2015 and opened on the same day. The RfQ evaluation is under progress.	(i) Establishment of 765/400kV substations at Warangal (New) with 2x1500 MVA transformers and 2x240 MVAR bus reactors. 765/400kV (ii) Warora Pool – Warangal (New) 765kV D/c line with 240 MVAR switchable line reactor at both ends. 765 KV D/C Length- 350 KM (iii) Warangal (New) –Hyderabad 765 kV D/c line with 330 MVAR switchable line reactor at Warangal end. 756 KV D/C Length- 160 KM (iv) Warangal (New) – Warangal (existing) 400 kV (quad) D/c line. 400KV D/C Length-10 KM (v) Hyderabad – Kurnool 765 kV D/c line with 240 MVAR switchable line reactor at Kurnool end. 765 KV D/C Length- 170 KM (vi) Warangal (New) – Chilakaluripeta 765kV D/c line with 240 MVAR switchable line reactor at both ends.765 KV D/C Length-250 (vii) Cuddapah – Hoodi 400kV (quad) D/c line with 63 MVAR switchable line reactor at both ends. 400 KV D/C Length-200	**SPV Transferred** **Scheduled Date of Completion : Nov-2019**
13	Common Transmission System for Phase-II Generation Projects in Odisha and Immediate Evacuation System for OPGC (1320 MW) Project in Odisha	PFC Orissa Generation Phase-II Transmission Limited (A subsidiary of Sterlite Grid Limited) **Milestones:** (i) MoP vide Gazette Notification dated 06.02.15 appointed PFCCL as BPC. (ii) SPV incorporated on 17.04.2015 (iii) RFQ notice published on 23.04.2015.	(i) OPGC (IB TPS) – Jharsuguda (Sundargarh) 400kV D/C line with Triple Snowbird Conductor 400 kV D/C Length- 50 KM (ii) Jharsuguda (Sundargarh) – Raipur Pool 765 kV D/C line 765 KV D/C Length- 350 KM	**SPV Transferred** **Scheduled Date of Completion: 08.08.2019** **Anticipated Date of Completion: July'17**
14.	Transmission System Strengthening in WR associated with Khargone TPP	REC Milestones: (i). MoP vide Gazette	Scope: A. **Connectivity system for Khargone STPP** (i) LILO of one ckt of Rajgarh-	**TSA not yet signed** **Yet to Award / Bidding**

S.N.	Name of the Project	BPC / Implementing Agency / Milestones	Scope of works	Current Status
	(1320 MW)	Notification dated 17.11.2015 appointed RECTPCL as BPC (ii). RFQ notice published on 30.11.2015.	Khandwa 400kV D/C line at Khargone TPP (ii) Khargone TPP Switchyard – Khandwa pool 400 kV D/C (Quad) line. **B. System strengthening in WR in time frame of Khargone TPP** (i) Khandwa Pool– Indore 765 kV D/C line. (ii) Khandwa Pool– Dhule 765 kV D/C line. (iii) Establishment of 765/400 kV, 2x1500 MVA pooling station at Khandwa pool.	**under process**
15.	New WR- NR 765 kV Inter-regional corridor	REC Milestones: (i). MoP vide Gazette Notification dated 28.10.2016 appointed RECTPCL as BPC	(i) 765 kV Vindhyanchal Pooling Station- Varanasi D/C line	**Yet to Award**
16.	A. Additional 400kV feed to Goa B. Additional System for Power Evacuation from Generation projects pooled at Raigarh (Tamnar) Pool	PFC Milestones: (i). MoP vide Gazette Notification dated 28.10.2016 appointed PFCCL as BPC	**A. Additional 400kV feed to Goa** (i) LILO of one ckt. of Narendra (existing) – Narendra (New) 400kV D/c quad line at Xeldem (ii) Xeldem – Mapusa400kV D/c (quad) line (iii) Establishment of 2x500MVA, 400/220kV substation at Xeldem **B. Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool** Dharamjaygarh Pool section B - Raigarh (Tamnar) Pool 765kV D/c line	**Yet to Award**
17.	A. Connectivity System for Lanco Vidarbha Thermal Power Ltd. (LVTPL) B. Inter State Transmission system strengthening in Chhatarpur area in Madhya Pradesh	PFC Milestones: (i). MoP vide Gazette Notification dated 28.10.2016 appointed PFCCL as BPC	**A. Connectivity System for Lanco Vidarbha Thermal Power Ltd. (LVTPL)** (i) LVTPL TPS switchyard – Warora Pool 765kV D/c line (ii) 2 nos of 765kV Line bays at Warora Pool (for LVTPL TPS switchyard – Warora Pool 765kV D/c line) **B. Inter State Transmission system strengthening in Chhatarpur area in Madhya Pradesh** (i) LILO of both circuits of Satna – Bina 400kV (1st) D/c line at Bijawar. (There are 2 nos. of 400kV D/c lines between Satna and Bina. One circuit of 2nd D/c line is proposed to be LILOed at Sagar (MPPTCL) Substation. This LILO is to be done on the other D/c line). (ii) Establishment of 2x500MVA, 400/220kV substation at Bijawar	**Yet to Award**

Annexure - 2.2

STATUS OF TRANSMISSION SCHEMES UNDER IMPLEMENTATION BY POWERGRID IN WESTERN REGION

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
1	**Western Region System Strengthening Scheme -II**	5222	20th (23.01.04)	July'06		
	Set-A: For absorbing import in eastern and central part of WR Grid (POWERGRID)	1700			Commissioned	
	Set-B: For regional strengthening in Southern Maharashtra **(100 % private)**	1050			Commissioned	
	Set-C: For regional strengthening in Gujarat **(100 % private)**	600			---	Implementation by Reliance
	a) Rajgarh – Karamsad 400kV D/c				commissioned	
	b) Limdi(Chorania) – Ranchodpura 400kV D/c				commissioned	
	c) Ranchodpura – Zerda(Kansari) 400kV D/c				commissioned	
	Set-D: For regional Strengthening in Northern Madhya Pradesh **(POWERGRID)**	1050			commissioned	
2	**Western Region System Strengthening -V**	722	25th (30.09.06)	Dec'07		Under implementation
	a) 400 kV Vapi- Kala - Kudus D/c				Mar'17	Vapi-Kala portion commissioned in Mar'14. Kudus S/s being implemente by MSETCL.
	b) LILO of 400 kV Lonikhand - Kalwa line at Navi Mumbai				Dec'16	Cable work in progress (2km.) Critical ROW issues
	c) Establishment of 400/220 kV, 2 x 315 MVA new S/s (GIS) at Navi Mumbai				Substation is ready and shall be commissioned matching with line	
	d) 220 kV Vapi- Khadoli D/c.				Commissioned	
3	**Tr. System of Mundra Ultra Mega Power Project (4000 MW)**	4824	26th (23.02.07)	Oct'08		Under implementation
	a) Mundra – Bachchau -Ranchodpura 400 kV (Triple) D/c				Commissioned	
	b) Mundra – Jetpur 400 kV (Triple) D/c				Commissioned	
	c) Mundra – Limbdi 400 kV (Triple) D/c				Commissioned	
	d) Gandhar-Navsari 400 kV D/c				Commissioned	
	e) Navsari - Boisar 400 kV D/c				Dec'16	Severe ROW & Forest issue.
	f) LILO of both circuits of Kawas-Navsari 220 kV D/c at Navsari (PG)				Commissioned	
	g) Wardha-Aurangabad 400 kV(Quad) D/c (with provision to upgrade at 1200 kV at later date)				Mar'17	Both Contracts terminated due to unsatisfactory performance. Tender awarded for both the packages.
	g) Aurangabad (PG) -Aurangabad I (Waluj) 400 kV(Quad)				Commissioned	
	Substations					
	a) 40% Fixed Series Compensation each on Wardha - Aurangabad 400 kV D/c at Wardha end				Mar'17	Commissioning matching with the line
	b) Establishment of new 400/220 kV, 2x315 MVA substation at Navsari & Bachchau				Commissioned	
	c) Establishment of new 765/400 kV, 3x1500 MVA, substation at Wardha for charging of Seoni - Wardha 2xS/c lines at 765 kV level				Commissioned	
4	**Transmission system associated with Krishnapatnam (5x800 MW) (WR Portion)- now delinked from Krishnapatnam UMPP**	1928	27th (30.07.07)			Under implementation
	a) Raichur – Solapur (PG) 765 kV S/c				Commissioned	
	b) Solapur(PG) – Pune 765 kV S/c				Commissioned	
	c) LILO of 400kV Aurangabad I (Waluj) - Pune (PG) D/c & Parli (PG) - Pune (PG) D/c lines at Pune(GIS)				Commissioned	
	d) Establishment of new 765/400 kV substations at Pune (GIS) with 2x1500 MVA transformation capacity				Commissioned	

STATUS OF TRANSMISSION SCHEMES UNDER IMPLEMENTATION BY POWERGRID IN WESTERN REGION

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
5	**Associated transmission system of VSTPP-IV and Rihand-III**	4673	29th (10.09.09)	Mar'10		Under implementation
	a) Rihand III- Vindhyachal Pool 765 kV D/c (initially to be op. at 400kV)				Ready for commissioning	Ckt-I charged on 26.06.14. Ckt-II ready for commissioning in Aug'15
	b) Vindhyachal IV - Vindhyachal Pool 400kV D/c(Quad)				Commissioned	
	c) Vindhyachal Pool - Satna 765 kV 2xS/c				Commissioned	
	d) Satna -Gwalior 765 kV 2xS/c				Commissioned	
	e) Gwalior – Jaipur(South) 765 kV S/c				Commissioned	
	f) Vindhyachal Pool-Sasan 765 kV S/c				Commissioned	
	g) Vindhyachal Pool-Sasan 400 kV D/c				Commissioned	
	h) Establishment of 765/400kV, 2x1500 MVA substation at Vindhyachal Pool				Commissioned	
6	**Solapur STPP(2x660MW) transmission system**	63.32	30th (08.07.10)	Oct'13		Under implementation
	a) Solapur STPP – Solapur (PG) 400kV D/c (Quad)				Commissioned	Line completed in Apr'15
	b) Augmentation of 400/220kV ICT by 1x500MVA transformer (3rd) at Solapur (PG)				Commissioned	
7	**Solapur STPP (2x660MW) transmission system (Part-A)**	50.52	36th (29.08.13)	Mar'15		Award placed in May'15
	a) Solapur STPP – Solapur (PG) 400kV 2nd D/c (Quad)				Mar'17	Foundation commenced from Nov'15
8	**Transmission system for evacuation of Kakrapar Atomic Power Project unit 3 &4 (2x700 MW)**	378.71	31st (27.12.10)	Feb'14		Under Implementation
	a) Kakrapar NPP – Navsari 400kV D/c – 38 km				Dec'16	Stringing commenced from Mar'16
	b) Kakrapar NPP – Vapi 400kV D/c - 104 km				Dec'16	
9	**Transmission System associated with Mauda Stage-II (2x660 MW)**	1575.3	32nd (13.05.11)	Sep'13		Under Implementation
	a) Mauda II – Betul 400KV D/c (Quad)-210 km				Dec'16	
	b) Betul– Khandwa 400KV D/c (Quad)-180 km				Dec'16	
	c) Khandwa – Indore(PG) 400kV D/c -215 km				Dec'16	
	d) Establishment of 400/220kV 2x315MVA substation at Betul				Dec'16	
10	**Provision of 1x315MVA ICT & Spare Converter Trf for reliable auxlliary power supply at HVDC back to back station at Bhadravati**	143	33rd (21.10.11)	-	Mar'17	ICT commissioned in Mar'15. Balance work under progress.
11	**Establishment of Pooling Station at Champa and Raigarh (Near Tamnar) for IPP Generation Projects in Chhattisagrh**	2066.85	29th (10.09.09)	May'11		Under Implementation
	a) Champa Pooling Station - Raipur Pooling Station 765kV D/c				One ckt commissioned	Other ckt terminated at D'jaygarh bypassing Champa
	b) Raigarh Pooling Staiton (near Kotra) - Raigarh pooling (near Tamnar) 765kV D/c				Commissioned	
	c) Champa Pooling Station - Dharamjaygarh Pooling Station 765kv S/c				Commissioned by-passing Champa Pool	
	d)Raigarh Pooling Staiton (near Kotra) - Champa pooling 765kV S/c				Commissioned	
	e) Establishment of 765/400kV 6x1500MVA Champa Pooling Station				Nov'16	ICTs to be commissioned with C-K HVDC Link
	f)Establishment of 765/400kV 3x1500MVA Raigarh Pooling Station (near Tamnar)				Commissioned	
12	**Transmission system strengthening in Western Part of WR for IPP generation proejcts in Chhattisgarh**	2127.51	29th (10.09.09)	Nov'11		Under Implemetation
	a) Aurangabad(PG) – Boisar 400kV D/c (Quad)				Dec'16	Stage-I Forest Clearance received in Aug'15
	b) Wardha - Aurangabad (PG) 765kV D/c				Commissioned	
	c) Establishement of 765/400kv 2x1500MVA auraganbad (PG) S/s				Commissioned	

STATUS OF TRANSMISSION SCHEMES UNDER IMPLEMENTATION BY POWERGRID IN WESTERN REGION

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	d) Augmentation of transformation capacity at Boisar by 400/220kV, 1x500MVA				Commissioned	
13	**System strengthening in North/West part of WR for IPP Projects in Chhattisgarh**	2073.26	29th (10.09.09)	Dec'11		Under Implementation
	a) Aurangabad (PG) – Padghe(PG) 765kV D/c				Mar'17	Forest clearance awaited
	b) Vadodara – Asoj 400kV D/c(Quad)				Commisisoned	
	c) Padghe – Kudus 400kV D/c (Quad)				Mar'17	Matching with Kudus S/s of MSETCL & A'bad-Padghe line
14	**System Strengthening in Raipur-Wardha Corridor for IPP projects in Chhattisgarh (DPR-6)**	1422.85	29th (10.09.09)	Jan'12		Under Implementation
	a) Raipur Pooling station - Wardha 765kV 2nd D/c				Dec'16	Stage-I Forest Clearance received in Jun'15 & Stage-II in Dec'15
15	**WR-NR HVDC interconnector for IPP Projects in Chhattisgarh**	9569.76	29th (10.09.09)/30th (08.07.10)	Mar'12		Under Implementation
	a) A ± 800kV, 3000Mw HVDC bipole between Champa Pooling Station-Kurukshetra (NR) (provision to upgrade to 6000MW at a latter date)				Nov'16	
	b) Kurukshetra(NR) - Jallandhar 400kV D/c(Quad) one ckt. via 400/220kV Nakodar				Commissioned	
	c) LILO of Abdullapur – Sonepat 400kV D/c(triple) at Kurukshetra				Commissioned	
	d) Establishment of 3000MW 800KV HVDC bipole terminal each at Champa Pooling station and Kurukshetra(NR) respectively: to be upgraded to 6000MW.				Nov'16	
	e) Establishment of 400/220kV 2x500 MVA S/s at Kurukshetra (GIS) 2x500MVA				Nov'16	400kV bays ready for commissioning in Dec'15. ICT-II under progress.
16	**Inter-regional system strengthening scheme for WR and NR-Part A**	1315.9	36th (29.08.13)	Oct'13		Completed
	a) Solapur - Aurangabad 765kV D/c				Commissioned	
17	**Transmission System Associated with Lara STPS-I (2x800MW)**	400.47	17th LTA (03.01.13)	Jun'14		Under Implementation
	a) Lara STPS-I – Raigarh (Kotra) Pooling Station 400 kV D/c line – 18km				Commissioned	
	b) Lara STPS-I – Champa Pooling Station 400 kV D/c (quad) line.-112km				Apr'17	Tower erection commenced in Oct'15
18	**Transmission System Strengthening in WR-NR Transmission Corridor for IPPs in Chattisgarh**	5151.37	35th (03.01.13)	Jun'14		Award under progress
	a) Up-gradation of + 800kV, 3000MW HVDC bipole between Champa Pooling Station – Kurukshetra (NR) to 6000MW				Mar'18	
	b) Kurukshetra (NR) – Jind 400kV D/c (Quad)				Mar'18	
19	**Inter-regional system strengthening scheme for WR and NR-Part B**	6517.36		Dec'14		Award placed in Mar'15
	(a) 765KV D/C Jabalpur Pooling Station - Orai line				Apr'18	
	(b) 765KV D/C Orai - Aligarh line				Apr'18	
	(c) 400KV D/C Orai - Orai line (Q)				Apr'18	
	(d) LILO of one ckt of Satna-Gwalior 765KV 2x S/C line at Orai				Apr'18	
	(e) LILO of Agra - Meerut 765KV S/C at Aligarh				Apr'18	
	(f) LILO of Kanpur - Jhatikara 765KV S/C at Aligarh				Apr'18	
20	**Wardha - Hyderabad 765kV Links**	3662.02		Jan'15		
	(a) 765KV D/C Wardha - Hyderabad line				May'18	
	(b) 400KV D/C Nizamabad - Dichpali line				May'18	Award placed in Mar'15
21	**GREEN ENERGY CORRIDORS:- Inter State Transmission Scheme (ISTS) - Part B**	3705.61	36 / 37th (29.08.13/05.09.14)	Apr'15		Award placed in July'15
	(a) 765KV D/C Banaskanta - Chittorgarh (New) line				Apr'18	
	(b) 765KV D/C Chittorgarh (New) - Ajmer (New) line				Apr'18	
	(c) 400KV D/C Banaskanta - Sankhari line				Apr'18	

STATUS OF TRANSMISSION SCHEMES UNDER IMPLEMENTATION BY POWERGRID IN WESTERN REGION

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	(d) Establishment of 765/400/220kV (765/400kV - 2x1500 MVA & 400/220kV - 2x500MVA) substation at Banaskanta				Apr'18	
22	**GREEN ENERGY CORRIDORS:- Inter State Transmission Scheme (ISTS) - Part C**	2247.37	36 / 37th (29.08.13/05.09.14)	July'15		Award under progress.
	(a) 765KV D/C Bhuj Pool - Banaskanta line				July'18	
	(d) Establishment of 765/400/220kV (765/400kV - 2x1500 MVA & 400/220kV - 2x500MVA) pooling station at Bhuj				July'18	
23	**Transmission System Strengthening Associated with Vindhyachal V - Part A**		34th (09.05.12)	Feb'15		Award placed in Aug'15
	(a) 1x1500MVA, 765/400kV ICT at Vindhyachal Pooling Station				July'17	
24	**Transmission System Strengthening Associated with Vindhyachal V - Part B**		34th (09.05.12)			Investment Approval pending
	(a) 2 nos of 765kV Line bays alongwith 2x330MVAR Line Reactor at Vindhyachal Pooling Station				Jun'18	
	(a) 2 nos of 765kV Line bays alongwith 2x330MVAR Line Reactor at Jabalpur Pooling Station				Jun'18	
25	**STATCOMs in Western Region**		36th (29.08.13)	Mar'15		
	(a) Aurangabad				Sep'17	Award placed in Jun'15
	(b) Gwalior				Sep'17	Award under progress
	(c) Solapur				Sep'17	Award placed in Jun'15
	(d) Satna				Sep'17	Award placed in Jun'15
26	**Western Region System Strengthening Scheme XIV**	93.96	37th (05.09.14)			
	(a)2x500MVA, 400/220kV transformer alongwith six nos of 220kV bays at Indore (PG) 765/400kV Substation				July'18	
	(b)1x500MVA, 400/220kV transformer alongwith two nos of 220kV bays at Itarsi (PG) 400/220kV S/s				July'18	
27	**Powergrid works associated with Part-A of Transmission system for Gadarwara STPS of NTPC**		36/37th (29.08.13 / 05.09.14)			
	(a) 2 nos. 765 kV line bays at 765/400kV Jabalpur Pooling Station of POWERGRID {for Gadarwara STPS (NTPC) - Jabalpur PS 765 kV D/c}				May'17	
28	**Powergrid works associated with Part-B of Transmission system for Gadarwara STPS of NTPC i.e. WRSS XV**		36/37th (29.08.13 / 05.09.14)		Matching with TBCB schedule	
	(a) 2 nos. 765 kV line bays at 765/400kV Solapur sub-station of POWERGRID {for Parli New (TBCB) - Solapur (PG) 765 kV D/c}					
	(b) 2 nos 400kV line bays at existing 400kV Parli (PG) Switching Station of POWERGRID {for Parli New (TBCB) - Parli (PG) 400kV D/c (quad)}					
29	**Powergrid works associated with System Strengthening for IPPs in Chhattisgarh and other generation projects in Western Region**		36th (29.08.13)		Matching with TBCB schedule	
	(a) 1 no. 765 kV line bay at 765/400kV Vindhyachal Pooling Station of POWERGRID {for Sasan UMPP - Vindhyachal PS (PG) 765 kV 2nd S/c}					
	(b) 2 no. 400 kV line bays at 765/400kV Vindhyachal Pooling Station of POWERGRID {for Vindhaychal (IV/V) STPP switchyard (NTPC) - Vindhyachal PS (PG) 400 kV 2nd D/c (quad)}					
	(c) 2 no. 400 kV line bays at Gwalior Substation {for Gwalior - Morena 400 kV D/c (quad)}					
	(d) 2 nos. 765 kV line bays at 765/400kV Pune (GIS) sub-station of POWERGRID {for LILO of one circuit of Aurangabad(PG) – Padghe(PG)765 kV D/c at Pune (GIS) (PG)}					

STATUS OF TRANSMISSION SCHEMES UNDER IMPLEMENTATION BY POWERGRID IN WESTERN REGION

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	(e) 2 nos. 765 kV line bays at 765/400kV Champa Pooling Station of POWERGRID {1for Champa PS(PG) - Raigarh (Kotra) PS(PG) 765 kV 2nd S/c, 1 for Champa PS(PG) – Dharamjaigarh(PG) 765 kV 2nd S/c}					
	(f) 1 no. 765 kV line bay at 765/400kV Raigarh (Kotra) Pooling Station of POWERGRID {for Champa PS(PG) - Raigarh (Kotra) PS(PG) 765 kV 2nd S/c}					
	(g) 1 no. 765 kV line bay at 765/400kV Dharamjaigarh Pooling Station of POWERGRID {for Champa PS(PG) – Dharamjaigarh(PG)765 kV 2nd S/c}					
30	**Powergrid works associated with Additional System Strengthening Scheme Chhattisagrh IPPs Part-B**		36/37th (29.08.13 / 05.09.14)		Matching with TBCB schedule	
	(a) 2 nos. 765 kV line bay at 765/400kV Raipur Pooling Station of POWERGRID {for Raipur PS(PG) – Rajnandgaon (TBCB) 765 kV D/c}					
30	**Powergrid workds associated with Additional System Strengthening for Sipat STPS**		36/37th (29.08.13 / 05.09.14)		Matching with TBCB schedule	
	(a) 3 nos. 765 kV line bays at 765/400kV Bilaspur Pooling Station of POWERGRID (1 no. for Sipat STPS(NTPC) - Bilapur PS(PG) 3rd 765kV S/c, 2 nos. for Bilaspur PS(PG)-Rajnandgaon(TBCB) 765 kV D/c)					
	(b) 2 nos. 240 MVAR, 765 kV switchable line reactors at 765/400kV Bilaspur PS end for Bilaspur PS(PG) - Rajnandgaon(TBCB) 765 kV D/c					
31	**Transmission System Strengthening associated with Mundra UMPP- Part A**	266.19	36th (29.08.13)		Jun'18	
	(a) LILO of both circuits of Mundra UMPP-Limbdi 400kV D/c (triple snowbird) line at Bachau					
32	**Transmission System Strengthening associated with Mundra UMPP- Part B**		36/38th (29.08.13/17.07.2015)		Jan'19	
	(a) Mundra UMPP - Bhuj Pool 400kV D/c line (triple snowbird)					
33	**Bays for Transmission System Associated with DGEN Torrent Energy Ltd (1200MW)**		13/14th LTA (27.12.10/13.05.2011)		Matching with TBCB Line	
	(a) 2nos 400kV Bays at Vadodara (GIS)					
	(b) 2nos 220kV Bays at Navsari (GIS)					
34	**Western Region System Strengthening -16**		38th (17.07.15)		July'18	
	(a) Installation of 2x500MVA, 400/220kV ICTs with associated bays at Parli (PG) switching station along with provision of six nos. of 220 kV bays					
	(b) Provision of two nos. of 220kV bays at Mapusa (Colvale) 400/220 kV substation					
	(c) Installation of 500MVA, 400/220kV (3rd) ICT with associated bays at Satna (PG) S/s with provision of two nos. 220kV line bays					
	(d) Provision of two nos. of 400 kV bays at 765/400kV Indore(PG) substation					
35	**Western Region System Strengthening -17**		39th (30.11.15)		Mar'19	
	1. Provision of 1x240 MVAR switchable line reactor at Pune GIS S/s end {for Aurangabad (PG) – Pune GIS 765kV S/C line, formed after LILO of one ckt of Aurangabad (PG) – Padghe (PG) 765kV D/C line at Pune GIS}.					
	2. Conversion of followings Fixed Line Reactor into Switchable Line Reactors / BUS Reactor.					
	a. Itarsi – Indore (MPPTCL) 400kV 2xS/C lines: 420kV 50 MVAR fixed line reactors at both ends of each line are to be converted into switchable line reactors.					
	b. Bina (PG) – Shujalpur 400kV D/C line: 420kV 50 MVAR fixed line reactor at Shujalpur end is to be converted into switchable line reactor. The 420kV 63 MVAR line reactor installed at Bina (PG) end is already switchable.					
	c. 1x63 MVAR BUS Reactor at Bhadravati S/s: 420kV					

