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V. REQUIREMENTS FOR TRANSFORMERS SITUATED ON CUSTOMER PROPERTY

A. Padmounted Transformer Requirements

Complete requirements are contained in FPL specifications given to Customers for individual projects. Typical pad mounted transformer requirements include, but are not limited to the following:

The Customer Will:

- provide a transformer pad location per FPL specifications. Transformers should be installed at least 15 feet from doors and windows. If this is unachievable, the absolute minimum distance is 5 feet. Transformer installations between 5 and 15 feet must be approved by FPL Design and Standards;
- transformer pad locations are not to be located inside of parking garages or other structures. The location must remain accessible to truck for future maintenance and operations. If FPL equipment is to be located inside of a structure it will need to follow the vault specifications laid out in section B. Pad locations need at least a 20' vertical clearance from the top of the pad mounted equipment to any other structure;
- transformer pad location shall be at level final grade or, at minimum, top of pad should be above the crown of the road and not located in an area subject to flooding;
- transformers shall be located a minimum of 10' away from any liquefied petroleum gas tank, such as a propane tank, as specified by NFPA 58;
- transformer pad location shall be at level final grade, with subgrade compaction done in lifts not exceeding 6". Final grade should be thoroughly compacted with vibratory plate compactor;
- pour and cure the concrete pad according to FPL specifications, or install the FPL supplied pre-cast pad;
- maintain access to FPL to padmounted equipment located on the Customer's property (eight feet of clearance from the door side and three feet of clearance from other sides from items such as fences, shrubs and other obstructions are to be maintained by the Customer, as shown in **Fig. V-1**. FPL will help plan the Customer's installations of fences, shrubs, etc. near FPL facilities such that they will not obstruct access or cause damage to FPL's facilities. Where adequate access to FPL facilities is maintained, faster service restoration is made possible in the event of a power interruption.);
- provide suitable barriers, if specified by FPL, to protect the padmounted transformer and associated metering equipment from vehicular traffic;
- FPL requires a minimum easement of 10' for conductor, 10' x 10' for single phase pad mount transformers, 15' x 15' for three phase pad mount transformers and 20' x 20' for switchgear. Additional easement may be required depending on installation, field conditions and other equipment;
- clear trench route, have to grade, as specified in **section II.E**;
- conform to the requirements of the National Electrical Code and applicable local codes (approval from the local inspecting authority shall be provided to FPL before FPL will connect service).
- bring the service entrance conductors out to the transformer, installed in accordance with National Electrical Code requirements, leaving adequate cable, as determined by FPL, for FPL to make connections in the transformer, the number of cables limited as shown below:



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- provide transformer specifications to the Customer;
- determine if a secondary connection cabinet will be required;
- provide and install the transformer, the concrete pad (if applicable), and the primary cable and conduit.

If only one, single-meter Customer is served (greater than 600 amps in FPL or greater than 400 amps in FPL Northwest), and no future additional meters will be connected, current transformers may be placed in padmounted transformer before the Customer's service is tapped to its secondary. This would avoid the need for a current transformer cabinet. However, the meter socket and connecting conduit shall still be installed by the Customer. The meter socket will not be mounted on the padmounted transformer. The location of the meter socket will be specified by FPL.



