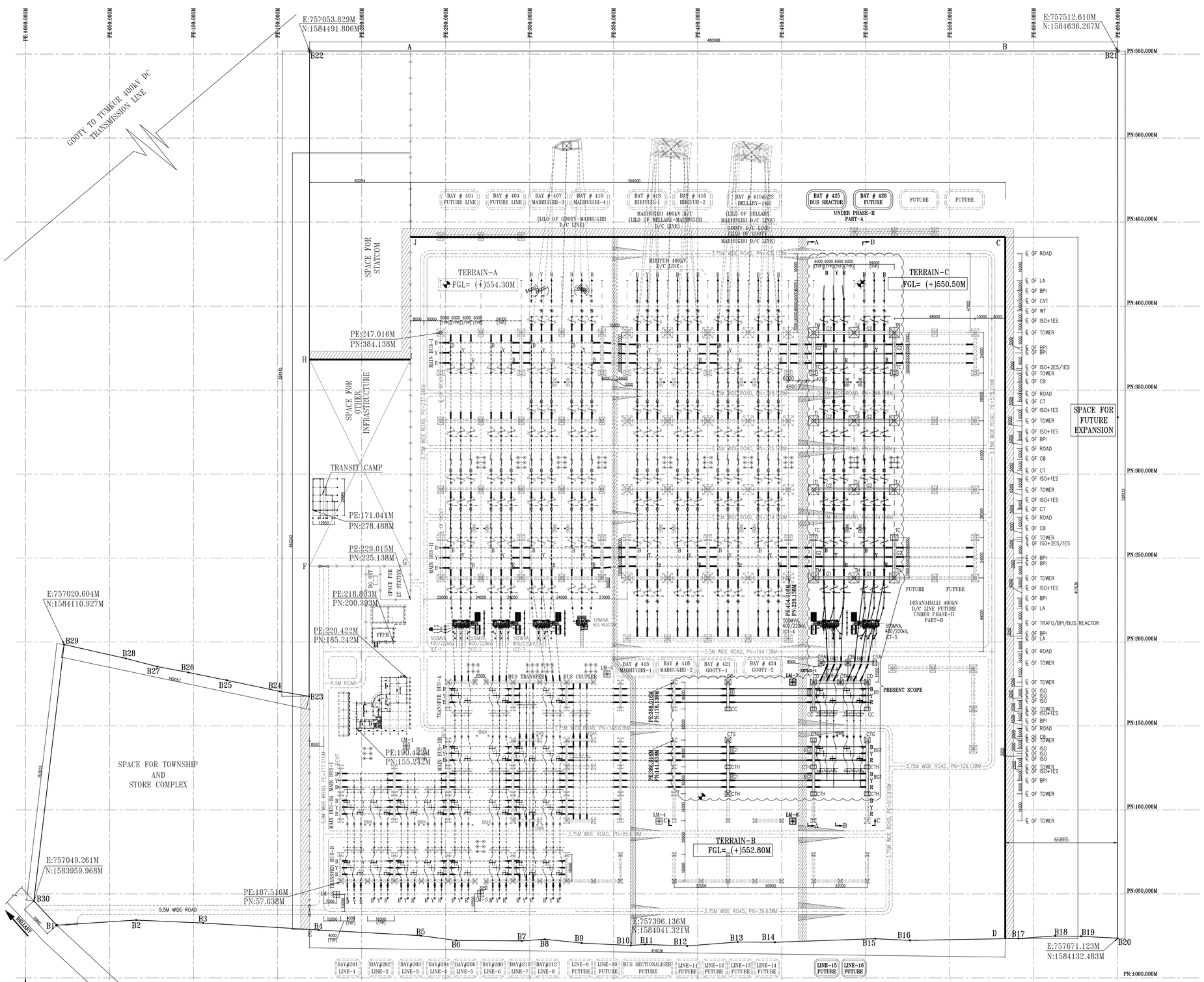
FIRST ANGLE PROJECTION ( ALL DIMENSIONS ARE IN MM. )

