

Specifications
for
Customer
Electric Service

2.4 kv to 34.5 kv

NYSEG

SP-1099

FORWARD.....	1
CHAPTER 1 - PRIMARY METERED SERVICE.....	4
General Service Information.....	4
CA-206	6
CA-208A.....	7
Section 1	8
Existing NYSEG Facilities and Interconnect.....	8
Primary Cable - Requirements and Construction	10
Primary Cable Acceptance Form.....	12
Section 2	13
CUSTOMER Primary Interface Equipment.....	13
Group Operated Load Break Switch Requirements	16
Typical Pad Mounted Switchgear	17
Switchgear Minimum Requirements.....	18
Typical Switchgear Installation	21
High Voltage Fuse Requirements.....	22
CUSTOMER Installed Single Pole Interface Structure.....	23
Group Op Switch Grounding (Option 1).....	24
Group Op Switch Grounding (Option 2).....	27
Typical Customer Installed Second Interface Pole.....	29
Section 3	30
CUSTOMER Installed Primary Overhead or Underground.....	30
Underground Cable:.....	30
Overhead Construction:.....	31
Section 4	33
CUSTOMER Installed Utilization Equipment.....	33
Transformer Bumper Protection	34
Transformer Requirements.....	36
Typical Padmounted Transformer Installation	39
CHAPTER 2 - SECONDARY METERED SERVICE	40
General Service Information.....	40
CA-206	42
CA-208A.....	43
Section 1	44
Existing NYSEG Facilities and Interconnection	44
Primary Cable - Requirements and Construction	46
Primary Cable Acceptance Form.....	48

Section 2	49
CUSTOMER Installed Primary Overhead and/or Underground.....	49
Overhead Construction	49
Underground Construction	51
Combination Overhead and Underground	52
Typical Customer Installed Riser Pole.....	53
Section 3	54
CUSTOMER Installed Utilization Equipment:	54
Flat Pads-Sizing for Three Phase Transformers	55
Flat Pad-Installation For Three Phase Transformers	56
Vault Pad Installation For Single Phase Transformers.....	57
CHAPTER 3 - PRIMARY METERED SERVICE IN AREAS OF SUB-TRANSMISSION	58
General Service Information.....	58

Forward

This booklet (SP-1099) outlines NYSEG's minimum equipment specifications, and minimum installation requirements for a **CUSTOMER** constructed primary voltage (2400 Volts to 34500 Volts) distribution line which serves a single **CUSTOMER** and is located on private property. It does not apply to extensions along or paralleling public roadways, or to taps off transmission lines rated higher than 34500 volts.

NYSEG requires the **CUSTOMER** to acquire and install electric equipment in accordance with this document, the latest editions of the National Electrical Code (ANSI/NFPA 70 or NEC.) and National Electrical Safety Code (ANSI C2 or NESC.), and other applicable governing codes. SP-1099 is a supplement to, but not a substitute for these codes. In case of conflict the National Electric Code will be the ruling code.

All installations shall conform to the general information section of NYSEG's tariff schedule PSC-90, NYSEG's "Specifications for Electrical Installations" and Section III of NYSEG's "Electric Service Procedures Manual". **CUSTOMERS MUST WORK WITH LOCAL NYSEG ENGINEERING PERSONNEL TO ASSURE THE MOST CURRENT POLICIES ARE FOLLOWED.**

It is in the best interest of the **CUSTOMER** and NYSEG to install facilities in such a manner as to provide dependable, safe, and adequate electric service to the **CUSTOMER**. Cooperation of all parties involved and strict adherence to the requirements in this booklet will expedite service. NYSEG's written agreement is required for any equipment exceptions to SP-1099. Alternate designs of equipment and/or facilities should be submitted to NYSEG engineering for review and acceptance. Provided the governing codes, and minimum electrical requirements stated in this document are adhered to, alternate designs are acceptable.

SP-1099 is not intended to provide a final engineering design for **CUSTOMER** installations. **CUSTOMERS** receiving secondary metered service will be provided with basic engineering and design services by NYSEG. There may be an additional cost if detailed engineering and/or a bill of materials is required. **CUSTOMERS** receiving primary metered service shall have the responsibility of engineering their facilities to meet the minimum requirements noted in chapter 1. NYSEG can coordinate this engineering service for a fee.

Because of the complexity of primary voltage service and long equipment delivery times, the **CUSTOMER** is required to furnish NYSEG all pertinent information early in the development of plans for new or increased electric service.

THE FOLLOWING INFORMATION SHALL BE PROVIDED IN WRITING TO NYSEG'S CUSTOMER SERVICES DEPARTMENT. **CUSTOMER** DESIGNS MUST BE SUBMITTED TO AND ACCEPTED BY NYSEG BEFORE EQUIPMENT IS ORDERED.

- Site layout and an electrical one line diagram.

Forward

- The electrical characteristics (voltage, initial and future connected load, and hours of usage).
- Any unusual requirements (e.g. welders, x-ray equipment, large motors, etc.)
- Size and rating of service equipment and facilities to be used.
- Time schedule for service.

In addition, for primary metered **CUSTOMERS**, the following is also required:

- Specifications of protective equipment such as the fuse sizes, types, manufacture, and slow or standard speed to be used, etc.
- Specifications for primary voltage equipment must be submitted to and accepted by NYSEG prior to ordering equipment.
- For underground construction a 'Customer Primary Voltage Cable Acceptance Form' will be required. A cable sample may also be required depending on the cable construction and/or manufacturer.

NYSEG will advise the **CUSTOMER** on the available electric characteristics (system voltage and available short circuit current at the interface point) and applicable rates to meet the **CUSTOMER'S** requirements. NYSEG may require the **CUSTOMER** to design proposed facilities to meet planned NYSEG system modifications. **CUSTOMERS** installing generators should contact NYSEG for additional requirements and engineering coordination of facilities. Normally only one service will be made available to a **CUSTOMER'S** premises.

CUSTOMER CONSTRUCTED FACILITIES CROSSING PROPERTIES OWNED BY OTHERS, REQUIRE SPECIAL AGREEMENTS (CONTACT NYSEG FOR DETAILS).

The specifications and drawings included in this booklet were current design standards at time of issue. Since they are revised on occasion, the **CUSTOMER** shall contact the Customer Services Department for copies of the latest standards, prior to the design of any facilities.

An inspection and subsequent approval is required of **CUSTOMER** installed facilities by a NYSEG approved inspection authority. A list of approved inspection agencies is available at any NYSEG office.

NYSEG reserves the right to inspect the electric facilities prior to connection for conformance to this document. NYSEG's review of the **CUSTOMER'S** facilities and equipment shall not be construed as endorsing the design, nor as any warranty of safety or durability of the facilities or equipment.

NYSEG will assist the **CUSTOMER** with any problem regarding the interpretation and application of these specifications and installation requirements.

Forward

The **CUSTOMER** is responsible for all maintenance of **CUSTOMER** facilities, rights-of-way and tree trimming. It is the **CUSTOMER'S** responsibility to stock replacement equipment for **CUSTOMER** facilities. NYSEG may provide emergency repairs to a privately owned line upon request, provided that NYSEG has the capability of so doing, and the **CUSTOMER** agrees to pay all NYSEG costs.

IT IS THE **CUSTOMER'S** RESPONSIBILITY TO UTILIZE QUALIFIED PERSONS IN THE CONSTRUCTION, OPERATION, AND MAINTENANCE OF THE ELECTRICAL FACILITIES. These qualified persons shall adhere to the applicable employee work rules and safety procedures of the National Electrical Safety Code and the National Electrical Code. Local government ordinances may have additional qualification requirements for these individuals.

Chapter 1

Chapter 1 - Primary Metered Service

General Service Information

NYSEG will provide overhead or underground service to the **CUSTOMER** in accordance with tariff PSC-90, Section III of the "Electric Service Procedures Manual," and this document.

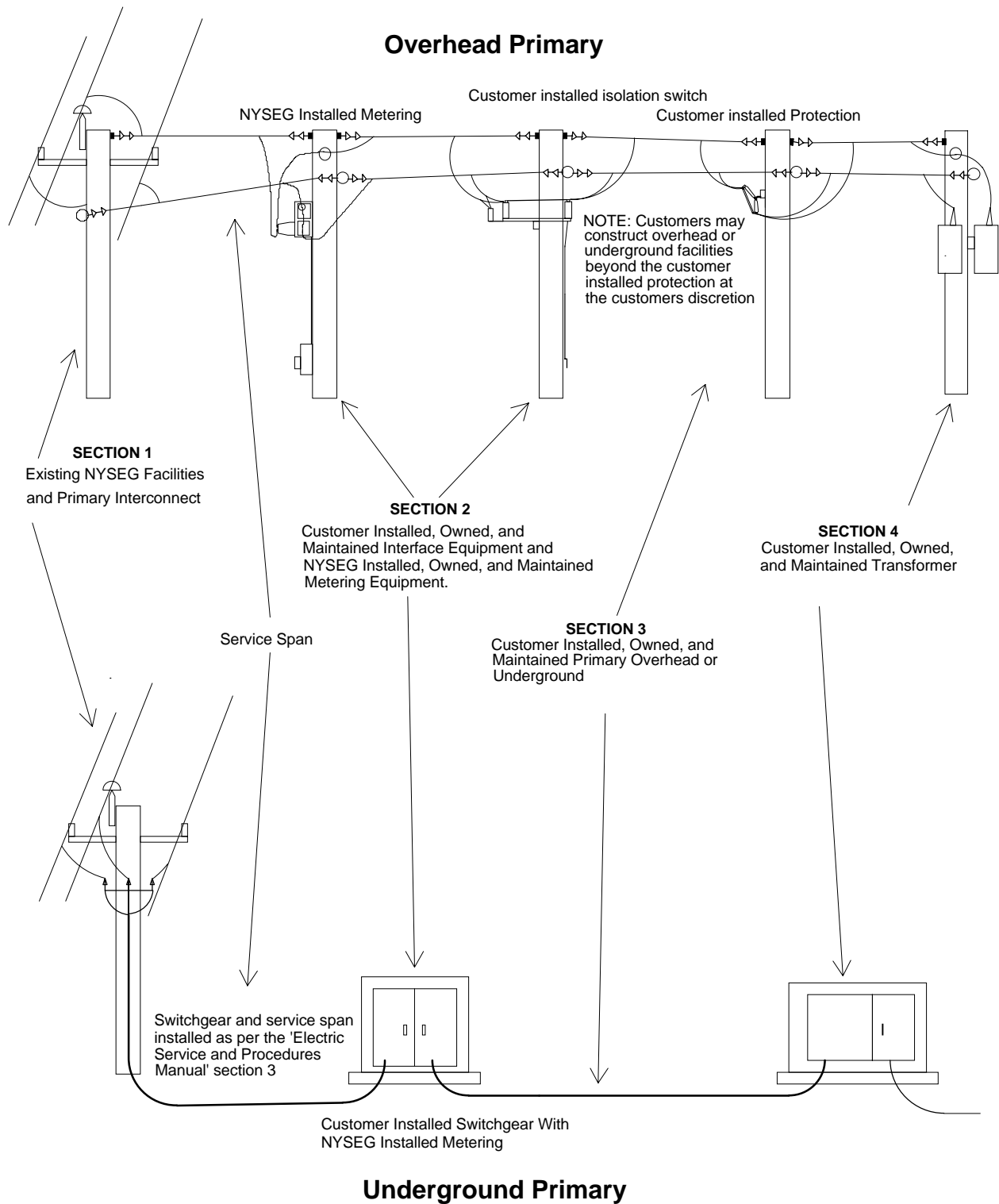
CUSTOMERS metered at primary voltage shall furnish, install, own, and maintain (with the exception of the metering equipment) all transformers, switches, structures, primary and secondary protection and other pertinent equipment, beyond the service span. The service span is defined as the final span of conductor and accessories necessary to connect NYSEG's existing system to the **CUSTOMER'S** facility. **The service span and metering equipment will be supplied, installed, and maintained as per the "Electric Service and Procedures Manual" Section III.** It is recommended **CUSTOMERS** stock replacement equipment and materials in case of failure.

All **CUSTOMER** circuit and equipment grounds shall conform to this document, the manufacturer recommendations, and the National Electric Code article 250.

For **CUSTOMER** built lines NYSEG will require the **CUSTOMER** to sign a memorandum of customer ownership of facilities. Use form CA-206 for overhead facilities (on page 6) or CA-208A for underground facilities (on page 7). These stipulate that:

- The **CUSTOMER** owns and is responsible for line right-of-way maintenance, so the line remains in a safe condition.
- The **CUSTOMER** will be responsible for maintaining an adequate voltage level to his facility, given an adequate voltage level at the point of interconnection.

The following chapter is divided into four sections (see following page). Each section contains the appropriate information and specifications to construct that portion of the service.



MEMORANDUM OF CUSTOMER OWNERSHIP OF ELECTRIC SERVICE LINE EXTENSION

Date _____

It is understood the electric service line connected to pole # _____ of line # _____ in the (town, village) of _____, consisting of _____ poles and facilities approximately _____ feet in length, serving (my, our) premises located at _____, is (my, our) property and the line and right-of-way is to be maintained by (me, us) or (my, our) successors and assigns in a safe condition. Therefore, the operation or failure of said service line will not give rise to any liability on the part of NYSEG, its successors and assigns. If NYSEG's overhead facilities are to be replaced, moved, or relocated for any reason, the cost of relocating (my, our) overhead electric service line is to be borne by (me, us).

It is further understood that should emergency repairs of said electric service line be necessary, and NYSEG is subsequently requested to make such repairs, (I, we) agree to pay to NYSEG the cost of repair. Further, (I, we) agree to be responsible for maintaining an adequate voltage level to (my, our) facilities given an adequate voltage level at the point of connection of said facilities to NYSEG's system.

Signed _____

Address _____

Work Order or
Service Order No.

CA-206

MEMORANDUM OF CUSTOMER OWNERSHIP OF UNDERGROUND ELECTRIC SERVICE LINES

Date _____

It is understood the underground electric service line connected to location # _____ of line # _____ in the (town, village) of _____, serving (my, our) premises located at _____, consisting of facilities approximately _____ feet in length, is (my, our) property and the line and right-of-way is to be maintained by (me, us) or (my, our) heirs, successors and assigns in a safe condition. Therefore, the operation or failure of said service line will not give rise to any liability on the part of NYSEG, its successors and assigns. If NYSEG's underground facilities are to be replaced, moved, or relocated for any reason, the cost of relocating (my, our) underground electric service line is to be borne by (me, us).

It is further understood that should emergency repairs of said electric service line be necessary, and NYSEG is subsequently requested to make such repairs, (I, we) agree to pay to NYSEG the cost of repair. Further, (I, we) agree to be responsible for maintaining an adequate voltage level to (my, our) facilities given an adequate voltage level at the point of connection of said facilities to NYSEG's system.

Signed _____

Address _____

Work Order or
Service Order No.

CA-208A

Existing NYSEG Facilities and Interconnect

Three options exist for **CUSTOMERS** receiving primary service from NYSEG's facilities:

- a) Overhead from existing NYSEG overhead facilities.
- b) Underground from existing NYSEG overhead facilities.
- c) Underground from existing NYSEG underground facilities.

NYSEG will determine (through discussions with the **CUSTOMER**) the point at which the **CUSTOMER'S** facilities interconnect with NYSEG's facilities. The financial responsibility for road crossing poles, primary interconnect cables or overhead wires, terminations, insulators, etc., will all be per Section III of NYSEG's Electric Service Procedures Manual. In all cases NYSEG will make the final electrical connection from the **CUSTOMER'S** facilities to NYSEG's facilities.

- a) For **CUSTOMERS** extending overhead from NYSEG's overhead facilities, proceed to section 2 page 13 of this document for the installation of the metering and protection/isolation equipment.
- b) For **CUSTOMERS** extending underground from existing NYSEG overhead facilities, the **CUSTOMER** will install a padmounted or freestanding switchgear unit at the location determined in the above discussion. Refer to page 13 of this document for the installation of the interface equipment and page 18 for the switchgear's minimum requirements.
The responsibility for the 'Service Span' (including but not limited to all cable, terminations, trenching, and riser materials) between NYSEG's overhead facilities and the **Customer's** switchgear will be determined by Section III of 'The Electric Service Procedures Manual'. If the **Customer** will be supplying the cable refer to page 10 of this document for primary cable requirements and page 12 for a primary cable acceptance form. **CUSTOMERS** supplying unacceptable cable may incur additional charges for NYSEG installed terminations.

Warning: If CUSTOMERS are required to install materials on a NYSEG pole, a minimum of ten foot clearance shall be maintained at all times between NYSEG's energized high voltage conductors and equipment, and persons, tools, and materials including the cable being installed.