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Transformer KVA	Secondary Voltage	Max. Number of Conductors	Max. Conductor Size	Max. Number of Conduits & Sizes
25 – 100 (Low Style)	120/240V	8 sets	4/0	8 – 2" Max
50 – 167 (High Style)	120/240V	8 sets	500 KCMIL	8 – 2" Max 6 – 3.5" Max 4 – 4" Max
25- 75 (Northwest Region Only)	120/240V	8 Sets	350KCMIL	8 – 2" Max
100 – 167 (Northwest Region Only)	120/240V	8 sets	500 KCMIL	8 – 2" Max 6 – 3.5" Max 4 – 4" Max
150 – 500**	120/208V 277/480V	8 sets <750 KCMIL <u>or</u> 8 sets 750 KCMIL AL <u>or</u> 6 sets 750 KCMIL CU*	750 KCMIL	8 – 4" Max
750	277/480V	8 sets <750 KCMIL <u>or</u> 8 sets 750 KCMIL AL <u>or</u> 6 sets 750 KCMIL CU*	750 KCMIL	8 – 5" Max
750	120/208 V	12 sets < 750 KCMIL* <u>or</u> 8 sets 750 KCMIL AL* <u>or</u> 6 sets 750 KCMIL CU*	750 KCMIL	12 – 5" Max
1000	277/480V	12 sets < 750 KCMIL* <u>or</u> 8 sets 750 KCMIL AL* <u>or</u> 6 sets 750 KCMIL CU*	750 KCMIL	12 – 5" Max
1000	120/208V	12 sets < 750 KCMIL* <u>or</u> 8 sets 750 KCMIL AL* <u>or</u> 6 sets 750 KCMIL CU*	750 KCMIL	12 – 5" Max
1500 - 2000	277/480V	12 sets < 750 KCMIL* <u>or</u> 8 sets 750 KCMIL AL* <u>or</u> 6 sets 750 KCMIL CU*	750 KCMIL	12 – 5" Max
1500 - 2000	277/480V	14 sets*	500 KCMIL	14 – 5" Max
2500	277/480V	12 sets < 750 KCMIL* <u>or</u> 8 sets 750 KCMIL AL* <u>or</u> 6 sets 750 KCMIL CU*	750 KCMIL	12 – 5" Max
2500	277/480V	16 sets*	500 KCMIL	16 – 5" Max

*An FPL provided secondary connection cabinet is recommended for new installations with more than 8 sets of 750 KCMIL AL, more than 6 sets of 750 KCMIL CU, or more than 12 sets of a smaller size conductor.

** If CTs are to be installed inside of the transformer please consult local FPL representative for the max cable size and sets that can be accommodated.

Note: FPL will not upsize transformers solely to accommodate cables size or number of sets.



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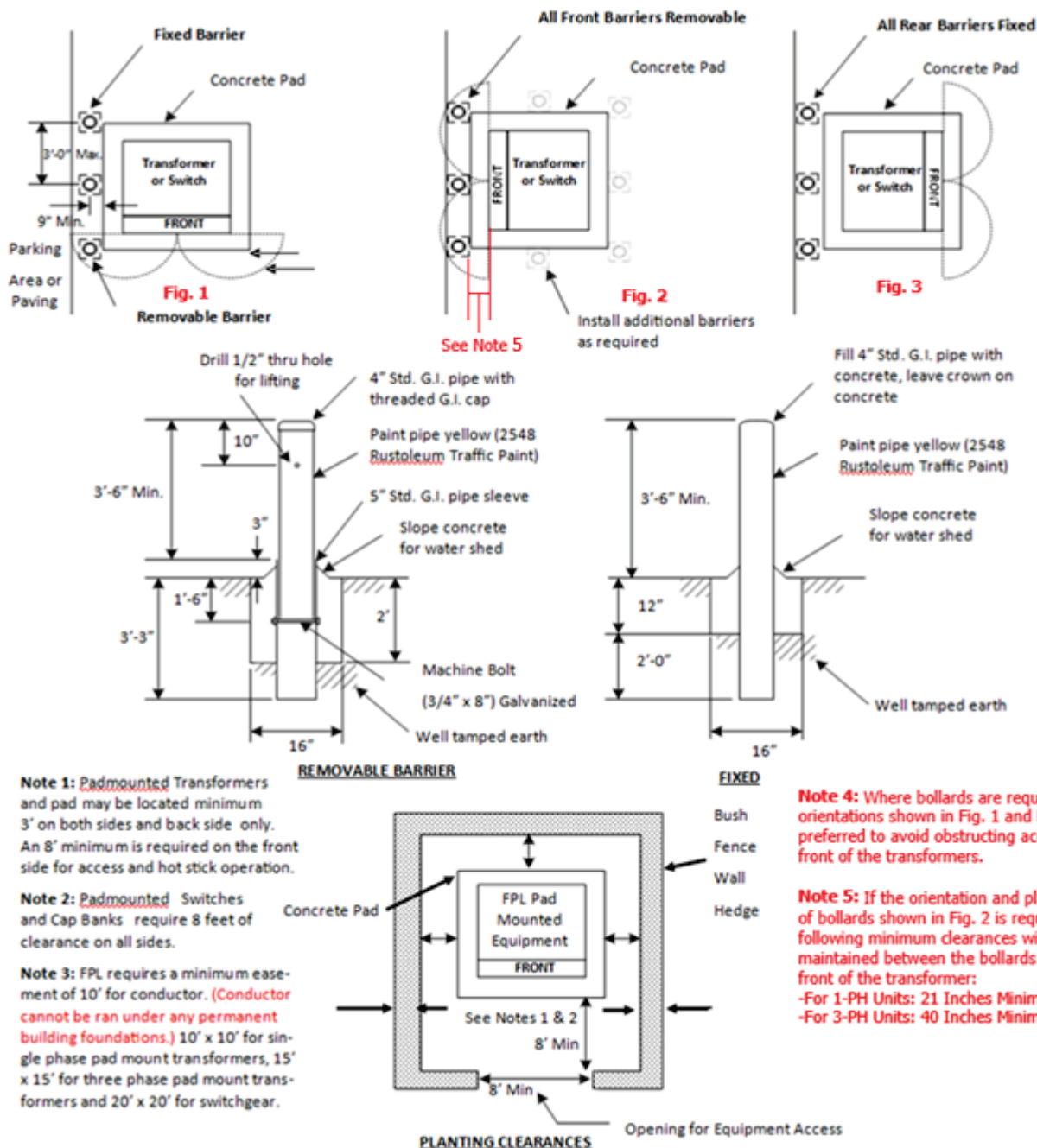
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FIGURE V-1

