

**GROUNDING NETWORK SYSTEM TRANSFORMER VAULTS  
WET, DRY, OR SPOT - COPPER BUS**

Wet vaults are those vaults located below grade or where otherwise subject to flooding or wet interior conditions. Dry vaults are above grade or are not subject to periodic flooding, such as locations in a customer basement. Dry vault equipment must be out of the rain or drip. Dry vaults may have vent gratings open to the rain.

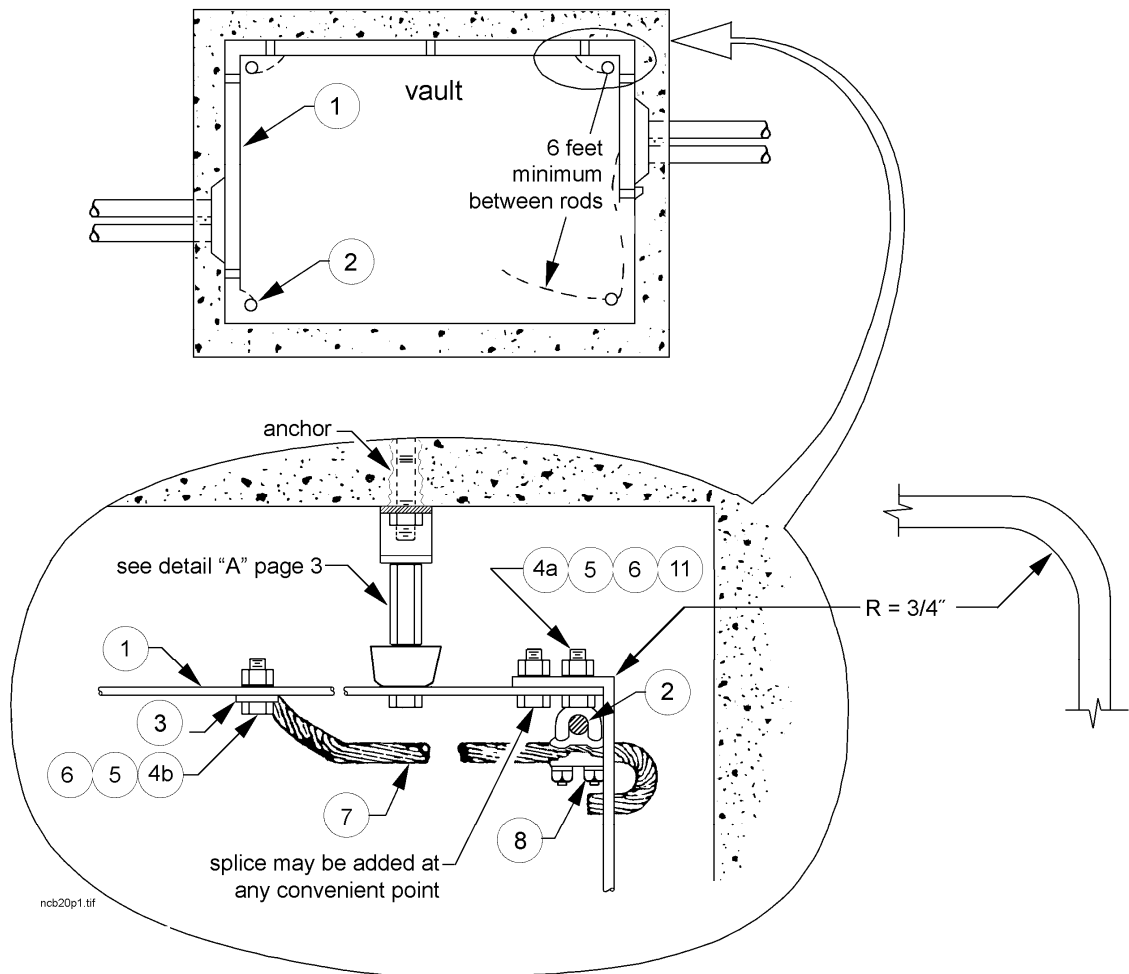


Figure 1, Tying Bus to Ground Rod

STANDARDS COORDINATOR

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SEATTLE CITY LIGHT  
**CONSTRUCTION GUIDELINE**

Grounding Network System Transformer Vaults  
 Wet, Dry, or Spot – Copper Bus

STANDARD NUMBER: **NCB-20**

PAGE: 2 of 3

SUPERCEDING: October 23, 2002

