



CUSTOMER	TAMILNADU TRANSMISSION CORPORATION LTD (TANTRANSCO)
PROJECT	400/230-110 kV SUB STATION AT VELLALAVIDUTHI
STATION	VELLALAVIDUTHI, TAMILNADU

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Project 400/230-110 KV SUB STATION AT VELLALAVIDUTHI

SECTION-1



System FIRE FIGHTING SYSTEM

Customer TAMILNADU TRANSMISSION CORPORATION LTD
(TANTRANSCO)

TB-399-316-160
REV-0

Purchaser BHEL (TRANSMISSION BUSINESS GROUP)

SECTION 1

INTENT, SYSTEM REQUIREMENT, DESIGN CRITERIA AND SCOPE

1.0.0 INTENT OF SPECIFICATION

- 1.1.0 This specification is intended to specify the requirements for design, engineering, manufacture, assembly, stage testing, inspection, testing before supply, packing, forwarding, transportation at site, complete erection of all equipment and accessories, testing of the system, trial run, commissioning of the system, final painting and carrying out acceptance test of Fire Fighting System along with its accessories and auxiliary equipments / instruments etc. as mentioned in this section and in various other sections of this specification for **400/230-110KV SUB STATION AT Vellalaviduthi Site of TAMILNADU TRANSMISSION CORPORATION LTD (TANTRANSCO)**.
- 1.2.0 The system shall be designed, erected & commissioned in accordance with TAC/ NFPA guidelines.
- 1.3.0 Requirements pertaining to type, make, quality, testing & inspection of equipments as laid down in various clauses of CUSTOMER Specification, enclosed in Section 2, shall be full & final. In the event of any contradiction w.r.t. other sections of this specification, technical requirements of Section 1 & 2 shall prevail.
- 1.4.0 The Bidder shall be deemed to have understood completely all the tender drawings and documents and quoted accordingly.
- 1.5.0 It is not the intent to specify herein all the details of design and manufacture. However, the equipment shall conform in all respect to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to Purchaser / Owner, who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material, which in his/their judgment is not in full accordance with the specifications.
- 1.6.0 The Bidder to note carefully that parameters, estimated capacities of equipment indicated and the tender drawings in the specification are only for the guidance of the Bidder. The system shall be designed as per relevant standards/ codes and exact capacities and quantities are to be estimated by the Bidder. All such estimations and design calculations shall be submitted for Purchaser's approval.
- 1.7.0 The Contract shall be on unit rate basis for the quantities furnished by BHEL. During contract stage, quantities of various items of BOQ may vary to any extent and same rates will be applicable so far the resultant variation in total contract value is within $\pm 30\%$.
- 1.8.0 The term **Customer/Owner** shall refer to **TANTRANSCO**, '**Purchaser**' shall refer to **BHEL** and the term '**Contractor**' shall refer to the **successful Bidder**.
- 1.9.0 There shall preferably be no deviation on technical specification. The bidder shall sign and stamp the "Certificate for No Deviation" enclosed in Schedule-1, Section-5 towards confirmation. ***Deviations in any other form including clarifications / assumptions / observations, input data in the GTP etc will not be considered and it will be construed that the bid conforms strictly to the specification.***



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2.0.0 TYPE OF FIRE PROTECTION REQUIRED

400 / 230-110 kV SUB STATION AT VELLALAVIDUTHI SITE

Conventional fire detection & alarm system for different areas of Control Room Building.

Architecture drawing of Control Room Building is attached to this specification in Section-5.

Fire Extinguishers

Fire Extinguishers for different areas of Control Room Building, DG set, & LT Transformers as per TAC. Each fire extinguisher shall be clearly and permanently marked with the information specified in the relevant Indian Standard for such type of fire extinguisher. The letters TANTRANSCO shall be embossed/screen printed or painted on the cover of each fire extinguisher.

Fire Bucket with Stand

It shall be installed near Transformers and reactors area in switchyard.

3.0.0 DESIGN CRITERIA

3.0.1 All the requirements regarding supplies, provisions of control, interlocks, indications, annunciations, alarms etc, stipulated in various clauses of specification (Section 2) shall be satisfied by the contractor in totality.

3.0.2 Interfacing Requirement

Purchaser shall provide one no. 220V DC power supply for annunciation cum fire alarm panel Suitable no. of windows/terminals/zones will be provided by the contractor in the Annunciation panel in the control room to annunciate fire signals under current scope.

However cable laying and termination scope to wire up fire signals from equipment to annunciation panel cum fire alarm panel in Control room building as per specification lies with the contractor.

4.0.0 SCOPE OF SUPPLIES & SERVICES

The requirements mentioned under this clause are **indicative and minimum** for the system. Any other item/ service required to complete the work for safe and sound operation of system (as under customer technical specification enclosed under section-2) shall be provided and installed by the bidder at no extra cost to the BHEL. The bidder may bring out such requirement(s) suitably.

4.1.0 SCOPE OF SUPPLY

Complete supply under fire fighting system for 400 / 230-110 kV SUB STATION AT VELLALAVIDUTHI shall consist of following:

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Sr. No.	System	Areas Covered
1	Conventional Fire Detection and alarm System including annunciation cum fire alarm panel	Control Room Building
2	Fire Extinguishers	Areas of Control Room Building, 500KVA DG set & LT Transformers
3	Fire & Water stand of size 2000mm (H) X 2600mm (W) out of 60X60X8mm G.I. angle for frame, 125X65sqmm G.I. channel for Base 10SWG, G.I. steel for hood & 8 nos. hook Fire buckets 10 ltrs. Capacity made out of 26 (0.46mm) SWG MS sheet painted with white & red enamel paint inside & outside respectively. Bottom of the bucket shall be U shaped, outside of the bucket shall be written as "Fire" in English/Tamil in white enamel paint.	For reactors and transformer areas
4	Erection, Testing & commissioning	For complete fire fighting system as per specification.

Besides, the Bidder shall take a note of the following while preparing his offer:

- Power & Control cables for fire protection system (except 2CX1.5 sqmm. Unarmored for Detection & alarm system) will be supplied on free issue basis to contractor. BHEL shall procure various sizes of cables for the complete requirement of sub-station. Contractor shall have to choose their cables from the available sizes only and necessary modifications in their equipment for termination of these cables shall be made by contractor.
- Since laying & termination of all power & control cables is in contractor's scope, supply of cable accessories such as lugs, glands, cable tags & markers etc. shall be included by the bidders in their offers alongwith supply of cable for fire detection and alarm system.
- Cables under fire detection and alarm system shall be 2CX1.5 sqmm unarmored inside the Control building area and shall be put under conduit. All these cables including junction boxes (if applicable) and other accessories pertaining to fire detection and alarm system shall be supplied and erected by contractor.
- Necessary cable trays will be supplied on free issue basis to the contractor, however necessary hardware for fixing the same on walls or elsewhere shall be included by the bidders in their offers.
- Earthing material viz. GS flat & wire will also be supplied on free issue basis to contractor, however requirement shall be given by the bidders in their respective bids and earthing of fire fighting equipments shall be done by contractor.
- Contractor shall submit valid Type test report for approval by owner. Fresh type test of equipment is not envisaged. It is presumed that equipments offered are duly type tested.



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Type Test Certificate for degree of protection shall be submitted for the following:

Annunciation panel

In case the type test reports are found un-satisfactory, tests shall be carried out afresh by contractor without any additional cost implication to BHEL.

- g. Bidder shall choose the makes from among the tentative list of makes enclosed in *Schedule-4(a) of Section-5 as Annexure-M*, however all makes/sub vendors of applicable equipments shall be subjected to acceptance of customer. No additional price implication shall be made to BHEL on account of non-acceptance of proposed makes by TANTRANSCO.
- h. Any spares required for commissioning purpose shall be supplied separately by the contractor.

4.2.0 SCOPE OF SERVICES

4.2.1 Erection, Testing & Commissioning (ETC) requirements

- a) The scope of ETC shall include handling of equipment/ material at site, erection of equipment /material at site including fabrication, equipment and system testing, commissioning of the entire system.
- b) The contractor shall arrange all machinery -tools & tackles and consumables required for erection of the system.
- c) Contractor shall ensure that sufficient quantity of commissioning spares is made available for timely completion of commissioning of the system.
- d) Conducting Performance Guarantee tests to the satisfaction of Customer/ Purchaser.
- e) It is the responsibility of the successful Bidder to obtain necessary approval/ clearance from statutory organizations wherever applicable for the equipment/ systems under the scope specified.
- f) The contractor shall furnish the operation and maintenance manual specifically compiled for each of the sub-stations. The draft O&M manual shall be submitted within 20 weeks after award of contract. The O&M manual shall contain the following information:
 - i) Description of the system and equipment with design particulars
 - ii) Instruction for erection.
 - iii) Instruction for operation, maintenance and repair.
 - iv) Recommended inspection practices and inspection schedule.
 - v) Ordering information for all replaceable parts
 - vi) Recommendation for type of lubricants and frequency of lubrication.

4.2.2 Inspection & Testing

All the equipments shall be inspected prior to dispatch in line with relevant IS, approved GTP/ drawing and technical specification.

5.0.0 EXCLUSIONS

5.1.0 Unloading, Storage and safety of material.

- 5.2.0 Supply of power & control cables for the system except for fire detection & alarm system which shall be supplied and laid by contractor.



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- 5.3.0 Supply of necessary cable trays for laying power and control cables, if required.
- 5.4.0 Supply of GI flat for earthing of equipments is free issue item to contractor. However earthing of all firefighting equipment, if applicable shall be done by contractor.

6.0.0 HANDING & TAKING OVER

It is the responsibility of the Contractor to run and maintain the plant till it is handed over to the owner. Contractor shall assist purchaser to hand over the plant to owner.

7.0.0 VARIOUS HEADS TO BE QUOTED FOR

Based on the above input it is recommended that the bidders shall submit their offers in the prescribed format as given in Schedule-2 of Section-5. Bidder must submit signed and stamped copy of the same in the bid.

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SECTION 2

EQUIPMENT SPECIFICATION

Fire Detection and alarm System

This system shall be provided for control room building of substations.

Suitable fire detection system using smoke detectors and/or heat detectors shall be provided for the entire building, including corridor and toilets. Fire detectors shall be located at strategic locations in various rooms of the building. The operation of any of the fire detectors/ manual call point should result in the following;

1. A visual signal exhibited in the annunciation panels indicating the area where the fire is detected.
2. An audible alarm sounded in the panel, and
3. An external audible alarm sounded in the control building, location of which shall be decided during detailed engineering.
4. If the zone comprises of more than one room, a visual signal shall be exhibited on the outer wall of each room of control building.

Each zone shall be provided with two zone cards in the panel so that system will remain healthy even if one of the cards becomes defective.

Coverage area of each smoke detector shall not be more than 80 m² and that of heat detectors shall not be more than 40 m². Ionisation type smoke detectors shall be provided in all areas except pantry room where heat detectors shall be provided. If a detector is concealed, a remote visual indication of its operation shall be provided. Manual call points (Break glass Alarm Stations) shall be provided at strategic locations in the control room building. All cabling shall be done through concealed conduits.

Cables used should be exclusively for fire detection and alarm system and shall be 2Cx1.5sq.mm Cu. cables. Un-armoured PVC insulated FR cables conforming to IS 1554 (Part 1) for inside building areas.

Fire Detectors

Fire detectors shall be approved by FOC-London or similar international authorities.

Both smoke and heat type fire detectors shall be used. Bidder shall clearly indicate the mode of operation of detectors in his proposal.

The set point shall be selected after giving due consideration for ventilating air velocity and cable insulation.

Fire detectors shall be equipped with an integral L.E.D. so that it shall be possible to know which of the detectors has been operated. The detectors, which are to be placed in the space above the false ceiling or in the floor void shall not have the response indicators on the body but shall be provided with remote response indicators.

Approval from Department of Atomic Energy (DAE), Government of India shall be made available for ionisation type smoke detectors. All accessories required to satisfy DAE shall also be included in the scope of supply.



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Fire detectors shall be guaranteed to function properly without any maintenance work for a period of not less than ten (10) years.

Annunciation System (Location-Control Room Building)

The annunciation system shall be complete with all necessary relays, flashers and other accessories required for the proper operation of the equipment and shall be completely solid state. The control circuit shall be mounted on plug-in type glass epoxy printed circuit boards. Audible alarms for the system shall be mounted inside the panel. One set of acknowledge, test and reset push buttons shall be mounted on the panel.

Indications shall be engraved on Acrylic inscription plate window and shall be visible clearly when the indication lamp is lighted (black letters on white background). Each window shall be provided with two lamps.

Audible hooter shall sound when a trouble contact operates and shall continue to sound until the acknowledge button is pressed. In addition to the hooters provided on annunciation panels, a hooter shall be provided outside FFPH which shall sound in any fire alarm condition.

Indication lamps shall flash when trouble contact operates and shall continue flashing until acknowledge button is pressed.

After acknowledge button is pressed, the hooter and flashing shall stop but the indication lamp shall remain lighted.

After trouble is cleared indication lamps shall be ready and shall go off only when reset.

Silencing the hooter in conjunction with one trouble contact shall not stop and hooter sounding if another trouble contact operates.

When test button is pressed, all lamps shall flash and hooter shall sound.

Annunciator systems shall operate on 220V DC Systems.

The annunciation system shall include alarm for AC control system failure (working on DC supply), DC supply failure (working on AC supply) and test facilities for these alarms.

List of annunciations required on the panels has been listed elsewhere.

The Contractor shall also provide additional annunciations if desired by the Employer/Engineer during Vendor drawing review stage and for such additional annunciations no extra charges shall be claimed by the Contractor, if the number of such additions are within 10% of the number stipulated in this specification.

20% spare windows shall be provided on the panel.

Annunciation Panel

Location: Substation Control Room

- i) Indication lamp showing power supply 'ON'
- ii) *Each floor of control room building shall be considered as separate zone for fire detection and alarm system*
- iii) Following annunciations shall be provided



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Sl No.	Description	Numbers
1	Fire/Fault (zone alarm module)	1+1(duplicate) For each zone as applicable
2	Spare windows complete in all respect, with relays	10
3	Spare zone alarm modules for future use	5

- iv) Each annunciation panel shall be provided with a hooter.
- v) Hooters of control rooms shall also be annunciated in the panel suitably.
- vi) Indication for fault in respective areas shall also be provided. Each zone alarm module shall exhibit 'FIRE' and 'FAULT' conditions separately.
- vii) ***Provision for sending data to Remote Control Unit (SCADA under purchaser scope) for the following***
 - a) Fire in each zone of switchyard control building (each floor of CRB shall be considered as separate zone for fire detection and alarm system).
 - b) Fire/Fault in Control Room.
 - c) 10 nos. spare terminal (potential free contacts)

Painting:

The paint thickness shall not be less than 60 microns. Finished parts shall be coated by peelable compound by spraying method to protect the finished surface from scratches, grease, dirt and oily spots during testing, transportation handling and erection.