The final connection between NYSEG's existing overhead facilities and the **CUSTOMERS** facilities shall be made by NYSEG.

- c) For **CUSTOMERS** extending underground from NYSEG's existing underground facilities, the **CUSTOMER** interface equipment shall be installed at the location determined in the above discussion. See page 13 of this document for interface equipment requirements and page 18 for minimum switchgear requirements. The responsibility for the primary cable and terminations connecting NYSEG's point of attachment and the **CUSTOMER** installed interface equipment will be as per

Section III of the 'Electric Service and Procedures Manual'. If the **Customer** will be supplying the cable see page 10 of this document for primary cable requirements and page 12 for the cable acceptance form. NYSEG will make the final electrical connection to NYSEG's system. If a **CUSTOMER** supplied cable does not meet NYSEG's cable requirements, NYSEG may impose an additional charge for NYSEG installed terminations.

Primary Cable - Requirements and Construction

NOTE: Only those cables meeting NYSEG current internal cable specification (SP-1294) will be suitable for takeover by NYSEG at a future date. If the CUSTOMER will be retaining ownership of the cable see the minimum requirements below.

The following is NYSEG's minimum requirements for solid dielectric insulated cable suitable for use on **CUSTOMER** electric power systems at voltages classes of 15kV or 35kV. The **CUSTOMER** shall supply NYSEG with the selected manufacturer's specifications and receive approval prior to ordering cable.

The cables shall be manufactured in accordance with the most recent applicable Insulated Cable Engineers Association (ICEA) and Association of Edison Illuminating Companies (AEIC) standards or be a NYSEG approved equivalent. AEIC shall take preference over ICEA in cases of conflict.

The voltage rating of the cable shall be as required by the system with the minimum acceptable voltage class being 15kV. The minimum required conductor size is, #2 AWG concentric or compressed stranded copper or aluminum for 15kV, and 1/0 AWG concentric or compressed stranded copper or aluminum for 35kV. All conductors shall be stranded, annealed copper or "EC" grade aluminum as per current ICEA and National Electric Manufacturers Association (NEMA) standards.

The cable shall have an extruded strand shield.

The Cable shall have an extruded insulation layer of cross linked polyethylene (XLPE), tree retardant crosslinked polyethylene (TRXLPE), or an ethylene propylene rubber (EPR) based compound suitable for use at conductor temperatures listed in the current AEIC standard CS6.

Minimum insulation thickness shall be as follows:

Cable Voltage Rating	Minimum Average Thickness
15kV	175 mils
35kV	345 mils

The insulation shall be covered with an extruded insulation shield of a design as dictated by the appropriate current AEIC standard.

For 15kV through 35kV cables with extruded insulation shielding over the insulation, the effort required to remove 1/2 inch strips of the insulation shielding, at room temperature, shall not be greater than 10 pounds. The shielding shall be removable without damaging the insulation, leaving no conducting material which cannot be readily removed.

For jacketed cables, the jacket shall be strippable using a Ripley Tool Company WS-61 tool or equivalent.

NOTE: NYSEG reserves the right to refuse to energize cable it feels does not meet industry accepted minimum standards of construction, or require an industry accepted high voltage test prior to energizing.

NOTE: Cables terminated with porcelain potheads will require an industry accepted high voltage test prior to energizing.

Typical cable constructions are described below:

- a) Two Conductor, Jacketed Cable (**NYSEG required design for a NYSEG takeover at a future date**) - The cable shall have a concentric neutral of copper wires and shall be covered overall with a PVC (poly vinyl chloride) or PE (polyethylene) jacket. The capacity of the concentric neutral shall be full capacity for conductor sizes up to 1/0 AWG. This cable would be suitable for single phase or three phase applications. For cable used only in three phase applications, neutrals shall be a minimum one-third (1/3) capacity for conductor sizes between 4/0 AWG and 500 KCM, and one-sixth (1/6) capacity for conductors 750 KCM or larger. All cable can be used for both direct buried and conduit installations and do not normally require a separate neutral*.
***In joint trench applications with TV, communication, or other facilities, a separate, bare copper neutral, may be required. Refer to section 3 for a discussion of when this is a concern and the NESC (article 354) for the specific requirements.**
- b) Single Conductor, Jacketed Cable - The cable shall have zinc or copper tape, or copper drain wires over the insulation shield and shall be covered overall with a PVC or PE jacket. This cable must be installed in conduit. A separate neutral conductor is required when installing this type of cable. The neutral size shall be equivalent to the concentric neutral size specified in item (a).
- c) Two Conductor, Unjacketed URD Type Cable - The cable shall have a concentric neutral of copper wires over the insulation shield. The capacity of the neutral shall be full capacity for conductor sizes up to 1/0 AWG (suitable for single phase or three phase application). For three phase applications the neutral shall be one-third (1/3) capacity for conductor sizes between 4/0 AWG and 500 KCM, and one-sixth (1/6) capacity for conductors 750 KCM or larger. This cable is for direct buried installation and does not require a separate neutral.

CUSTOMER PRIMARY VOLTAGE CABLE ACCEPTANCE FORM

The **CUSTOMER** shall provide the following cable information for NYSEG's review and acceptance. Note: If the **CUSTOMER** does not obtain NYSEG's approval prior to installing the primary cable, the **CUSTOMER** may be subject to additional costs for NYSEG to install the cable terminations.

CUSTOMER Name _____

Location _____

Contractor Name _____ Phone _____

Cable Manufacturer _____

Manufacturer Catalog No. _____

Cable Voltage Rating _____ Conductor Size _____ Type _____

Type of Insulation _____ Insulation Thickness _____ mils Diameter over Ins. _____

Concentric Neutral Size _____ Separate Neutral Size _____

Jacketed _____ Non-Jacketed _____ Cable Overall Diameter _____

Note: NYSEG may require a two foot cable sample for review. NYSEG may require manufacturer information verifying that this cable was manufactured in accordance with NYSEG requirements

NYSEG Engineering has reviewed the above information and has (examined _____), (waived _____ the requirement for) the cable sample.

_____ This cable is acceptable for this **CUSTOMER** underground service.

_____ This cable is not acceptable, for the following reasons:

Signed

New York State Electric & Gas Corp.

Date

CUSTOMER Primary Interface Equipment

For the **CUSTOMER** installed primary interface equipment, the **CUSTOMER** shall provide:

- a) A location for NYSEG installed **primary metering equipment**
 - b) A group operated load interrupting **isolation switch** to provide for de-energizing and a visible air gap during maintenance of **CUSTOMER'S** facilities.
 - c) A **protective device** for the automatic interruption of **CUSTOMER** faults.
-
- a) **Primary Metering Equipment** - The **CUSTOMER** will provide a location for the NYSEG installed primary metering equipment either, on the first pole of a **CUSTOMER** installed overhead system, or in the padmounted/free standing switchgear installed with a **CUSTOMER'S** total underground system. NYSEG will install their metering equipment only after the **CUSTOMER** has completed their installation. NYSEG will advise the **CUSTOMER** as to the space required for the installation of the pole mounted or pad mounted metering equipment. No **CUSTOMER** controlled switches will be allowed ahead of NYSEG's metering equipment without the explicit approval of the Corporate Metering Department, as special metering equipment will be required. (*Exception - in padmounted and free standing switchgear with the incoming switch and meter cubicles secured by a NYSEG lock, the switch will be allowed ahead of the metering equipment*).
 - b) **Isolation Switch** - The **CUSTOMER** will provide a group operated, load interrupting, isolation switch for the planned interruption of the **CUSTOMER'S** facilities. The voltage rating of this switch shall not be less than the phase to phase operating voltage of the circuit. This switch will provide a clearly visible air gap when open. The operating handle will be grounded and padlocked by the **CUSTOMER** at all times with a lock that will accept both a NYSEG and **CUSTOMER** key. Refer to page 16 for NYSEG's requirements for a pole mounted group operated switch and page 17 for typical pad mounted equipment.

NOTE: Manufacturer's specifications for isolation switches shall be submitted to and accepted by NYSEG prior to ordering the equipment.

- c) **Protective Device** - The **CUSTOMER** will provide a device to automatically interrupt faults on the **CUSTOMER'S** facilities. The voltage rating on this device will not be less than the phase to phase rating of the circuit to be protected. Fuses, reclosers, or circuit breakers are acceptable devices. If the **CUSTOMER** installs breaker or recloser bypass equipment, additional protection will be required. NYSEG will provide available short circuit current at the interface point, and the maximum allowable fuse rating, or protective setting for a breaker or recloser to coordinate with NYSEG's facilities. Refer to page 22 for the minimum electrical requirements of a standard distribution type High Voltage Fuse and page 18 for typical pad mounted equipment requirements.

NOTE: Manufacturer's specifications for protective equipment shall be submitted to and Accepted by NYSEG prior to ordering the equipment.

The interface equipment can either be:

- Pole mounted (single or multiple pole) or
- Pad mounted/free standing

Pole Mounted Interface - For CUSTOMERS providing pole mounted interface equipment, single or multiple pole interfaces can be used. Where the **CUSTOMER** would normally expect to install multiple poles as part of the **CUSTOMER** overhead system, a multiple pole interface is recommended. This will simplify the installation, operation, and maintenance of the **CUSTOMERS** overhead facilities. Refer to section 3, page 31 for the minimum requirements for poles and associated hardware.

A Discussion On Grounding: One of the purposes for grounding equipment is to prevent hazardous voltages from developing in areas accessible to personnel. The level of grounding required to accomplish this function will depend on the amount of current available both during normal and abnormal (or fault) conditions. Two methods of grounding group operated switch operating handles are shown in the following pages. These methods demonstrate the two extremes to accomplish this protection.

Grounding Option one: (this method is ideal for a multiple pole interface and is the least expensive to install and maintain) Option one uses an insulator in the switch operating shaft to effectively isolate the switch handle from the majority of any currents entering the grounding system. The switch frame and lightning arresters are grounded at adjacent poles. The only grounding required for the switch handle is a small ground loop for any induced or leakage currents that may exist. If other equipment is mounted on this pole, it too must be grounded at the adjacent poles. If this is not appropriate or if other conductors must be run down the pole (such as metering leads or primary cables) **this type of grounding will not be sufficient and can not be used.** Under these circumstances refer to option two for grounding.

Grounding Option two: (this method must be used at a single pole interface) Option two uses a grounding mat to minimize the step and touch voltages that can develop during a fault condition. This ground mat or an approved equivalent should be used any time equipment grounds or other conductors are brought down the pole within the reach of personnel. This mat is designed to safely dissipate the fault currents that can be generated during an equipment failure and keep the voltage between an operators feet, or between the operators hands and feet at a safe level.

Single Pole Interface - For a single pole interface structure, the metering, isolation, protection, and primary cable riser equipment (if needed) will be located on one pole.

Refer to page 23 for a typical single pole interface. All equipment grounding and the switch operating handle grounding must take place at this pole as shown in option two on page 27.

Multiple Pole Interface - For a multiple pole interface, the **CUSTOMER** will provide, as the first pole, a primary meter pole for the NYSEG installed and maintained primary metering equipment. The second pole of a multiple pole interface will contain the **CUSTOMER'S** isolation switch. The **CUSTOMERS** protective device (and riser pole if required) can either be installed on this second pole (acceptable) or the next available pole (preferred). If a primary cable riser is installed on the same pole as the group operated switch, the option two grounding method (page 27) will be required for the switch operating handle. Without the cable riser, the switch can be grounded using option one (adjacent pole grounding page 24).

Padmounted/Free Standing Interface - The CUSTOMER will furnish and install a pad mounted or free standing switchgear unit with provisions for primary metering. NYSEG will designate the location and space requirements for the metering equipment. This enclosure shall be approved by NYSEG's Corporate Metering Department prior to ordering. Refer to page 17 for typical pad mounted switchgear, page 18 for the minimum electrical requirements and page 21 for a suggested flat pad installation.

Group Operated Load Break Switch Requirements

SCOPE: Minimum electrical requirements for standard 15kV and 35kV distribution class group operated 600 ampere load break switches for application on the overhead distribution system. For switches with ratings other than 600 amps, contact NYSEG.

RATINGS: The following ratings are approved by NYSEG. Other ratings will require explicit approval by NYSEG.

<u>Application</u>	<u>Voltage (kV)</u>	<u>Current (Amp)</u>	<u>BIL (kV)</u>
15kV line to line & below	15 kV	600.00	110.00
35kV line to line	19.9/34.5kV	600.00	200.00

STANDARDS: The group operated load break switches shall be manufactured in accordance with all applicable ANSI and NEMA standards.

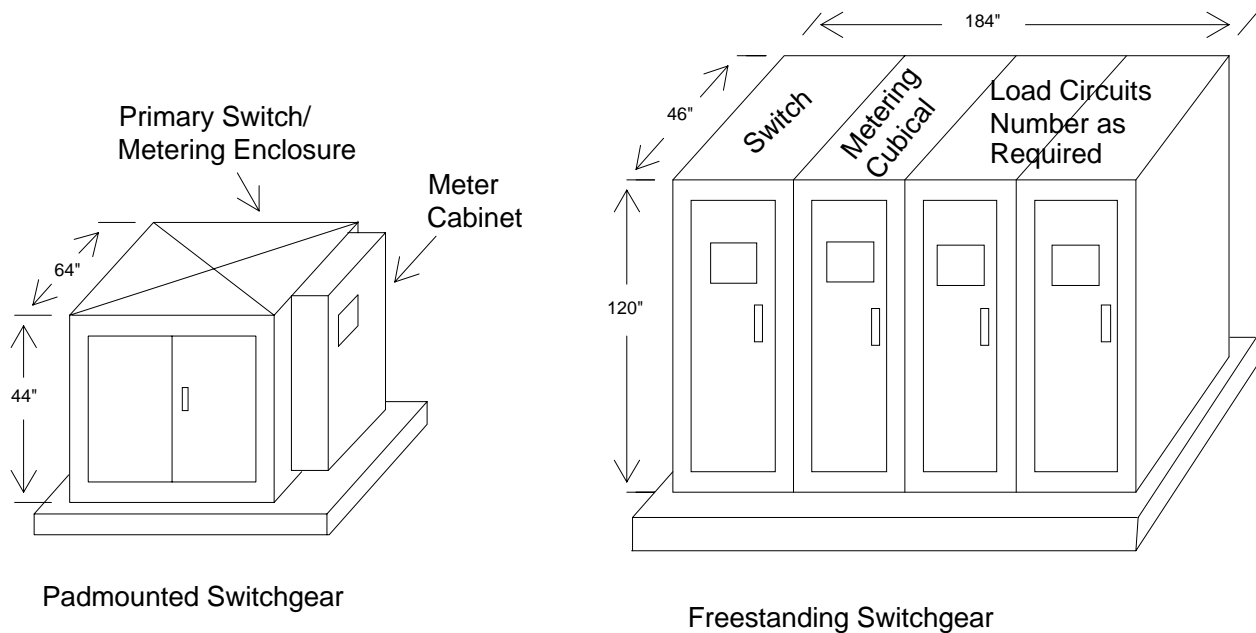
INTERRUPTERS: The switch interrupting device shall be capable of interrupting distribution loads described above. Typical interrupting designs are internal de-ionizing gas quenching devices or external rapid separation devices.

CONSTRUCTION: An insulator shall be placed in the switch operating shaft above the operating handle and below the system neutral position (*not required if the switch will be grounded using the option two grounding method as shown on page 27). It is recommended that pre-assembled and pre-adjusted switches mounted on steel or aluminum crossarms or cluster mount be utilized. It is also recommended that 2 hole or 4 hole NEMA terminal pads be utilized to aid in attachment to NYSEG's system.

See NYSEG Specification SP-1467 for NYSE's preferred design on group operated loadbreak switches.

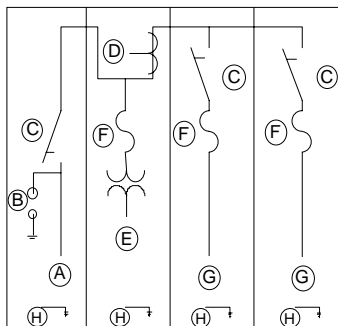
*An in shaft insulator had previously been required by NYSEG for all distribution type pole mounted switches. While this is no longer a requirement when using the option 2 grounding method, an insulator can still be installed without compromising safety.