DRAWING No. TB-0-393-316-004




## BILL OF QUANTITY – 400kV

| ITEM CODE | DESCRIPTION | SYMBOL | QTY. |
|---|---|---|---|
| 1 | 500 MVA, 400/220/33KV, 3-Ph AUTO TRANSFORMER | | 02 |
| 2 | 420kV, 125MVAR BUS REACTOR (3-Ph) | | 01 |
| 3 | 420kV, 2000A, 50kA/1s CIRCUIT BREAKER WITHOUT PIR (WITH CSD) (3-Ph) | | 03 |
| 4 | 420kV, 3150A, 50kA/1s CIRCUIT BREAKER WITHOUT PIR (WITH CSD) (3-Ph) | | 01 |
| 5 | 420kV, 3150A, 50kA/1s CIRCUIT BREAKER WITH PIR (WITH CSD) (3-Ph) | | 01 |
| 6 | 420kV, 2000A, 50kA/1s HDB ISOLATOR WITH 1 E/S (3-Ph) | | 09 |
| 7 | 420kV, 3150A, 50kA/1s HDB ISOLATOR WITH 1 E/S (3-Ph) | | 05 |
| 8 | 400kV, 3000/1A, 6 CORE, 50kA/1s CT (1-Ph)(WITH 120% EXTENDED CURRENT RATING) | | 15 |
| 9 | 336kV, 20kA SURGE ARRESTER (1-Ph) | | 09 |
| 10 | 420kV POST INSULATOR | | 23 |

## BILL OF QUANTITY – 220kV

| ITEM CODE | DESCRIPTION | SYMBOL | QTY. |
|---|---|---|---|
| 1 | 245kV, 1600A, 40kA/1s CIRCUIT BREAKER (3-Ph) | | 02 |
| 2 | 245kV, 1600A, 40kA/1s HDB ISOLATOR WITH 2 E/S (3-Ph) | | 02 |
| 3 | 245kV, 1600A, 40kA/1s HDB ISOLATOR WITH 1 E/S (3-Ph) | | 02 |
| 4 | 245kV, 1600A, 40kA/1s HDB ISOLATOR TANDEM WITHOUT E/S (3-Ph) | | 04 |
| 5 | 245kV, 1600/1A, 5 CORE, 40kA/1s CT (1-PH)(WITH 120% EXTENDED CURRENT RATING) | | 06 |
| 6 | 216kV SURGE ARRESTER (1-PH) | | 06 |
| 7 | 245kV POST INSULATOR (HIGH LEVEL) | | 06 |
| 8 | 245kV POST INSULATOR | | 20 |

## SYSTEM PARAMETERS :-

| | | | |
|---|---|---|---|
| 1. | NOMINAL SYSTEM VOLTAGE | 400kV | 220kV |
| 2. | HIGHEST SYSTEM VOLTAGE | 420kV | 245kV |
| 3. | RATED FREQUENCY | 50Hz | 50Hz |
| 4. | RATED SHORT TIME CURRENT FOR 1 SEC | 50kA | 40kA |
| 5. | RATED FULL WAVE WITHSTAND VOLTAGE | 1550kVp | 1050kVp |
| 6. | DRY IMPULSE WITHSTAND VOLTAGE | 630kVrms(+ve & -ve) | 460kVrms(+ve & -ve) |
| 7. | MINIMUM CREEPAGE (25MM/kV) | 10500MM | 6125MM |
| 8. | SYSTEM NEUTRAL EARTHING | EFFECTIVELY EARTHED | EFFECTIVELY EARTHED |

