

6-19-100	UNDERGROUND – SECONDARIES & SERVICES Customer Reference Specification	6-19-100
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Customer Low-Voltage Switchboards Service Cable Terminal Compartment Arrangements and Clearances

(Replaces A-190556)

THIS CUSTOMER REFERENCE SPECIFICATION (CRS) IS PART OF THE
RULES FOR ELECTRIC METER AND SERVICE INSTALLATION (REMSI) WEBSITE.

DISTRIBUTION CONSTRUCTION SPECIFICATIONS PPL ELECTRIC UTILITIES CORPORATION	Issue Date: <u>3/19/10</u> Typist: <u>SLF</u> Drafter: _____
	Sponsor: <u><i>Melanie D. Blawie</i></u> Approved: <u><i>Mark R. Bernier</i></u> Manager – Distribution Maintenance

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This specification contains basic information which clearly defines PPL EU requirements for the supply terminal compartment of low-voltage switchboards. These rules and sketches are intended to advise the customer, his architect, electrical contractors, and switchgear manufacturers of the minimum clearances acceptable to PPL EU. Compliance with this specification will provide adequate working clearance for pulling-in service lateral cables and making the necessary bus connections.

All details shown here and on the REMSI website must be strictly followed. All low-voltage switchboards must be approved by a PPL EU engineer before the units are built. Unapproved designs or unapproved deviations from this specification can result in long delays or possible refusal to connect service.

Notes:

1. Preapproved List

PPL EU maintains a preapproved list, on the REMSI Website, Table 3 – Approved Switchgear Metering and Termination Compartments. Any switchgear and termination compartments not currently listed may require up to 90 days for review and approval.

2. Approval Process

To secure approval, the customer's contractor must supply PPL EU with two sets of detailed drawings (drawings that are scalable or fully dimensioned) showing:

- terminal compartment bus arrangement,
- neutral bus location and arrangement,
- where service conduits will enter cabinet,
- alignment of service conduits with bus connectors,
- and location of switchboard in mechanical room.

PPL EU engineer will evaluate the design and return one set of drawings signed, dated, and marked "approved without changes" or "approved with corrections as noted". When modifications are required, the customer's contractor is responsible for any follow up with the switchboard manufacturer.

If detailed drawings are not available from the switchboard manufacturer, the electrical contractor can secure preliminary approval based on one of the arrangements shown in this specification. However, PPL EU may refuse to connect service when, in PPL EU's opinion, the customer's installation does not conform to this specification. It is then the responsibility of the customer to make the necessary changes before service will be connected.

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Notes continued:

3. Interrupting Capacity

Adequate interrupting capacity for protective devices is a specific requirement of the National Electric Code (NEC). Service equipment and its overcurrent protective devices must have short-circuit current rating equal to or greater than the available short-circuit currents listed in Table 1 on sheet 4 and Table 2 on sheet 5 of this document. These values do not include short-circuit currents generated by the customer's synchronous and induction machines.

4. Working Clearances

All dimensions shown are minimum. More working clearance may be required depending upon where service conduits enter the cabinet and how they are aligned with the bus connectors.

The cable termination compartment must have a full-width front access panel(s). This panel must be hinged and sealable. Switchboards which require PPL EU linemen to make connections from behind the compartment must also have full-width rear access panel that is hinged and sealable. Minimum working clearances in mechanical room is shown on Figure 6, see Sheet 12.

5. Pulling Pits

Where a switchboard is designed for bottom entry, as shown in Figure 2 and Figure 3, the use of a "pull-pit" below the floor is not allowed.

6. Service Cables

PPL EU will install the minimum number and size aluminum service cables listed in Table 3 and Table 4, or quantity as specified by the PPL EU Design Engineer. The customer's electrical contractor/switchboard manufacturer must provide the appropriate size and quantity of set-screw type bus connectors.

