DRAWING No. 0-13100-P8151

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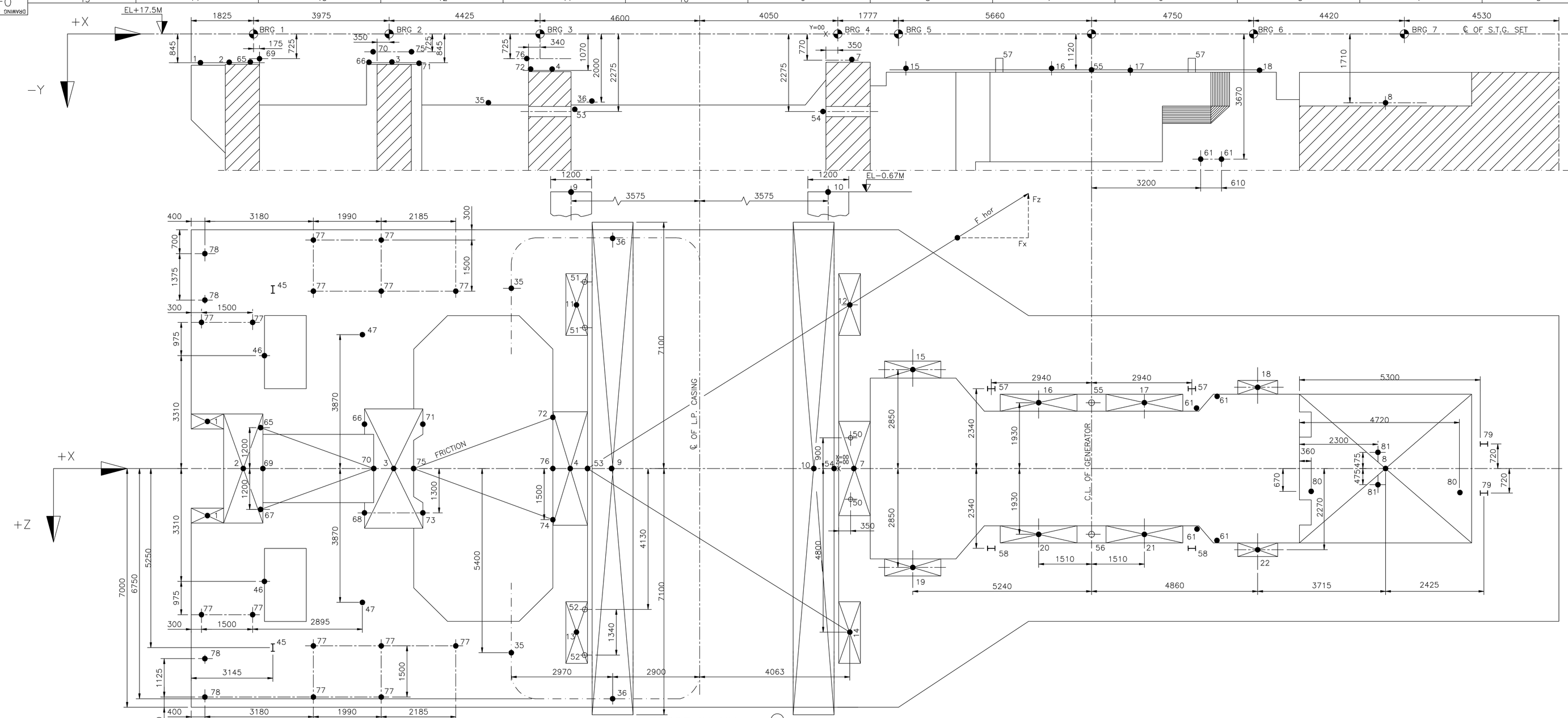

