

Trinidad and Tobago Electricity Commission

Wiring for Light & Power

8th Edition, 2005



TRINIDAD AND TOBAGO ELECTRICITY COMMISSION

FOREWORD

This is the eighth edition of "Wiring for Light and Power" published by the Trinidad and Tobago Electricity Commission for the benefit of all those who might need to be acquainted with the requirements, standards and general information regarding a supply of electricity.

The first edition of this booklet was printed in 1959. It was subsequently updated in 1966, 1974, 1978, 1985, 1995 and 2001. On each occasion, the text and content have been enhanced with more information, diagrams and improved format, although the original title has been retained.

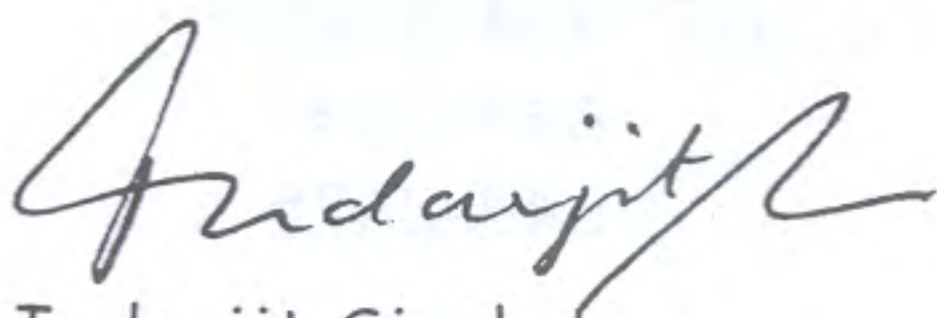
The purpose of this book is to provide the non-academic apprentice electrician, craft student and electricity enthusiast with a practical approach to the theory and practice of electricity and electrical installation work. This book should also prove useful to those connected with the industry who wish to 'brush up' on their basic knowledge.

We hope that this new attempt will serve our customers' interests and prove to be a support for all in a broader and even more useful application. This edition includes guidelines on power quality issues and standards and highlights the responsibilities of customers in this regard.

We wish to acknowledge the valuable contributions of the government electrical inspectorate, and in particular, the chief electrical inspector, members of T&TEC's senior staff and the corporate communications department in producing this latest work which has become a staple on the student syllabus for secondary schools.

The Commission would appreciate your comments on any aspect of this document as they may serve to improve future editions by highlighting issues that we may not have covered in sufficient detail in this edition.

Please be assured of our best interest.



Indarjit Singh
GENERAL MANAGER

March 2005

APPENDIX 1
TRINIDAD AND TOBAGO ELECTRICITY COMMISSION
SERVICE CENTERS

HEAD OFFICE

63 Frederick Street,
Port of Spain.

Tel Nos. 623-6291-7
623-2611-7

NORTHERN AREA

Cor. Park & Flament Streets,
Port of Spain.

Tel Nos. 623-5070
623-5162-3
623-5165
625-7531
625-1296
625-1774

PAYMENT CENTRE

PTSC City Gate,
South Quay

Tel. No. 624-0720

ST. JAMES SERVICE CENTRE

Cor. Madras Street
& Western Main Rd, St. James

Tel. No. 628-1705

SOUTHERN AREA

Gooding Village,
San Fernando.

Tel Nos. 657-7281-3

MARABELLA SERVICE CENTRE

Tel. Nos. 658-7594-95-97

PENAL SERVICE CENTRE

13-26 Siparia Erin Rd.,
Penal

Tel. No. 647-1223

RIO CLARO SUB-AREA OFFICE

Naparima/Mayaro Road,
Rio Claro.

Tel Nos. 644-2262
644-2331
644-2475

POINT FORTIN SUB-AREA OFFICE

Main Road,
Point Fortin.

Tel Nos. 648-2903
648-2791-92

EASTERN AREA

Tumpuna Road
Arima.

Tel Nos. 643-2433-4
643-2510
643-2538
643-1974-6

CUREPE SERVICE CENTRE

Eastern Main Road, Curepe

Tel. No. 662-9289

SANGRE GRANDE SERVICE CENTRE

Cor. Brieley & Henderson Streets,
Sangre Grande

Tel. No. 668-6429

ARIMA SERVICE CENTRE

#18 Sorzano Street, Arima

Tel. Nos. 664-1474-75-76

CENTRAL AREA

Pt. Lisas Industrial Estate,
Couva.

Tel Nos. 636-0786
636-2768
636-0821
636-8107-8
636-8110
636-4871

CHAGUANAS SERVICE CENTRE

Royal Bank Plaza
Main Road
Chaguanas

Tel. Nos. 672-0955-6

COUVA SERVICE CENTRE

Couva Shopping Complex
Couva

Tel. Nos. 679-0378-0757

TOBAGO AREA

Development Road,

Tel Nos. 639-2541-2
639-2451
639-2015-7

WIRING FOR LIGHT AND POWER
EIGHT EDITION 2005

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WIRING FOR LIGHT AND POWER

1. INTRODUCTION

The Trinidad and Tobago Electricity Commission has set out in this booklet its requirements for customer's installations and equipment.

This booklet only covers general requirements. Consumers and other interested parties are therefore advised to seek additional guidance and information from the Commission when planning or modifying installations, purchasing equipment, appliances or other apparatus for which the Commission would be requested to supply electrical energy. In this regard, particular attention should be paid to Section 6 below.

2. DEFINITIONS

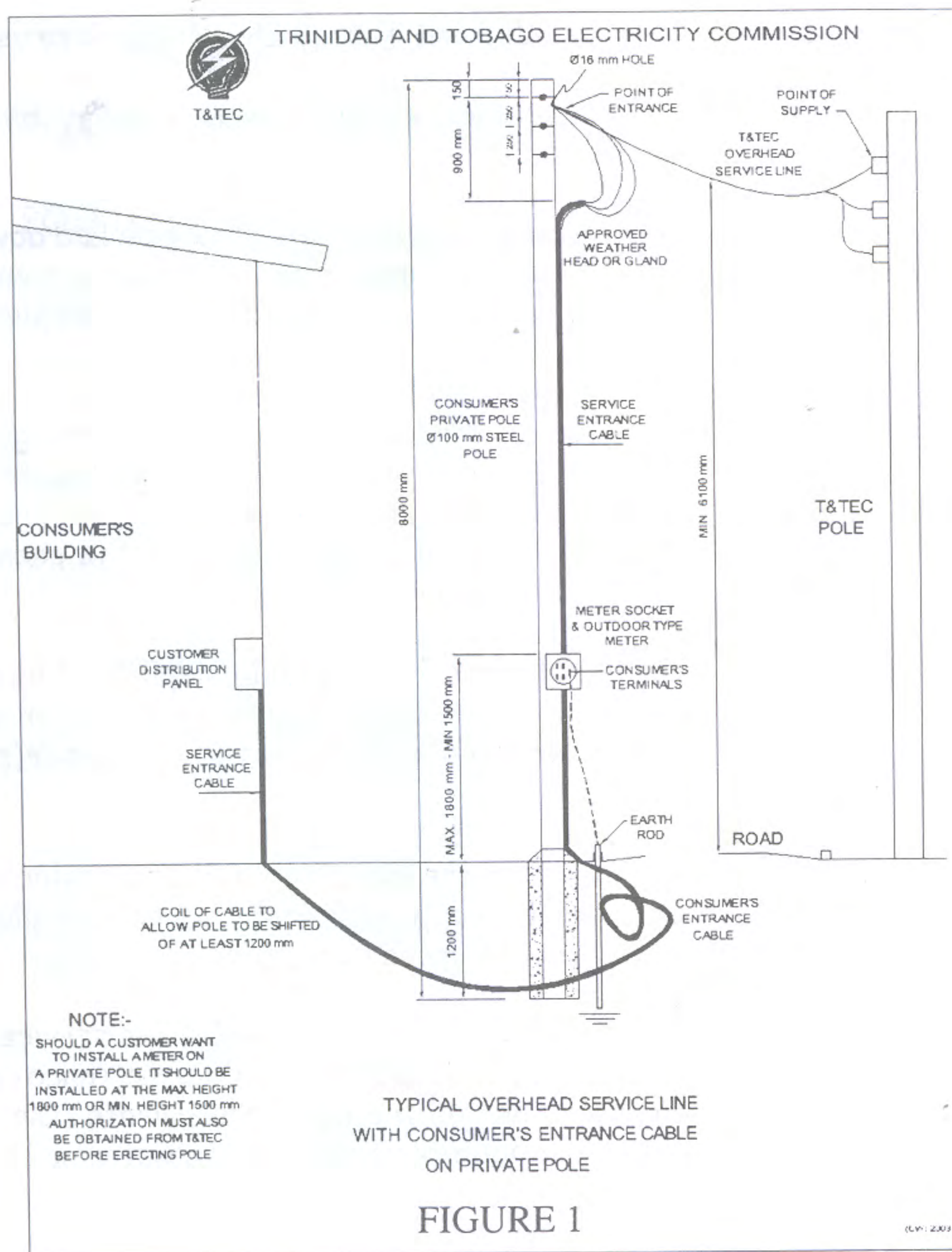
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|-----|-------------------|--|
| 2.1 | Commission | The Trinidad and Tobago Electricity Commission. |
| 2.2 | Consumer | Any customer supplied with energy by the Commission |
| 2.3 | Distribution Main | Any electric conductor which may be laid down or erected by the Commission, through which energy may be supplied or is intended to be supplied by the Commission. |
| 2.4 | Service Line | Any electric conductor through which energy may be supplied or is intended to be supplied by the Commission to a consumer either from a distribution main or directly from the premises of the Commission. |
| 2.5 | Installation | All the electrical wiring and equipment fed from one service line supplying energy to one or more consumers and owned by the consumer(s) or landlord. |
| 2.6 | Point of Supply | The point on the distribution main at which the Commission supplies energy to an installation serving one or more consumers. |
| 2.7 | Point of Entrance | The point at which the Commission's service line connects to the customer's service entrance cable. Examples are at the roof, the private pole, and the low voltage terminals of a transformer bank. |

2.8 Service Entrance Cable That portion of the installation between the point of entrance and the consumer's main disconnecting device, cable and made up in the form of a cable.

2.9 Consumer's Terminals The end of the electric lines belonging to the consumer terminals to which the supply of energy is delivered from the service entrance cable.

For a low voltage installation, the consumer's terminals shall be on the terminals of the meter base.

For a high voltage installation, the Commission shall determine the consumer's terminals.



3. CHARACTERISTICS OF SUPPLY

3.1 The Commission supplies only single and three-phase alternating current sixty-hertz (cycles per second) energy with the following declared voltages and characteristics:

- (a) Single phase, 2 wire, 115 volts and 230 volts used for installations with loads up to a maximum of 30 amperes. This does not apply to new customers. For new domestic customers, the minimum breaker size shall be 60 amperes.
- (b) Single phase, 3 wire, 115/230 volts for installations with loads up to a maximum of 200 amperes.
- (c)
 - (i) Single phase, 2 wire, 220 volts for installations in parts of the borough of Point Fortin only, up to a maximum of 200 amperes.
 - (ii) Three phase, 4 wire, 115/230 volts from a delta-connected source for installations with combined lighting and power loads, up to a maximum demand of 199KVA.
 - (iii) Voltages of 230 across phase wires, 115 between either of two phase wires and earthed neutral, and 200 volts between the third phase wire and neutral. (This third 200 volt phase wire must be positively identified with the colour blue throughout the installation or by whatever means of identification is required by the codes in force.)
- (d) Three phase, 4 wire, 230/400 volts from a star-connected source for installations with combined lighting and power loads up to a maximum of 350 KVA.
- (e) One of the following high voltages depending on the maximum demand of the load, location of the installation and the voltage available at that location:

3 phase	3 wire	6.6KV (in the City of Port of Spain only)
3 phase	3 or 4 wire	12 KV
3 phase	3 wire	33 KV
3 phase	3 wire	66 KV
3 phase	3 wire	132 KV

Accordingly, it is important that the consumer consult the Commission before making plans for an installation to be supplied at high voltage.

