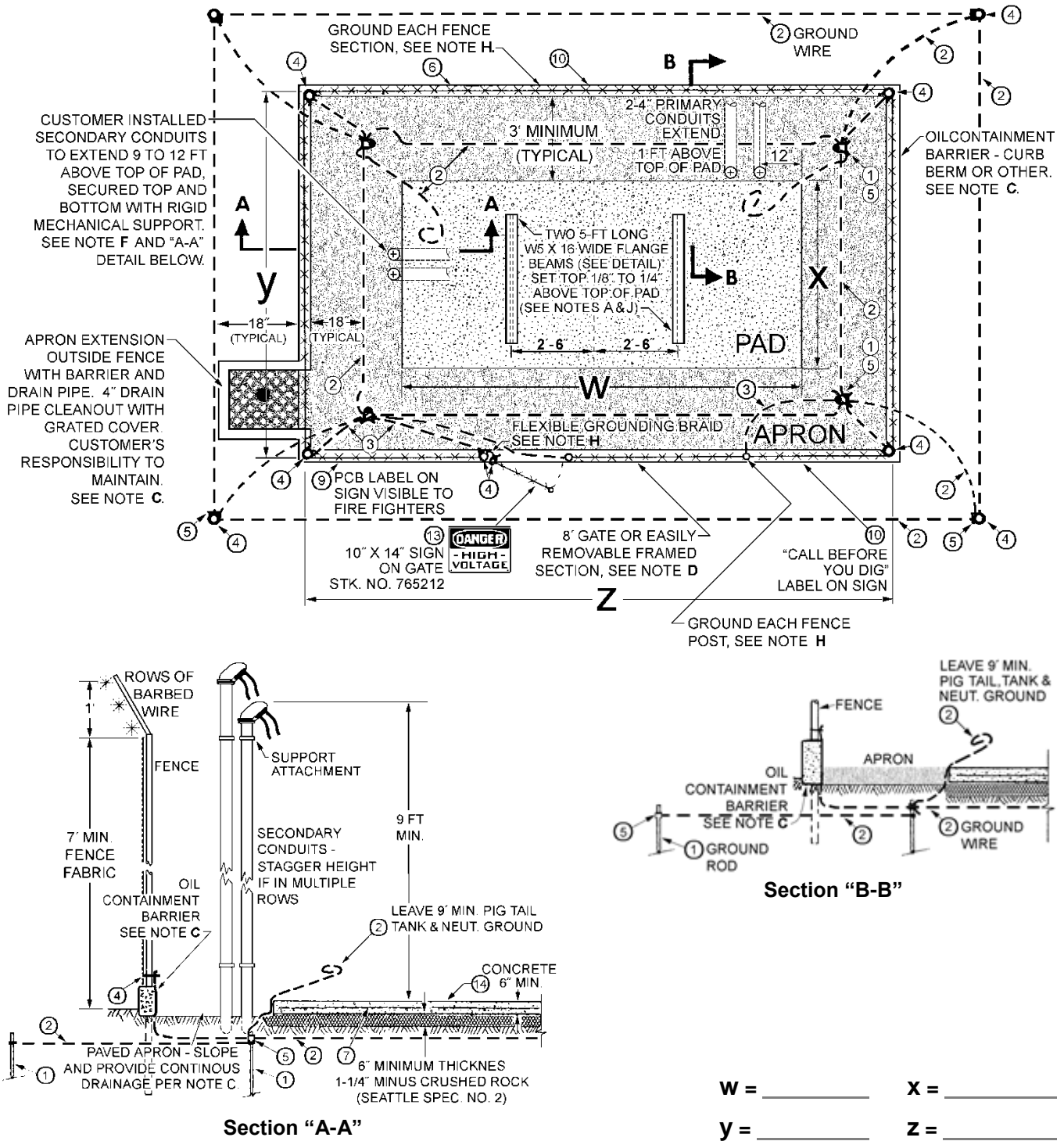


**Transformer Pad, Commercial and Industrial
 Underground from Overhead**



Pad and Apron Dimensions for _____ (site location)

Standards Coordinator
 Laura Vanderpool

Standards Supervisor
 John Shipek

Unit Director
 Darnell Cola

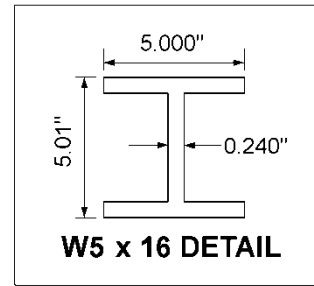
Notes:

- A. Concrete Transformer Pad.** The concrete pad shall be located so that the closest edge of the pad will be 10-foot minimum from combustible buildings and all exterior doors and windows, and 3-foot minimum from non-combustible buildings. See guideline U10-2.

