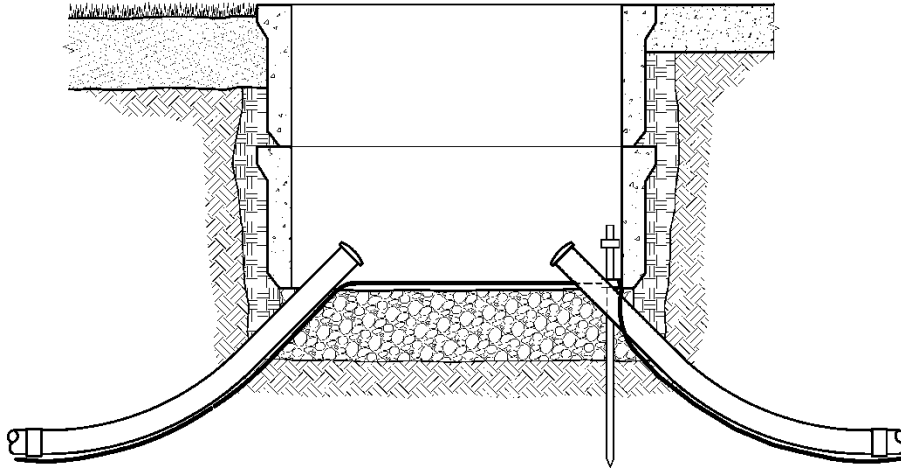


## Secondary Handhole Installation and Grounding



### 1. Scope

This standard covers the requirements for secondary handhole installations.

This standard addresses open bottom and closed bottom handholes.

Streetlight handholes are outside the scope of this standard. See Seattle City Light (SCL) 1716.07.

### 2. Application

This standard provides direction to SCL crews and contractors regarding proper installation of secondary handholes owned and maintained by SCL.

For handhole and conduit clearances and orientation, see SCL 0214.00.

### 3. Definitions

**Heavy traffic:** constant vehicular loading (i.e. roadway)

**Medium traffic:** occasional vehicular loading (i.e. driveway)

**Light traffic:** rare vehicular loading (i.e. sidewalk)

### 4. Requirements

#### 4.1 Grounding

Grounding of secondary handholes shall conform to requirements of this standard and SCL 0461.10.

Standards Coordinator  
Brett Hanson

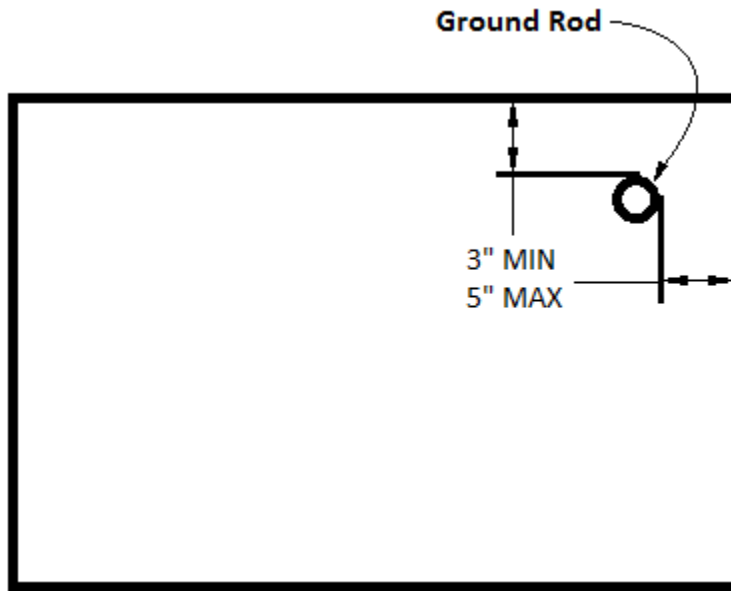
Standards Supervisor  
John Shipek

Unit Director  
Andrew Strong

### 4.1.1. Ground Rod Locations

Ground rod shall be located in the corner of the handhole and shall not interfere with conduits and wires. See Figure 4.1.1.