7. Service Conduits

The customer must provide the minimum number of 4 inch service conduits specified in Table 3 and Table 4 or quantity as specified by the PPL EU Design Engineer. The customer's contractor must install these conduits by one of the following methods:

- A. Use rigid or intermediate grade galvanized steel. All bends must be minimum 36 inch radius. Grounding bushings must be provided at the switchboard entry.
- B. Use PVC conduit encased in concrete envelope as specified in PPL EU CRS 6-15-180. All bends must be rigid or intermediate grade galvanized steel with a minimum 36 inch radius. Concrete envelope must also encase bends to prevent breakage at steel-to-PVC joints. Conduits entering switchboard must be rigid or intermediate steel with grounding bushings.

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Notes continued:

C. Bonding jumper per NEC article 250 – Grounding. Ground and neutral buses, along with the conduit grounding bushings must be bonded together and to the cabinet.

8. Cable Limiters

PPL EU will provide and install cable limiters (a type of current-limiting fuse) on certain size WYE 277/480V services, see Table 4. Figure 1 illustrates the type of limiter used, installation method, and special bus bar drilling required to install these limiters. When cable limiters are installed set-screw type bus connectors are not required.

MAXIMUM AVAILABLE SHORT-CIRCUIT CURRENT

TABLE 1 – UNDERGROUND SERVICE FROM OVERHEAD BANK

Transformer Bank Size (kVA)	Maximum Available Symmetrical Short-Circuit Current (Amps)	
	WYE 120/208	WYE 277/480
75	17,350	—
150	34,700	15,040
300	55,510	27,760
500	63,210	46,360

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TABLE 2 – UNDERGROUND SERVICE FROM 3-PHASE TRANSFORMER

Transformer Bank Size (kVA)	Maximum Available Symmetrical Short-Circuit Current (Amps)	
	WYE 120/208	WYE 277/480
75	17,350	—
150	34,700	15,040
300	55,520	27,760
500	63,090	40,100
750	39,280	17,020
1000	52,380	22,700
1500	—	34,050
2000	—	45,390
2500	—	56,740

SERVICE CABLES AND CONDUITS

TABLE 3 – WYE 120/208 VOLT SERVICES

Transformer Size (kVA)	Minimum Number Aluminum Conductors		Minimum No. 4 Inch Service Conduits
	Per Phase	Neutrals	
75	1-4/0	1-2/0	2
150	1-750	1-4/0	2
300	2-750	2-4/0	4
500	4-750	4-4/0	6
750	6-750	6-4/0	10
1000	8-750	8-4/0	12

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TABLE 4 – WYE 277/480 VOLT SERVICES

Transformer Size (kVA)	Minimum Number Aluminum Conductors		Minimum No. 4 Inch Service Conduits
	Per Phase	Neutrals	
150	1-4/0	1-2/0	2
300	1-750	1-4/0	2
500	2-750	2-4/0	3
750*	3-750	3-4/0	4
1000*	4-750	4-4/0	6
1500*	6-750	6-4/0	10
2000*	8-750	8-4/0	12
2500*	10-750	10-4/0	12

* Requires installation of cable limiters (by PPL EU)
See bus bar details, Figure 1.