Reinforcing Bars shall be placed within the concrete pad in an 18-inch maximum grid approximately 3 inches above the bottom of the concrete slab (18" O.C.E.W.). The pad shall be a minimum of 6 inches thick.

The pad shall be poured on a 6-inch bed of crushed rock, minimum.

The pad shall be poured around two 5-foot long **Steel Beams** (W5 x 16). The tops of the beams shall be set at 1/8" to 1/4" above the top of the pad. See the drawing on page 1 and the above W5 x 16 beam detail.



- B. Paved Apron.** The concrete transformer pad shall be surrounded by a paved apron that it will be impervious to spilled oil. The apron will extend a minimum of 3 feet from the pad edge. See the section below on fencing the apron and pad. Gravel on bare soil for the apron area is not sufficient to meet the intent of the appropriate oil spill regulations (see below) unless soils data is provided by and stamped by a professional engineer registered in the State of Washington that certifies that the soil is sufficiently impervious to prevent the escape of oil from the containment system before cleanup occurs.
- C. Oil Containment System.** The concrete transformer pad; the paved apron; the surrounding curb, dyke, berm or other appropriate barrier; and any oil/water collection and separation system shall, together, constitute an oil containment system. The intent of the oil containment system shall be to contain all spilled oil and oil-contaminated rainwater prior to cleanup. Since this containment system is subject to rain and snow accumulation, provision is required for handling water runoff.

The oil containment system shall conform to the current requirements of the Clean Water Act, Title 40 of the Code of Federal Regulations, Part 112 (see 40 CFR 112.7(c)) as amended. For convenience, pertinent language from 40 CFR 112.7(c), current as of July 17, 2002, is quoted in part, as follows, or review the EPA web site <http://www.epa.gov/oilspill/spcc.htm>.

... The entire containment system ... must be capable of containing oil ... so that any discharge ... will not escape ... before cleanup occurs. At a minimum, you must use one of the following prevention systems or its equivalent:

- Dikes, berms, or retaining walls sufficiently impervious to contain oil;
- Curbing;
- Culverting, gutters, or other drainage systems;
- Weirs, booms, or other barriers;
- Spill diversion ponds;
- Retention ponds; ...

The criteria for regulation under 40 CFR 112 takes into consideration the potential for oil spill discharge into navigable waters. In the SCL service area, discharge to navigable waters would typically be of concern if there is potential discharge to storm drain systems.

Responsibility for Design, Construction, Operations and Maintenance. Design, construction, operation and maintenance of oil containment systems shall be the responsibility of the property owner including appropriate provisions for oil and water run-off and separation of oil from water and periodic collection and proper disposal of oil and oil-contaminated water.

Spill Prevention, Control and Countermeasure (SPCC) Plans. For Seattle City Light-owned transformers located on private property, preparation of SPCC plans in conformance with 40 CFR 112 shall be the responsibility of the property owner.