Protective Barrier and Planting Clearances for Padmounted Transformers and Switches





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B. Vault Requirements

FPL will maintain existing sub-grade vaults but does not allow the construction of new sub-grade vaults. FPL approved grade level vault is required for any additional load from an existing sub-grade vault. If services are removed from the sub-grade vault, the customer will have to be re-fed from a grade level service point. Any major reconstruction may require a new service point to be provided to FPL.

Vaults located in FEMA flood zones “A” or “V” and below base flood elevation level need to follow the additional coastal vault design criteria.

Complete requirements are contained in FPL specifications given to Customers for individual projects. Typical vault requirements include, but are not limited to the following:

The Customer will:

Provide construct and maintain the transformer vault in accordance with applicable codes and FPL specifications, which specify, but are not limited to:

- necessary layout information for such vaults, including the size, location and number of conduits to be stubbed out;
- Customer to stub out ducts as specified beyond the building foundation, as shown on specifications vault drawing (fiber, plastic, or transite ducts shall be enclosed in concrete. Elbows shall have a minimum radius of 36 inches);
- in grade level vaults, Customer will provide 1-1/4 inch plastic conduit sleeves at specified locations through the concrete floor for FPL's ground rods;
- provisions for adequate vault ventilation, as shown (ventilating fans, if needed, will be installed by FPL);
- doors shall open outward, and shall have a hasp for padlocking. A mortise lock option is available for stack vaults only and shall not be used on main vaults. Locks and latches shall be so arranged that the door may be readily and quickly opened from the inside. Doors opening into the building shall be tight fitting and of a type approved for a class A situation (see NFPA No. 80, latest edition). Customer is responsible for maintenance of walls, roof, doors and windows;
- FPL provided, Customer installed pulling eyes opposite each duct entrance. Pulling eyes shall be tied into building steel and capable of withstanding 10,000 pounds tension in direction shown in specifications;
- floors of vault to have adequate structural strength to support the vault equipment;
- drainage facilities provided and installed as required by applicable codes for "Transformer Vaults" (door sill of height as specified, minimum of four inches);
- means of direct access to vault from outside for personnel and equipment, through doors opening outward (if this cannot be done, special arrangements shall be agreed on for moving personnel and equipment into and out of the vault. These arrangements shall be included in an addendum to the standard specifications); The location must remain accessible to truck for future maintenance and operations.
- if metering current transformers are located in the vault, Customer shall provide a continuous 1-1/2 inch metallic (threaded bushing on ends) or schedule 80 PVC conduit (without condulets) from the meter socket or cabinet to the inside of the vault wall (no metering equipment except instrument transformers are to be in the vault. Maximum distance of metering devices from conduit termination in vault to be ten feet, or FPL approved distance) with a maximum of 2 – 90 degree bends;



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- special restrictions (no pipes for sanitary plumbing, water or gas supply or for any other purpose foreign to the vault installation shall pass through the transformer vault; no toilets or wash basins shall be installed in the vault; any conduit or piping required in connection with sump pumps or other necessary equipment shall be insulated electrically from the exterior of the vault; vaults shall not be used for storage, nor for any other purpose than to contain and protect the transformers and necessary equipment);

(Note: Customer should submit the vault specifications to the appropriate authorities for their information at time of submitting construction plans for approval.)