Tests: Following tests/inspection shall be carried out by the Contractor in the presence of Employer's representative:

- a) Compliance with approved drawings, data, applicable standards and specification. In absence of any code/standards, equipments shall be tested as per mutually agreed procedure between supplier and the employer.
- b) Response of heat/smoke detectors
- c) A comprehensive visual and functional check for panel would be conducted and will include thorough check up of panel dimensions.
- d) Visual check for workmanship.
- e) Wiring continuity and functional checks.
- f) Calibration of instruments, relays and metres wherever required by inspector.
- g) All test certificate and reports shall be submitted to the employer for approval.

Pre-Commissioning Tests

All the detectors installed shall be tested for actuation by bringing a suitable source of heat/smoke near the detector and creating a stream of hot air/smoke over the detector. The exact procedure of this test shall be detailed out by the Employer to the successful Bidder.



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Guarantee

Heat/smoke & fire alarm unit shall be guaranteed to function without defects for a period of ten years from the date of commissioning and defective detectors & fire alarm unit shall be replaced free of cost.

FIRE EXTINGUISHERS

SCOPE: Supply of Fire Extinguishers

CODES AND STANDARDS:

The design, manufacture and performance of the fire extinguishers shall comply with all currently applicable standards, regulations and safety codes in the locality where these equipments will be installed; in particular the fire extinguishers shall conform to the latest Indian Standard Specifications as detailed below:-

IS.13386 -Specification for Trolley mounted mechanical Foam Type Fire Extinguishers

IS.10204-Specification for Portable mechanical Foam Type Fire Extinguisher.

IS.10658-Specification for Higher capacity Trolley Mounted Dry chemical Powder type Fire Extinguisher.

IS.2171-Specification for Portable (Cartridge type) Dry Chemical Powder Type Fire Extinguisher

TESTS:

All tests shall be conducted as per relevant ISS. The successful tenderer shall submit test certificates for approval. All test certificates shall be got approved by the Purchaser before dispatch of materials. Corporation is not responsible for dispatches made without observing the above formality.

Internal hydraulic pressure test on every fire extinguisher and hydraulic burst test on ten percent (10%) of fire extinguishers selected as samples shall be carried out FREE of cost to the Corporation.

Discharge performance test on ten percent (10%) of fire extinguishers to be selected as sample at random by Corporation's inspecting official shall also be done FREE of cost to the Corporation.

Details of tests to be conducted on various types of fire extinguishers as per relevant ISS are furnished below:

i) MECHANICAL FOAM TYPE OF EXTINGUISHERS:

a) Every Extinguisher body and cap assembly shall be tested to an internal hydraulic test pressure of 30 Kg. f/sq.cm. for a period of 2 Mts. During this test, it shall not show any sign of leakage. This test may be done either with cap or without cap. In latter case, the cap shall be tested separately.

b) In case of hydraulic burst test for extinguisher, mechanical failure shall not occur at a pressure less than 45 Kg. f/sq.cm.

c) when an extinguisher is set in operation under normal temperature condition of 27 ± 5 Degree Centigrade, the foam solution shall be expelled in the form of jet which shall maintain a throw of not less than 10 metres for a minimum period of 60 seconds provided also that 90% of the liquid shall be completely discharged within a maximum period of 180 seconds. The expelled foam shall cover an area of 1.0 square metre to a depth of 5 cm.

d) A discharge hose of 50 lts. Mechanical Foam type fire extinguishers shall have a minimum bursting strength of 42 kg. F/sq.cm.

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ii) DRY CHEMICAL POWDER TYPE EXTINGUISHERS:

a) The extinguisher body and the cap assembly shall be tested to an internal hydraulic pressure of 30 kg. f/sq.cm. for a period of two minutes. During this test it shall not show any sign of leakage.

This test may be done either with cap or without cap and in the latter case, the cap shall be tested separately.

b) In case of hydraulic burst failure test, the mechanical failure shall not occur at a pressure less than 45 kg. f/sq.cm. (The test shall be done through discharge fittings with cap assembled)

c) The design and construction of the fire extinguishers shall be such that it shall be capable of discharging not less than 85% by weight of the actual rated capacity of dry powder when the extinguisher is operated at angle of 45 degrees from horizontal position at a temperature of 27+/- 2 Degree centigrade in still weather condition.

d) The contents shall be expelled in the form of continuous discharge which shall comply with following requirements.

Capacity (KG)	Minimum period for which throw of jet will be maintained (In seconds)	Maximum period to discharge 85% of contents (In seconds)	Throw of jet (In Mtrs)
5	15	20	Not less than 4
10	23	30	Not less than 6
25	25	30	6 to 8

PACKING AND TRANSPORT:

The method of packing shall be such as to protect the fire extinguishers with all its component parts against damage, corrosion, heavy rain, breakages and vibration injury that may be encountered in transportation, handling and during storage at site. The heads and threaded portion of the fire extinguishers shall be properly protected against damage.

GENERAL REQUIREMENTS:

The fire extinguishers in all respects shall incorporate the highest quality of modern engineering design and workmanship. The fire extinguishers shall be designed and manufactured in accordance with Indian Standards and Supplier's Standard practices when such practices do not conflict with Indian Standards.

The fire extinguishers offered shall be complete with all components and accessories which are necessary or usual for their satisfactory performance and efficient maintenance: such parts shall be deemed to be within the scope of this specification whether specifically included or not.

An air space shall be provided in the body above the specified liquid/dry powder level and shall be of sufficient volume to ensure that when discharge nozzle is temporarily closed and extinguisher is put into operation at a temperature of 27 +/- 5 Degree Centigrade, the pressure exerted shall not exceed 15 kg. f/sq.cm.

The specified level of solution in the body before insertion of inner container shall be indicated on the exterior of the body and shall also be permanently indicated on the interior.



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50 Litres Mechanical Foam Type Fire Engine.

- i) Mild Steel Sheets used for the body shall not be less than 3.15mm thick and shall conform to Grade 'D' of IS 1079.'
- ii) Extruded brass sections used for the spindle, neck ring, cap, nozzle and other discharge fittings shall conform to Grade-I of IS.291 or Type-I of IS.319.
- iii) Leaded tin bronze used for neck-ring, cap, nozzle and other discharge fittings shall conform to Grade-LTB-2 of IS.318.
- iv) The shape of the body of the mechanical foam fire engine shall be cylindrical with an outside diameter of 300 +/- 25mm.
- v) The construction of the fire extinguisher shall be as per Clause-7 of IS.13386.
- vi) The charges shall consists of foam concentrate conform to IS.4989 (Part-2) and shall bear ISI certification Mark.
- vii) The anti-corrosive treatment and painting shall conform to clauses-9 and 10 of IS.13386 respectively.
- viii) The discharge hose shall have a bore of not less than 12.5 mm and it shall have a minimum bursting strength of 42 Kg f. per sq.cm and a length of not less than 3 metres.
- ix) The neck ring shall provide a clear opening of not less than 75 mm dia.

9 Litres mechanical Foam Type Fire Extinguisher:

- i) Mild Steel sheets used for the body shall not be less than 1.6mm thick and shall conform to Panel sheets Type-P of IS.513, Grade-"D".
- ii) Extruded brass sections used for the plunger, sealing disc, and nozzle shall conform to Grade-I of IS.291 or Type-I of IS.319.
- iii) Leaded tin bronze used for neck-ring, cap, plunger, nozzle, sealing disc and other discharge fittings shall conform to Grade-LTB-2 of IS.318.
- iv) Seamless mild steel tube, if used for neck-ring, shall conform to IS.1239 (Part-I).
- v) The shape of the body of the fire extinguisher shall be cylindrical with an outside diameter of 175 +/- 25mm.
- vi) The construction of the fire extinguisher shall be as per clause 7 of IS.10204.
- vii) The charges shall consists of foam concentrate conform to IS.4989 (Part-2) and shall bear ISI Certification Mark.
- viii) The anti-corrosive treatment and painting shall conform to clauses-9 and 10 of IS.10204 respectively.
- ix) The discharge hose shall have a bore of not less than 8 mm and it shall have a minimum busting strength of 45 Kgf per Sq.cm and a length of not less than 600 mm.
- viii) The neck ring shall provide a clear opening of not less than 57mm to 63 mm dia.

25 Kg. Dry chemical Powder Type Fire Extinguisher:

- i) Mild Steel sheets used for the fabrication of body and neck ring shall conform to IS.2002 or IS.2041 or IS.226. The neck ring may also be made of seamless tube as per IS.1239 (Part-I). The construction of body shall be welded and the requirement in respect of the thickness of the sheets and details of



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construction shall be as per IS.2825. The domed ends of the body shall be without reverse of curvature and shall be dished outwards to a radius not exceeding the internal diameter of the body to which these are fixed. The thickness of sheets used shall not be less than 3.15 mm.

- ii) Aluminium alloy used for nozzle shall conform to IS.617.
- iii) Extruded brass sections used for the cap and other discharge fittings shall conform to Grade-I of IS.291 or Type-I of IS.319.
- iv) Lead tin bronze used for cap and other discharge fittings shall conform to Grade-LTB-2 of IS.318.
- v) The shape of the body of the fire extinguisher shall be cylindrical with an outside diameter not exceeding 300 +/-25 cm.
- vi) The construction of the fire extinguisher shall conform to Clause 5 of IS.10658.
- vii) The Dry Powder shall conform to IS.4308 and shall bear ISI certification Mark.
- viii) The anti-corrosive treatment and painting shall conform to clauses-6 and 7 of IS.10658 respectively.
- ix) The discharge hose shall have bursting pressure of not less than 50 Kgf. Per sq.cm.
- x) The neck ring shall provide a clear opening of not less than 75mm dia. The neck ring shall be welded to the body.
- xi) The external carbon-di-oxide gas cylinder shall conform to IS.7285 and shall bear ISI certification Mark. The tube used to interconnect main body and Carbon-di-oxide gas cylinder shall be of copper and shall have a bursting pressure of not less than 275 kgf/sq.cm The Carbon-di-oxide cylinder shall have wheel valve with ISI certification Mark to operate and discharge CO2 Gas.
- xii) The Syphon shall conform to IS.4985 M.S. Syphon tube will not be accepted.
- xiii) The extinguisher shall be fitted with a separate safety valve incorporated with cap which shall blow off at a pressure of 25 kgf/sq.cm.
- xiv) Washers shall conform to Clause-4.5 of IS.10658.

5 Kg & 10 Kg Dry Chemical Powder Type Fire Extinguisher:

- i) Mild steel sheets used for the fabrication of body shall not be less than 1.6 mm in thickness for 5 kg and 2.0mm in thickness for 10 kg and shall conform to Panel Sheets (Type-P) of IS.513. Mild Steel sheet, if used for inner shell, shall also conform to Panel sheet of IS.513 and shall not be less than 1, 0 mm thick.
- ii) Aluminum alloy used for nozzle and discharge fittings shall conform to Grade 4450 or 4225 of IS.617. The nozzle shall be squeezed grip type.
- iii) Extruded brass to be used for the plunger, cartridge holder, nozzle and other discharge fittings shall conform to Grade-I of IS.291 or Type-I of IS.319.
- iv) Lead tin bronze used for neck ring, nozzle, cartridge holder and cap shall conform to Grade-LTB-2 of IS.318.
- v) Brass forging may be used for neck ring and cap and it shall conform to IS.3488.
- vi) Seamless M.S.pipe used for neck ring shall conform to IS.1239 (Part-I).
- vii) Brass used for syphon shall conform to Alloy-2 of IS.407. M.S. Syphon tubes will not be accepted.
- viii) The shape of the body of the fire extinguisher shall be cylindrical.



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SECTION-2

System FIRE FIGHTING SYSTEM

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- ix) The construction of the fire extinguisher shall conform to Clause-6 of IS.2171.
- x) The Dry Powder used shall be non-toxic and shall retain its free flowing properties under normal storage condition in the extinguisher. Any pressurizing agent used as an expellent shall also be in a dry state. The dry powder shall conform to IS.4308 and shall bear ISI certification mark.
- xi) The gas cartridge shall conform to IS.4847 and it shall bear ISI certification mark.
- xii) The discharge hose shall have bursting pressure of not less than 50 kg. f. per sq.cm.
- xiii) The plunger rod shall be of such a length that it has a minimum stroke of 7mm. A spring loaded piercing device shall be provided in the plunger for piercing the seal of the gas cartridge when fitted to the cartridge holder. A safety clip shall be provided to prevent accidental operation of piercing mechanism.
- xiv) Rubber or leather used for the cap joint washer shall be of standard quality. The washer (gasket) shall be retaining in a recess in the cap. It shall be acid/alkali resistant. If rubber like material is used it shall not be less than 2.5mm thick and it shall tightly fit against the cap.
- xv) The performance requirements, testing connection and anti-corrosive treatment shall conform to Clauses-10 and 8 of IS.2171.

Each fire extinguisher shall be clearly and permanently marked with the information specified in the relevant Indian Standard for such type of fire extinguisher. The letters TANTRANSCO shall be embossed/screen printed or painted on the cover of each fire extinguisher.

TEST CERTIFICATES:

Copies of test certificates showing the results of tests carried out as per relevant IS standards on all types of fire extinguishers from a recognized Government Laboratory shall be submitted for customer/BHEL review and acceptance without which clearance shall not be issued.

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SECTION – 3

PROEJCT DETAILS & GENERAL TECHNICAL REQUIREMENT

3.0 FOREWORD

The provisions under this section are intended to supplement general requirements for the materials, equipment's and services covered under other sections.

3.1 PROJECT INFORMATION AND SYSTEM PARAMETERS

- a) Customer : M/s Tamil Nadu Transmission Corporation Limited
- b) Project Title : 400/230-110 kV Substation at Vellalaviduthi
- c) Transport facilities : Road/Rail

Physical and other parameters:

- 3.1.1 Location of the substation : Vellala viduthi, Pudukottai district
- 3.1.2 Nearest Railway station : Pudukottai
Railway : Southern Railway
- 3.1.3 Meteorological data
- | | |
|--|----------------|
| (i) Maximum ambient temperature | : 50°C |
| (ii) Minimum ambient temperature | : 20°C |
| (iii) Maximum daily average ambient air temperature | : 45° C |
| (iv) Maximum yearly average ambient air temperature | : 32° C |
| (v) Maximum Humidity (%) | : 100% |
| (vi) Average thunder storm days per annum | : 50 |
| (vii) Average rainy days per annum | : 90 |
| (viii) Average annual rainfall (mm) | : 1000 mm |
| (ix) No. of months during which tropical monsoon condition prevail | : 5 |
| (x) Maximum wind pressure | : 150 Kgf/Sqmm |
| (xi) Altitude above MSL | : 1000M |

However for design purpose, ambient temperature should be considered as 50° C and relative humidity as 100%.

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MAIN ELECTRICAL PARAMETERS:		
a)	Fault Levels	400kV: 63kA for 1 sec. 230kV: 40kA for 3 sec. 110kV: 40kA for 3 sec.
a)	Creepage Distance	25mm/kV

3.1.4 AUXILIARY POWER SUPPLY :

Auxiliary electrical equipment's, maintenance equipment's etc., shall be suitable for operation on the following supply system.