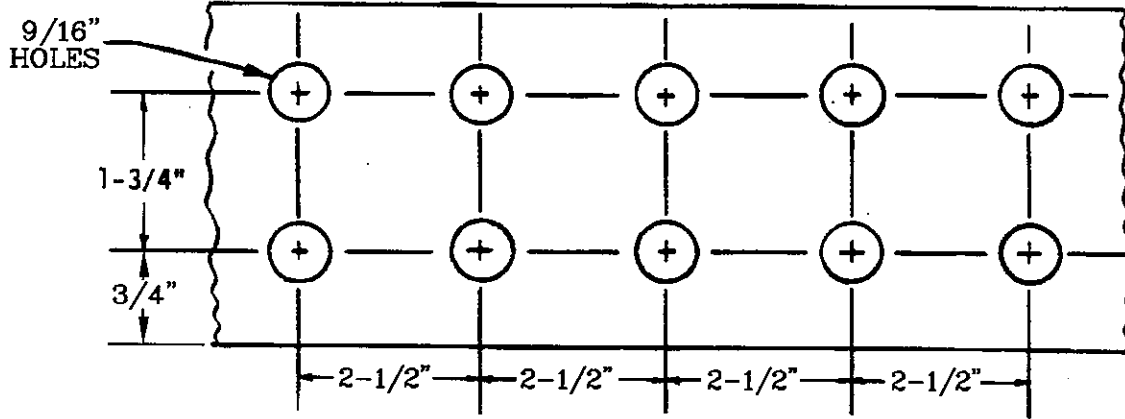
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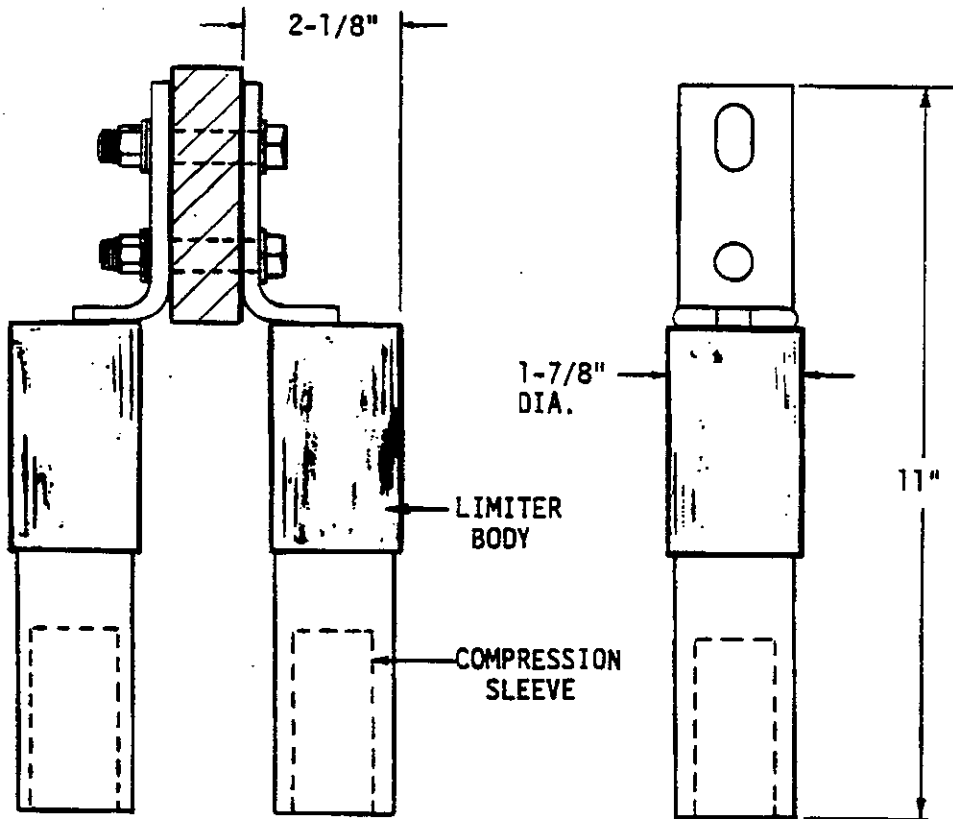
FIGURE 1