Typical Pad Mounted Switchgear



- Above dimensions are based on 15kv units and are intended for comparison only
- Concrete vault or pad furnished and installed by customer
- Enclosure to be mounted flush with the concrete pad
- Incoming switch cubical door and metering cubical door to be locked with NYSEG padlocks
- Incoming switch handle to be padlocked by a NYSEG lock that will accept both a customer and a NYSEG key
- all load circuit switch handles and doors to be locked with a customers padlock
- 'Danger High Voltage' and other required signs to be furnished and installed by the manufacturer

Typical one line diagram



ITEMS

- A - Incoming Underground Circuit
- B - Lightning Arrester Protection
- C - Loadbreak Switch
- D - Current Metering Transformer
- E - Potential Metering Transformer
- F - Fuses
- G - Outgoing Underground Circuits
- H - Grounding Provision

NOTE: Any equipment electrically connected before the incoming switch SHALL be mounted in that switch compartment (such as the lightning arresters shown above). This is to avoid having energized equipment in compartments that are expected to be deenergized when the main switch is open.

**REQUIREMENTS FOR CUSTOMER OWNED
15kV AND 35kV DISTRIBUTION SWITCHGEAR**

The following applies to **CUSTOMER** owned 15kV and 35kV switchgear with a maximum continuous current rating of 200/600 Amps. Minimum 15kV class equipment shall be used for all voltage applications up to 15kV rating. For switchgear rated over 600 Amps, contact NYSEG's Distribution Engineering Department.

While NYSEG generally utilizes air insulated switchgear, the **CUSTOMER** has the option of air, gas, liquid, or vacuum insulated, live front or dead front units provided the unit meets the following minimum electrical requirements and have been reviewed and approved by NYSEG engineering prior to ordering.

a) General Requirements

The switchgear and accessories shall conform to the latest issues of ANSI Standards C37.20, C37.35, C37.46, and NEMA Standard SG5, and any other applicable standards of ANSI, NEMA, and OSHA. In case of conflict ANSI takes precedence over NEMA.

The switchgear and any power fuses, shall be in compliance with Article 490 of the current National Electrical Code.

b) Ratings

The interrupter switch ratings shall be as follows:

	<u>15 kV Class</u>	<u>35kV Class</u>
Rated maximum design voltage	15.5kV	38 kV
Rated minimum impulse withstand (BIL)	95 kV	150kV
Rated continuous and loop switching	200 or 600 Amps	200 or 600 Amps
Rated magnetizing interrupting current		
200 Amp class equipment	7 Amps	7 Amps
600 Amp class equipment	21 Amps	21 Amps
Rated cable charging current	4 Amps	10 Amps
Rated 3-second current (SYM)	10000 Amps	10000 Amps
Rated momentary and close & latch current (ASYM)	16000 Amps	16000 Amps
MVA (ASYM)	400 MVA	1000 MVA

c) Interrupter Switches

The interrupting switch operating handle shall be self-latching and have provisions for padlocking in both the open and closed positions.

Livefront switchgear shall have the handle attached to prevent removal from the site.

Switchgear shall have the compartment doors interlocked with the interrupter switch such that the door cannot be opened while the switch is closed and the switch cannot be closed while the door is open.

It is recommended that the main to hinge contacts of the interrupter switches should be silver to silver. The arcing contact of the interrupting units should be silver-tungsten tipped.

d) Insulators

It is recommended for air insulated switches, fuse mounting insulators and main bus support insulators be skirted. They shall be NEMA BIL rated class A-20 or B-20.

e) Cable Terminations

Livefront - Cable termination points shall consist of 2 hole NEMA pads with adequate clearance for terminating MV shielded cables.

Deadfront - NYSEG recommends that each bushing or bushing well be provided with a parking stand bracket located immediately adjacent to the bushing or bushing well. The parking stand bracket should accommodate standard feed-thru and standoff insulators, and other similar accessories. Adequate compartment space should be provided for the installation and operation of all connections and accessories.

f) Lightning Arresters

15kV class livefront or deadfront switchgear should have lightning arresters in the bays. 35kV class switchgear shall have lightning arresters in the bays. Mounting provisions and adequate compartment clearances are to be provided by the manufacturer for the type of lightning arrester specified by the **CUSTOMER**.

g) Grounding Provisions

The ground bus shall maintain electrical continuity throughout the integrated switchgear assembly. A ground-connection pad shall be provided in each termination compartment of the switchgear and a grounding stirrup on the incoming switch.

h) Metering

There shall be provision for NYSEG furnished metering equipment on the load side of the incoming switch. Adequate space and mounting provisions for metering potential transformers and current transformers shall be provided. Listed below are the surface-to-surface or edge-to-edge electrical clearances for use in determining space requirements for metering transformers. It is assumed that all insulators are skirted and barrier materials are NEMA GP-03 or equivalent.

Voltage Class	Phase to Phase w/o Barriers	Phase to Phase w/ Barriers	Phase to Ground w/o Barriers	Phase to Ground w/ Barriers	Phase to Barrier Vertical	Phase to Barrier Horizontal	Phase to Ground Insulators
15kV	9"	6"	6.5"	5.5"	1"	4"	6"
35kV	13.5"	9.5"	10.5"	8.5"	2"	8"	12"

NOTE: Contact NYSEG's Corporate Metering Department, before ordering switchgear, to obtain dimensions and mounting requirements for these transformers.

i) Enclosure Construction

Where the switchgear will be installed on a vault or manhole, NYSEG recommends the installation of base barriers to reduce contamination and condensation.

j) Compliance

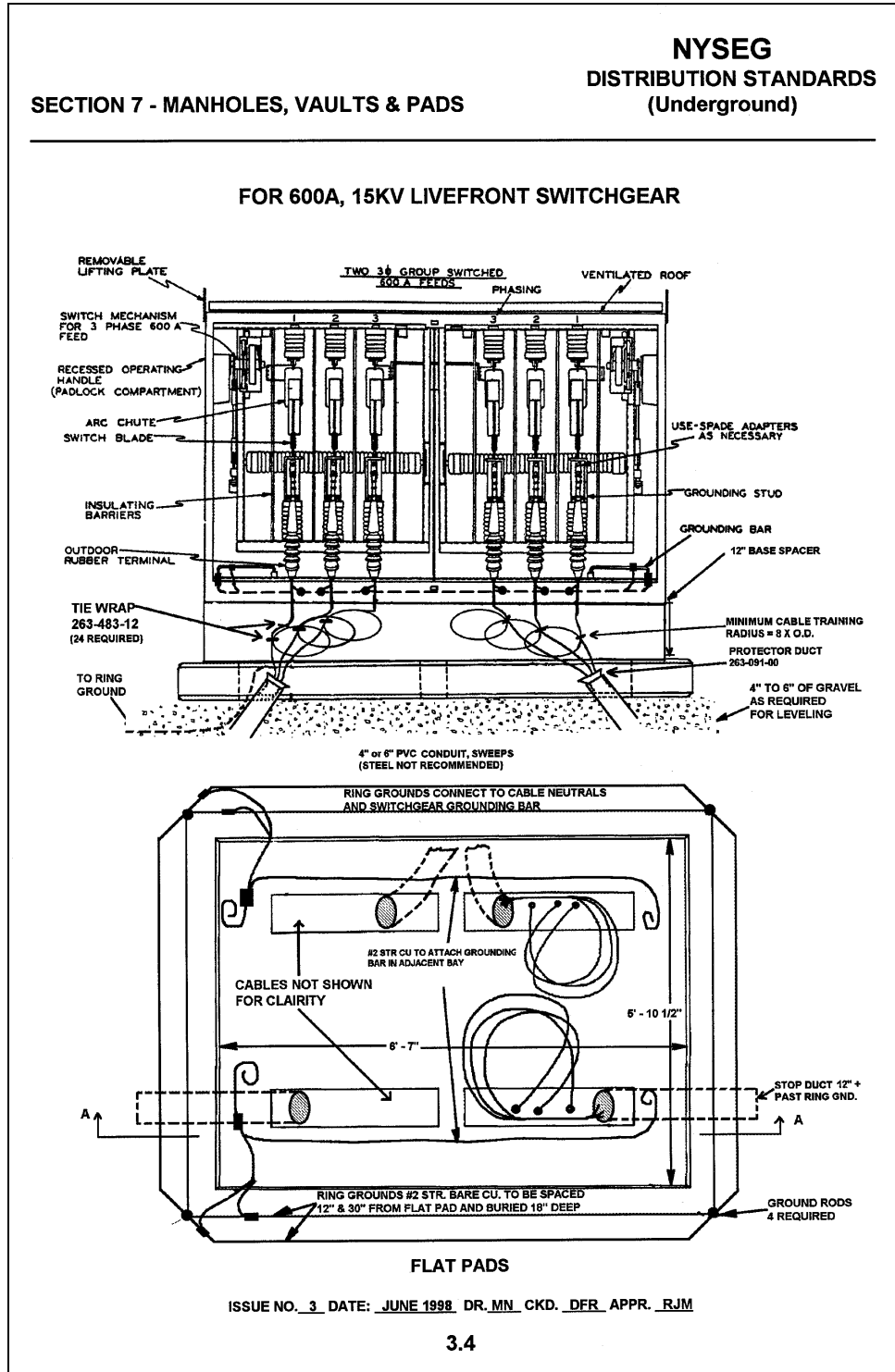
Prior to ordering equipment, the **CUSTOMER** shall furnish for review by NYSEG, two (2) copies of the switchgear design, showing all applicable information required such as: Type of construction and interlock system, connection, outline and component drawings. The outline drawings shall show all terminal locations, lightning arrester locations, and base detail for design of the foundation.

The manufacturer should furnish installation, operating and maintenance instructions to the **CUSTOMER**.

See NYSEG Specification SP-1382 for NYSEG's preferred 15kV switchgear design.

Typical Switchgear Installation

Flat-pad will be sized to meet requirements of switchgear.



This is a NYSEG distribution standard. References to page and section numbers within this standard are to other NYSEG standards not to page and section numbers within this book.

High Voltage Fuse Requirements

SCOPE: Minimum electrical requirements for standard distribution class open type high voltage fusing for application on the overhead distribution system.

<u>Application</u>	<u>Rating (kV)</u>	<u>BIL (kV)</u>
15 kV line-to-line and below	15/27* (see below)	125
35kV line-to-line	38** (see below)	150

* To achieve the 125kV BIL rating may require a 15 or 27kV rated fuse unit depending on the manufacturer and fuse size.

** 38kV is the standard rating for a fuse unit used on the 35kV system.

STANDARDS: The fuse and fuse holder shall be manufactured in accordance with current ANSI Standards C37.40, C37.41 and C37.42; and all current applicable NEMA standards.

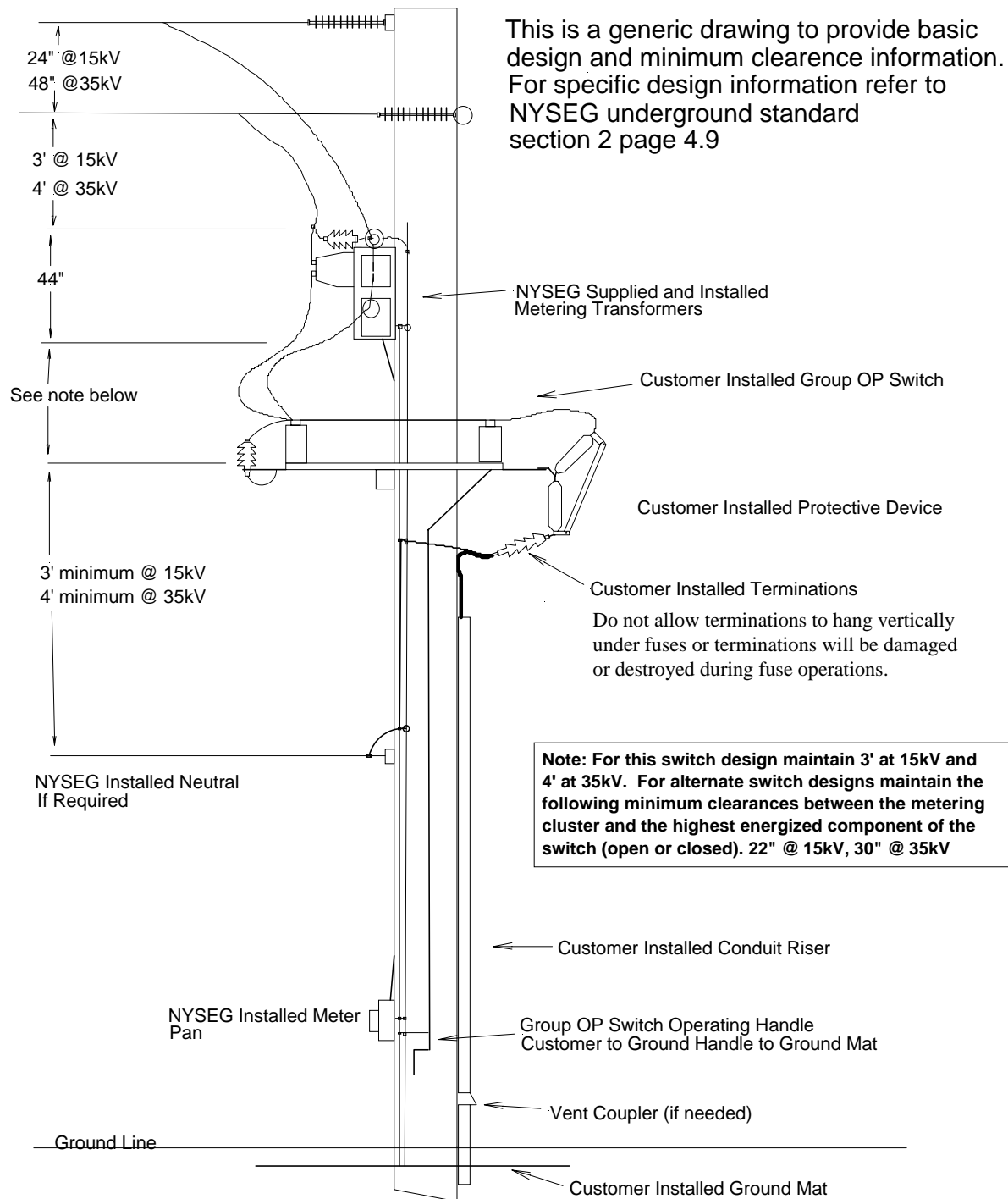
BODY: It is recommended that each outdoor 15 and 35 kV and each indoor 15 kV fuse be equipped with hooks to accommodate a portable loadbreak tool.

See NYSEG specification SP-1566 for NYSEG's preferred design on 15kV fuses.

Contact NYSEG for available short circuit current and to allow coordination of protective equipment with NYSEG's facilities.

It is the **CUSTOMER'S** responsibility to stock replacement fuses for their system.

CUSTOMER Installed Single Pole Interface Structure



Group Op Switch Grounding (Option 1)

NYSEG
DISTRIBUTION STANDARDS
 (Overhead)

SECTION 6 - GROUNDING

GROUNDING DISCUSSION AT ALL DISTRIBUTION VOLTAGES

All new group operated switches at all voltages on the distribution system shall be installed with an insulating section in the operating shaft of the switch and grounded in accordance with pages 4.2 and 4.3. This system provides complete isolation between a switch operator and all live parts on the structure.

A porcelain insulating section shall be located just beyond reaching distance (approximately 12 ft) but, below the point of the neutral wire. This provides protection from the lightning arrester discharge currents.

The handle of the switches shall be grounded in accordance with page 4.3.

Surge arresters shall be located at the switch location. They shall be connected between the primary conductors and the switch frame. The switch frame shall be connected to the neutral. Down grounds from the neutral shall be installed at the adjacent poles and not at the switch pole. No down grounds are to be installed at the switch pole.

Normally, low voltage secondary circuits and metering will not be allowed at the switch structure. If this condition cannot be avoided, see the note below.

The ground resistance is to be measured at every installation, and shall not exceed 25 ohms.

NOTE: NO FUTURE DOWN GROUNDS AT THE SWITCH STRUCTURE ARE PERMITTED WITH THIS STYLE OF GROUNDING - IF DOWN GROUNDS ARE REQUIRED AT THIS POLE THE SWITCH HANDLE MUST BE GROUNDED AS PER PAGE 4.4.

NOTE: On delta systems add a "dummy" neutral between poles A, B & C.