- provide and install his service entrance and bring his secondary service conductors into the transformer vault through designated areas only, leaving sufficient cable length in the vault for FPL to connect to its facilities. He will install meter protective equipment, in accordance with vault specifications;
- grant to FPL an easement for the FPL conduit and cables within the Customer's property.
- Additional coastal vault requirements:

Location and Elevation:

- Located away from direct path of storm surge
- All louver opening must be located above BFE+1
- Break-away walls are not allowed

Door and Ventilation

- Solid impact and flood proof double doors
 - ANSI A250.8 - SDI 100 - Extreme Duty - Level 4
 - Gauge NO.14 stainless steel frame and hardware
 - Gauge NO.14 hollow-steel construction
 - Meets ANSI/FM 2510 flood standard
 - 22hr water resistance rating
 - Meets three-hour fire rating
- Louvers openings
 - Min 7ft from the vault floor

Access and Visibility

- Elevated vault must be always visible and have at all times open walking access i.e. access door with stair case not a ship ladder
- Additional access door must be located at the same visible location of the vault

FPL Will:

- provide vault specifications to the Customer;
- where accessible to employment of rapid and customary methods of construction, provide and install conduit from the conduit stubs at the transformer to its facilities;
- provide, install, and connect the primary cable to the transformer vault;
- provide and install the necessary transformer(s) and switching equipment;
- perform all work inside the transformer vault associated with rendering electric service (with the



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exception of pulling customer cables);

- maintain all of its facilities from its pole or manhole to where the Customer's secondary service conductors are connected to FPL's facilities;
- keep the vault locked (FPL will give the Customer escorted access to the vault, when necessary, upon request);
- reserve the right to install the necessary cables, conduit, and other facilities that may be required for supplying service to other Customers from the vault;
- allow only the supply transformers and associated FPL equipment in the vault (No meters or Customer secondary fuses, switches, communications or other Customer equipment are to be installed therein. Secondary devices and meters, however, are to be installed as near the transformer vault as practicable, but not in it).



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C. "Stacked Vault" Requirements

Complete requirements are contained in FPL specifications given to Customers for individual projects. Typical stacked vault requirements include, but are not limited to the following:

The Customer will:

- provide, construct and maintain the vaults in accordance with FPL's specifications, the National Electrical Code and any local building code;
- provide ducts enclosed in at least two inches of concrete, for FPL's primary cables;
- provide soundproofing necessary to contain the noise from transformers, each having a noise level of 45 Decibels. The Customer agrees to take responsibility for any noise problem;
- install non-louvered metal clad doors, with cylinder dead locks, as called for in the specifications. The locks will be provided by FPL, installed by the Customer;
- provide vault ventilation, as called for in the specifications;
- provide adequate structural strength to support 4,500 lbs. for each transformer to be installed in each vault. He will provide, where required by FPL, a 7/8" galvanized pull iron in the ceiling, as near as practical over each duct bank entrance through the floor, for pulling and supporting cables. The pulling iron shall be tied into the building steel and shall be capable of withstanding 10,000 pounds of tension;
- provide a minimum of 4 ft. wide and 7 ft. high unrestricted and unlocked passageway, with a floor capable of supporting 3,500 lbs. concentrated load, from outside the building to each "stacked" vault. Passage through the doorway may be reduced to 42 inches wide by 80 inches high;
- provide an elevator with minimum rated capacity of 3,500 lbs. and minimum clear door opening of 42" wide by 80" high, as called for in the specifications;
- provide and install single phase, 120/240 volt secondary service entrance conductors into the vaults through designated areas only, leaving sufficient cable to reach the point of connection to FPL's facilities;
- not use the vaults for storage, or for any other purpose than to protect the transformers and necessary equipment incident thereto.

FPL Will:

- provide and install all equipment and material in the vault, including lighting fixtures and wiring for this equipment;
- provide and install fans, if applicable as described under "Ventilation" in the specifications;
- provide and install all primary cable in ducts provided by the Customer, in duct runs between "main vault" and "stacked" vaults and between "stacked" vaults;
- maintain all equipment and material installed by FPL.