3 phase AC Supply	415V, 3 phase 4 wire, 50 Hz, neutral grounded AC supply -10% to +10%, Frequency +/- 5%
1 phase AC supply	240V, single phase, 50 Hz, neutral grounded AC supply -10% to +10%, Frequency +/- 5%,
DC supply	220V, 2 wire DC supply + 10% to -15%, Ungrounded 48V, 2 wire DC supply , Positively earthed

3.2 GENERAL REQUIREMENT

3.2.0 ALL THE EQUIPMENTS / MATERIALS TO BE SUPPLIED SHOULD BE IN ACCORDANCE WITH RELEVANT LATEST / AMENDED IS/IEC, WHETHER IT HAS BEEN SPECIFICALLY MENTIONED IN THE SPECIFICATION OR NOT.

3.0.1 The bidder shall also furnish drawings for the following:

All EQUIPMENTS and type of clamps, fittings hardware, insulators, bus bar. These designs/ drawing shall be got approved by the purchaser before commencing the manufacture/ construction/ erection and are to be as per latest IS/ IEC.

3.2.2 GENERAL:

The bidder shall be fully responsible for providing all equipment, materials system and services specified or otherwise which are required to complete the construction and successful commissioning of the substation in all respects.

Any other items not specifically mentioned in the specification but which are required for erection of materials/equipment under the scope of work, testing and commissioning are deemed to be included in the scope of the specification unless specifically excluded.

All items shall be supplied as per schedule and as specified in the relevant Indian standard of latest

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revision. The Technical specification of the main materials/equipment is furnished. The Technical specification contained herein for the materials are for the guidance of the tenderer.

The bidders are requested to procure the equipment's/materials/component only from reputed /qualified manufacturer as per Technical requirement stipulated in Section-1 of Technical specifications. Approval of make of item shall be taken up by vendor from TANTRANSCO himself.

3.3 SPECIFIC REQUIREMENT

The bidder shall furnish make/manufacturer, catalogues, engineering data, technical information, design documents, drawings etc., fully in conformity with the technical specification and get approval from competent authority before commencement of any work.

All steel materials, other than materials for earthing should be of galvanized if not specified.

3.4 STANDARD:

The works covered by the specification shall be designed, engineered, manufactured, built, tested and commissioned in accordance with the Acts, Rules, Laws and Regulations of India.

The equipment to be furnished under this specification shall conform to latest issue with all amendments (as on the date of bid opening) of standards specified in the specification.

The Bidder shall note that standards mentioned in the specification are not mutually exclusive or complete in themselves, but intended to complement each other.

The Bidder shall also note that list of standards presented in this specification is not complete. Whenever necessary the list of standards shall be considered in conjunction with specific IS/IEC. When the specific requirements stipulated in the specifications exceed or differ than those required by the applicable standards, the stipulation of the specification shall take precedence.

3.5 TEST CERTIFICATE:

Copies of all test certificates relating to material to be procured by the contractor for the works shall be forwarded to the OWNER.

3.6 TESTS :

All the tests as per relevant IS/IEC shall be carried out.

3.7 MATERIALS AND WORKMANSHIP:

All the materials shall be of the best class and capable of satisfactory operation in the tropics with humid atmosphere conditions. Unless otherwise specified, they shall conform to the requirements of the appropriate IS/IEC.

The workmanship shall be of the best grade and the entire construction in accordance with the best

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modern practice.

The equipment shall be designed to facilitate inspection and repairs and to ensure satisfactory operation under atmosphere condition prevailing at site and under such sudden variation of load and voltage as may be met with under working conditions in the system including those due to faulty synchronizing and short circuit within the rating of the apparatus.

The design shall incorporate every reasonable precaution and provision for the safety of all those concerned in the operation and maintenance of the equipment.

All the equipments should operate without undue vibration and with the least practicable amount of noise.

3.8 INSPECTION :

The inspection may be carried out by the TANTRANSCO/BHEL at any stage of manufacture. The supplier shall grant free access to TANTRANSCO's/BHEL representative at a reasonable time when the work is in progress. The TANTRANSCO/BHEL shall have access at all times to the works and all other places of manufacture/fabrication, where the equipments are being manufactured/fabricated and the bidder shall provide TANTRANSCO's/ BHEL representative all facilities for unrestricted inspection of the works, raw materials, manufacture of all the accessories and for conducting necessary tests.

Inspection and acceptance of any equipment under this specification by the TANTRANSCO/BHEL shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective. The supplier shall keep the TANTRANSCO/BHEL informed in advance, about the manufacturing programme so that arrangement can be made for inspection.

The TANTRANSCO/BHEL , reserves the right to insist for witnessing the acceptance/routine testing of the bought out items. No material shall be dispatched from its point of manufacture unless the material has been satisfactorily inspected and tested.

The correct grade and quality of steel shall be used by the supplier. To ascertain quality of steel, the TANTRANSCO/BHEL may at his discretion get the material tested at an approved laboratory.

The BHEL/TANTRANSCO or his representative shall have the right to inspect and/or test the goods /works to confirm their conformity to the supplier. BHEL/TANTRANSCO shall notify the supplier in writing of the identity of any representatives authorized for these purposes.

The inspections and tests may be conducted on the premises of the supplier or his Sub vendor at the point of delivery and /or at the goods' final destination. Where tests are conducted in the premises of Supplier, all reasonable facility and assistance including access to drawings and production data shall be furnished at no charge to the BHEL.

Should any inspected or tested goods fail to conform to specifications, the BHEL/TANTRANSCO may reject them and the supplier shall either replace the rejected goods or make all alterations necessary to meet specification requirements free of cost to the BHEL/TANTRANSCO within one week of intimation.

The BHEL/TANTRANSCO's right to inspect, test and where necessary reject the goods after the goods; arrival at the site, shall in no way be limited or waived by reason of the goods having been

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previously inspected. Tested and passed by the BHEL/TANTRANSCO or his representative prior to the goods dispatch.

Not less than 15 (Fifteen) days advance intimation shall be given about the quantity of materials that will be ready for inspection by the officers of TANTRANSCO/ BHEL/Third agency authorized by the Corporation. The materials should not be dispatched without instruction from the Corporation.

3.9 GUARANTEE:

The supplier shall guarantee that the goods under the Contract are new, unused of the most recent or current models and incorporated all recent improvements in design and materials unless provided otherwise in the Contract. The supplier shall further guarantee that the goods supplied under this Contract shall have no defects arising from design, materials or workmanship, installation and erection, if that may develop under normal use of the supplied goods. The supplier shall also guarantee the performance of the works executed by him including the performance of all the materials/goods supplied by him.

BHEL shall promptly notify supplier in writing of any claims arising under guarantee in respect of goods. Upon receipt of such notice, the supplier shall, with all reasonable speed, repair or replace the defective works or parts thereof, free of cost at site. All the expenses towards transportation of defective parts to supplier's works and of repaired/replaced parts to site shall be borne by the Supplier.

If the Supplier, having been notified, fails to remedy the defects within 14 days, the BHEL will proceed to take such remedial action as may be necessary, at the supplier's risk and expenses. All expenses in this regard will be recovered from Supplier.

3.10 PRE COMMISSIONING TESTING (if applicable) :

On completion of erection of equipment's and before charging each item of equipment's shall be thoroughly cleaned and inspected jointly by the TANTRANSCO/ BHEL and the bidder for correctness and completeness of installation and acceptability for charging leading to initial pre commissioning test. The pre commissioning testing to be carried all equipment's in the presence of BHEL/ TANTRANSCO. Necessary tools, testing kits to be arranged by the Supplier.

3.11 DOCUMENTATION :

All drawings shall conform to relevant international standards Organization (ISO) specification. All drawings shall be in ink and suitable for micro filming. All dimensions and data shall be in S.I. units.

3.12 PAINTING, GALVANISING :

All interiors and exteriors of all metal parts shall be thoroughly cleaned to remove all rust, scales, corrosion, greases or other adhering foreign matter and the surfaces treated by phosphating (e.g. seven tank phosphating sequences).

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All metal surfaces exposed to atmosphere shall be given, in addition to the treatment, two primer coats of zinc chromate and two coats of epoxy paint with epoxy base thinner. All metal parts not accessible for painting shall be made of corrosion resisting material. All machine finished or bright surfaces shall be coated with a suitable preventive compound and suitably wrapped or otherwise protected. All paints shall be carefully selected to withstand tropical heat and extremes of weather within the limits specified. The paint shall not scale off or wrinkle or be removed by abrasion due to normal handling. All external paintings shall be as per shade **No.697/631 of IS-5**.

Paint inside the metallic housing shall be of anti condensation type and the paint on outside surfaces shall be suitable for outdoor installation.

All components shall be given adequate treatment of climate proofing as per **IS: 3202** so as to withstand corrosive and several service conditions.

All ferrous parts including all sizes of nuts, bolts, support channel structures, etc. as also the mechanism housing shall be hot dip galvanized conforming to latest version of IS : 2629 or epoxy painted. Spring washers shall be electro-galvanised.

All members of the structure members shall be hot dipped galvanised with a zinc coating of **610 gms. per square metre** . Galvanising shall be done after a work is completed, except that the nuts may be tapped or rerun after galvanization. The zinc coating shall be smooth, clean, of uniform thickness and free from defects. The preparation for galvanising itself shall not adversely affect the mechanical properties of the coated materials. The employer shall be at liberty to have the samples of zinc used, test checked in any laboratory at his own cost and reject the particular supply if it is below standard.

All galvanised material shall withstand test as per IS 2633-1972 or any other equivalent standard. The zinc used for galvanising fabricated material shall be of high grade Electrolytic zinc of 99.99% purity.

All nuts and pins shall be adequately locked. Nuts, bolts and pins used inside the transformer and tap-changer compartment where gaskets are not used shall be provided with spring washers or locknuts. Where galvanizing is specified, it shall be applied by the hot dipped process or by electro-galvanizing process and for all parts, other than steel wires, shall consist of a thickness of zinc coating equivalent to not less than 610gm of zinc per square meter of surface. The zinc coating shall be smooth, of uniform thickness and free from defects.

3.13 SURFACE FINISH

All interiors and exteriors of tanks, control cubicles and other metal parts shall be thoroughly cleaned to remove all rust, scales, corrosion, greases or other adhering foreign matter. All steel surfaces in contact with insulating oil as far as accessible, shall be painted with not less than two coats of heat resistant, oil insoluble, insulating paints.

All metal surfaces exposed to atmosphere shall be given two primer coats of zinc chromate and two coats of epoxy paint with epoxy base thinner. All metal parts not accessible for painting shall be made of corrosion resisting material. All machine finished or bright surfaces shall be coated with a suitable preventive compound and suitably wrapped or otherwise protected. All paints shall be carefully selected to withstand tropical heat and extremes of weather within the limit specified. The paint shall

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not scale off or wrinkle or be removed by abrasion due to normal handling.

3.14 PROTECTION

All coated surfaces shall be protected against abrasion, impact, discoloration and any other damages. All exposed threaded portions shall be suitably protected with either a metallic or a non-metallic protecting device. All ends of all valves, pipings and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage.

All equipment accessories and wiring shall have fungus protection, involving special treatment of insulation and metal against fungus, insects and corrosion. The parts which are likely to get rusted, due to exposure to weather should also be properly treated and protected in a suitable manner. Screens of corrosion resistant material shall be furnished on all ventilating louvers to prevent entry of insects.

3.15 FUNGI-STATIC VARNISH

Besides the space heaters, special moisture and fungus resistant varnish shall be applied on the parts, which may be subjected or predisposed to the formation of fungi due to the presence or deposit of nutrient substances. The varnish shall not be applied to any surface of part where the treatment will interface with the operation or performance of the equipment. Such surfaces or parts shall be protected against the application to the varnish.

3.16 DEGREE OF PROTECTION

The supplier shall propose following Degree of protection for those equipment/Items for which the degree of protection has not been specified in the specification for the approval of BHEL/TANTRANSCO. The decision of BHEL/TANTRANSCO shall be final. The enclosures of the Control Cabinets, Junction boxes and Marshalling boxes, panels etc to be installed shall provide degree of protection as detailed here under:

- a) Installed outdoor: IP-55
- b) Installed indoor in air conditioned area: IP-42
- c) Installed in covered area IP:52
- d) For LT switchgear (AC & DC distribution Boards): IP-54

The degree of protection shall be in accordance with IS: 13947 (Part-1)/ IEC-60947 (Part-1)/ IS 12063 / IEC-60529. Type test report for degree of protection test on each type of the box shall be submitted for approval.

3.17 FIRST FILL OF CONSUMABLES, OIL AND LUBRICANTS

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All the first fill of consumables such as oils, lubricants, filling compounds, touch up paints, soldering/brazing material for all copper piping of circuit breakers and essential chemicals etc. which will be required to put the equipment covered under the scope of the specifications, into operation, shall be furnished by the Contractor unless specifically excluded under the exclusions in these specifications and documents.

3.18 RATING PLATES, NAME PLATES AND LABELS :-

The equipments shall be provided with a rating plate or plates marked with but not limited to following data whatever needs to that particular equipments (as applicable).

- (a) Manufacturer's name or trade mark.
- (b) Serial number and type design making it possible to get all relevant information from the manufacturer.
- (c) Year of manufacture.
- (d) Rated voltage
- (e) Rated insulation level.
- (f) Rated frequency
- (g) Rated Normal current.
- (h) Rated short circuit breaking current
- (i) First pole to clear factor
- (j) Rated duration of short circuit
- (k) Rated auxiliary D.C. supply voltage of closing and opening devices.
- (l) Rated pressure of SF6 gas for operation and interruption.
- (m) Rated out of phase breaking current.
- (n) Rated supply voltage of auxiliary circuit.
- (o) Rated supply frequency of auxiliary circuits.
- (p) Purchase Order Number and Date.

The rating plate shall be visible in position of normal service and installation. The rating plate shall be weather proof and corrosion proof.

Each main and auxiliary item of substation is to have permanently attached to it in a conspicuous position a rating plate of non-corrosive material upon which is to be engraved manufacturer's name, year of manufacture, equipment name, type or serial number together with details of the loading conditions under which the item of substation in question has been designed to operate, and such diagram plates as may be required by the BHEL/TANTRANSCO. The rating plate of each equipment shall be according to IEC requirement.

All such nameplates, instruction plates, rating plates of transformers, reactors, CB, CT, CVT, SA, Isolators, C & R panels and PLCC equipments shall be bilingual with Hindi inscription first followed by English. Alternatively two separate plates one with Hindi and the other with English inscriptions

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may be provided. During approvals drawings of Rating/name plates/labels shall also be submitted.

3.19 EARTHING :

The operating mechanism housing, control cabinets, support structure etc. shall be provided with two separate earthing terminals suitable for bolted connection to 50x8mm mild steel flat to be provided for connection to station earth mat.

3.20 TERMINAL BLOCKS AND WIRING

Control and instrument leads from the switchboards or from other equipment will be brought to terminal boxes or control cabinets in conduits. All Inter-phase and external connections to equipment or to control cubicles will be made through terminal blocks.

