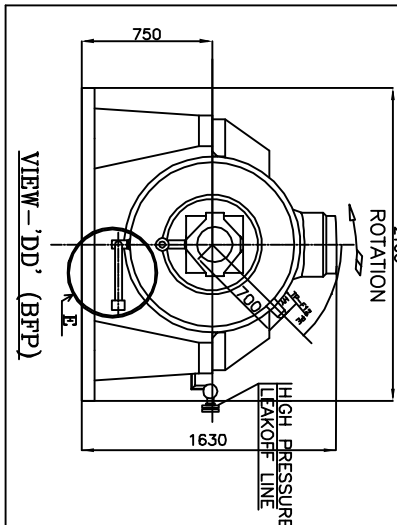
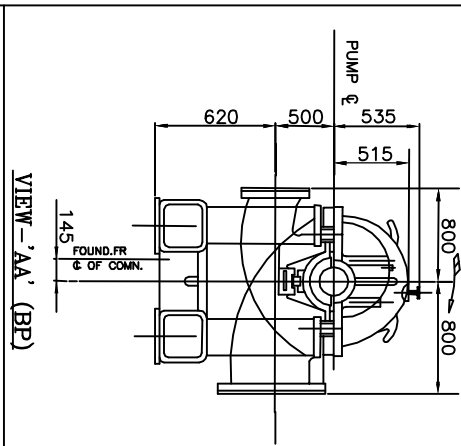


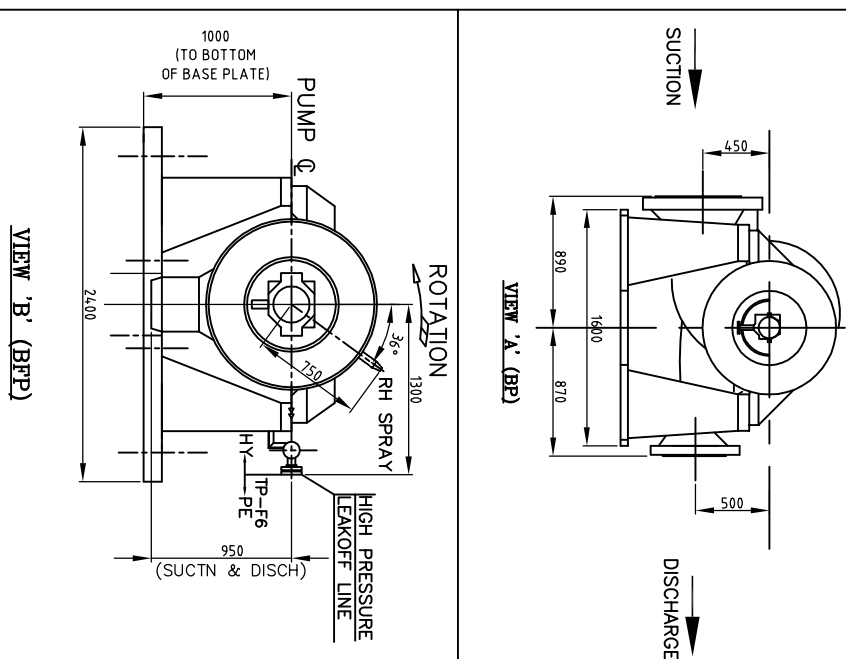
| SCOPE OF SUPPLY | |
|-----------------|-----------------------|
| HY | BHEM, HYDERABAD SCOPE |
| BP | BHEM, BHOPAL SCOPE |
| PE | BHEM, PUN SCOPE |

[illegible]

TDBFP
[MODEL - MG605]
[MAKE - BHEL HYD/HH]

MIN HOOK DISTANCE REQUIRED

3850mm SPACE REQUIRED FOR INNER CASING
(CARTRIDGE) WITHDRAWAL
INNER CASING WEIGHT—3800kg



NOTE: TEMP STUBS ARE TO BE CLEAR OF FOUNDATION DECK FOR EASY ACCESSIBILITY.

11








3 NOS TEMP STUBS, R1"(F)


NOTE :

1. FOR LOADING POINTS & LOADING DETAILS, TERMINAL DETAILS OF DRIVE TURBINE REFER TD8P SET FOUND, DRG.
2. TERMINAL POINTS SHOWN IN THE HYD. SCOPE INCLUDES COUNTER FLANGES ALONG WITH FASTENERS & GASKETS.
3. DBSE – DISTANCE BETWEEN SHAFT ENDS.
4. SPACE INDICATED FOR BRP CARTRIDGE/BR ROTOR REMOVAL SHALL BE CLEAR OF ANY OBSTRUCTION (NO PIPING SHALL BE ROUTED IN THIS AREA.



| | | | | | | | | | | | |
|-----------------------------|----------|--|--|--|--|--|--|--|--|--|--|
| 1. JOB NO. | 390 | | | | | | | | | | |
| 2. STATUS: | CONTRACT | | | | | | | | | | |
| 3. DRG./REF. NO. (INTERNAL) | | | | | | | | | | | |
| 4. DISTRIBUTION | | | | | | | | | | | |
| 5. TO | | | | | | | | | | | |
| 6. No. OF | | | | | | | | | | | |

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PROJECT
 **RAGHUNATHPUR THERMAL
PHASE-II (2X660 MW)**

PACKAGE STEAM TURBINE GENERATOR

| Supply | PE | BHEL | PEN SCOP |
|--------|----|------|----------|
| | | | |

| Supply | PE | BHEL | PEN SCOP |
|--------|----|------|----------|
| | | | |

RH SPRAY

WELD EDGE PREPARATION

| TERMINAL POINT | DESCRIPTION | NOMINAL SIZE | TERMINATED WITH | QTY. |
|----------------|--------------------------|----------------------------|---|------|
| TP-F1 | SUCTION OF FEED PUMP | 14" | BW END TO SUIT PIPE DIA AS PER DETAIL 'A' | 1 |
| TP-F2 | DISCHARGE OF FEED PUMP | 16" | BW END TO SUIT PIPE DIA AS PER DETAIL 'B' | 1 |
| TP-F3 | R.H. SPRAY | 3" | BW END TO SUIT PIPE DIA AS PER DETAIL 'C' | 1 |
| TP-F4 | SUCTION OF BP | 16' | COUNTER FL. TO SUIT PIPE DIA 406x12.7 THK | 1 |
| TP-F5 | DISCHARGE OF BP | 12" | COUNTER FL. TO SUIT PIPE DIA 323.85x12.7 THK | 1 |
| TP-F6 | HIGH PRESS. LEAKOFF LINE | 2" | SORF 2" CL 150 | 1 |
| TP-F7 | TURBINE MAIN STEAM INLET | 12" #1500 WNRJ, SCH=60, CS | | 2 |
| TP-F8 | TURBINE EXHAUST HOOD | DIA 2032 X16 | | 1 |

TERMINAL POINTS

| WEIGHTS OF PUMPS | | | | |
|------------------|------------------|----------|--------------|----------|
| ITEM | BOLLER FEED PUMP | | BOOSTER PUMP | |
| | DRY (kg) | WET (kg) | DRY (kg) | WET (kg) |
| PUMP | 16000 | 16250 | 3500 | 3800 |
| BASE | 5600 | 5600 | 2650 | 2650 |
| TOTAL | 21600 | 21850 | 6150 | 6450 |

WEIGHTS OF PUMPS

| EQUIPMENT DATA | |
|-------------------------------|---------------------------|
| ITEM | WEIGHT (KG) |
| DRIVE TURBINE | 61000 |
| | SINGLE HEAVIEST EQUIPMENT |
| GEARBOX | 950 |
| COUPLING B/W BFP & TURBINE | 192 |
| COUPLING B/W BP & GEAR BOX | 51 |





EQUIPMENT DATA

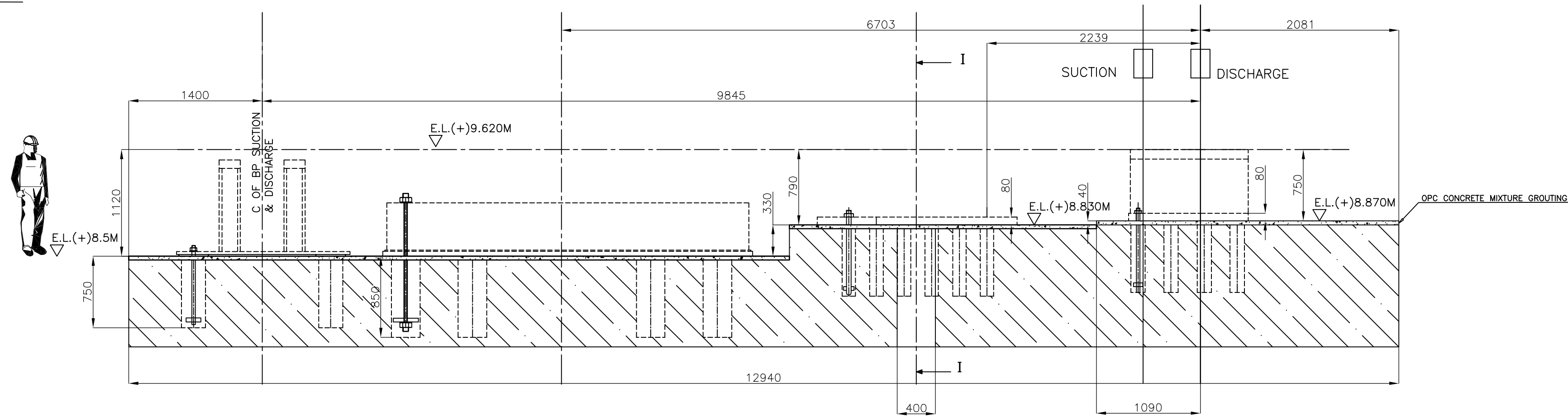
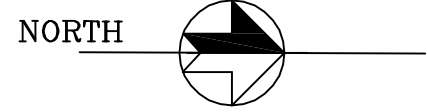
| | | | |
|----------------------|------------|--------------|-------|
| | | BOOSTER PUMP | BFP |
| STATIC LOAD (kg) | VERTICAL | 6450 | 21850 |
| DYNAMIC LOAD (kg) | VERTICAL | 5700 | 24375 |
| | HORIZONTAL | 5700 | 24375 |
| | AXIAL | 3800 | 16250 |