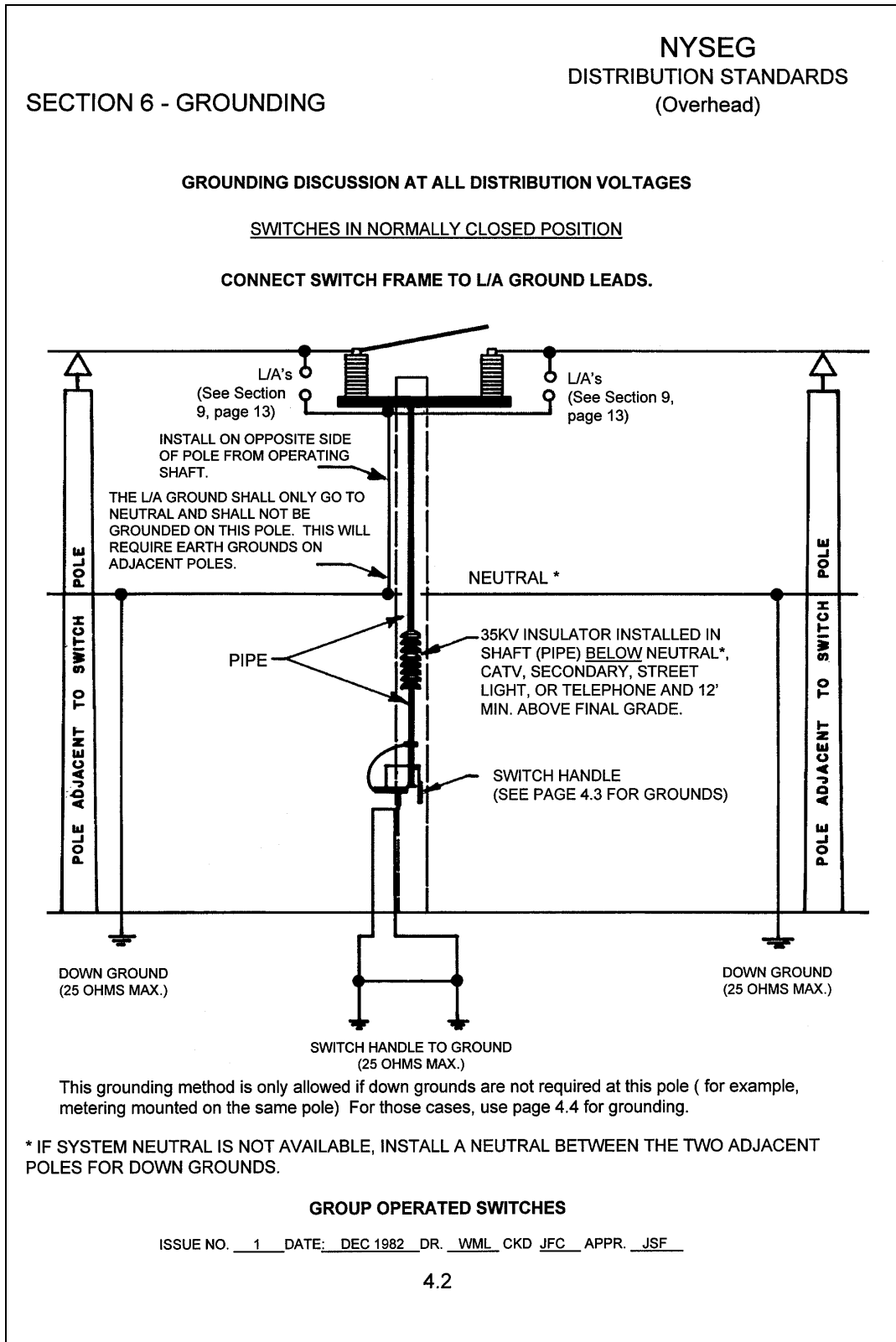
GROUP OPERATED SWITCHES

ISSUE NO. 2 DATE: DEC 1982 DR. WML CKD JFC APPR. JSF

4.1

This is a NYSEG distribution standard. References to page and section numbers within this standard are to other NYSEG standards not to page and section numbers within this book.

Group Op Switch Grounding (Option 1)



This is a NYSEG distribution standard. References to page and section numbers within this standard are to other NYSEG standards not to page and section numbers within this book.

Group Op Switch Grounding (Option 1)

NYSEG
DISTRIBUTION STANDARDS
 (Overhead)

SECTION 6 - GROUNDING

**GROUNDING LOOP FOR HANDLES
 AT ALL DISTRIBUTION VOLTAGES
 (WITH INSULATORS IN OPERATING PIPE)**

THE LOOP SHALL BE INSTALLED IN THE GROUND SIDE OF POLE FROM WHICH SWITCH HANDLE WILL BE OPERATED.

GROUND ROD(S) SLOPING INTO GROUND (2 LOCATIONS MINIMUM)

BOND ALL RODS WITH #4 S.D. BARE COPPER WIRE OR LARGER. WIRE SHOULD BE 6" BELOW GROUND (18" WHERE LAND MAY BE PLOWED).

ADDITIONAL ROD WHEN REQUIRED

STRAP TO PIPE OPERATING ROD

#4 BUG

#4 CU. S.D.

13/32" DIA.

5"

3/4"

1 1/16" DIA.

The minimum installation shall consist of two 8' ground rods and loop as shown above. If resistance is above 25 ohms, it shall be reduced by one or more of the methods listed below.

- Add additional ground rods in the loop.
- Extend one or all rods by adding up to three sections.
- Install counterpoise as described on page 3.2.

GROUP OPERATED SWITCHES

ISSUE NO. 1 DATE: DEC 1982 DR. WML CKD JFC APPR. JSF

4.3

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Group Op Switch Grounding (Option 2)

NYSEG
DISTRIBUTION STANDARDS
(Overhead)

SECTION 6 - GROUNDING

**GROUNDING GRID FOR GROUP OPERATED SWITCHES
ALTERNATE METHOD***

Mesh is cut to fit around pole and reconnected on the back side.

Ground Rods

6'x8' copperweld ground mesh ss# 940-480-49 with six 8' ground rods placed as shown. ground rod placement is critical.

Bond all ground rods and copperweld mesh with a continuous loop of #4 S.D. bare copper wire or larger. Wire and mesh shall be a minimum of 6" below grade.

Install #2 crushed stone 4" thick extending approx. 2' beyond all edges of the ground grid. Geo textile material to be placed under gravel to inhibit plant growth

4" Crushed Stone

Geo Textile landscaping material SS# 393-113-00 can be purchased locally if required

The ground resistance of this entire installation should be below 25 ohms. If above 25 ohms with 8' ground rods, try extending corner rods by up to three sections, if possible.

NOTE: If a ground resistance of less than 25 ohms cannot be achieved **OR** the available fault current at the switch location is in excess of 10,000 amps, an above-ground equipotential mat is also required. Refer to pages 5.1 and 5.2 for details. If a portable equipotential mat is used, the switch must be permanently marked "A PORTABLE SWITCHING PLATFORM IS REQUIRED TO OPERATE THIS SWITCH".

* This grounding method is to be used only at locations where adjacent pole grounding is not acceptable.

GROUP OPERATED SWITCHES

ISSUE NO. 2 DATE: FEBRUARY 1997 DR. MJU CKD RSE APPR. AHM

4.4

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Group Op Switch Grounding (Option 2)

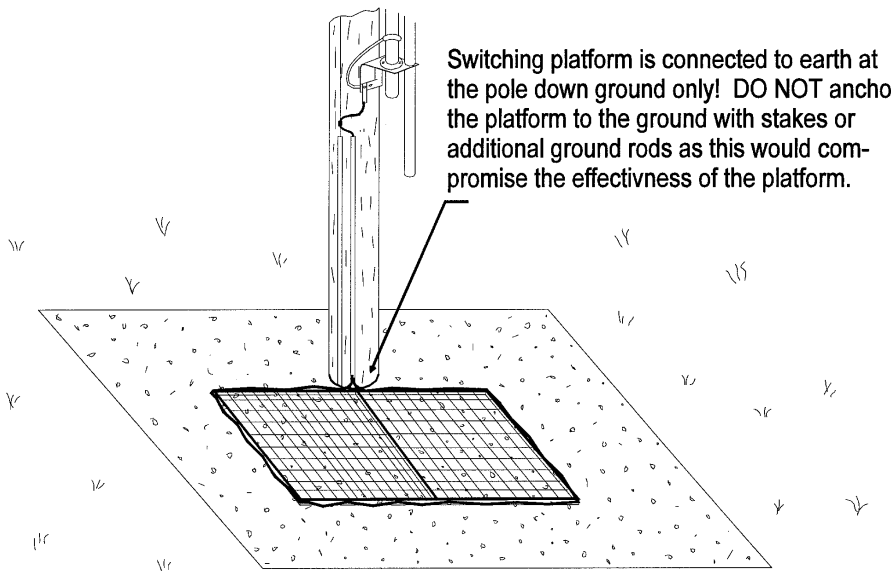
Alternate mat designs will be allowed after review and acceptance by NYSEG.

NYSEG
DISTRIBUTION STANDARDS
(Overhead)

SECTION 6 - GROUNDING

This permanent switching platform is used in conjunction with the group-operated switch grounding grid shown on page 4.4. **DO NOT** use this platform without a properly installed grounding system.

The platform(s) is(are) placed on the gravel and connected to the down ground with a loop of #4 SD bare copper connected as required to the perimeter of the platform.



Switching platform is connected to earth at the pole down ground only! **DO NOT** anchor the platform to the ground with stakes or additional ground rods as this would compromise the effectiveness of the platform.

Use NYSEG platform SS# 850-001-01 or equivalent. Use one or two platforms as required to allow the switch operator to keep both feet on the platform while operating the switch.

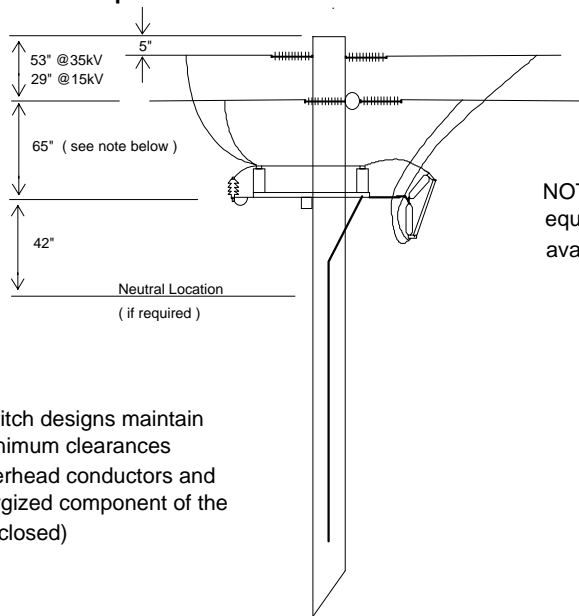
PERMANENT SWITCHING PLATFORM

ISSUE NO. 2 DATE: FEBRUARY 1997 DR. RSE CKD RSE APPR. AHM

5.2

This is a NYSEG distribution standard. References to page and section numbers within this standard are to other NYSEG standards not to page and section numbers within this book.

Customer's second pole of a two pole interface

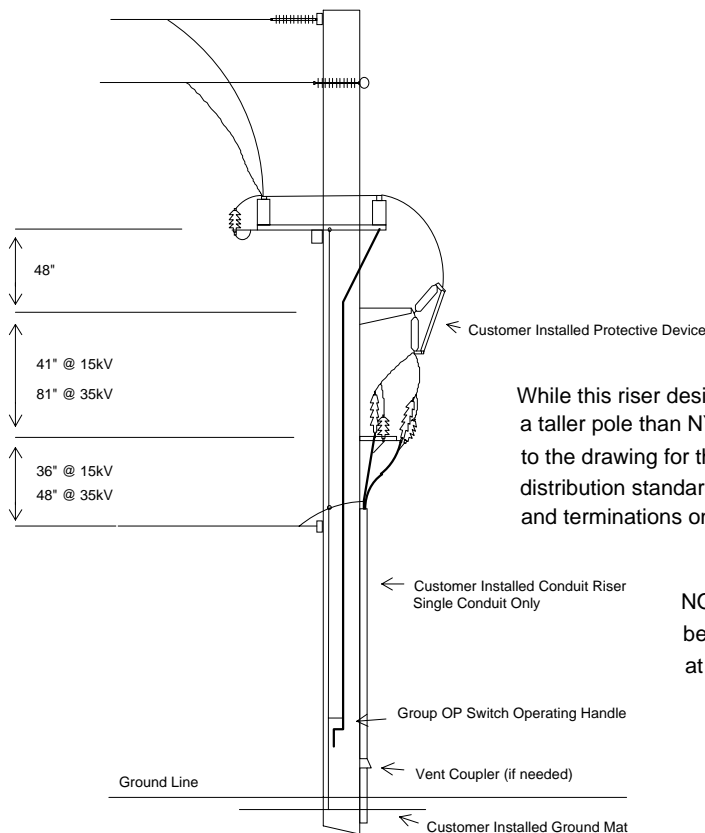


NOTE The Customers protection equipment should be moved to the next available pole to simplify the installation

Overhead to Overhead

For alternate switch designs maintain the following minimum clearances between the overhead conductors and the highest energized component of the switch (open or closed)

22" @ 15kV
30" @ 35kV



Overhead to Underground

While this riser design is acceptable it does require a taller pole than NYSEG's current design. Refer to the drawing for the single pole interface or NYSEG's distribution standards for a design mounting the fuse and terminations on the switch frame.

NOTE: The Customer installed riser can be placed at or beyond this interface pole at the Customer's discretion

CUSTOMER Installed Primary Overhead or Underground

At the **CUSTOMER'S** discretion, a primary metered **CUSTOMER** can extend the primary system from the **CUSTOMER'S** protective device to the utilization equipment using either primary underground cable or pole mounted overhead conductors.

Underground Cable:

NOTE: In accordance with industrial code #53, the CUSTOMER shall notify NYSEG and other utilities prior to digging.

CUSTOMERS who will be installing the primary cable in a common trench with telephone or cable TV cables (commonly referred to as joint trench) should adhere to the requirements of the NESC article 354. To paraphrase, if bare concentric neutral or semiconducting jacketed cables are direct buried, they can be installed in the trench with no intentional separation from the other facilities (random lay). If the primary cable is installed in conduit, or an insulating jacket is used, the NESC **may** require either a one foot separation between the primary cable and the other facilities, or the addition of a bare grounding conductor adjacent to the primary cable. Contact NYSEG for additional details prior to installing cable under these circumstances.

The **CUSTOMER** may choose from either a direct buried or conduit system using a shielded, solid dielectric insulated, high voltage cable (refer to page 10 for cable requirements). The **CUSTOMER** has complete responsibility for the installation and termination of this cable. Any cable risers installed in this portion of the installation are also the **CUSTOMER'S** complete responsibility. The voltage class of the cable shall be in accordance with the operating voltage of the area to be served with 15kV being the minimum acceptable. In those area's designated for future conversion to a higher voltage, NYSEG may have additional requirements.

For direct buried primary cable installations, the minimum depth of burial shall be 30 inches for 15,000 volt cable and 36 inches for 35,000 volt cable. Depth of burial may be reduced as per the National Electric Code article 300-50. The cable shall be protected above and below with back-fill free from stones or other material that will damage the cable. The remainder of the trench will also be back-filled with select fill.

The ends of all **CUSTOMER** installed cable shall be sealed by the **CUSTOMER** to prevent contamination of the cable with dirt or moisture. NYSEG reserves the right to inspect a **CUSTOMER'S** primary cable installation prior to back-filling. Where a **CUSTOMER'S** cable may be used to serve additional future **CUSTOMERS**, NYSEG may impose more stringent design and equipment requirements.

NOTE: For three phase underground installations connected to transformers, ferroresonance overvoltages can be a concern. Consult with NYSEG to determine if the particulars of your installation are susceptible to ferroresonance. Refer to page 36 for an explanation of ferroresonance.

Overhead Construction:

Customer facilities shall be designed to the NATIONAL ELECTRICAL SAFETY CODE (NESC) requirements. Grade of construction shall be a minimum NESC grade C. All material and equipment used by the **CUSTOMER** shall be of good quality and new condition.

The following materials are required for the meter structure and are recommended for construction elsewhere:

NOTE: Treated lumber contains pesticides to protect it from insect attack and decay and requires the use of special handling and proper disposal methods. The **CUSTOMER** is advised to follow the recommendations in the manufacturer's Consumer Information Sheets supplied with these products.

- a) **Poles:** Meter pole is to be a new southern yellow pine pole or equivalent in accordance with ANSI Spec. 05.1 latest edition and is to be full length pentachlorophenol, CCA, or creosote treated in accordance with section C4 of American Wood Preserver's Association Standards. Minimum length and class is to be one of the following: 40' and 45' Class 4, 50' Class 3, 55' Class 2. Pole setting depth is generally 2 feet plus 10% of pole length. NYSEG will specify the size of the meter pole and setting depth based on field conditions.
- b) **Framing Materials:** The meter pole is to be framed with Fiberglass deadend arms or crossarms of southern yellow pine, Douglas fir or an equivalent. Wood crossarms are to be pressure treated with pentachlorophenol or an equivalent in accordance with section C25 of the American Wood Preservers' Association Standards. Minimum arm size is 3.5" x 4.5" x 8'. When crossarms are used, they shall be braced. Wood braces shall have a minimum cross section of 13/16" x 1 3/4" and are to be pressure treated with pentachlorophenol or an equivalent.