- D. Fence.** The pad and apron shall be enclosed by a fence of Cyclone quality or equal. The fence fabric shall be a minimum of 7-foot high (NESC required) to be topped by another foot of barbed wire. The fence line shall be set at a minimum of 3 feet from the pad edge. The fence shall be placed along and outside the oil-stop barrier such as a curb of concrete or asphalt (See Oil Containment System, above).
- Gate.** The fence shall contain a 3-foot, 6-inch gate. The gate shall have provision for a padlock.
- Eight-Foot Opening.** In addition to the main gate, the fence shall include another gate or easily removable **and** framed section to be 8 feet wide.
- Grounding Fence and Gate.** Each section of fence wire fabric shall be grounded with No. 8 or larger copper to fence post ground wire. Grounding is to include the gate and removable sections. Reference NESC Rule 92E4.
- E.** The primary **Terminal Pole** shall be designated by Seattle City Light.
- F. Secondary Conduit and Conductors.** If conduit is installed instead of bus duct by the customer, the customer shall furnish and install the phase and neutral conductors of sufficient length to connect to the transformer terminals with a maximum of 6 conductors per phase and neutral and a maximum size of 750 kcmil.
- Conduit for secondary shall extend 9 to 12 feet above the pad (9 feet minimum) and shall be secured top and bottom with rigid mechanical support. If the pad is adjacent to the service building, the secondary conduits may extend, above ground, from the building (inside the pad) before extending vertically to the proper height. If the secondary conduits are laid out in rows extending outward from the pad, the height of the tops (weatherhead) should be staggered in height with the back row higher than the front row (from the pad edge). The location of the customer-installed secondary conduit shall be determined by Seattle City Light.
- G. Secondary Bus Duct.** If bus duct is installed instead of conduit and cable by the customer, Seattle City Light shall furnish and install the phase and neutral conductors from the transformer to the bus duct. The customer shall provide approved compression type terminals on the bus duct. The number of terminals and size shall be determined by Seattle City Light. The bus duct shall extend approximately 18 inches beyond the fence. The bottom of the bus shall be 9 feet above the concrete pad.
- H. Grounding.** Eight ground rods shall be driven at the corners, 4 inside the fence and 4 outside the fence, using a driving head to prevent damage to the ground rod threads. See drawing on page 1 for details.
- The resistance of the grounding system shall not exceed 25 ohms. Install additional ground rods or other grounding electrodes (with prior approval from SCL engineering) until resistance is below 25 ohms. Reference 2007 NESC Rule 96D.
- The **Ground Wire** shall not be spliced.
- Ground each fence post to a ground rod. Reference 2007 NESC Rule 92E5.
- Ground each section of fence wire strand with No. 8 or larger copper to fence post. Grounding is to include the gate and removable sections with flexible braid as required. Reference NESC Rule 92E4.
- If grounding is under concrete or asphalt, all connections shall be done by exothermic welding (Cadweld or better).
- I. Signs** Seattle City Light will install the following signs on the pad fence:
- **PCB content** label (one sign from item 9). Choose from one of four different pressure sensitive labels indicating PCB content ranges matching the PCB content of the energized transformer coolant. Note, the PCB label must show the same PCB levels as indicated on the transformer label. See the material list for content labels. Mount two appropriate labels on 7" x 10" fiberglass signs (item 11) and hang the signs on the pad fence with cable ties. Locate the signs where they will be visible to fire fighters.
 - **"Call Before You Dig"** pressure sensitive label. Mount two labels on 7" x 10" fiberglass signs (item 11) and hang on the pad fence with cable ties. Where appropriate, one sign can face the street and other can face the customer's building.
 - **Signs, Danger Hazardous Voltage, 7 in x 10 in, Rigid.** Use for mounting the above labels – items 9 and 10.
 - **Signs, Danger Hazardous Voltage, 10 in x 14 in, Rigid;** item 13. Mount this sign on the pad gate with cable ties.
- Tie wraps shall be used to attach all of these above signs.
- In addition to the above signs, a **"Danger Hazardous Voltage"** pressure sensitive label (item 8) is to be mounted on the transformer.

J. All **Structural Steel** used in the installation shall be per ASTM A 36. Paint with one coat of Devoe Coatings Bar-Rust 235.

K. **Gravel and Crushed Rock** (Section "A-A") shall be per City of Seattle Standard Specifications Section 9-03.16 Mineral Aggregate Chart.

L. Material List

Item	Quantity	Description	Material Std.	Stock No.
1	8	GROUND ROD, 5/8" X 8", copper clad steel, sectional	6762.25	564238 E
2	200' (est.)	WIRE, 2/0 bare stranded copper, SD	6103.90	610425
3	10' (est.)	WIRE, #2 bare stranded copper, SD	6103.90	610434
4	6 (est.)	CONNECTOR #4 thru 2/0 to 1-1/4" IPS	6762.7	676271
		#4 thru 2/0 to 1-1/2" IPS	6762.7	676277
		#4 thru 2/0 to 2" IPS	6762.7	676283
5	8	CONNECTOR, 2 cables (#4 thru 2/0) to 5/8" rod	6762.7	676551
6	as req'd.	FENCE fabric, 7', 9 gauge, with 3 strands of barbed wire on support pipe with 3" spacing between strands, Cyclone or equal.	–	–
7	as req'd.	REINFORCING BAR, #5	–	–
8	1	LABEL, "Danger Hazardous Voltage", pressure sensitive, to be mounted on transformer.	7651.27	765182
9	2	LABEL, pressure sensitive. Label states PCB content in energized transformer coolant. Mount labels on a 7" x 10" fiberglass sign (item 11) and hang on the pad fence with cable ties. Locate the signs (2) where visible to fire fighters. <i>PCB label must show the same PCB level as that on the transformer.</i>		
		transformer with PCB content of 500 ppm or greater (yellow)	–	765201
		transformer with PCB content from 50 to less than 500 ppm (white)	–	765208
		transformer with PCB content of 1 to less than 50 ppm (blue)	–	765206
		transformer with PCB content less than 1 ppm (green)	–	765211
10	2	LABEL, "Call Before You Dig." Mount labels on a 7" x 10" fiberglass sign (item 11) and hang on the pad fence with cable ties, one sign, facing street, one facing the customer's installation.	–	765255E
11	4	Signs, Danger Hazardous Voltage, 7 in x 10 in, Rigid Use for mounting labels – items 9 and 10 above.	7651.23	765181
12	20	TIE, Cable, black, 7"	7358.1	735805E
13	1	Signs, Danger Hazardous Voltage, 10 in x 14 in, Rigid Mount sign on the pad gate with cable ties.	7651.19	765212
14	as req'd.	CONCRETE, Class B – 6-sack mix	City of Seattle Std. Specs. 6-02.3(2)A	–