CABLE LIMITER INSTALLATION DETAILS

BUS BARS MUST BE DRILLED AS SHOWN
TO ACCOMMODATE CABLE LIMITERS



CABLE LIMITER DIMENSIONS



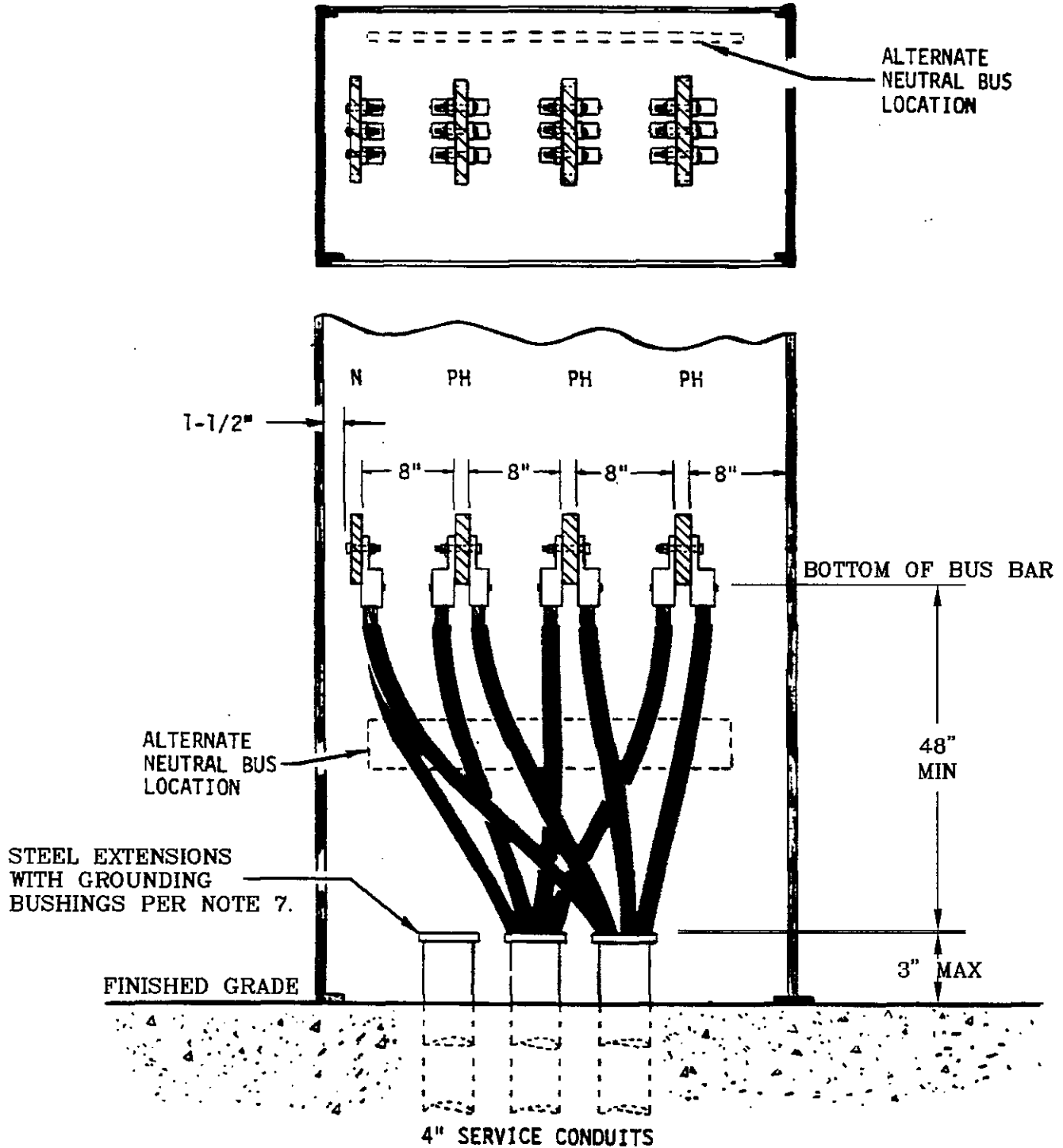
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FIGURE 2

