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## Customer Requirements for Below-Grade Transformer Service Vaults, Looped Radial System

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### 1. Scope

This standard provides the requirements for Seattle City Light (SCL) looped radial system below-grade transformer service vaults.

For transformers located within in-building vaults, refer to SCL 0751.00 and 0751.60.

For transformers installed outside on pads, refer to SCL 0724.50.

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### 2. Application

This standard provides direction to customers, contractors, and SCL crews about where and how to properly install below-grade transformer vaults and construct structures around existing vaults.

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### 3. Conflict

Where conflict exists between SCL requirements, the following order of precedence shall apply:

1. Project-specific Customer Requirements Package, including the Service Construction Letter and Drawing
2. SCL 0732.50
3. Seattle Building Code, 2015, Section 428 (within the City of Seattle)
4. Other SCL construction standards
5. Other industry standards

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### 4. General Requirements

#### 4.1. Vault High Voltage (Primary) Entrance

##### 4.1.1

Provide and install two 4-inch conduits from the vault to the utility facility specified in the project-specific Customer Requirements Package. A maximum of 270 degrees of bends are allowed in the primary conduit run, unless otherwise specified in the project-specific Customer Requirements Package.

##### 4.1.2

Install and terminate below-grade conduit per SCL 0214.00 and 0222.02. If applicable, provide and install conduit risers on the pole per SCL 0224.34. Orientation and arrangement of conduit risers will be shown in the project-specific Customer Requirements Package.

##### 4.1.3

Conduits entering the vault shall be supplied with closing plugs.

Conduit shall enter the vault perpendicular to the vault wall no more than 18 inches from the adjacent wall.



All duct terminations into vaults shall be done by core drill.

Provide and install PVC-type DB-120 conduit end bells flush with the interior walls on all conduits entering the vault. The conduits shall be grouted both inside and outside of the vault. See SCL 7055.09 for approved manufacturers.

A minimum of 6 inches shall be required between the closest edge of the conduit and the adjacent ceiling or walls.

The first two feet of all conduits exiting the vault shall be vertically and horizontally perpendicular to the vault face.

If there are multiple duct banks or direct-buried conduits entering horizontally and at right angles to each other in the same corner of a vault, they shall enter at different elevations so they are vertically offset to the other.

#### **4.2 Secondary Conduits**

The customer shall furnish and install NEC-sized conduit and phase and neutral conductors of sufficient length to connect to the transformer terminals. See SCL 0473.50 for cable options. The conduit location shall be designated by SCL. If more than six conductors per phase and neutral are installed, the customer may be required to provide a secondary termination facility. Conduits from the transformer vault to the secondary termination facility shall meet SCL 0224.07.

#### **4.3 SCL Access**

Provide properly supported, unobstructed access from the right-of-way to the transformer vault for SCL equipment-handling machinery. SCL must be able to move to the transformer vault, or remove from the transformer vault, all electrical equipment, including tall, heavy transformers, and to service electrical equipment using SCL equipment handling machinery.

Provide 25 feet clear space above each vault so that SCL can move transformers using SCL equipment handling machinery. Provide a permanent, level, unobstructed, 8-ft wide working area around the vault.

#### **4.4 Vault Location**

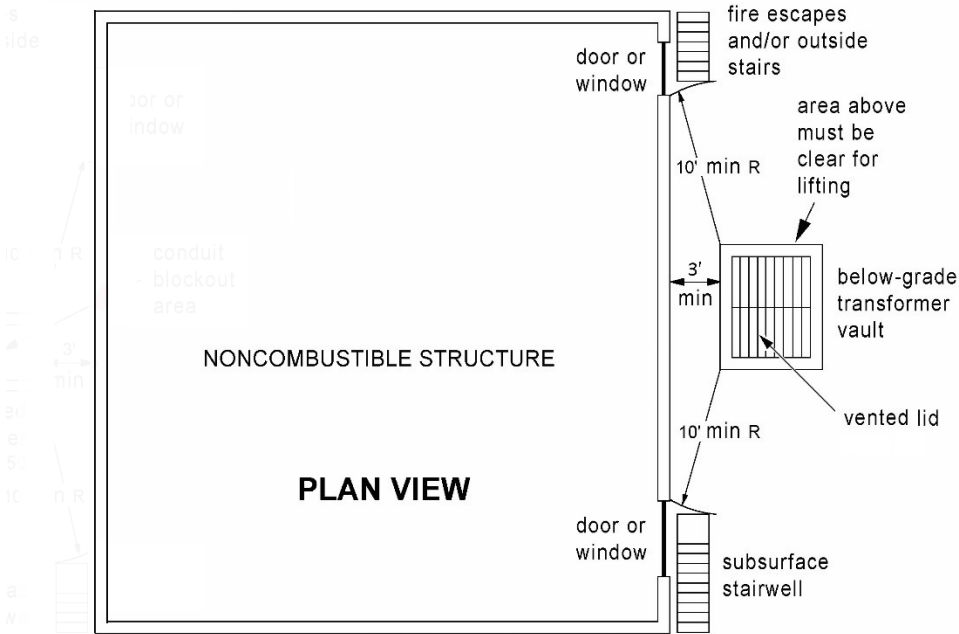
Vault shall be located in order to satisfy Figures 4.4a, 4.4b, and 4.4c. Combustible and noncombustible structures are defined by the Authority Having Jurisdiction.

Maintain a minimum of 25 feet unobstructed vertical working clearance from the top of the vault to any trees.