All framing material shall be designed to the National Electrical Safety Code to a MINIMUM of Grade C Construction.

- c) **Insulation Levels:** Insulation levels shall be in accordance with the operating voltage, with 15kV class the minimum acceptable. If the line is constructed in an area designated for future 34.5 kV operation, NYSEG may require 34.5 kV insulation for primaries. For single phase lines operating at delta voltages, NYSEG may have additional requirements, if a conversion to grounded wye is planned in the future.

Insulation design and electrical clearances shall conform to the National Electrical Safety Code.

- d) **Line Conductors, Ground Wire and Connectors:** Minimum size line conductor is #2 and is to be in accordance with applicable ASTM standards. The conductor and connector systems shall be designed to meet the National Electrical Safety Code Grade C construction.

Recommended line conductor types are ACSR, AAAC, copper or copperweld. Conductor connectors should meet ANSI specifications for Class A connections. Only connectors designed for aluminum shall be used on aluminum conductors.

Minimum size ground wire is to be #4 bare copper, solid or stranded, and soft drawn. Ground wire is to be covered with plastic molding as required by the National Electric Safety Code. Structure and equipment grounding shall meet the requirements of the National Electrical Code. Ground wire connectors shall be either compression, fired-on or bolted copper vise type.

- e) **Anchor Systems:** The anchor and guying system shall meet the minimum of Grade C construction of the National Electrical Safety Code.

Guy wire shall be a minimum 3/8" on dead end structures and 9/32" on angle structures, extra high strength steel, with a galvanized class B coating per ASTM A-475. All guy hardware shall have a minimum 15,000 lb. rating and be hot dipped galvanized.

Anchors shall be either, crossplate steel with a minimum cross section of 200 square inches or, power installed screw anchor with a minimum 8" diameter helix 7000 ft.-lb. torque rated. Anchor rods shall have a minimum diameter of 3/4 inch. The number of anchors, and the length of the anchor rod, shall be as needed to achieve the required holding strength for the specific installation. All anchor equipment shall be galvanized in accordance with ANSI Specification C135.2, except the helix of screw anchors and crossplates, which may be either painted or bituminous coated.

CUSTOMER Installed Utilization Equipment

A primary metered **CUSTOMER** may choose from any of the following transformer installations.

- Padmounted single or three phase units.
- Station mounted single or three phase power units (enclosed by fence).
- Pole mounted single phase units. (For single or three phase service)
- *Indoor single or three phase units.

NOTE: * NYSEG does not recommend transformer vaults, however, if the CUSTOMER elects this construction, the vault shall be constructed and ventilated in accordance with the National Electric Code article 450.

Transformers shall be located and physically protected as required by article 450 of the National Electric Code. The transformer should be located away from vehicular traffic or should be suitably guarded from damage. Refer to pages 34 and 35 for typical bumper protectors.

Transformers shall be installed to minimize fire hazards as per National Electric Code articles 450-21 through 450-27.

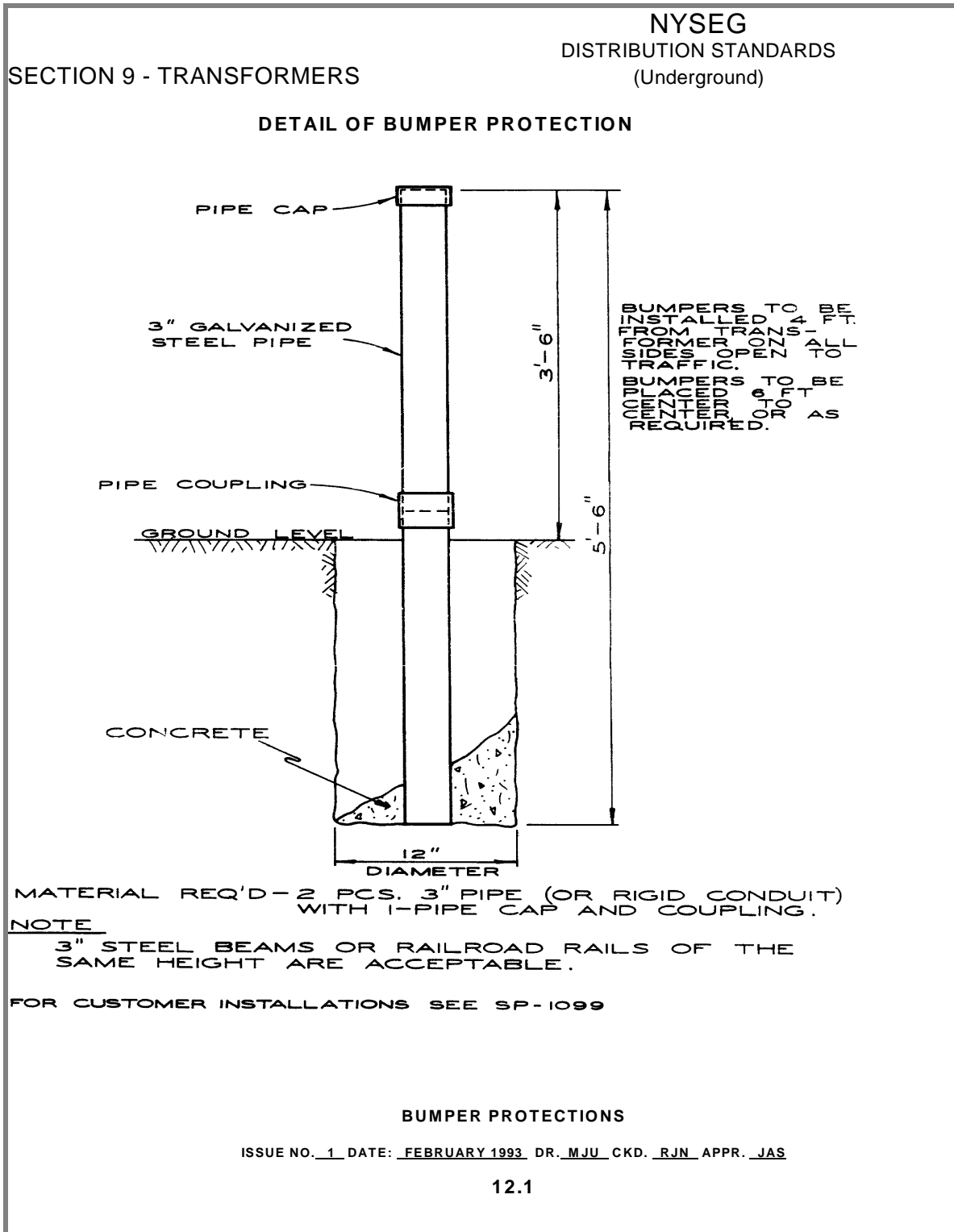
Each transformer shall have over current protection as required by article 450-3 of the National Electric Code. For 3 phase transformer installations the voltage rating on these protective devices shall be the full line to line rating of the system. Each transformer shall be grounded as per the National Electric Code.

Each transformer shall be properly protected against unauthorized access, and shall be designed and installed to meet the requirements of section 38 of the National Electric Safety Code.

For three phase transformers which are, or will be, connected for wye-wye operation, a four or five legged core or shell form construction transformer is required to avoid excessive tank heating.

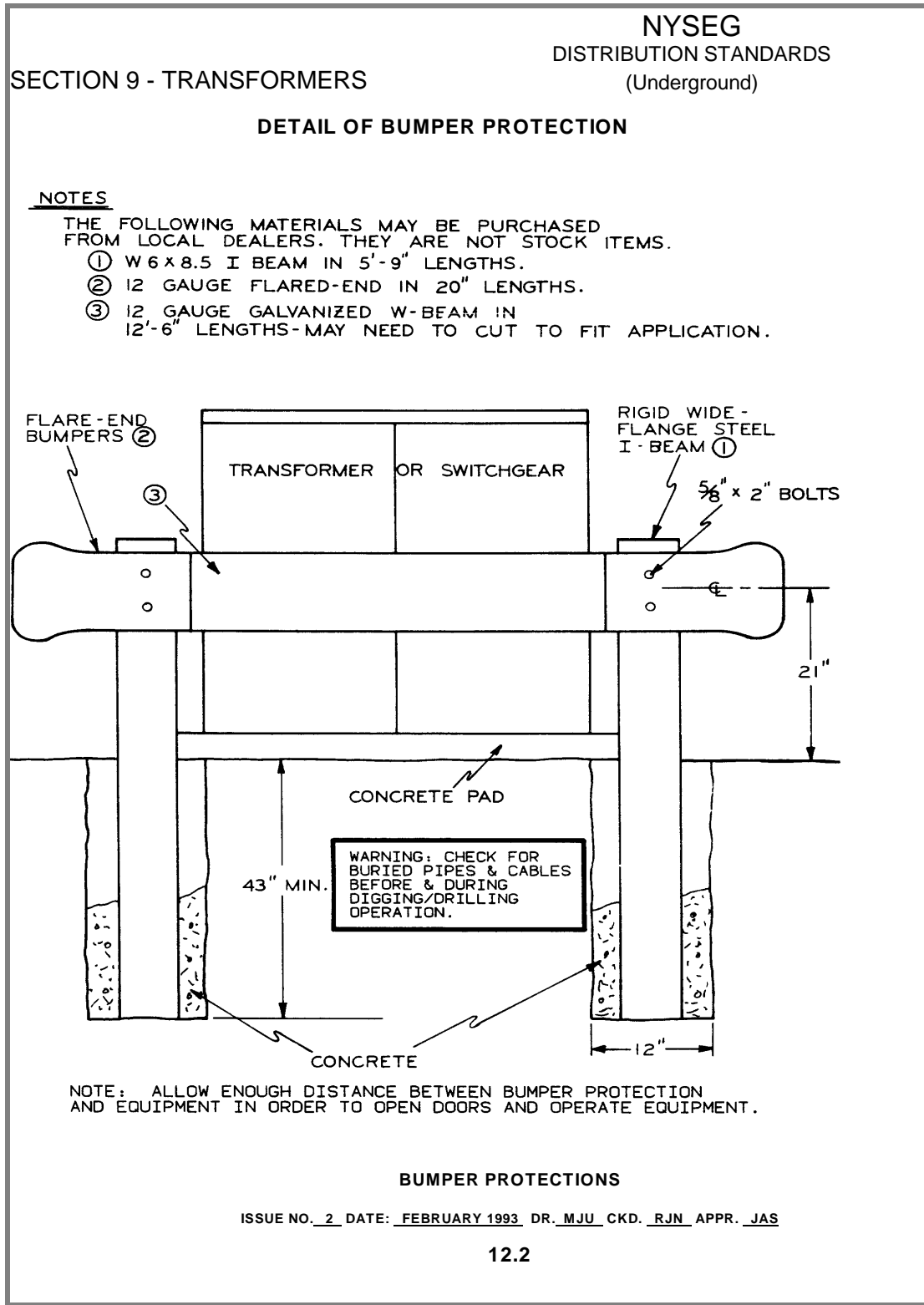
Refer to pages 36 - 38 for the electrical requirements for pad mounted and pole mounted transformers and page 39 for a suggested pad design.

Transformer Bumper Protection



This is a NYSEG distribution standard. References to page and section numbers within this standard are to other NYSEG standards not to page and section numbers within this book.

Transformer Bumper Protection



This is a NYSEG distribution standard. References to page and section numbers within this standard are to other NYSEG standards not to page and section numbers within this book.

Transformer Requirements

Voltage Ratings: The high voltage winding must conform to NYSEG's system voltages available in the **CUSTOMER'S** area and should be one of the following:

2400/4160Y	4800/8320Y/ x 7620/13200Y
2400/4160Y x 7200/12470Y	12470 grdY/7200
2400/4160Y x 7620/13200Y	13200 grdY/7620
4800/8320Y	34500 grdY/19920
4800/8320Y x 7200/12470Y	

CAUTION: Ferroresonance is a prolonged overvoltage condition that can damage transformers, arresters, cable, and customer equipment. It can occur when a capacitive reactance (typically a primary underground cable) and inductive reactance (transformer) are in series and their values are in certain proportions. A typical example is a three phase padmount transformer fed by an underground cable from a wye-primary system with one or two phases of the supply circuit open and no load on the transformer

Situations most prone to cause ferroresonance are:

- Smaller sized transformers (less than 300 KVA are most susceptible).
- Low core-loss design transformers.
- Delta connected primary on the transformer.
- Single-phase overcurrent protection (e.g., fusegear).
- No-load on the transformer secondary.
- Single-phase switching on three-phase circuits.
- Primary systems operating at voltages greater than 5 kV.
- Primary supplied from an underground cable as opposed to overhead conductor.

If ferroresonance does occur it causes higher than normal voltage across the primary and secondary of the transformer. Both the distribution system (transformers, arresters, fuses, cable, etc.) and customer equipment will be subject to this overvoltage as long as the ferroresonance condition exists.

Although it cannot be entirely eliminated, steps can be taken to minimize ferroresonance by avoiding the situations listed above. Contact NYSEG regarding any primary systems utilizing insulated cable and pad mounted transformers for an assessment of ferroresonance risk. To calculate the expected level of ferroresonance, NYSEG will need to know the primary cable length, conductor size, voltage, and manufacturer as well as the transformer size, voltage and

connections. If available the transformer excitation current and core loss will allow a more accurate calculation.

Connections: NYSEG recommends the following transformer connections on primary systems. While all are acceptable to NYSEG, some may have characteristics not desirable to the **CUSTOMER**, for example, the presence or absence of the capability of providing secondary ground fault current.

NOTE: Open Wye and Open Delta configurations are not applicable for three phase padmounted units.

System Voltage	Primary Connection	Secondary Connection	Notes
Delta Primary Systems			
2400 Delta, 4800 Delta	Delta	Grounded Wye	a
7200 Delta	Delta	Delta	a
	Delta	Ungrounded Wye	a,c,d
	Open Delta	Open Delta	a,b
Wye Primary Systems			
4160 Wye, 8320 Wye	Grounded Wye	Grounded Wye	a,e
12470 Wye, 13200 Wye	Grounded Wye	Ungrounded Wye	a,d,e
Do to a higher susceptibility to ferroresonance overvoltages, (see caution previous page) these transformer connections should be avoided when using padmounted transformers. Underground installations utilizing these transformer connections will require explicit acceptance by NYSEG.	Ungrounded Wye	Delta	a,e
	Delta	Grounded Wye	a,c,e
	Delta	Delta	a,c,e
	Delta	Ungrounded Wye	a,c,d,e
	Open Wye	Open Delta	a,b,e
Wye Primary Systems			
34500 Wye	Grounded Wye	Grounded Wye	e
	Grounded Wye	Ungrounded Wye	d,e
	Open Wye	Open Delta	b,e

Notes:

- a) **CUSTOMER** may be required to purchase a transformer with a dual ratio primary rating. Contact NYSEG for details.

- b) This is an unbalanced transformer connection which could result in dissimilar secondary voltages and attendant utilization equipment problems.
- c) Acceptable, but not a standard NYSEG connection.
- d) Not applicable for 208 volt secondary service per National Electrical Code.
- e) Other connections may be required if **CUSTOMER** has on-site generation paralleled with NYSEG. Consult NYSEG for details.

STANDARDS: The transformer shall be manufactured in accordance with the current ANSI Standards C57.12.00, C57.12.00A and B, C57.12.21, C57.12.22 , C57.12.25 and C57.12.26; NEC and all current applicable NEMA standards. The BIL for the primary winding shall be 95kV for 15kV class transformers and 150kV for 35kV class transformers.

VOLTAGE RATINGS: The high voltage windings shall conform to NYSEG's system voltage available in the CUSTOMER'S operating area.

FOR PAD MOUNTED TRANSFORMERS THE FOLLOWING WILL ALSO APPLY:

HIGH VOLTAGE PROTECTIVE FUSING: For 1 phase transformers with high voltage windings of 12470 GrdY/7200V and 13200V GrdY/7620V, NYSEG recommends that a bayonet fuseholder without an isolation link be used in series with an oil immersed 8.3 kV rated current limiting fuse.

For 1 phase transformers with a high voltage winding of 4800V delta, NYSEG recommends that two bayonet fuseholders with isolation link attachments be used.

Consult with NYSEG for recommended fusing on other transformers.