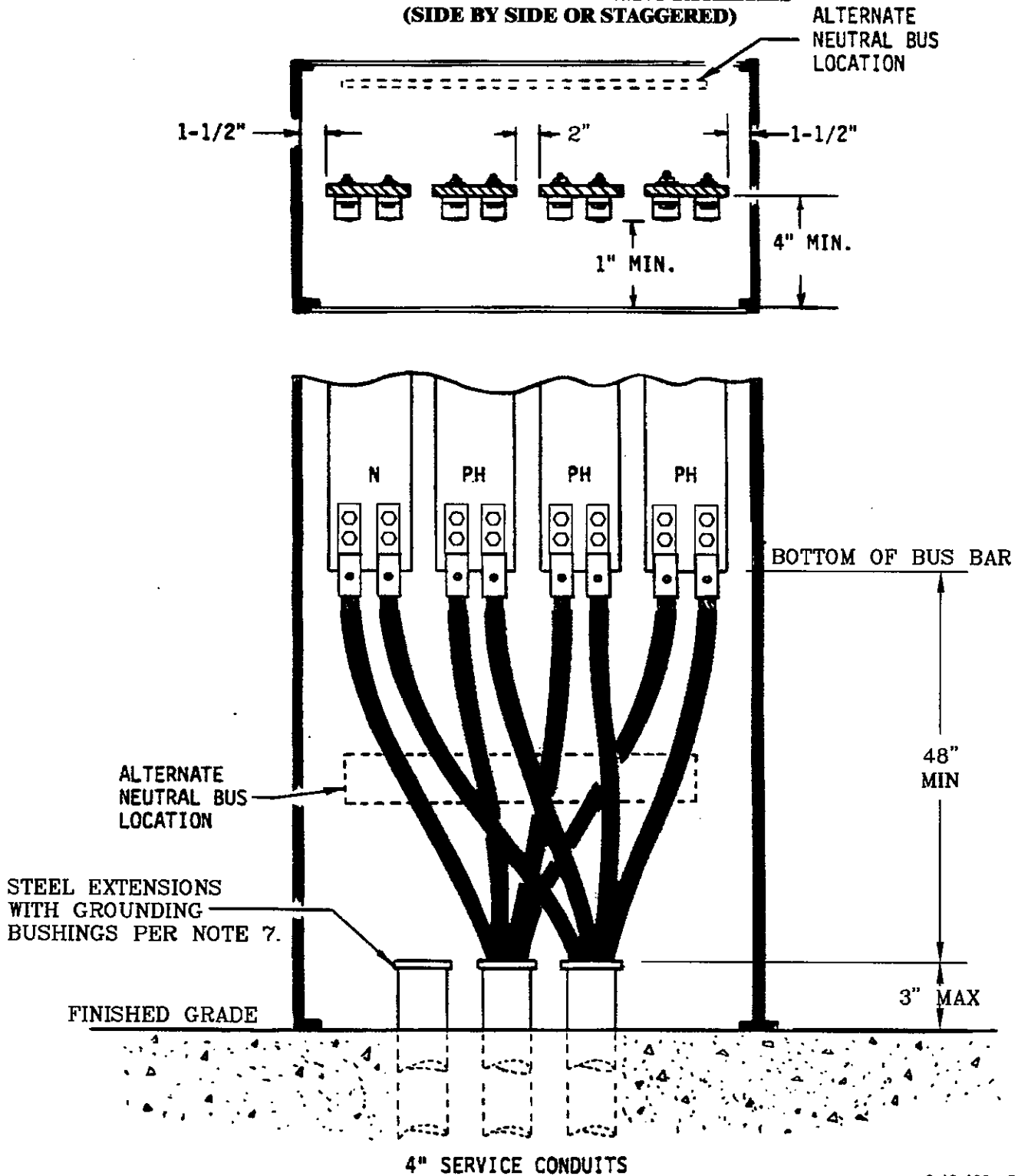
**BOTTOM ENTRY SWITCHBOARD
EDGEWISE TERMINATING FACILITIES**



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FIGURE 3
BOTTOM ENTRY SWITCHBOARD
FRONT FACING TERMINATING FACILITIES
(SIDE BY SIDE OR STAGGERED)



