REQUIREMENTS FOR TRANSFORMER PADS AND EXTERNAL, BELOW-GRADE TRANSFORMER SERVICE VAULTS, LOOPED RADIAL SYSTEM

1. Scope

This Construction Guideline provides the requirements for Seattle City Light looped radial system's transformer pads and below-grade transformer service vaults. This Construction Guideline does not provide requirements for in-building vaults; please see SCL Construction Standards 0751.00 and 0751.60.

2. Requirements and Codes

All work, including shoring and bracing, shall be in compliance with the latest editions of the State of Washington Department of Labor and Industries Chapter 296-155 WAC "Safety Standards for Construction Work" and the Seattle Department of Transportation "Street and Sidewalk Pavement Openings and Restoration Rules." The below-grade vault location shall conform to the clearances shown in this Guideline. The vault size, ventilation, access, and grounding shall be approved by Seattle City Light. See Figures 9.1a, 9.1b, and 9.2.

3. General Requirements

See project specific construction package for:

- Below-grade vault, if required
- Transformer pad location, if required
- Guard Posts, if required

4. Primary Conduit

The customer shall furnish and install two conduits from the vault floor or wall to a point one conduit length up the utility pole per Construction Guideline U7-10.2. The conduit size and location shall be designated by City Light. Below-grade, the conduits must be separated from each other by a minimum of two inches of concrete.

5. Secondary with Conduit and Cable

The customer shall furnish and install conduit and phase and neutral conductors of sufficient length to connect to the transformer terminals. The conduit location shall be designated by City Light. If more than six conductors per phase and neutral are installed, the customer may be required to provide a suitable tap box or collector bus with compression-type connectors on the bus of the size, type and number designated by City Light.

6. Ground Rods

The customer shall furnish and install four 5/8 inch x 8 feet copperclad steel sectional ground rods in the corners of the vault or pad. The rods shall protrude approximately 6 inches above the finished floor. A driving head shall be used to prevent damage to the ground rod threads. The space between the rods and the floor shall be caulked and grouted to prevent the entrance of water.

Individual, stand alone ground rods shall have a resistance to ground not exceeding 25 ohms. If a single electrode resistance exceeds 25 ohms, a second ground rod shall be driven not less than six feet away and the second ground rod shall be connected in parallel.

In vaults where four parallel-connected ground rods do not achieve 25 ohms, additional grounding is required. Acceptable grounding can be achieved with one additional ground rod driven outside the vault, not less than six feet from all other ground electrodes. This ground rod shall be connected in parallel with the vault grounds with #2 bare stranded copper wire and extended ten feet into the vault for connection by Seattle City Light. The vault penetration shall be sealed against water entry.

Occasionally, due to poor ground conditions on very large transformers, multiple transformer installations, or high fault duties, the customer will be required to install more ground rods as designated by City Light.

If grounding is under concrete or asphalt, all connections shall be done by exothermic welding (Cadweld or better).

7. Below-Grade Transformer Service Vault Requirements

7.1 See Table 7 for minimum vault dimensions.

7.2 Minimum of one 42 inch round hatch with vented cover required.

7. Below-Grade Transformer Vault Requirements, continued

7.3 All conduits shall enter no more than 18 inches from vault corner.

Table 7, Minimum Vault Dimensions

Transformer Bank Maximum Size	Interior Dimensions, ft Width	Length	Minimum Height
150 KVA	7	12	8
225 KVA	7	12	8
500 KVA	8	14	8

7.4 The customer shall furnish and install fire stop insulating material per NEC requirements for service conduits and service bus duct that are installed by the customer in the customer's building or service equipment.

7.5 It shall be the customer's responsibility to assure that water does not enter the building and does not enter service entrance equipment from City Light vaults.

7.6 Sump and Grate shall be located underneath the hatch, next to the nearest wall.

8. Protective Guard Posts (Bollards)

After the transformer has been set on the pad, install 4-inch diameter by 8-foot long rigid steel posts to protect the transformer from vehicles. Insert posts to a depth of 4 feet and fill with concrete.