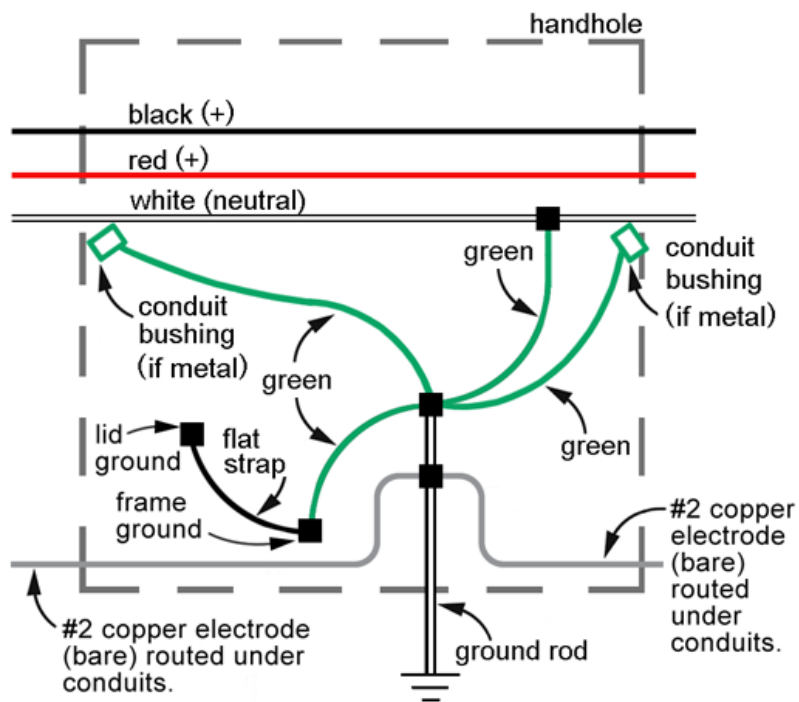
**Figure 4.1.1 Ground Rod Location, Plan View**



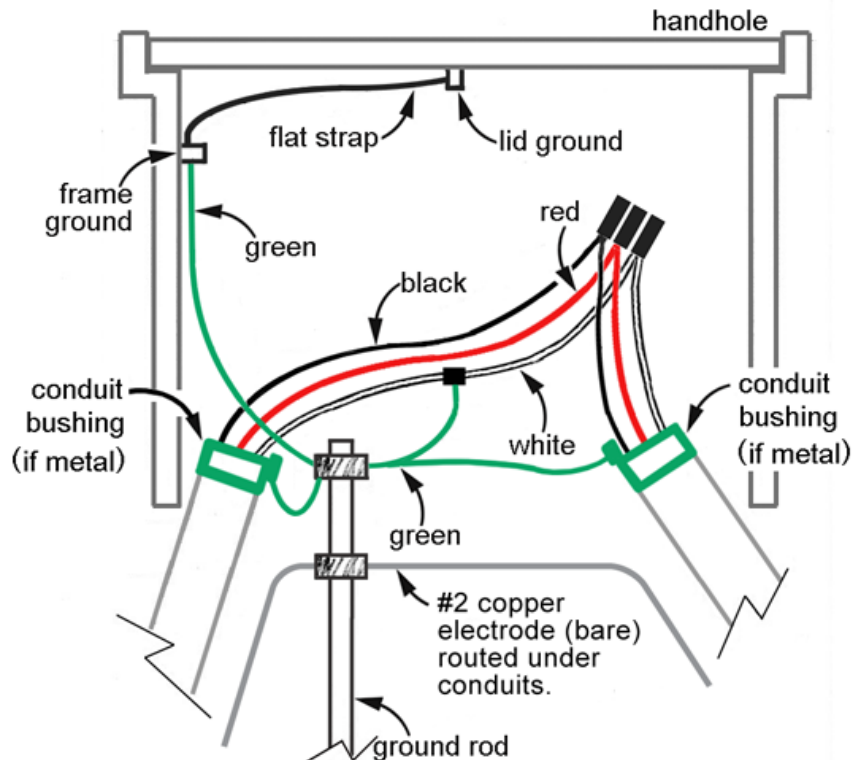
### 4.1.2. Grounding Connections

See figures 4.1.2a and 4.1.2b. Bond any metal conduits with bushings (Stock No. 013270).