STATUS OF TRANSMISSION SCHEMES UNDER IMPLEMENTATION BY POWERGRID IN WESTERN REGION

Sl. No.	Description of Scheme	Estimated Cost (Rs. Cr)	Date of firming up in WR standing committee	Date of investment approval	Target date as of now	Remarks
	3. Installation of ICTs along with associated bays at following substations of POWERGRID:					
	a. Khandwa 400/220kV Substation: 1x500 MVA, 400/220kV 3rd ICT.					
	b. Boisar 400/220kV Substation: 1x500 MVA, 400/220kV 4th ICT.					
	c. Kala 400/220kV Substation: 1x500 MVA, 400/220kV 3rd ICT.					
	d. Dehgam 400/220kV Substation: 1x500 MVA, 400/220kV 3rd ICT.					
36	**Western Region System Strengthening -18**		39th (30.11.15)		Aug'19	
	1. Splitting of following substation along with necessary switching arrangement.					
	a. Dharamjaygarh Pool 765kV BUS					
	b. Raigarh Pool (Kotra) 400kV & 765kV BUS					
	c. Champa Pool 400 kV & 765kV BUS					
	2. Installation of Reactors:					
	a. 1X125 MVAR BUS Reactor at 400kV BUS Section A of Dharamjaygarh Pool.					
	b. 1X125 MVAR BUS Reactor at 400kV BUS Section A of Raigarh Pool (Kotra).					
	c. 1X240 MVAR BUS Reactor at 765kV BUS Section A of Raigarh Pool (Kotra).					
	d. 1X240 MVAR BUS Reactor at 765kV BUS Section A of Champa Pool.					
	e. 1X330 MVAR BUS Reactor at 765kV BUS Section B of Dharamjaygarh Pool.					
37	**PG Works associated with Transmission System for Khargone TPP**		(17.07.15 & 30.11.15)			
	1. 63 MVAr switchable line reactor along with 500Ω NGR at Rajgarh(PG) end of Khargone TPS – Rajgarh (PG) 400kV line *{formed after LILO of one circuit of Khandwa - Rajgarh 400 kV D/C line at Khargone TPS, being implemented under TBCB}*				Feb'18	
	2. 2 nos. of 765 kV line bays at 765/400kV Indore Substation of POWERGRID *{for termination of Khandwa PS – Indore 765 kV D/C line, being implemented under TBCB }*				July'19	
	3. 240 MVAr Switchable Line Reactors along with 700Ω NGR at Indore (765/400kV S/s) end of each circuit of Khandwa Pool – Indore 765kV D/c line (Line being implemented under TBCB)				July'19	
38	**POWERGRID Works associated with New WR - NR 765kV Inter-regional corridor**		40th (01.06.2016)		Matching with TBCB Line	
	a. 2 nos. of 765kV Line Bays at Vindhyachal 765/400 kV Pooling Station;					
	b. 2 nos. of 765kV Line Bays along with 765kV, 1x330 MVAr line reactor in each bay at Varanasi 765/400 kV GIS sub-station					
39	**POWERGRID Works associated with Additional 400kV feed to Goa**		40th (01.06.2016)		Matching with TBCB works	
	2 nos of 400kV line bays at Mapusa s/s for termination of Xeldem – Mapusa 400kV D/c (quad) line & 1x80MVAr LR at Narendra (New) S/s for Narendra(New) - Xeldam 400kV line					
40	**POWERGRID Works associated with Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool**		40th (01.06.2016)		Matching with TBCB works	
	2 nos. of 765kV Line Bays each at Dharamjaygarh Pool and Raigarh (Tamnar) Pool					

Study Report on addressing loading on 400kV Banaskantha-Sankhari line

In the 40th WR SCM held on 01.06.2016, issue of critical loading of Banaskantha-Sankhari 400 kV D/c during its n-1 contingency was discussed. In the meeting, it was decided that joint studies amongst GETCO, PGCIL and CEA shall be carried out to address above issue.

It is to mention that recently new applications from various wind IPP/developer in Kutch area have been received by the CTU, which are under processing. A list of new applications (total- 2100 MW) near Bhuj PS is as under:

- Adani Green (Connectivity & LTA -500 MW)
- Inox (Connectivity-I -500 MW)
- Inox (Connectivity-II -500 MW)
- Suzlon (Connectivity-I – 250 MW)
- Suzlon (Connectivity-II – 250 MW)
- Orange (Connectivity-100 MW)

765/400kV Banaskantha Pooling station pools power from Banaskantha Solar park (700 MW) as well as 765kV Bhuj Pooling Station. M/s Srijan Energy (Wind-300 MW) has already been granted Connectivity/LTA at Bhuj Pooling station in last LTA meeting held on 01.06.2016.

In order to find out a solution to control loading of 400 kV Banaskantha-Sankhari D/c line as well as other aspects, a joint study meeting was held on 27th & 28th July 2016 amongst CEA, PGCIL & GETCO. Studies were carried out for other than peak demand scenario in 2018-19 time frame, with Solar maximised scenario (100%) & wind despatch scenario 40% as well as considering above new applications also.

From studies, it was observed that at 400/220kV Sankhari (GETCO) S/s, total about 1300-1400 MW is drawn which includes about 700 MW power drawl through Sankhari ICT and balance 650 MW through Zerda & Randhodpura. Sankhari 400/220kV ICTs drawl is increased due to GETCO's reconfiguration of 220kV lines towards load centers which are being LILOed at Sankhari.

Majority of above power is injected from 400kV Banaskantha- Sankhari D/c line at 400kV Sankhari. In base case, flow on 400 kV Banaskantha- Sankhari line is about 544 MW/circuit, which under n-1 contingency reaches upto 978 MW. Result of base case load flow study is enclosed at ***Exhibit-I***.

Since drawl at 400/220kV Sankhari ICT is feeding the loads, alternatives have been explored to address loading towards Ranchodpura & Zerda so as to control overall loading of 400kV Banaskantha – Sankhari line.

Towards this, following three alternatives have been studied -

Alternative-1

LILO of 400 kV Zerda-Ranchodpura one line (2nd circuit) at Banaskantha(PG)PS – 30 km

Estimated Cost – Rs 55 Cr

Alternative-2

LILO of 400 kV Zerda-Soja S/c (existing) at Banaskantha(PG) PS – 35 km

Estimated Cost – Rs 60 Cr

Alternative-3

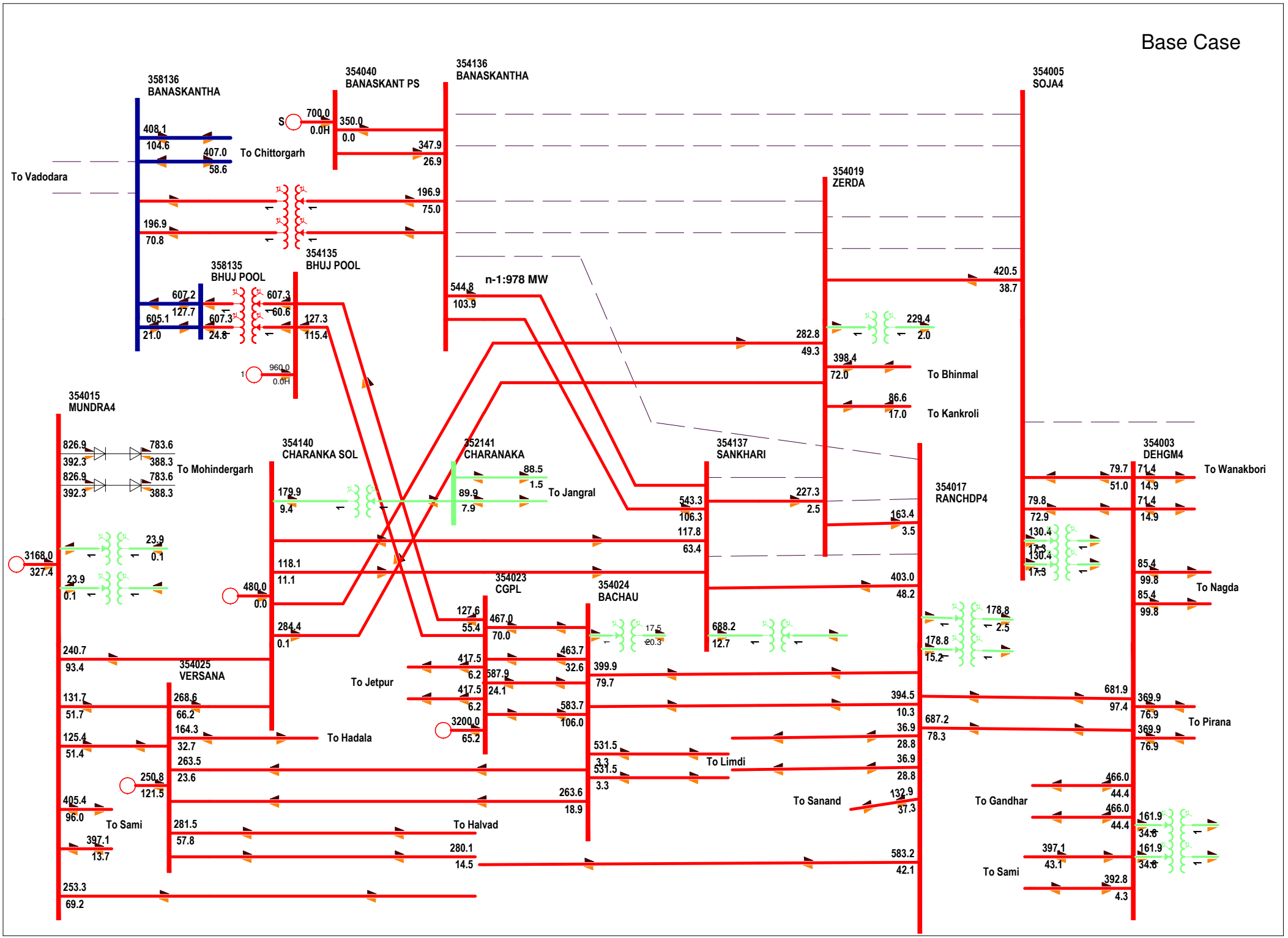
765 kV Banaskantha-Vadodara D/c - 340 km

Estimated Cost – Rs 1400 Cr

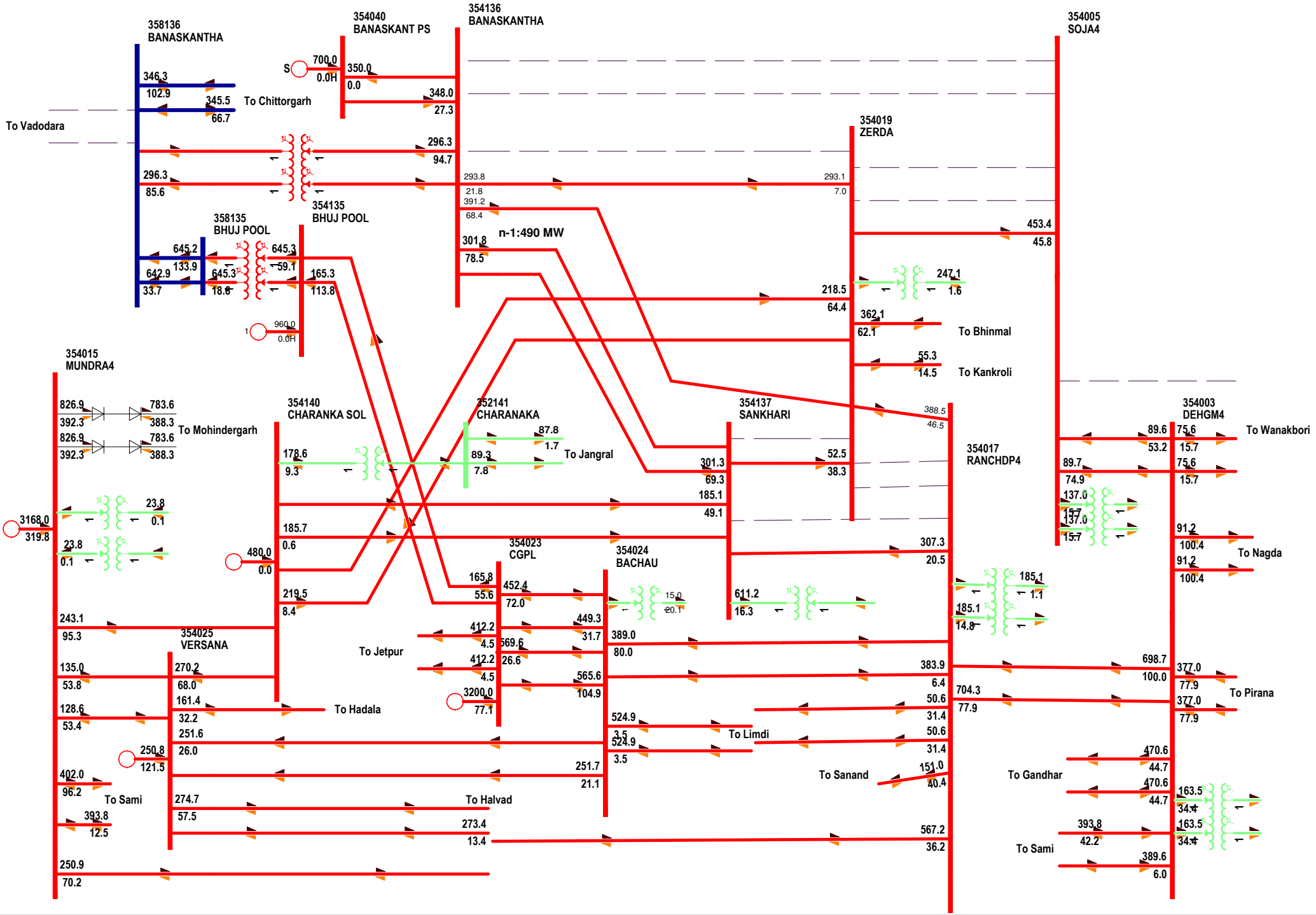
Flows on various elements in three different alternatives are summarized in table as under:

S. No	Element	Base Case (MW)	Alt- 1 (MW)	Alt- 2 (MW)	Alt- 3 (MW)
1	Banaskantha-Sankhari 400 kV D/c	2x544 (n-1:978)	2x301 (n-1:490)	2x288 (n-1:473)	2x271 (n-1:478)
2	Banaskantha 765/400 kV transformer	2x196	2x296	2x293	-2x76
3	Banaskantha-Chittorgarh 765 kV D/c	2x408	2x346	2x344	2x133
4	CGPL-Bhuj Pool 400 kV D/c	2x127	2x165	2x160	2x282
5	Banaskantha-Zerda 400 kV D/c	-	293	209	-
6	Banaskantha-Ranchodpura 400 kV D/c	-	391	-	-
7	Banaskantha-Soja 400 kV D/c	-	-	495	-
8	Banaskantha-Vadodara 765 kV D/c	-	-	-	2x702

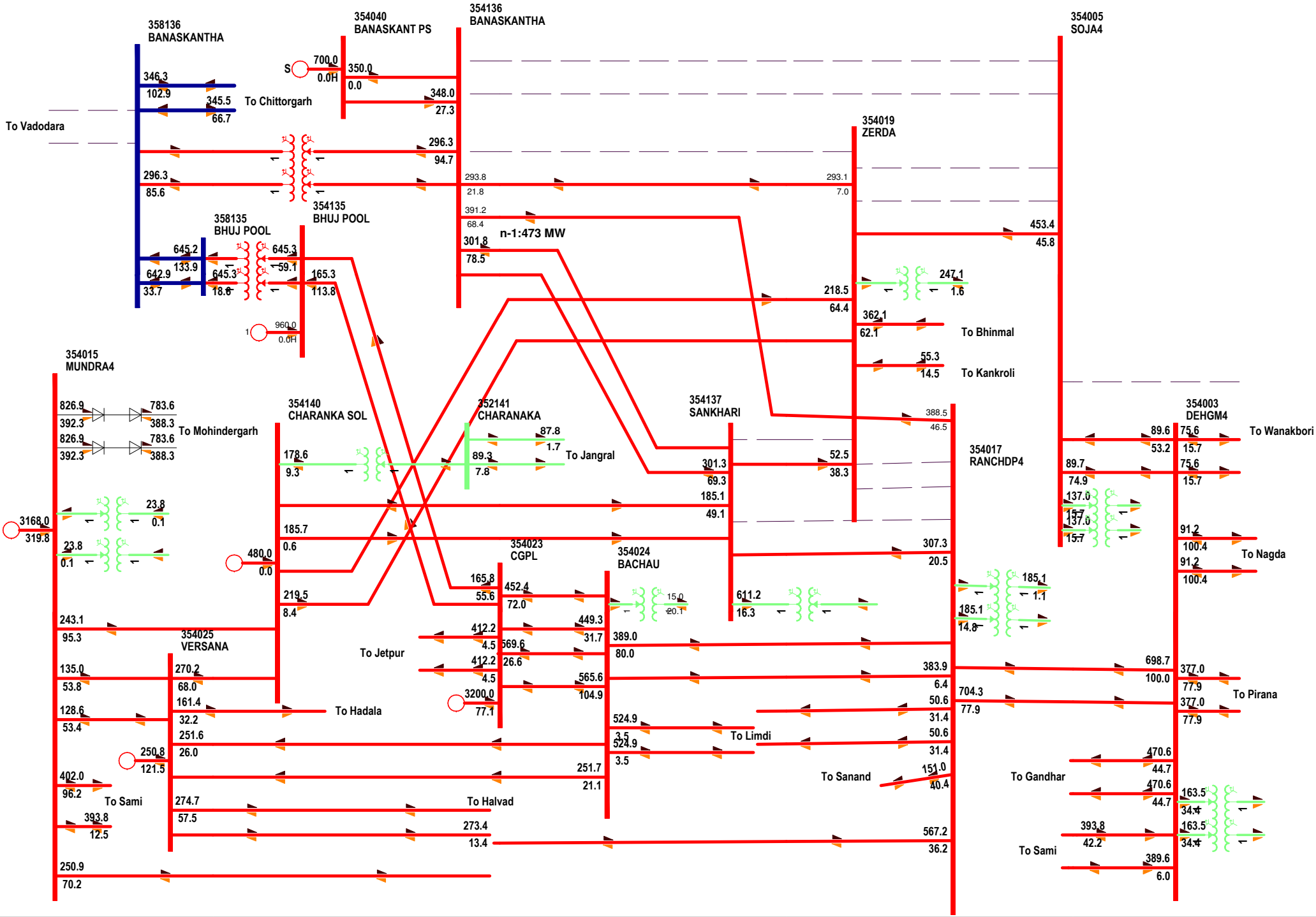
From above, it may be seen that with all above three alternatives, loading on Banskantha – Sankhari line during n-1 contingency is significantly relieved. However ***Alternative -1*** seems to be most economical alternative. In view of the above, LILO of 400 kV Zerda-Ranchodpura one line (2nd circuit) at Banaskantha (PG)PS is proposed.


Base Case
358136
BANASKANTHA
354040
BANASKANT PS
354136
BANASKANTHA
354005
SOJA4
354019
ZERDA
358135
BHUJ POOL
354135
BHUJ POOL
n-1:978 MW
354015
MUNDRA4
354140
CHARANKA SOL
352141
CHARANAKA
354137
SANKHARI
354017
RANCHDP4
354003
DEHGM4
354023
CGPL
354024
BACHAU
354025
VERSANA
To Vadodara
To Chittorgarh
To Bhinmal
To Kankroli
To Mohindergarh
To Jangral
To Wanakbori
To Nagda
To Pirana
To Jetpur
To Hadala
To Limdi
To Sanand
To Gandhar
To Halvad
To Sami
To Sami

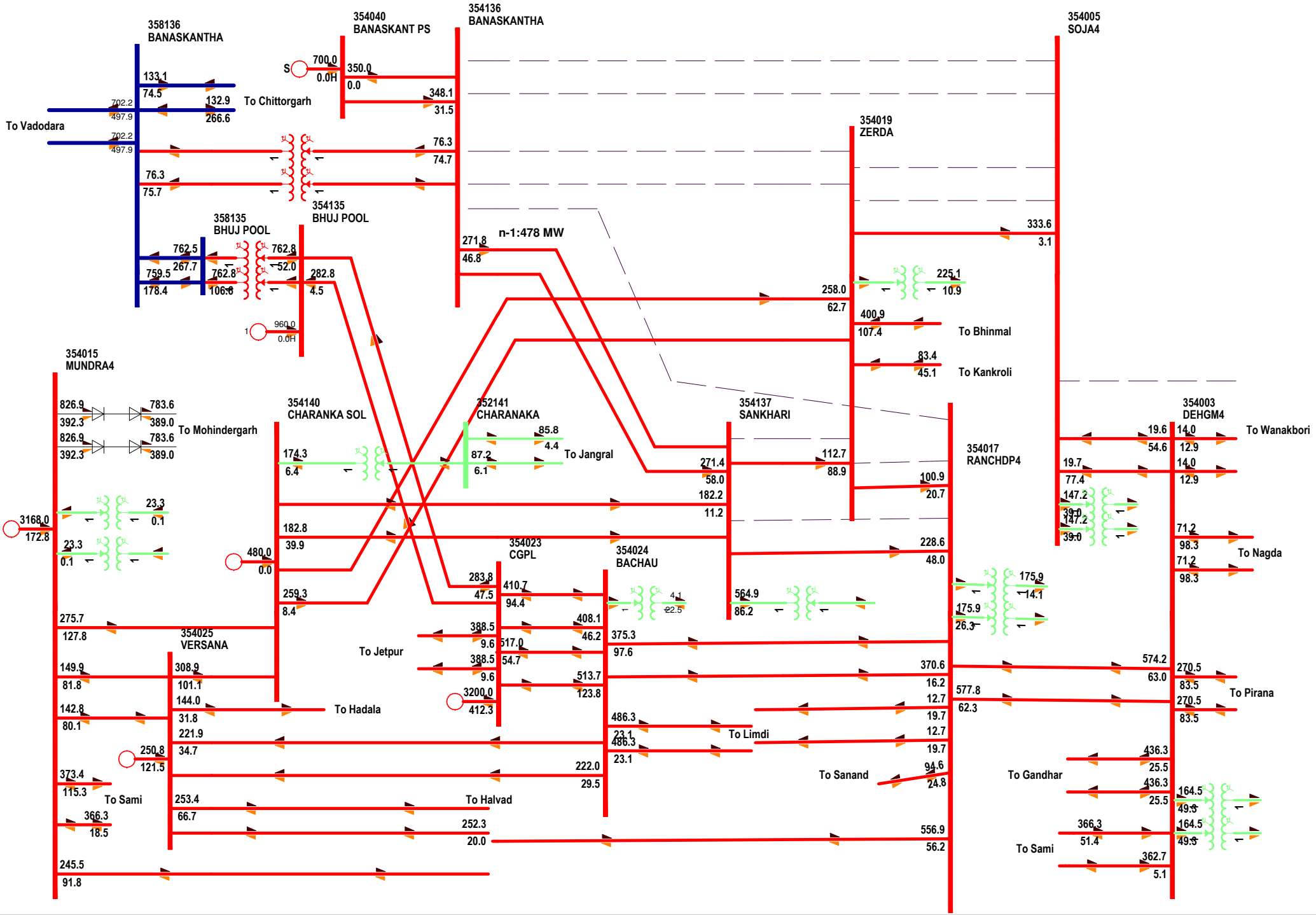
Alt-1 LILO of 400 kV Zerda Ranchodpura at Banaskantha



Alt-2 LILO of 400 kV Zerda Soja (Existing) at Banaskantha



Alt-3 765 kV Banaskantha-Vadodara D/c



Annexure 9.1

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

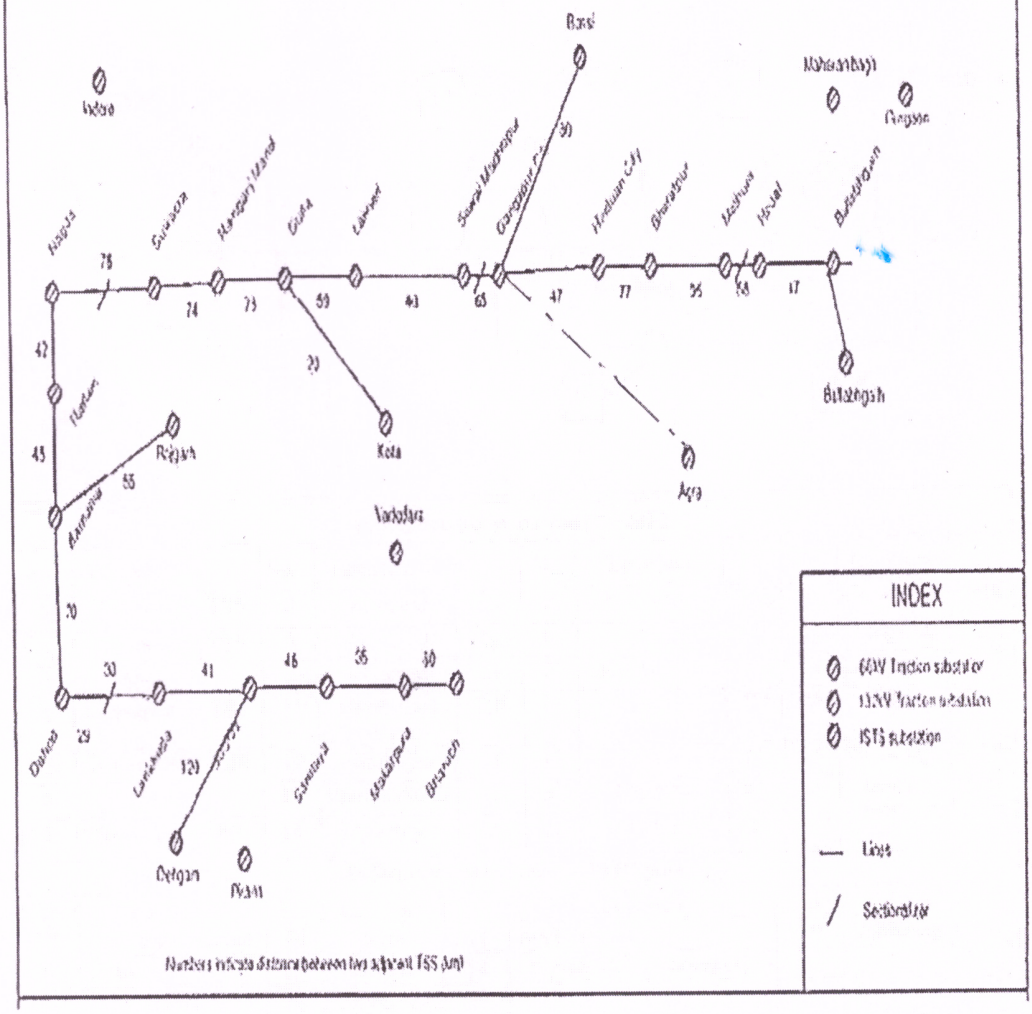
Connectivity scheme of TSS along Delhi - Bharuch route					
Sr.	PGCIL GSS	Connectivity required at (kV)	Railway TSS to be supplied	Grid Voltage at TSS	Tentative load requirement
1	Ballabhgarh	220	Ballabhgarh	66	50
2			Hodal	66	
3	Agra/Bassi	220	Mathura	132	60
4			Bharatpur	132	
5			Hindun city	132	
6			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