- 3.2 Consumers requiring supplies with utilization voltages other than the Commission's standard voltages declared in 3.1 (a), (b), (c), (d) and (e) above shall be supplied at one of the Commission's standard high voltages declared in 3.1 (e) and are required to provide their own transformers.
- 3.3 The Commission shall supply a consumer or a multiple occupied premise with only one of the voltages mentioned in 3.1 (a), (b), (c), (d) and (e).
- 3.4 The Commission reserves the right to change its system and its methods of distribution from time to time within the limits of the Trinidad and Tobago Electricity Commission Act Chapter 54.70 if it considers it advisable for an economical and more efficient supply to the public. Where such changes involve alteration to the consumer's installation and equipment, the Commission will normally make the changes at its own expense.
- 3.5 The electricity supply rules made under Section 15 of the electricity (Inspection) Act Chapter 54.72 provide for variation of six percent above or below the declared voltages.

4. APPLICATION FOR SUPPLY

- 4.1 Application for supply should be made well in advance of the date the supply is required. Such "Request for Supply" can be made at the Commission's offices listed and located as shown in appendix 1.
- 4.2 Consumers are advised not to commit themselves to the wiring of their premises before the Commission has considered their "Request for Supply". This is essential if their premises are located more than 30.5m from the low voltage distribution mains of the Commission and more so if the requests are for 3 phase or high voltage supplies.
- 4.3 In all cases requiring mains extensions, the consumer will be required to grant to the Commission all the necessary easements for the construction of such mains, as well as any extension thereof to supply other consumers. Such mains with associated equipment shall be and will remain the property of the Commission to operate, maintain and to be utilized as the Commission may decide.
- 4.4 A consumer requiring a temporary supply for a period of less than 3 years shall be required to pay the full cost of installing and removing all mains and equipment required to provide such a supply, together with a percentage of the cost of the re-useable materials

as determined by the Commission. THIS TOTAL PAYMENT SHALL BE MADE IN ADVANCE.

Charges for energy consumed shall be in accordance with the Commission's standard tariffs and the consumer may be required to deposit payment in advance for anticipated energy consumed for a period to be determined by the Commission.

5. CHANGE IN CONSUMER'S REQUIREMENTS

- 5.1 The capacity of the system provided by the Commission is designed to guarantee an adequate supply to the consumer's installation for the load requested. Any appreciable increase in load therefore could result in disruption of the supply or damage to equipment. The consumer is therefore required to give reasonable notice to the Commission of any intention to increase the demand on the system, so that adequate facilities could be provided by the Commission.
- 5.2 The consumer is liable for the cost of repairing or replacing any of the Commission's equipment, which is damaged because of the failure of the consumer to comply with the requirements of (5.1) above.

6. INSPECTION OF CONSUMER'S INSTALLATION

- 6.1 The consumer's installation shall conform to the appropriate regulations of the Electricity Inspections Act, Chapter 54.72, and other rules or regulations having the force of statute and of any modification applicable to the taking and/or use of electricity within the consumer's premises.

Before any installation can be connected to its system, the Commission shall be presented with an *inspection certificate of approval* for the installation. This certificate is to be obtained from the Chief Electrical Inspector, Electrical Inspectorate Division.

- 6.2 The Commission reserves the right to withhold or discontinue its supply whenever it considers that any installation is likely to affect the quality of the supply to other consumers and the chief electrical inspector shall be notified.
- 6.3 The Commission can inspect an installation for purposes related to the supply of electricity and can refuse to supply an installation

if it does not meet the requirements of the Commission and or the chief electrical inspector.

- 6.4 An electrical installation, which has been disconnected from the Commission's system for a period of more than three months, shall be re-inspected and approved by the chief electrical inspector before the Commission will connect that installation to its system.

The following electrical installations are subject to inspection by the Government Electrical Inspectorate at the intervals shown:

- (a) Temporary supplies - 600 volts and less - 3 months
- (b) Temporary supplies - greater than 600 volts - 12 months
- (c) Permanent supplies - 600 volts and less - 5 years
- (d) Permanent supplies - greater than 600 volts - 12 months
- (e) Installations with standby generators - 12 months

- 6.5 The Commission shall not be responsible for damage resulting from defects in the consumer's installation. The consumer is advised to obtain the services of a licensed electrical wireman to repair the installation and obtain an inspection certificate of approval for the work undertaken by the licensed electrical wireman. A defective installation disconnected from the system by the Commission shall not be reconnected until the inspection certificate of approval has been presented to the Commission.

7. POINT OF SUPPLY

- 7.1 It is advisable that the consumer or his representative consult the Commission to determine the location of the point of supply for a new installation or an installation, which is to be modified.
- 7.2 The point of supply for an installation supplied at 115/230 or 230/400 volts shall be at the Commission's distribution pole on which the appropriate voltage supply is available, except in the case where the consumer provides an underground service entrance cable.
- 7.3 In the case where it is necessary for the Commission to install transformers on the consumer's premises to supply the consumer at 115/230 or 230/400 volts the secondary terminals of the transformers shall be point of supply.
- 7.4 The point of supply for a consumer's installation supplied at high voltage shall be either the consumer's terminals which connect with the service line, or the terminals of the Commission's disconnecting means, or such other point as negotiated between the consumer and the Commission.

8. SERVICE LINE:

- 8.1 The Commission shall provide only one service line to supply a building, which shall be considered as any structure under one roof.
- 8.2 The Commission shall install an overhead service line to connect to the point of supply as indicated in Figure 1.
- 8.3 The customer's point of entrance shall not be located directly above a building extension (e.g. a garage or porch extension) or split roof. This is because the point of entrance cannot be directly reached from a ladder placed on the ground.
- 8.4 The weather-head or cable gland at the point of entrance shall be placed at a minimum distance of 15cm away from the fascia (bash) board and shall not be in the direct path of water flow from rooftops /flashings and gutterings.
- 8.5 Where an overhead connection is provided, it is preferred that for 115/230 and 230/400 volts installations, the consumer's terminals at the point of supply be located at a pole furnished and maintained by the consumer, located on his premises at the boundary of his property as indicated in Fig. 3. (Specifications for a private pole - without meter) and Fig. 4. (with meter).
- 8.6 The overhead service conductors shall be connected to the building at a minimum height of 3.7 metres above finished grade level, or at such a greater height as is necessary to maintain a minimum height of 6.1 metres for clearance of the Commission's overhead service line over roads. (See figs. 9 & 10)
- 8.7 In order to meet the clearance requirements in 8.3 above or any other requirement the consumer shall, where necessary, provide and maintain a private pole (with meter) or an intermediate pole on his premises to support the Commission's overhead service line in accordance with the Commission's specifications (figs 3+4). For connections to buildings, it is the responsibility of the customer to make provisions for the attachment of the service connection. Where metal flashing or purlins are used, a 16mm hole shall be provided to accommodate a "D-Iron," complete with a (1/2 inch) bolt and insulator (fig 5-8).

9. CONSUMER'S ENTRANCE CABLE

- 9.1 The Commission shall connect only to a single consumer's entrance cable at the point of supply to a building.

9.2 The consumer's entrance cable shall be in either rigid metallic conduit treated against corrosion or other approved non-corrosive enclosures, or shall be concentric or tamper-proof cable from the consumer's terminals at the point of supply to the metering equipment and should preferably continue to the consumer's main switch. If the conduit is used, only standard conduit elbows and fittings to facilitate pulling of the cables shall be allowed (see figs. 9 & 10). Splicing of consumer's entrance cable shall not be permitted.

9.3 An approved weather head or gland is required at the consumer's terminals at the point of supply and a minimum of 0.5 metres of cable must be left for connection to the Commission's overhead service line. Attachment to the Commission's conductors shall be made at a point no less than 0.3 metres from the weather head or gland (see Fig. 9)

The consumer is required to provide and install terminating lugs for connecting to cables with conductor sizes larger than 95 mm².

9.4 Multiple occupancy buildings with accommodation for two or more consumers shall not be supplied unless the service entrance cable is adequate to supply the entire number of consumers. A 35 mm² cable shall be the minimum cable size to a splitter.

9.5 The size of a consumer's service entrance cable for a building with only one meter supplied at 115/230 or 230/400 volts shall not be less than 16 sq. mm. This cable size is for copper conductors, with rubber, polythene or P.V.C. insulated. Other approved cables can be used with equivalent minimum current carrying capacity.

10. METERS

10.1 In general, all electrical energy supplied to a consumer at a single location shall be metered by a single meter.

10.2 The Commission shall furnish, install, connect and maintain meter(s) required for the measurement of electrical energy and maximum demand for billing purposes. These meters shall remain the property of the Commission.

10.3 Outdoor meter sockets shall be supplied by the consumer and shall conform with the American National Standards Institute's Standard ANSI C12.7 for watt hour meter sockets.

10.4 Outdoor socket type meters shall be installed for single phase 115/230 volts installations up, to a maximum of 200 amperes.

The consumer shall furnish and install the entrance cable and meter socket. Meter sockets of the ringless type are acceptable but must be provided with an approved means for sealing the cover.

- 10.5 Meter sockets shall be installed on the front foremost wall of the premises. Meters, whether installed indoors or outdoors, shall not be located over doorways, along stairways, or directly under water pipes or drainpipes, and shall be mounted free from shock, vibration and mechanical damage.
- 10.6 In a building elevated more than 2.4 metres above the ground, the meter shall be located on one of the supporting columns of the building.
- 10.7 Where alterations result in inaccessibility to the Commission's meter, a notice shall be served and copied to the Government Electrical Inspectorate advising the customer to relocate his meter base to a specified location within a stipulated time frame. An inspection certificate will be required. Failure to provide the Commission with accessibility to read the meter will result in disconnection of the supply.
- 10.8 Meters shall be accessible for reading and testing at all times and located so that the tops of the meters are not over 1.8 meters or less than 1.5 metres above floor or finished grade. A clear space of at least 0.90 metres in front of all meters shall be available at all times.
- 10.9 Where the Commission decides to install a bottom connected/conventional type meter, the consumer shall provide a meter-board for mounting the meter. Meter-boards shall be sized for the consumer's tariff, as shown in fig. 11, and shall be made from 19 mm hard-wood stock free from knots, set plumb and level and securely fastened to substantial supports.
- 10.10 Meters for a residential/commercial multi-storey and multi-occupancy building shall be grouped in one location on either the basement or ground floor in an accessible location. Where there are more than six metered installations in the building, the Commission shall permit the installation of groups of not more than six meters on the basement floor, the ground floor and accessible locations on any of the upper floors.

Each meter circuit must be positively identified with the installation to which it is connected.

10.11 The Commission shall provide outdoor socket type class 200 amp meters for all new 115/230 and 230/400 volts, three phase installations with loads of up to 200 amperes per phase for consumers. Consumers shall, therefore, be required to provide ringless type outdoor 200 ampere, 7-jaw meter sockets for such installations. The consumer may consider it an advantage to install a meter socket with bypassing facilities, since this would enable meter testing without disruption of supply.

10.12 Socket type meters shall meter three phase, 115/230 volts and 230/400 volts installations loads up to a maximum of 200 amperes per phase. For loads between 201 to 500 amperes per phase, the Commission shall provide current transformer metering. The consumer shall furnish and install the current transformer cabinet and meter-board (see Fig. 11) and meter cabinet where necessary. The meter cabinet shall be sized to accommodate the appropriate meter board shown in Fig. 11 and shall have a minimum depth of 25.4 cm.

Between the current transformer cabinet and the meter board of the meter cabinet, a 20 mm² conduit properly terminated and bushed containing three 1.5 mm² identified red, white, blue and four 2.5 mm² identified red, white, blue and black 600 volts insulated conductors must also be provided and installed by the Consumer.