STATIC & DYNAMIC LOADS FOR BP & BFP

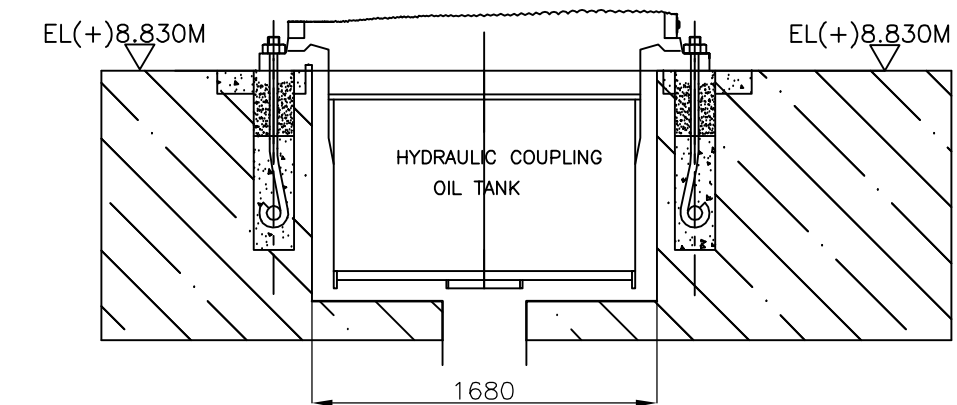
[illegible]

| | | |
|-----|---------------|------------|
| 1 | JOB NO : | 390 |
| 2 | STATUS : | CONTRACT |
| 3 | DRG./REF. NO. | (INTERNAL) |
| 4 | DISTRIBUTION | |
| 5 | TO | |
| 6 | No. Of | |
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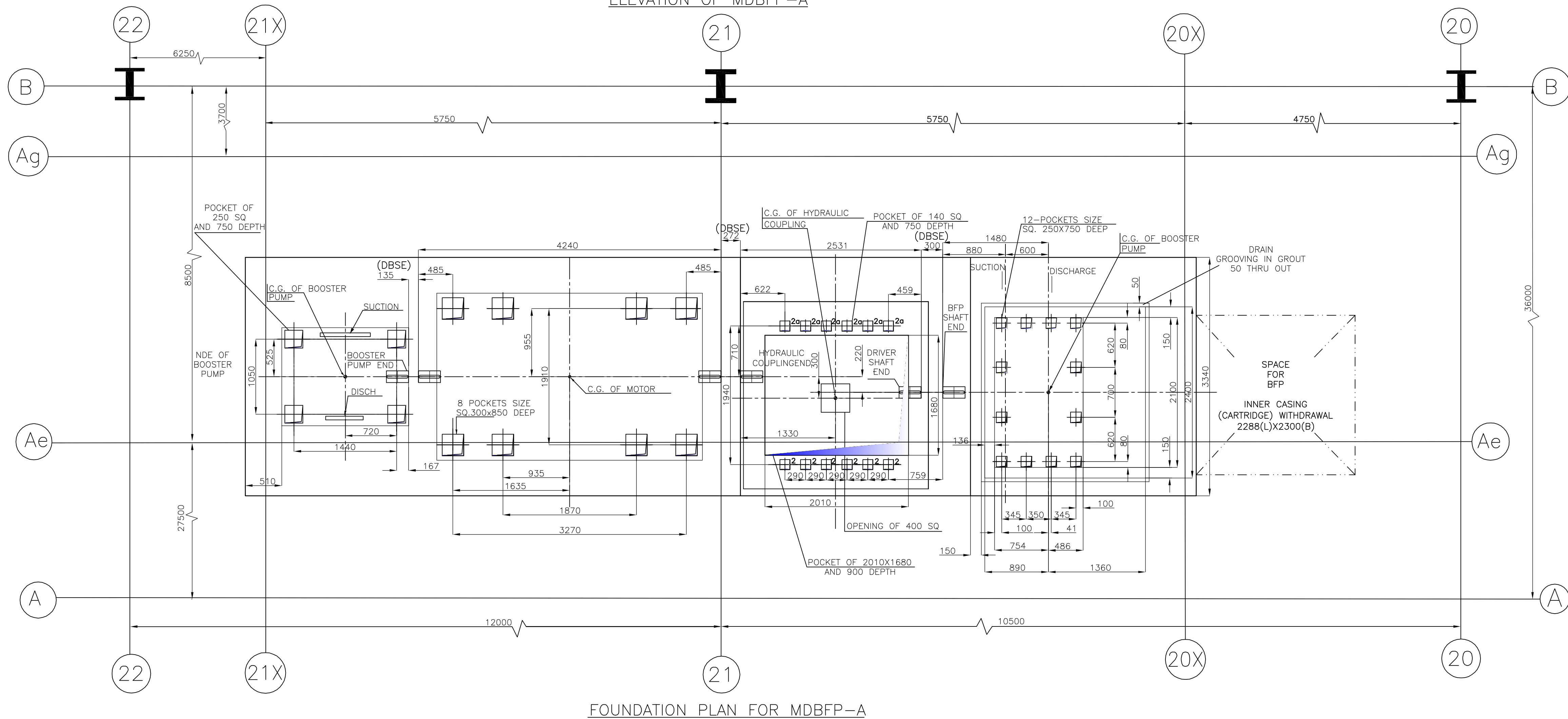
| | |
|---|--|
|  PROJECT RAGHUNATHPUR THERMAL PHASE-II (2X660 MW) | |
| PACKAGE STEAM TURBINE GENERATOR | |
| DRAWER | |
| DAMODAR VALLEY CORPORATION | |
|  REGULATED HEAVY ELECTRICAL LIMITED HYDROELECTRIC | |
| DEPT. PLANT CODE 410 |  FLANGE |
|  SOCKET | SIZE NTS |
| WEIGHT (KG) NA | NO. OF BOLTS NA |
| NAME CO. PO. GUPTA | DATE 20.05.15 |
| REF. TO SPEC. Dwg. NO. NA | REF. TO SPEC. Dwg. NO. NA |
| ISSUANCE NO. BT-02-1-184-00-97582 | DATE 02-05-2015 |
| SHEET NO.02 | NO. OF SHEETS 02 |



ELEVATION OF MDBFP-A



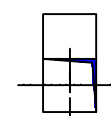
SECTION I-I



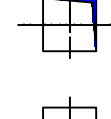
FOUNDATION PLAN FOR MDBFP-A

| TECHNICAL DATA OF BOILER FEED PUMP & BOOSTER PUMP | | |
|---|--|--------------------------------------|
| PUMP TYPE | BOILER FEED PUMP | BOOSTER PUMP |
| MODEL | MDG 346 | FA1B75 |
| TYPE | MULTI STAGE, AXIALLY SPLIT INNER CASING & BARREL TYPE OUTER CASING | SINGLE STAGE HORIZONTALLY SPLIT TYPE |
| DIRECTION OF ROTATION (VIEWED FROM PUMP DRIVE END) | CLOCKWISE | COUNTER CLOCKWISE |
| DESIGN CAPACITY/PUMP(M ³ /Hr) | | |
| DESIGN HEAD (MLC) | | |
| TEMPERATURE (DEG C) | | |
| NPSH REQUIRED (MLC) | | |
| GRADE OF BALANCING | | |
| MOTOR RATING OF BFP SET(kw) | 10,700 | |

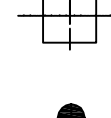
LEGEND



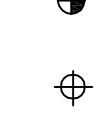
BLIND POCKET WITH
SLOPE FOR POURING
SECONDARY GROUTING



BLIND POCKET



OPENING



ELEVATION



THROUGH
OPENINGS

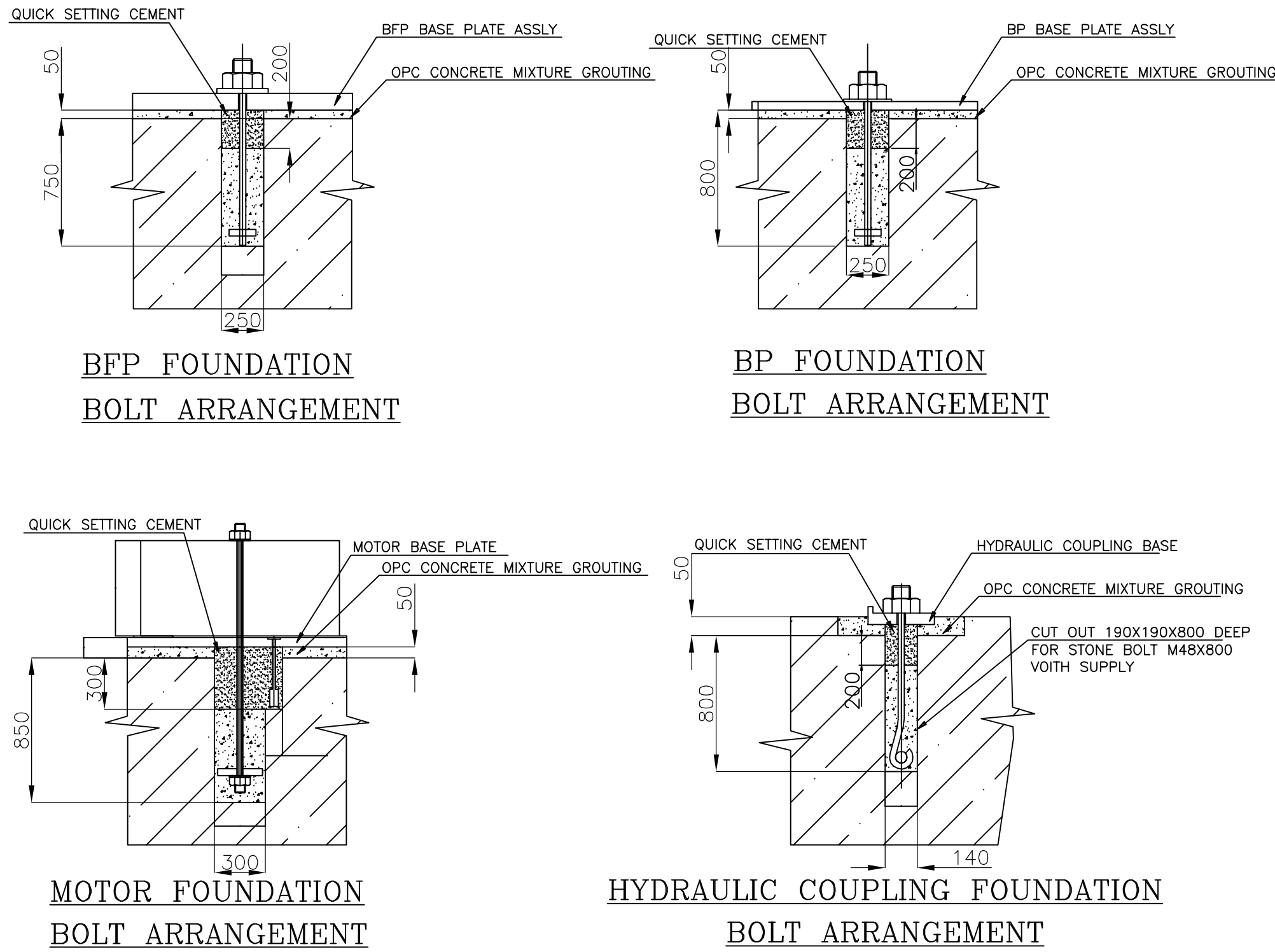
NOTE:

- 1) FOUNDATION ARRANGEMENT IS IDENTICAL FOR MDBFP-B ALSO.
- 2) FOR FURTHER CLARIFICATION IN LAYOUT OF MDBFP SETS ARRANGEMENT REFER TO T.G EQUIPMENT LAYOUT PLAN AT 8.5M PEM DRWG NO PE-DG-390-100-M004.
- 3) REF. ALL COLUMNS, ROWS & ELEVATIONS BHEL/PEM Drg.No. PE-DG-390-100-M004.