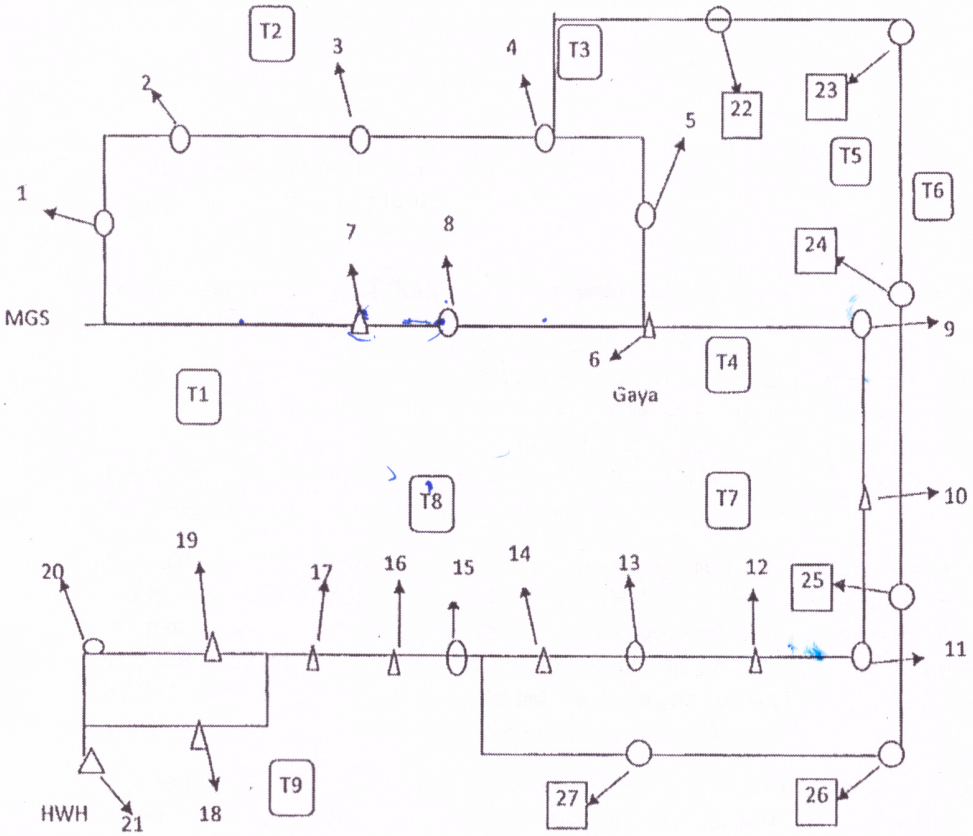
Sr.	Propo-sed ISTS point	Connecti vity required at (kV)	Railway TSS to be supplied	Grid Voltage at TSS	Contarct Demand (MVA)	Tentative load requirement (MW)
1	Arah/ Patna	220/ 132	Zamania	132kV	13.5	60
2			Dumraon		10.8	
3			Ara		10.8	
4			Danapur		10.8	
5			Jahanabad		10.8	
6	Pusauli/Gaya	220	Sonnagar		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	Luckisarai/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 9.2

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 - 9.3

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

(Ajit 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

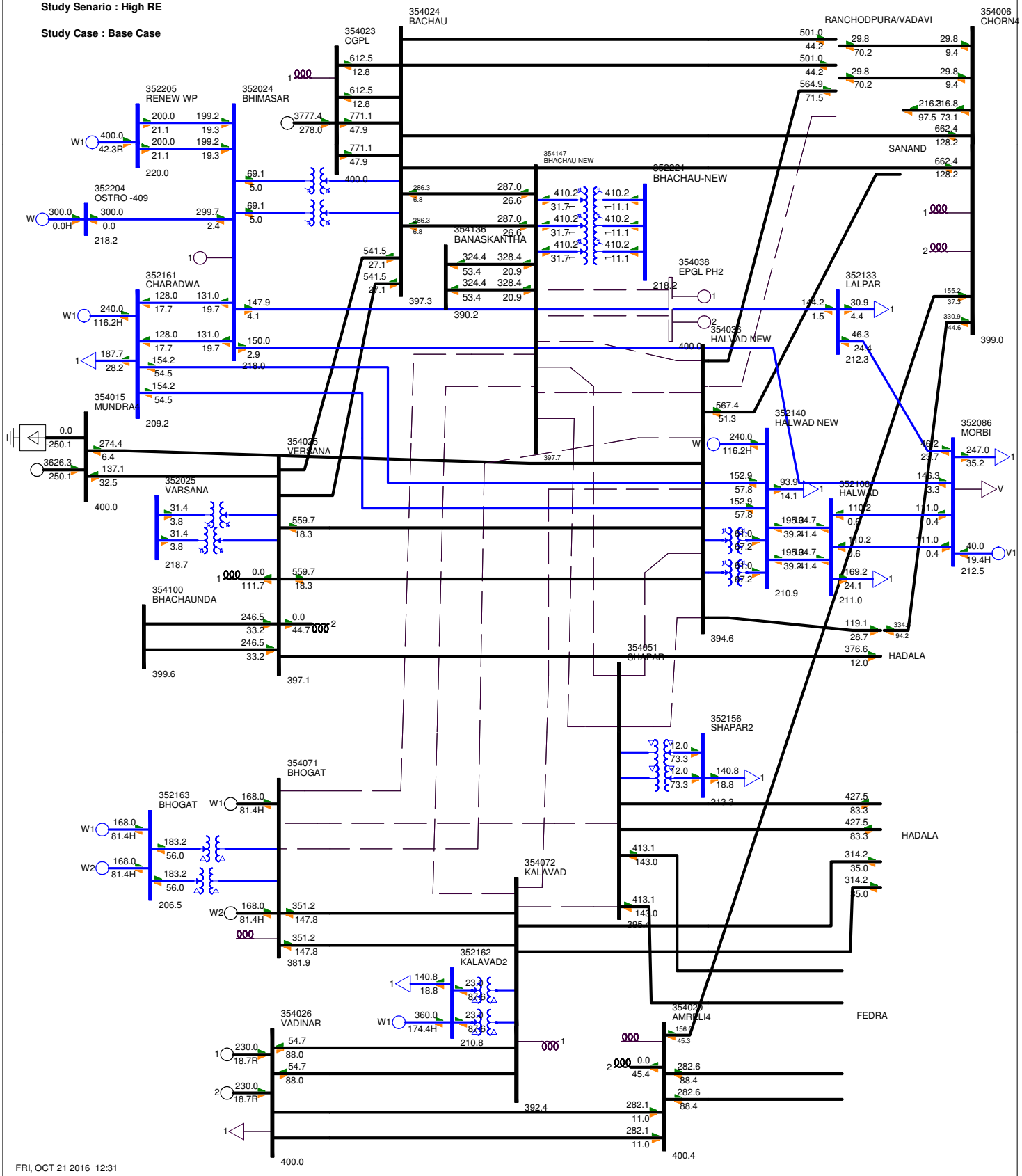
Details of TSS along Mughal Sarai - Howrah route

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

ESSAR - BHACHAU UTILISATION STUDIES

Study Senario : High RE

Study Case : Base Case



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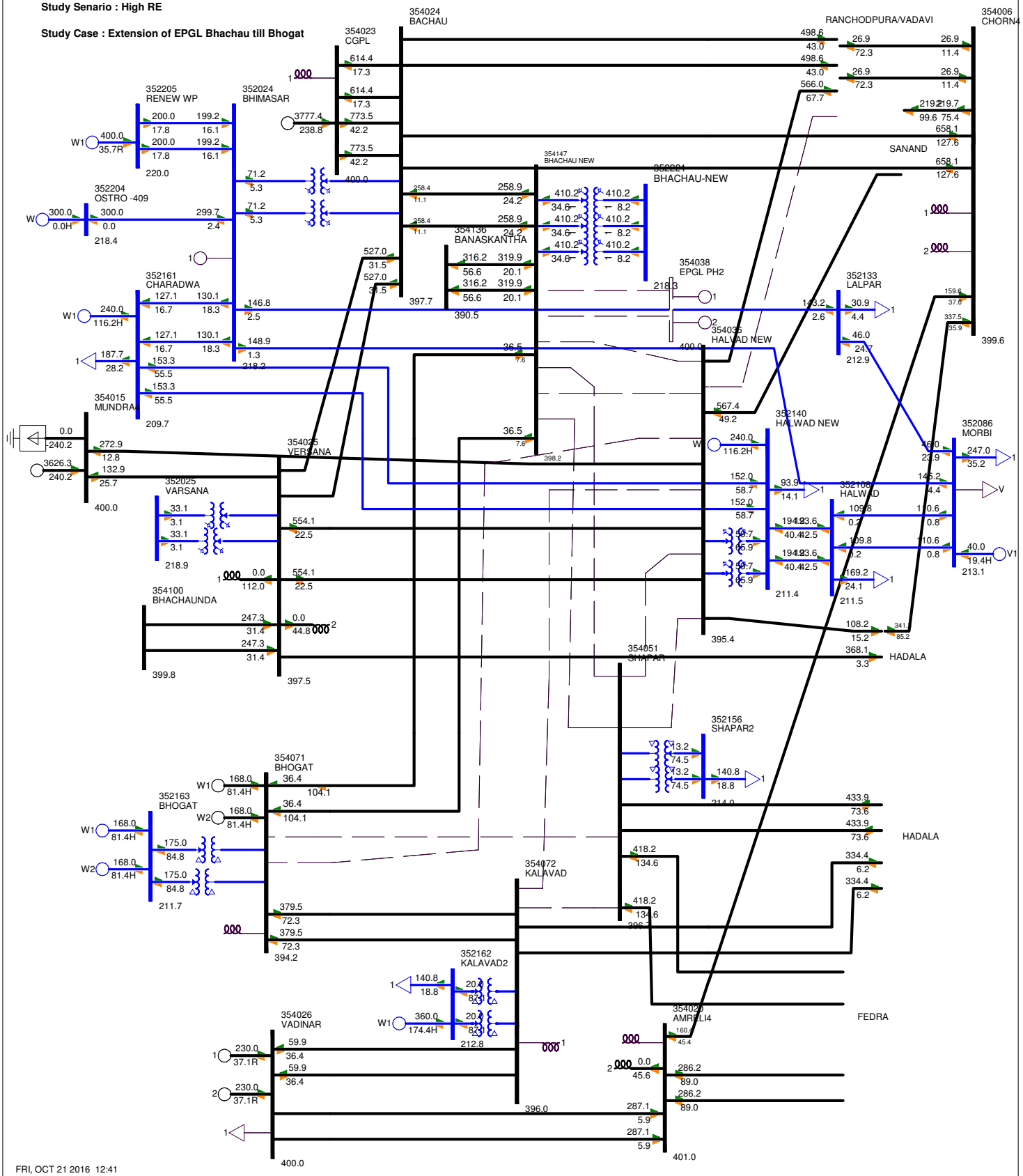
ESSAR - BHACHAU UTILISATION STUDIES

Study Senario : High RE

Study Case : Extension of EPGL Bhachau till Bhogat



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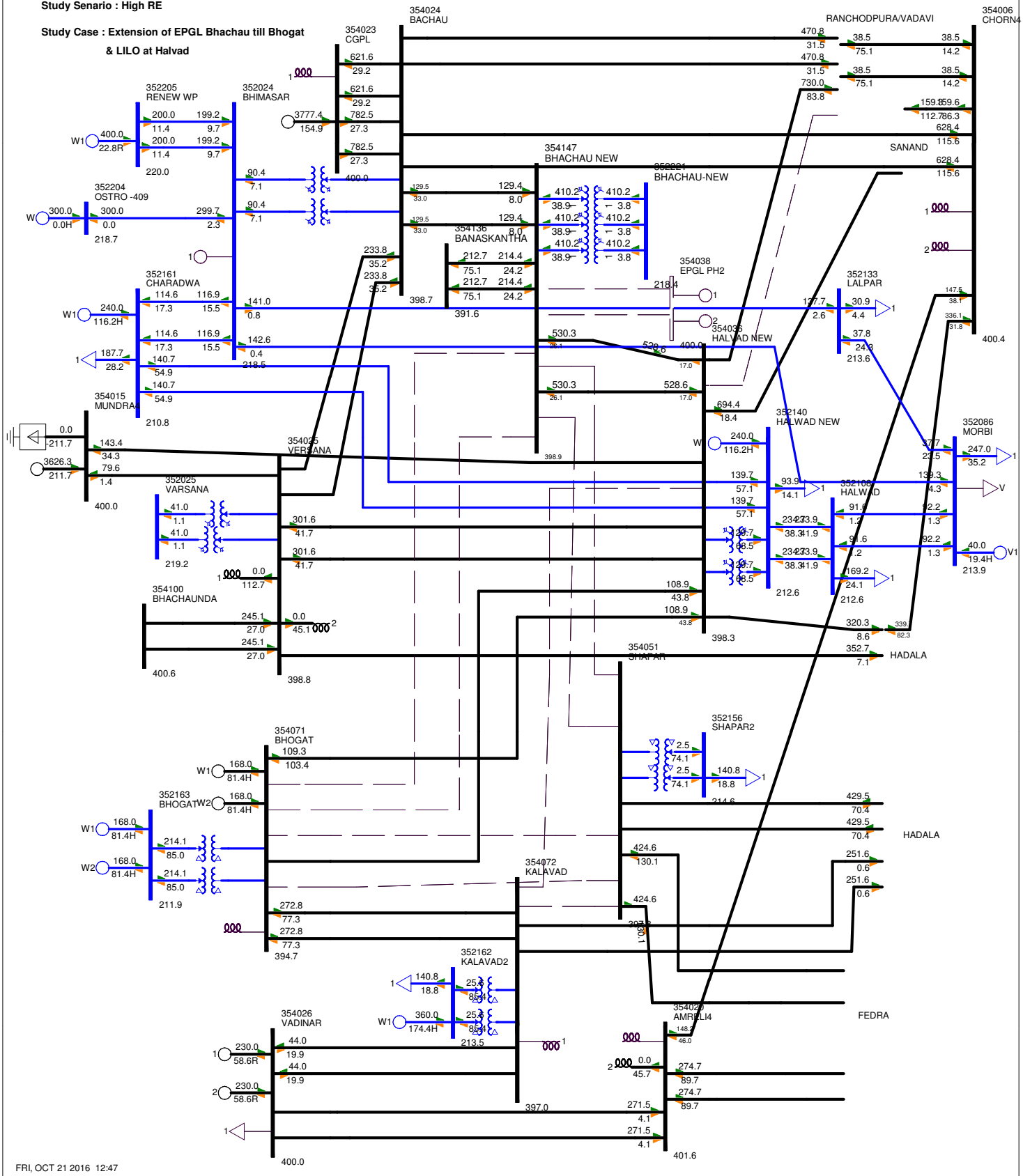
ESSAR - BHACHAU UTILISATION STUDIES

Study Senario : High RE

Study Case : Extension of EPGL Bhachau till Bhogat & LILO at Halvad



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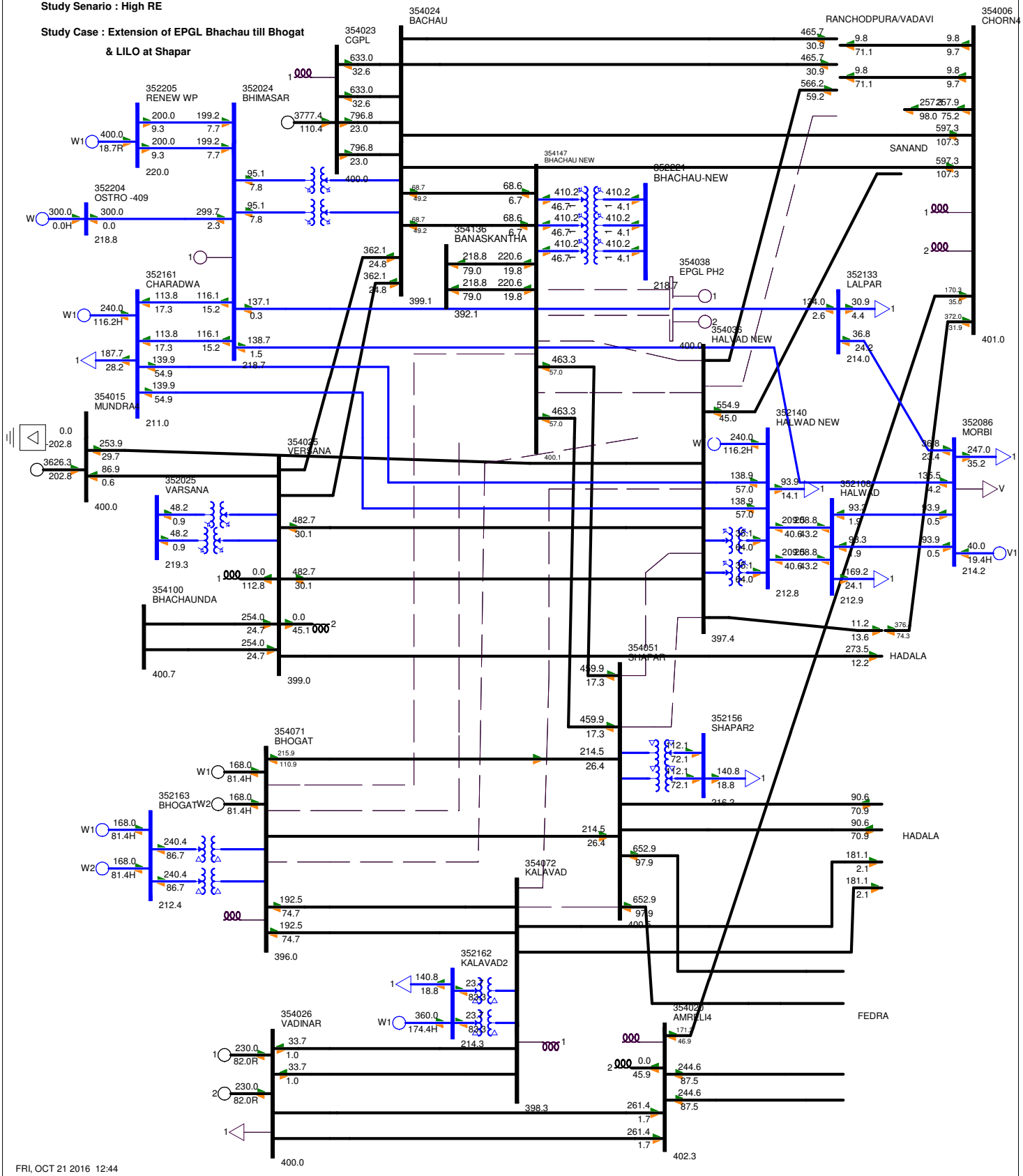
ESSAR - BHACHAU UTILISATION STUDIES

Study Senario : High RE

Study Case : Extension of EPGL Bhachau till Bhogat & LILO at Shapar



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Annexure 17.1

No. 15/1/2013-Trans
Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg,
New Delhi - 110001

Dated, 15th July, 2015

ORDER

Subject: - Policy for incentivizing early commissioning of Transmission projects.

The undersigned is directed to say that the Hon'ble Minister of State (IC) for Power has approved the Policy for incentivizing early commissioning of Transmission projects w.e.f. 12.06.2015 as given below:

1.1 For transmission system strengthening schemes under Tariff Based Competitive Bidding (TBCB) and also for such schemes awarded to PGCIL under compressed time schedule on cost plus basis, the developer shall get the following incentive for early commissioning of transmission project(s).

(i) Entitlement of the transmission charges from the actual date of Commercial Operation (COD) prior to the original scheduled COD. However, the number of years of applicability of tariff would remain unchanged i.e. for 25/35 years, as the case may be.

Note: The above incentive will be applicable for the transmission project(s)/ element(s) which are under implementation / yet to be bid out under TBCB / yet to be assigned to CTU (PGCIL) under compressed time schedule.

2. It is requested that the aforesaid Policy may be disseminated to all the stakeholders for information and necessary action.

(S. Venkateshwarlu)
Under Secretary (Trans)
Tele.No.2332 5242
Email:transdesk-mop@nic.in

To

1. Chairperson, CEA.
2. Secretary, CERC – Also requested to make necessary changes in the Regulations of CERC, if necessary, for smooth implementation of the Policy.
3. Principal Secretary / Secretary (Energy/Power) of all States/UTs (as per list attached)
4. CMD, PGCIL, Gurgaon.
5. CEO, REC Transmission Projects Company Ltd., New Delhi.
6. CEO, PFC Consulting Limited, New Delhi.

Annexure 17.2

No. 15/1/2013-Trans
Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg, New Delhi- 110001

Dated, 5th October, 2016

OFFICE MEMORANDUM

Subject: - Constitution of Committee to ensure smooth operationalization of the Policy for early commissioning of Transmission Projects, issued by Ministry of Power on 15.7.2015

The undersigned is directed to inform that it has been decided with the approval of Competent Authority to constitute a committee to ensure smooth operationalization of the Policy for incentivizing early commissioning of Transmission Projects, issued by Ministry of Power on 15.7.2015.

2. Composition of the Committee shall be as mentioned below:

Sl. No.	Constituent of the Committee	Capacity
1	Member (Power System), CEA	Chairperson
2	COO (CTU- Plg), PGCIL	Member
3	CEO, POSOCO	Member
4	Chief Engineer, PSPA- II, CEA	Member
5	Chief Engineer, PSPA- I, CEA	Convener & Member Secretary
6	Representatives of STUs of concerned State Utilities, LLTTC and Generation project developer (if ATS)	As invitees (as the case may be)
7	Representatives of the transmission project developer	As invitee

3. Committee shall look into and resolve various issues related to Policy for incentivizing early commissioning of Transmission Projects in respect of various ISTS lines, as per following mechanism:

(i) Transmission licensee may send their request for revised early Scheduled Commercial Operation Date (SCoD) well in advance (i.e. 24 months in advance of the intended early SCOD) to the Convener & Member Secretary of the committee and communicate the same to the implementing agencies of the interconnecting (upstream/ downstream) elements.

(ii) The Committee, will discuss the early SCoD request received from transmission licensee and may take a decision on early commissioning, based on usefulness of the early commissioning for the system and mutual indemnification agreements between Transmission Licensee/ STU/ POWERGRID/ existing Transmission Licensee/ Generation developer, as the

case may be, whose transmission elements/assets are involved. Accordingly, the committee would state the Revised SCOD (RSCOD) and the TSA would stand modified mutatis mutandis.

(iii) PSPM Division of CEA may convene quarterly meetings to review the progress of the transmission elements involved in the early commissioning and assess their commissioning in matching RSCOD. The deviations may be brought to the notice of the committee.

(iv) In case of non- availability of interconnecting elements as per the agreed RSCOD, Committee may explore the alternative arrangement for utilization of Transmission element. The effected parties may seek recourse as per the Indemnification Agreements.

5/x/16

(Bihari Lal)
Under Secretary to the Govt. of India
Tele-fax: 2332 5242
E-mail: transdesk-mop@nic.in

To,

1. Member (PS), Central Electricity Authority
2. Chief Engineer, PSPA- I, CEA
3. Chief Engineer, PSPA- I, CEA
4. Chief Engineer, PSPM, CEA
5. COO (CTU- Plg), PGCIL
6. CEO, POSOCO, New Delhi.

Copy to: PPS to Secretary(Power)/ SS(BPP)/ AS (SP)/ JS(Trans)/ Director (Trans), MoP.