The conductors between the current transformers and meter should not be more than 15m in length. Lengths of not less than 0.9 metres must be provided outside the two ends of the conduit to permit connection to the meter and the current transformers by the Commission as indicated in Figure 11. The consumer or contractor shall obtain current transformers from the Commission and install them in a cabinet on the supply side of the main switch.

10.13 Three phase, 115/230 volts and 230/400 volts installations requiring loads in excess of 500 amperes per phase shall be supplied and metered at high voltage by the Commission. The metering unit shall be installed by the Commission on a distribution pole supplied by the Commission or the consumer, or in the consumer's transformer substation subject to the conditions of the supply.

10.14 Only authorized employees of the Commission and government electrical inspectors are permitted to break meter seals to carry out inspection or testing of the meter and/or installation. All other persons are forbidden to interfere with metering and associated equipment.

- 10.15 The Commission shall not permit pilot lights, voltmeters, ammeters or any consumer's equipment to be connected to the secondaries of its metering transformers or associated metering equipment.

11. CONSUMER'S INSTALLATION

- 11.1 A consumer shall furnish, install and maintain all wiring, equipment, and apparatus, except the meter(s), connected with his installation from the point of supply.
- 11.2 Any accessible part of the consumer's installation between the point of supply and the load side of the metering equipment shall be sealed by the Commission. The consumer shall provide the means by which the Commission can apply its seals.
- 11.3 All equipment furnished by the Commission and installed in the consumer's premises shall always remain the property of the Commission and may be removed there either for servicing or when it is no longer required for the particular installation.
- 11.4 The portion of the consumer's installation between the point of supply and the main distribution panel shall be subject to approval of the Commission, in addition to the normal approval of all other authorities having jurisdiction.
- 11.5 The minimum sizes of main switches or circuit breakers permitted on consumer's installations are as follows:-

Characteristic of Supply

Minimum Current Rating of Main Switch

115 volts, 2 wire, 1 phase	30 amperes
115/230 volts, 3 wire, 1 phase	60 amperes
115/230 volts, 4 wire, 3 phase	60 amperes
230/400 volts, 4 wire, 3 phase	60 amperes

- 11.6 In a building with more than one separately metered consumer's installation, a security type metal splitter box with a suitably sized circuit breaker for each installation shall be installed between the consumer's entrance cable and the meter sockets by the consumer(s) or landlord. Security type tamper-proof splitters are required to have provisions for a padlock and the Commission's seal.

A disconnecting means must be available for each metered circuit and clearly labeled to allow for isolation and locking in the "OFF" position from the service entrance live conductors.

The provision and maintenance of a splitter is the responsibility of the owner of the property. However, under no circumstances should she/he or the customer access any breaker or internal part of the splitter without the express permission of the Commission. The Commission must first be contacted to remove its seal and lock in such cases.

- 11.7 Where there are seven or more separately metered consumer's installations in a building, a main disconnecting means or circuit breaker shall be installed between the consumers' entrance cables and the group of circuit breakers in the splitter box by the consumer(s) or landlord (see fig 14). Provision shall be made for the sealing or locking of this switch or breaker by the Commission.
- 11.8 Where a consumer requires a supply in a building already wired with one or more metered installations, he should consult the Commission before any work is done. In all such cases adequately sized entrance cable and splitter facilities shall be provided by the consumer.
- 11.9 Where the Commission considers it necessary to install transformers and associated equipment on a consumer's premises to supply the consumer, the consumer shall furnish, construct and maintain an enclosure according to the Commission's specification and without charge to the Commission. Transformer kiosks should be located to provide 24- hour emergency access to the Commission. Where there is shared access to the premises, the customer shall install a mutually acceptable "double lock" arrangement to accommodate the Commission's standard lock.

The construction of the kiosk shall conform to the standards laid out in article 450 -"Transformer and Kiosk Vaults" in the current edition of the National Electrical Code, in particular Section "C", which deals with walls, roof, floors, doorways and ventilation openings. These standards are available throughout the Commission's utilization departments.

- 11.10 The Commission shall not provide a supply at high voltage to any consumer unless the consumer guarantees in writing that every portion of the consumer's installation which is for use at high voltage will be maintained in a safe and efficient state to the satisfaction of the Commission, and that an authorized person will be available at all reasonable times for switching in accordance with Rule 32 of the Electricity (Inspection) (Supply) Rules Chapter 54:72. A **Danger** sign carrying the operating voltage of apparatus 600 volts and above must be displayed on enclosures containing electrical equipment in order to deter entry of unqualified personnel, e.g.-

DANGER
12,000 VOLTS
NO UNAUTHORIZED ENTRY

- 11.11 The consumer shall furnish and install a high voltage circuit breaker as the primary disconnecting means for an installation with a maximum demand in excess of 800 KVA. The consumer should conform to the Commission's specification with respect to the rating and interrupting capacity of the circuit breaker. The limits of the consumer's protection setting shall be stipulated by the Commission to ensure discrimination with the protection of the Commission's system.

It is recommended that the consumer maintain an adequate supply of spare parts for the normal maintenance of his circuit breaker and ancillary apparatus.

- 11.12 Figures 4. to 10 show examples of typical installations and locations of the service line, point of supply, entrance cable and consumer's terminals. In all cases, maintenance of all wiring, equipment and apparatus in the installation is the responsibility of the consumer(s) and/or landlord(s) and not of the Commission.

12. MOTORS AND MISCELLANEOUS APPARATUS

- 12.1 The starting current of motors and in-rush current of other apparatus such as welders and x-ray machines shall be such as not to impair the quality of supply rendered by the Commission to consumers.
- 12.2 Motors up to 750 watts in size can be supplied at either 115 or 230 volts, single phase.
- 12.3 Motors of more than 750 watts and up to 5.6 kilowatts in size can be supplied at 230 volts either single/or 3 phase depending on the supply available. Single phase motors rated between 3.75 kilowatts and 5.6 kilowatts shall be arranged for no load starting.
- 12.4 Motors of more than 5.6 kilowatts in size shall be supplied at 3 phase and must be arranged for reduced voltage starting. The Commission will be prepared to consider by way of written application, direct on line starting of motors of these sizes where the supply to the consumer's installation is at high voltage.
- 12.5 Other apparatus not larger than 2.5 kilowatts in size can be supplied at either 115 or 230 volts, single phase.

- 12.6 Apparatus larger than 2.5 kilowatts in size, up to and including 15 kilowatts in size, can be supplied at 230 volts, single phase.
- 12.7 Apparatus larger than 15 kilowatts in size can only be supplied from a three phase supply.
- 12.8 In certain areas where only a single phase supply is available, an application to the Commission for the installation of apparatus mentioned in paragraphs (12.4) and 12.7) will be specially considered by the Commission.
- 12.9 Single phase appliances and motors supplied from 3 or 4 wire installations shall be so connected that the operating current unbalance will be a minimum.
- 12.10 Motors and appliances such as refrigerators, air conditioning units, video-recorders, computers, microprocessor controlled equipment, television sets and other sensitive electronic equipment should be provided with devices for protection against variations from normal supply conditions.
- 12.11 Three phase motors, apparatus and other equipment should be protected against single phasing conditions.
- 12.12 Consumers with voltage sensitive equipment must provide their own stabilizing equipment to meet the limits of the sensitivity of their equipment. In such cases the consumers should consult the Commission before finalizing plans for installing such equipment.
- 12.13 Fluorescent and other lighting fittings of inherently poor power factor must be corrected to a value of at least 0.8 before being connected to any installation supply by the Commission.

13. POWER QUALITY REQUIREMENTS

- 13.1 Transient voltage surge suppressors (TVSS) are highly recommended for the protection of electrical equipment against damage caused by lightning and switching surges. The clamping voltage and Joules rating of the TVSS should be coordinated with the rating of the connected equipment. The Commission advises that such surges are characteristic of ALL power systems and consumers must protect their sensitive equipment accordingly.
- 13.2 Consumers should verify that their TVSS are underwriters' laboratory listed for compliance with standard #1449 or equivalent.
- 13.3 The customer's installation must be provided with a driven earth

- 13.3 The customer's installation must be provided with a driven earth rod located as close as practically possible to the meter base and connected to the first point of termination of the consumer's neutral. The maintenance of a ground resistance not greater than 25 ohms will provide protection within the installation against unbalanced voltages in situations where the customer's neutral is corroded, slack or open. It is advisable that the area around the earth electrode be kept moist at all times. A loop at the termination of the earth conductor to the earth electrode should be provided for the purposes of testing.
- 13.4 Ground fault circuit interrupters (GFCI) are mandatory for all outlets at locations where there may be contact with water. These include counter tops in kitchens and bathrooms. The GFCI will operate for very small ground currents less than the circuit breaker will protect against, thus providing safety to users of connected appliances. This is now a mandatory requirement for new and rewired premises.

14. STANDBY GENERATORS

The installation of standby generators is restricted to special situations in which a continuous supply of electricity is considered critical, the failure of which would result in risk to life, severe economic hardship, or public safety. To this end, standby generators can only be installed under the following conditions:

- 14.1 Before a generator is connected to an electrical installation it is necessary to obtain a license from the Ministry of Public Utilities.
- 14.2 The entire installation must be inspected and certified by the Government Electrical Inspectorate and the generator and its changeover switch must be tested by the Trinidad and Tobago Electricity Commission for final approval.
- 14.3 Where automatic transfer switches (ATS) are installed, (see diagram below) they shall comply with the following:
- (1) There must be a mains disconnect from the incoming utility supply to the ATS. The ATS (Automatic transfer switch) is not a means of disconnect
 - (2) The ATS must be capable of carrying its rated load current continuously.
 - (3) The ATS must be capable of detecting failures in the utility supply and disconnecting the load from same.

- (4) The ATS must 'break then make' in transferring load to the generator with no possibility of back feed to the utility supply.
- (5) The ATS must be capable of detecting the return of a normal supply and transferring the load to same.
- (6) The ATS must be rated to carry expected fault current continuously and must not operate or fail under fault conditions.