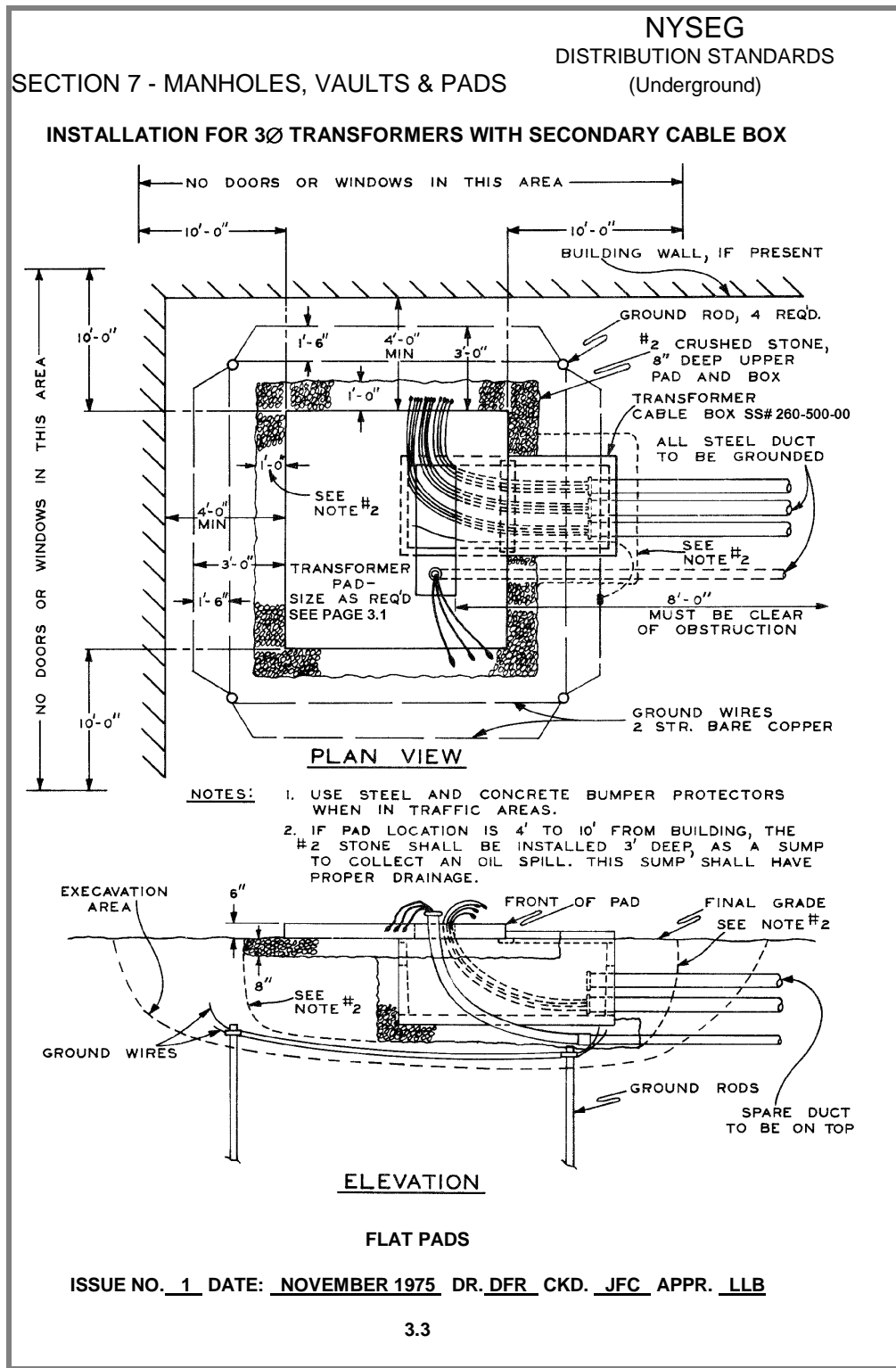
COMPARTMENT: The transformer door shall be of a tamperproof design, shall be bolted with a recessed penta head bolt and shall have provisions for padlocking. On three phase transformers access to the primary compartment shall be accomplished only after the door to the secondary compartment has been opened.

LIGHTNING ARRESTERS: Provisions for mounting lightning arresters should be supplied on live front transformers. Additional bushing wells are recommended on dead front transformers to accommodate shielded arrester applications.

CONNECTIONS: An externally removable H0 and X0 is recommended to aid in transformer testing.

NOTE: For three phase transformers which are, or will be, connected for wye-wye operation, a four or five legged core or shell form construction transformer is required to avoid excessive tank heating

Typical Padmounted Transformer Installation



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Chapter 2

Chapter 2 - Secondary Metered Service

General Service Information

NYSEG will provide overhead or underground service to the **CUSTOMER** in accordance with Tariff PSC-90, section III of the "Electric Service Procedures Manual", NYSEG's "Specifications for Electric Installations" and this document.

NOTE: For CUSTOMERS requiring up to and including a 600 volt service extension, this document does not apply. Those CUSTOMERS should refer directly to NYSEG's "Specifications for Electric Installations."

NYSEG will provide basic engineering service for CUSTOMER built lines including;

- Voltage information
- Point of interconnection
- Size, location, and guying requirements of interface and transformer poles
- Size and location of transformer pad
- A rough layout drawing
- Any construction standards requested

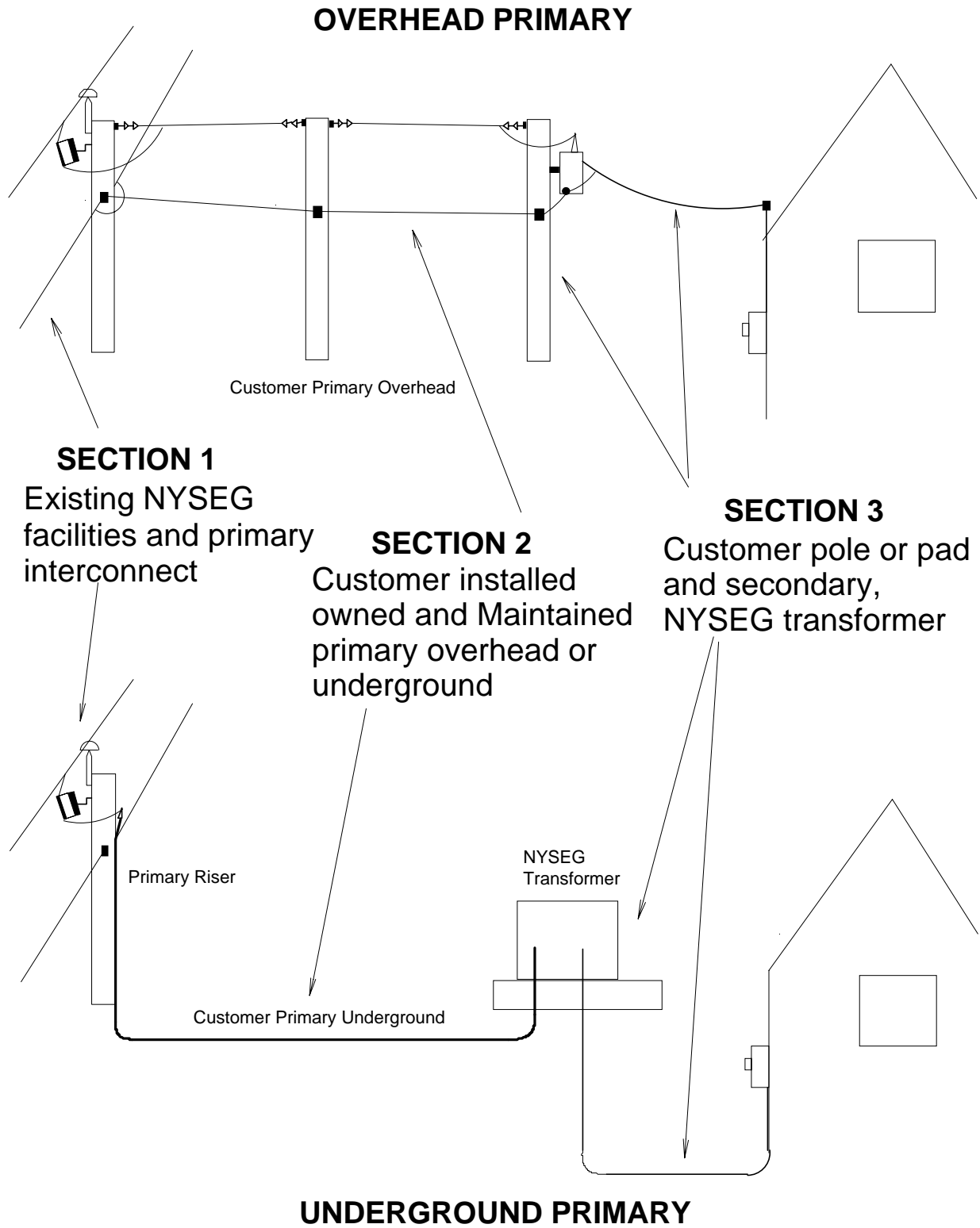
If the **CUSTOMER** requires detailed engineering including a bill of materials, a fee will be charged. **CUSTOMER LINES CROSSING THE PROPERTY OF OTHERS REQUIRE A SPECIAL AGREEMENT. CONTACT NYSEG FOR DETAILS.**

For **CUSTOMER** built lines NYSEG will require the **CUSTOMER** to sign a memorandum of customer ownership of facilities. Use form CA-206 for overhead facilities (on page 42) or CA-208A for underground facilities (on page 43). These stipulate that:

- The **CUSTOMER** owns and is responsible for the line right-of-way maintenance, so the line remains in a safe condition.
- The **CUSTOMER** will be responsible for maintaining an adequate voltage level to the **CUSTOMER'S** facility, given an adequate voltage level at the point of interconnection.

The following chapter is divided into three sections; existing NYSEG facilities and the primary interconnection (section 1), **CUSTOMER** installed primary overhead and or underground (section 2), and the **CUSTOMER'S** installed secondary, and pole or pad for a NYSEG installed transformer (section 3).

Chapter 2 - Secondary Metered Service



MEMORANDUM OF CUSTOMER OWNERSHIP OF ELECTRIC SERVICE LINE EXTENSION

Date _____

It is understood the electric service line connected to pole # _____ of line # _____ in the (town, village) of _____, consisting of _____ poles and facilities approximately _____ feet in length, serving (my, our) premises located at _____, is (my, our) property and the line and right-of-way is to be maintained by (me, us) or (my, our) successors and assigns in a safe condition. Therefore, the operation or failure of said service line will not give rise to any liability on the part of NYSEG, its successors and assigns. If NYSEG's overhead facilities are to be replaced, moved, or relocated for any reason, the cost of relocating (my, our) overhead electric service line is to be borne by (me, us).

It is further understood that should emergency repairs of said electric service line be necessary, and NYSEG is subsequently requested to make such repairs, (I, we) agree to pay to NYSEG the cost of repair. Further, (I, we) agree to be responsible for maintaining an adequate voltage level to (my, our) facilities given an adequate voltage level at the point of connection of said facilities to NYSEG's system.

Signed _____

Address _____

Work Order or
Service Order No.

CA-206

MEMORANDUM OF CUSTOMER OWNERSHIP OF UNDERGROUND ELECTRIC SERVICE LINES

Date _____

It is understood the underground electric service line connected to location # _____ of line # _____ in the (town, village) of _____, serving (my, our) premises located at _____, consisting of facilities approximately _____ feet in length, is (my, our) property and the line and right-of-way is to be maintained by (me, us) or (my, our) heirs, successors and assigns in a safe condition. Therefore, the operation or failure of said service line will not give rise to any liability on the part of NYSEG, its successors and assigns. If NYSEG's underground facilities are to be replaced, moved, or relocated for any reason, the cost of relocating (my, our) underground electric service line is to be borne by (me, us).

It is further understood that should emergency repairs of said electric service line be necessary, and NYSEG is subsequently requested to make such repairs, (I, we) agree to pay to NYSEG the cost of repair. Further, (I, we) agree to be responsible for maintaining an adequate voltage level to (my, our) facilities given an adequate voltage level at the point of connection of said facilities to NYSEG's system.

Signed _____

Address _____

Work Order or
Service Order No.

CA-208A

CHAPTER 2 - Secondary Metered Services Section 1

Existing NYSEG Facilities and Interconnection

Three options exist for **CUSTOMERS** receiving secondary metered service from NYSEG's existing primary facilities:

- a) Overhead from existing NYSEG overhead facilities.
- b) Underground from existing NYSEG overhead facilities.
- c) Underground from existing NYSEG underground facilities.

NOTE: Road crossing poles, primary interconnect cables or overhead wires, terminations, insulators, etc., will all be supplied and installed as per Section III of the "Electric Service Procedures Manual."

NYSEG will determine (through discussions with the **CUSTOMER**) the point at which the **CUSTOMER'S** facilities interconnect with NYSEG's facilities. Where **CUSTOMER** facilities may be used to serve additional future **CUSTOMERS**, NYSEG may impose more stringent design and equipment requirements. A NYSEG supplied fused cutout will be placed on NYSEG's takeoff pole or the **CUSTOMER'S** first pole at NYSEG's discretion. In all cases NYSEG will make the final electrical connection from the **CUSTOMER'S** facilities to NYSEG's facilities.

- a) For **CUSTOMERS** extending overhead from NYSEG's overhead facilities, proceed to section 2 page 49 for the installation of the **CUSTOMER'S** primary overhead facilities. NYSEG will install the span of wire from the NYSEG takeoff pole to the **CUSTOMER'S** first pole, after the **CUSTOMER** has completed his installation.
- b) For **CUSTOMERS** extending underground from existing NYSEG overhead facilities, the **CUSTOMER** will install the underground primary cable (refer to page 46 for cable requirements, page 48 for the acceptance form, and page 51 for construction methods) to the base of the NYSEG designated pole, back-fill the trench, complete the cable riser 8 to 12 feet up the pole and coil a sufficient length of cable at this point to reach the primary cable terminations on the pole (NYSEG will provide the **CUSTOMER** with the details required for installing a riser on an existing NYSEG pole such as length of cable required, location on the pole, etc.). The **CUSTOMER** will seal the ends of the cable to prevent contamination and moisture ingress. NYSEG will complete the installation of the cable riser and install the cable terminations provided the **CUSTOMER** has installed a cable approved by NYSEG. If unacceptable cable is installed, there may be additional charges for NYSEG to terminate the cable.

Warning: A minimum of ten-foot clearance shall be maintained at all times between NYSEG's energized high voltage conductors and equipment, and persons, tools, and materials including the cable being installed.

CHAPTER 2 - Secondary Metered Services Section 1

For a cable riser installed on a **CUSTOMER** owned pole, the riser will be supplied, installed, owned, and maintained entirely by the **CUSTOMER**. See page 53 for a typical riser installation.

- c) For **CUSTOMERS** extending underground from an existing NYSEG primary underground facility, the **CUSTOMER** will install the primary underground cable (refer to page 46 for cable requirements, page 48 for the acceptance form, and page 51 for construction methods) to within two feet of the NYSEG designated point of attachment. NYSEG will then complete the cable installation and terminations into NYSEG's equipment. If the cable installed by the **CUSTOMER** is not a NYSEG approved cable, there may be additional charges for NYSEG to terminate the cable.

CHAPTER 2 - Secondary Metered Services Section 1

Primary Cable - Requirements and Construction

NOTE: Only those cables meeting NYSEG current internal cable specification (SP-1294) will be suitable for takeover by NYSEG at a future date. If the CUSTOMER will be retaining ownership of the cable, see the minimum requirements below.

The following is NYSEG's minimum requirements for solid dielectric insulated cable suitable for use on CUSTOMER electric power systems at voltages of 15kV or 35kV. The CUSTOMER shall supply NYSEG with the selected manufacturer's specifications and receive approval prior to ordering cable.

The cables shall be manufactured in accordance with the most recent applicable Insulated Cable Engineers Association (ICEA) and Association of Edison Illuminating Companies (AEIC) standards or be a NYSEG approved equivalent. AEIC shall take preference over ICEA in cases of conflict.

The voltage rating of the cable shall be as required by the system with the minimum acceptable voltage class being 15kV. The minimum required conductor size is, #2 AWG concentric or compressed stranded copper or aluminum for 15kV, and 1/0 AWG concentric or compressed stranded copper or aluminum for 35kV. All conductors shall be stranded, annealed copper or "EC" grade aluminum as per current ICEA and National Electric Manufacturers Association (NEMA) standards.

The cable shall have an extruded strand shield.

The Cable shall have an extruded insulation layer of cross linked polyethylene (XLPE), tree retardant crosslinked polyethylene (TRXLPE), or an ethylene propylene rubber (EPR) based compound suitable for use at conductor temperatures listed in the current AEIC standard CS6.