TABLE FOR C.G. (STATIONARY COMPONENTS)				
NAME OF COMPONENTS	LOAD IN KN	C. G. COORDINATES		
		X	Y	Z
HPT	1500	-14450	0	0
IPT	836	-10370	0	0
LPT	2820	-3700	0	0
CONDENSER	5400	-3700	-13700	0
FRONT BEARING PEDEASTAL	92	-17523	0	0
MIDDLE BEARING PEDESTAL	113	-12605	0	0
LP FRONT PEDESTAL	136	-8221	0	0
LP REAR PEDESTAL	84	+539	0	0
GENERATOR *	4458	+7787	0	0
EXCITER **	368	+15792	-350	0

* THE LOAD SHOWN FOR GENERATOR, i.e. 4458 KN, INCLUDES STATIONARY COMPONENTS OF GENERATOR STATOR (=3726 KN) AND ROTOR LOAD AT STANDSTILL (=732KN). THIS IS DUE TO THE FACT THAT GENERATOR BEARINGS ARE END SHIELD MOUNTED & ROTOR LOAD GET TRANSFERRED, VIA STATOR BODY TO FOUNDATION.

** THE LOAD SHOWN FOR EXCITOR, i.e. 368 KN, INCLUDES STATIONARY COMPONENTS OF EXCITER STATOR (=328 KN) AND EXCITER ROTOR LOAD AT STANDSTILL (=40 KN). THIS IS DUE TO THE FACT THAT EXCITER BEARING IS MOUNTED ON EXCITER BED PLATE & EXCITER ROTOR LOAD GETS TRANSFERRED, VIA BED PLATE TO FOUNDATION.