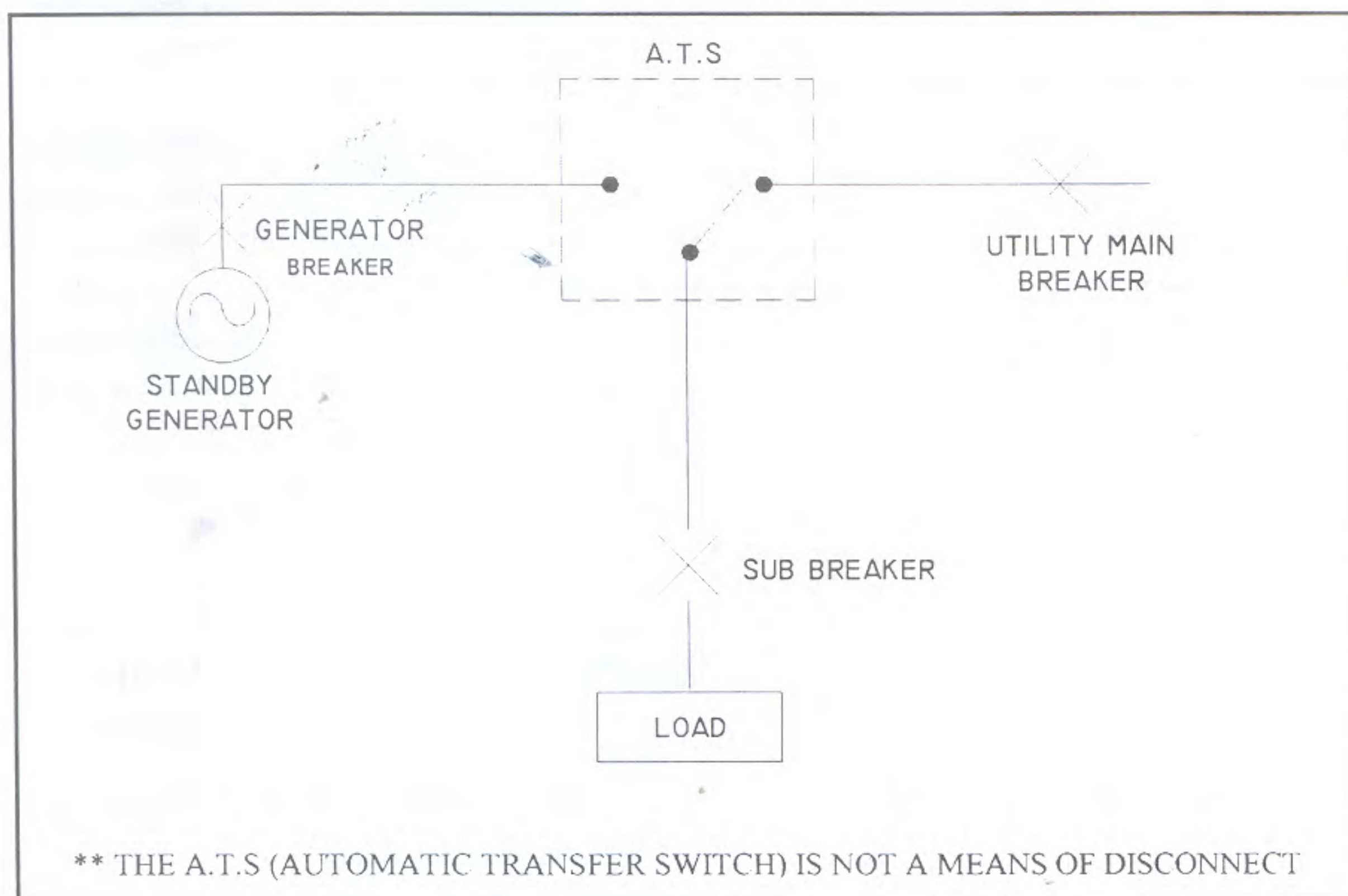


FIGURE 2

Where a manual change over switch is installed, requirements # 1,2,4,6, shall apply to the above.

15. GENERAL INFORMATION ON THE COMMISSION'S PRACTICES

- 15.1 Consumers are advised to provide adequate capacity in their installation for reasonable use of appliances and equipment. In this respect, proper planning of their installations is essential.
- 15.2 In view of the ever-increasing use of electric energy, resulting in increasing load demands from consumers, it is recommended that spare capacity of at least 25% should be provided whenever installations are being rewired and new switches, panels, feeders and circuits are being installed.

- 15.3 Electrical equipment must be used by consumers in such a manner as not to cause unusual voltage fluctuation or other disturbances to the Commission's system. The Commission will require consumers, at their own expense, to install suitable apparatus to limit such voltage fluctuations and disturbances. The Commission reserves the right to take whatever action it considers necessary to correct or prevent such disturbances from unduly affecting the quality of supply to other consumers.
- 15.4 Consumers shall be responsible for the Commission's equipment installed on their premises. In the event of any loss or damage to the property of the Commission caused by or arising out of carelessness, neglect, misuse or tampering by consumers or other unauthorized parties, the cost of making good such loss or repair shall be paid by the consumer.
- 15.5 The use of the Commission's poles, towers, structures or other facilities for the purpose of fastening or supporting any radio equipment or any wires, ropes, signs, banners or anything of any nature, or the locating of same in such proximity to the Commission's installations as to cause or be likely to cause interference with the supply of electricity is prohibited by the Commission and the Commission shall have the right to move such items without notice, unless consent has been given by the Commission in writing.
- 15.6 The Commission shall use all diligence in supplying a regular and uninterrupted supply and will not be liable for damage occasioned by the interruptions which the Commission could not reasonably have foreseen and guarded against, or where such interruptions are necessary for repairs or changes in the Commission's generation, transmission or distribution equipment.
- 15.7 Consumers shall notify the Commission when their supply is interrupted or unsatisfactory.
- 15.8 Consumers and the general public are requested to notify the Commission of any defects, trouble or accidents affecting the Commission's system or the supply of electricity.
- 15.9 Consumers shall permit identified and authorized employees of the Commission to enter their premises for purposes related to the supply of electricity.
- 15.10 Employees of the Commission are forbidden to demand or accept from the public or any consumer reward for services rendered or to make, modify or alter any rates, terms, conditions of contracts or to waive negotiated contracts, rules and regulations under the Act by which the Commission operates.

the consumers only for the purposes specified in the applications and conditions for supply. Consumers shall not retail or otherwise dispose of electrical energy except with the written consent of the Commission and/or through the obtaining of the necessary licenses as required by the Trinidad and Tobago Electricity Commission Act, Chapter 54.70.

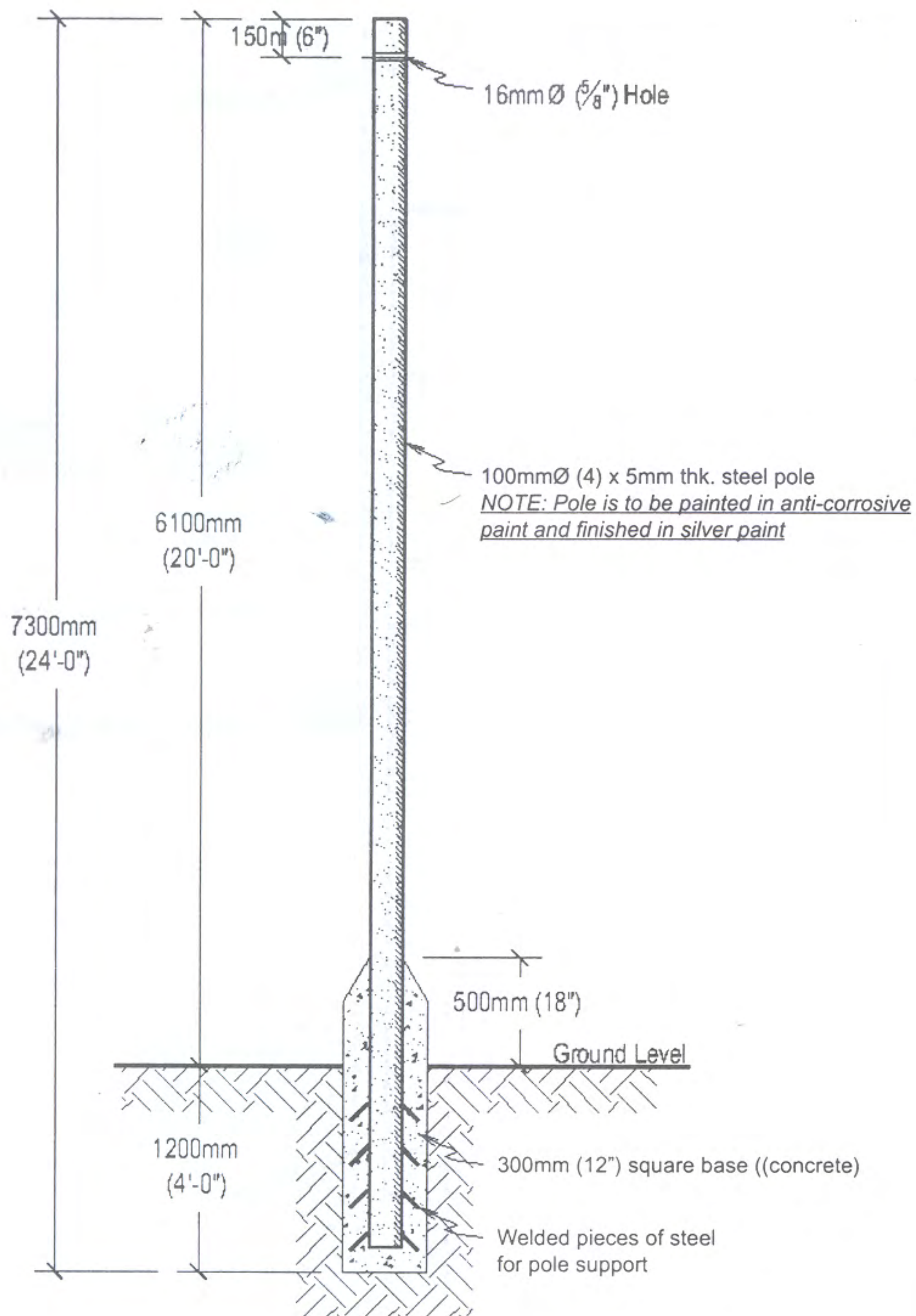
15.12 Where electrical energy is used in an unsafe manner to cause harm to life and limb e.g. electrified fences or other traps, the Commission will instruct the customer to desist from such use. Failure to comply will result in disconnection and a need for re-inspection by the Government Electrical Inspectorate.

15.13 The consumer shall be charged for the use of electrical energy under the tariff which is most appropriate in relation to the use for which the consumer requires the supply and/or the characteristics of the supply.

15.14 All previous notices, instructions, regulations or advices issued by the Commission, which in any way conflict with the information contained in this booklet, are now considered null and void.

15.15 The Commission reserves the right to impose upon consumers any further requirements not inconsistent with these regulations, or to amend these regulations as may be deemed necessary in the interest of the consumer and the Commission.

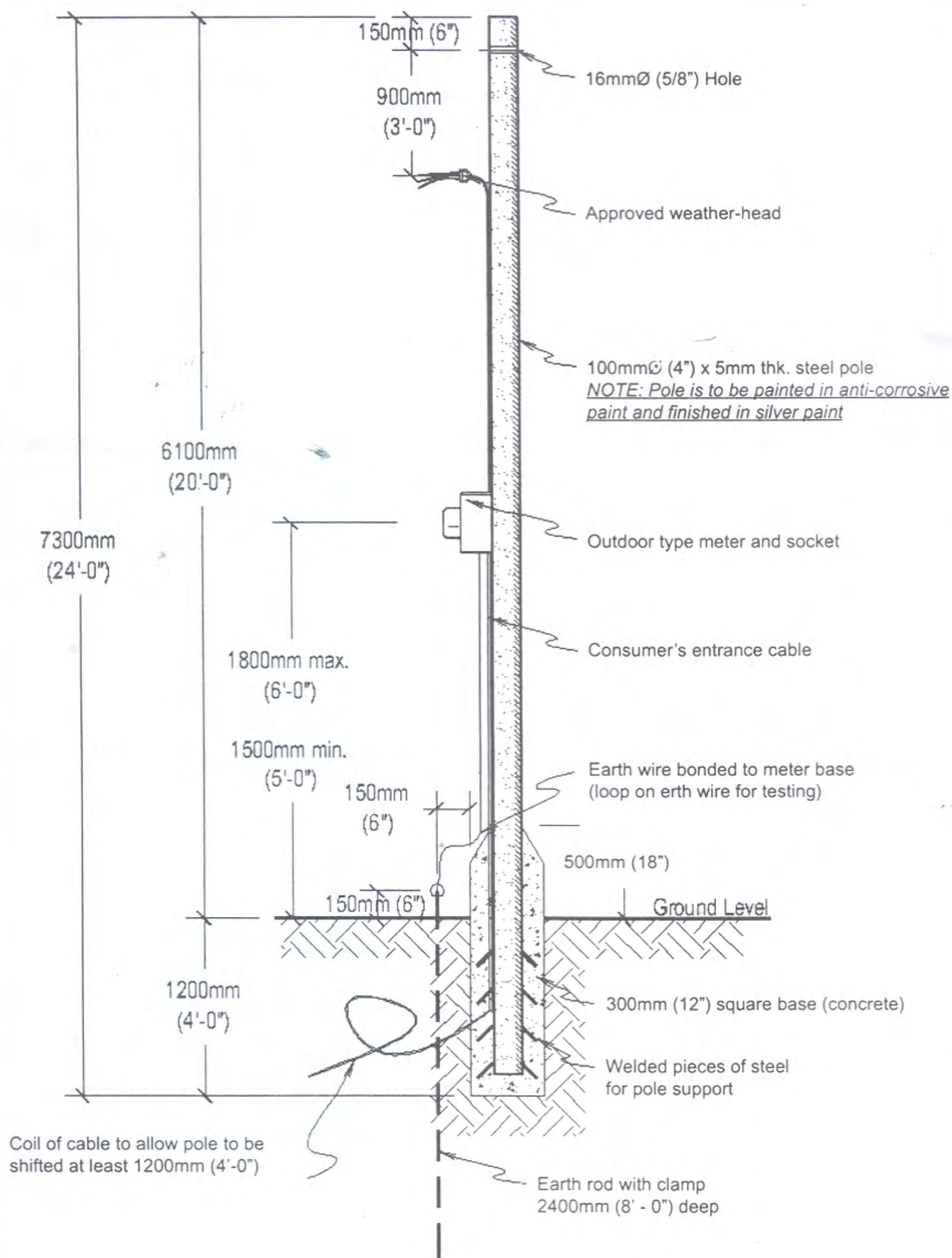
15.16 Rules and regulations in this booklet are not intended to conflict with existing rules and regulations of the Electricity (Inspection) Act, Chapter 54.72, or any other authorities having jurisdiction.