- 4) FOR GENERAL ARRANGEMENT OF MD BFP SET,
REFER DRG NO. HY-DG-1-180-00-57591.
- 5) ALL ELEVATIONS ARE W.R.T TO TG HALL
FINISHED FLOOR LEVEL WHICH IS ELO.0M
- 6) TOLERANCES FOR POCKET LOCATIONS ± 5 MM.
- 7) TOLERANCES FOR CONCRETE DIMENSIONS ± 10 MM.
- 8) TOLERANCES FOR TOP OF FOUNDATION BEFORE
GROUTING $+0$ & -10 MM

| | | | |
|----|--------------------------|---|----------|
| 1. | JOB NO | : | 390 |
| 2. | STATUS | : | CONTRACT |
| 3. | DRG./REF. NO. (INTERNAL) | | |
| | HY-DG-1-180-00-57593 | | |
| 4. | DISTRIBUTION | | |
| 5. | TO | | |
| 6. | No. Of | | |

| | | | | | | | | | | |
|---|---|-------|-------------|----|-------|-----------------------|-------|----------|-----|---------------------|
| PROJECT | RAGHUNATHPUR THERMAL POWER PROJECT | | | | | | | | | |
| | PHASE- II (2X660 MW) | | | | | | | | | |
| OWNER | STEAM TURBINE GENERATOR (STG) | | | | | | | | | |
| | DAMODAR VALLEY CORPORATION | | | | | | | | | |
|  | BHARAT HEAVY ELECTRICALS LIMITED | | | | CHN. | NAME | SIGN. | DATE | NO. | |
| | HYDERABAD | | | | DRL | L.KRISHNA | s.d./ | 20.05.13 | VAR | |
| DEPT. PUMPS |  | SCALE | WEIGHT (KG) | NA | APPD. | M.M.RAO | W | NO | NA | |
| | | | | | | | | | | REF. TO ASSLY. DRG. |
| CODE 410 | | NTS | | | | | NA | NA | REV | |
| FOUNDATION ARRANGEMENT OF | | | | | | DRAWING NO. | | | | |
| MD BFP SET-A | | | | | | HY-DG-01-180-00-57593 | | | | |
| | | | | | | SHEET NO.-1 | | | | |
| | | | | | | NO OF SHEETS 02 | | | | |



LOAD POINTS FOR MDBFP SET

| MOTOR FOUNDATION LOADING DETAILS | |
|---------------------------------------|--------|
| Reaction Due to Wt on Each Side (G) = | 209 KN |
| MAX Short circuit force (MS) = | 572 KN |
| Reaction Downward MS+G = | 781 KN |
| Reaction upward MS-G = | 363 KN |

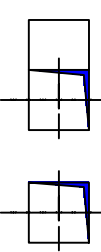
NOTE:

- 1-THE FORCES OCCUR ALTERNATELY INDEPENDENT OF THE DIRECTION OF ROTATION. (REFER LOADING ON FOUNDATION TABLE).
- 2-THE TRANSFER OF VIBRATIONS FROM SURROUNDING EQUIPMENT HAS TO BE AVOIDED BY SUITABLE LAYOUT OF FOUNDATION.
- 3-THE FIRST NATURAL FREQUENCY OF THE FOUNDATION AFTER ERECTION OF THE MACHINE MUST DIFFER ATLEAST +25% & -20%, FROM ONE & TWO TIMES RUNNING SPEED FREQUENCIES & TWO TIMES THE ELECTRICAL FREQUENCY




SPEEDS AT OPERATING POINTS (RPM)

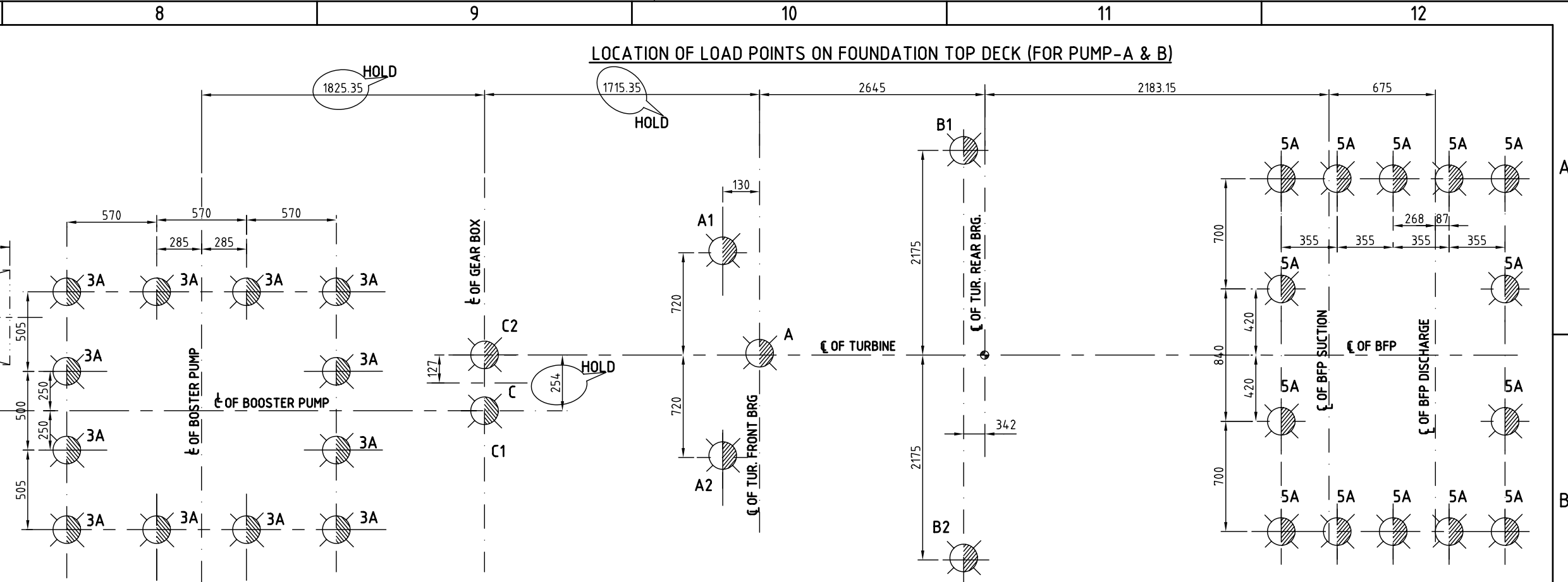
| EQUIPMENT | DESIGN POINT 1 | DESIGN POINT 2 | RUN OUT POINT | BEP | EMERGENCY POINT | UNDER FREQ-1 | UNDER FREQ-2 |
|----------------------------------|-------------------|-------------------|---------------|------|--------------------|-----------------|-----------------|
| BFP | 6215 | 6000 | 5350 | 5860 | 6325 | 6405 | 6380 |
| BOOSTER PUMP | 1495 | 1495 | 1495 | 1495 | 1495 | 1495 | 1495 |
| MOTOR | 1495 | 1495 | 1495 | 1495 | 1495 | 1495 | 1495 |
| HYDRAULIC COUP. (INPUT SHAFT) | 1495 | 1495 | 1495 | 1495 | 1495 | 1495 | 1495 |
| HYDRAULIC COUP (OUTPUT SHAFT) | 6215 | 6000 | 5350 | 5860 | 6325 | 6405 | 6380 |