## CLEARANCE TABLE :-

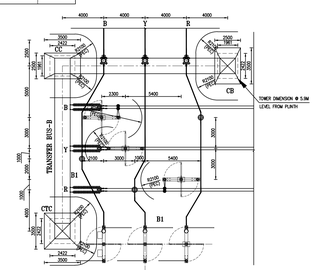
| MINIMUM CLEARANCE TABLE | 400kV | 220kV |
|---|---|---|
| PHASE TO PHASE (PP) | 4000/4200mm | 2100mm |
| PHASE TO EARTH (PE) | 3500mm | 2100mm |
| SECTION CLEARANCE (SC) | 6500mm | 5000mm |
| HEIGHT OF TUBE CENTRE LINE OF FIRST LEVEL (MIN.) (FROM PLINTH LEVEL) | 8000mm | 5900mm |

## DETAILS OF TOWERS/BEAMS : 400kV

| S.NO. | STR DESIGNATION | STR. HT/SPAN | QTY. |
|---|---|---|---|
| 1 | TC | 15M | 04 |
| 2 | TH | 22M+7.5M | 01 |
| 3 | TI | 22M+7.5M | 02 |
| 4 | TJ | 22M+7.5M | 05 |
| 5 | TM | 15M+7M+7.5M | 02 |
| 6 | TN | 15M+7M+7.5M | 02 |
| 7 | G1 | 24M | 02 |
| 8 | G2 | 24M | 10 |

## DETAILS OF TOWERS/BEAMS : 245kV

| S.NO. | STR DESIGNATION | STR. HT/SPAN | QTY. |
|---|---|---|---|
| 1 | CB | 16.2M+5M | 01 |
| 2 | CC | 11.7M | 04 |
| 3 | CD | 11.7M+4.5M+5M | 02 |
| 4 | CTA | 16.2M+5M | 02 |
| 5 | CTG | 11.7M | 03 |
| 6 | CTH | 11.7M | 06 |
| 7 | CTK | 11.7M+4.5M+5M | 01 |
| 8 | BG1 | 16M | 10 |
| 9 | B1 | 16M | 03 |
| 10 | LM | 50M | 02 |




DETAIL-1
(SCALE 1:100)

## REFERENCE DWG :-

| DWG. NO. | TITLE |
|---|---|
| C/ENGG/SS/SR/SR-II/TUMKUR-EXT/400KV-SEC./001, R0 | 400KV LAYOUT SECTION (TYPICAL) |
| C/ENGG/SS/SR/SR-II/TUMKUR-EXT/LAY/001, R1 | LAYOUT PLAN (TYPICAL) |
| C/ENGG/SS/SR/SR-II/TUMKUR-EXT/GA/001, R2 | GENERAL ARRANGEMENT DRAWING |
| TB-0-393-316-001 | SINGLE LINE DIAGRAM FOR 400/220kV TUMKUR(PAVAGADA) S/s EXTN. |

## STRINGING DETAILS (400kV) :-

| | CONDUCTOR | INS. STRING |
|---|---|---|
| MAIN BUS I & II | QUAD BERSIMIS | DOUBLE TENSION |
| JACK BUS & JUMPERING | QUAD/TWIN BERSIMIS | DOUBLE TENSION |
| ALL EQUIPMENT INTERCONNECTION | 4.5" IPS AL./QUAD/TWIN BERSIMIS | |
| SUB CONDUCTOR SPACING FOR QUAD | 450 mm | – |
| SUB CONDUCTOR SPACING FOR TWIN | 450 mm | – |
| EARTHWIRE | 10.98MM DIA GS WIRE. | |

## STRINGING DETAILS (220kV) :-

| | CONDUCTOR | INS. STRING |
|---|---|---|
| MAIN BUS I & II | QUAD BERSIMIS | DOUBLE TENSION |
| TRANSFER BUS | TWIN BERSIMIS | DOUBLE TENSION |
| JACK BUS & JUMPERING | QUAD/TWIN BERSIMIS | DOUBLE TENSION |
| ALL EQUIPMENT INTERCONNECTION | 4" IPS AL./TWIN BERSIMIS | |
| SUB CONDUCTOR SPACING FOR QUAD | 250 mm | – |
| SUB CONDUCTOR SPACING FOR TWIN | 250 mm | – |
| EARTHWIRE | 10.98MM DIA GS WIRE. | |