-PRIVATE POLE DETAILS-

1. Authorization must be obtained from T & TEC before erecting pole
2. Should a customer want to install a meter on a private pole, he should do it at a maximum height of 1800mm (6'-0") or a minimum height of 1500mm (5'-0")
3. Minimum length of earth rod to be 24(x) mm (8'-0")

FIGURE 3



-PRIVATE POLE DETAIL (with meter base)-

1. Authorization must be obtained from T&TEC before erecting pole
2. Should a customer want to install a meter on a private pole, he should do it at a maximum height of 1800mm (6'-0") or a minimum height of 1500mm (5'-0")
3. Minimum length of earth rod to be 24(x) mm (8'-0")

FIGURE 4

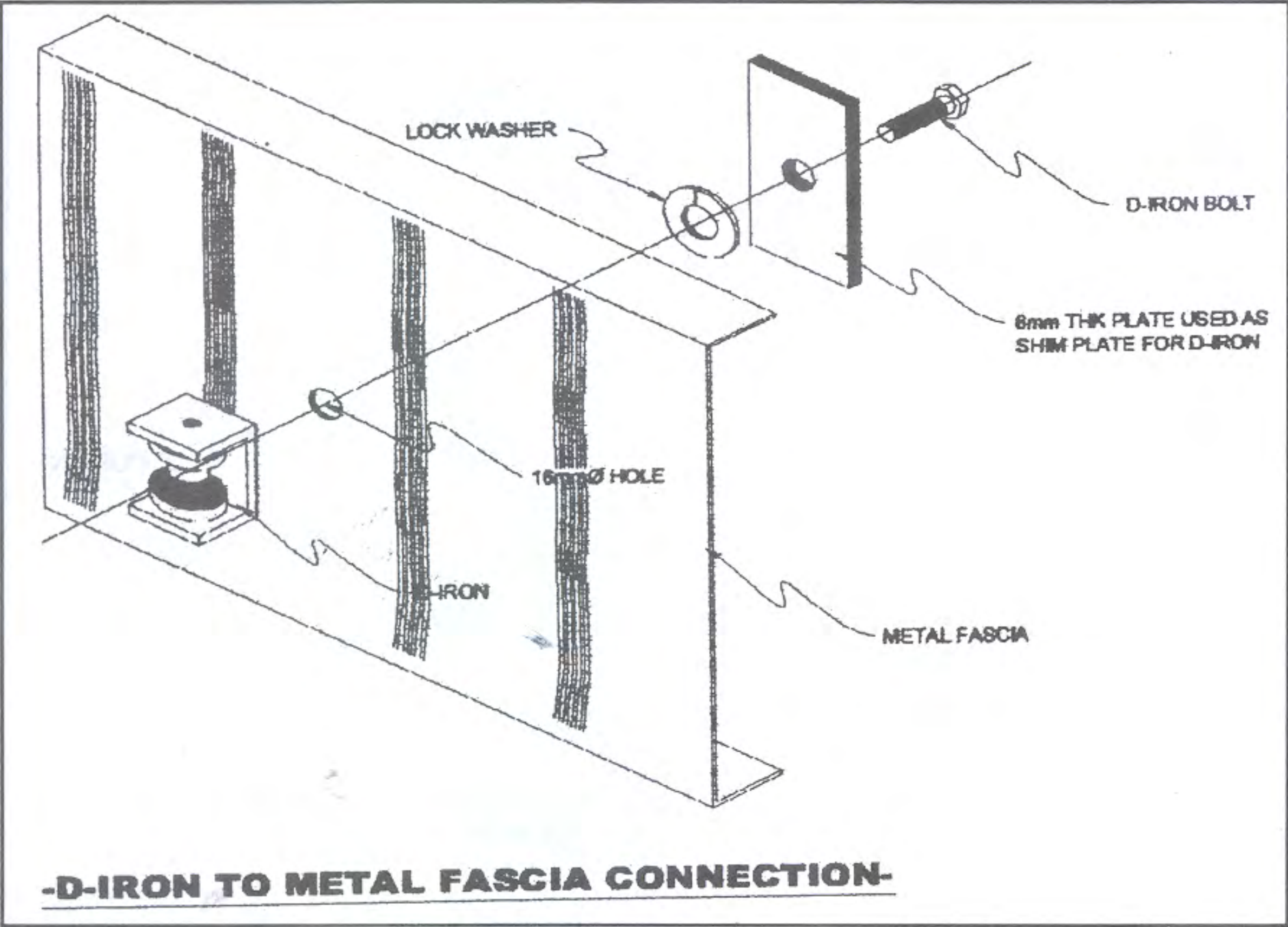


FIGURE 5

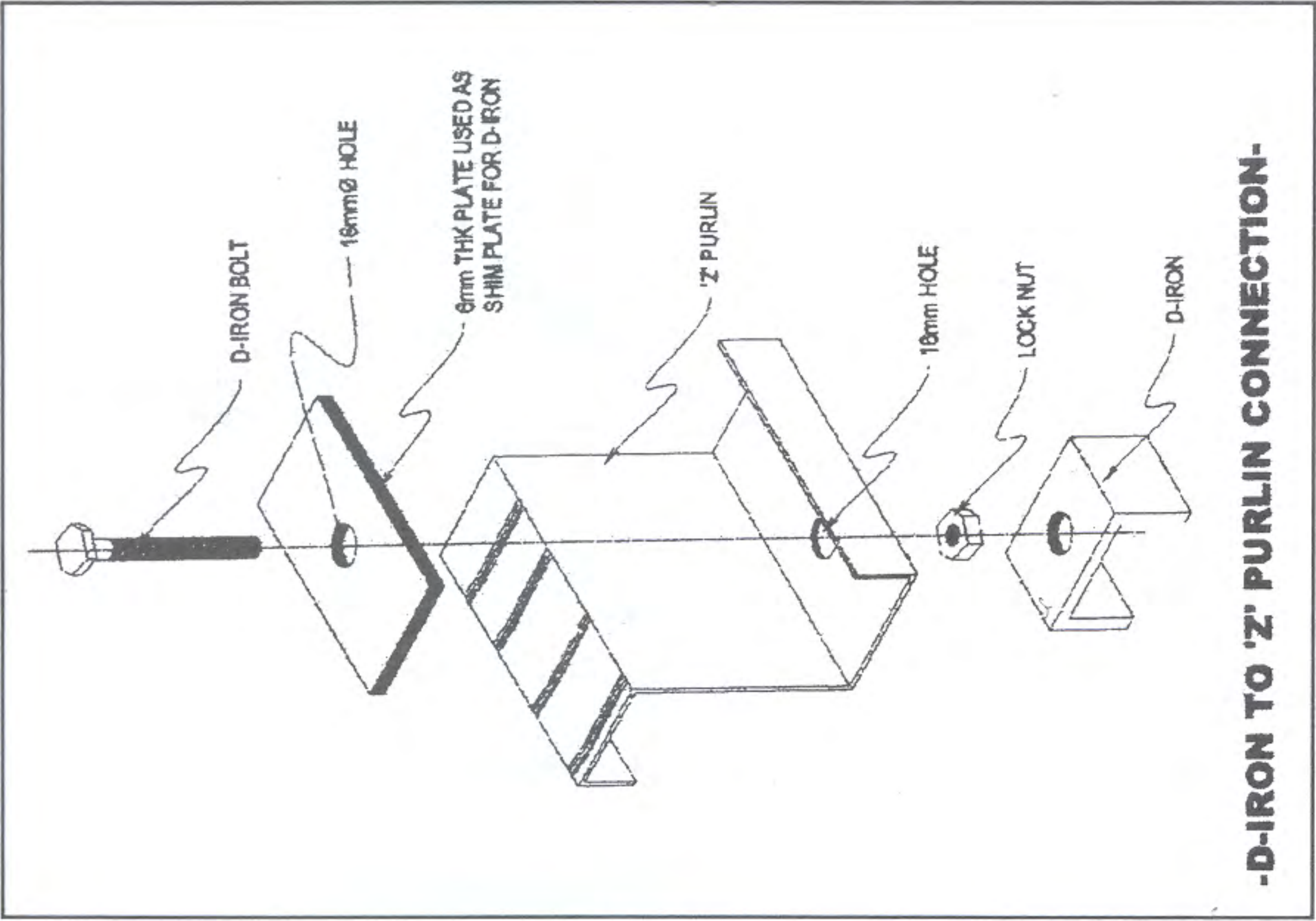
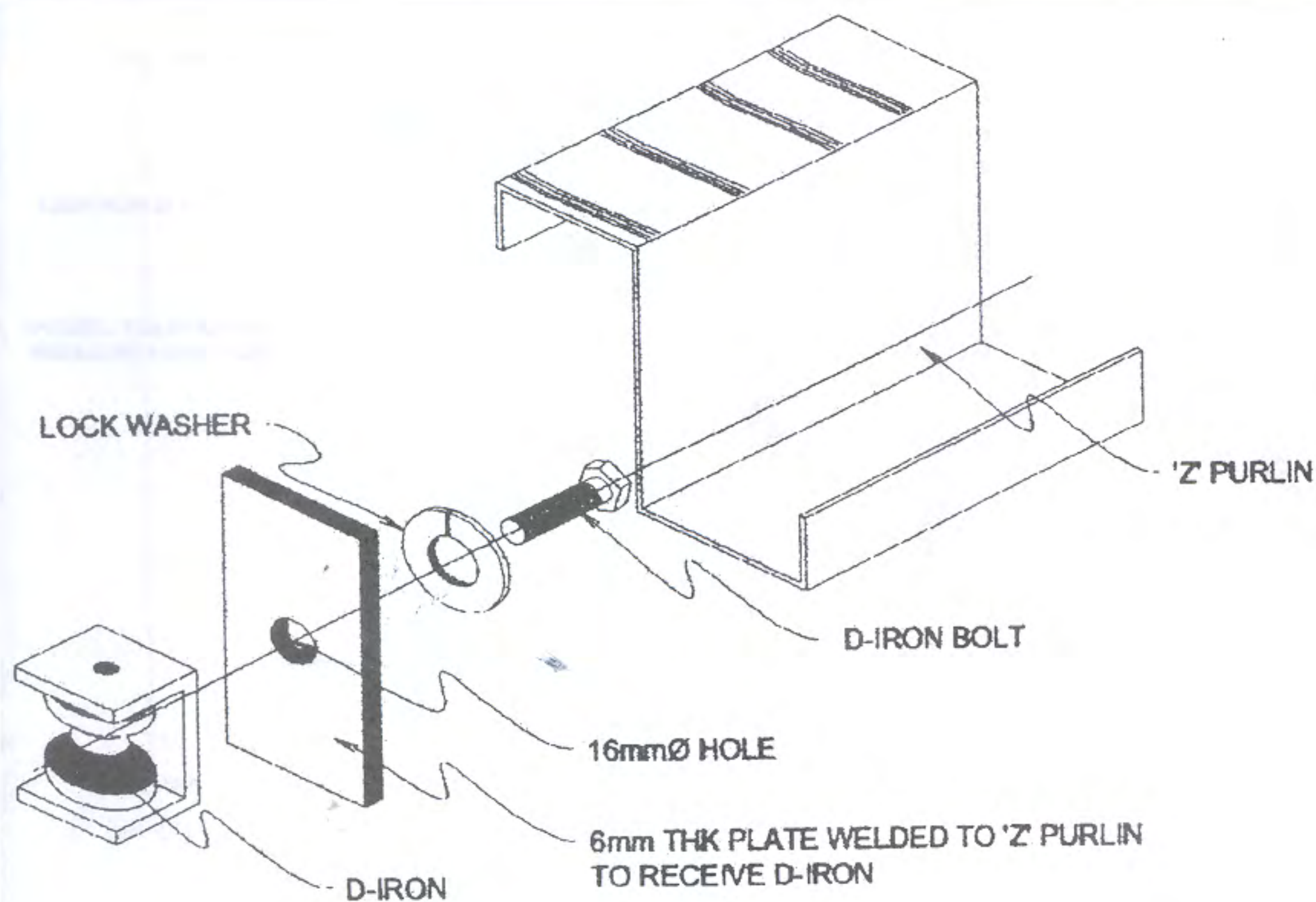
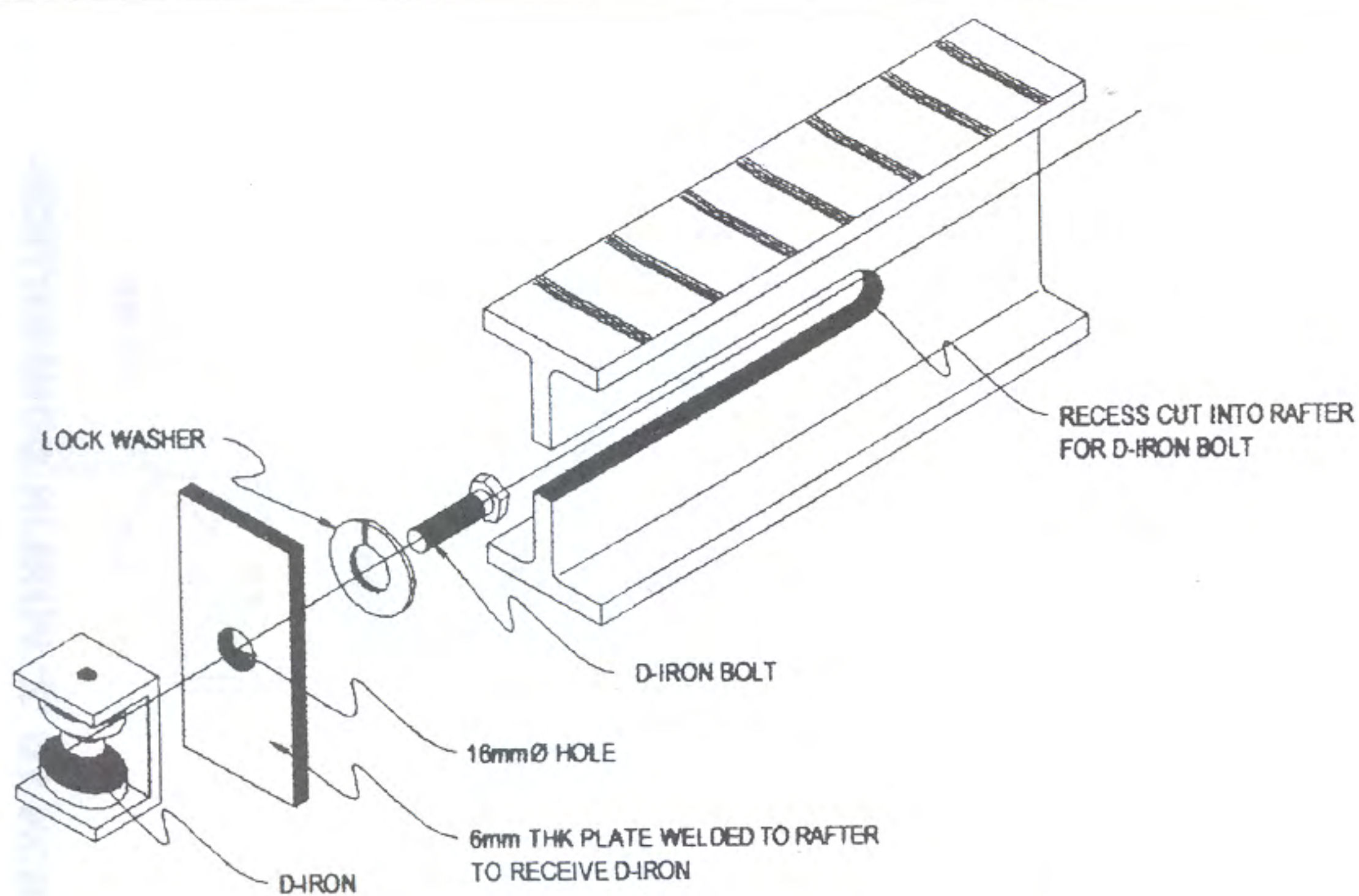