LEGEND

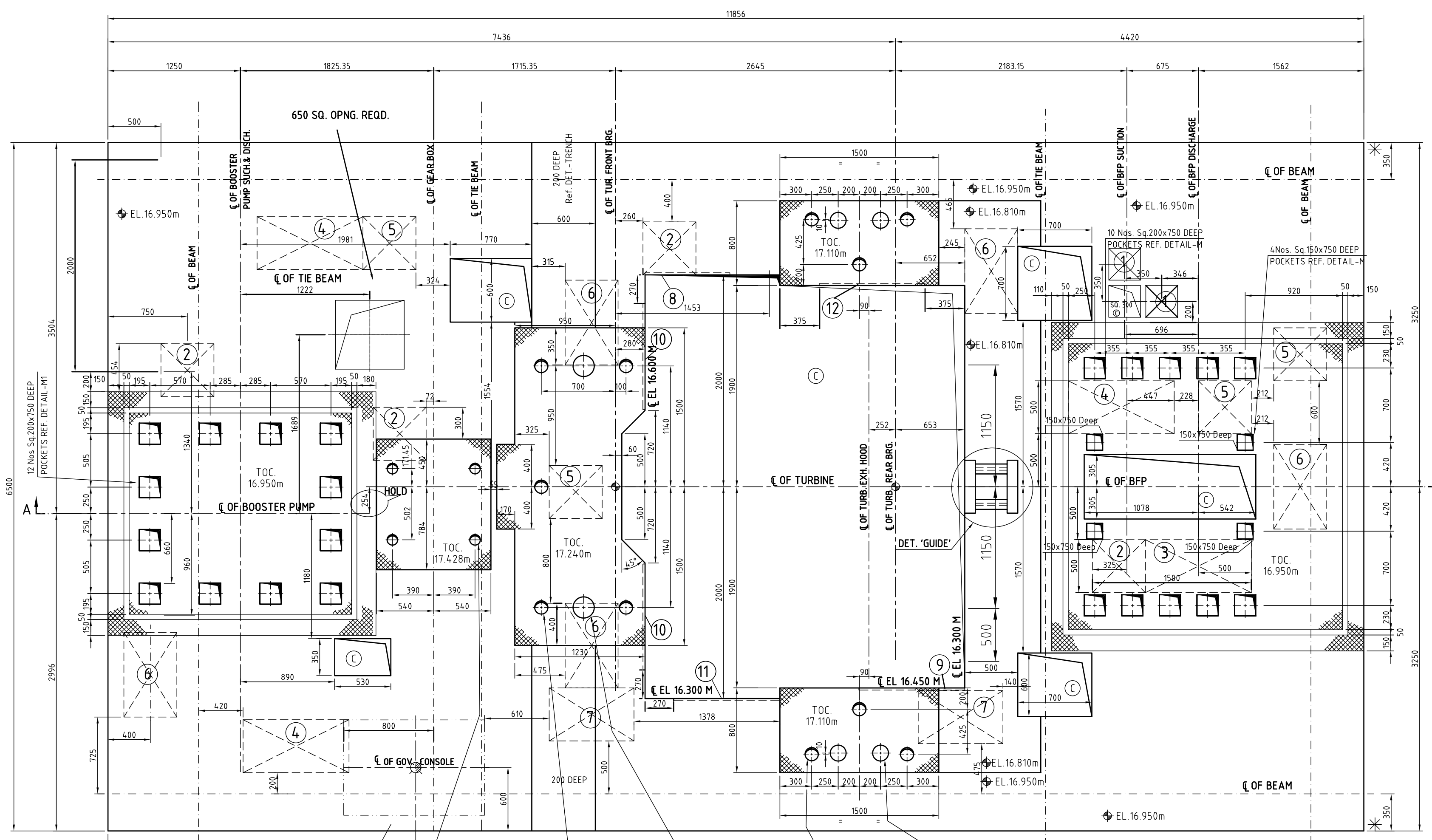


BLIND POCKET

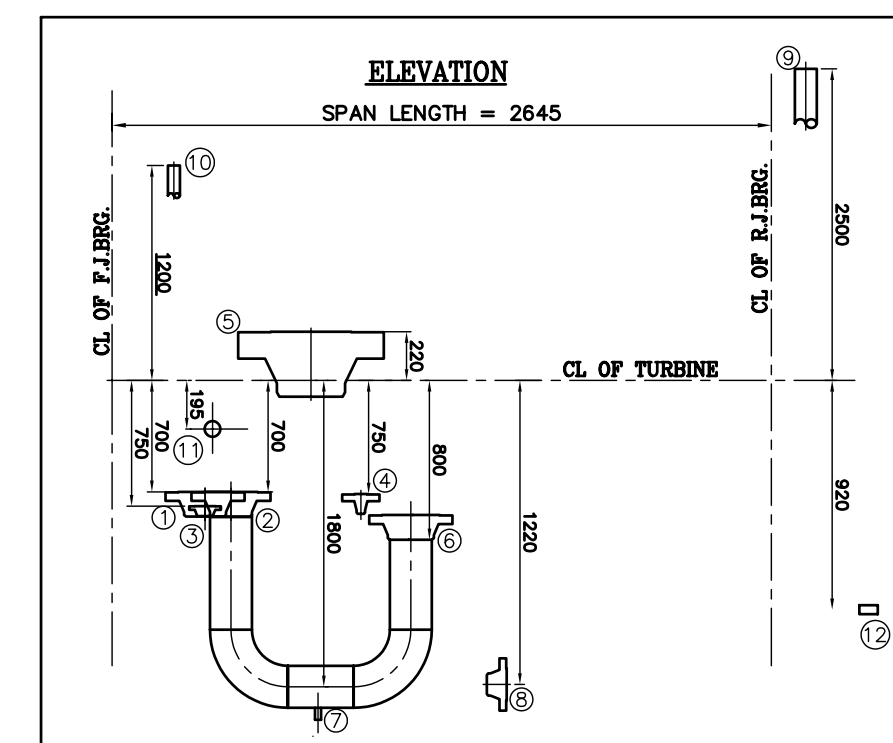
| | | |
|---|---|----------------------------------|
|  | RAGHUNATHPUR THERMAL POWER PROJECT PHASE- II (2X660 MW) STEAM TURBINE GENERATOR (STG) | |
| | OWNER | |
| DAMODAR VALLEY CORPORATION | | |
|  | INDIA | |
| DEPT. PUMPS CODE 410 | HYDRABAD | NO. OF PIPES NA |
|  | SCALE NTS | NO. OF PIPES NA |
| TITLE FOUNDATION ARRANGEMENT OF MD BFP SET-A | WEIGHT (KG) NA | NO. OF PIPES NA |
| DRAWING NO. HY-D-1-180-00-57593 | REF. TO ASSY. DRG. NO. NA | NO. OF PIPES NA |
| SHEET NO. 02 | NO. OF SHEETS 02 | REV. 00 |



SECTION A-A

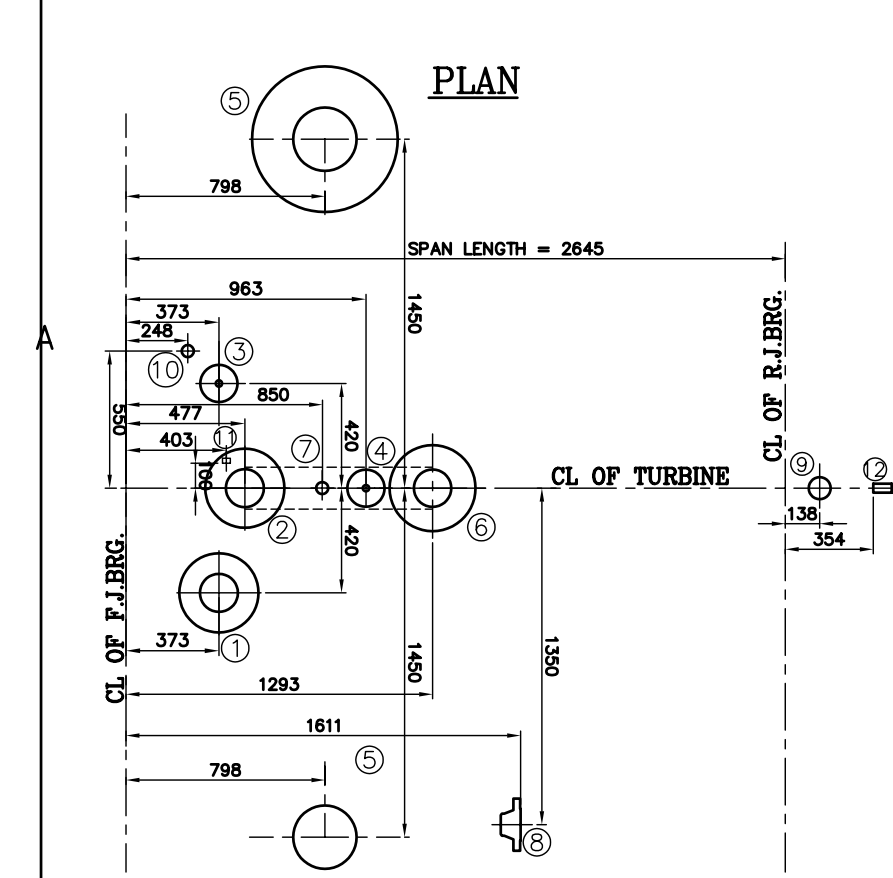


PLAN AT 17.00m (FOR PUMP-A)
(FOR PUMP-B ROTATE TOP DECK BY 180°)



ELEVATION

SPAN LENGTH = 2645







PLA

SPAN LENGTH = 2645

| SL NO. | DESCRIPTION | QTY | TYPE OF FLANGE | STEAM PARAMETERS |
|--------|------------------------|-----|----------------------------|------------------|
| 1. | FRONT GLAND INLET | 1 | E* #300 WNRFS,SCM+40,C.S. | 1.1ato/330°C |
| 2. | BALANCE PLATING GLAND | 1 | E* #300 WNRFS,SCM+40,C.S. | 2.1ato/331°C |
| 3. | CASING DRN FLANGE-1 | 1 | E* #600 WNRFS,SCM+80,C.S. | 1.1ato/283°C |
| 4. | CASING DRN FLANGE-2 | 1 | E* #600 WNRFS,SCM+80,C.S. | 1.1ato/283°C |
| 5. | MAIN STEAM INLET | 2 | 1" #1500 WNRFS,SCM+80,C.S. | 15.15ato/397° |
| 6. | B.P. GLAND INTO CASING | 1 | E* #150 WNRFS,SCM+40,C.S. | 2.1ato/331°C |
| 7. | B.P PIPING DRN | 1 | 1" SOCKET C.S. | 2.1ato/331°C |
| 8. | REAR GLAND INLET | 1 | E* #300 WNRFS,SCM+40,C.S. | 0.98ato/330°C |
| 9. | REAR STEAM VENT | 1 | PIPE DIA. 88.9x45, C.S. | 0.98ato/330°C |
| 10. | FRONT STEAM VENT | 1 | PIPE DIA. 48.3x35.8, C.S. | 0.98ato/330°C |
| 11. | FRONT STEAM GLAND DRN | 1 | PIPE 10.2", SA312,TP321 | 0.98ato/330°C |
| 12. | REAR STEAM GLAND DRN | 1 | DULO G 1/2" | 0.98ato/330°C |

LEGEND:-

1.  INDICATES LOAD POINTS.
2. 
 - a) ALL EP MARKED ON PLAN ARE REQUIRED AT BOTTOM OF DECK.
AND EP MARKED ON SIDE (SECTION A-A & VIEW A) ARE REQUIRED AT BOTH SIDES OF DECK
 - b) ADDITIONAL EP OF 500 SQ ARE REQUIRED AT OPPOSITE SIDES OF OPENING FOR TURBINE EXHAUST AT 400MM BELOW EP-5 ALONG CENTRE LINE OF EXHAUST HOOD
3.  INSULATION FOR FOUNDATION PROTECTION FOR TURBINE CUTOUT.
4.  POCKETS.
5. TOC TOP OF CONCRETE
6. TOG TOP OF GROUT
7. CUT out in TG DECK (Thorough Opening)