**Figure 4.1.2a. Handhole Wiring, Schematic View**



**Figure 4.1.2b. Handhole Wiring, Elevation View**



**4.1.3. Lid Grounding**

Choose appropriate method based on traffic load. See Table 4.1.4.

**Table 4.1.3. Lid Grounding**

Traffic Load	Method
Heavy	A
Medium	A
Light	B

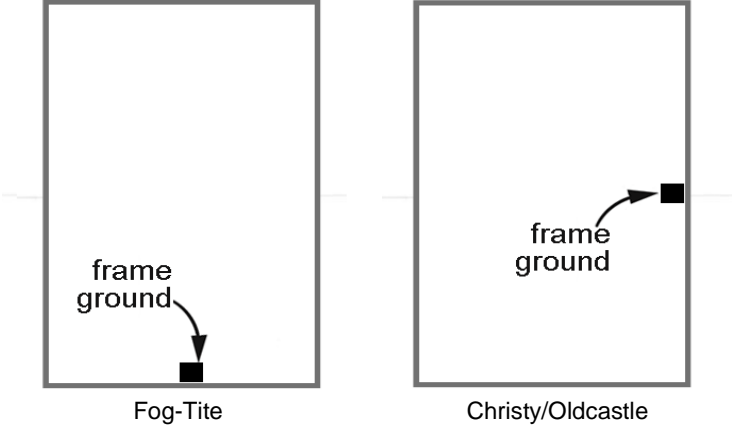
**4.1.4. Grounding Method A (Example: 17" x 28" Handhole, Heavy or Medium Traffic)**

Use precast handhole (stock number 720391) with lid that has factory installed ground strap.

Connect factory ground strap from lid to frame as follows:

1. Install and test grounding electrodes per SCL 0461.10.
2. Install green #8 AWG THWN ground wire (Stock No. 612277) from frame using factory bolt and set screw lug (Stock No. 012564) to ground rod using a ground rod clamp (Stock No. 564012).
  - Fog-Tite: manufacturer frame ground bolt is on the center of the long side wall below lip. See Figure 4.1.5.
  - Christy/Oldcastle: frame ground bracket is on the short side wall. See Figure 4.1.5.
3. Bond neutral conductor to a green #8 AWG THWN ground wire (Stock No. 612277) with an irreversible connection. Connect ground wire to ground rod electrode with an irreversible connection listed for direct burial use.

**Figure 4.1.5. Frame Ground Locations**



**4.1.5. Grounding Method B (Example: 17" x 28" Handhole, Light Traffic)**

Use composite fiberglass, reinforced plastic, polymer mortar/concrete handholes (Stock No. 720393) and lid (Stock No. 720397). This handhole and lid do not require grounding.

**4.2 Conduits**

Rigid steel conduit ends shall be protected with plastic bushings and furnished with a ground bushing or grounding clamp.

PVC conduit ends shall be protected with end bells.

Unused conduits shall be plugged and protected.

Used conduits shall be sealed with duct seal or foam.

Conduits shall enter the handhole perpendicular to the walls.

Conduit entrances into the handhole shall be offset to allow cables to wrap in the same direction. See Figure 4.2.

Conduits entering the handhole shall have a minimum cover per SCL 0224.07.

Furnish and install all risers up to 12 inches maximum in order to maintain minimum conduit cover. Risers shall not exceed 12 inches in order to maintain crew hand access to handhole.