Terminal blocks shall be 1100 V grade and have continuous rating to carry the maximum expected current on the terminals. Those shall be of moulded piece complete with insulated barriers stud type terminals, washers, nuts and lock nuts. Screw clamp, overall insulated, insertion type, rail mounted terminals can be used in place of stud type terminals. But preferably the terminal blocks shall be non-disconnecting stud type equivalent to Elmex type CATM4, Phoenix cage clamp type of Wedge or equivalent. The Insulating material of terminal block shall be nylon 6.6 which shall be free of halogens, fluorocarbons etc.

Terminal block for current transformer and voltage transformer secondary leads shall be provided with test links and isolating facilities. The current transformer secondary leads shall also be provided with short circuiting and earthing facilities.

The terminal shall be that maximum contact area is achieved when a cable is terminated. The terminal shall have a locking characteristic to prevent cable from escaping from the terminal clamp unless it is done intentionally. The conducting part in contact with cable shall preferably be tinned or silver plated however Nickel plated copper or zinc plated steel shall also be acceptable. The terminal blocks shall be of extensible design. The terminal blocks shall have locking arrangement to prevent its escape from the mounting rails.

The terminal blocks shall be fully enclosed with removable covers of transparent, non-deteriorating type plastic material. Insulating barriers shall be provided between the terminal blocks. These barriers shall not hinder the operator from carrying out the wiring without removing the barriers.

Unless otherwise specified terminal blocks shall be suitable for connecting the following conductors on each side.

All circuits except CT circuits :	Minimum of 2 nos. of 2.5 sq.mm.copper flexible.
All CT circuits :	Minimum of 4 nos. of 2.5 sq.mm, copper flexible.

The arrangements shall be in such a manner so that it is possible to safely connect or disconnect

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terminals on live circuits and replace fuse links when the cabinet is live. At least 20 % spare terminals shall be provided on each panel/cubicle/box and these spare terminals shall be uniformly distributed on all terminals rows.

There shall be a minimum clearance of 250mm between the first bottom row of terminal block and the associated cable gland plate. Also the clearance between two rows of terminal blocks shall be a minimum of 150 mm. The Supplier shall furnish all wire, conduits and terminals for the necessary inter-phase electrical connection (where applicable) as well as between phases and common terminal boxes or control cabinets.

All input and output terminals of each control cubicle shall be tested for surge withstand capability in accordance with the relevant IEC Publications, in both longitudinal and transverse modes. The supplier shall also provide all necessary filtering, surge protection, interface relays and any other measures necessary to achieve an impulse withstand level at the cable interfaces of the equipment. TB sizes for incoming power supply shall be informed/confirmed during drawing approval stage.

3.21 CONTROL CABINETS, JUNCTION BOXES, TERMINALS BOXES AND MARSHALLING BOXES FOR OUTDOOR EQUIPMENTS

All types of boxes, cabinets etc. shall generally conform to and be tested in accordance with IS-5039, IS-8623 or IEC-439, as applicable and the clause given below.

Control cabinet, Junction boxes, Marshalling boxes & Terminal boxes shall be made of sheet steel. Sheet steel used shall be at least 2.0 mm thick cold rolled or 2.5 mm hot rolled. The box shall be properly braced to prevent wobbling. There shall be sufficient reinforcement to provide level surfaces, resistance to vibrations and rigidity during transportation and installation. Cabinet/boxes shall be free standing floor mounting type, wall mounting type or pedestal mounting type as per requirements. Cabinet /boxes shall be provided with double hinged doors with padlocking arrangements. The distance between two hinges shall be adequate to ensure uniform sealing pressure against atmosphere. The quality of gaskets shall be such that it does not get damaged/cracked during the operation of the equipment.

All door, removable covers and plates shall be gasketed all around with suitably profiled Neoprene /EPDM gaskets. The gasket shall be tested in accordance with approved quality plan. The quality of gasket shall be such that it does not get damaged /cracked during the years of the equipment or its major overhaul whichever is earlier. All gasketed surfaces shall be smooth, straight and reinforced if necessary to minimize distortion and to make a tight seal. Ventilating Louvers, if provided, shall have screen and filters. The screen shall be fine wire mesh made of brass.

All boxes/cabinets shall be designed for the entry of cables from bottom by means of weather proof and dust-proof connections. Boxes and cabinets shall be designed with generous clearances to avoid interference between the wiring entering from below and any terminal blocks or accessories mounted within the box or cabinet. Suitable cable gland plate projecting at least 150 mm above from the base of the Marshalling Kiosk/box shall be provided for this purpose along with the proper blanking plates. Necessary number of cable glands shall be supplied and fitted on this gland. The gland shall project at least 25mm above gland plate to prevent entry of moisture in cable crutch. Gland plate shall have

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provision for some future glands to be provided later, if required.

3.22 SPACE HEATERS

The heater shall be suitable for continuous operation at 240 V AC supply voltage and shall be provided with on – off switch and fuse shall be provided for heater. One or more adequately rated, thermostatically connected heaters shall be supplied to prevent condensation in any compartment.

3.23 DELIVERY OF GOODS AND DOCUMENTS RELATED THERETO:

Delivery of goods shall be made by the supplier in accordance with the terms specified by the BHEL in its schedule of requirements.

3.24 INCIDENTAL SERVICES:

The Supplier is required to provide any or all the services broadly outlined in the Technical specification. Any other minor incidental service related to the scope of work like providing necessary assistance whether specifically mentioned or not must be carried out by the Supplier at his own cost. All tools, Tackles Plant etc., required for completion of above works shall be brought by the Supplier.

3.25 DISCREPANCIES BETWEEN DRAWING AND SPECIFICATION:

Should there be any discrepancy between the specifications and/or schedule of prices and/or drawings or any inconsistency, error or omission in either of them, reference must be made to the BHEL/TANTRANSCO for an explanation and the Supplier will be held responsible for any errors that may occur in the work through neglect of this precaution. The explanation of the BHEL/TANTRANSCO shall be final and binding on the Supplier.

3.26 LIST OF DRAWINGS AND DOCUMENTS :

The drawings for the equipments provided by the TANTRANSCO/BHEL shall be followed strictly by the bidder while designing. For the rest of the equipments, the design is in the scope of the bidder and the same got approved by the TANTRANSCO/BHEL.

The bidder shall furnish one set of relevant descriptive and illustrative published literature pamphlets and the following drawings/documents for preliminary study along with the Offer (as applicable). (Drawings, GTP, type test reports, list of past supplies etc. Drawings & documents submitted at the time of offer shall be subject to review at contract stage)

- (i) General outline drawings showing dimensions and shipping weights, quantity of insulating media, etc.

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- (ii) Sectional views showing the general constructional features of the equipment (eg. Breaker drg includes operating mechanism, arcing chambers, contacts with lifting dimensions for maintenance).
- (iii) Schematic diagrams of equipment (eg. Breaker drg includes for control supervision and re-closing.)
- (iv) Structural drawing, design calculations and loading data for support structures.
- (v) Foundation drilling plan and loading data for foundation design.
- (vi) The Type Test Reports
- (vii) Bill of materials shall be furnished along with drawings.

The supplier shall, within 1 week of placement of order submit six sets of final version of all the above drawings for TANTRANSCO/BHEL approval. The TANTRANSCO/BHEL shall communicate its comments/approval on the drawings to the supplier within reasonable period. The Supplier shall, if necessary, modify the drawings and resubmit six copies of the modified drawings for TANTRANSCO/ BHEL approval within one week from the date of comments. After receipt of TANTRANSCO/BHEL approval, the supplier shall, within two weeks, submit 8 prints and two good quality reproducible of the approved drawings for TANTRANSCO/BHEL use. However the drawing approval does not absolve the supplier from complying with the terms of the specification.

The following should be supplied to each consignee circle along with the initial supply of equipments ordered.

- 1) Five copies of printed and bound volumes of operation, maintenance and erection manual in English along with the copies of approved drawings and type test reports etc.
- 2) Three sets of manuals detailed in item (1) shall be supplied to the TANTRANSCO/BHEL within one week from the date of approval of drawings.
- 3) The spares for the Equipment's ordered under the scope of the Contract should also be supplied to the consignee circle along with initial supply of the equipments.
- 4) It should be noted that if the above conditions are not fulfilled the initial payment will not be released.

Note: The supplier may please note that all resubmissions must incorporate, all comments given in the submission by the TANTRANSCO/BHEL failing which the submission of documents is likely to be returned. Every revision shall have a revision number, date and subject, in a revision block provided in the drawing, clearly marking the changes incorporated.

Following Documentation schedule to be followed

S. No.	DESCRIPTION	TENDER STAGE	CONTRACT STAGE FOR APPROVAL	FINAL DOCUMENTATION	
			Prints	Prints	CDs

Project	400/230-110 KV SUB STATION AT VELLALAVIDUTHI	SECTION-3	
System	FIRE FIGHTING SYSTEM		
Customer	TAMILNADU TRANSMISSION CORPORATION LTD (TANTRANSCO)	TB-399-316-160 REV-0	
Purchaser	BHEL (TRANSMISSION BUSINESS GROUP)		

1	Drawings and Data Sheets	1	6	10	5
2	Drawings “As Built “	-	-	10	
3	Type Test Reports	1	6	10	
4	Erection Manuals	-	6	10	
5	Operation and Maintenance Manuals	-	6	10	
6	Manufacturing Quality Plan	-	6	10	
7	Field Quality Plan	-	6	10	
8	Inspection Test Reports	-	6	10	

Note: Drawings will also be submitted in CD/DVD in Latest AUTOCAD-2004 or Later version or any other CAD package along with conversion files for all major items. Final Documentation shall be submitted in bound volumes with details of Customer & Project etc. written on top.

3.27 QUALITY ASSURANCE PLAN :

The bidder shall invariably furnish following information along with his offer.

- (i) Statement giving list of important raw materials including but not limited to:
 - (a) Contact material
 - (b) Insulation
 - (c) Porcelain
 - (d) Sealing material
 - (e) Contactor, limit switches, etc. in control cabinet.

Name of sub-supplier for the raw materials, list of standards according to which the raw materials are tested, list of test normally carried out on raw materials in presence of bidder's representative, copies of test certificates.

- (ii) Information and copies of test certificates as in (i) above in respect of bought out accessories.
- (iii) List of areas in manufacturing process, where such inspections are normally carried out for quality control and details of such tests and inspections.
- (iv) Special features provided in the equipment to make it maintenance free.
- (v) List of testing equipment available with the Bidder for final testing of equipments vis-à-vis, the type, special, acceptance and routine tests specified in the relevant standards. These limitations shall be very clearly brought out in the relevant schedule i.e. schedule of deviations from specified test requirements.

The supplier shall submit following information to the TANTRANSCO/BHEL.

Project	400/230-110 KV SUB STATION AT VELLALAVIDUTHI	SECTION-3	
System	FIRE FIGHTING SYSTEM		
Customer	TAMILNADU TRANSMISSION CORPORATION LTD (TANTRANSCO)	TB-399-316-160	
Purchaser	BHEL (TRANSMISSION BUSINESS GROUP)	REV-0	

- 1) List of raw materials as well bought out accessories and the names of sub-suppliers selected from those furnished along with offer.
- 2) Type test certificates of the raw material and bought out accessories.
- 3) Quality assurance plan (QAP) withhold points for TANTRANSCO/BHEL inspection. The quality assurance plan and hold points shall be discussed between the TANTRANSCO/BHEL and supplier before the QAP is finalized.

The supplier shall submit the routine test certificates of bought out items and raw material, at the time of routine testing of the fully assembled equipment.

3.28 TEMPERATURE RISE :

The maximum temperature attained by any part of the equipment when in service at site under continuous full load conditions and exposed to the direct rays of the sun shall not exceed 30(/25) deg. C over an ambient of 45(/50) deg. C limits specified in relevant IEC. When the standard specify the limit of temperature rise these shall be exceeded when corrected for the difference between ambient temperature at site and that specified in the approved specifications.

No material shall be dispatched from its point of manufacture unless the material has been satisfactorily inspected and tested.

3.29 FITTINGS AND ACCESSORIES :

Following is a partial list of some of the major fittings and accessories to be furnished by contractor as an integral part of the equipment.

Operation mechanism housing complete with:

- (a) Locking arrangement.
- (b) Heaters equipped with automatic thermostatic control and control switch.
- (c) Cable glands.
- (d) Local/Remote change over switch.
- (e) Operation Counter.
- (f) Terminal Blocks.
- (g) Control switches to cut off control power supply.
- (h) MCCBs/MCBs are required with permanent identification marks for protection of D.C. circuits and A.C. circuits.
- (i) Two earthing terminals.

3.30 PACKING AND FORWARDING:

The equipment shall be packed in crates suitable for vertical/horizontal Transport, as the case may be and suitable to withstand handling transport and outdoor storage during transit. The supplier shall be responsible for any damage to the equipment during transit due to improper and inadequate packing and handling. The easily damageable material shall be carefully packed and marked with the appropriate caution symbols. Wherever necessary, proper arrangement for lifting, such as lifting hooks

Project	400/230-110 KV SUB STATION AT VELLALAVIDUTHI	SECTION-3	
System	FIRE FIGHTING SYSTEM		
Customer	TAMILNADU TRANSMISSION CORPORATION LTD (TANTRANSCO)	TB-399-316-160 REV-0	
Purchaser	BHEL (TRANSMISSION BUSINESS GROUP)		

etc., shall be provided. Any material found short inside the packing cases shall be supplied by supplier without any extra cost.

The supplier shall provide such packing of the goods as is required to prevent their damage or deterioration during transit to their final destination as indicated in the Contract. The packing shall be sufficient to withstand, without limitation, rough handling during transit to their final destination as indicated in the Contract and exposure to extreme temperatures, salt and precipitation etc., during transport and open storage. Packing case size and weights shall be taken into consideration wherever appropriate, the remoteness of the 'goods' final destination and absence of heavy mechanized handling facilities, at all points in transit.

The packing, marking and documentation within and outside the package shall comply strictly with such special requirements as shall be expressly provided for in the Contract or in any subsequent instructions issued by BHEL.

Project 400/230-110 KV SUB STATION AT VELLALAVIDUTHI

SECTION-4



System FIRE FIGHTING SYSTEM

Customer TAMILNADU TRANSMISSION CORPORATION LTD
(TANTRANSCO)

TB-399-316-160
REV-0

Purchaser BHEL (TRANSMISSION BUSINESS GROUP)

SECTION 4

GUARANTEED TECHNICAL PARTICULARS

GTPs for the firefighting items as per scope and parameters defined in Section-1& 2 shall be submitted by contractor during detailed engineering and it shall be approved by customer before manufacturing.

There shall not be any price implication to BHEL/Customer on account of Bidder's understanding of equipments at tender stage and final acceptance of document by customer with respect to technical parameters or make.