Locate guard posts a minimum of 4 feet in front of transformer doors so that the doors will open 180 degrees.

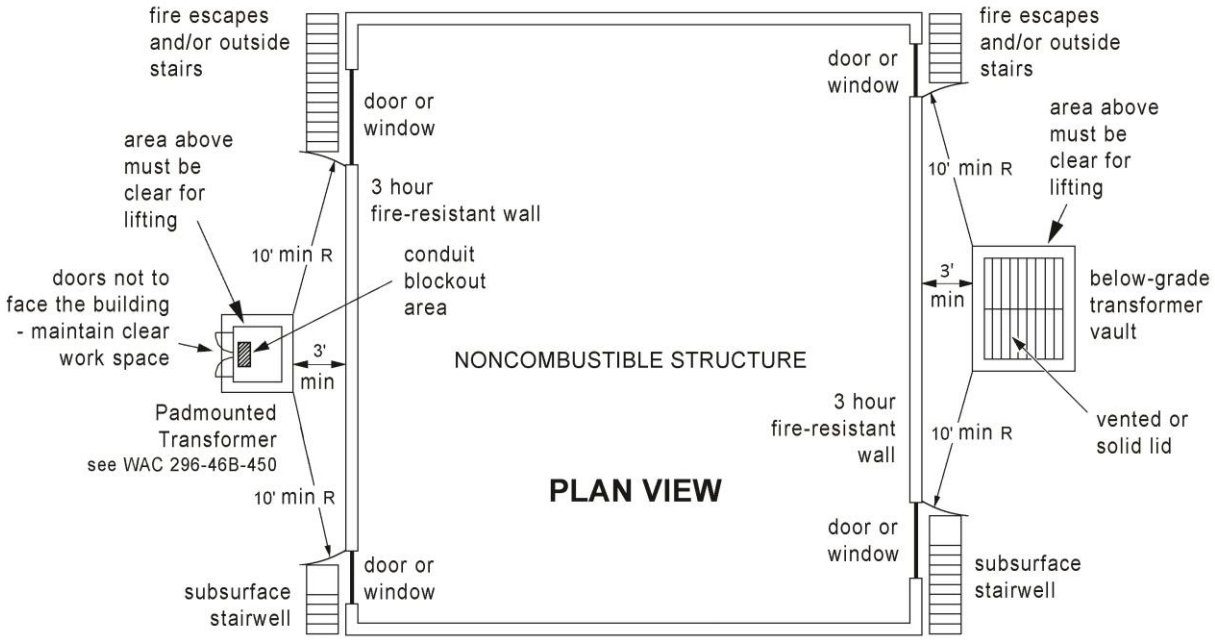
Locate guard posts a minimum of 3 feet from the transformer on the other three sides of the pad.

See project specific construction package for:

- Guard post locations from non-door sides of transformer
- Guard post grounding

9. Figures, Clearances of Vaults and Padmounted Enclosures from Buildings

Figure 9.1a, Noncombustible Structures (Structures Designed to Resist Fire for Three Hours), plan view (for combustible structures, see figure 9.2)



9. Figures, Clearances of Vaults and Padmounted Enclosures from Buildings, continued

Figure 9.1b, Noncombustible Structures (Structures Designed to Resist Fire for Three Hours), elevation view (for combustible structures, see figure 9.2)