पावर ग्रिड कारपोरेशन ऑफ इंडिया लिमिटेड
(भारत सरकार का उद्यम)
POWER GRID CORPORATION OF INDIA LIMITED
(A Government of India Enterprise)
पावरग्रिड
केन्द्रीय कार्यालयः "सौदामिनी" प्लॉट सं. 2, सैक्टर–29, गुडगाँव–122 001, (हरियाणा) दूरभाषः 0124-2571700-719, फैक्स : 0124-2571762,
"Saudamini" Plot No. 2, Sector-29, Gurgaon-122 001, (Haryana) Tel. : 0124-2571700-719, Fax : 0124-2571762, Web.: www.powergridindia.com
CIN : L40101DL1989GOI038121

Ref. No. C/CTU-Plg/E/TBCB

Date: 12-08-2016

Shri K. K. Arya
CE (PSP&A-I)
CEA, Sewa Bhawan
R. K. Puram
New Delhi-110066

Sub: Advancement of schedules of TBCB schemes

Sir,

As you are kindly aware, a number of TBCB schemes have been awarded for implementation to different private Transmission Service Providers (TSP). Few of these transmission schemes require termination of transmission lines at POWERGRID sub-station for which line bays are to be provided by POWERGRID. In this regard, few TSPs have approached POWERGRID requesting to advance the commissioning schedule of associated line bays so as to enable them commission their transmission lines before the scheduled date of commissioning. A list of such schemes is enclosed.

In this regard, it may be mentioned that CERC in few orders has opined that utilization of transmission system in the advanced timeframe should be examined and certified by CEA. Accordingly, CEA is requested to convene a meeting of all concerned to discuss and decide the course of action in this regard.

Thanking you.

Yours faithfully,

(**Ashok Pal**)
GM (CTU-Plg)

Copy to:

Shri Pardeep Jindal
CE (PSP&A-II)
CEA, Sewa Bhawan
R. K. Puram, New Delhi-110066

1. **Scheme:** System Strengthening for IPPs in Chhattisgarh and other generation projects in Western Region

Sl. No.	Bays at POWERGRID Substation	Transmission line under TBCB
1	Vindhyachal PS (2 nos. 400kV line bays)	400 kV (2nd) D/C Vindhyachal PS - Vindhyachal STPS (NTPC) (Quad) line (Adani)
2	Vindhyachal PS (1 nos. 765kV line bays)	765kV S/C Sasan UMPP - Vindhyachal PS line (Adani)
3	Gwalior GIS Substation (2 nos. 400kV line bays)	400kV D/C Gwalior – Morena line (Adani)
4	Pune GIS Substation (2 nos. 765kV line bays)	LILO of one ckt of 765kV D/C Aurangabad-Padghe Line at Pune GIS Substation (Adani)
5	3x80MVAR, 765kV Shunt Reactor at Pune (GIS) S/S (Under WRSS-17)	
6	Champa Pooling Station (1 nos. 765kV line bays)	765kV S/C (2nd) Champa-Raigarh (Kotra) Line (Adani)
7	Raigarh (Kotra) S/S (1 nos. 765kV line bays)	765kV S/C (2nd) Champa-Raigarh (Kotra) Line (Adani)
8	Champa Pooling Station (1 nos. 765kV line bays)	765kV S/C (2nd) Champa- Dharamjaygarh Line (Adani)
9	Dharamjaygarh S/S (1 nos. 765kV line bays)	765kV S/C (2nd) Champa- Dharamjaygarh Line (Adani)

2. **Scheme:** Additional System Strengthening Scheme Chhattisgarh IPPs Part-B

Sl. No.	Bays at POWERGRID Substation	Transmission line under TBCB
1	Raipur Pooling Station (2 nos. 765kV line bays)	765kV D/C Raipur PS - Rajnandgaon Line (Adani)

3. **Scheme:** Additional System Strengthening for Sipat STPS

Sl. No.	Bays at POWERGRID Substation	Transmission line under TBCB
1	Bilaspur Substation (1 nos. 765kV line bays)	765 kV (3rd) S/C Sipat STPS - Bilaspur PS (PG) line (Adani)
2	Bilaspur Substation (2 nos. 765kV line bays)	765 kV D/C Bilaspur PS - Rajnandgaon line (Adani)
3	6x80MVAR 765kV switchable line reactors at Bilaspur PS	

4. **Scheme:** Connectivity lines for Maheshwaram (Hyderbad) 765/400kV Pooling Station

Sl. No.	Bays at POWERGRID substation	Transmission line under TBCB
1	Maheshwaram (PG) GIS substation (2 no. 400kV line bays)	Maheshwaram – Mehboob Nagar 400kV D/c line (Sterlite)
2	Nizamabad (PG) GIS substation (2 no. 400kV line bays)	Nizamabad – Yeddumailaram 400kV D/c line (Sterlite)

5. **Scheme:** Common Transmission System for Phase-II Generation Projects in Odisha and Immediate Evacuation System for OPGC (1320MW) Project in Odisha

Sl. No.	Bays at POWERGRID substation	Transmission line under TBCB
1	Jharsuguda substation (2 no. 400 kV line Bays)	OPGC - Jharsuguda 400 kV D/C line (Sterlite)
2	Jharsuguda substation (2 no. 765 kV line Bays)	Jharsuguda - Raipur 765 kV D/C line (Sterlite)
3	Raipur Pool substation (2 no. 765 kV line Bays)	
4	2x240 MVAr switchable line reactor along with 700Ohm NGR at Jharsuguda (Sundargarh) end	
5	2x240 MVAr switchable line reactor along with 700 Ohm NGR at Raipur Pool end	

Annexure 17.4

Sterlite Power

Khargone Transmission Limited
F-1, The Mira Corporate Suits, 1 & 2, Ishwar Nagar,
Mathura Road, New Delhi 110 065, INDIA.

Phone: +91-11-49962200
Email: power@sterlite.com
www.sterlitepower.com

Date:10.11.2016

To,
The Member (Power Systems),
Central Electricity Authority,
Sewa Bhawan,R.K. Puram,
New Delhi – 110066

Ref:- MOP Letter No.- 15/1/2013-Trans dated 15th July 2015.

Sub:- Proposal for De-linking of transmission projects & early commissioning.

Dear Sir,

This Transmission Project will connect NTPC's 1,320 MW of thermal power project at Khandwa in Madhya Pradesh with the transmission system to cater to Maharashtra and Southern states. This project is awarded to Sterlite Grid 4 Limited by RECTPCL vide their letter no.-RECTPCL/P-24/Khargone/2016-17/98 dated 26.05.2015 & also SPV acquisition done on 22nd August 2016.

This is with reference to above subject as per the guidelines of Ministry of Power vide their letter no.- 15/1/2013-Trans dated 15th July 2015 we wish to inform that we are planning to commission our transmission line before schedule. For that we request you to De-link element 2 with element 3,4,5,6 as enclosed. Even though we delink element 2 with element 3,4,5,6, the System can work independently without any dependent as part of system strengthening.

We request you to take up this matter with standing committee of western region and accord your approval for proceed further.

The relevant documents are enclosing for your ready reference.

Thanking You,

Yours Faithfully,

For Khargone Transmission Limited,

Khargone Transmission Limited

Bigyan Barija
A.V.P.- Projects

Encl:- 1. MOP letter no. 15/1/2013-Trans dated 15th July 2015
2. Schedule 3 of TSA.

Cc:- Chairman , CEA.

Schedule: 3

Scheduled COD

[Note: As referred to in the definition of "Element", "Scheduled COD", and in Articles 3.1.3 (c), 4.1 (b) and 4.3 (a) of this Agreement]

Sr. No	Name of the Transmission Element	Scheduled COD in months from Effective Date	Percentage of Quoted Transmission Charges recoverable on Scheduled COD of the Element of the Project	Element(s) which are pre-required for declaring the commercial operation (COD) of the respective Element
1.	LILO of one ckt of Khandwa – Rajgarh 400 kV D/C line at Khargone TPP	20 months # (February-2018)	0.39%	NIL
2.	Khargone TPP Switchyard – Khandwa pool 400 kV D/C (Quad) line.	37 months # (July-2019)	8.34%	Elements marked at Sr. No.2, 3, 4, 5, 6 are required to be commissioned simultaneously..
3.	Khandwa Pool – Indore 765 kV D/C line	37 months # (July-2019)	29.62%	
4.	Khandwa Pool – Dhule (BDTCL) 765 kV D/C line.	37 months # (July-2019)	40.62%	
5.	Establishment of 765/400 kV, 2x1500 MVA pooling station at Khandwa.	37 months # (July-2019)	17.20%	
6.	2 nos. of 765 kV line bays and 7 X 80 MVAR Switchable line reactors (1 unit as spare) along with 800 Ω NGR and its auxiliaries for Khandwa Pool – Dhule 765 kV D/C at Dhule 765/400 kV substation of M/s BDTCL.	37 months # (July-2019)	3.83%	

The payment of Transmission Charges for any Element irrespective of its successful commissioning on or before its Scheduled COD shall only be considered after successful commissioning of the Element(s) which are pre-required for declaring the commercial operation of such Element as mentioned in the above table.

Scheduled COD for overall Project: 38 months from Effective Date #.

Scheduled COD in months is considering Effective date in June 2016. It is clarified that in case there is delay in achieving Effective date the schedule shall be compressed, accordingly to achieve Schedule COD for Element1 by February'2018 and for Elements 2 to 6 by July'2019.

KTL MPPMCL CSPDCL GUVNL

MSEDCL DNH DND GED

Vedanta Limited
(formerly known as Sesa Sterlite Ltd.)

balco

BALCO/CEA/2016/01 Dated:19-Sep-2016

To

The Chief Engineer,
Power System Planning & Appraisal-I Division,
Central Electricity Authority,
Sewa Bhawan, R. K. Puram, Sector-1, New Delhi - 110 066

Kind attention : Mr. KK Arya

Sub:- Regarding BALCO's 2nd Grid Connectivity (new).

Ref:

1) Balco letter: BALCO/PGCIL/2016/07 Dated :12.08.2016.
2) Balco letter: BALCO/PGCIL/2016/08 Dated : 23.08.2016.

Respected Sir,

Bharat Aluminium Company Ltd., (BALCO) is having an installed Power Plant capacity of 2010MW at Korba Chhattisgarh.

BALCO has signed BPTA agreement with PGCIL for 200MW & grid connectivity agreement of 2010MW with PGCIL dated 16Sep2013 with an interim arrangement of LILO connection with 400KV Transmission line -01 of Korba to Birsinghpur with permanent connectivity to 400KV double circuit transmission line from BALCO to Dharamjaigarh / Korba Pooling station.

BALCO originally has its connectivity through 400 KV LILO from Korba – Birsinghpur D/c Line. Presently LILO transmission line is disconnected & kept in uncharged condition since BALCO constructed and commissioned 400 KV D/C direct line from BALCO – Dharamjaigarh in June2016.

Balco has tied-up a long term & medium term power sale agreement with various state government & details are as below,

Bharat Aluminium Company Limited
Balco Nagar, Korba (Chhattisgarh) - 495 684
T +91 7759 252 316 F +91 7759 242 084 www.balcoindia.com

Registered Office : Aluminium Sadan Core - 6, Scope Office Complex, 7 Lodi Road, New Delhi - 110 003
CIN : U74899DL1965PLC004518

Capacity	Agreement type	Agreement with	Present Status	Commence of Supply	End of Supply
100MW	LTOA	Tamil Nadu Govt.	Operationalised	01-Feb-2014	30-Sep-2028
100MW	LTOA	Tamil Nadu Govt.	Operationalised	01-Jun-2014	30-Sep-2028
100MW	MTOA	Kerala Govt.	Operationalised	01-Mar-2014	28-Feb-2017
100MW	MTOA	Kerala Govt.	Not Operationalised	01-Oct-2017	30-Sep-2042
200MW	LTOA	UP Government	PPA signing is under process	Expected the start of flow of power in Q3/Q4 of FY 16-17	For 15 years
60 MW	LTOA	CSPTrdCL (Chhattisgarh Govt)	Operationalised	From the date of COD of Generating Units	Till Plant Life

Presently BALCO is having single grid connection (one 400KV Double circuit line between BALCO to Dharamjaigarh Pooling station) for entire BALCO Complex of 2010MW Power plant & Aluminium Smelter. In order to maintain:-

a) Grid security for Aluminium Smelter,

b) Fulfil RPO Obligation &

c) Power Sale commitment,

It is required to have second grid connectivity for BALCO. ***Hence Balco is requesting for grant of Second Grid connectivity.***

In this regard, it is requested to Grant the 400KV LILO Circuit of Korba-Birsinghpur Circuit-02 as Second permanent Grid Connectivity. BALCO shall segreggate 2x300MW power plant and 1410MW wherein 1410MW shall be connected to second grid connection (Permanent LILO line).

The proposed second grid connectivity scheme along with existing grid connection is enclosed in annexure-01& it shall be execute as below,

a) BALCO shall install new 400KV Switchyard & ICT transformer.

Bharat Aluminium Company Limited
Balco Nagar, Korba (Chhattisgarh) - 495 684
T +91 7759 252 316 F +91 7759 242 084 www.balcoindia.com

Registered Office : Aluminium Sadan Core - 6, Scope Office Complex, 7 Lodi Road, New Delhi - 110 003
CIN : U74899DL1965PLC004518

b) BALCO shall connect 1410MW Powerplant with LILO connectivity of 400KV korba to Birsinghpur circuit-2

c) During normal condition power flow in this LILO line shall be -50MW(or) +50MW.

d) During contigency the power flow in this LILO line shall be +200MW (or) -200MW

BALCO request your good office to consider our proposal & accord your consent.

With Best Regards
Bharat Aluminium Company Limited,

(D.K.Patel)

Devendra Patel
General Manager Power.

Encl: Annexure01- Propose BALCO's Grid Connectivity Network (with 2nd grid connection).

CC:

1) Shri Awdesh kumar Yadav, Dy. Director(SP&PA), CEA
2) Shri. Ashok Pal, GM, CTU planning, PGCIL.
3) Shri. Dr. Subir Sen, ED, CTU Planning, PGCIL.

Bharat Aluminium Company Limited
Balco Nagar, Korba (Chhattisgarh) - 495 684
T +91 7759 252 316 F +91 7759 242 084 www.balcoindia.com

Registered Office : Aluminium Sadan Core - 6, Scope Office Complex, 7 Lodi Road, New Delhi - 110 003
CIN : U74899DL1965PLC004518

Vedanta Limited
(formerly known as Sesa Sterlite Ltd.)

balco

BALCO/CEA/2016/02

Dated:21-Oct-2016

To

The Director,
Power System Planning & Appraisal-II Division,
Central Electricity Authority,
Sewa Bhawan, R. K. Puram, Sector-1, New Delhi - 110 066

Kind attention : Mr. Awdesh kumar yadav

Sub:- Regarding Redundant 400KV Double Circuit Transmission line for BALCO Complex (second grid connectivty to BALCO)

Ref:

1) Balco letter: BALCO/CEA/2016/01 , Dated :19.09.2016.

Respected Sir,

Bharat Aluminium Company Ltd., (BALCO) is having an installed Power Plant capacity of 2010MW & 5.6LTPA Aluminium Smelter at Korba Chhattisgarh.

BALCO has signed BPTA agreement with PGCIL for 200MW & grid connectivity agreement of 2010MW with PGCIL dated 16thSep2013 with an interim arrangement of LILO connection with 400KV Transmission line-01 of Korba to Birsinghpur with permanent connectivity to 400KV double circuit transmission line from BALCO to Dharamjaigarh / Korba Pooling station.

Balco has tied-up a long term & medium term power sale agreement with various state government & details are as below,

Capacity	Agreement type	Agreement with	Present Status	Commence of Supply	End of Supply
100MW	LTOA	Tamil Nadu Govt.	Operationalised	01-Feb-2014	30-Sep-2028
100MW	LTOA	Tamil Nadu Govt.	Operationalised	01-Jun-2014	30-Sep-2028
100MW	MTOA	Kerala Govt.	Operationalised	01-Mar-2014	28-Feb-2017
100MW	LTOA	Kerala Govt.	Not Operationalised	01-Oct-2017	30-Sep-2042

Bharat Aluminium Company Limited
Balco Nagar, Korba (Chhattisgarh) - 495 684
T +91 7759 252 316 F +91 7759 242 084 www.balcoindia.com

Registered Office : Aluminium Sadan Core - 6, Scope Office Complex, 7 Lodi Road, New Delhi - 110 003
CIN : U74899DL1965PLC004518

Capacity	Agreement type	Agreement with	Present Status	Commence of Supply	End of Supply
200MW	LTOA	UP Government	PPA signing is under process	Expected the start of flow of power in Q3/Q4 of FY 16-17	For 15 years
60 MW	LTOA	CSPTrdCL (Chhattisgarh Govt)	Operationalised	From the date of COD of Generating Units	For 25 Years

Presently BALCO is having single grid connection (one 400KV Double circuit line between BALCO to Dharamjaigarh Pooling station) for entire BALCO Complex of 2010MW Power plant & 5.6LTPA Aluminium Smelter. BALCO is requesting for redundant 400KV Double Circuit Transmission line for BALCO Complex (i.e second grid connectivity to BALCO) for the below reason

a) To ensure Grid security for Aluminium Smelter,

b) Fulfil RPO Obligation &

c) Fulfil Power Sale commitment,

a) Grid security / reliability for Aluminium Smelter:

Aluminium Smelter is power intensive & power sensitive process. Any disturbance in grid power / failure of 400KV supply due to some unforeseen incident cause stoppage of aluminium production & revival of aluminium production requires huge capital expense & requires more than a year for restart of production.

With big industrial complex of 5.6LTPA Aluminium Smelter, 2010MW Thermal Power Plant, Aluminium Fabrication / cast house facility it is requested for second grid connectivity for reliable & secure grid connection.

b) RPO obligation:

As Government of india is emphasis for renewable power obligation (RPO) for industrial load & in the draft of Chhattisgarh State Electricity Regulatory Commission (Renewable Purchase Obligation and REC framework Implementation) Regulations, 2016, proposing the below minimum quantity of RPO obligation for year 2016 -2021:

Bharat Aluminium Company Limited
Balco Nagar, Korba (Chhattisgarh) - 495 684
T +91 7759 252 316 F +91 7759 242 084 www.balcoindia.com

Registered Office : Aluminium Sadan Core - 6, Scope Office Complex, 7 Lodi Road, New Delhi - 110 003
CIN : U74899DL1965PLC004518

Year	Solar	Non-Solar		Total
		Biomass/ renewable energybased cogeneration /MSW	OtherRE (hydel, wind etc)	
2016-17	2.00%	3.75%	4.00%	9.75%
2017-18	4.00%	3.75%	5.25%	13.00%
2018-19	6.00%	3.75%	6.25%	16.00%
2019-20	7.00%	3.75%	7.00%	17.75%
2020-21	8.75%	3.75%	7.50%	20.00%

With BALCO's industrial of load of 950MW & inorder to fullfill 20% of RPO obligation by Year2020, it may requires to procure/ import Renewable power from grid / from RE power generator in present scenario & in future. Presently BALCO is having single grid connectivity & exporting power for LTOA consumer, WRLDC is in opinon that in same 400KV line (single grid connectivity) it is not possible to import & export of power. Hence BALCO is requesting for 2nd Grid connectivity Hence BALCO shall import renewable power from grid for fulfilling RPO obligation.

c) Power sale commitment:

BALCO is having Operationalised power sale of 200MW LTOA to Tamil nadu Government, 60MW LTOA to Chhattisgarh government & 100MW MTOA with Kerla Government. BALCO is having 100MW LTOA with kerala government (not operationalised) & BALCO is in process of signing 200MW PPA with UP Government by november2016.

As BALCO is having single grid connectivity & having industrial load of 950MW, Inorder to ensure power sale commitment to LTOA & MTOA customer BALCO is requesting for second grid connectivity.

Bharat Aluminium Company Limited
Balco Nagar, Korba (Chhattisgarh) - 495 684
T +91 7759 252 316 F +91 7759 242 084 www.balcoindia.com

Registered Office : Aluminium Sadan Core - 6, Scope Office Complex, 7 Lodi Road, New Delhi - 110 003
CIN : U74899DL1965PLC004518

BALCO,Vandana Vidyut ltd (VVL) & PGCIL has signed transmission agreement on 15th July2011 for 400KV transmission line connection to 400KV Bay on dharamjagarh pooling station. Subsequently BALCO & PGCIL has signed MOU on 28th September2011 for execution of 2 numbers of 400KV Bay.

During the execution of 400KV Bay at Dharamjagarh pooling station M/s VVL regretted to pay construction charges, subsequently PGCIL requested BALCO to provide additional 3.8CrRs for completion of 400KV bay construction. In the interest of project completion BALCO has provided its consent for addtional 3.8Cr Rs. Also BALCO is signing the MOU of O&M contract with M/s PGCIL for 4 number of 400KV bays in the absence of Ms VVL .

BALCO is requesting for the second permanent grid connectivity to BALCO (i.e one additional 400KV double circuit transmission line between BALCO to Dharamjaigarh Pooling station 700KV/400KV). BALCO shall segreggate 2x300MW power plant and 1410MW wherein 1410MW shall be connected to second grid connection.

The proposed second grid connectivity scheme along with existing grid connection is enclosed in annexure-01. BALCO request your good office to consider our proposal & accord your consent.

With Best Regards
Bharat Aluminium Company Limited,

Devendra Patel
General Manager Power.

Encl: Annexure01- Propose BALCO's Grid Connectivity Network (with 2nd grid connection).

CC:

1) Shri. Ashok Pal, GM, CTU planning, PGCIL.
2) Shri. Dr. Subir Sen, ED, CTU Planning, PGCIL.

Bharat Aluminium Company Limited
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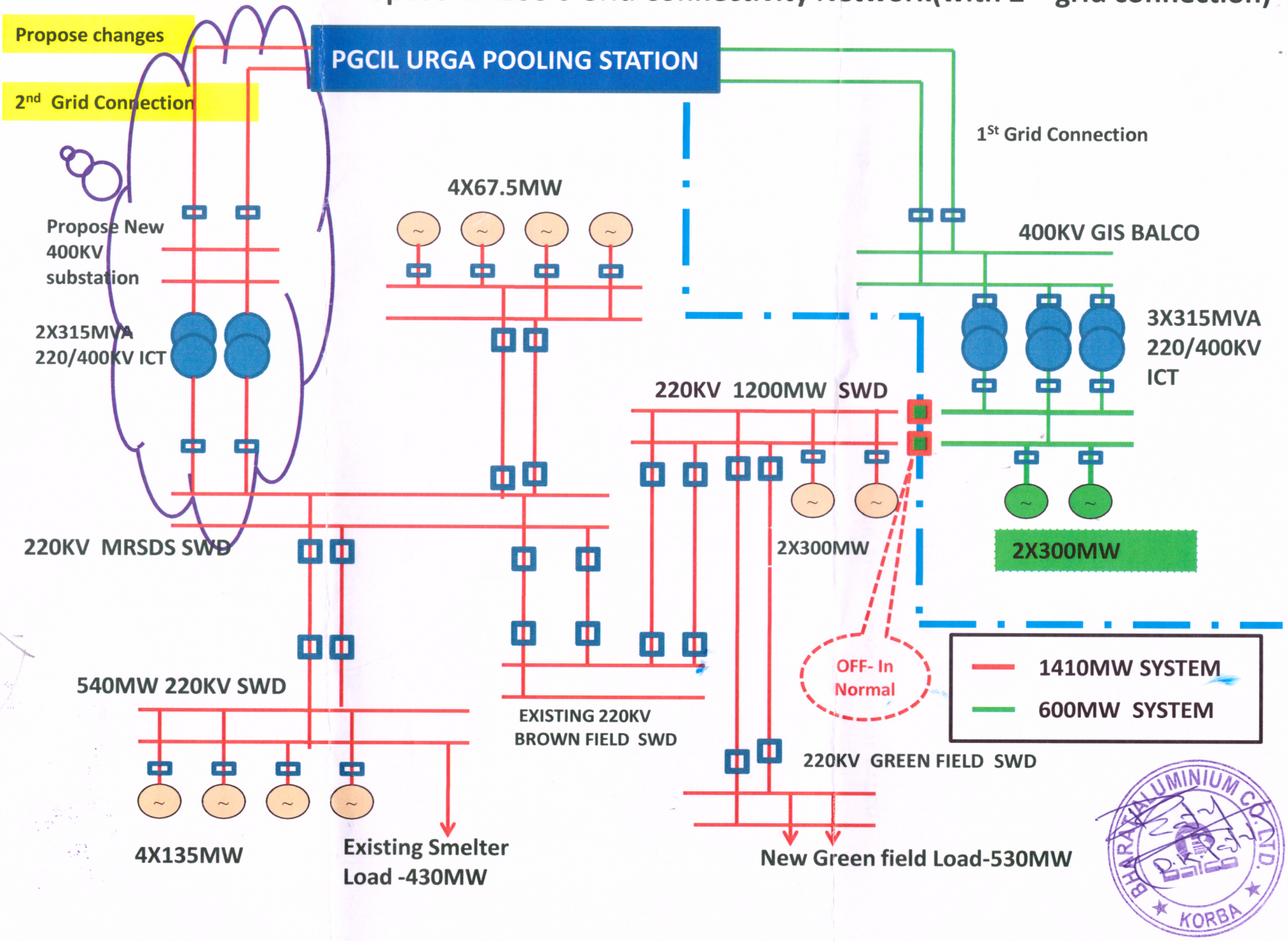
CIN : U74899DL1965PLC004518

Annexure-01 - Propose BALCO's Grid Connectivity Network(with 2nd grid connection)



Annexure 19

System Study to assess requirement of new substation near Vapi / Ambethi area and Kosamba- Vapi 400 kV D/c line

Joint System Study Report

CEA, CTU & GETCO
October, 2016

Abstract: This report is the outcome of studies carried out after the joint system studies meeting among CEA, CTU and GETCO from 28th – 29th July, 2016 and proposes establishment of Vapi – II Substation in order to ensure secure and reliable supply of power to South Gujarat and UT of Dadra and Nagar Haveli

Study

System Study to assess requirement of new substation near Vapi / Ambethi area and Kosamba- Vapi 400 kV D/C line

Time Frame

2021-22

Study Background

In the 38th WR SCM held on 17.07.2015 it was decided that the proposal of 400 kV Kosamba – Vapi D/C needs to be reviewed through joint studies of CEA, CTU & GETCO after considering the augmentation of 400kV network in southern Gujarat to be implemented by GETCO. Further in the 39th WR SCM held on 30.11.2015, it was suggested that instead of augmenting transformation capacity at Vapi (existing), a new substation may be proposed near Vapi / Ambethi area to cater to the demand of DNH and Daman & Diu as there is no space available for putting additional transformers at existing Vapi 400/220 kV substation.