Project 400/230-110 KV SUB STATION AT VELLALAVIDUTHI

SECTION-5

System FIRE FIGHTING SYSTEM

Customer TAMILNADU TRANSMISSION CORPORATION LTD
(TANTRANSCO)

TB-399-316-160
REV-0

Purchaser BHEL (TRANSMISSION BUSINESS GROUP)

SECTION- 5

ENCLOSURES TO SPECIFICATION

SCHEDULES TO BE FILLED UP BY THE BIDDER

Schedule 1 **Schedule of Deviations**

Schedule 2 **Copy of Unpriced BOQ**

Schedule 3 **Details of contact persons (technical & commercial)**

Schedule 4 **Enclosures to Specification**

- a) **List of makes (Annexure-M) for reference only**
- b) **Drawings**



Project 400/230-110 KV SUB STATION AT VELLALAVIDUTHI

SECTION-5

System FIRE FIGHTING SYSTEM

Customer TAMILNADU TRANSMISSION CORPORATION LTD
(TANTRANSCO)

TB-399-316-160
REV-0

Purchaser BHEL (TRANSMISSION BUSINESS GROUP)

SCHEDULE-1

SCHEDULE OF TECHNICAL DEVIATION

The following are the deviations / variations / exceptions from the specification:

Section	Clause No. / Page No.	Statement of deviation/ Variations/Exceptions
---------	--------------------------	--

- 1) In case, this schedule is not submitted, it will be presumed that the equipment /material to be supplied under this contract is deemed to be in compliance with the specification.
- 2) If there is NIL deviation, even then the format to be filled as **NIL DEVIATION**
- 3) Continuation sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.

Place Signature of the authorized representative of Bidder

Name -----

Date Designation-----

Company seal-----



Project 400/230-110 KV SUB STATION AT VELLALAVIDUTHI

SECTION-5

System FIRE FIGHTING SYSTEM

Customer TAMILNADU TRANSMISSION CORPORATION LTD
(TANTRANSCO)

TB-399-316-160
REV-0

Purchaser BHEL (TRANSMISSION BUSINESS GROUP)

SCHEDULE-2

Bidders shall attach signed and stamped **unpriced** copy of this BOQ with their technical offer:

Sl. No.	Item Description	UNIT	QTY.	Supply	ETC
01.	Conventional Ionisation Smoke Detectors	Nos.	70	YES	YES
02.	Conventional heat detectors	Nos.	02	YES	YES
03.	Conventional Manual call point	Nos.	5	YES	YES
04.	Conventional hooters	Nos.	5	YES	YES
05.	Remote Response Indicator	Nos.	35	YES	YES
06.	Annunciation Panel in Control Room (Fire alarm cum annunciation panel)	Nos.	01	YES	YES
07.	2CX1.5 Sqmm. Unarmoured control cable for fire detection and alarm system	Meters	1500	YES	YES
08.	Mechanical foam type fire extinguisher trolley mounted 50L capacity	Nos.	03	YES	YES
09.	Mechanical foam type portable 9 ltrs. capacity fire extinguisher	Nos.	02	YES	YES
10.	Trolley mounted 25 KG Capacity Dry Chemical Powder Cylindrical shape fire extinguisher	Nos.	03	YES	YES
11.	Portable 10 KG Capacity Dry Chemical Powder Cylindrical shape fire extinguisher	Nos.	05	YES	YES
12.	Portable 05 KG Capacity Dry Chemical Powder Cylindrical shape fire extinguisher	Nos.	15	YES	YES
13.	Supply of Fire & Water stand of size 2000mm (H) X 2600mm (W) out of 60X60X8mm G.I. angle for frame, 125X65sqmm G.I. channel for Base 10SWG, G.I. steel for hood & 8 nos. hook & as directed by engineer	Nos.	6	YES	YES



Project 400/230-110 KV SUB STATION AT VELLALAVIDUTHI

SECTION-5

System FIRE FIGHTING SYSTEM

Customer TAMILNADU TRANSMISSION CORPORATION LTD
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TB-399-316-160
REV-0

Purchaser BHEL (TRANSMISSION BUSINESS GROUP)

14	Supply of fire buckets 10 ltrs. Capacity made out of 26 (0.46mm) SWG MS sheet painted with white & red enamel paint inside & outside respectively. Bottom of the bucket shall be U shaped, outside of the bucket shall be written as "Fire" in English/Tamil in white enamel paint.	Nos.	48	YES	YES
----	---	------	----	-----	-----

Signature of the authorized representative of Bidder

Name :

Designation :

Place :

Date :

Company Seal



Project 400/230-110 KV SUB STATION AT VELLALAVIDUTHI

SECTION-5

System FIRE FIGHTING SYSTEM

Customer TAMILNADU TRANSMISSION CORPORATION LTD
(TANTRANSCO)

TB-399-316-160
REV-0

Purchaser BHEL (TRANSMISSION BUSINESS GROUP)

SCHEDULE-3

DETAILS OF CONTACT PERSON BOTH TECHNICAL AND COMMERCIAL

Name

Address for correspondence

Phone No.

Fax No.

Email

Place

Signature of the authorized representative of Bidder

Name-----

Date

Designation-----

Company seal -----

Note: Continuation sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.



Project	400/230-110 KV SUB STATION AT VELLALAVIDUTHI	SECTION-5
System	FIRE FIGHTING SYSTEM	
Customer	TAMILNADU TRANSMISSION CORPORATION LTD (TANTRANSCO)	TB-399-316-160 REV-0
Purchaser	BHEL (TRANSMISSION BUSINESS GROUP)	

SCHEDULE –4

ENCLOSURES TO SPECIFICATION

a) List of makes-Annexure-M

b) DRAWINGS

1. Control Room Building Layout for 400/230-110 kV Vellalaviduthi S/s

DRG. NO. TB-3-399-316-005, R-3

Annexure-M**List of makes of Equipments/Items for Fire Protection System**

Sl No.	Item	Vendors
1	Heat & Smoke Detector	APOLLO,UK/PYROTONICS SYSTEM SENSOR,USA/Nittan,UK/Tyco
2	RESPONSE INDICATORS / HOOTERS/BREAK GLASS UNITS	MATHS, Thane/MEHTA & ASSOCIATES, Ahmedabad/M.C.ENGINEERING/MATHS /MEHTA & ASSOCIATES FIRE /TECHNICO (INDIA) PVT LTD/Agni Instruments, Okhla
3	Electrical Panels	NITYA, MAKTEL, AGNI, AVAIDS ETC.
4	Fire Alarm Zonal Panels	Agni Instruments, Okhla/ECD/ Apollo, UK/Daksha, Uttarakhand
5	Fire Extinguisher & FIRE BUCKET	SAFEX Fire, Mumbai/KANADIA FYR FYTER PVT.LTD, Bhavnagar/Minimax/Zenith
6	Cables	KEI, Delton, POLYCAB

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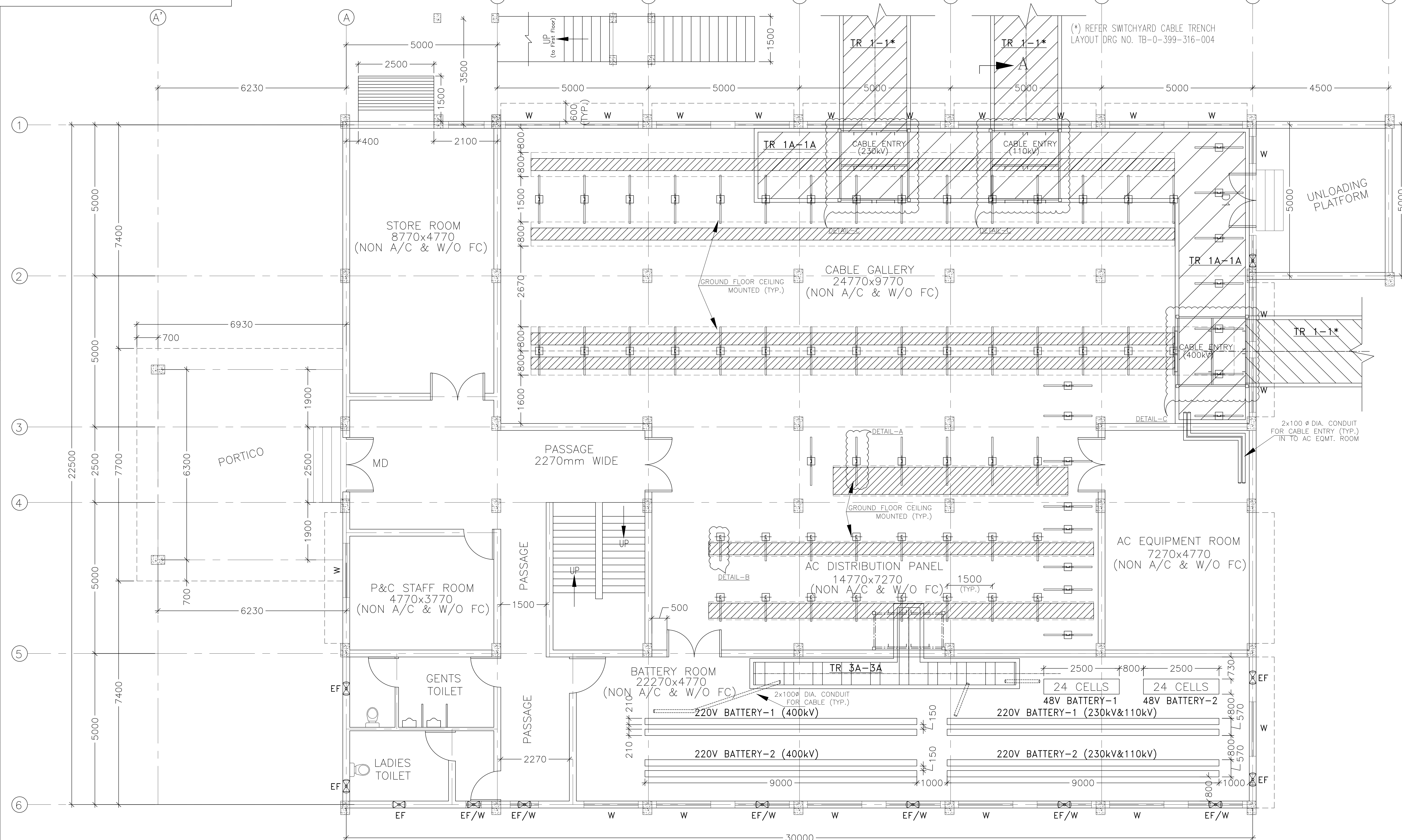
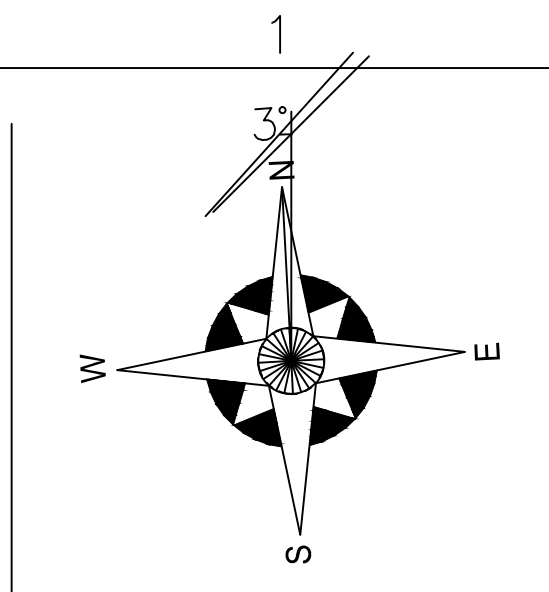
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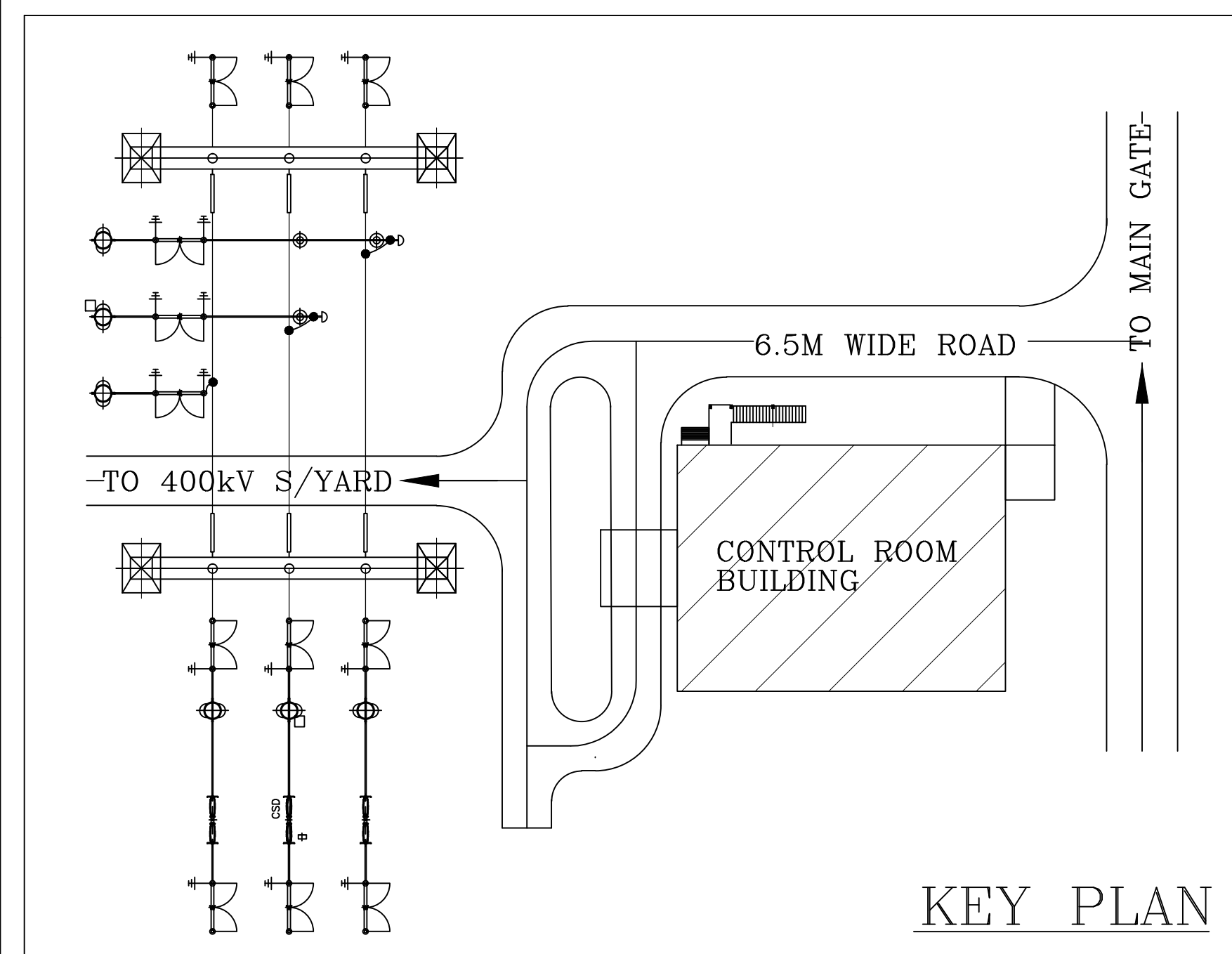
INVENTORY No.

TB-3-399-316-005
DRAWING No.

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM.)