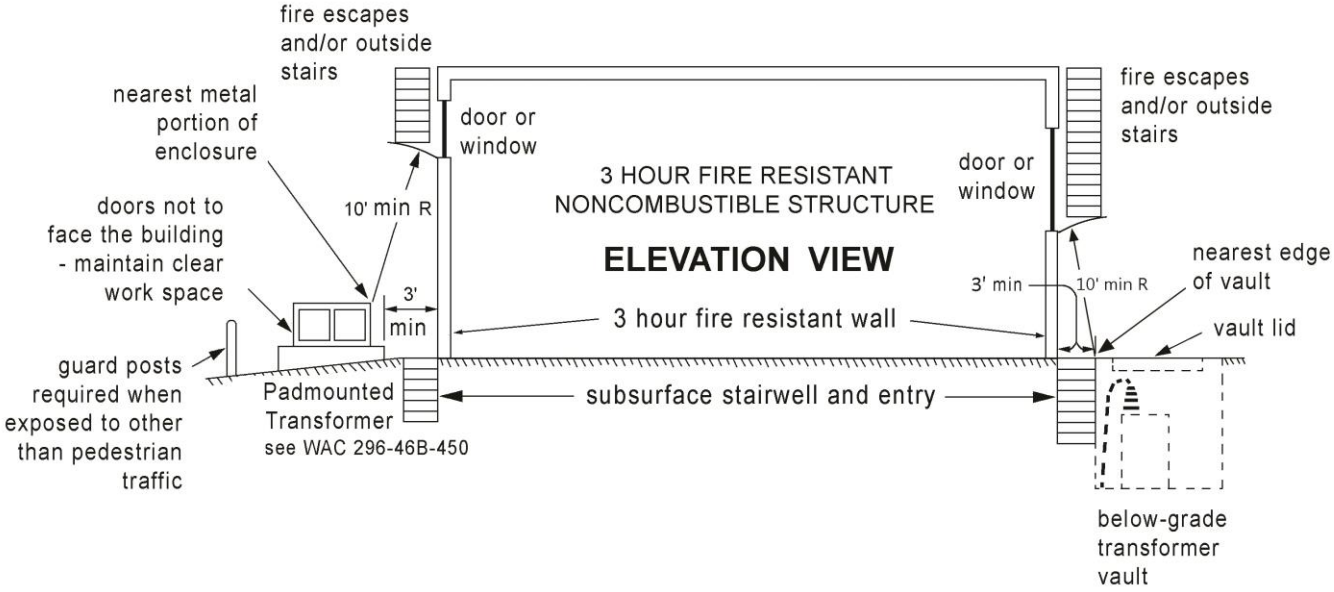
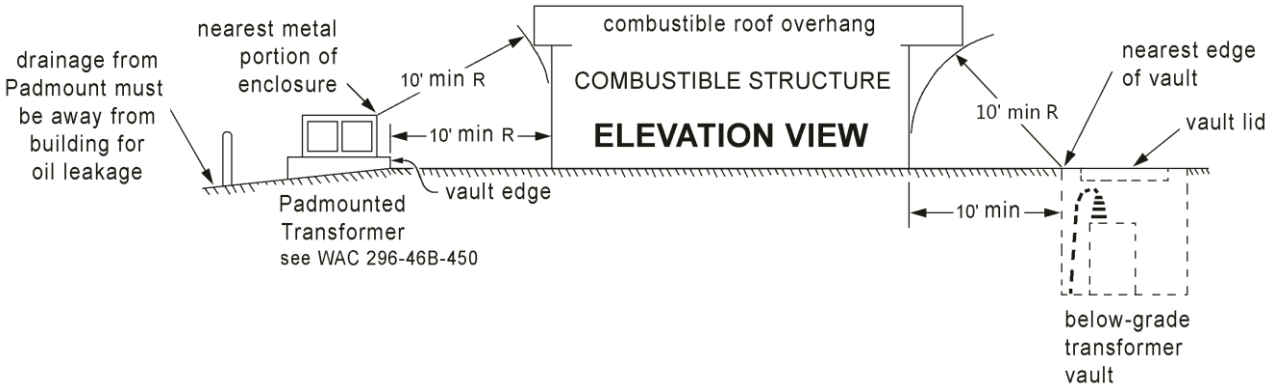


Figure 9.2, Combustible Structures, elevation view



10. References

U10-2 (canceled); "Transformer Service Vaults and Padmounts, Customer's Responsibility, Outside Network Area;" Construction Standard; SCL