Minimum insulation thickness shall be as follows:

Cable Voltage Rating	Minimum Average Thickness
15kV	175 mils
35kV	345 mils

The insulation shall be covered with an extruded insulation shield of a design as dictated by the appropriate current AEIC standard.

CHAPTER 2 - Secondary Metered Services Section 1

For 15kV through 35kV cables with extruded insulation shielding over the insulation, the effort required to remove 1/2 inch strips of the insulation shielding, at room temperature, shall not be greater than 15 pounds. The shielding shall be removable without damaging the insulation, leaving no conducting material which cannot be readily removed.

For jacketed cables, the jacket shall be strippable using a Ripley Tool Company WS-61 tool or equivalent.

NOTE: NYSEG reserves the right to refuse to energize cable it feels does not meet industry accepted minimum standards of construction, or require an industry accepted high voltage test prior to energizing.

NOTE: Cables terminated with porcelain potheads will require an industry accepted high voltage test prior to energizing.

Typical cable constructions are described below:

- a) Two Conductor, Jacketed **Cable (NYSEG required design for a NYSEG takeover at a future date)** - The cable shall have a concentric neutral of copper wires and shall be covered overall with a PVC (poly vinyl chloride) or PE (polyethylene) jacket. The capacity of the concentric neutral shall be full capacity for conductor sizes up to 1/0 AWG. This cable would be suitable for single phase or three phase applications. For cable used only in three phase applications, neutrals shall be a minimum one-third (1/3) capacity for conductor sizes between 4/0 AWG and 500 KCM, and one-sixth (1/6) capacity for conductors 750 KCM or larger. All cable can be used for both direct buried and conduit installations and do not normally require a separate neutral*.
***In joint trench applications with TV, communication, or other facilities, a separate, bare copper neutral, may be required. Refer to section 2 for a discussion of when this is a concern and the NESC (article 354) for the specific requirements.**
- b) Single Conductor, Jacketed Cable - The cable shall have zinc or copper tape, or copper drain wires over the insulation shield and shall be covered overall with a PVC or PE jacket. This cable must be installed in conduit. A separate neutral conductor is required when installing this type of cable. The neutral size shall be equivalent to the concentric neutral size specified in item (a).
- c) Two Conductor, Unjacketed URD Type Cable - The cable shall have a concentric neutral of copper wires over the insulation shield. The capacity of the neutral shall be full capacity for conductor sizes up to 1/0 AWG (suitable for single phase or three phase application). For three phase applications the neutral shall be one-third (1/3) capacity for conductor sizes between 4/0 AWG and 500 KCM, and one-sixth (1/6) capacity for conductors 750 KCM or larger. This cable is for direct buried installation and does not require a separate neutral.

CUSTOMER PRIMARY VOLTAGE CABLE ACCEPTANCE FORM

The **CUSTOMER** shall provide the following cable information for NYSEG's review and acceptance. Note: If the **CUSTOMER** does not obtain NYSEG's approval prior to installing the primary cable, the **CUSTOMER** may be subject to additional costs for NYSEG to install the cable terminations.

CUSTOMER Name _____

Location _____

Contractor Name _____ Phone _____

Cable Manufacturer _____

Manufacturer Catalog No. _____

Cable Voltage Rating _____ Conductor Size _____ Type _____

Type of Insulation _____ Insulation Thickness _____ mils Diameter over Ins.

Concentric Neutral Size _____ Separate Neutral Size _____

Jacketed _____ Non-Jacketed _____ Cable Overall Diameter _____

Note: NYSEG may require a two foot cable sample for review. NYSEG may require manufacturer information verifying that this cable was manufactured in accordance with NYSEG requirements

NYSEG Engineering has reviewed the above information and has (examined _____), (waived _____ the requirement for) the cable sample.

_____ This cable is acceptable for this **CUSTOMER** underground service.

_____ This cable is not acceptable, for the following reasons:

Signed

New York State Electric & Gas Corp.

Date

CHAPTER 2 - Secondary Metered Services Section 2

CUSTOMER Installed Primary Overhead and/or Underground

As per Section III of the "Electric Service and Procedures Manual," the **CUSTOMER** will furnish, install, own, maintain, and operate all facilities between the primary interconnection and the NYSEG installed utilization transformer. The **CUSTOMER** can install:

- a) Pole mounted overhead equipment
- b) Primary underground cable
- c) A combination overhead and underground equipment

(a) Overhead Construction:

The **CUSTOMER'S** primary overhead facilities will begin at the **CUSTOMER'S** first pole. NYSEG will make the final connection between NYSEG's takeoff pole and the **CUSTOMER'S** overhead facilities after the **CUSTOMER** has completed his installation.

All **CUSTOMER** overhead facilities shall be designed to the National Electrical Safety Code (NESC) requirements. Grade of construction shall be a minimum NESC grade C. All material and equipment used by the **CUSTOMER** shall be of good quality and new condition.

The following materials are required for the transformer structure and are recommended for construction elsewhere.

NOTE: Treated lumber contains pesticides to protect it from insect attack and decay and requires the use of special handling and proper disposal methods. The CUSTOMER is advised to follow the recommendations in the manufacturer's Consumer Information Sheets supplied with these products

Poles: Transformer pole is to be a new southern yellow pine pole or equivalent in accordance with ANSI Spec. 05.1 latest edition and is to be full length pentachlorophenol, CCA, or creosote treated in accordance with section C4 of American Wood Preserver's Association Standards. Minimum length and class is to be one of the following: 40' and 45' Class 4, 50' Class 3, 55' Class 2. Pole setting depth is generally 2 feet plus 10% of pole length. NYSEG will specify the size of the meter pole and setting depth based on field conditions.

Framing Materials: The transformer pole is to be framed with Fiberglass deadend arms or crossarms of southern yellow pine, Douglas fir or an equivalent. Wood crossarms are to be pressure treated with pentachlorophenol or an equivalent in accordance with section C25 of the American Wood Preservers' Association Standards. Minimum arm size is 3.5" x 4.5" x 8'. When crossarms are used, they shall be braced. Wood braces shall have a minimum cross section of 13/16" x 1 3/4" and are to be pressure treated with pentachlorophenol or an equivalent.

CHAPTER 2 - Secondary Metered Services Section 2

All framing material shall be designed to the National Electrical Safety Code to a MINIMUM of Grade C Construction.

Insulation Levels: Insulation levels shall be in accordance with the operating voltage, with 15kV class the minimum acceptable. Insulation design and electrical clearances shall conform to the National Electrical Safety Code. If the line is constructed in an area designated for future 34.5 kV operation, NYSEG may require 34.5 kV insulation for primaries. For single phase lines operating at delta voltages, NYSEG may have additional requirements, if a conversion to grounded wye is planned in the future.

Line Conductors, Ground Wire and Connectors: Minimum size line conductor is #2 and is to be in accordance with applicable ASTM standards. The conductor and connector systems shall be designed to meet the National Electrical Safety Code Grade C construction.

Recommended line conductor types are ACSR, AAAC, copper or copperweld. Conductor connectors should meet ANSI specifications for Class A connections. Only connectors designed for aluminum shall be used on aluminum conductors.

Minimum size ground wire is to be #4 bare copper, solid or stranded, and soft drawn. Ground wire is to be covered with plastic molding as required by the National Electric Safety Code. Structure and equipment grounding shall meet the requirements of the National Electrical Code. Ground wire connectors shall be either compression, fired-on or bolted copper vise type.

Anchor Systems: The anchor and guying system shall meet the minimum of Grade C construction of the National Electrical Safety Code.

Guy wire shall be a minimum 3/8" on dead end structures and 9/32" on angle structures, extra high strength steel, with a galvanized class B coating per ASTM A-475. All guy hardware shall have a minimum 15,000 lb. rating and be hot dipped galvanized.

Anchors shall be either, crossplate steel with a minimum cross section of 200 square inches or, power installed screw anchor with a minimum 8" diameter helix - 7000 ft.-lb. torque rated. Anchor rods shall have a minimum diameter of 3/4 inch. The number of anchors, and the length of the anchor rod, shall be as needed to achieve the required holding strength for the specific installation. All anchor equipment shall be galvanized in accordance with ANSI Specification C135.2, except the helix of screw anchors and crossplates, which may be either painted or bituminous coated.

CHAPTER 2 - Secondary Metered Services Section 2

(b) Underground Construction:

NOTE: In accordance with industrial code #53, the **CUSTOMER** shall notify NYSEG and other utilities prior to digging.

CUSTOMERS who will be installing the primary cable in a common trench with telephone or cable TV cables (commonly referred to as joint trench) should adhere to the requirements of the NESC article 354. To paraphrase, if bare concentric neutral or semiconducting jacketed cables are direct buried, they can be installed in the trench with no intentional separation from the other facilities (random lay). If the primary cable is installed in conduit, or an insulating jacket is used, the NESC **may** require either a one foot separation between the primary cable and the other facilities, or the addition of a bare grounding conductor adjacent to the primary cable. Contact NYSEG for additional details prior to installing cable under these circumstances.

The **CUSTOMER'S** privately owned underground system will commence at a **CUSTOMER** owned riser on a NYSEG designated pole, or at a NYSEG furnished and installed enclosure. The **CUSTOMER** can extend the single phase or three phase primary system using either a direct buried, or a conduit and manhole underground system. The **CUSTOMER** will install all primary cable, trench, conduit, and manholes (if necessary) between the interface point and the NYSEG installed transformer. The voltage class of the cable shall be in accordance with the operating voltage of the area to be served with 15kV being the minimum acceptable. In those area's designated for future conversion to a higher voltage, NYSEG may have additional requirements. The **CUSTOMER'S** primary cable specifications must be submitted to and accepted by NYSEG prior to ordering (see page 46 for cable requirements and page 48 for NYSEG's cable acceptance form). The **CUSTOMER** may be required to supply NYSEG with a primary cable sample to assist in reviewing the acceptance of the cable, and to provide sizing information for terminations. **CUSTOMERS** installing unacceptable cable may be charged for the installation of terminations.

For direct buried primary cable installations, the minimum depth of burial shall be 30 inches for 15,000 volt cable and 36 inches for 35,000 volt cable. Depth of burial may be reduced as per the National Electric Code article 300-50. The cable shall be protected above and below with back-fill free from stones or other material that will damage the cable. The remainder of the trench will also be back-filled with select fill. The ends of all **CUSTOMER** installed cable shall be sealed by the **CUSTOMER** to prevent contamination of the cable with dirt or moisture. NYSEG reserves the right to inspect a **CUSTOMER'S** primary cable installation prior to back-filling. Where a **CUSTOMER'S** cable may be used to serve additional future **CUSTOMERS**, NYSEG may impose more stringent design and equipment requirements.

CHAPTER 2 - Secondary Metered Services Section 2

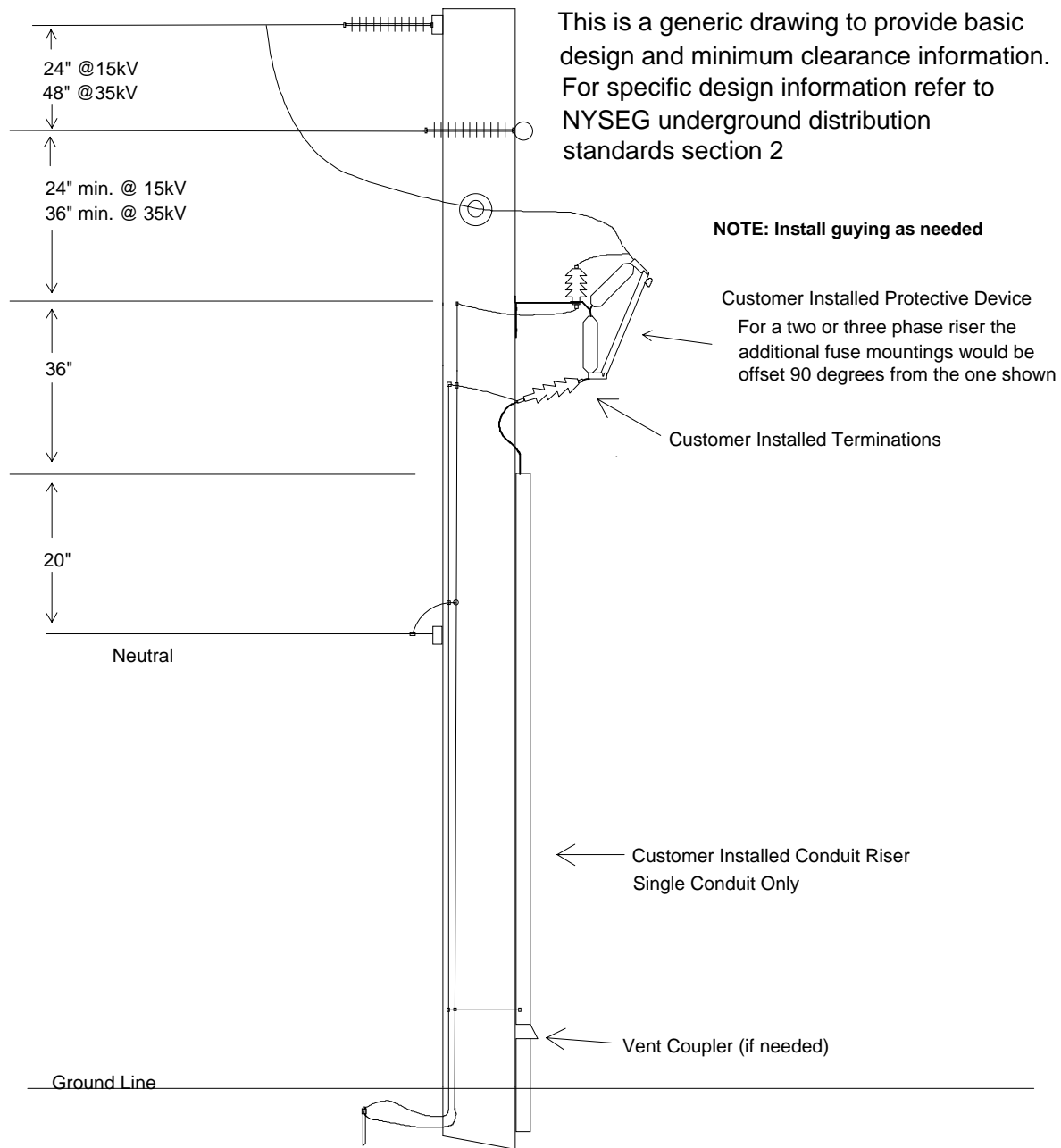
(c) **Combination Overhead and Underground:**

The **CUSTOMER** may install a combination overhead and underground system according to the requirements of item a. and b. above. **CUSTOMERS** installing a primary cable riser within the combination overhead and underground system shall have sole responsibility for installing the riser including, but not limited to, supplying, installing and maintaining all conduit, cable, terminations, brackets, grounding, and connections to the **CUSTOMER'S** overhead system. See page 53 for a typical customer installed riser.

CHAPTER 2 - Secondary Metered Services Section 2

Typical Customer Installed Riser Pole

For installation on a CUSTOMER owned pole in a combination overhead and underground installation. This installation is the sole responsibility of the customer.



CUSTOMER Installed Utilization Equipment:

NYSEG will supply transformers for the following installations;

- a) Single phase pole mounted units (for single phase and 3 phase applications)
- b) Single phase or three phase pad mounted units

CUSTOMERS requiring other types of installations will be required to take primary metered service and supply their own utilization equipment.

(a) Single Phase Pole Mounted Units:

For **CUSTOMERS** utilizing primary overhead to extend from NYSEG's existing system, NYSEG will furnish, install, own, and maintain, single phase pole mounted transformers and the transformer protection equipment. The **CUSTOMER** will furnish install, own and maintain the transformer pole as per the requirements of section 2. NYSEG, through discussions with the **CUSTOMER**, will determine the size, location and guying requirements of the transformer pole. The **CUSTOMER** will then complete the installation of the primary and secondary equipment on the transformer pole prior to NYSEG installing the transformer. NYSEG will also complete all connections to the transformers.

The **CUSTOMER'S** secondary, metering installation, and grounding shall follow NYSEG's pamphlet "Specifications for Electric Installations". NYSEG will designate the location of the meter and the space required.

(b) Pad Mounted Single and Three Phase Transformers:

For **CUSTOMERS** extending primary underground cable to the transformer location, NYSEG will furnish, install, own and maintain, single or three phase pad mounted transformers on a **CUSTOMER** furnished, installed, owned, and maintained pad (see pages 55 - 57 for typical pad designs). The **CUSTOMER** will install the pad and required grounding, and install the primary and secondary cables into the pad. NYSEG will advise the **CUSTOMER** as to the length of cables required to complete the terminations. NYSEG will then install the transformer on the **CUSTOMER'S** pad and complete the primary and secondary terminations at the transformer. If the **CUSTOMER** has installed an unacceptable primary cable (see cable specifications on page 46) NYSEG may charge for the termination installation.