LEGEND—
FLOOR CUTOUT



GROUND FLOOR - PLAN @ EL+0.50M LVL

REV.	DATE	ALTERED	MVK
03	28.02.19	CHECKED	MVK
		APPROVED	SKS
ZONE	REVISED AS PER CUSTOMER COMMENTS DT. 07.02.19.		

REV.	DATE	ALTERED	MVK	Sd/-
02	19.01.19	CHECKED	MVK	Sd/-
		APPROVED	SKS	Sd/-
ZONE	REVISED AS PER CUSTOMER COMMENTS DT. 11.01.19.			

ADDITIONAL INFORMATION
W.O.No. 87007

STATUS OF DRAWING
DISTRIBUTION OF PRINTS

REV.	DATE	ALTERED	MVK	Sd/-
01	28.12.18	CHECKED	MVK	Sd/-
		APPROVED	SKS	Sd/-
ZONE	REVISED AS PER CUSTOMER COMMENTS DT. 22.10.18, 30.10.18 & 28.11.18.			

ग्राहक/परियोजना का नाम
NAME OF CUSTOMER/PROJECT



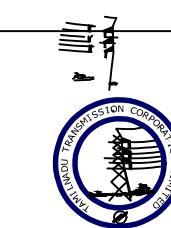
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द्रांसमिशन परियोजना विभाग
BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION BUSINESS GROUP

विभाग
DEPT. TBEM
कोड
CODE 422

अनुपात / SCALE
N/A

कॉड कोड
CARD CODE

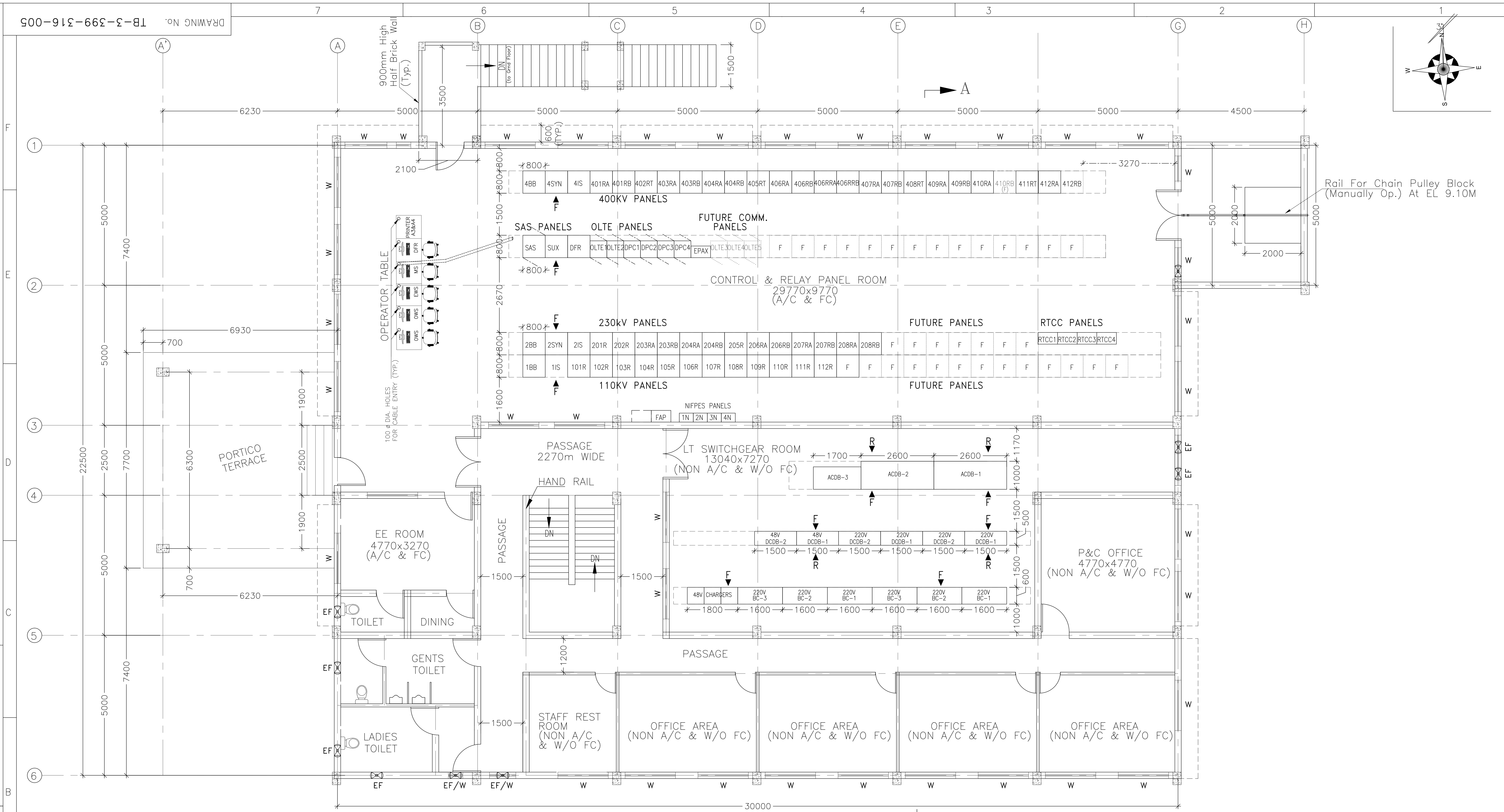
CONTROL ROOM BUILDING LAYOUT FOR
400/230-110kV VELLALAVIDUTHI S/S



TAMILNADU TRANSMISSION CORPORATION LTD.
400/230-110kV SS AT VELLALAVIDUTHI

वर्गा DRAWN	नाम /NAME	हस्ता./SIGN.	दि./DATE
जांचा CHECKED	MVK	Sd/-	17.09.18
स्वीकृत APPROVED	SKS	Sd/-	17.09.18

ड्राईंग.क्र./DRAWING NO. TB-3-399-316-005	पुनः/REV. 03
पृष्ठ क्र./SHEET No. 1	अगला पृष्ठ/NEXT SHEET 2



FIRST FLOOR – PLAN @ EL+4.50M LVL

REV.	DATE	ALTERED	MVK
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		APPROVED	SKS
ZONE	REVISED AS PER CUSTOMER COMMENTS DT. 07.02.19.		

REV.	DATE	ALTERED	MVK	Sd/-
02	19.01.19	CHECKED	MVK	Sd/-
		APPROVED	SKS	Sd/-
ZONE	REVISED AS PER CUSTOMER COMMENTS DT. 11.01.19.			

REV.	DATE	ALTERED	MVK	Sd/-
01	28.12.18	CHECKED	MVK	Sd/-
		APPROVED	SKS	Sd/-
ZONE	REVISED AS PER CUSTOMER COMMENTS DT. 22.10.18, 30.10.18 & 28.11.18.			



भारत हेवी इलेक्ट्रिकल्स लिमिटेड
ट्रांसमिशन परियोजना विभाग
BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION BUSINESS GROUP

खाराया DRAWN	नाम /NAME	हस्ता./SIGN.	दि./DATE
	MVK	Sd/-	17.09.18
जाँचा CHECKED	MVK	Sd/-	17.09.18
स्वीकृत	SKS	Sd/-	17.09.18

विभाग DEPT.	TBEM
कोड CODE	422

	अनुपात / SCALE N/A	कार्ड कोड CARD CODE
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ड्राईंग.क./DRAWING NO. TB-3-399-316-005		पुनः/REV. 03
पृष्ठ क्र./SHEET No. 2	अगला पृष्ठ/NEXT SHEET 3	

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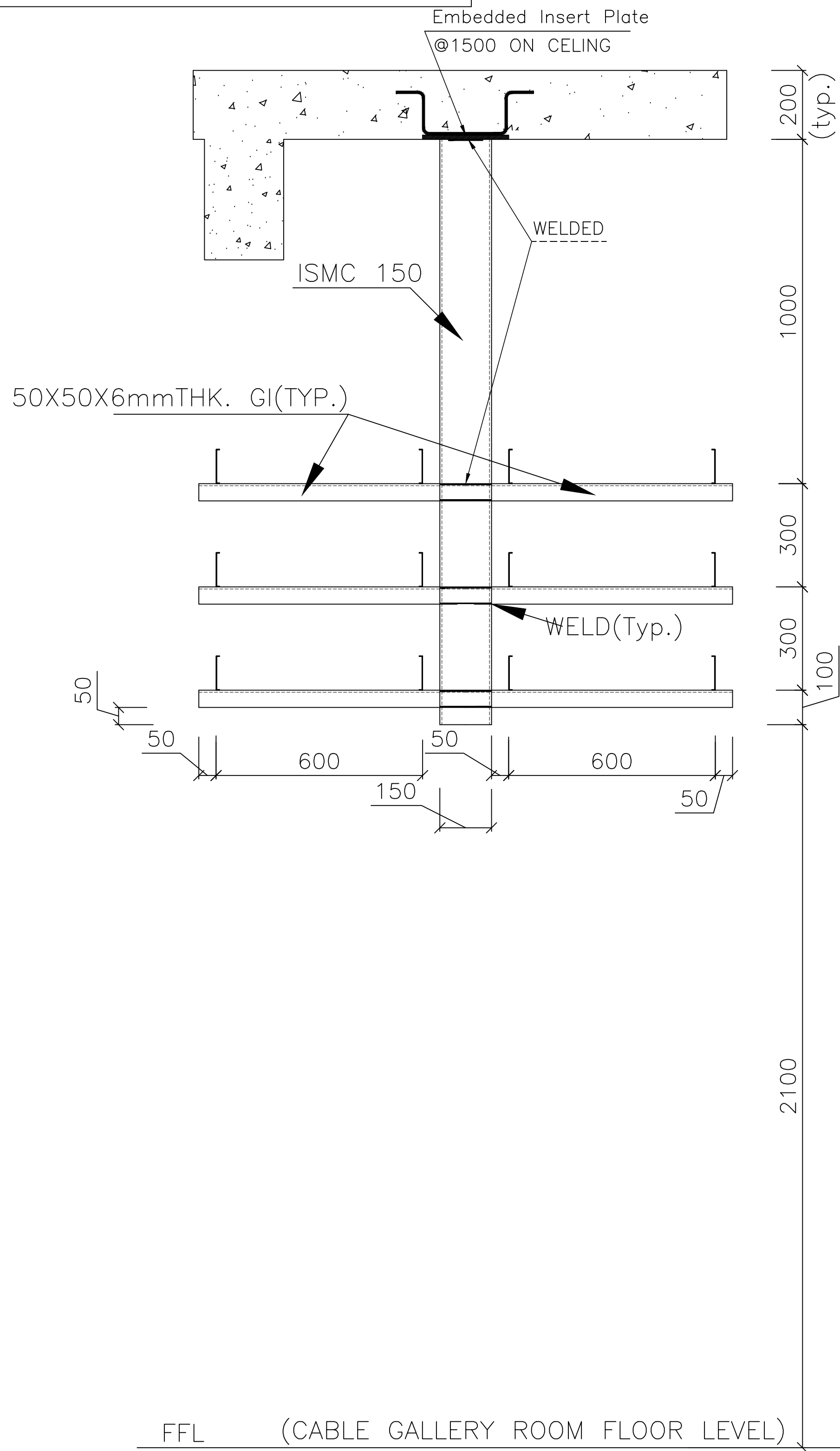
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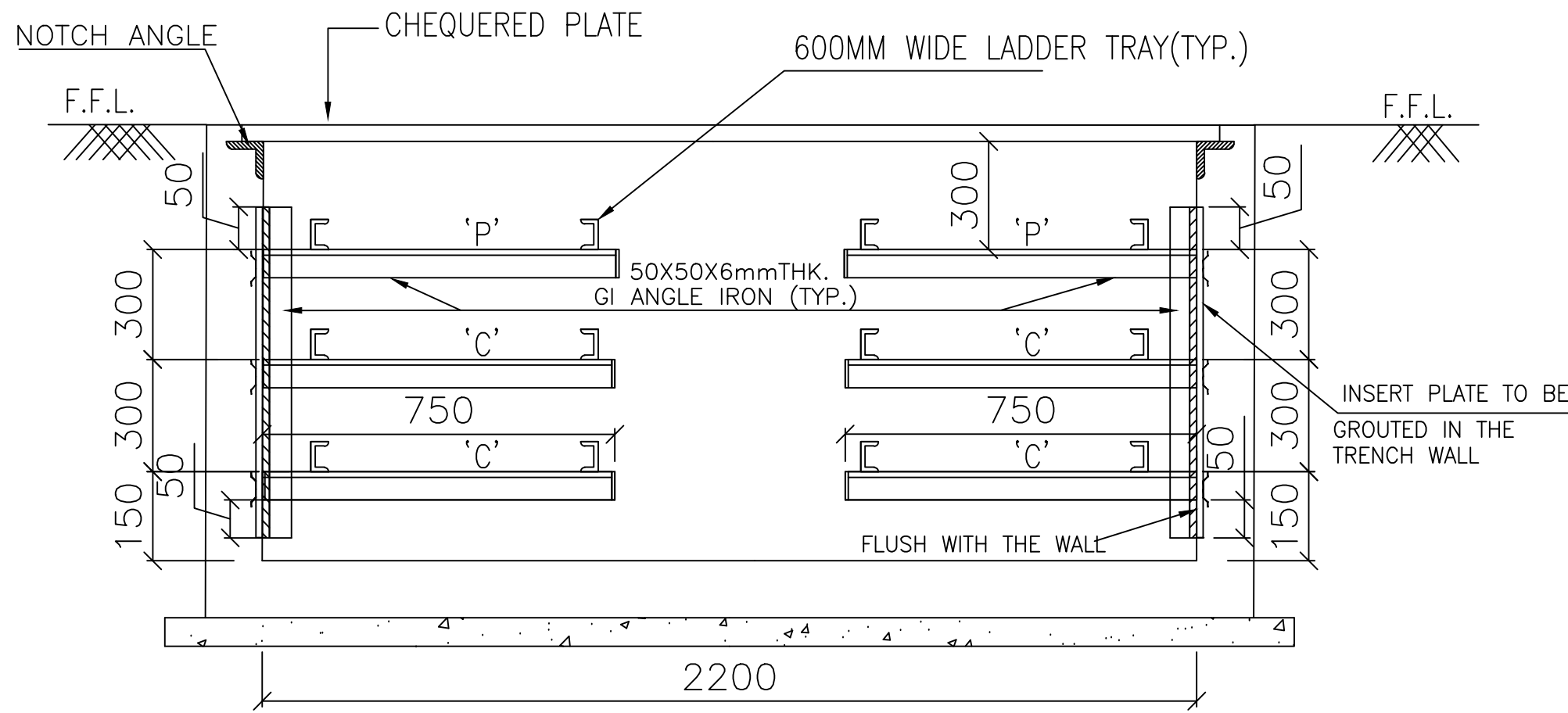
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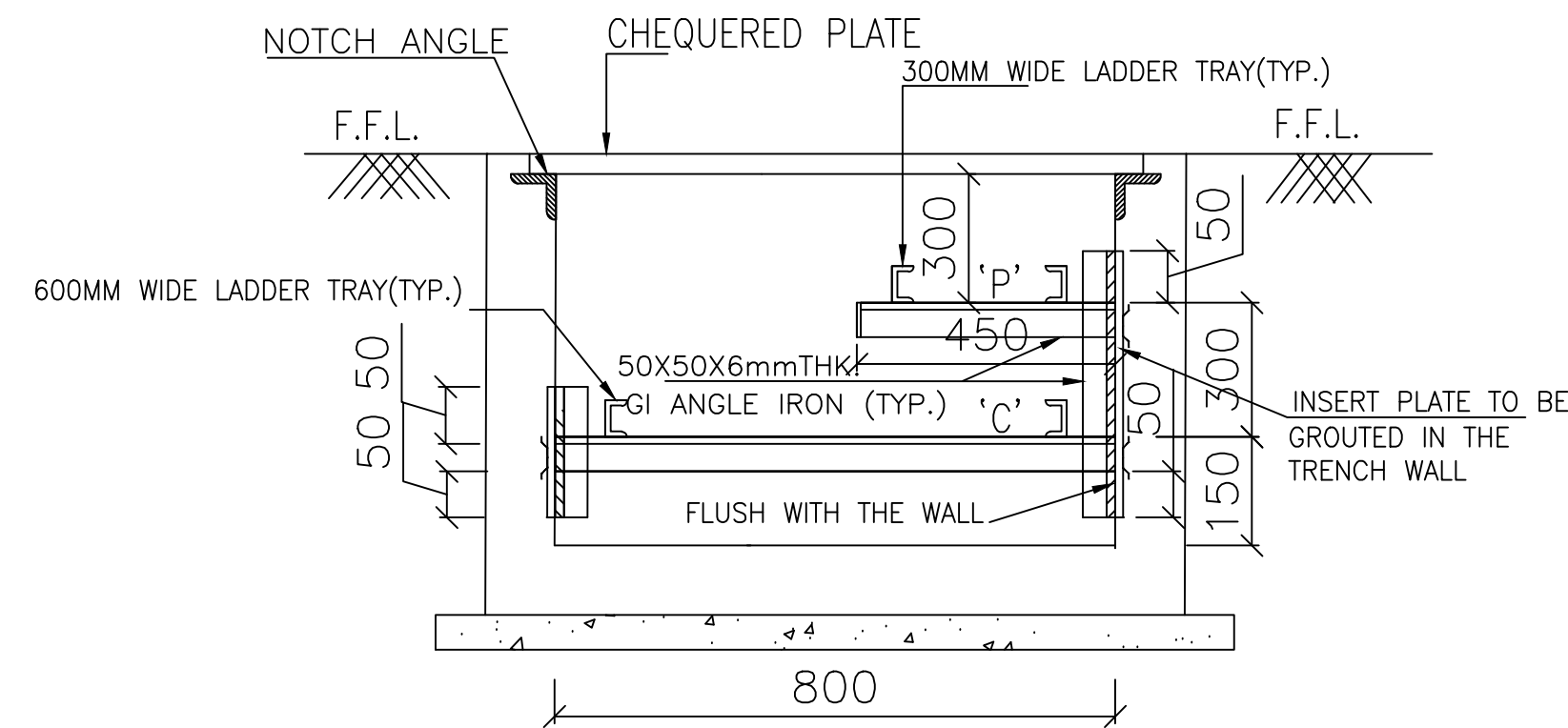
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DRAWING No.