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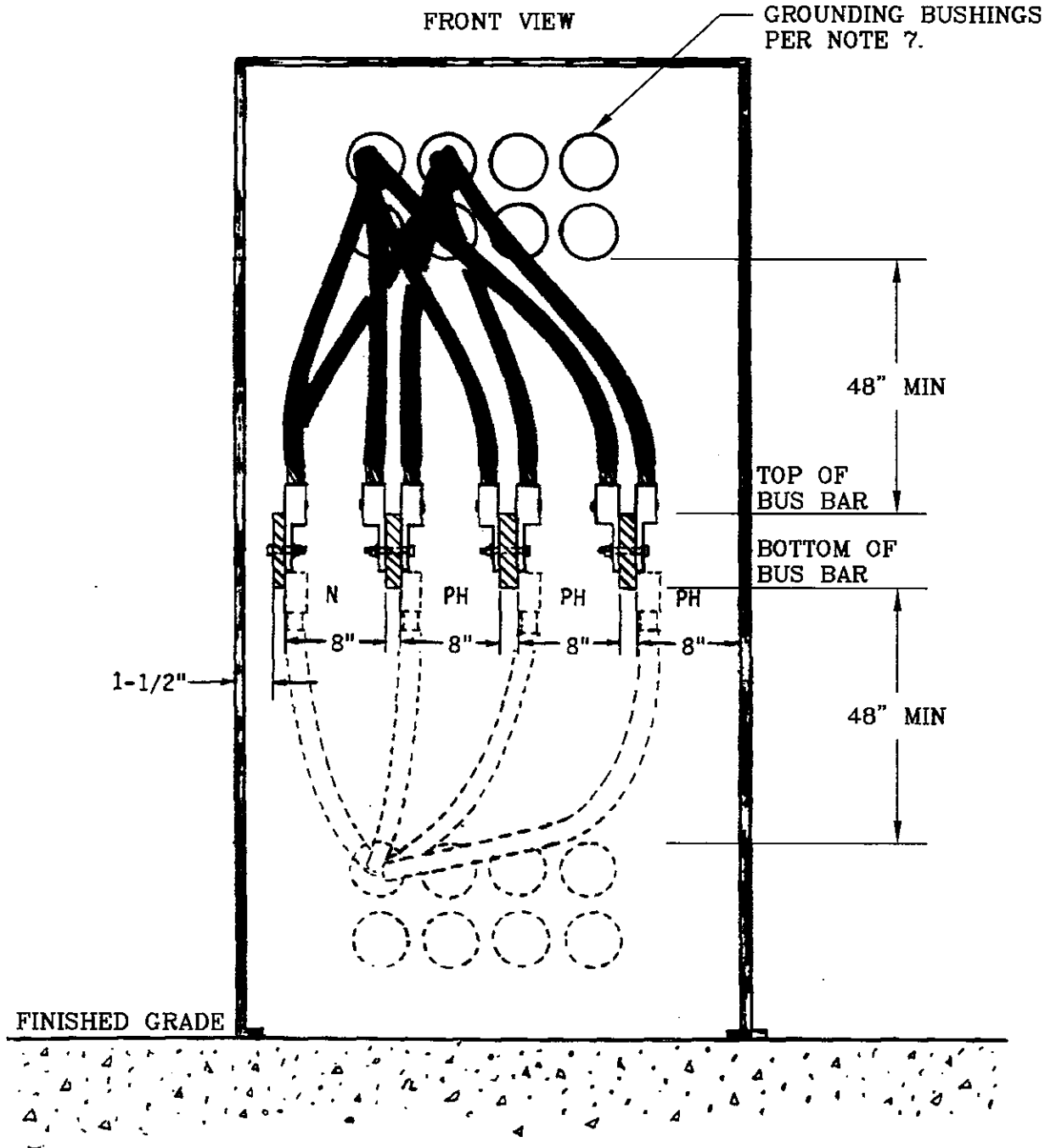
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FIGURE 4