STATUS: PRELIMINARY




| | | | | | |
|------|------|-----------|------|------|-----------|
| REV. | DATE | ALTERED. | REV. | DATE | ALTERED. |
| | | CHD/APPD. | | | CHD/APPD. |

SUPPORT PLATES : EP PLATE DETAILS REQUIRED BY PEM-MPI

| DESIG. | PLATE SIZE | LOADS | QTY NO's | LOCATION |
|--------|------------|-------|----------|---|
| 1 | 300 X 300 | 0.5 T | 2 | TOP OF DECK |
| 2 | 500 X 500 | 2.5 T | 4 | BOTTOM OF DECK |
| 3 | 1000 X 500 | 5.0 T | 1 | BOTTOM OF DECK |
| 4 | 1000 X 500 | 1.5 T | 3 | BOTTOM OF DECK |
| 5 | 500 X 500 | 1.0 T | 4 | BOTTOM OF DECK |
| 6 | 500 X 800 | 2.0 T | 5 | BOTTOM OF DECK |
| 7 | 800 X 500 | 5.0 T | 2 | BOTTOM OF DECK |
| 8 | 800 X 500 | 2.0 T | 1 | VERTICAL, C.L. = 16.25M |
| 9 | 1000 X 500 | 1.5 T | 1 | VERTICAL, C.L. = 16.25M |
| 10 | 300 X 1000 | 0.5 T | 4 | VERTICAL SIDE OF DECK (CL EL 15.925 M & CL EL 16.225 M) |
| 11 | 300 X 1000 | 0.5 T | 2 | VERTICAL SIDE OF DECK (CL EL 15.925 M & CL EL 16.225 M) |
| 12 | 1000 X 500 | 0.5 T | 2 | VERTICAL SIDE OF DECK (CL EL 15.925 M & CL EL 16.225 M) |

NOTES:-

1. THIS DUGS VALVE FOR BOTH TDBFP'S (A & B)
2. ALL EMBEDMENT & INSERT PLATES SHALL BE IN THE SCOPE OF CIVIL CONTRACTOR
3. SPRINGS HEIGHT AND LOCATIONS ARE TO BE DECIDED BY CIVIL DESIGNER.
4. * INDICATED DIMENSIONS ARE TO BE DECIDED CIVIL DESIGNER
5. FOR POINT LOAD DATA PLEASE REFER BHEL-PEM DRAWING.
Drg. LOADING ON TO-BFP DECK (TDBFP-A & TDBFP-B)
6. ALLOWABLE TOLERANCE IN HORIZONTAL AND VERTICAL DIRECTION :
 - a) FOUNDATION DIMENSIONS ±20mm
 - b) LOCATION OF EMBEDDED ANCHOR BOLTS ±5mm
 - c) LOCATION OF SLEEVES FOR PIPING AND THROUGH HOLES FOR ANCHOR BOLTS ±10mm

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|----------------------------|--------------------|----------|------------|--|--|--|--|--|-----------|----------------------------|------|------|--------------------|------|----------|--------------------|---------------|--|------|-----------|--------------------|----------|--|-------|-----------|--------------------|----------|--------|
| <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: left;"> <div style="border: 1px solid black; padding: 2px; font-size: 8px; margin-bottom: 5px;">PROJECT</div>  </div> <div style="text-align: center;"> <h2 style="margin: 0;">RAGHUNATHPUR THERMAL POWER PROJECT</h2> <h3 style="margin: 0;">PHASE-II (2X660 MW)</h3> </div> <div style="text-align: right;"> <div style="border: 1px solid black; padding: 2px; font-size: 8px; margin-bottom: 5px;">G</div> </div> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: left;"> <div style="border: 1px solid black; padding: 2px; font-size: 8px; margin-bottom: 5px;">PACKAGE</div> </div> <div style="text-align: center;"> <h4 style="margin: 0;">STEAM TURBINE GENERATOR (STG)</h4> </div> <div style="text-align: right;"> <div style="border: 1px solid black; padding: 2px; font-size: 8px; margin-bottom: 5px;">G</div> </div> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 30%;">OWNER :</div> <div style="width: 40%; text-align: center;">DAMODAR VALLEY CORPORATION</div> <div style="width: 30%;"></div> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 30%;">DVC DRG./DOC. NO.:</div> <div style="width: 40%; text-align: center;">9586-110-PVM-V-111</div> <div style="width: 30%;"></div> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 30%;">TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT</div> <div style="width: 40%; text-align: center;">2x660 MW DVC Raghunathpur</div> <div style="width: 30%;"></div> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 45%;">  <div style="text-align: center;"> BHARAT HEAVY ELECTRICALS LTD. HYDERABAD </div> </div> <div style="width: 55%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"></td> <td style="width: 35%;">NAME</td> <td style="width: 20%;">SIGN</td> <td style="width: 20%;">DATE</td> <td style="width: 10%;">NO OF VAR.</td> </tr> <tr> <td>DRN.</td> <td>C.BALAJI</td> <td><i>[Signature]</i></td> <td>24.05.13</td> <td></td> </tr> <tr> <td>CHD.</td> <td>G.N.PAWAR</td> <td><i>[Signature]</i></td> <td>24.05.13</td> <td></td> </tr> <tr> <td>APPD.</td> <td>G.N.PAWAR</td> <td><i>[Signature]</i></td> <td>24.05.13</td> <td>-N.A.-</td> </tr> </table> </div> </div> | | | | | | | | | | | NAME | SIGN | DATE | NO OF VAR. | DRN. | C.BALAJI | <i>[Signature]</i> | 24.05.13 | | CHD. | G.N.PAWAR | <i>[Signature]</i> | 24.05.13 | | APPD. | G.N.PAWAR | <i>[Signature]</i> | 24.05.13 | -N.A.- |
| | NAME | SIGN | DATE | NO OF VAR. | | | | | | | | | | | | | | | | | | | | | | | | | |
| DRN. | C.BALAJI | <i>[Signature]</i> | 24.05.13 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CHD. | G.N.PAWAR | <i>[Signature]</i> | 24.05.13 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| APPD. | G.N.PAWAR | <i>[Signature]</i> | 24.05.13 | -N.A.- | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 20%;"> <div style="display: flex; justify-content: space-between;"> <div>DEPT.</div> <div>TCEP</div> </div> <div style="display: flex; justify-content: space-between;"> <div>CODE</div> <div>415</div> </div> </div> <div style="width: 15%;"> <div style="display: flex; justify-content: space-between;"> <div>UNTO DIMS GR.</div> <div>ENGINE</div> </div> </div> <div style="width: 10%; text-align: center;">  </div> <div style="width: 10%;"> <div style="display: flex; justify-content: space-between;"> <div>SCALE</div> <div>1:30</div> </div> </div> <div style="width: 15%;"> <div style="display: flex; justify-content: space-between;"> <div>WEIGHT (KG)</div> <div>-N.A.-</div> </div> </div> <div style="width: 35%;"> <div style="display: flex; justify-content: space-between;"> <div>REF. TO ASSY. DRG.</div> <div>ITEM NO.</div> </div> <div style="display: flex; justify-content: space-between;"> <div>-N.A.-</div> <div>-N.A.-</div> </div> </div> <div style="width: 10%;"> <div style="display: flex; justify-content: space-between;"> <div>NO OF ITEMS</div> <div>-N.A.-</div> </div> </div> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 45%;"> <div style="display: flex; justify-content: space-between;"> <div>TITLE</div> <div>FOUNDATION ARRANGEMENT FOR BFP & DRIVE TURBINE</div> </div> </div> <div style="width: 55%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">CARD CODE</td> <td style="width: 60%;">DRAWING NO.1-313-01-06335)</td> <td style="width: 25%;">REV.</td> </tr> <tr> <td>N.A.</td> <td>HY-DG-390-139-0111</td> <td>00</td> </tr> <tr> <td></td> <td>SHT. NO. 01</td> <td>NO OF SHT. 03</td> </tr> </table> </div> </div> | | | | | | | | | | CARD CODE | DRAWING NO.1-313-01-06335) | REV. | N.A. | HY-DG-390-139-0111 | 00 | | SHT. NO. 01 | NO OF SHT. 03 | | | | | | | | | | | |
| CARD CODE | DRAWING NO.1-313-01-06335) | REV. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| N.A. | HY-DG-390-139-0111 | 00 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | SHT. NO. 01 | NO OF SHT. 03 | | | | | | | | | | | | | | | | | | | | | | | | | | | |



PLAN AT 17.C
(TDBFP-A)



(TDBFP-B)



| | |
|--|--|
| | |
| | |

STATUS: PRELIMINARY

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

INVENTORY NO
SIGN AND DATE
REF. DRG. NO.
COMPUTER FILE NAME

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

1110-6EL-06E-DG-AH ON DRG

2
EO
HS

3

4

5

6

7

8

9

10

11

12

A

B

C

D

E

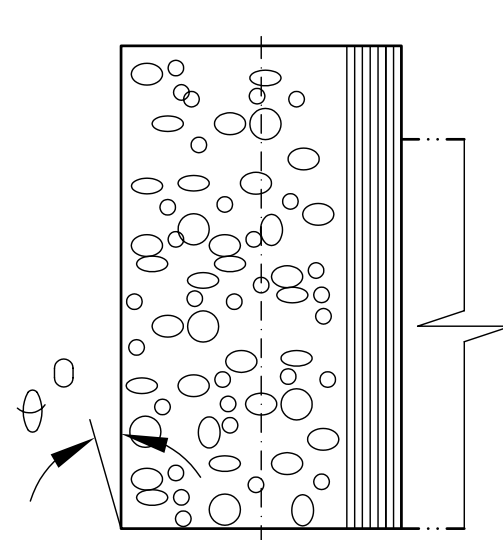
F

G

H

| | | | |
|--|----------|--------------------|-------------|
| TYPE OF TURBINE :- NK 63/71-3 | | | |
| TYPE OF BOILER FEED PUMP :- MDG 346 | | | |
| TYPE OF BOOSTER PUMP :- MLC 400X300H | | | |
| WEIGHT OF SINGLE HEAVIEST PIECE FOR | | | |
| | ERECTION | in kg. | MAINTENANCE |
| TURBINE | 60327 | 14,000 | |
| BFP | 21600 | 3710 | |
| BP | 6.150 | 1250 | |
| DIRECTION OF ROTATION VIEWED FROM BOOSTER PUMP TO BFP FOR :- | | | |
| TURBINE | - | CLOCKWISE | |
| BFP | - | CLOCKWISE | |
| BP | - | COUNTER CLOCK WISE | |

DETAIL 'PED'

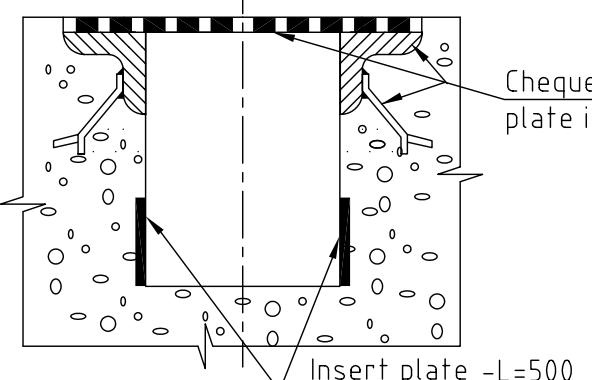


THE THICKNESS OF THE CONCRETE MEMBER MUST BE SUFFICIENT TO ENSURE THAT THE ANGULAR DEFLECTION DOES NOT EXCEED : 0.015 DEG. WITH THE HORIZONTAL FORCES SPECIFIED.