POWERGRID had carried out comprehensive transmission system studies, as a part of consultancy, for UT of Dadra and Nagar Haveli (DNH) as well as Daman and Diu (D&D) for 2021-22 time- frame. For providing adequate transformation capacity at ISTS level for power drawl by UT of DNH, the following transmission system has been proposed by POWERGRID:

(i) Establishment of a New 2x500MVA, 400/220kV Substation near Vapi / Ambheti
(ii) LILO of KAPP – Vapi 400kV D/c line at Vapi / Ambheti (New) Substation
(iii) Vapi / Ambheti (New) – Sayali (DNH) 220kV D/c line (high capacity)
(iv) Vapi / Ambheti (New) – New Kharadpada (DHN) 220kV D/c line (high capacity)

In the 40th WR SCM held on 01.06.2016, GETCO was of the view that outlets may be given from the proposed Vapi(New) S/s to GETCO 220kV network. In view of the same, it was decided that a revised study would be jointly carried out CEA, CTU and GETCO and the proposal would be put up for approval in the next standing committee meeting. This report is the outcome of studies carried out after the joint system studies meeting from 28th – 29th July, 2016.

Load Generation Scenario

Load Generation Scenario of Gujarat for 2021-22 time - frame considered for this study:

	Generation (MW)	Demand (MW)	Net Surplus (MW)
Gujarat	20504	21168	- 664 (Deficit)

Renewable generation despatch has been considered as about 10% in order to simulate a stressed scenario when Gujarat would experience a deficit scenario.

Load Flow Study Cases & Results

As proposed by GETCO, Chikhli S/s (under planning stage) has not been considered in the studies. Further, following load flow cases have been performed:

BASE CASE – Without Vapi (New) Substation

CASE-1 – Feed from Vapi (New) Substation to GETCO 220kV network

- LILO of Chikhli(Ambetha) – Vapi(GETCO) 220kV D/c line at Vapi(New) S/s
- Vapi(New) – Atul 220kV D/c line

Estimated Cost – 160 Cr.

CASE-2 – Feed from Vapi (New) Substation to GETCO as well as DNHPDCL 220kV network

- Case – 1 Network (Interconnection with GETCO 220kV network)
- Vapi(New) – Kharadpada (DNH) 220kV D/c line (high capacity proposed)
- Vapi(New) – Sayali 220kV D/c line (high capacity proposed)

Estimated Cost – 222 Cr.

Load flow study exhibits are available at Exhibit – 1. Summary of the load Flow results are as given below:

TABLE-1

Sl.	Line/ICT	BASE CASE Loading (MW)	CASE-1 Loading (MW)	CASE-2 Loading (MW)
1	Vapi(New) – Vapi(existing) 220kV D/c	n/a	2x155 (251*)	2x65 (98)
2	Kala – New Kharadpada (DNH) 220kV D/c	2x165 (245*)	2x152 (226)	1x105 (137)
3	Vapi(PG) – Kharadpada 220kV D/c	2x94	2x107 (149)	2x27
4	Kala ICTs (2x315+500MVA)	2x253+402 (2x350*)	2x236 + 374 (2x324*)	2x199+316 (2x260)
5	Vapi ICTs (3x315MVA)	3x246 (2x290*)	3x202 (2x234)	3x180 (2x207)
6	Vapi (New) ICTs (2x500MVA)	n/a	2x216 (286)	2x285 (351)

**Critical Loadings observed*
Values in brackets represent power flow on the line under N-1 outage of parallel circuit

In the second case, it is observed N-1 outage constraints are relieved considerably. Moreover, reliable feed of power to DNH as well as GETCO networks is also achieved through Vapi (New) S/s. Further flow on **Kosamba – Vapi 400kV D/c** line when it is put into service in both the cases is as given below: **Case – 1 : 2x61MW ; Case – 2 : 2x52MW**. Hence, it may be concluded that Padghe(PG) – Kudus 400kV D/c line provides a powerful ISTS feed to Vapi 400/220kV S/s (via Kala S/s), thereby eliminating the need for another 400kV feed to South Gujarat in the form of Kosamba – Vapi 400kV D/c line.

Recommendations

1. In order to ensure that all 400kV and 220kV system in Vapi area is N-1 as well as N-1-1 compliant and seemless supply of power to South Gujarat and DNH area, following transmission system is proposed:

Inter-state Transmission System Strengthening Near Vapi Area

i. Establishment of 2x500MVA, 400/220kV S/s near Vapi / Ambheti (Vapi – II)
ii. LILO of KAPP – Vapi 400kV D/c line at Vapi – II
iii. 1x125MVAr bus reactor at Vapi – II Substation
iv. Following 220kV connectivity from Vapi – II is proposed:

For Gujarat (GETCO)

- Vapi-II – Atul (GETCO) 220kV D/c line
- LILO of Chikhli(Ambetha) – Vapi(GETCO) 220kV D/c line at Vapi-II

For Dadra and Nagar Haveli (DNHPDCL)

- Vapi-II – Sayali (DNH) 220kV D/c line (high capacity)
- Vapi-II – New Kharadpada (DHN) 220kV D/c line (high capacity)

The above system also ensures supply of power to Chikhli area thereby eliminating need of establishment of a new substation in Chikhli area by GETCO. Here, it may be mentioned that the above ISTS strengthening has been worked out assuming the following intra-state works which are proposed to be implemented by DNHPDCL in matching time-frame (in DNHPDCL Draft Consultancy report):

Intra-state Transmission System Strengthening in DNHPDCL network

1. Strengthening required at 220kV level

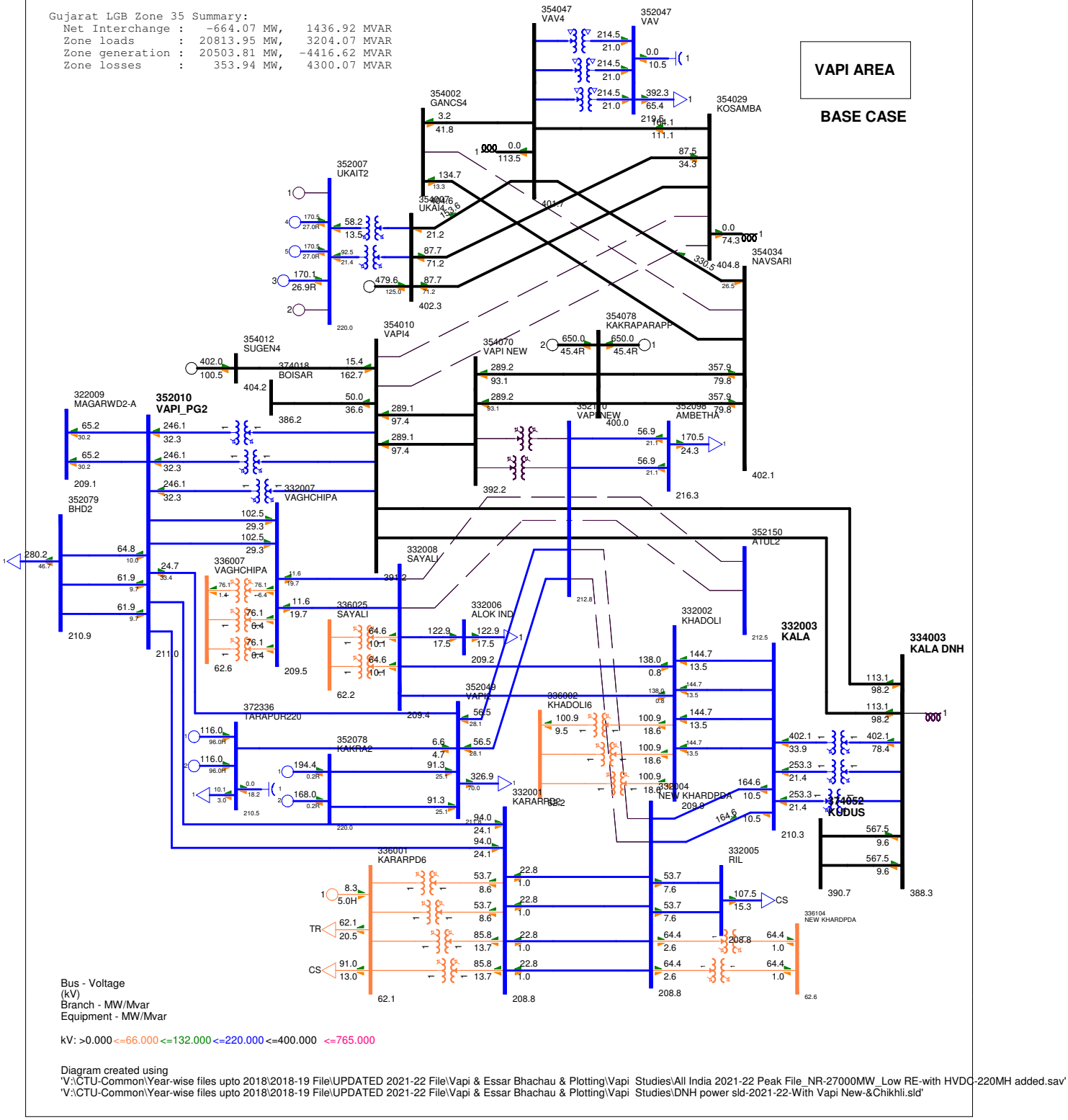
i. LILO of Vaghchipa – Khadoli 2nd 220kV line at Sayali Substation
ii. Kala (PG) – Khadoli 220kV 2nd D/c line (New)
iii. Kharadpada – New Kharadpada 220kV 2nd D/c line (New)
iv. Conversion of New Kharadpada 220kV switching station into 2x160MVA, 220/66kV substation
v. Augmentation of Transformation capacity at 220/66kV Vaghchipa substation by 160MVA (3rd ICT)

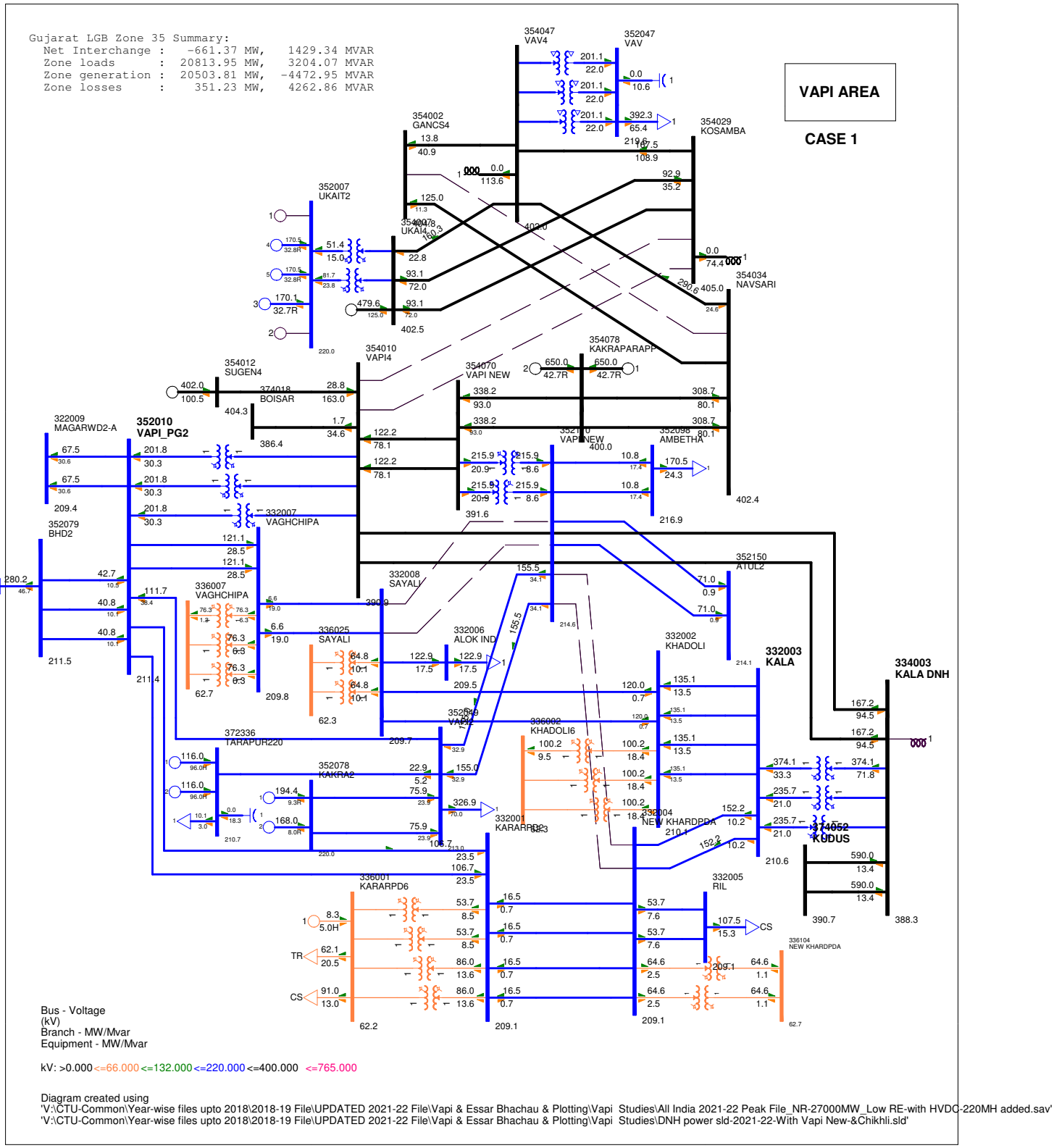
2. Strengthening required at 66kV level

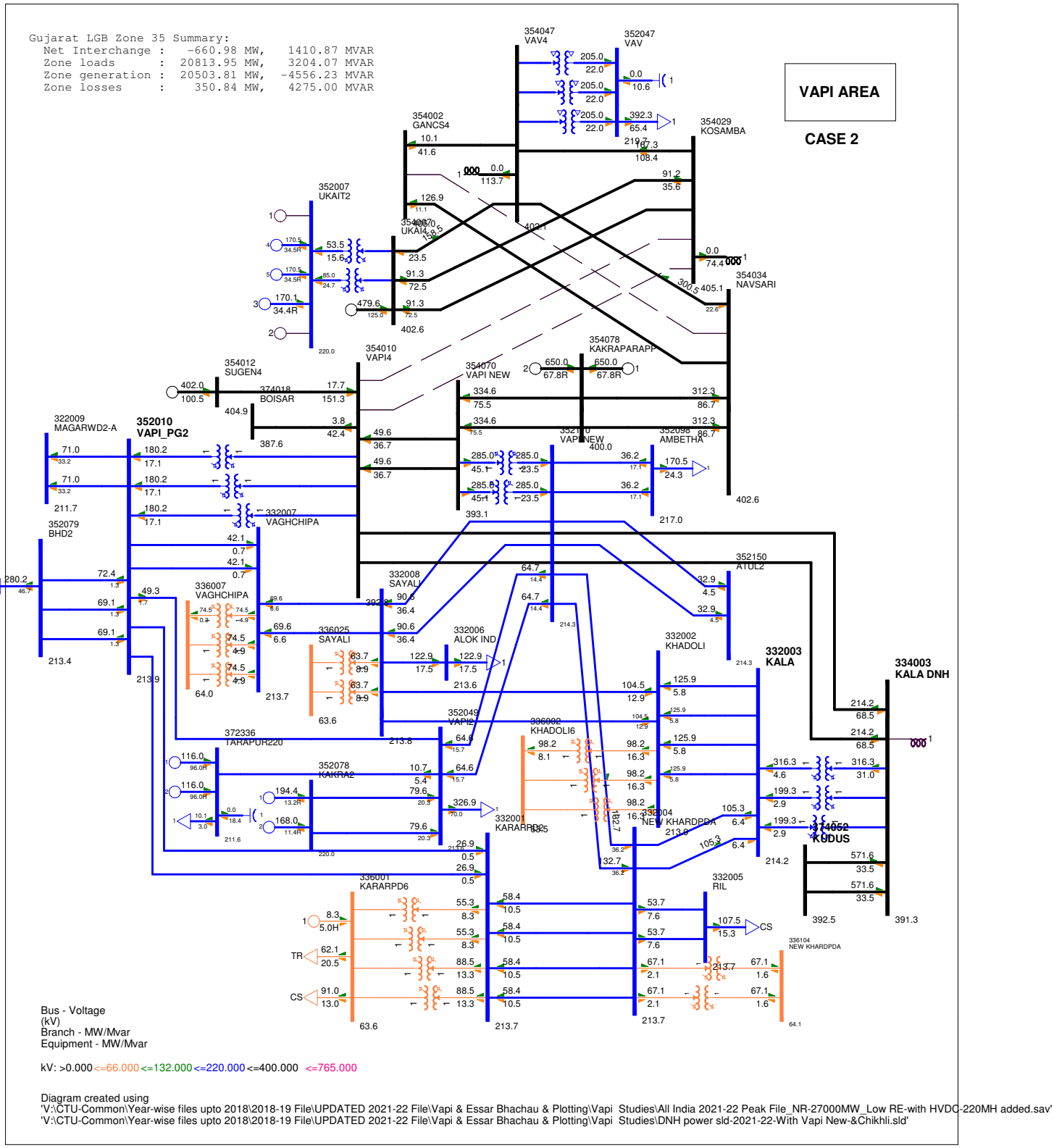
vi. New Kharadpada – Amli 66kV D/c line (High Capacity/HTLS conductor)
vii. New Kharadpada – Rakholi 66kV D/c line (High Capacity/HTLS conductor)
viii. Vaghchipa – Dadra 66kV line, which is under construction, may be constructed with high capacity/HTLS conductor. Further, Waghdara – Dadra 66kV S/c line may be put into service under normal conditions so as to support the system under n-1 outage of Vaghchipa – Dadra line
ix. Khadoli (220/66kV) – Khadoli (66/11kV) 66kV D/c line shall have to be strengthened through another 66kV D/c line or reconductoring with high capacity/HTLS conductor.

2. There is no requirement of Kosamba – Vapi 400kV D/c line with the commissioning of Padghe (PG) – Kudus 400kV D/c line which serves as a strong infeed link to South Gujarat from Maharashtra.

EXHIBIT-1 : VAPI-II STUDY REPORT



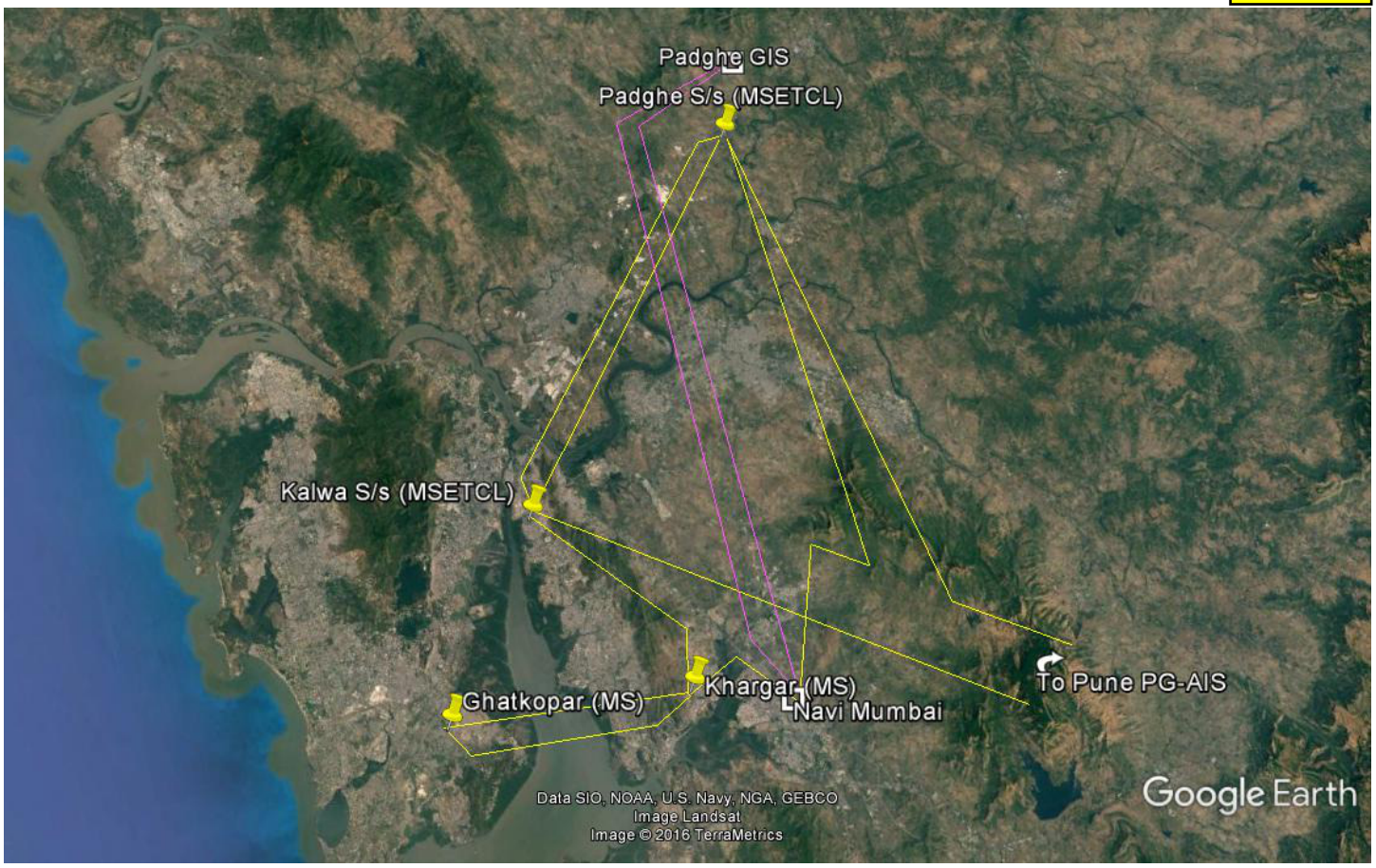

Gujarat LGB Zone 35 Summary:
Net Interchange : -661.37 MW, 1429.34 MVAR
Zone loads : 20813.95 MW, 3204.07 MVAR
Zone generation : 20503.81 MW, -4472.95 MVAR
Zone losses : 351.23 MW, 4262.86 MVAR
VAPI AREA
CASE 1
354047 VAV4
352047 VAV
354002 GANCS4
354029 KOSAMBA
352007 UKAIT2
354034 NAVSARI
354010 VAPI4
354078 KAKRAPARAPP
354012 SUGEN4
354070 VAPI NEW
352098 AMBETHA
322009 MAGARWD2-A
352010 VAPI_PG2
352079 BHD2
332007 VAGHCHIPA
336007 VAGHCHIPA
336025 SAYALI
332008 SAYALI
332006 ALOK IND
352150 ATUL2
332002 KHADOLI
332003 KALA
334003 KALA DNH
372336 TARAPUR220
352078 KAKRA2
336002 KHADOLI6
332001 KARARPD2
332004 NEW KHARDPDA
374052 KUDUS
336001 KARARPD6
332005 RIL
336104 NEW KHARDPDA
Bus - Voltage (kV)
Branch - MW/Mvar
Equipment - MW/Mvar
kV: >0.000 <=66.000 <=132.000 <=220.000 <=400.000 <=765.000
Diagram created using
'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Vapi & Essar Bhachau & Plotting\Vapi Studies\All India 2021-22 Peak File_NR-27000MW_Low RE-with HVDC-220MH added.sav'
'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Vapi & Essar Bhachau & Plotting\Vapi Studies\DNH power sld-2021-22-With Vapi New-&Chikhli.sld'


Gujarat LGB Zone 35 Summary:
Net Interchange : -660.98 MW, 1410.87 MVAR
Zone loads : 20813.95 MW, 3204.07 MVAR
Zone generation : 20503.81 MW, -4556.23 MVAR
Zone losses : 350.84 MW, 4275.00 MVAR
VAPI AREA
CASE 2
354047 VAV4
352047 VAV
354002 GANCS4
354029 KOSAMBA
352007 UKAIT2
354034 NAVSARI
354010 VAPI4
354012 SUGEN4
354078 KAKRAPARAPP
354070 VAPI NEW
352098 AMBETHA
322009 MAGARWD2-A
352010 VAPI_PG2
352079 BHD2
332007 VAGHCHIPA
336007 VAGHCHIPA
336025 SAYALI
332008 SAYALI
332006 ALOK IND
352049 VAPI2
372336 TARAPUR220
352078 KAKRA2
336002 KHADOLI6
332001 KARARPD2
336001 KARARPD6
332002 KHADOLI
332003 KALA
334003 KALA DNH
374052 KUDUS
332004 NEW KHARDPDA
332005 RIL
352150 ATUL2
Bus - Voltage (kV)
Branch - MW/Mvar
Equipment - MW/Mvar
kV: >0.000 <=66.000 <=132.000 <=220.000 <=400.000 <=765.000
Diagram created using
'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Vapi & Essar Bhachau & Plotting\Vapi Studies\All India 2021-22 Peak File_NR-27000MW_Low RE-with HVDC-220MH added.sav'
'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Vapi & Essar Bhachau & Plotting\Vapi Studies\DNH power sld-2021-22-With Vapi New-&Chikhli.sld'

