

Pulling Iron Installation for In-Building Vaults, Network System



1. Scope

This standard covers proper installation of pulling irons during construction of in-building vaults to facilitate pulling Seattle City Light (SCL) electrical cable. The number, location, and height shall be determined for each project by the SCL engineer. The pulling irons are not intended to be used to pull out lodged cable or to move heavy equipment.

2. Application

This standard provides requirements for the installation of pulling irons (also known as pulling eyes, item 1 in the material list).

A form (item 2 in the material list) is used to create the pulling iron recess.

A cover (item 3 in the material list) is used to conceal the floor-mounted pulling irons.

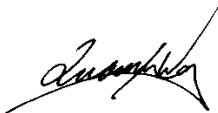
This standard is intended for use by SCL engineers, SCL inspectors, SCL civil crews, and contractors who approve, inspect, build, and construct in-building and cast-in-place vaults.

Additional Network vault requirements are found in SCL NVH-80. SCL U1-4.11/NCI-60 describes cable pulling tension calculations.

3. Material List

Item	Description	Stock No.	Quantity
1	Pulling iron, stainless steel	720235	Project specific
2	Form for embedded pulling iron	013525	"
3	Pulling iron cover	720236	"

Standards Coordinator
Quan Wang



Standards Supervisor
John Shipek



Unit Director
Andrew Strong



4. SCL Civil Engineering Review Requirement

SCL Civil Engineering needs to review the pulling iron design if:

1. It is a retrofit (pulling iron installed on existing wall/ceiling/floor). If so, design calculation and pull test are both required.
2. The pulling iron is other than SCL stock number 720235. Other pulling irons will require design calculation and pull test for new and retrofit installation.

5. Installation Notes

5.1 General

The following requirements shall be met when installing pulling irons:

- Pulling irons shall be installed behind concrete reinforcing steel (rebar). See Figure 5b.
- Spacing and size of rebar shall be determined by a licensed civil engineer.
- Pulling irons shall be tied to the rebar.
- Pulling iron installation shall be rated and labeled in the vault as 5000 lb maximum working tension.
- The vault wall, ceiling, and floor shall be designed so that each pulling iron obtains a 10,000-lb ultimate strength.
- Rubber forms shall be used to create the pulling iron recess shown in Figure 5a.
- If a pulling iron is installed in the floor, install a recessed pulling iron cover to avoid a tripping hazard.
- Pulling iron embedment detail is required in the vault layout drawings for new and retrofit installation.

Figures 5a and 5b show a pulling iron embedded in a concrete vault, behind and tied to rebar. Pulling irons are typically opposite the entry or conduit entrance.

Figure 5a. Pulling Iron, Inset View

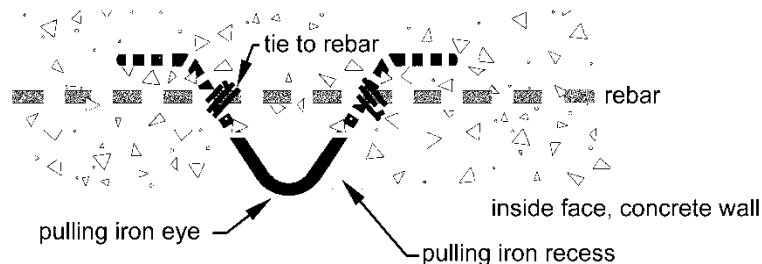
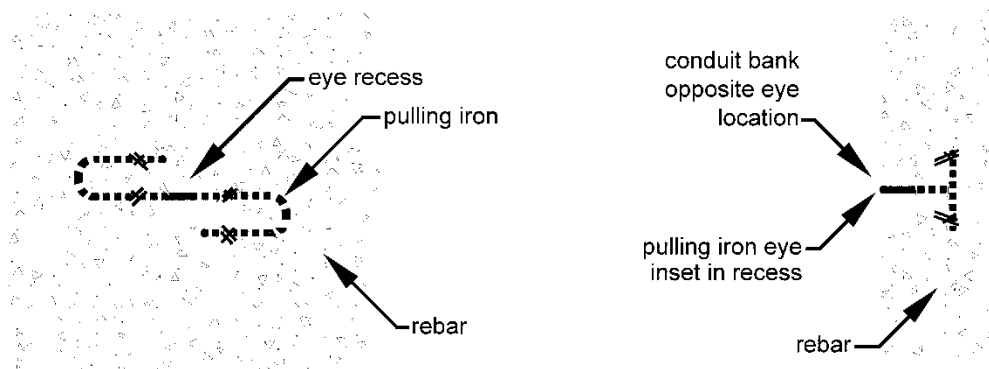


Figure 5b. Pulling Iron, Vault Interior, Front and Side Views



5.2 Installation in New Construction

Pulling irons for rigging equipment shall be installed minimally, without duplication, and as follows:

- Opposite each conduit entrance at approximately the same height.
- Inset into a recess in the vault wall so that the eye is exposed and flush with the interior wall. See Figure 5b.

Locations for pulling irons can vary depending on the vault plan and configuration (entry door, conduit entrance, hatch, and transformer locations). SCL prefers that pulling irons on walls shall optimally match the height of the conduits, or as the next preferred option, the pulling iron shall be just below the conduit entrance.

If the vault is constructed of concrete blocks, with engineering pre-approval irons may be floor-mounted. One pulling iron cover shall be provided for each pulling iron installed in the vault floor.

5.3 Installation on an Existing Wall (Retrofit)

Installation of a pulling iron on an existing vault wall shall meet the following requirements:

- Pulling iron and wall design calculation and drawings shall be stamped by a licensed Civil Engineering PE. These calculations and drawings shall be submitted to SCL for review and approval.
- Drawing detail shall include pulling iron detail, anchor detail, and existing wall details, as well as layout of the pulling iron and the cable entrance.
- The concrete masonry unit (CMU) wall that a pulling iron will be anchored to shall be fully grouted.
- A pulling test shall be required for any pulling iron installed on an existing wall.
- Pulling iron installation shall meet a minimum testing load of 7500 lb.

6. Labeling

Using a stencil, paint 2-inch tall letters near the pulling iron indicating “5000 LB MAX. WORKING.”

7. References

SCL Construction Guideline U1-4.11/NCI-60; “Cable Pulling Calculations: Maximum Pulling Tensions for Installing Electrical Wire and Cables (Underground)”

SCL Construction Guideline NVH-80; “Network Area Requirements for Panel or Cast-In-Place Vaults”

8. Sources

Lee, Dennis; Network Service Supervisor, subject matter expert, and originator of NCI-62 (dennis.lee@seattle.gov)

Ng, Sharon; Sr. Civil Engineer and subject matter expert for NCI-62 (sharon.ng@seattle.gov)

Siddiqi, Uzma; SCL Standards Engineer and subject matter expert for NCI-62 (uzma.siddiqi@seattle.gov)

Youngs, Rob; Crew Chief and subject matter expert for NCI-62 (rob.youngs@seattle.gov)