**BACK ENTRY SWITCHBOARD (TOP OR BOTTOM)
EDGEWISE TERMINATING FACILITIES**



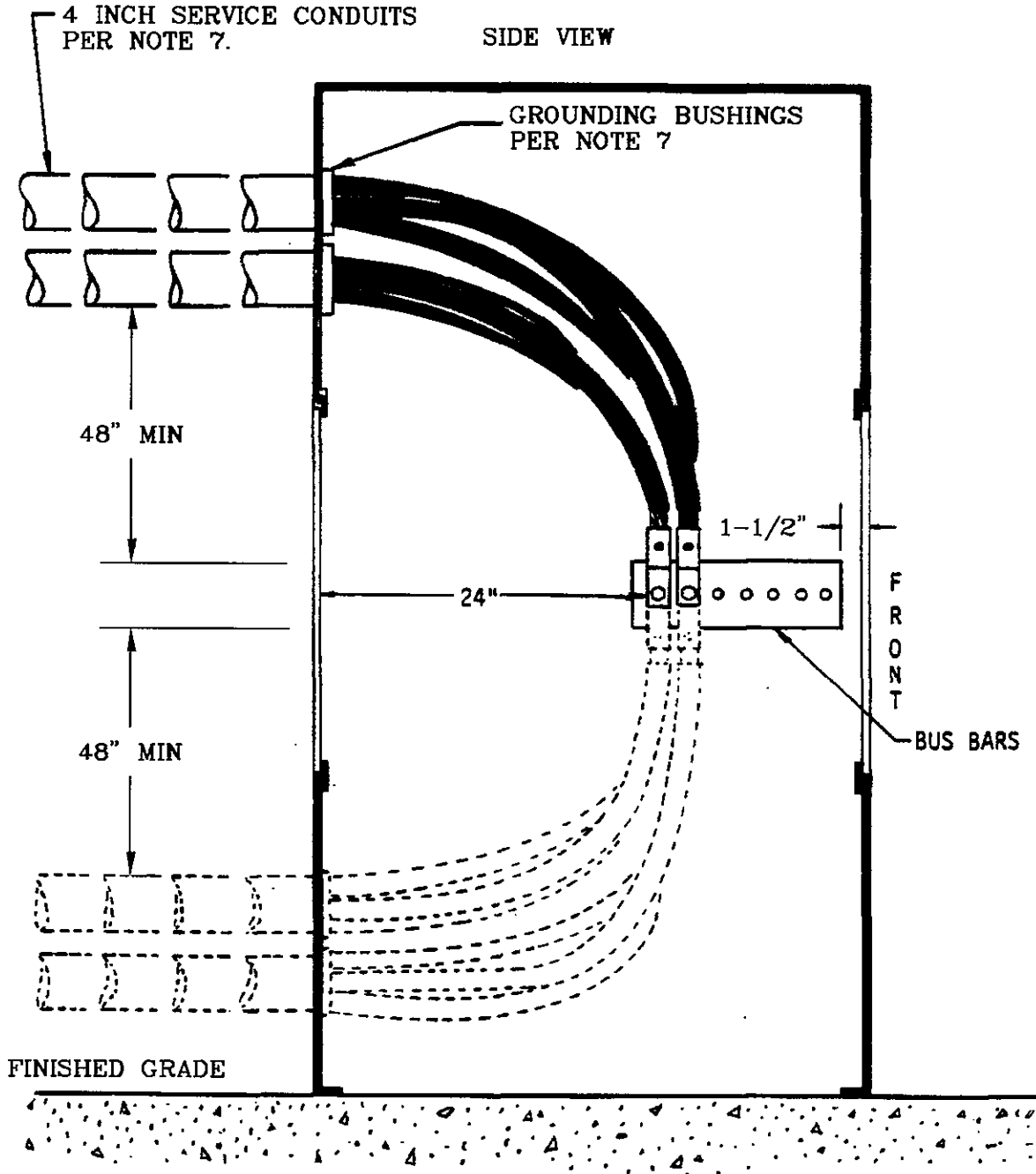
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FIGURE 5