FIGURE 6



-D-IRON TO 'Z' PURLIN CONNECTION-

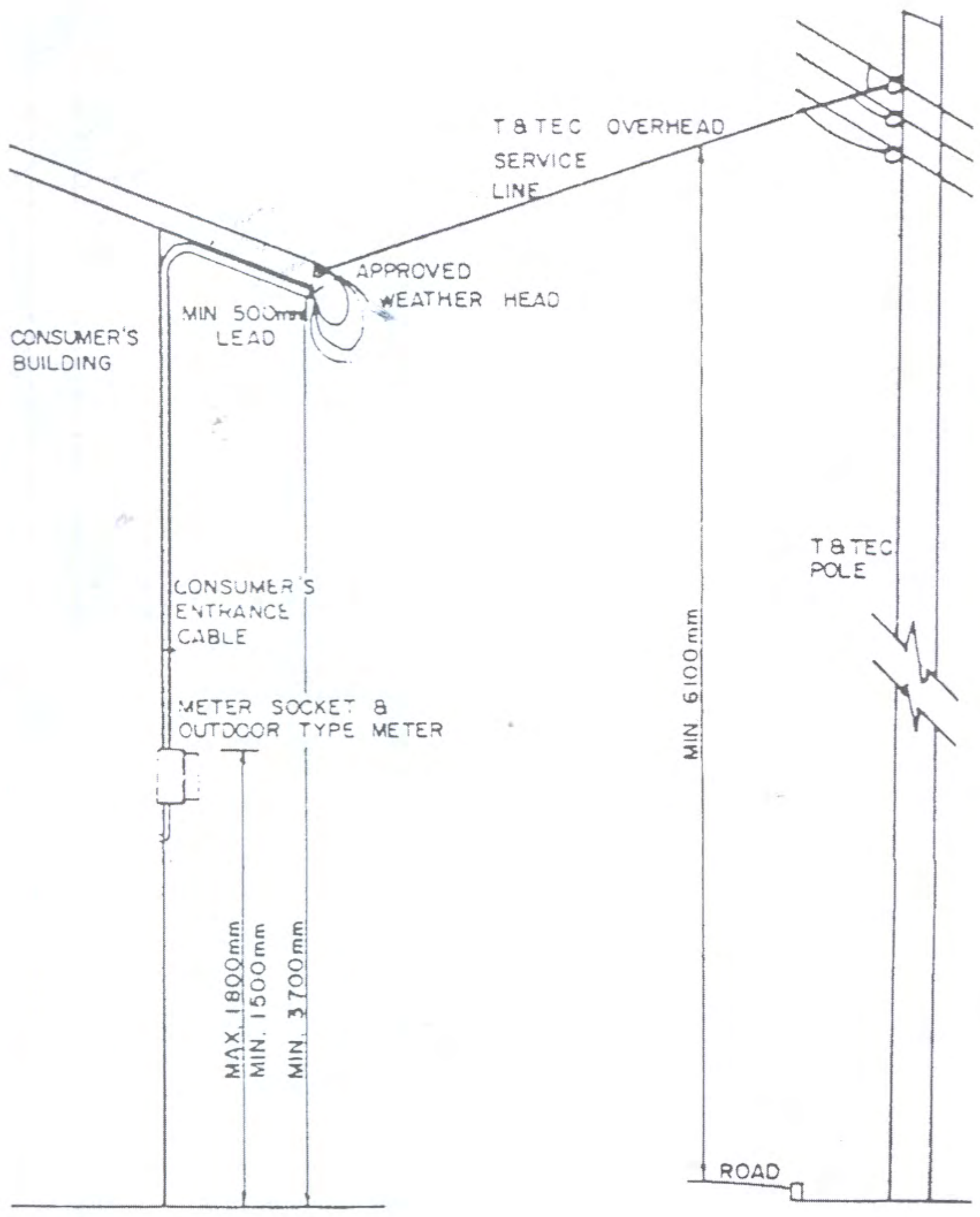
FIGURE 7



-D-IRON TO RAFTER CONNECTION-

FIGURE 8

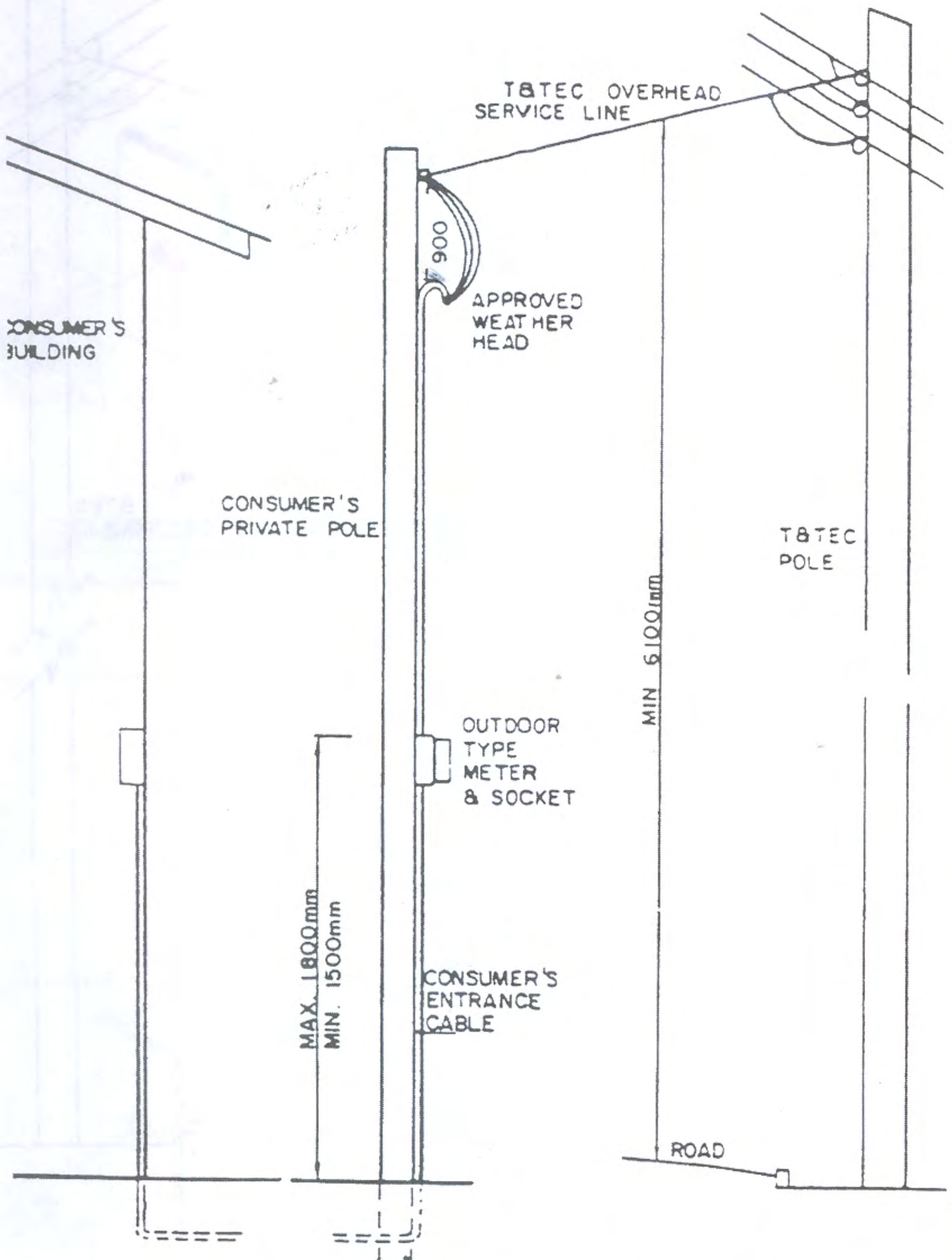
TRINIDAD AND TOBAGO ELECTRICITY COMMISSION



TYPICAL OVERHEAD SERVICE LINE
WITH CONSUMER'S ENTRANCE CABLE ON
CONSUMER'S BUILDING