Annexure 20

Study for Utilization of Navi Mumbai 400/220kV Substation : Time Frame 2021-22												
Sl. No.	Line / ICT Loading in MW	Base Case i.e. w/o Navi Mumbai (NM) s/s	1 + LILO of Padghe-Kharghar 400kV S/c and LILO of Apta - Kalwa 220kV S/c & Kharghar - Khandalgaon 220kV S/c @ NM	2 + Padghe PG - NM 400kV D/c (Quad) line	2 + Padghe PG - Kharghar 400kV D/c line with one ckt terminating to one ckt of Ghatkopar - Kharghar 400kV D/c bypassing Kharghar S/s	4 + LILO of one ckt of Ghatkopar - Kharghar 400kV D/c @NM	4 + LILO of one ckt of Paghe PG - Kharghar @ NM	4 + LILO of one ckt of Padghe PG - Ghatkopar 400kV D/c (Q) @ NM	2 + Padghe PG - Ghatkopar 400kV D/c (Q) line	2+ Connecting NM - Kharghar line with Kharghar - Kalwa line so as to form NM - Kalwa 400kV S/c bypassing Kharghar S/s (in order to spare 2nos. 400kV line bays at Kharghar s/s)	7+ Padghe PG - Kharghar 400kV D/c (Quad) line (one ckt via NM)	7+ Padghe PG - Kharghar 400kV D/c (Quad) line & Padghe PG - NM 400kV D/c (Quad) Line
	Case ID ->	1	2	3	4	5	6	6a	6b	7	8	9
	Alternatives as per MoM dtd 10.08.2016			i	ii	iii	iv	v	vi	Addl. Alt. Base Case	Addl. Alt. I	Addl. Alt. II
	ICT Loadings											
1	400/220kV Kalwa (3x500+600MVA)	3*353+434	3*335+411	3*365+449	3*366+450	3*366+450	3*364+448	3*369+454	3*363+447	3*390+479	3*369+453	3*375+461
2	400/220kV Kharghar (3x315MVA)	3*189	3*159	3*255	3*259	3*258	3*254	3*266	3*253	3*11	3*268	3*280
3	400/220kV Navi Mumbai (2x315MVA)	-	2*133	2*242	2*215	2*219	2*223	2*233	2*210	2*210	2*231	2*251
4	400/220kV Vikroli (2x315MVA)	2*79	2*71	2*103	2*116	2*116	2*115	2*108	2*124	2*16	2*107	2*111
5	400/220kV Padghe (3x315+500+600MVA)	3*202+320+393	3*198+314+386	3*218+346+425	3*216+342+420	3*216+342+421	3*216+343+421	3*218+346+425	3*215+340+418	3*208+330+405	3*218+345+425	3*222+351+432
6	400/220kV Kudus (2x500MVA)	2*577	2*576	2*382	2*391	2*390	2*391	2*375	2*399	2*580	2*375	2*343
7	765/400kV Padghe (PG) (2x1500MVA)	2*822	2*821	2*1142	2*1128	2*1129	2*1127	2*1155	2*1114	2*825	2*1154	2*1028
8	765/400kV Pune (PG) GIS (2x1500MVA)	2*948	2*950	2*762	2*770	2*769	2*770	2*754	2*778	2*943	2*754	2*723
	Line Loadings											
1	Padghe - Kalwa 400kV 2xS/C line	2*503	2*510	2*368	2*360	2*362	2*367	2*353	2*367	2*478	2*353	2*328
2	Padghe - Kharghar 400kV S/C	498	-	-	-	-	-	-	-	-	-	-
3	Padghe - Navi Mumbai 400kV S/C line	-	556	129	208	197	185	148	227	421	152	81
4	Navi Mumbai-Kharghar 400kV S/C (or D/c) line	-	285	1283	223	2*23	409+352	347	-194	-	160 (Q)	-
5	Navi Mumbai-Kalwa 400kV S/C line bypassing Khargar	-	-	-	-	-	-	-	-	-2	365	483
6	Kalwa - Kharghar 400kV S/C line	233	337	-307	-325	-318	-298	-367	-286	-	-	-
7	Pune PG AIS - Kalwa 400kV S/C line	729	740	510	513	514	517	496	524	706	496	457
8	Padghe PG - Navi Mumbai 400kV D/c (or S/c) (Quad)	-	-	2*823	-	-	1028	824	-	-	839	2*453
9	Padghe PG - Ghatkopar 400kV S/c line (bypassing Khargar)	-	-	-	520	521	537	-	2*750	-	-	-
10	Padghe PG - Khargar 400kV S/c (or D/c) line (Quad)	-	-	-	1045	1050	-	882	-	-	864	2*534
11	Navi Mumbai-Ghatkopar 400kV S/c line	-	-	-	-	-288	-	155	-	-	-	-
12	Khargar - Ghatkopar 400kV S/c (or D/c) line	2*79	2*71	2*103	-287	-	-305	61	(-) 2*622	2*16	2*107	2*111

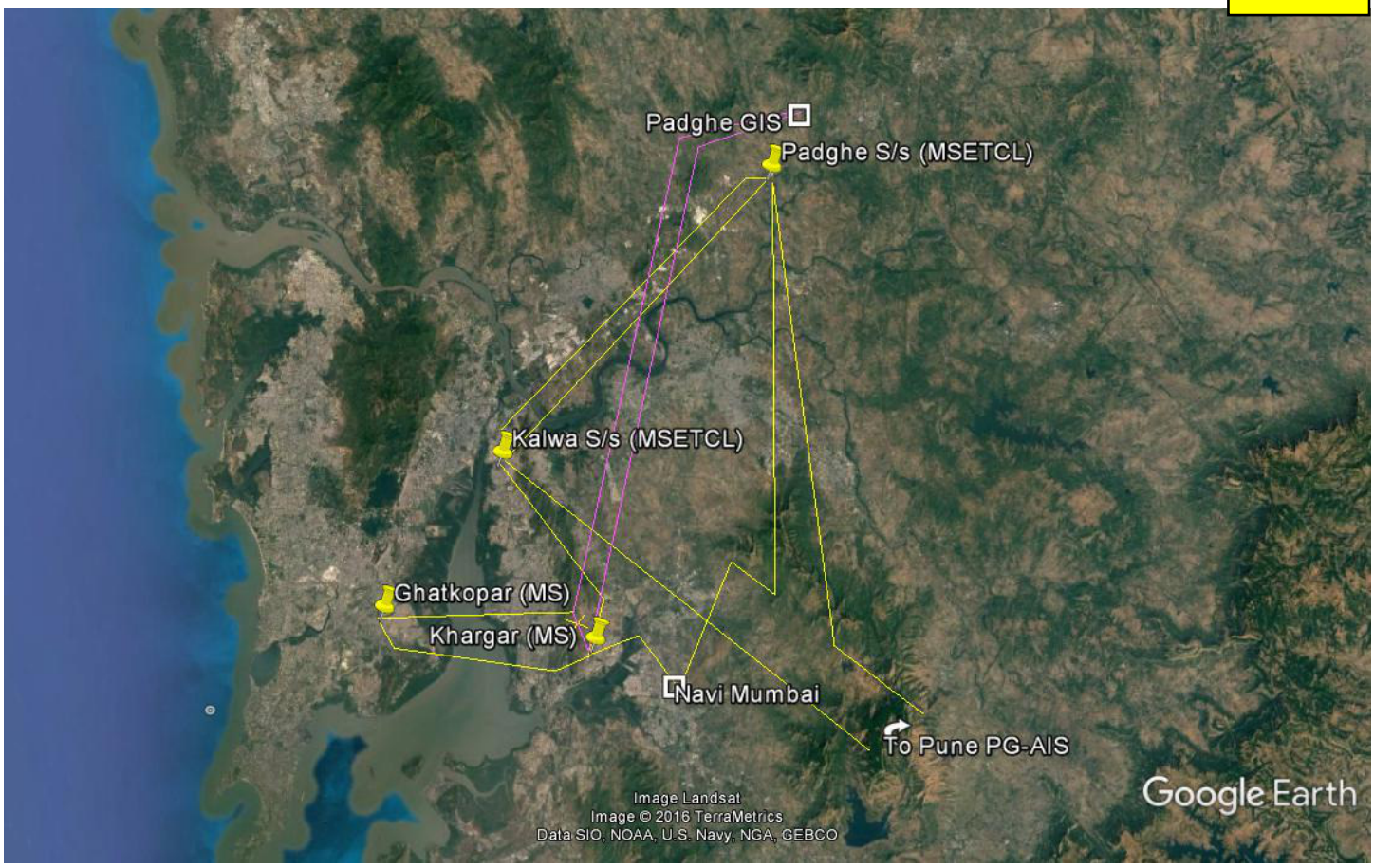
Alternative-1



Google Earth

miles 20
km 40

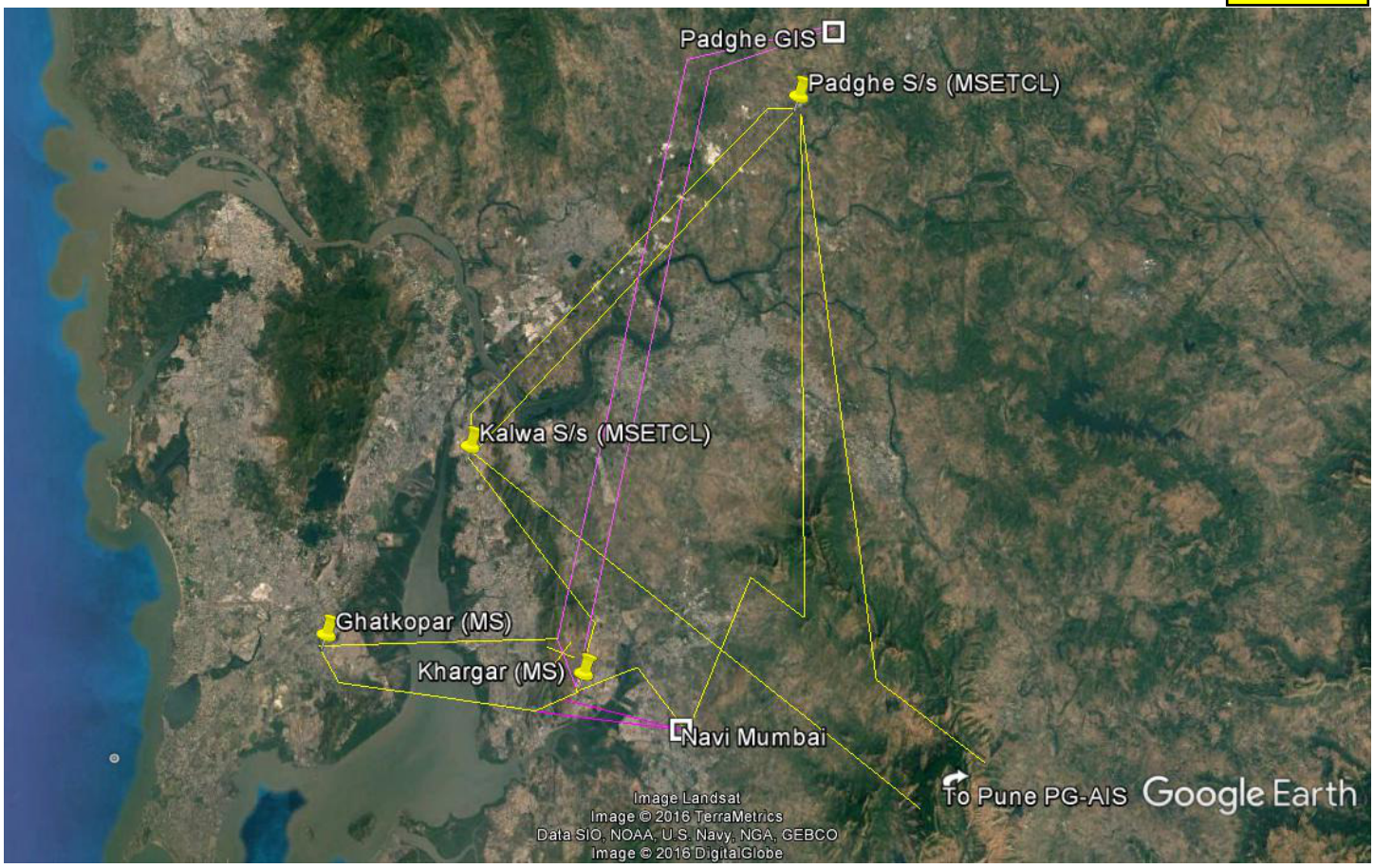
Alternative-2



Google Earth

miles 30
km 50

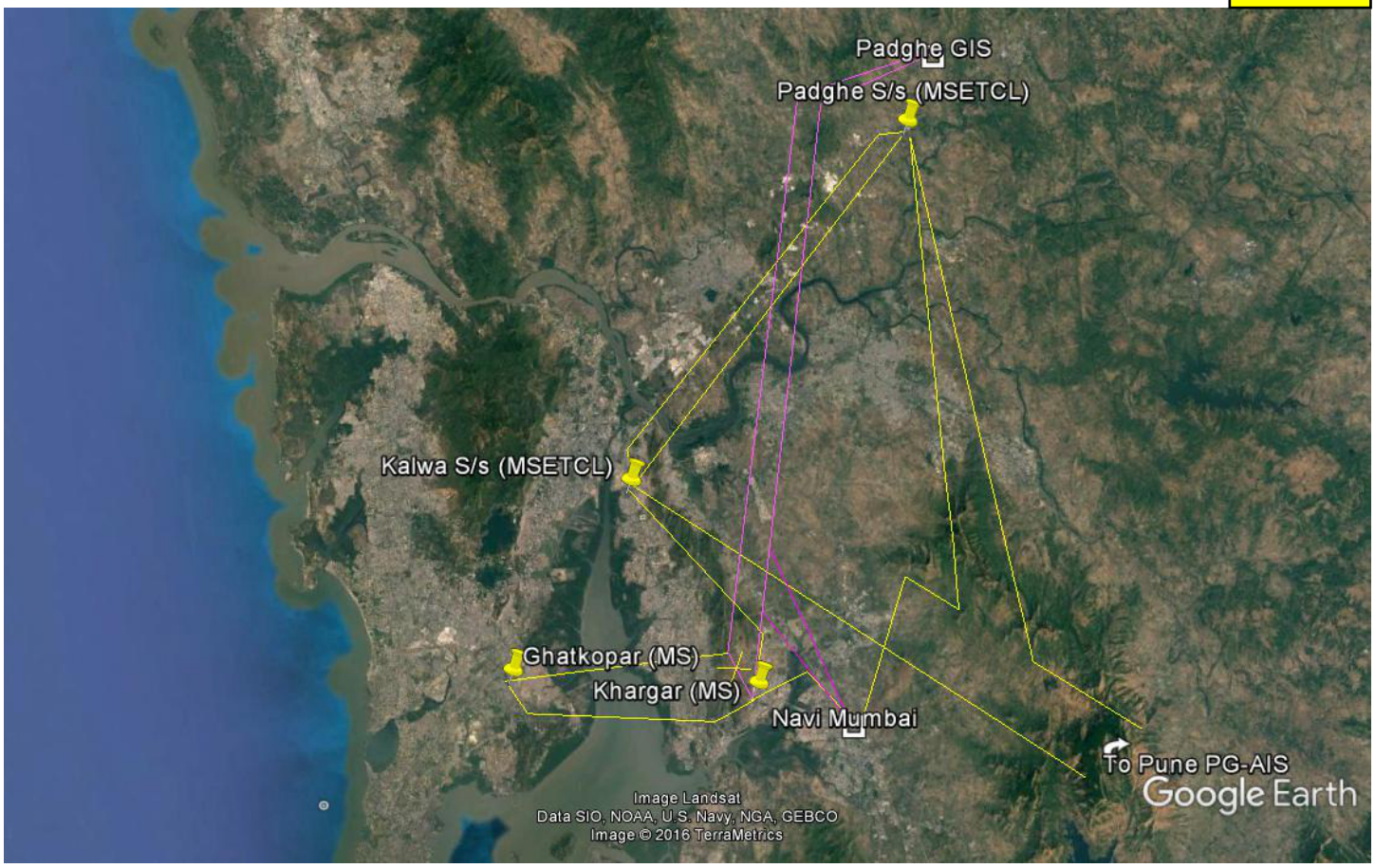
Alternative-3



Google Earth

miles 20
km 40

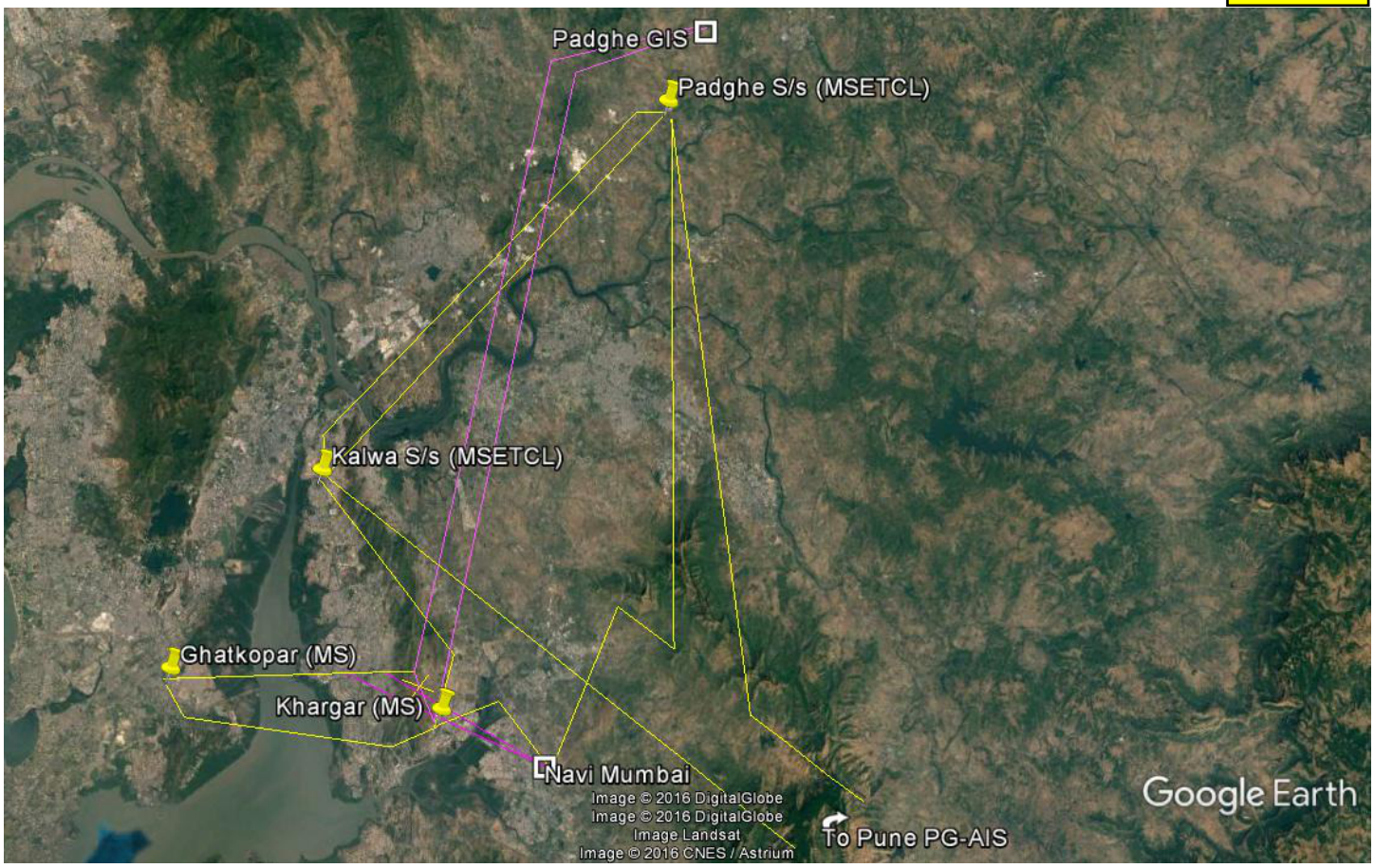
Alternative-4



Google Earth

miles 20
km 40

Alternative-5

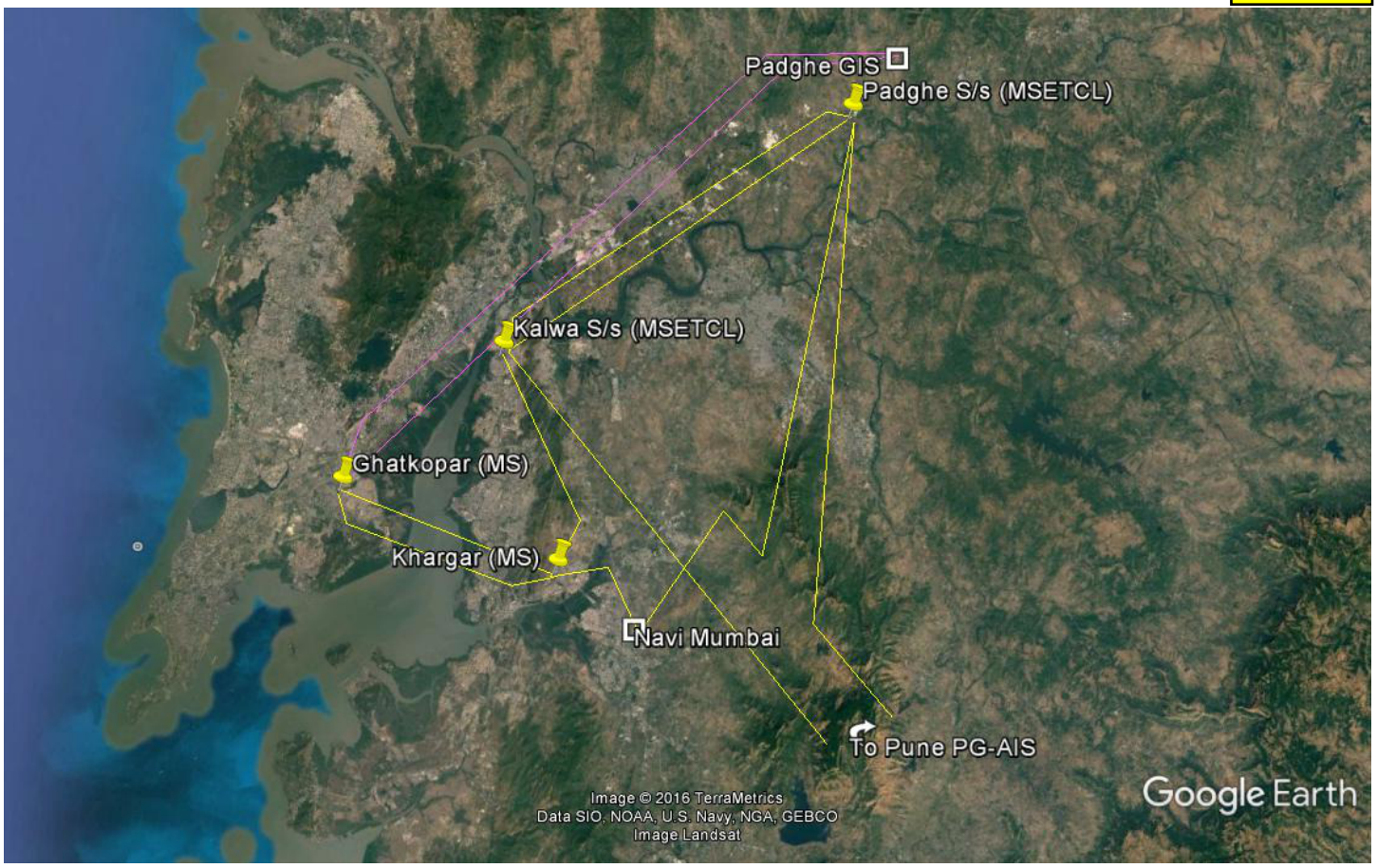


Google Earth

miles 20

km 40

Alternative-6



Google Earth

miles 30

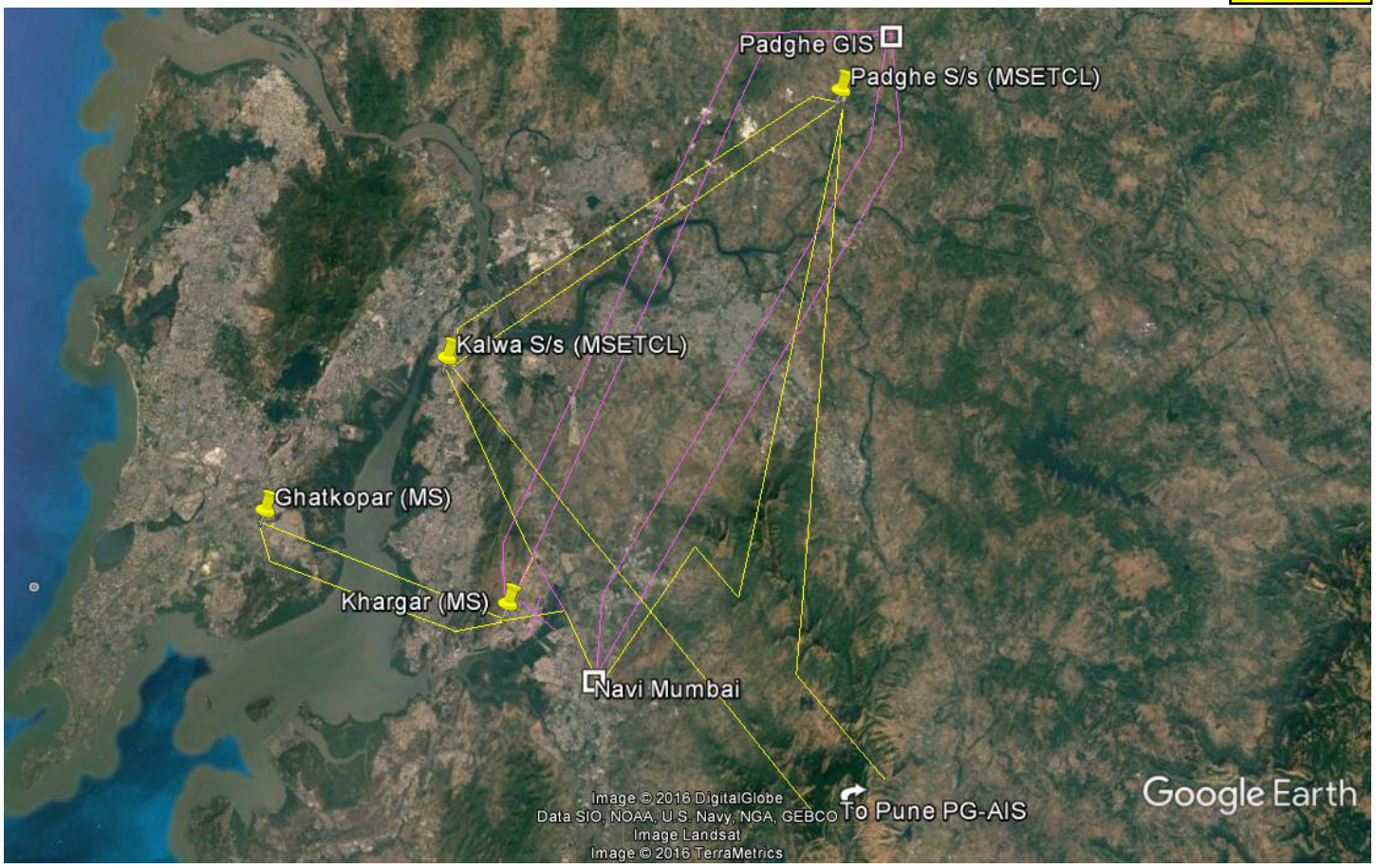
km 40

Alternative-7

Google Earth

miles 20
km 40

Alternative-8



Google Earth

miles 20
km 40

NAVI MUMBAI UTILISATION STUDIES

THU, AUG 18 2016 15:31

```
MAHARASTHRA LGB Zone 37 Summary:
  Net Interchange :  -6487.17 MW,   1156.94 MVAR
  Zone loads      :  29747.37 MW,   4895.32 MVAR
  Zone generation :  24739.21 MW,   2758.63 MVAR
  Zone losses     :   1479.01 MW,  19932.36 MVAR
```