The **CUSTOMER'S** secondary, metering installation, and grounding shall follow NYSEG's pamphlet "Specifications for Electric Installations". NYSEG will designate the location of the meter and the space required.

Flat Pads-Sizing for Three Phase Transformers

NYSEG
DISTRIBUTION STANDARDS
 (Underground)

SECTION 7 - MANHOLES, VAULTS & PADS

FLATPAD SELECTION GUIDE FOR PADMOUNTED UTILIZATION AND STEP TRANSFORMERS

1" COIL INSERTS FOR LIFTING (THROUGH HOLES)

FRONT

6"

6"

A

B

C

D

E

F

G

6"

1-1/2" MINIMUM COVER OF REINFORCING BARS

DIMENSIONS OF POURED OR PRECAST CONCRETE PADS												
TYPE	TRANSFORMER RATING			DIMENSIONS IN INCHES							WEIGHT	SS#
	KV	PHASE	KVA	A	B	C	D	E	F	G		
Util.	15/35	1	25-167*	50	50	24	12	7	13	13	750	262-803-00
Util.	15	3	75-750**	78	72	48	18	10	17	13	2700	262-777-00
Util.	15	3	750-2500	89	75	50	17	14	21	18	3100	262-781-00
Util.	35	3	75-1500	89	75	50	17	14	21	18	3100	262-781-00
Util.	35	3	2500	96	96	60	24	12	24	12	4300	262-782-00
Step		1/3	250-500	76	71	30	15	22.5	23	23	2600	262-790-00
Step		3	500-1500	95	89	43	17	20	26	26	4100	262-791-00
Step		3	1500-2500	96	96	62	17	20	17	17	4300	262-792-00
Step		3	3750-5000	120	120	80	24	20	20	20	6500	262-793-00

* Used for conversion of a submersible transformer installation to a padmounted installation. This unit is 4" thick, not 6".

** 750KVA will fit on both this pad and SS# 262-781-00. Use the larger pad where transformer size may be increased in the future

Notes

1. Reinforce with grade 60 #4 bars on 6" centers both ways
2. 4000 PSI concrete at 28 days
3. Top and Bottom to be smooth finish

FLAT PADS

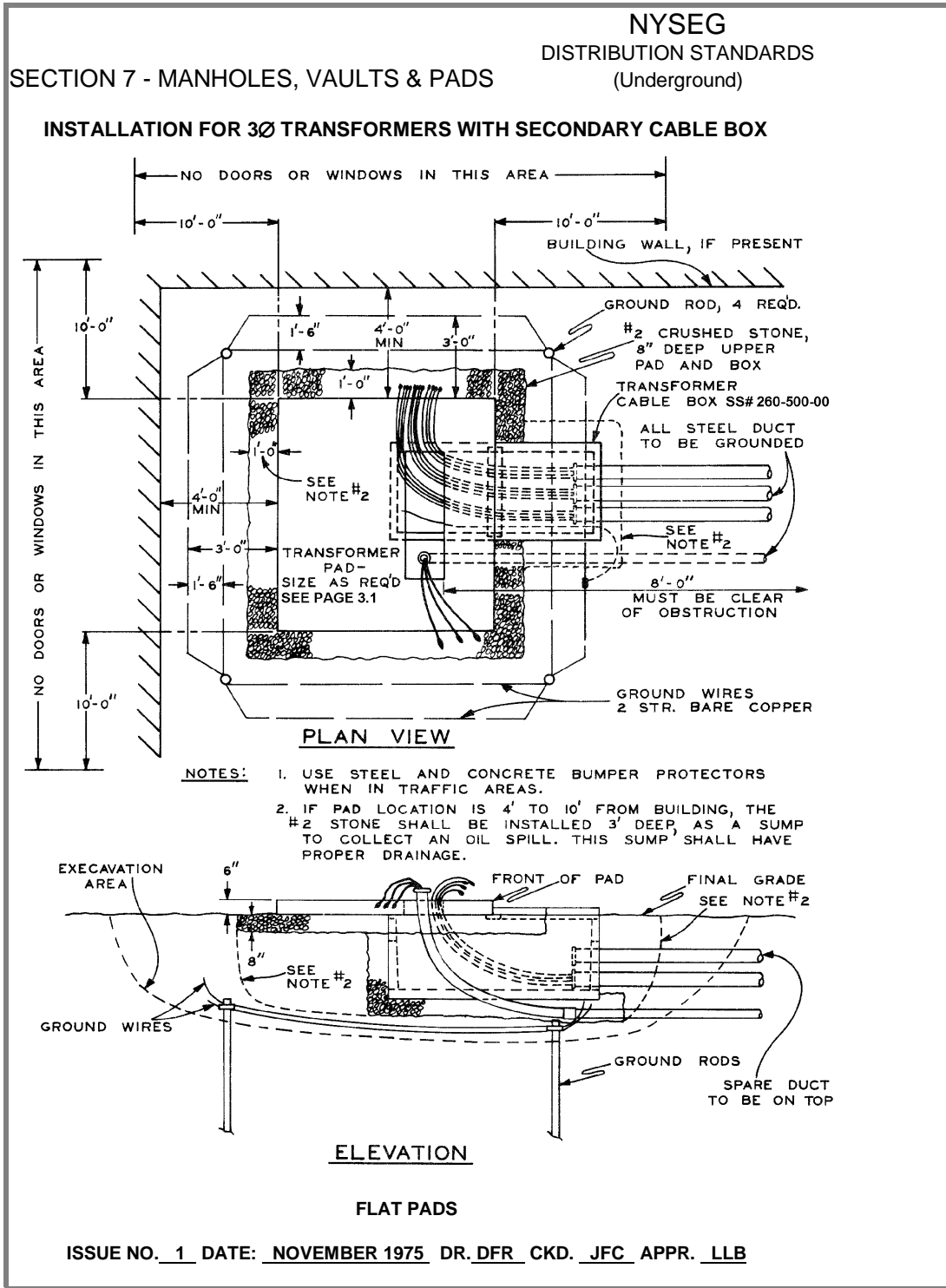
ISSUE NO. 5 DATE: JUNE 2003 DR. KLH CKD. RSE APPR. RSE

3.1

This is a NYSEG distribution standard. References to page and section numbers within this standard are to other NYSEG standards not to page and section numbers within this book.

Typical Flat Pad-Installation For Three Phase Transformers

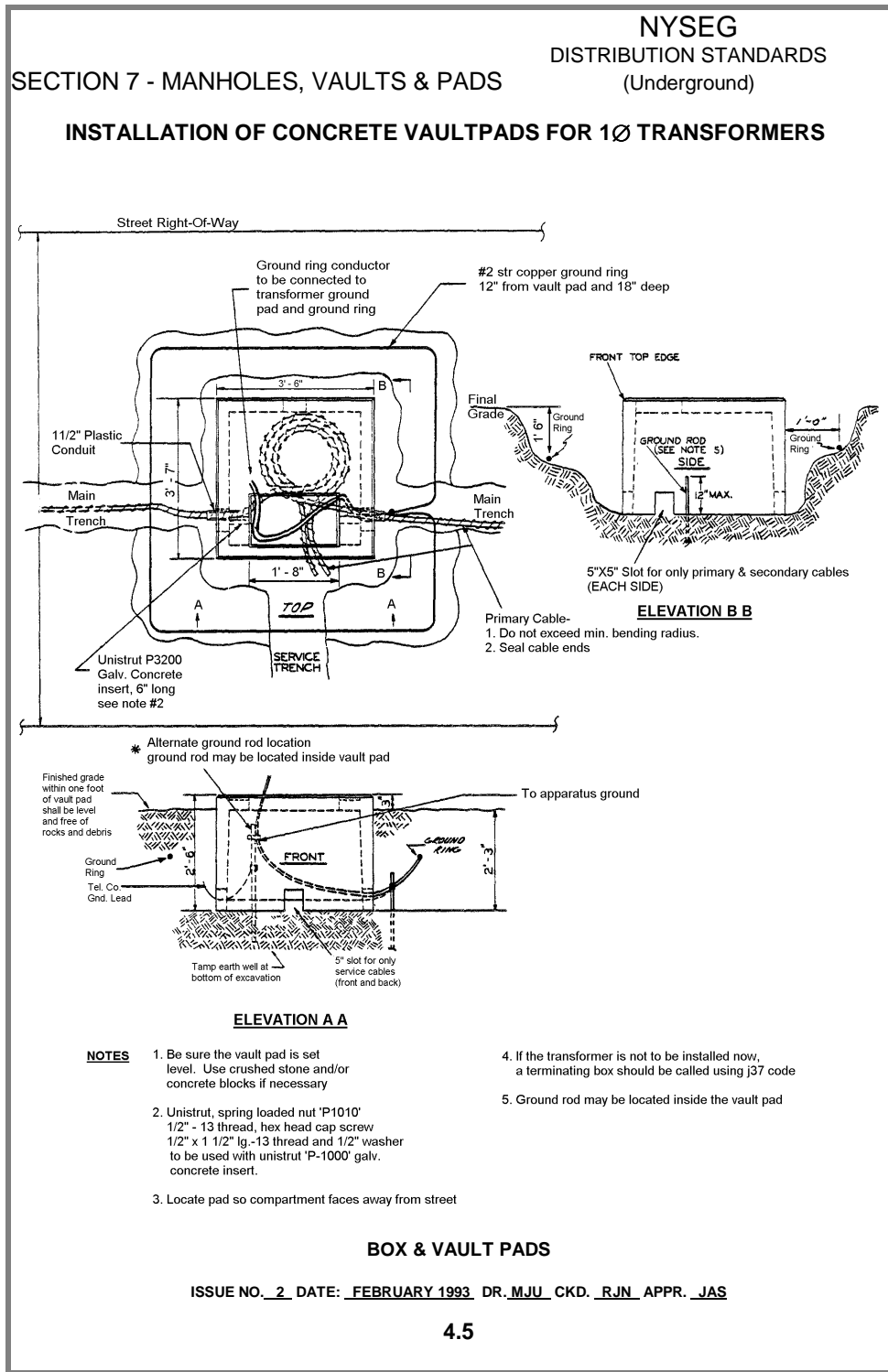
Alternate foundation designs (such as a vault pad) may be acceptable after review by NYSEG



This is a NYSEG distribution standard. References to page and section numbers within this standard are to other NYSEG standards not to page and section numbers within this book.

Vault Pad Installation For Single Phase Transformers

A fiberglass vault is also acceptable after review by NYSEG (1 phase 100kva or less).



This is a NYSEG distribution standard. References to page and section numbers within this standard are to other NYSEG standards not to page and section numbers within this book.

CHAPTER 3

CHAPTER 3 - Primary Metered Service in Areas of Sub-Transmission

General Service Information

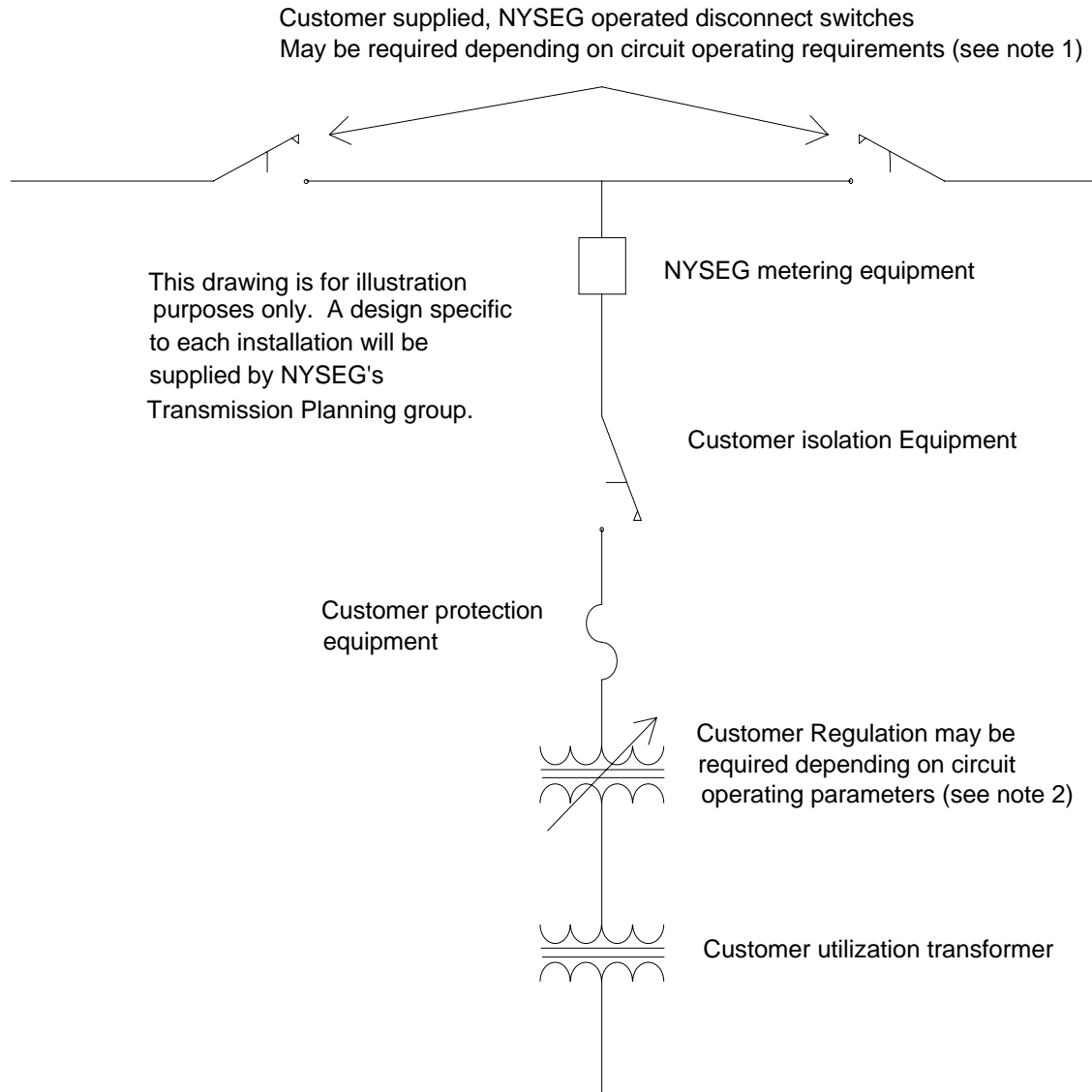
NYSEG will attempt to provide service to a **CUSTOMER** from NYSEG's 34500 volt sub-transmission system in accordance with NYSEG's tariff PSC-90. A **CUSTOMER'S** privately owned overhead and/or underground system can be used to extend a single or three phase primary line to an outdoor or indoor transformer location from NYSEG's 34500 volt sub-transmission system.

Any application for service from NYSEG's 34500 volt sub-transmission system will need to be coordinated through the NYSEG Corporate Transmission Planning Group. They will determine the feasibility of serving a primary metered **CUSTOMER** from the requested sub-transmission facilities and designate whether the line can be considered 'effectively grounded'. They will also determine if any additional **CUSTOMER** requirements may be imposed as a result of the facilities the **CUSTOMER** is requesting service from, such as:

- Voltage regulation
- Additional switches

The basic installation will follow the requirements of chapter 1 'Primary Metered Service'. Customer equipment connected to NYSEG circuits determined to be 'effectively grounded' will have the same BIL requirements as in chapter 1. Any primary equipment connected to facilities not considered 'effectively grounded' will have a minimum BIL rating of 200kv. This includes all switches, insulators, cable, cable terminations and connectors, breakers or other protection equipment, and transformers. Lightning arrestors applied to systems not considered effectively grounded shall have a MCOV rating of 38kV. NYSEG will advise the **CUSTOMER** of the system parameters in the area of connection to allow proper sizing of protection equipment. The **CUSTOMER** shall submit all equipment specifications to NYSEG for review prior to purchasing.

CHAPTER 3 - Primary Metered Service in Areas of Sub-Transmission



Note 1 - CUSTOMERS who are unable to tolerate periodic outages may be required to provide additional disconnect switches to sectionalize the transmission facilities. This will allow NYSEG the ability to remove portions of the transmission facilities for maintenance purposes

Note 2 - Some transmission facilities may operate outside of the voltage range acceptable to the **CUSTOMER**. As a result the **CUSTOMER** may be required to install voltage regulation.