DETAIL 'TRENCH'

REFER NOTE-14

PROPOSED TRENCH COVER



NOT INCLUDED IN B.H.E.L. SCOPE OF SUPPLY.

SPEEDS (RPM)

| EQUIPMENT | RATED DESIGN | TRIP SPEED | CRITICAL SPEEDS |
|-----------|--------------|------------|-------------------|
| TURBINE | 5695 | 6200 | CRITICALLY DAMPED |
| BFP | 5695 | 6200 | 11847 |
| BP | 1495 | 1645 | 3000 |

NOTE :-

The installation details shown here are only informative. For final installation, ref. the Assembly drawings furnished alongwith the respective equipment.

FORCES ON FOUNDATION IN kgf

| LOAD POINT | LOAD CONDITION | | | | | | |
|------------|-------------------------------------|-----------------|---|----------------------|------------------------------|--|-----------------------|
| | STATIC LOAD WITHOUT ROTATING WEIGHT | ROTATING WEIGHT | OPERATING WEIGHT OF CONDENSER/VACUUM PULL | SHORT CIRCUIT LOAD * | LOAD DUE TO OPERATING TORQUE | OPERATING UNBALANCE * * (Turbine - Blade breakage) | FAILURE MODE LOAD * * |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| A | - | 2920 | - | - | - | 1132 | 6792 |
| A1 | 14375 | - | 1403 | - | 791 | - | - |
| A2 | 14375 | - | 1403 | - | -791 | - | - |
| B | - | - | - | - | - | - | - |
| B1 | 15955 | 1555 | 13318 | - | 262 | 603 | 3618 |
| B2 | 15955 | 1555 | 13318 | - | -262 | 603 | 3618 |
| C | 550 | - | - | - | - | - | - |
| C1 | - | 110 | - | - | -2088 | 43 | 258 |
| C2 | - | 440 | - | - | 2088 | 45 | 270 |
| C3 | - | - | - | - | - | - | - |
| C4 | - | - | - | - | - | - | - |

FOUNDATION LOADING DATA

(LOAD POINT APPLICATION IS AT EACH POCKET)

| LOAD APPLICATION POINT | EQUIPMENT | WEIGHT | STATIC LOAD ON EACH POINT(kg's) | | | DYNAMIC LOAD ON EACH POINT(kg's) | | |
|------------------------|------------------------------|--------|---------------------------------|------|----------|----------------------------------|------------|-------|
| | | | DRY | WET | VERTICAL | VERTICAL | HORIZONTAL | AXIAL |
| 5A | BOILER FEED PUMP (MDG 346) | 21600 | 21850 | 1561 | | 1742 | 1742 | 1161 |
| 3A | BOOSTER PUMP (MLC 400x300 H) | 6150 | 6450 | 540 | | 475 | 475 | 320 |

** At each supporting point acting in radial direction over 360 deg.

* Loads on either side of TG axis act in opposite directions and the direction changes at 50 cycles/sec.

NOTE :-1. DOWNWARD FORCES ARE POSITIVE

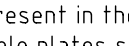
2. GRADE OF BALANCING: BFP, BP-G2.5

3. MASS MOMENT OF INERTIA:

$$\left[\begin{matrix} \text{BFP : } 215 \text{ N-Sq.m} \\ \text{BP : } 466 \text{ N-Sq.m} \end{matrix} \right] \text{GD}^2$$

DETAILS FOR FOUNDATION CALCULATIONS

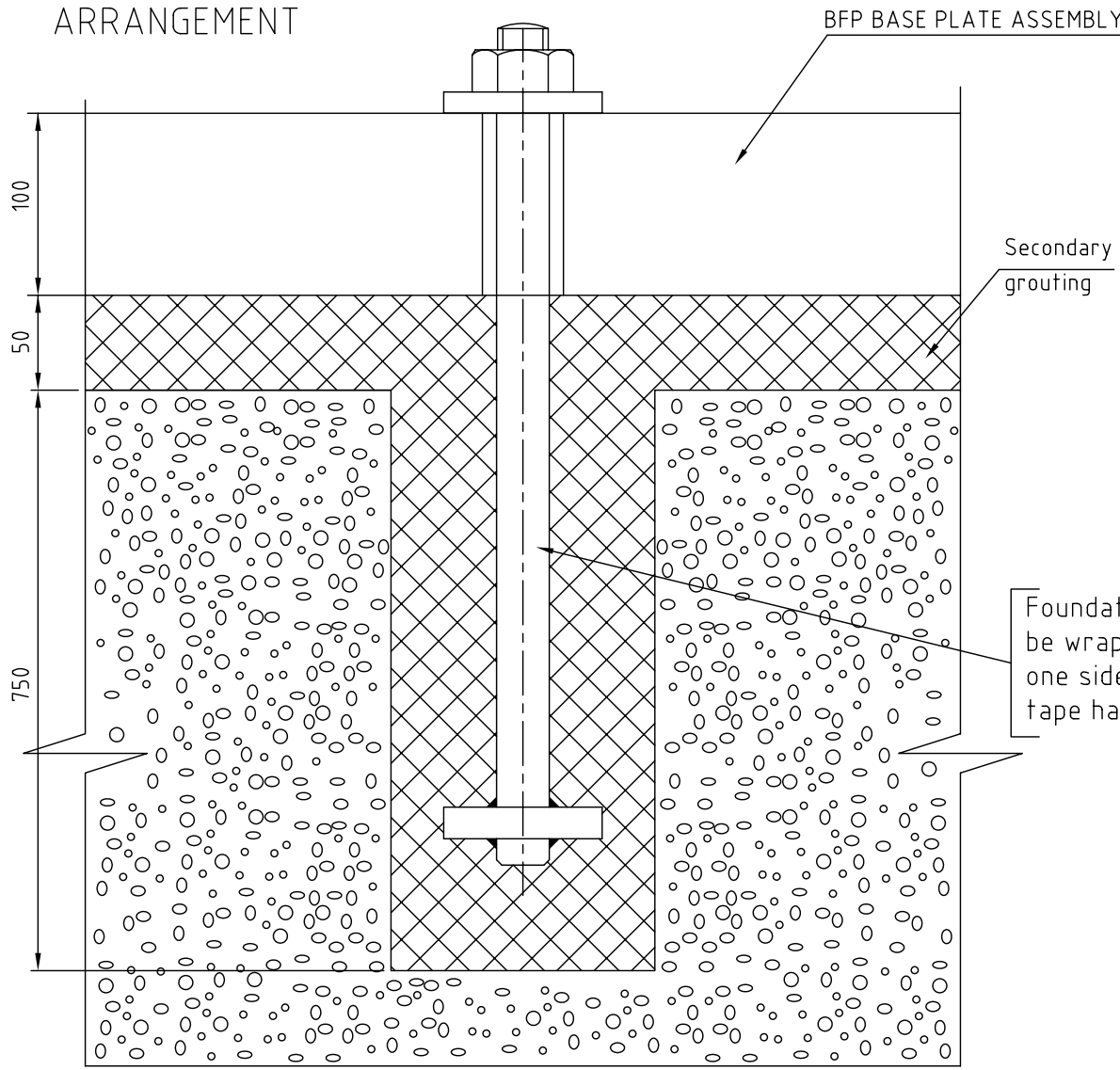
NOTES :-

- All dimensions are in mm and elevations are in metres.
- This foundation drawing is only intended as basis for preparing the layout for foundation (by the BHEL). All civil structural dimensions are tentative and same shall be decided by the civil engineer concerned. The foundation design calculations shall consider all the static and dynamic loads acting simultaneously.
- Suitable earth quake coefficient applicable for the project site should be adopted for seismic design of foundation as per IS 1893.
- The foundation block should be designed so that natural frequencies of foundation are sufficiently away from the frequencies of machines. The design shall be as per DIN 4024 standard and IS 2974 part III.
- Design of the foundation shall consider the allowable limits of vibration behaviour of machines (Group - T) as per VDI 2056.
- Bearing failure loads are less than failure load condition loads specified in col. 7 of the "Forces on Foundation " table.
- Dynamic loads in axial direction are negligible.
- Magnitude of unbalanced forces can be taken in vertical and horizontal directions as equal.
- Max. live load on top of the deck is : 2000 kg/sq.m
- Foundation block must not be joined to any other structure to avoid vibration transmission.
- Portions shown thus  in top deck are filled with secondary grouting. The concrete surface in these areas is to be ensured free from dust, grease and oil. Any wooden plugs present in these areas are to be removed. The packing plates below the machine sole plates shall be embedded into a 20 mm thick layer of special grout (local to plates) and are to be levelled horizontally. Later, total secondary grouting may be completed.
- For grouting instructions ref. TC-9-1901 (5 sheets). And for grouting cement specification ref. TC-9-1900.
- All embedded plates, angles, sleeves, pipes, ducts and any other structurals are not part of Turbine scope of supply unless otherwise specified.