EFFECTIVE DATE: April 10, 2006

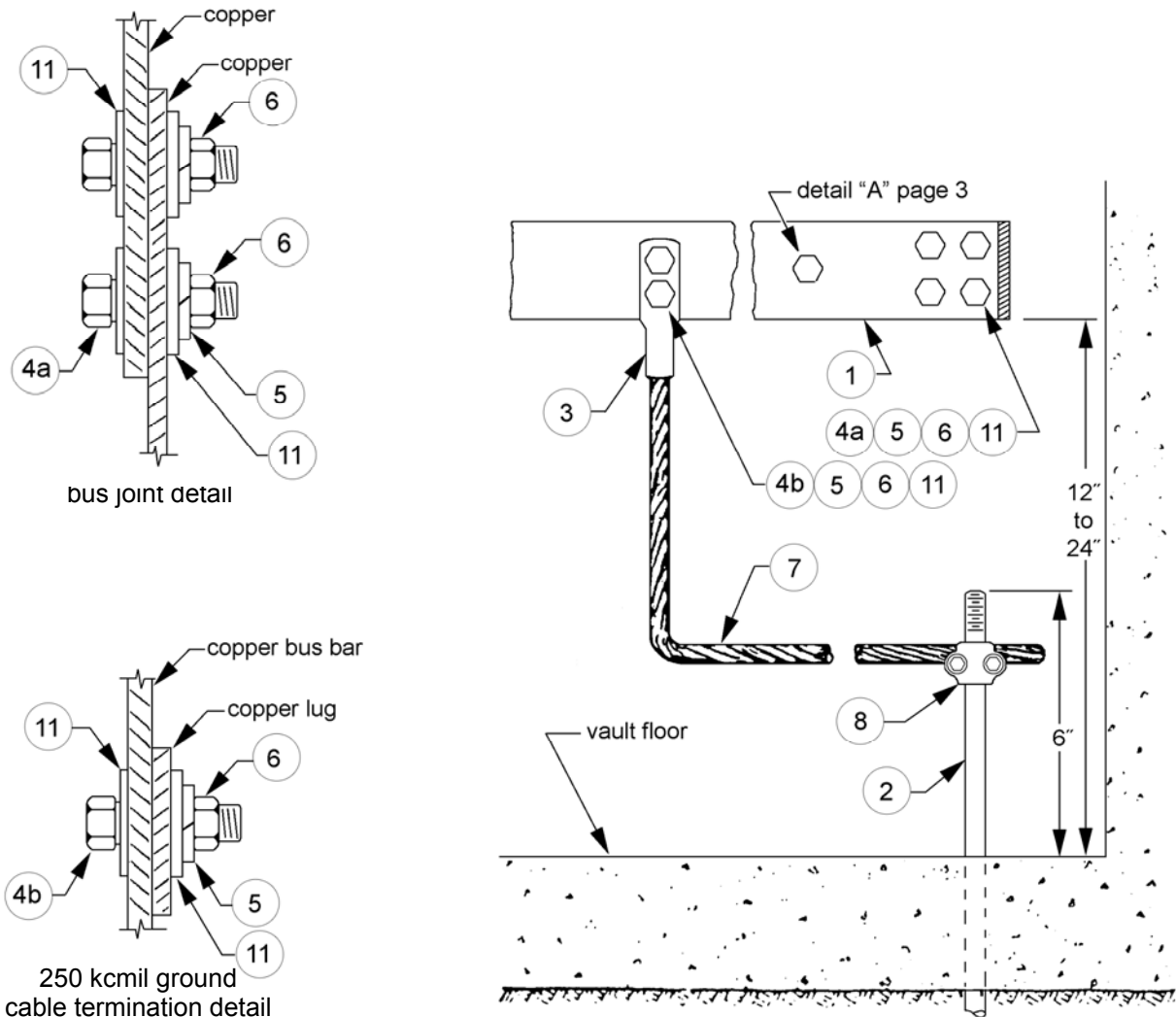


Figure 2, Bus Attachment

**Material List, Figures 1 and 2**

Item	Quantity	Description	Stock No.	Matl. Std.
1	as required	BUS BAR 1/4" x 4", Copper	630029	6300.0
2	4	GROUND ROD, 5/8" x 8'	564238E	5642.1
3	4	TERMINAL LUG, 250 Copper	677083E	6770.7
4a	as required	BOLT Silicon Bronze, 1/2" x 1-1/2", bus to bus	784587E	7845.1
4b	8	BOLT, Silicon Bronze, 1/2" x 1-1/4", bus to 250 lug	784586E	7845.1
5	as required	LOCK WASHER, Bronze, split, 1/2"	788125E	7880.2
6	as required	NUT Silicon-Bronze, 1/2"	783325E	7833.3
7	as required	WIRE, Bare stranded copper, 250 kcmil	610412	6103.9
8	4	GROUND CLAMP	676255	6762.7
11	as required	WASHER, Flat Bronze, 1/2"	788026E	7880.2