## NOTES:-

1. ALL DIMENSIONS ARE IN mm UNLESS SPECIFIED OTHERWISE.
2. LIGHTNING PROTECTION SHALL BE WITH SHIELD WIRE FOR 400kV SWITCHYARD & WITH LM FOR 220kV SWITCHYARD.
3. PLINTH LEVEL IS 300mm ABOVE FGL.
4. GRAVEL IS 100mm ABOVE 75mm THICK LAYER OF CEMENT CONCRETE.
5. CONDUCTOR TENSION:- 4000kG/PH.
   a) MAIN BUS 1000kg./SUB CONDUCTOR
   b) EARTH WIRE 800kg./CONDUCTOR
6. THE REQUIRED CLEARANCES AS PER CLEARANCE TABLE ABOVE AND AS PER PROVISION OF I.E. RULE & OTHER STATUTORY REGULATION ETC SHALL BE MAINTAINED.
7. SWITCHYARD LIGHTING SHALL BE PROVIDED ON LM/GANTRIES.

## LEGEND TABLE :-

| | |
|---|---|
| | PRESENT SCOPE |
| | FUTURE/NOT IN BHEL SCOPE |
| | SHIELD WIRE |
| | FENCE |
| | TENSION STRING INSULATOR (400kV) |
| | TENSION STRING INSULATOR (220kV) |
| | SUSPENSION STRING INSULATOR |
| | ISO. AND E/S BOX, CT/PT/CVT/JB |
| | COLUMN WITHOUT PEAK |
| | COLUMN WITH PEAK |

ADDITIONAL INFORMATION
W.O.No.

STATUS OF DRAWING

DISTRIBUTION OF PRINTS

NAME OF CUSTOMER/PROJECT: POWER GRID CORPORATION OF INDIA LTD. Substation Package for Extension of 400kV Tumkur Pooling Station (Pavagada) (including transformer & reactor), Extension of 400/220kV Tumkur(Vasantanarasapura) and Extension of 400/220kV Tumkur(Vasantanarasapura) (Design, Supply, Erection, Test and Commissioning) of Transmission Lines and Bays for Tumkur(Pavagada) Ultra Mega Solar Park(2000MW) at Tumkur(Pavagada), Karnataka-Phase-III(Part-A).
CC-CS/702-982/SS-3340/7/07/MOA-U7102, Dt.16.12.16 (Supply)
CC-CS/702-982/SS-3340/7/07/MOA-U7103, Dt.16.12.16 (Services)

भारत हैवी इलेक्ट्रिकल्स लिमिटेड
ट्रांसमिशन परियोजना विभाग
BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION PROJECTS DIVISION

| | नाम/NAME | हस्ता./SIGN. | दि./DATE |
|---|---|---|---|
| तैयार/DRAWN | PK | | 10.02.17 |
| जांचा/CHECKED | MVK | | 10.02.17 |
| अनुमोदित/APPROVED | SKS | | 10.02.17 |

विभाग/DEPT.
कोड/CODE
अनुपात / SCALE 1 : 500
कार्ड कोड/CARD CODE

शीर्षक/TITLE
LAYOUT PLAN FOR 400/220kV TUMKUR(PAVAGADA) S/s EXTN.

ड्राईंग क्र./DRAWING NO. TB-0-393-316-004
पृष्ठ/REV. 00
पृष्ठ क्र./SHEET No. 01
अगला पृष्ठ/NEXT SHEET 02

| REV. | DATE | ALTERED / CHECKED / APPROVED |
|---|---|---|
| ZONE | | |

INVENTORY No. | SIGN. & DATE | REF. DRG. No. | COUNTER REF. PATH NAME