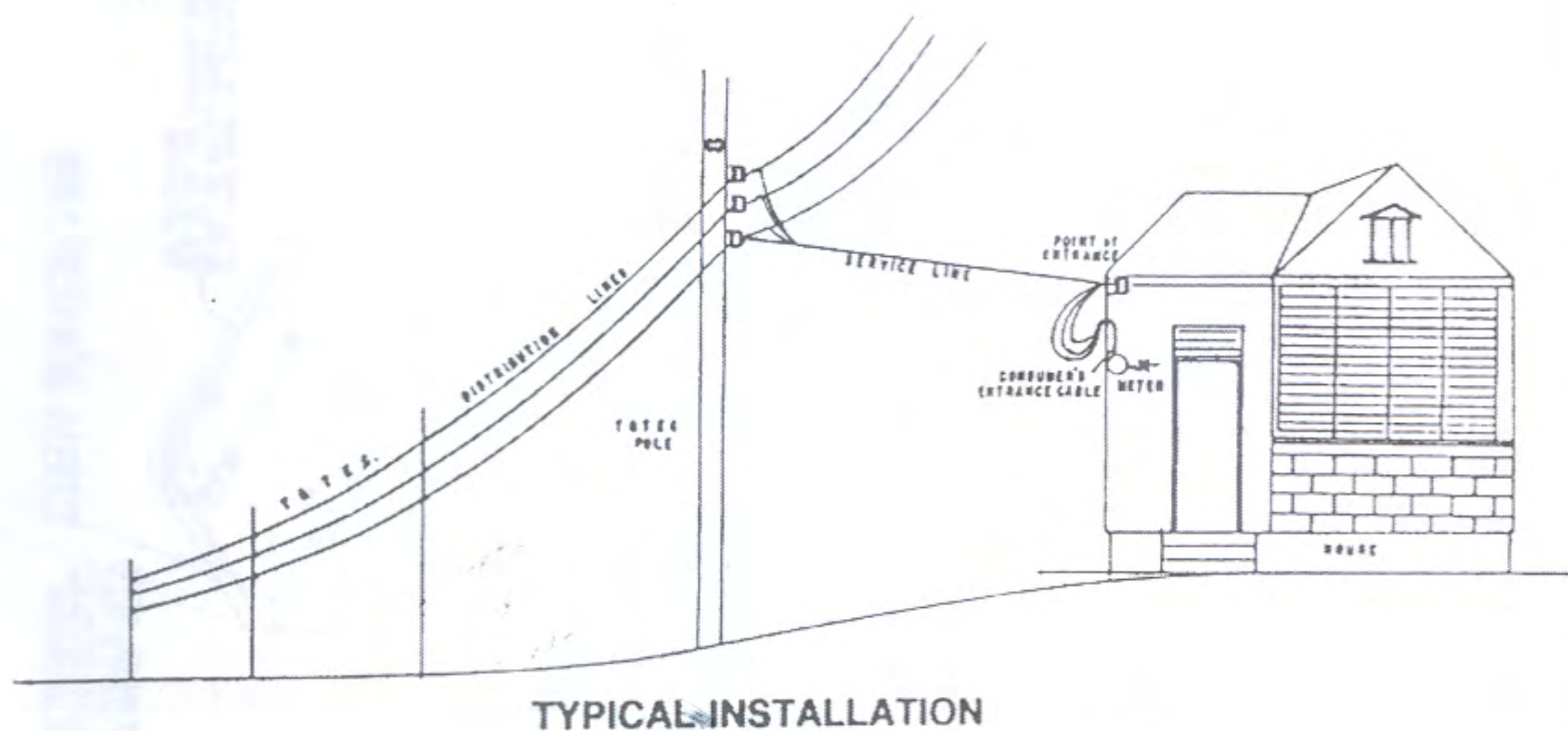
FIGURE 9

TRINIDAD AND TOBAGO ELECTRICITY COMMISSION



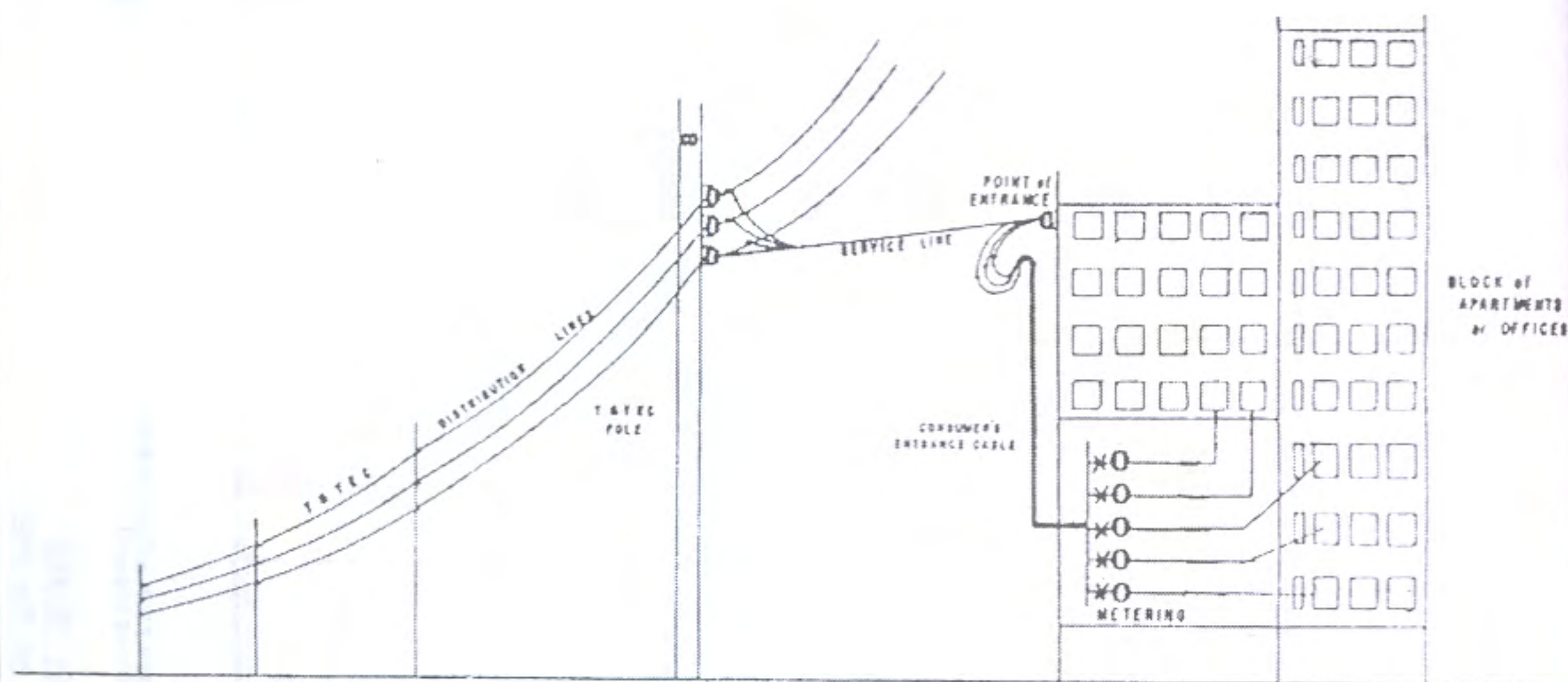
**TYPICAL OVERHEAD SERVICE LINE
WITH CONSUMER'S ENTRANCE CABLE ON CONSUMER'S
PRIVATE POLE**

FIGURE 10



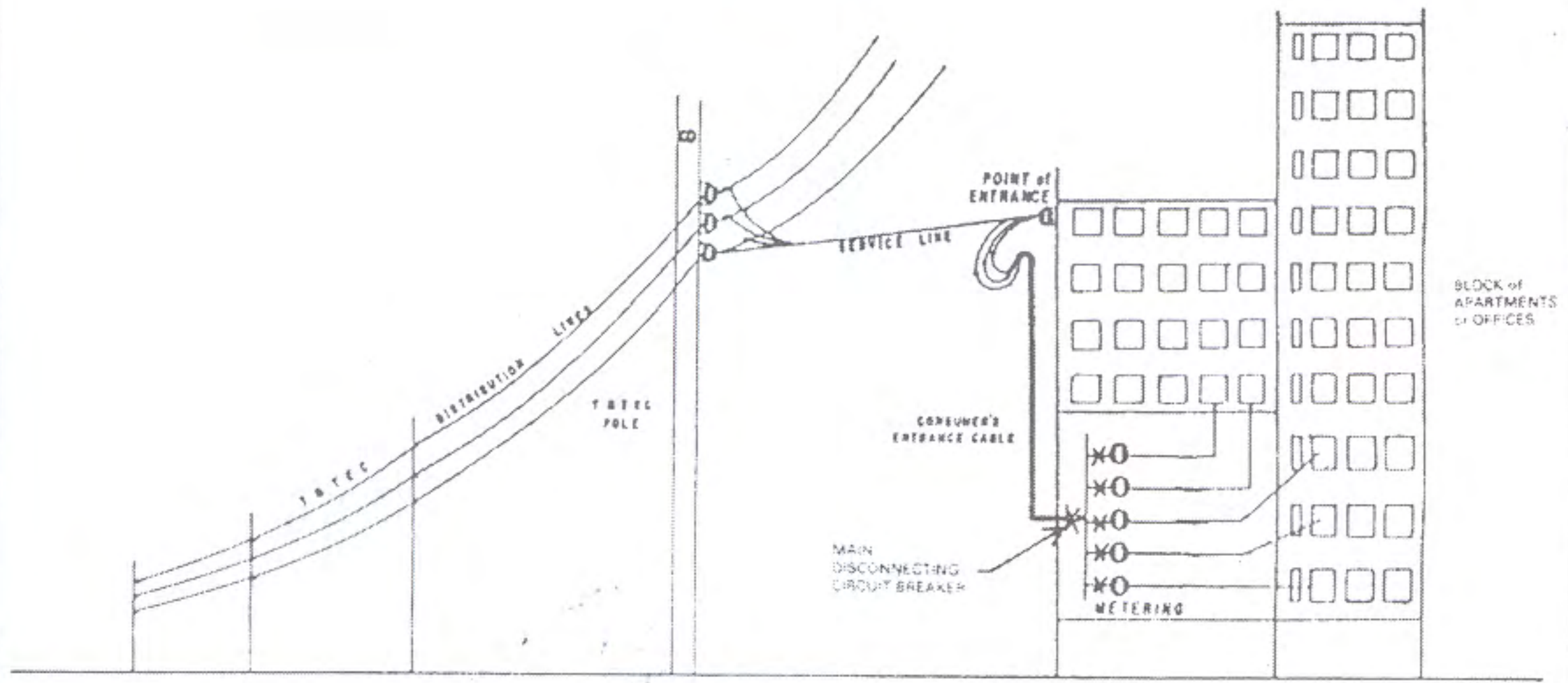
TYPICAL INSTALLATION
Single Metered Low Voltage Supply