BASE CASE W/o NAVI MUMBAI ICTs

Case ID 1

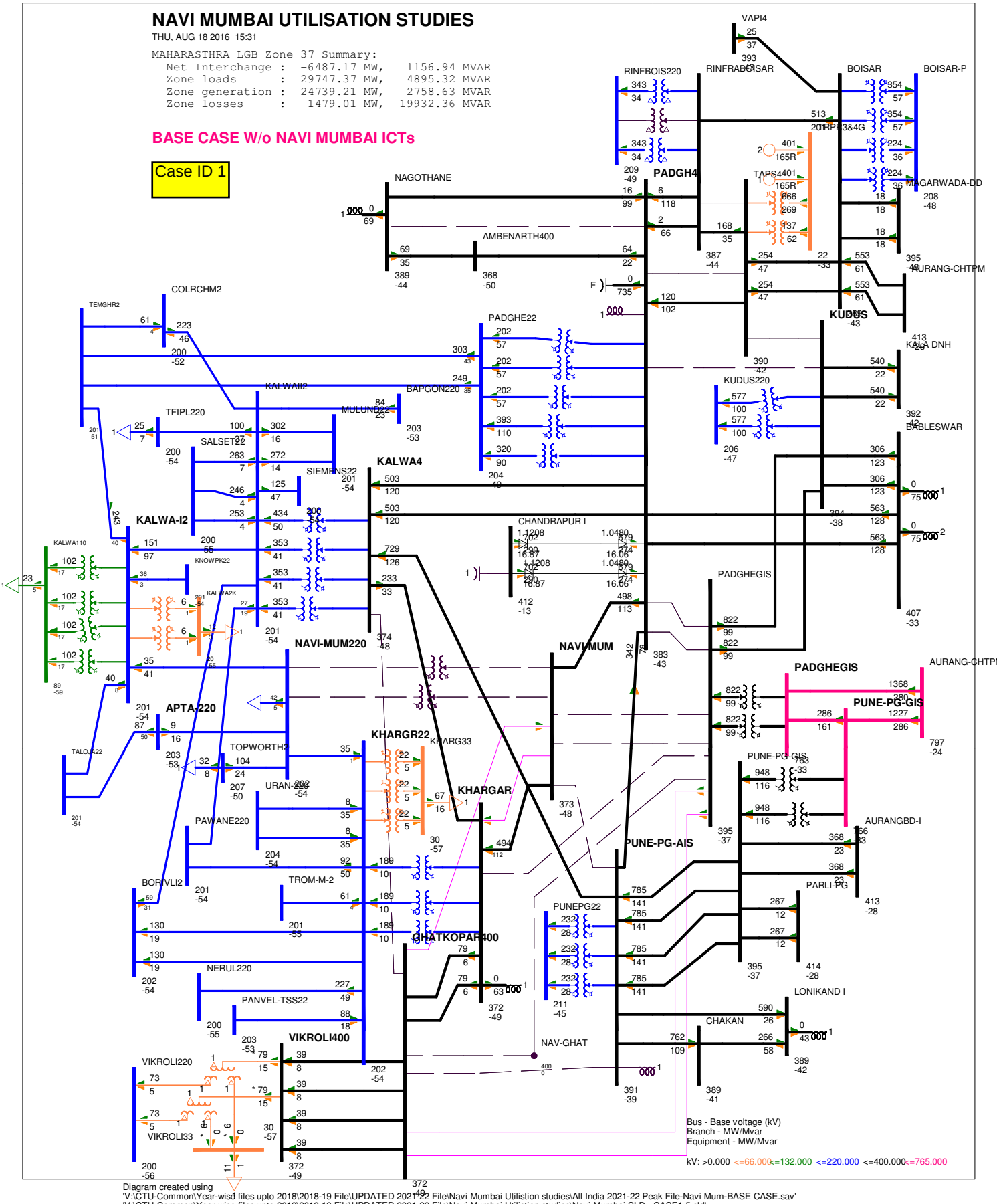


Diagram created using
'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Navi Mumbai Utilistion studies\All India 2021-22 Peak File-Navi Mum-BASE CASE.sav'
'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Navi Mumbai Utilistion studies\Navi Mumbai SLD - CASE1-5.sld'

NAVI MUMBAI UTILISATION STUDIES

WED, AUG 17 2016 15:17

```
MAHARASTHRA LGB Zone 37 Summary:
  Net Interchange :  -6482.26 MW,    1178.37 MVAR
  Zone loads      :  29747.40 MW,    4895.33 MVAR
  Zone generation :  24739.21 MW,    2713.45 MVAR
  Zone losses     :   1474.08 MW,   19881.16 MVAR
```

BASE CASE

Case ID 2

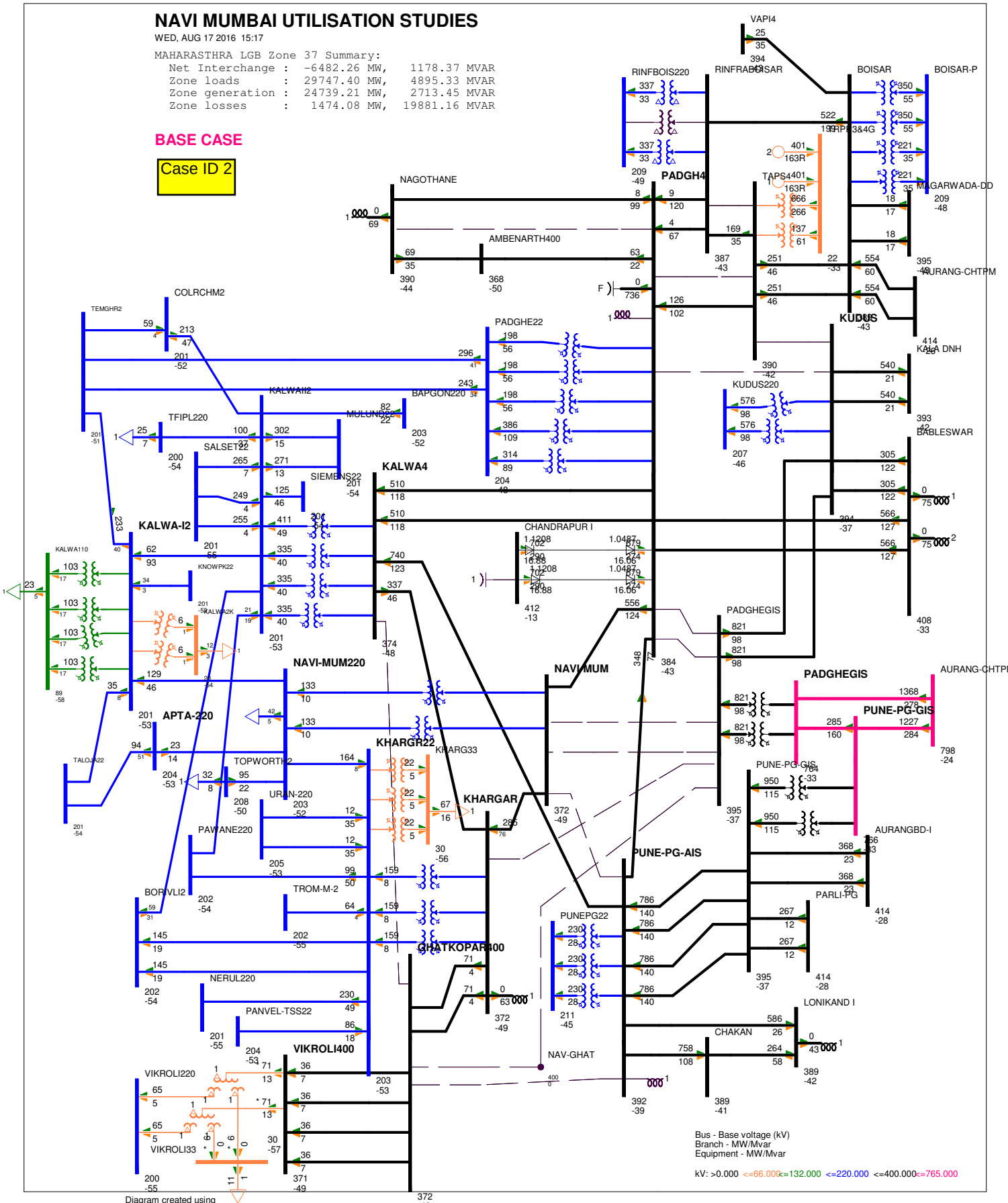


Diagram created using
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'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Navi Mumbai Utilistion studies\Navi Mumbai SLD - CASE1-6.sld'

NAVI MUMBAI UTILISATION STUDIES

WED, AUG 17 2016 15:21

```
MAHARASTHRA LGB Zone 37 Summary:
  Net Interchange :  -6389.81 MW,   1466.50 MVAR
  Zone loads      :  29747.79 MW,   4895.39 MVAR
  Zone generation :  24739.21 MW,   1944.09 MVAR
  Zone losses     :   1381.23 MW,  19149.91 MVAR
```

Case ID 3

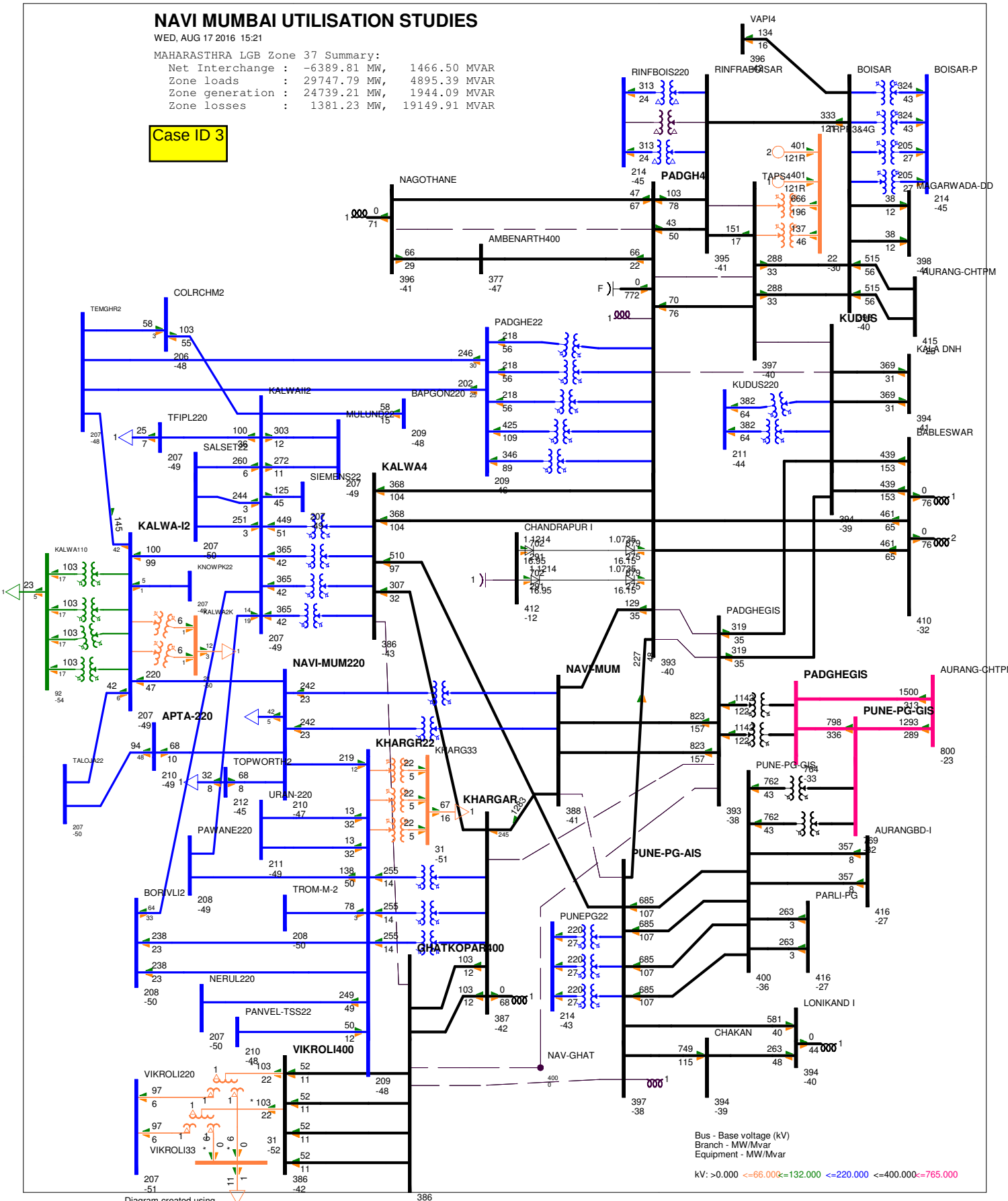

Diagram created using
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NAVI MUMBAI UTILISATION STUDIES

WED, AUG 17 2016 15:22

```
MAHARASTHRA LGB Zone 37 Summary:
  Net Interchange :  -6391.69 MW,    1465.21 MVAR
  Zone loads      :  29747.79 MW,    4895.39 MVAR
  Zone generation :  24739.21 MW,    1953.57 MVAR
  Zone losses     :   1383.12 MW,   19156.73 MVAR
```

Case ID 4

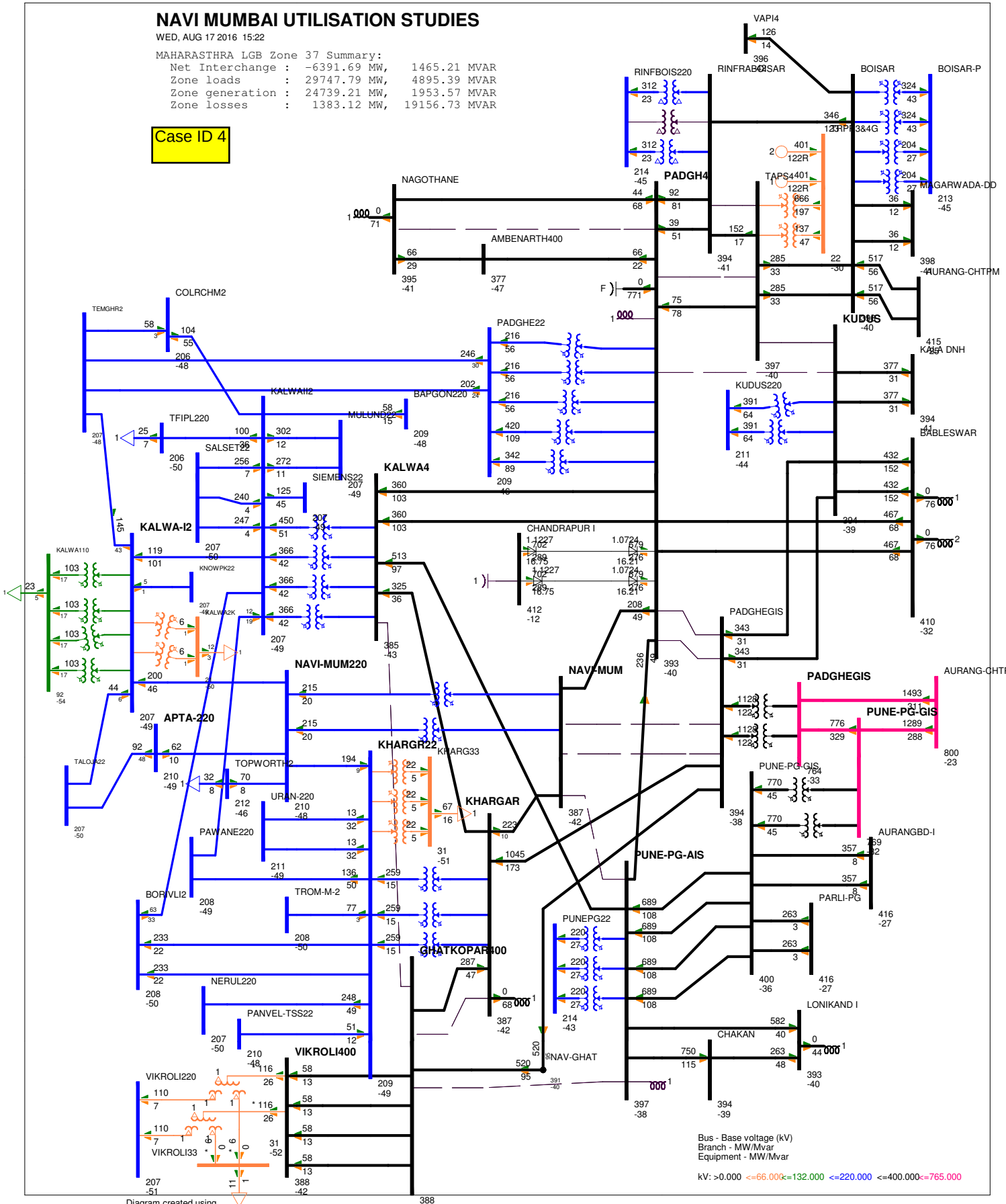

Diagram created using
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'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Navi Mumbai Utilistion studies\Navi Mumbai SLD - CASE1-6.sld'

NAVI MUMBAI UTILISATION STUDIES

WED, AUG 17 2016 15:25

```
MAHARASTHRA LGB Zone 37 Summary:
  Net Interchange :  -6391.40 MW,   1467.22 MVAR
  Zone loads      :  29747.79 MW,   4895.39 MVAR
  Zone generation :  24739.21 MW,   1949.28 MVAR
  Zone losses     :   1382.82 MW,  19154.68 MVAR
```

Case ID 5

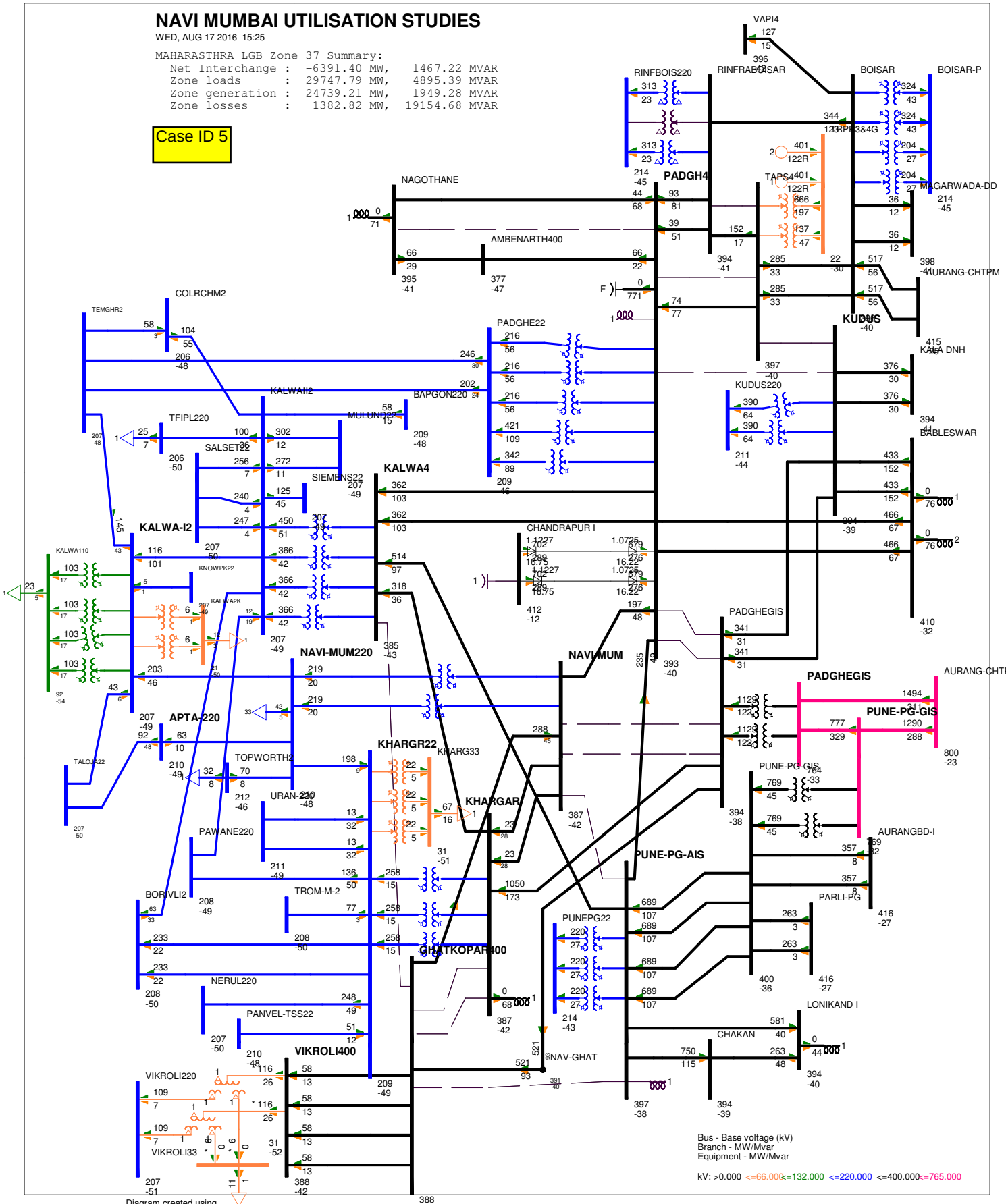

Diagram created using
'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Navi Mumbai Utilistion studies\All India 2021-22 Peak File-Navi Mum-CASE3.sav'
'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Navi Mumbai Utilistion studies\Navi Mumbai SLD - CASE1-6.sld'

NAVI MUMBAI UTILISATION STUDIES

FRI, AUG 19 2016 15:30

```
MAHARASTHRA LGB Zone 37 Summary:
  Net Interchange :  -6392.10 MW,   1465.41 MVAR
  Zone loads      :  29747.79 MW,   4895.39 MVAR
  Zone generation :  24739.21 MW,   1958.57 MVAR
  Zone losses     :   1383.53 MW,  19166.26 MVAR
```