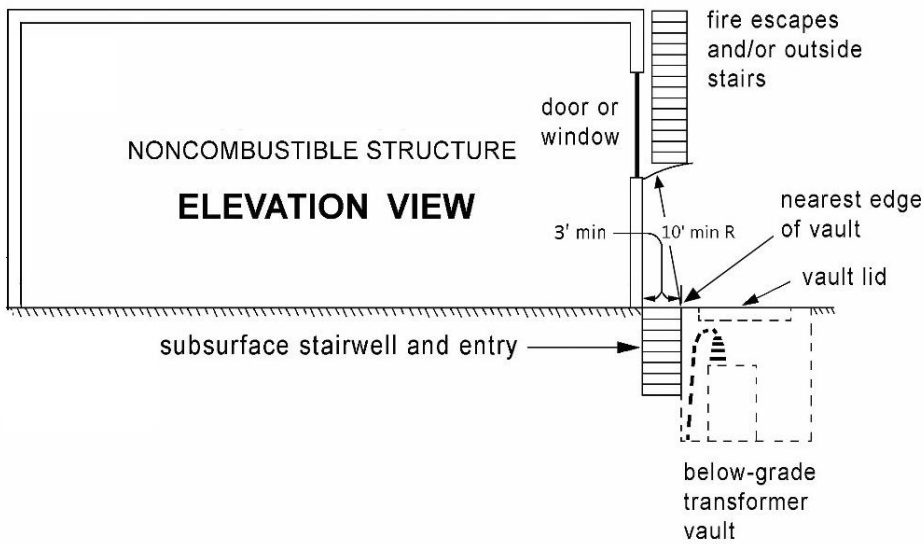
Transformer vault must be a minimum of:

- 10 feet from any property line between private properties.
- 10 feet from building doors or windows.
- 10 feet from combustible structures.
- 7 feet from noncombustible conductive (metal) structures.
- 3 feet from noncombustible nonconductive structures.
- 10 feet horizontally from any trees. The distance shall be measured from the tree's root ball to the nearest edge of the vault.

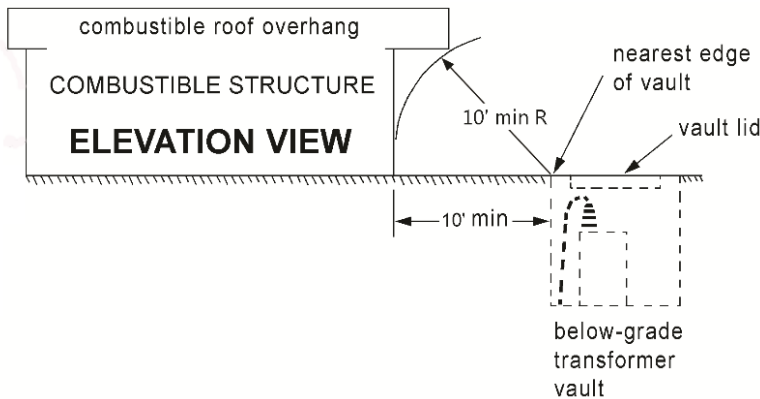
**Figure 4.4a. Noncombustible Structures, Plan View** (for combustible structures, see Figure 4.4c.)



**Figure 4.4b. Noncombustible Structures, Elevation View** (for combustible structures, see Figure 4.4c.)



**Figure 4.4c. Combustible Structures, Elevation View**



## 5. Vault Requirements

Install vault per SCL U2-14.2 and SCL U2-15.1.

Confirm minimum vault dimensions with the SCL Engineer.

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.

It shall be the customer's responsibility to assure that water does not enter the building and does not enter customer service entrance equipment from SCL vaults. The service termination facility must be above grade if the customer's service gear is at an elevation lower than the lid of the transformer vault.

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

Provide grounding per SCL 0461.10.

## 6. References

**SCL Construction Standard U2-14.2**; "Vault Installation"

**SCL Construction Standard U2-15.1**; "Installation of Ring-Type Vaults"

**SCL Construction Standard 0214.00**; "Clearances between SCL Underground Structures and Other Utility Structures in the Public Right-of-Way"

**SCL Construction Standard 0222.02**; "Requirements for Duct Banks in the Public Right-of-Way"

**SCL Construction Standard 0224.34**; "Steel Conduit Risers"

**SCL Construction Standard 0461.10**; "Grounding Electrodes for Handholes and Vaults"

**SCL Construction Standard 0473.50**; "Looped Radial and Network Service Entrance Cables in Conduit for Underground Primary Service"

**SCL Construction Standard 0751.00**; "Customer Requirements, In-Building Transformer Vaults, Network and Looped Radial Systems"

**SCL Construction Standard 0751.60**; "Concurrent Customer Requirements, In-Building Transformer Vaults"

**SCL Construction Standard 0724.50**; "Customer Requirements for Padmount Transformer Services, Looped Radial System"

**SCL Construction Standard 0224.07**; “Requirements for Secondary Conduits in the Right-of-Way”

**SCL Material Standard 7055.09**; “DB120, PVC Conduit Fittings”

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## 7. Sources

**Hanson, Brett**; SCL Standards Engineer and originator of 0732.50  
(brett.hanson@seattle.gov)

**Lin, Chung**; SCL Electrical Engineer and subject matter expert for 0732.50  
(chung-i.lin@seattle.gov)

**Perander, Eivind**; SCL Electrical Engineer and subject matter expert for 0732.50  
(eivind.perander@seattle.gov)

**SCL Construction Guideline U10-7 (canceled)**; “Requirements for Transformer Pads and External, Below-Grade Transformer Service Vaults, Looped Radial System”

**SCL Construction Standard 0230.03**; “Requirements for Pad Mounted Termination Enclosure Installations”