CASE NO.	Ⓐ STATIONARY COMPONENTS	Ⓑ ROTATING ELEMENTS	Ⓒ POWER TORQUE	Ⓓ VACUUM LOADS		Ⓔ THERMAL ELONGATION	Ⓕ HALF SIDE OPERATION	Ⓖ COND. PUMP FAILURE	Ⓗ FORCES AND MOMENTS OF STEAM PIPING			CASE NO.	Ⓘ FRICTION FORCES				Ⓙ MAXIMUM ALLOWABLE UNBALANCE		Ⓚ LOSS OF BLADE UNBALANCE		CASE NO.	Ⓜ SHORT CIRCUIT	Ⓝ SEISMIC LOADS			Ⓞ BOLT STRETCH	Ⓟ ERECTION LOADS			CASE NO.
POINT NO.	Fy	Fy	Fy	FX	Fy	Fy	Fy	Fy	Fx	Fy	Fz	POINT NO.	Fhor	Fx	Fy	Fz	Fy	Fz	Fy	Fz	POINT NO.	Fy	Fx	Fy	Fz	Fy	Fx	Fy	Fz	POINT NO.
BRG.01		-63										BRG.01					±69	±44	±1211	±417	BRG.01									BRG.01
BRG.02		-130										BRG.02					±81	±53	±956	±560	BRG.02									BRG.02
BRG.03		-615										BRG.03					±203	±130	±2489	±2456	BRG.03									BRG.03
BRG.04		-464										BRG.04					±92	±138	±3931	±2673	BRG.04									BRG.04
BRG.05		-353										BRG.05					±68	±52	±660	±743	BRG.05									BRG.05
BRG.06		-377										BRG.06					±87	±53	±701	±378	BRG.06									BRG.06
BRG.07		-39										BRG.07					±8	±7	±139	±36	BRG.07									BRG.07
1	-23											1									1									1
2	-69	-63										2									2		±17	±12	±25	2X639				2
3	-113	-130										3									3		±752	±22	±35	4X1074				3
4	-136	-615		+37								4									4		±20	±68	±106	4X1368				4
5												5									5									5
6												6									6									6
7	-84	-464										7									7		±12	±50	±77	4X1368				7
8	-328	-39										8									8		±46	±34	±52	8X220				8
9	-4488					-285						9									9							-6127		9
10	-4488					-285						10									10							-6127		10
11	-1830		+36			+142	+224/+847	-45		+260/-33		11	307	-33		-306					11		±1154	±1865	±366	3X1400		+1125		11
12	-1830		+36			+142	+847/+224	-45		+260/-33		12	307	+261		-163					12			±1865	±366	3X1400		+1125		12
13	-1830		-36			+142	+224/+847	-45		+260/-33		13	322	-34		+321					13		±1154	±1865	±366	3X1400		+1125		13
14	-1830		-36			+142	+847/+224	-45		+260/-33		14	322	+274		+171					14			±1865	±366	3X1400		+1125		14
15	-331	-176	-76									15	230	-203		+110					15	±624	±47	±46	±72	2X285				15
16	-717		-151									16	401	-248		-316					16	±1247	±101	±65	±101	4X285				16
17	-717		-151									17	401	248		-316					17	±1247	±101	±65	±101	4X285				17
18	-98	-188	-38									18	121	110		-52					18	±312	±14	±26	±41	1X285				18
19	-331	-176	+76									19	200	-176		96					19	∓ 624	±47	±46	±72	2X285				19
20	-717		+151									20	341	-211		269					20	∓1247	±101	±65	±101	4X285				20
21	-717		+151									21	341	211		269					21	∓ 1247	±101	±65	±101	4X285				21
22	-98	-188	+38									22	106	97		45					22	∓ 312	±14	±26	±41	1X285				22
35	-46											35									35									35
36	-31											36									36									36
45												45									45								±90	45
46												46									46							-158		46
47												47									47							-193		47
50				-19								50									50									50
51									±66			51		-131							51		±263							51
52									±66			52		-137							52		±263							52
53	-46										±131	53				-321					53				±422					53
54											±131	54				-171					54				±422					54
55												55		451		-91					55									55
56												56		387		78					56									56
57												57									57						+444		-444	57
58												58									58						+444		+444	58
61												61									61							-38		61
65	-375		+98						±89	±122		65	40	-38		-14					65			±34						65
66	-375		+98						±89	±122		66	40	+38		-40					66		±105	±34						66
67	-375		-98						±89	±122		67	60	-57		+21					67			±34						67
68	-375		-98						±89	±122		68	60	+57		+60					68		±105	±34						68
69											±89	69				-21					69				±105					69
70											±89	70				-60					70				±105					70
71	-209		+123						±93	±126		71	22	-21		-22					71		±59	±19						71
72	-209		+123						±93	±126		72	22	+21		-8					72			±19						72
73	-209		-123						±93	±126		73	46	-44		+46					73		±59	±19						73
74	-209		-123						±93	±126		74	46	+44		+16					74			±19						74
75											±93	75				-46					75				±59					75
76											±93	76				-16					76				±59					76
77	-10											77									77									77
78	-15											78									78									78
79												79									79						-35			79
80												80									80								±20	80
81												81									81							-234		81

DESCRIPTIONS

Ⓐ STATIC LOADS OF STATIONARY COMPONENTS. FOR STABILITY REASONS PART OF THE CONDENSER WEIGHT IS HANGING ON LP OUTER CASING. MAX POSSIBLE ACCUMULATION OF CONDENSATE IN CONDENSER 198 KN.

Ⓑ STATIC LOADS OF ROTATING ELEMENTS AND THEIR FOUNDATION LOADS.

Ⓒ FORCES DUE TO POWER TORQUE.

Ⓓ VACUUM LOAD DUE TO COMPENSATOR BELLOWS IN LP BEARING CASING OR CONDENSER EXPANSION BELLOWS.

Ⓔ THERMAL ELONGATION OF CONDENSER CAUSES COMPRESSION OF CONDENSER SPRINGS AND LIFTING OF LP OUTER CASING.

Ⓕ COOLING WATER DRAIN OF 2240 KN FROM ONE HALF OF CONDENSER DURING OPERATION.

Ⓖ CONDENSATE PUMP FAILURE.

Ⓗ STEAM PIPING FORCES ARE ACTING THROUGH TURBINE CASINGS TO EMBEDDED FIXING POINT IN FOUNDATION. PIPING WEIGHTS SUSPENDED ON FOUNDATION IN HP AND IP AREA ARE TO BE CONSIDERED WITH 400 KN AND 300 KN RESPECTIVELY.