FOUNDATION BOLT ARRANGEMENT

DETAIL 'M'

REFER NOTE-14

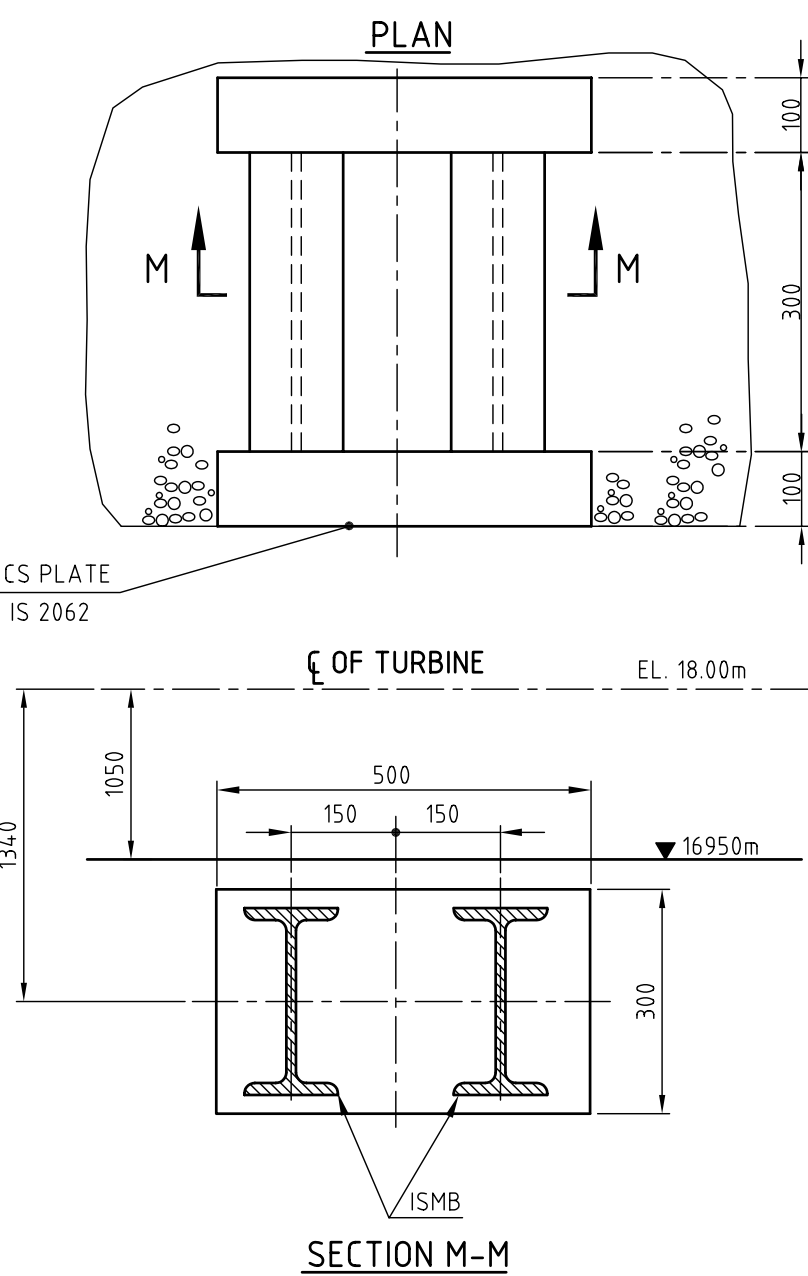


Note:Sealing mortar pouring and bitumen shall be part of ERECTION contract

DETAIL 'GUIDE'

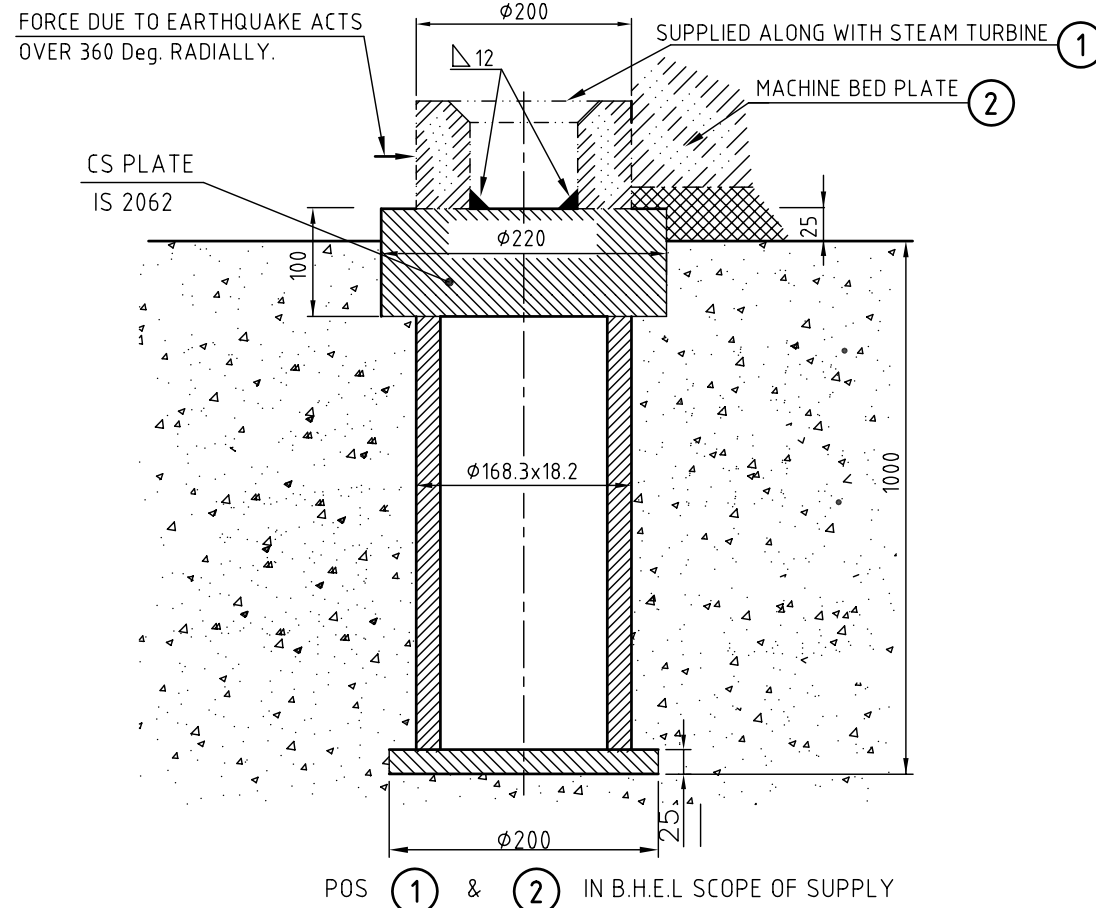
(FOR EXHAUST HOOD GUIDE SUPPORT)

NOT INCLUDED IN B.H.E.L. SCOPE OF SUPPLY.

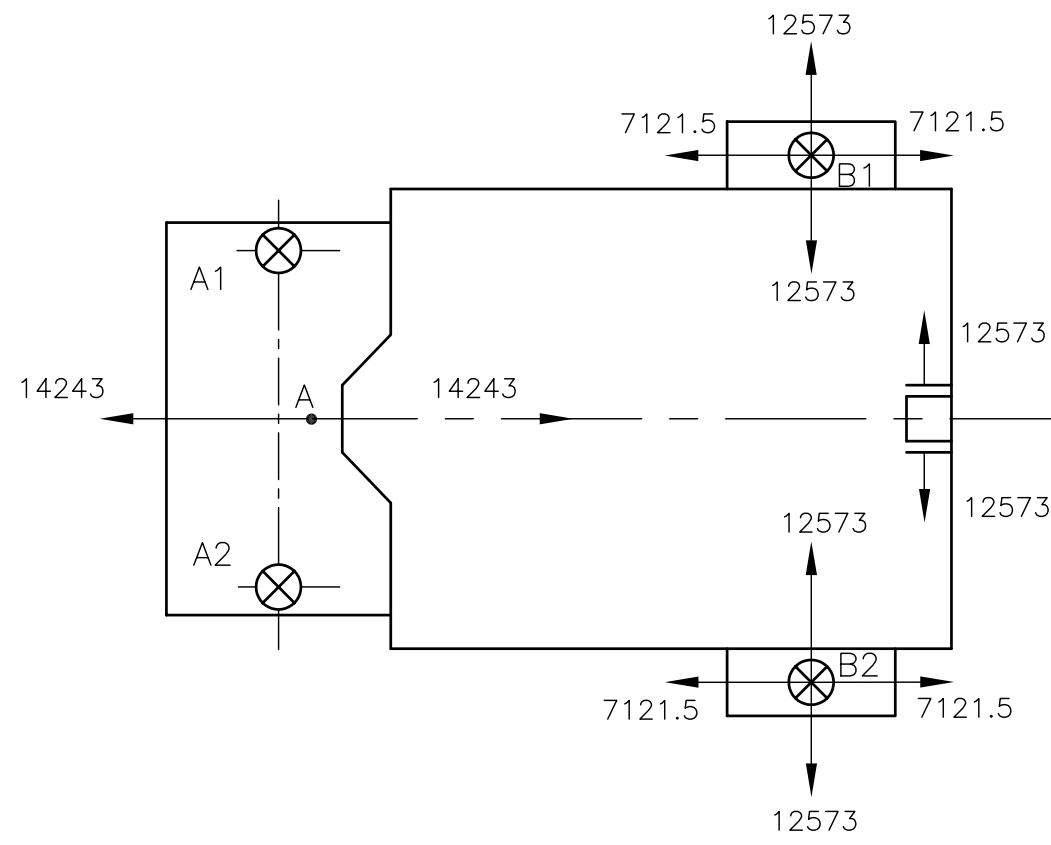


DETAIL 'EQ-TG'