FIGURE 12



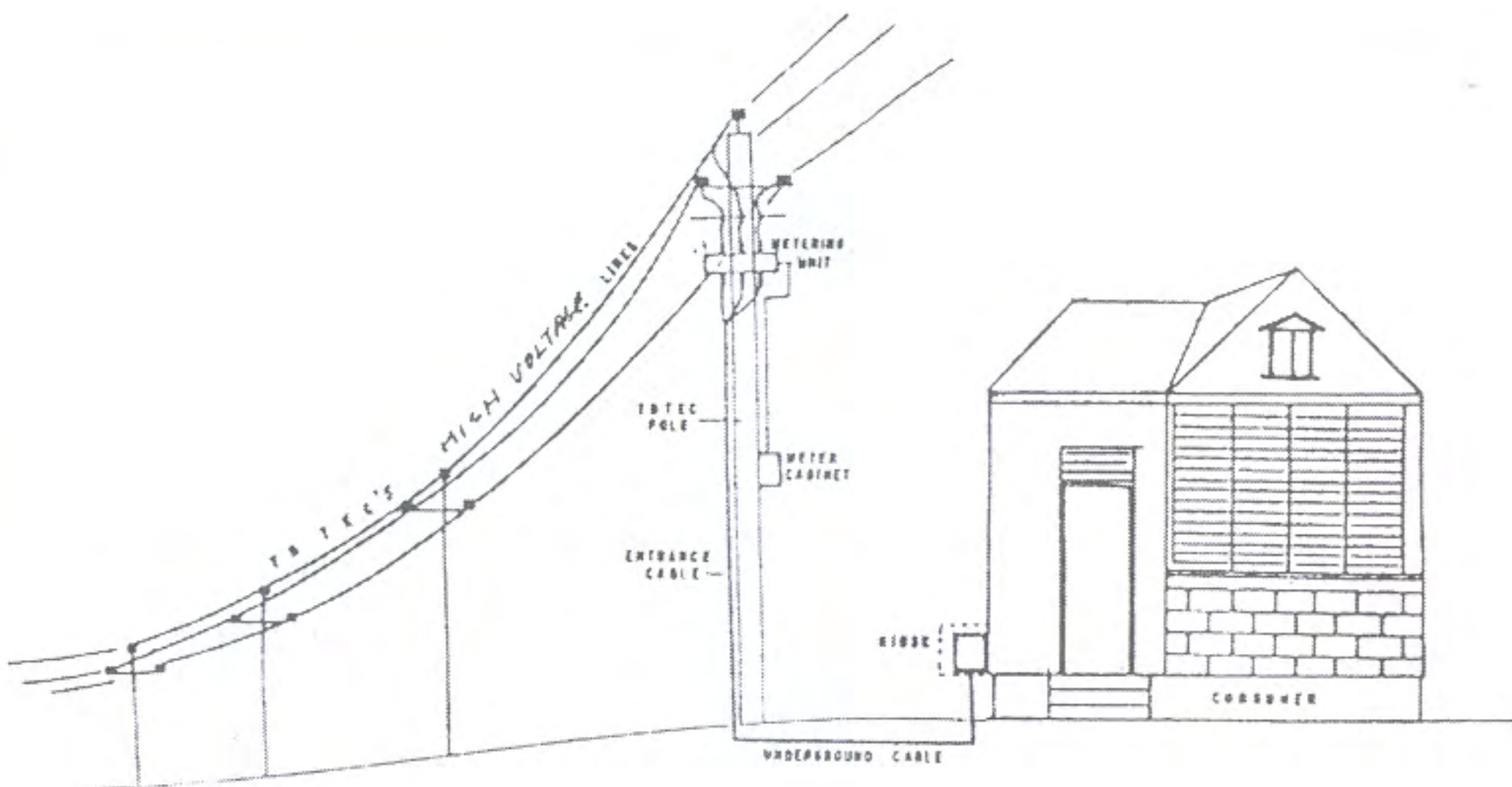
TYPICAL INSTALLATION
Multi-Metered Low Voltage Supply (6 meters or less)

FIGURE 13



TYPICAL INSTALLATION
Multi-Metered Low Voltage Supply (7 meters or less)

FIGURE 14



TYPICAL INSTALLATION
Single Metered High Voltage Supply

FIGURE 15

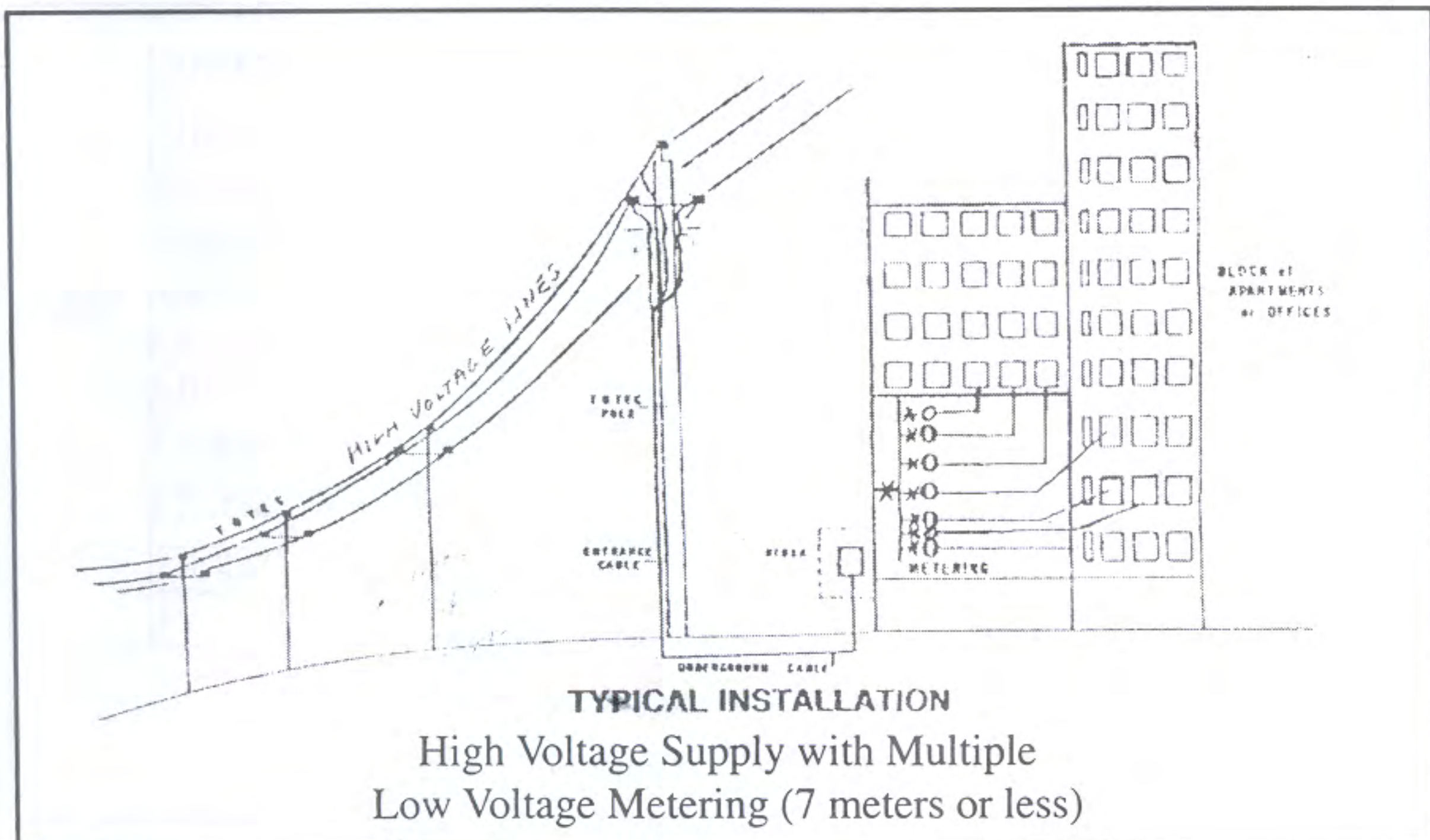


FIGURE 16

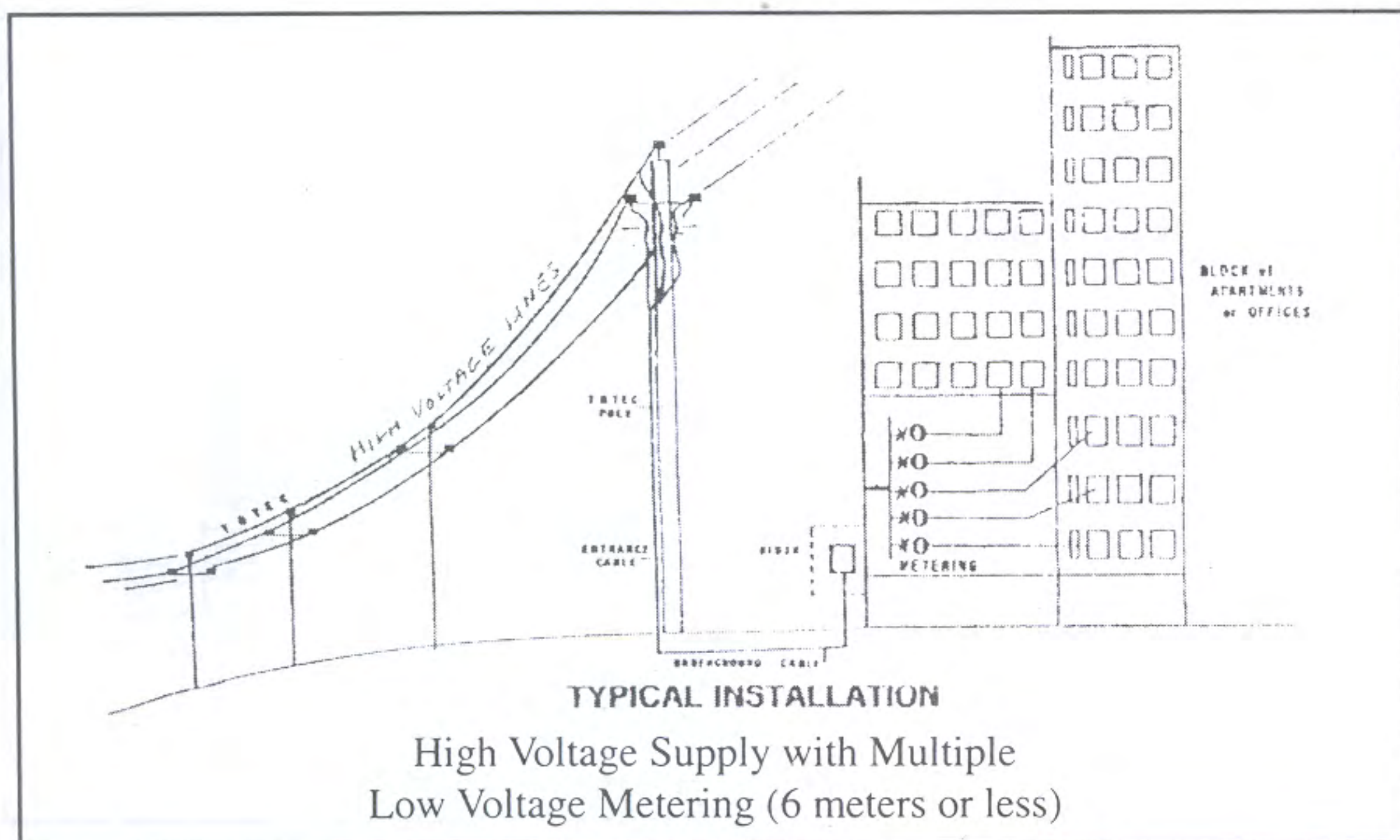


FIGURE 17