Ⓘ FRICTION FORCES(μ=0.2) SHOWN FOR START UP OF TURBINE AND GENERATOR AT COOLING DOWN. THE SIGNS ARE REVERSED. MAXIMUM VALUES OF REACTION FORCES TO FIXING POINTS ARE SHOWN ONLY.

Ⓙ DYNAMIC FOUNDATION LOADS DUE TO UNBALANCE ON HP-IP-OR-LP ROTOR.

Ⓚ LOSS OF BLADE UNBALANCE.

Ⓜ SHORT CIRCUIT FORCES
TIME FUNCTION OF SHORT CIRCUIT TORQUE MK.
$MK = 10904e^{-t/0.14} \sin wt - 5452e^{-t/0.21} \sin 2wt + 1069e^{-t/0.14}$ KNm.
MKmax=14585KNm
W=314 CYCLES/sec-ANGULAR FREQUENCY
STATOR MOMENT OF INERTIA AROUND THE AXIS =834 Mgm^2
ROTOR MOMENT OF INERTIA AROUND THE AXIS =10 Mgm^2
OPERATING SPEED n = 50 1/sec

Ⓝ SEISMIC LOADS DURING OPERATION (ϵ_{HORIZ} =0.14g AND ϵ_{VERT} =0.09g)

Ⓞ STRETCH ELONGATION OF FOUNDATION BOLTS IN KN.

Ⓟ ERECTION AND ALIGNMENT OF TURBINE AND GENERATOR ROTOR REMOVAL AND DENSITY TEST OF CONDENSER.

REFERENCE DRAWINGS:-

1. FOUNDATION PLANS
2. INFLUENCE FACTOR OF SHAFTING
3. DESCRIPTION OF FOUNDATION LOADS
4. GENERATOR OUTLINE
5. EXCITER OUTLINE
6. CONDENSER

NOTE:

1. THE FOUNDATION DESGINER SHOULD ADD HIS NORMAL DESGIN MARGINS TO THESES COMBINED LOADS.
2. ALL FORCES AND LOADS ARE SHOWN IN KILO NEWTONS.
3. ALL ELEVATIONS ARE SHOWN IN METERS.
4. IF A LOAD POINT NO. IS SHOWN AT MORE THAN ONE LOCATION, THE LOAD SHOWN IN TABLE IS APPLICABLE TO EACH SUCH LOAD POINT NO.

GRADE OF UNTOL.DIM	
M/CG.-$\not{G}/M/\not{F}$ AA0230208	
WELDING-$\not{K}/B/\not{E}/P$ AA0621104	
GAS CUTTING-T3 AA0621101	

~~GMS No.~~ / C.B.O.M			STATUS OF DRG
AGREED DEPT	NAME	SIGN	DATE
EME	AS/RPR	SD/-	03.07.09
HXE	DK YADAV	-SD-	07.07.09
STE-TM			
STE-TE	S.SONKAR	-SD-	24.06.09

REV	DATE	ALTERED / CHECKED

REV	DATE	ALTERED / CHECKED

REV	DATE	ALTERED / CHECKED

NTPC DRG. NO. 2250-110-03-HW-PVM-V-277

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: NATIONAL THERMAL POWER CORPORATION LTD. 2 X 500 MW VINDHYACHAL T.P.S. STAGE-IV UNIT-11&12 STEAM TURBINE GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR

	NAME	SIGN	DATE	NO. OF VAR
DRN	P.S.SHARMA	-Sd-	19.06.2009	–
CHD	ANUPAM	-Sd-	19.06.2009	
APPD	S.K.GUPTA	-Sd-	19.06.2009	

DEPT PED	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
CODE 4066	NTS	–	–	–	–

TITLE : LOAD ON FOUNDATION

CARD CODE | DRAWING NO. 0-13100-P8151 | REV 00

SHEET No. 01 | No. OF SHEETS 01

A0 SIZE