REFER NOTE-14



HORIZONTAL FRICTIONAL FORCES IN kgf



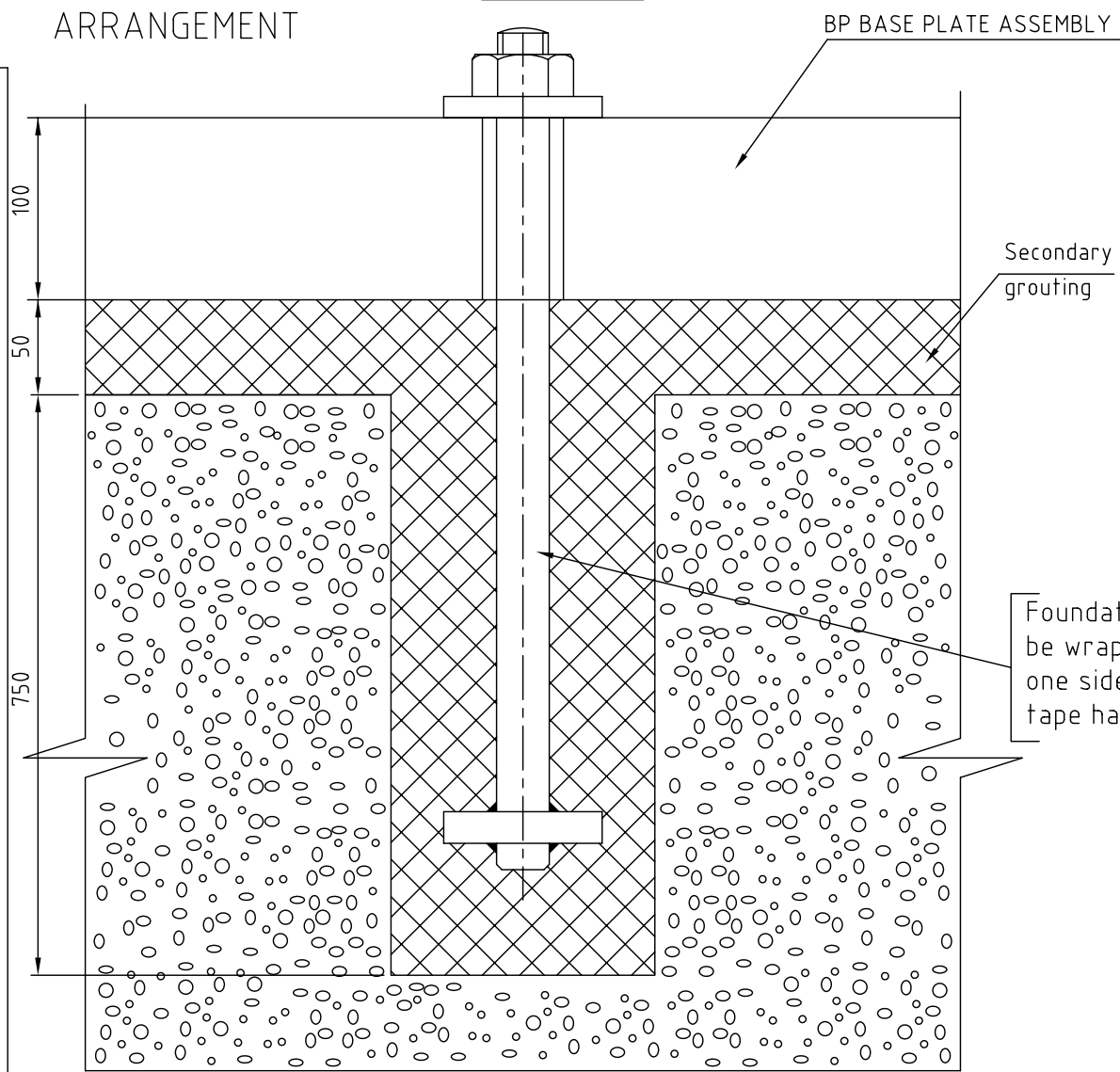
A:WORKING POINT OF FORCE (mm) : 710
B1,B2:WORKING POINT OF FORCE (mm) : 840
(THESE FORCES ALTERNATE IN DIRECTION)

THESE FORCES ALTERNATE IN DIRECTION

FOUNDATION BOLT ARRANGEMENT

DETAIL 'M1'

REFER NOTE-14

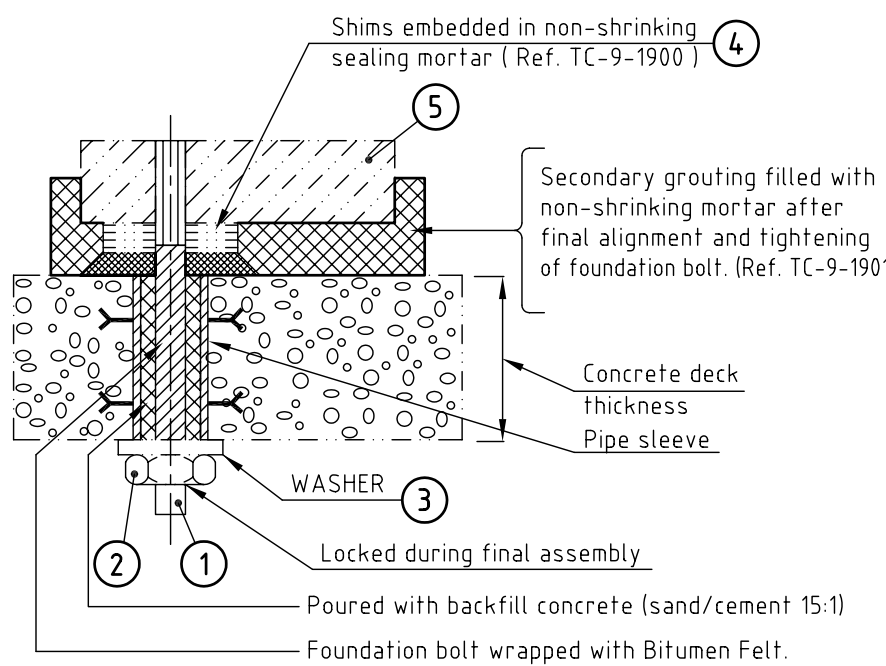


Note:Sealing mortar pouring and bitumen shall be part of ERECTION contract

DETAIL 'SP-WN'

FOUNDATION BOLT ASSEMBLY

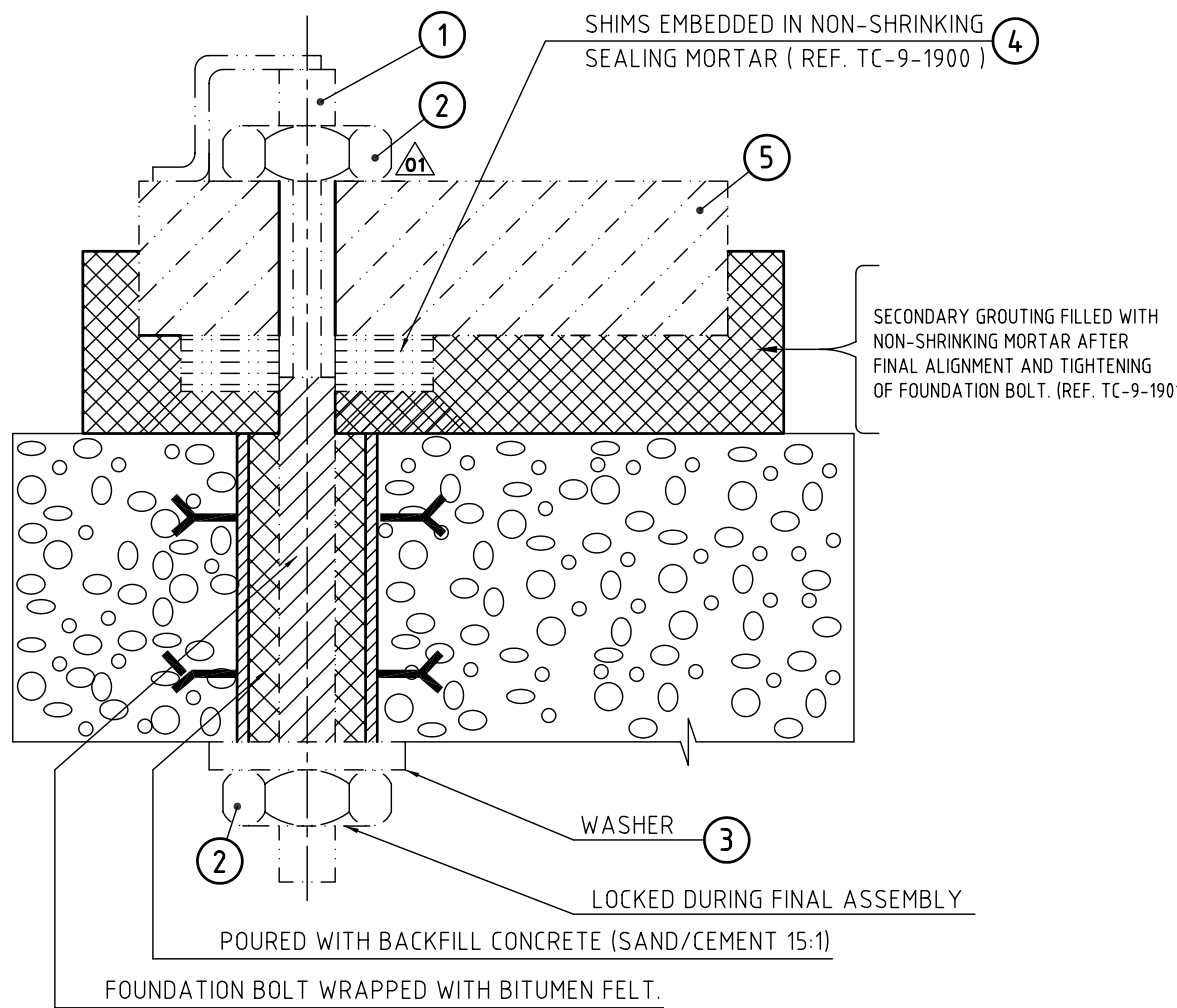
REFER NOTE-14



POS ① TO ⑤ IN B.H.E.L. SCOPE OF SUPPLY

DETAIL 'SP-N'

REFER NOTE-14



POS ① TO ⑤ IN B.H.E.L. SCOPE OF SUPPLY

STATUS : PRELIMINARY

REV. DATE ALTERED: CHD/APPD:

REV. DATE ALTERED: CHD/APPD:



PROJECT RAGHUNATHPUR THERMAL POWER PROJECT
PACKAGE STEAM TURBINE GENERATOR (STG)

OWNER : DAMODAR VALLEY CORPORATION
DVC DRG./DOC. NO.:9586-110-PVM-V-111

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT 2x660 MW DVC Raghunathpur

| DRN. | NAME | SIGN. | DATE | NO OF VAR. |
|-------|-----------|-------|----------|------------|
| CHD. | C.BALAJI | | 24.05.13 | |
| APPD. | G.N.PAWAR | | 24.05.13 | -N.A.- |
| | G.N.PAWAR | | 24.05.13 | -N.A.- |

DEPT. TCEP UNTOLO DMS. GR. EPMF SCALE 1:30 WEIGHT (KG) -N.A.- REF. TO ASSY. DRG. -N.A.- ITEM NO. -N.A.- NO OF ITEMS

TITLE FOUNDATION ARRANGEMENT FOR BFP & DRIVE TURBINE
CARD CODE N.A.
DRAWING NO. (1-313-01-06335) REV. HY-DG-390-139-0111 00
SHT. No 03 NO OF SHT. 03