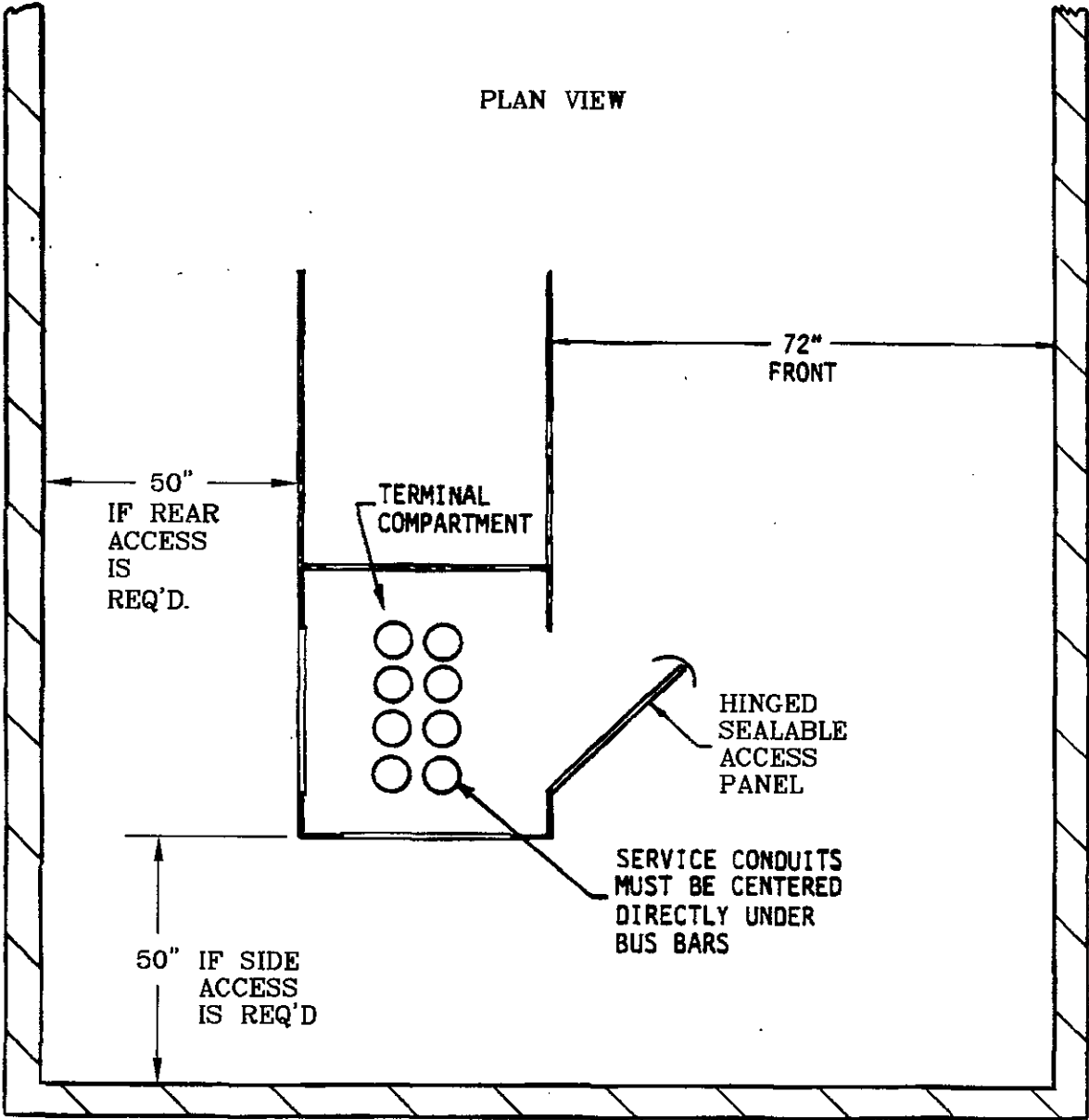
BACK ENTRY SWITCHBOARD (TOP OR BOTTOM)



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FIGURE 7
WORKING SPACE REQUIREMENTS
IN MECHANICAL ROOM



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