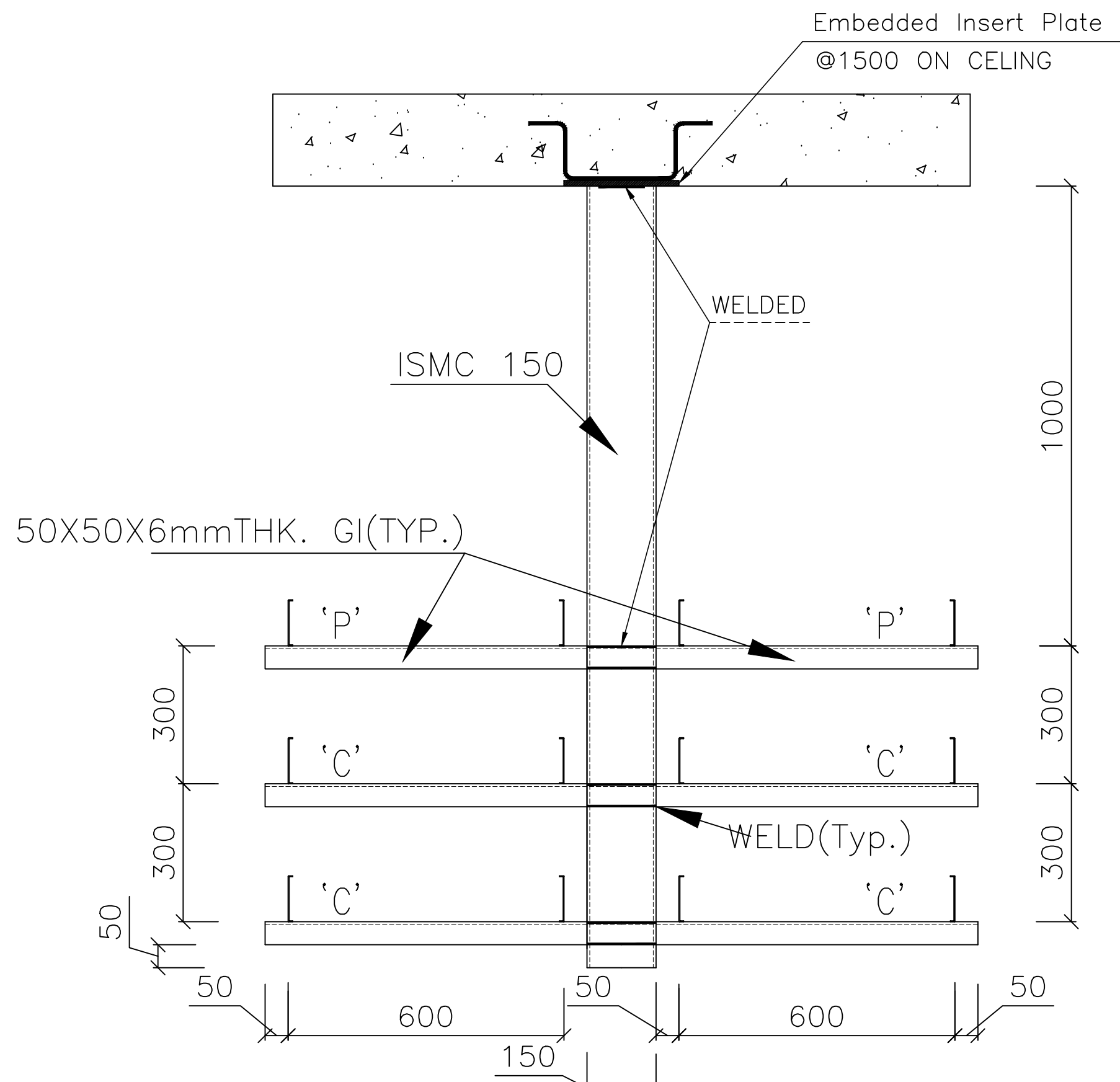
TYPICAL DETAIL OF UNDERHUNG CABLE RACK



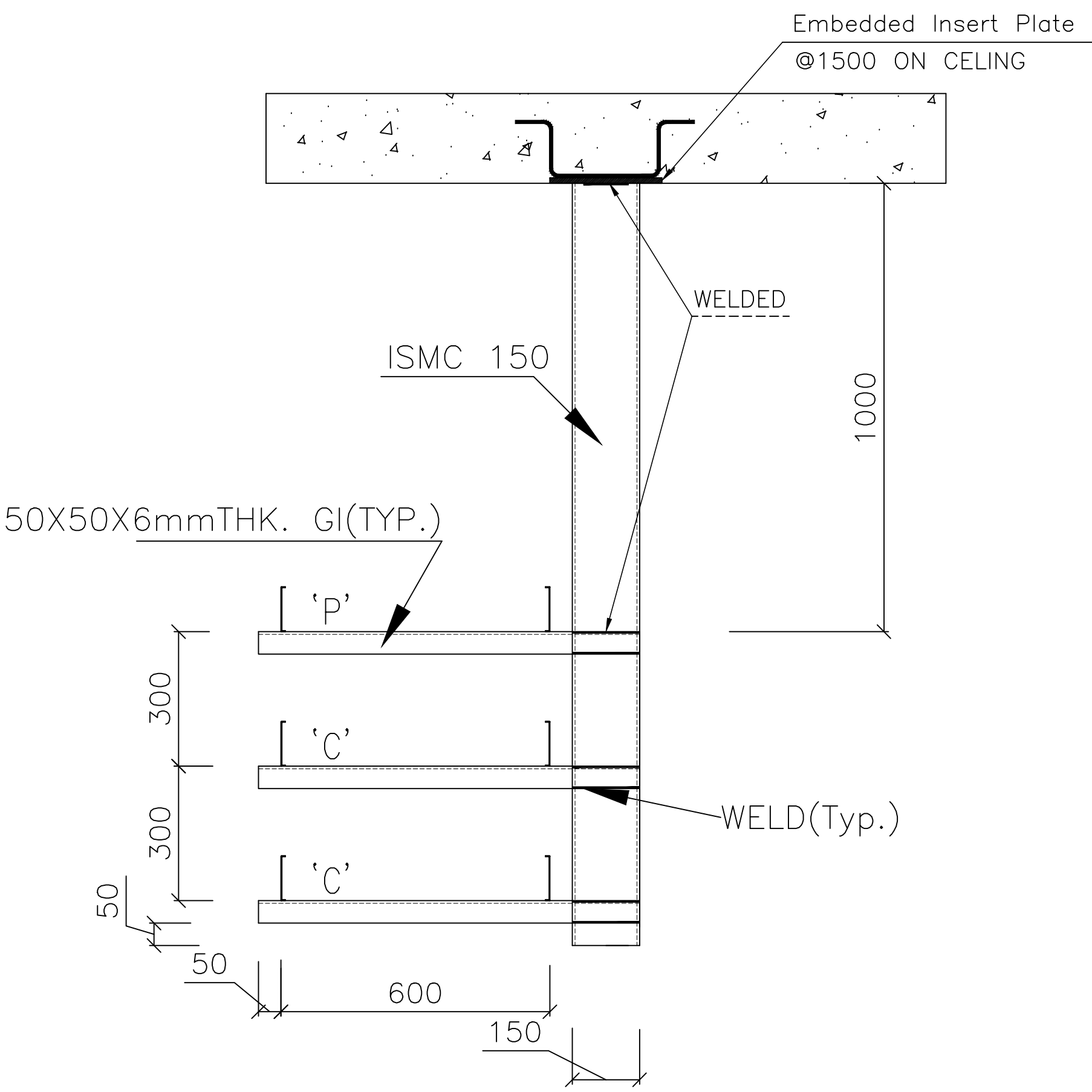
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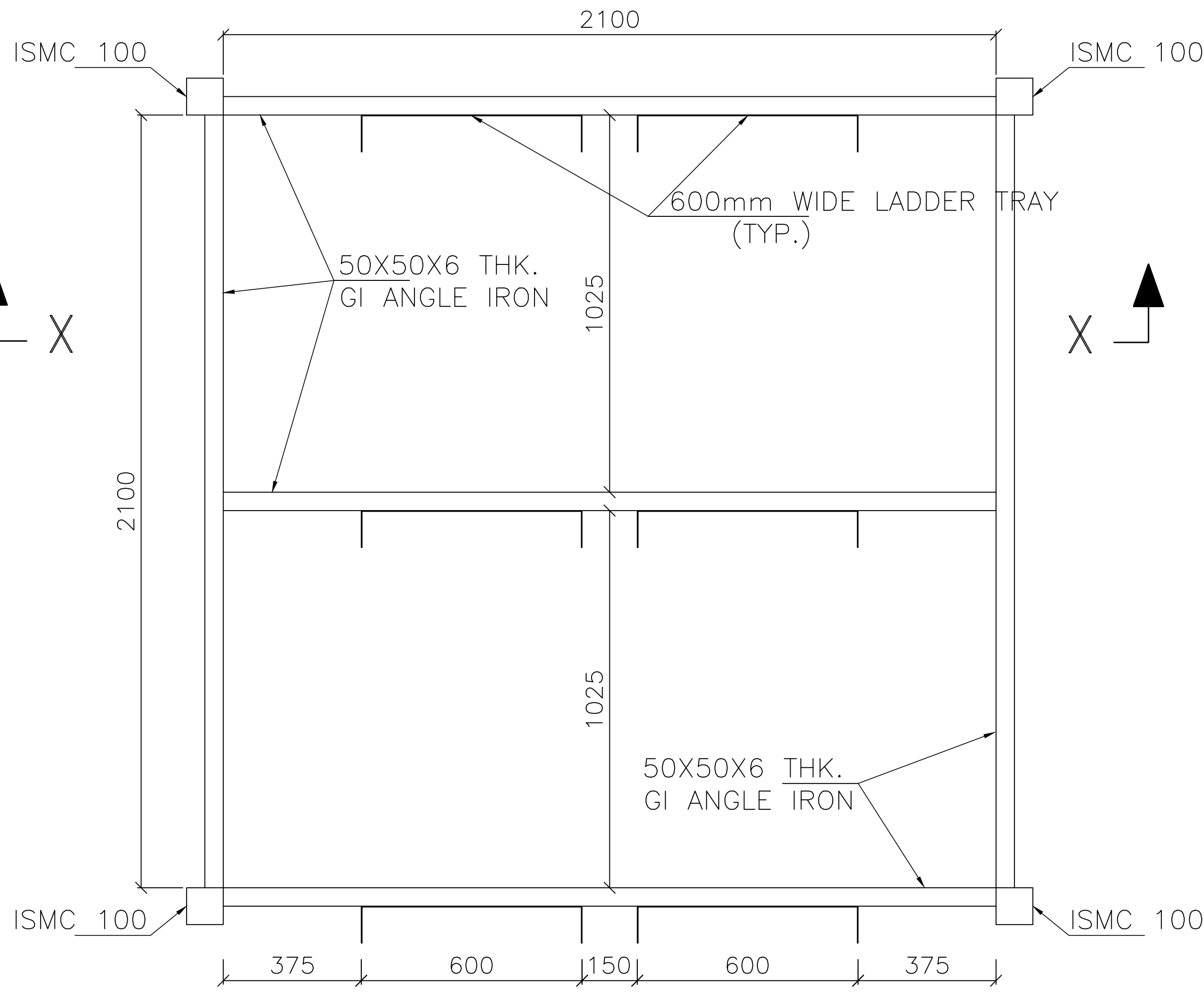
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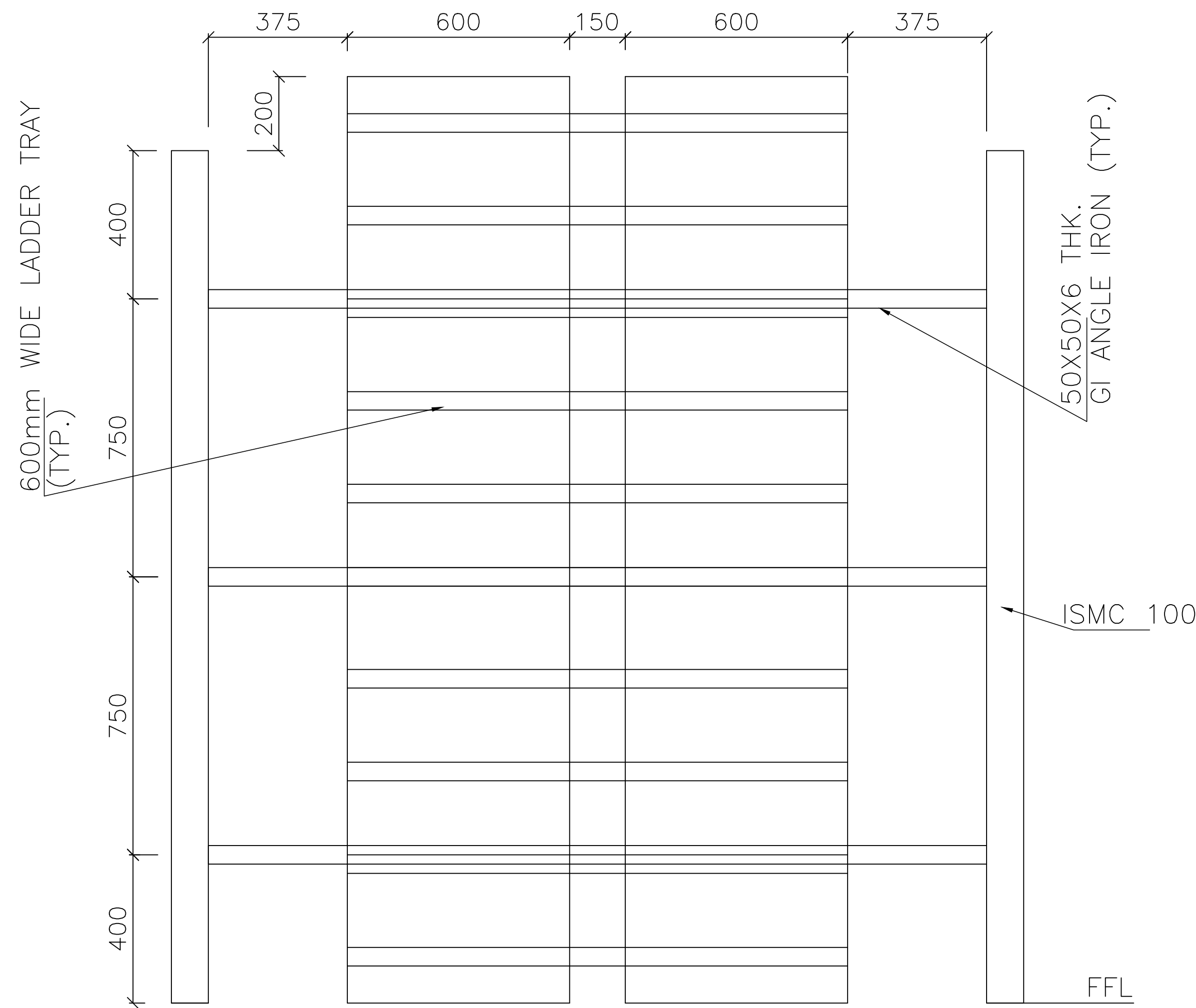
DETAIL-A