Case ID 6

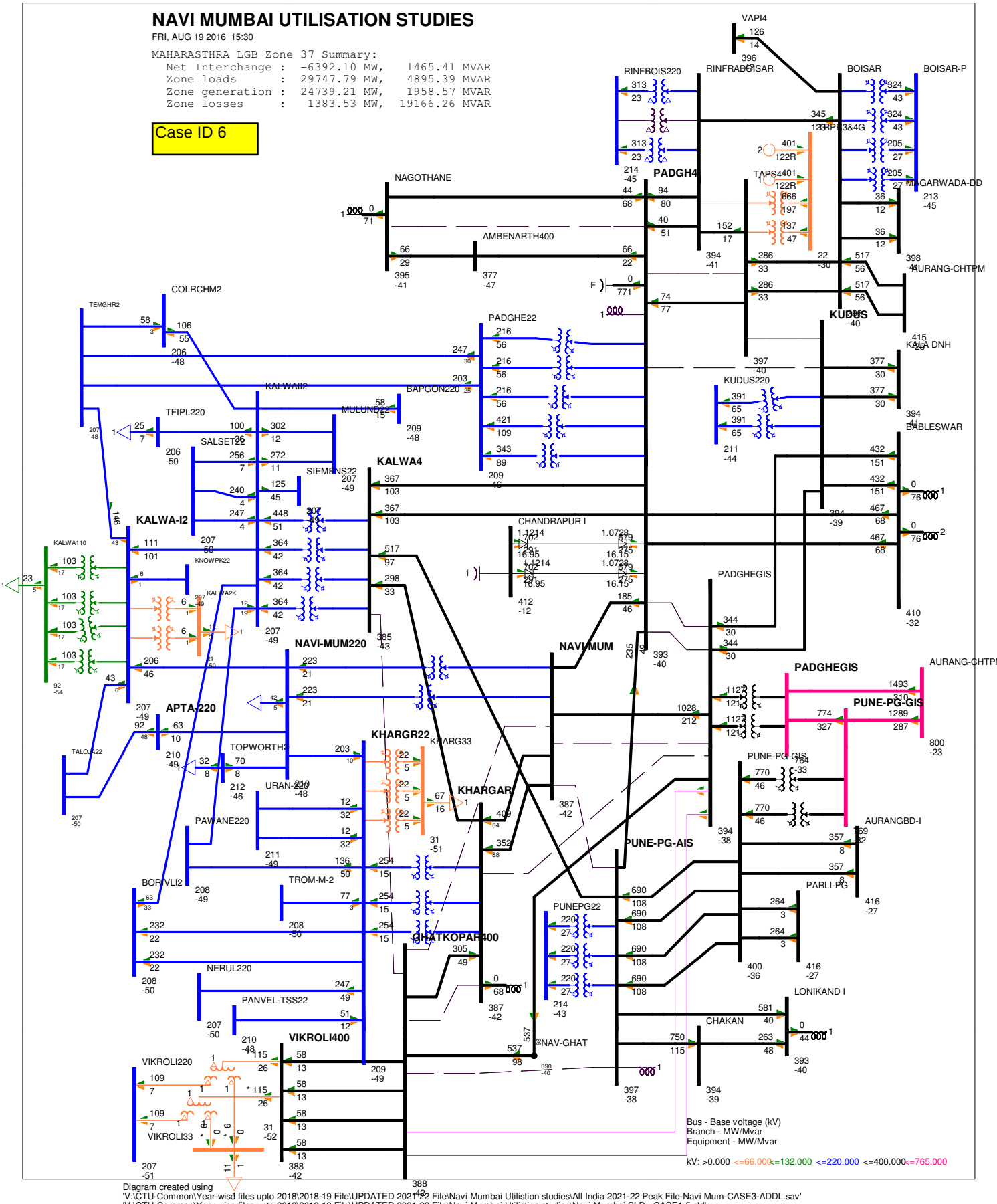

Diagram created using
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'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Navi Mumbai Utilistion studies\Navi Mumbai SLD - CASE1-5.sld'

NAVI MUMBAI UTILISATION STUDIES

TUE, SEP 06 2016 15:01

```
MAHARASTHRA LGB Zone 37 Summary:
  Net Interchange :  -6385.53 MW,   1476.45 MVAR
  Zone loads      :  29747.81 MW,   4895.40 MVAR
  Zone generation :  24739.21 MW,   1910.86 MVAR
  Zone losses     :   1376.93 MW,  19118.26 MVAR
```

CASE-6a

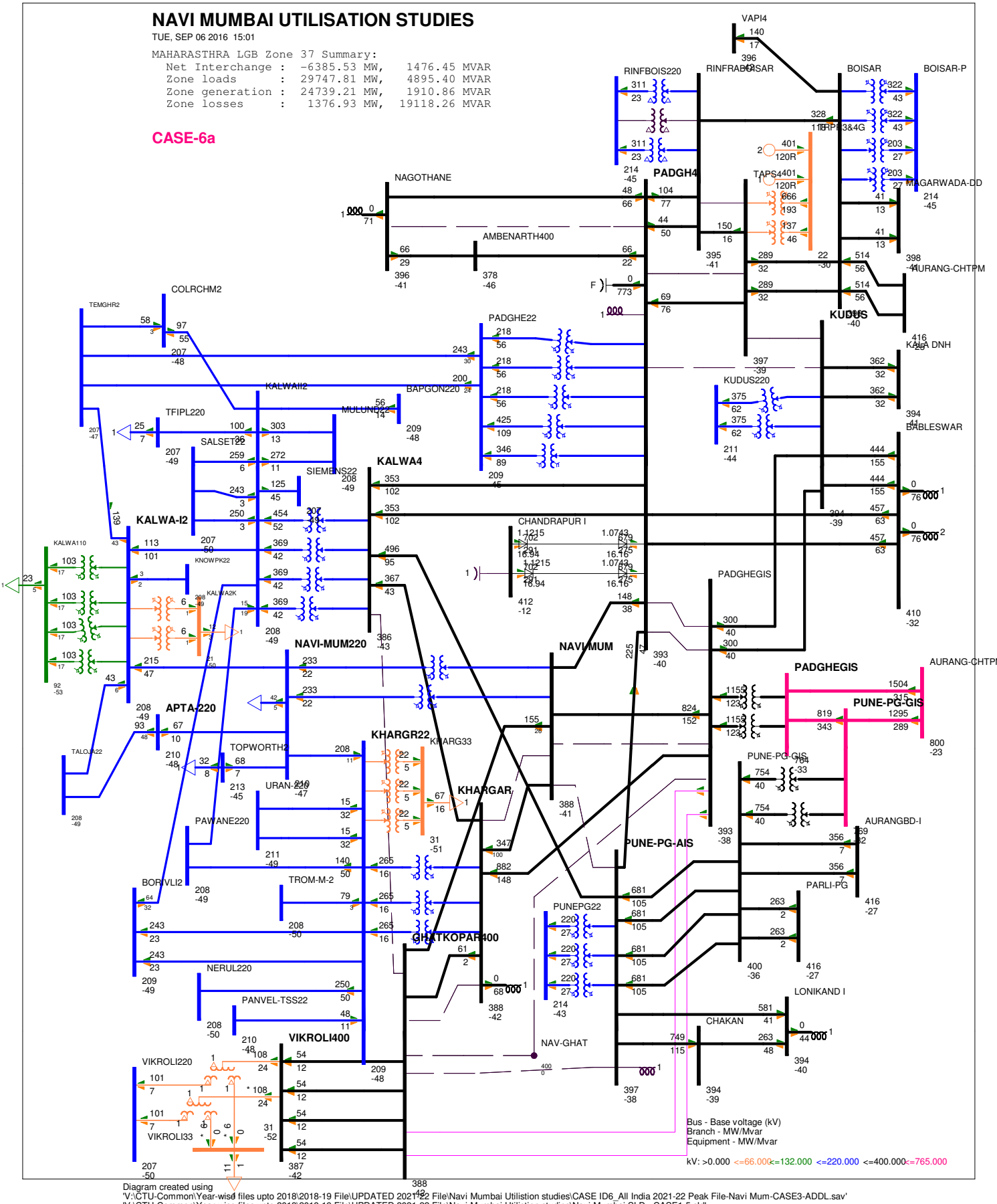

Diagram created using
'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Navi Mumbai Utilistion studies\CASE ID6_All India 2021-22 Peak File-Navi Mum-CASE3-ADDL.sav'
'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Navi Mumbai Utilistion studies\Navi Mumbai SLD - CASE1-5.sld'

NAVI MUMBAI UTILISATION STUDIES

WED, AUG 17 2016 15:32

MAHARASTHRA LGB Zone 37 Summary:

Net Interchange	:	-6395.22 MW,	1458.98 MVAR
Zone loads	:	29747.77 MW,	4895.39 MVAR
Zone generation	:	24739.21 MW,	1978.51 MVAR
Zone losses	:	1386.66 MW,	19180.47 MVAR

CASE 6b

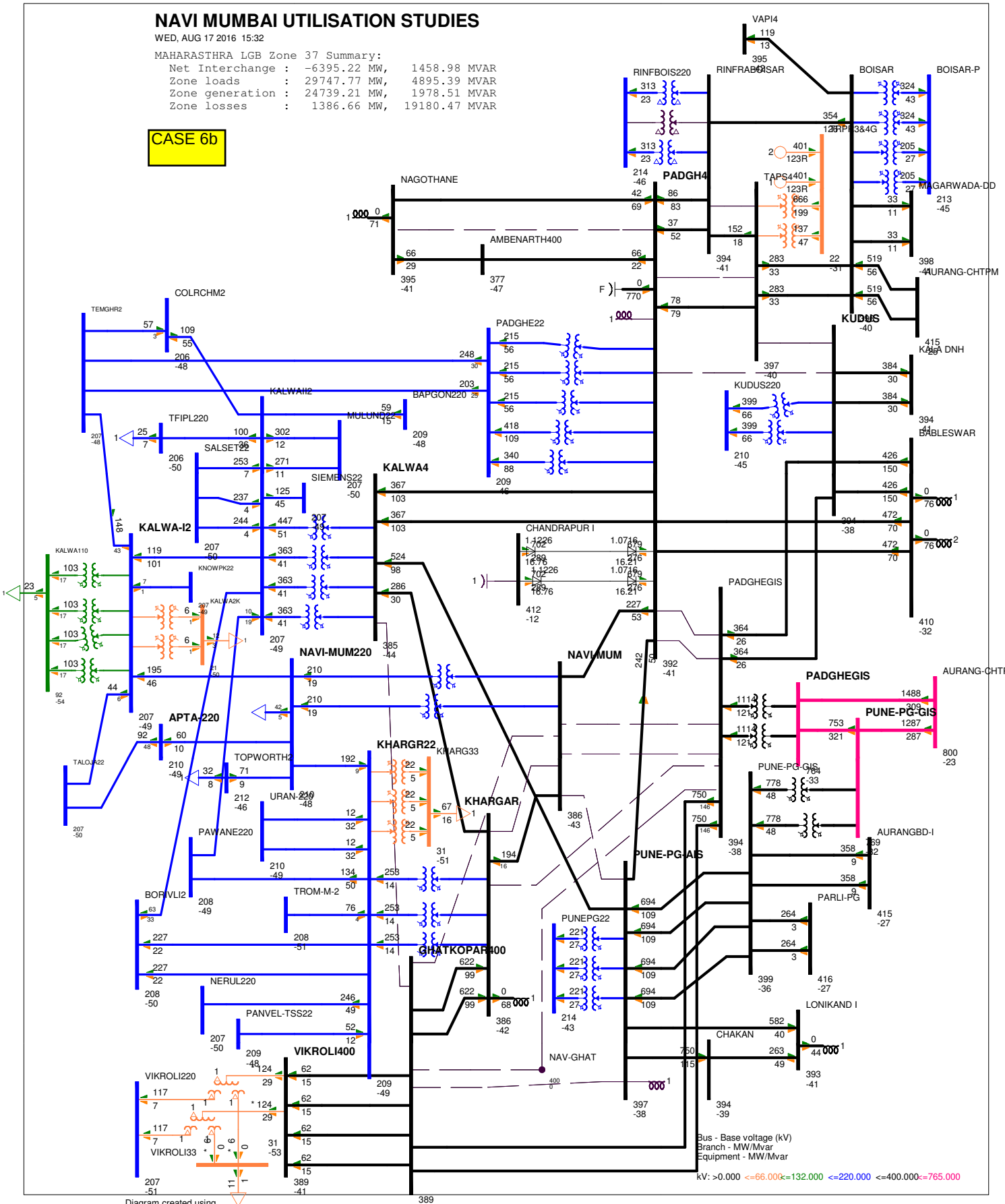

Diagram created using
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'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Navi Mumbai Utilistion studies\Navi Mumbai SLD - CASE1-6.sld'

NAVI MUMBAI UTILISATION STUDIES

THU, AUG 18 2016 15:34

```
MAHARASTHRA LGB Zone 37 Summary:
  Net Interchange :  -6503.30 MW,   1083.26 MVAR
  Zone loads      :  29747.27 MW,   4895.30 MVAR
  Zone generation :  24739.21 MW,   2893.20 MVAR
  Zone losses     :   1495.24 MW,  20090.12 MVAR
```

BASE CASE+NAVI MUMBAI KALWA S/c LINE BYPASSING KHARGAR

Case ID 7

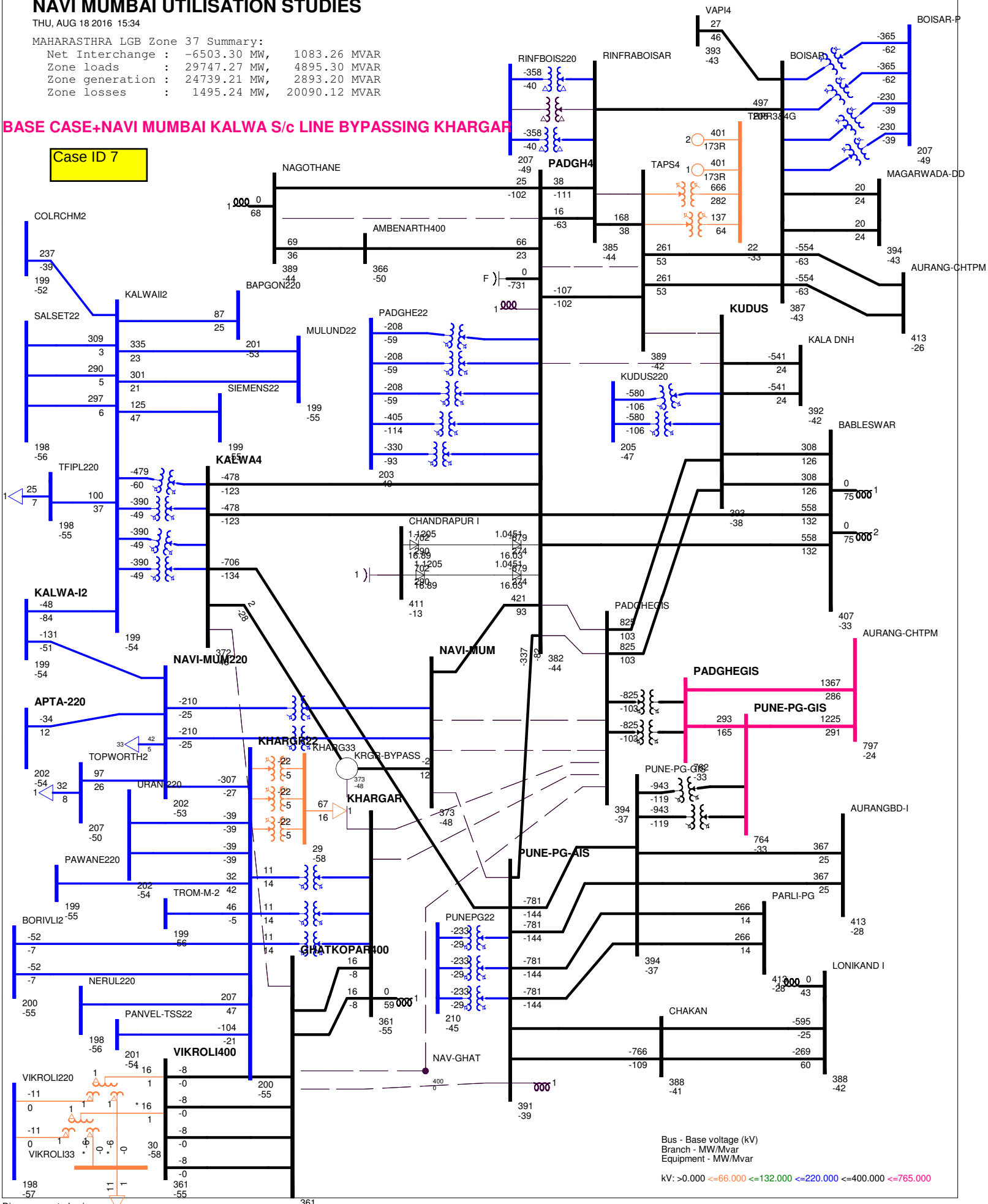


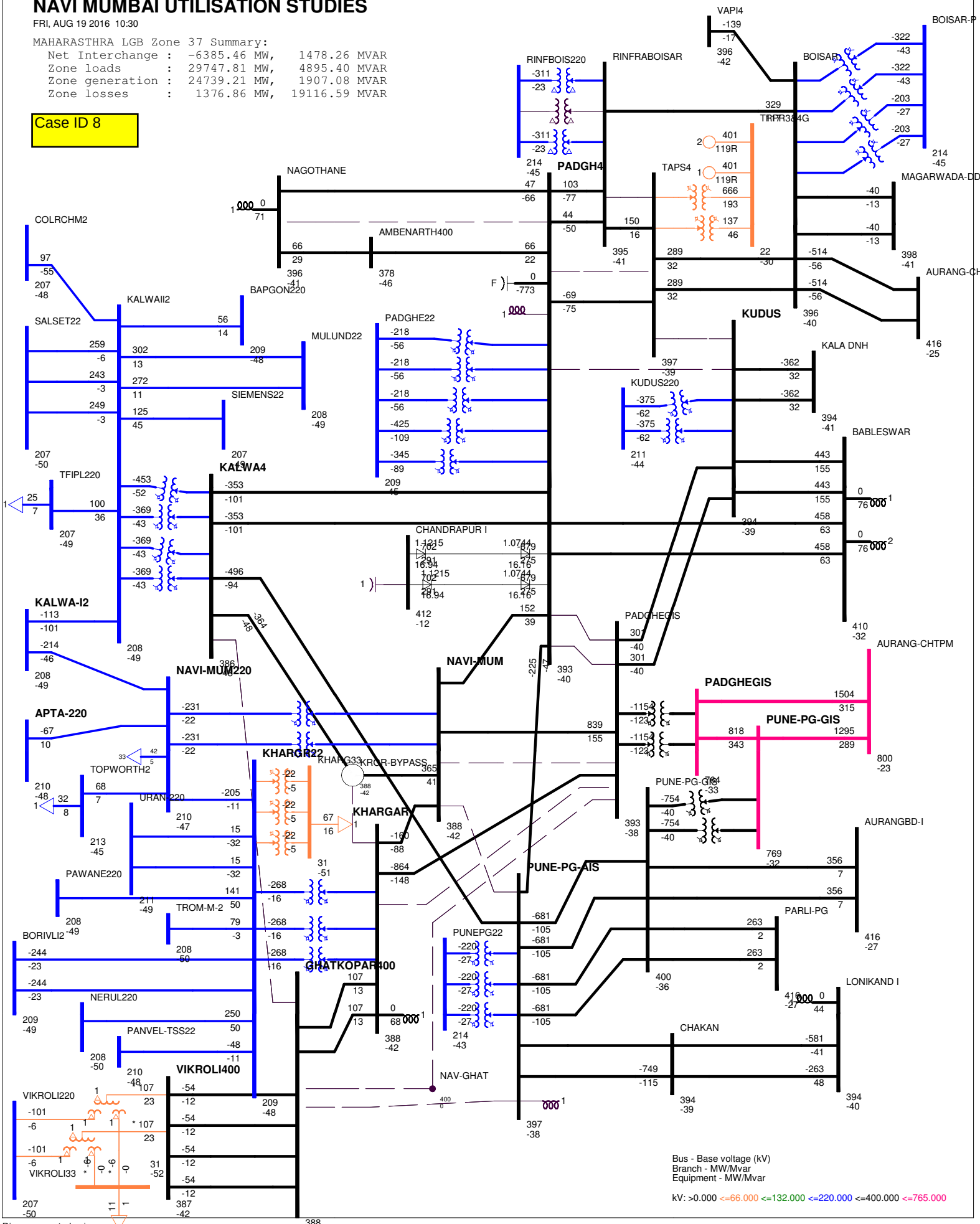
Diagram created using
'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Navi Mumbai Utilistion studies\All India 2021-22 Peak File-Navi Mum-CASE6.sav'
'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Navi Mumbai Utilistion studies\Navi Mumbai SLD - CASE6.sld'

NAVI MUMBAI UTILISATION STUDIES

FRI, AUG 19 2016 10:30

```
MAHARASTHRA LGB Zone 37 Summary:
  Net Interchange :  -6385.46 MW,   1478.26 MVAR
  Zone loads      :  29747.81 MW,   4895.40 MVAR
  Zone generation :  24739.21 MW,   1907.08 MVAR
  Zone losses     :   1376.86 MW,  19116.59 MVAR
```

Case ID 8



Bus - Base voltage (kV)
Branch - MW/Mvar
Equipment - MW/Mvar

kV: >0.000 <=66.000 <=132.000 <=220.000 <=400.000 <=765.000

Diagram created using
'V:\CTU-Common\Year-wise files upto 2018\2018-19 File\UPDATED 2021-22 File\Navi Mumbai Utilistion studies\All India 2021-22 Peak File-Navi Mum-CASE6.sav'
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NAVI MUMBAI UTILISATION STUDIES

WED, AUG 17 2016 15:35

MAHARASTHRA LGB Zone 37 Summary:

Net Interchange	:	-6372.09 MW,	1538.28 MVAR
Zone loads	:	29747.90 MW,	4895.41 MVAR
Zone generation	:	24739.21 MW,	1748.37 MVAR
Zone losses	:	1363.40 MW,	18997.06 MVAR

Case ID 9

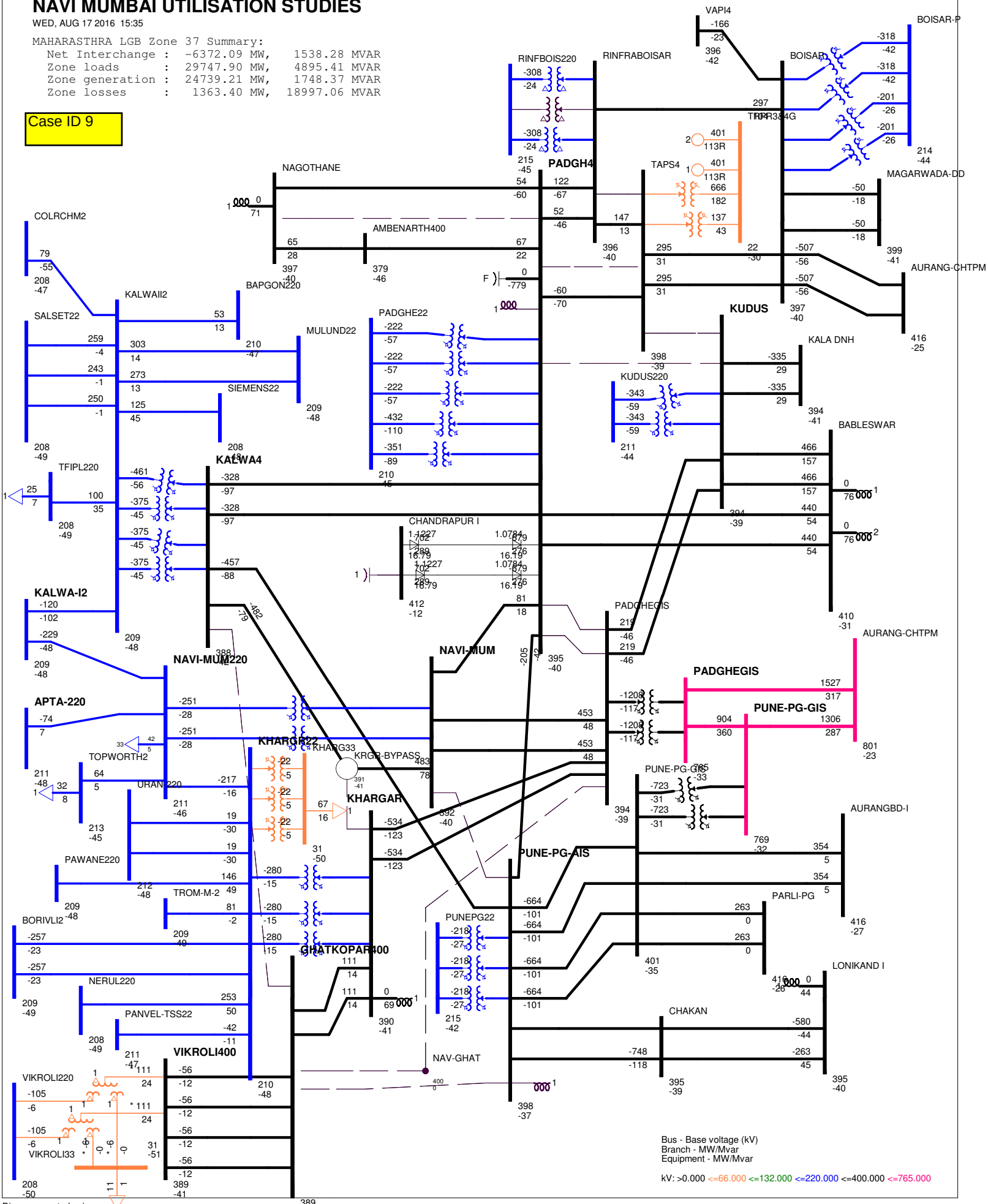

Diagram created using
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