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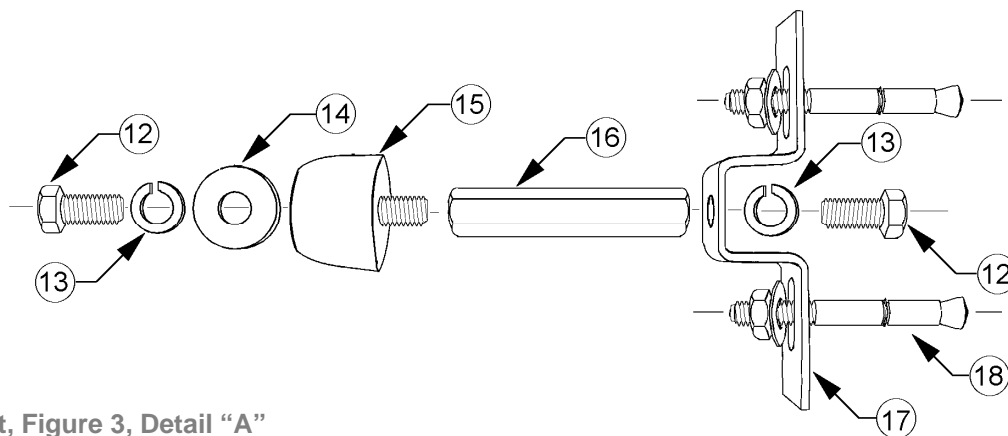
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**Notes:**

- Ground Rods:** Four 5/8" x 8' ground rods shall be driven as shown before the vault floor is poured. When installing rods in vaults with limited overhead clearance, two 5/8" x 5' sectional rods, coupled, may be used in lieu of each 5/8" x 8' rod. The head of the rod shall protrude approximately 6" above the finished floor. A driving head shall be used to prevent damage to the ground rod threads.
- Testing of Grounds:** The total resistance of the ground rods shall not exceed 25 ohms. If this requirement is not met with four rods as shown, additional lengths shall be coupled and driven, or additional rods installed.
- Ground Bus:** A 1/4" x 4" copper bus bar shall be installed as shown along the walls of the transformer vault to extend beyond duct entrances so neutrals can be connected near the duct.
- Ground Wire:** 250 kcmil bare stranded copper cable shall be used to connect ground rods to the ground bus. There should be sufficient slack in the cable to prevent damage due to tension or settling. All aluminum neutrals shall be sleeved out to insulated copper pigtails and adapters, sealed on both the sleeve and lug with heatshrinks, in vaults that are subject to flooding. Install a 250 kcmil copper system ground if no bus ties are available.
- Transformer Neutral:** The neutral terminal on the transformer may vary in location and orientation. Some transformers may have a neutral terminal with 4 bolt holes and others may have 2 bolt holes.
- Bus Tie Interrupters (BTIs):** - These shall have a case ground of 500 kcmil copper to ground bus.
- Conductors:** - Aluminum secondary conductors in a potentially wet location: sleeve copper pigtails with heat shrink onto the neutrals and then connect them to the neutral/ground bus. Use oil stop aluminum sleeves (Material Standard 6774.7). All conductors shall be insulated for the purpose of sealing the wall penetration.
- References:** Construction Standards NSV-30 and NCB-80 for joint preparation details. Construction Standard NCB-40 for transformer vault bus installation.

**Figure 3, Insulated Support Assembly, Detail "A"****Material List, Figure 3, Detail "A"**

quantities per insulator location

Item	Quantity	Description	Stock No.
12	2	SCREW, cap, hex head, cad plated, 5/8" - 11 NC x 1"	784885E
13	2	WASHER, lock, galvanized, 5/8"	584260E
14	1	WASHER, flat, 5/8"	585030E
15	1	INSULATOR, Phenolic spool, neutral bus support	690880
16	1	NUT, coupling, hex, steel, 5/8" - 11 NC	780050E
17	1	BASE, neutral bus support	690882
18	2	ANCHOR, Stainless Steel, light duty, stud bolt (stud, nut and washer) 1/2" x 2 - 3/4"	780032