DETAIL-B



DETAIL-C



SECTION-XX

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		APPROVED	SKS	Sd/-
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REV.	DATE	ALTERED	MVK	Sd/-
02	19.01.19	CHECKED	MVK	Sd/-
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ZONE	REVISED AS PER CUSTOMER COMMENTS DT. 11.01.19.			

REV.	DATE	ALTERED	MVK	Sd/-
01	28.12.18	CHECKED	MVK	Sd/-
		APPROVED	SKS	Sd/-
ZONE	REVISED AS PER CUSTOMER COMMENTS DT. 22.10.18, 30.10.18 & 28.11.18.			

ADDITIONAL INFORMATION W.O.No. 87007					ग्राहक/परियोजना का नाम NAME OF CUSTOMER/PROJECT				
STATUS OF DRAWING					TAMILNADU TRANSMISSION CORPORATION LTD. 400/230-110KV SS AT VELLALAVIDUTHI				
DISTRIBUTION OF PRINTS					भारत हेवी इलेक्ट्रिकल्स लिमिटेड ट्रांसमिशन परियोजना विभाग BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION BUSINESS GROUP				
REV. 01 DATE 28.12.18 ALTERED CHECKED APPROVED MVK SKS Sd/-					विभाग TBEM DEPT. कोड 422				
ZONE					अनुपात / SCALE N/A				
ZONE					कॉड कोड CARD CODE				
ZONE					शीट/कॉड/TITLE				
ZONE					CONTROL ROOM BUILDING LAYOUT FOR 400/230-110KV VELLALAVIDUTHI S/S				
ZONE					ड्राईंग.कॉ./DRAWING NO. TB-3-399-316-005				
ZONE					पृष्ठ क्र./SHEET No. 3 अगला पृष्ठ/NEXT SHEET 4				

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COMPUTER DRG. PATH NAME :

REF. DRG. No.

SIGN. & DATE

INVENTORY No.

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TB-3-399-316-005
DRAWING No.

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SAS EQUIPMENT			
SN	Panel No.	Description	DIMENSIONS (W X D)
1	SAS	SAS PANEL	
2	SUX	STATION AUXILIARY PANEL	
3	DFR	DISTURBANCE FAULT RECORDER	

400kV PANEL DESCRIPTION			
SN	Panel No.	Description	DIMENSIONS (W X D)
1	4BB	400kV BUSBAR PROTECTION PANEL	800 x 800
2	4SYN	400kV SYNCHRONIZING PANEL	800 x 800
3	4IS	400kV ISLANDING PANEL	800 x 800
4	401RA & 401RB	400/230kV AUTO TRAF0 - 1 PROTECTION PANEL (H.V. SIDE)	2 x 800 x 800
5	402RT	400kV TIE PROTECTION PANEL	800 x 800
6	403RA & 403RB	400/230kV AUTO TRAF0 - 2 PROTECTION PANEL (H.V. SIDE)	2 x 800 x 800
7	404RA & 404RB	400kV KARAIKUDI LINE PROTECTION PANEL	2 x 800 x 800
8	405RT	400kV TIE PROTECTION PANEL FOR LINES	800 x 800
9	406RA & 406RB	400kV PUGALUR LINE- 1 PROTECTION PANEL	2 x 800 x 800
10	406RRA & 406RRB	400kV LINE REACTOR PROTECTION PANEL	2 x 800 x 800
11	407RA & 407RB	400/110kV AUTO TRAF0 - 3 PROTECTION PANEL (H.V. SIDE)	2 x 800 x 800
12	408RT	400kV TIE PROTECTION PANEL	800 x 800
13	409RA & 409RB	400/110kV AUTO TRAF0 - 4 PROTECTION PANEL (H.V. SIDE)	2 x 800 x 800
14	410RA	400kV LINE (FUTURE) PROTECTION PANEL	800 x 800
	410RB	400kV LINE (FUTURE) PROTECTION PANEL	NOT IN BHEL SCOPE
15	411RT	400kV TIE PROTECTION PANEL FOR LINES	800 x 800
16	412RA & 412RB	400kV BUS REACTOR PROTECTION PANEL	2 x 800 x 800

230kV PANEL DESCRIPTION			
SN	Panel No.	Description	DIMENSIONS (W X D)
1	2BB	230kV BUSBAR PROTECTION PANEL	800 x 800
2	2SYN	230kV SYNCHRONIZING PANEL	800 x 800
3	2IS	230kV ISLANDING PANEL	800 x 800
4	201R	230kV BUS COUPLER PROTECTION PANEL	800 x 800
5	202R	230kV AUTO TRAF0 - 3 PROTECTION PANEL (L.V. SIDE)	800 x 800
6	203RA & 203RB	230kV LINE - 1 PROTECTION PANEL	2 x 800 x 800
7	204RA & 204RB	230kV LINE - 2 PROTECTION PANEL	2 x 800 x 800
8	205R	230kV AUTO TRAF0 - 4 PROTECTION PANEL (L.V. SIDE)	800 x 800
9	206RA & 206RB	230kV LINE - 3 PROTECTION PANEL	2 x 800 x 800
10	207RA & 207RB	230kV LINE - 4 PROTECTION PANEL	2 x 800 x 800
11	208RA & 208RB	230kV LINE - 5 PROTECTION PANEL	2 x 800 x 800

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM.)

110kV PANEL DESCRIPTION			
SN	Panel No.	Description	DIMENSIONS (W X D)
1	1BB	110kV BUSBAR PROTECTION PANEL	800 x 800
2	1IS	110kV ISLANDING PANEL	800 x 800
3	101R	110kV LINE - 1 PROTECTION PANEL	800 x 800
4	102R	110kV LINE - 2 PROTECTION PANEL	800 x 800
5	103R	110kV LINE - 3 PROTECTION PANEL	800 x 800
6	104R	110kV LINE - 4 PROTECTION PANEL	800 x 800
7	105R	110kV LINE - 5 PROTECTION PANEL	800 x 800
8	106R	110kV AUTO TRAF0 - 1 PROTECTION PANEL (L.V. SIDE)	800 x 800
9	107R	110kV LINE - 6 PROTECTION PANEL	800 x 800
10	108R	110kV LINE - 7 PROTECTION PANEL	800 x 800
11	109R	110kV LINE - 8 PROTECTION PANEL	800 x 800
12	110R	110kV LINE - 9 PROTECTION PANEL	800 x 800
13	111R	110kV AUTO TRAF0 - 2 PROTECTION PANEL (L.V. SIDE)	800 x 800
14	112R	110kV BUS COUPLER PROTECTION PANEL	800 x 800

DESCRIPTION:-

OWS – OPERATOR WORKSTATION
EWS – ENGINEERING WORKSTATION
MS – METERING STATION
DFR – DISTURBANCE FAULT RECORDER

R PRESENT SCOPE PANELS

F FUTURE (SPACE PROVISION)

REV.	DATE	ALTERED	MVK
03	28.02.19	CHECKED	MVK
		APPROVED	SKS
ZONE	REVISED AS PER CUSTOMER COMMENTS DT. 07.02.19.		

REV.	DATE	ALTERED	MVK	Sd/-
02	19.01.19	CHECKED	MVK	Sd/-
		APPROVED	SKS	Sd/-
ZONE	REVISED AS PER CUSTOMER COMMENTS DT. 11.01.19.			

REV.	DATE	ALTERED	MVK	Sd/-
01	28.12.18	CHECKED	MVK	Sd/-
		APPROVED	SKS	Sd/-
ZONE	REVISED AS PER CUSTOMER COMMENTS DT. 22.10.18, 30.10.18 & 28.11.18.			

SAS EQUIPMENT			
SN	Panel No.	Description	DIMENSIONS (W X D)
1	SAS	SAS PANEL	
2	SUX	STATION AUXILIARY PANEL	
3	DFR	DISTURBANCE FAULT RECORDER	

STATION AUXILIARY SYSTEM PANELS			
SN	Panel No.	Description	DIMENSIONS (W X D)
1	ACDB-1 & 2	415V AC DISTRIBUTION BOARD	
2	ACDB-3	415V EMERGENCY AC DISTRIBUTION BOARD	
3	220V DCDB-1 & 2	220V DC DISTRIBUTION BOARD (400kV)	
4	220V DCDB-1 & 2	220V DC DISTRIBUTION BOARD (230kV & 110kV)	
5	48V DCDB-1 & 2	48V DC DISTRIBUTION BOARD	
6	220V BC-1, 2 & 3	80A FLOAT AND FLOAT CUM BOOST CHARGER (400kV)	
7	220V BC-1, 2 & 3	60A FLOAT AND FLOAT CUM BOOST CHARGER (230kV & 110kV)	
8	48V BC-1, 2 & 3	120A FLOAT AND FLOAT CUM BOOST CHARGER	
9	220V BATT-1 & 2	220V, 400AH, LEAD ACID TUBULAR TYPE BATTERY (400kV)	
10	220V BATT-1 & 2	220V, 300AH, LEAD ACID TUBULAR TYPE BATTERY (230kV & 110kV)	
11	48V BATT-1 & 2	48V, 600AH, LEAD ACID TUBULAR TYPE BATTERY	

MISCELLANEOUS PANELS			
SN	Panel No.	Description	DIMENSIONS (W X D)
1	RTCC1	400/110kV AUTO TRAF0 - 1 PANEL	
2	RTCC2	400/110kV AUTO TRAF0 - 2 PANEL	
3	RTCC3	400/230kV AUTO TRAF0 - 3 PANEL	
4	RTCC4	400/230kV AUTO TRAF0 - 4 PANEL	
5	OLTE1	FOTE PANEL	
6	OLTE2	FOTE PANEL	
7	DPC1	DIGITAL PROTECTION COUPLER	
8	DPC2	DIGITAL PROTECTION COUPLER	
9	DPC3	DIGITAL PROTECTION COUPLER	
10	DPC4	DIGITAL PROTECTION COUPLER	
11	EPAX	EPAX PANEL	
12	FAP	FIRE ALARM PANEL	
13	1N	NIPPEs - 1 (400/110kV AUTO TRAF0 - 1)	
14	2N	NIPPEs - 2 (400/110kV AUTO TRAF0 - 2)	
15	3N	NIPPEs - 3 (400/230kV AUTO TRAF0 - 3)	
16	4N	NIPPEs - 4 (400/230kV AUTO TRAF0 - 4)	

ADDITIONAL INFORMATION W.O.No. 87007				ग्राहक/परियोजना का नाम NAME OF CUSTOMER/PROJECT				TAMILNADU TRANSMISSION CORPORATION LTD. 400/230-110KV SS AT VELLALAVIDUTHI			
STATUS OF DRAWING				DISTRIBUTION OF PRINTS				Bharat Heavy Electricals Limited Bharat Heavy Electricals Ltd. TRANSMISSION BUSINESS GROUP			
REV. 03 DATE 28.02.19 ALTERED CHECKED APPROVED ZONE				REV. 02 DATE 19.01.19 ALTERED CHECKED APPROVED ZONE				REV. 01 DATE 28.12.18 ALTERED CHECKED APPROVED ZONE			
REVISED AS PER CUSTOMER COMMENTS DT. 07.02.19.				REVISED AS PER CUSTOMER COMMENTS DT. 11.01.19.				REVISED AS PER CUSTOMER COMMENTS DT. 22.10.18, 30.10.18 & 28.11.18.			
TBEM DEPT. कोड CODE 422				अनुपात / SCALE N/A				कार्ड कोड CARD CODE			
शीर्षक/TITLE CONTROL ROOM BUILDING LAYOUT FOR 400/230-110kV VELLALAVIDUTHI S/S				डाईग.क्र./DRAWING NO. TB-3-399-316-005				पुनः/REV. 03			
पृष्ठ क्र./SHEET No. 5				अगला पृष्ठ/NEXT SHEET -							