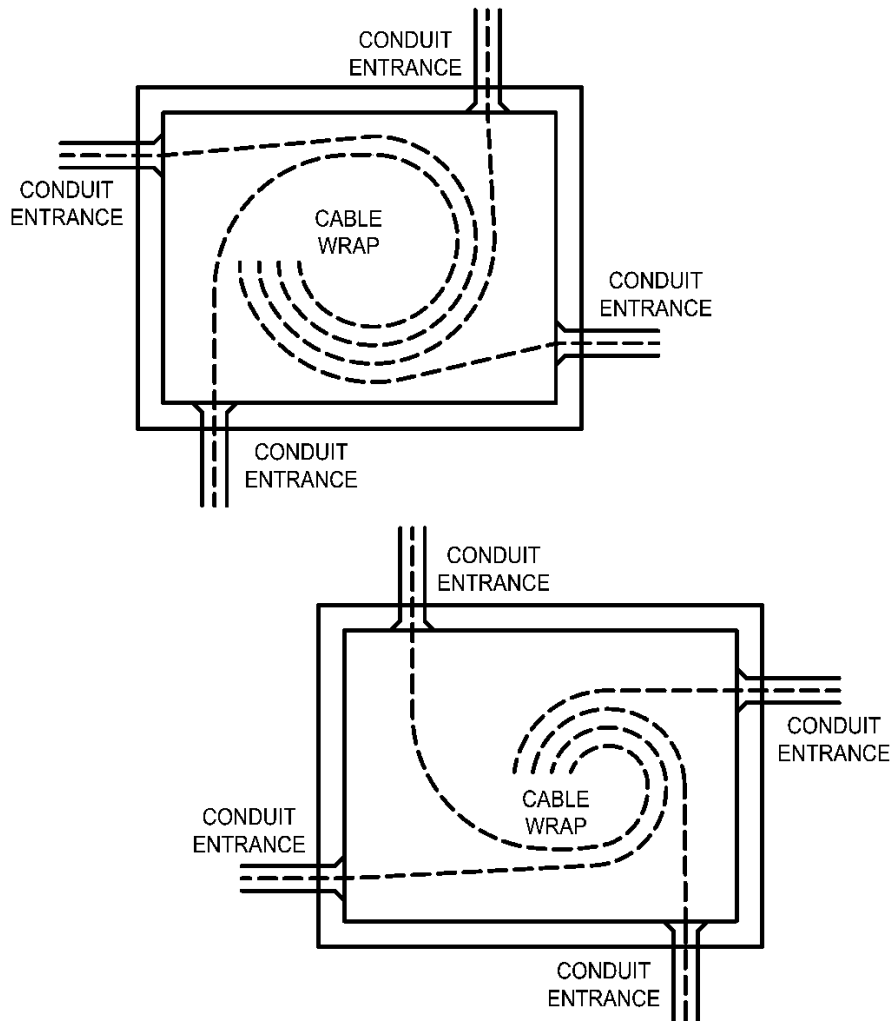
Conduits entering bottomless handholes shall be limited to 3 inches in diameter.

**Table 4.2 Handhole Types and Allowed Conduits**

Handhole Type	Conduit Diameter Allowed (in)			Handhole Maximum Capacity (in) <sup>a</sup>
	2	3	4	
1	yes	yes	no	6
2	yes	yes	no	12
3	yes	yes	no	24
5	yes	yes	yes	48
6	yes	yes	yes	–

<sup>a</sup> Handhole maximum capacity is calculated by multiplying the total number of conduits in the handhole by their diameters.

**Figure 4.2. Offset Conduit, Plan View**



### 4.3 Handholes

Handholes rated H-20 or Tier 22 shall only be installed in planting strips and pedestrian sidewalks where an occasional car or light truck may inadvertently traverse. Handholes in driveways shall be Type 5 or 6.

In backfill, aggregate, and planted areas, handholes shall be installed 1 in above grade. In paved areas, handholes shall be installed flush with grade.

All handhole covers shall have a slip resistant surface that meets the requirements of SCL 7203.01.

Handholes shall be easily accessible and not hidden among planned landscaping that will obscure it over time.

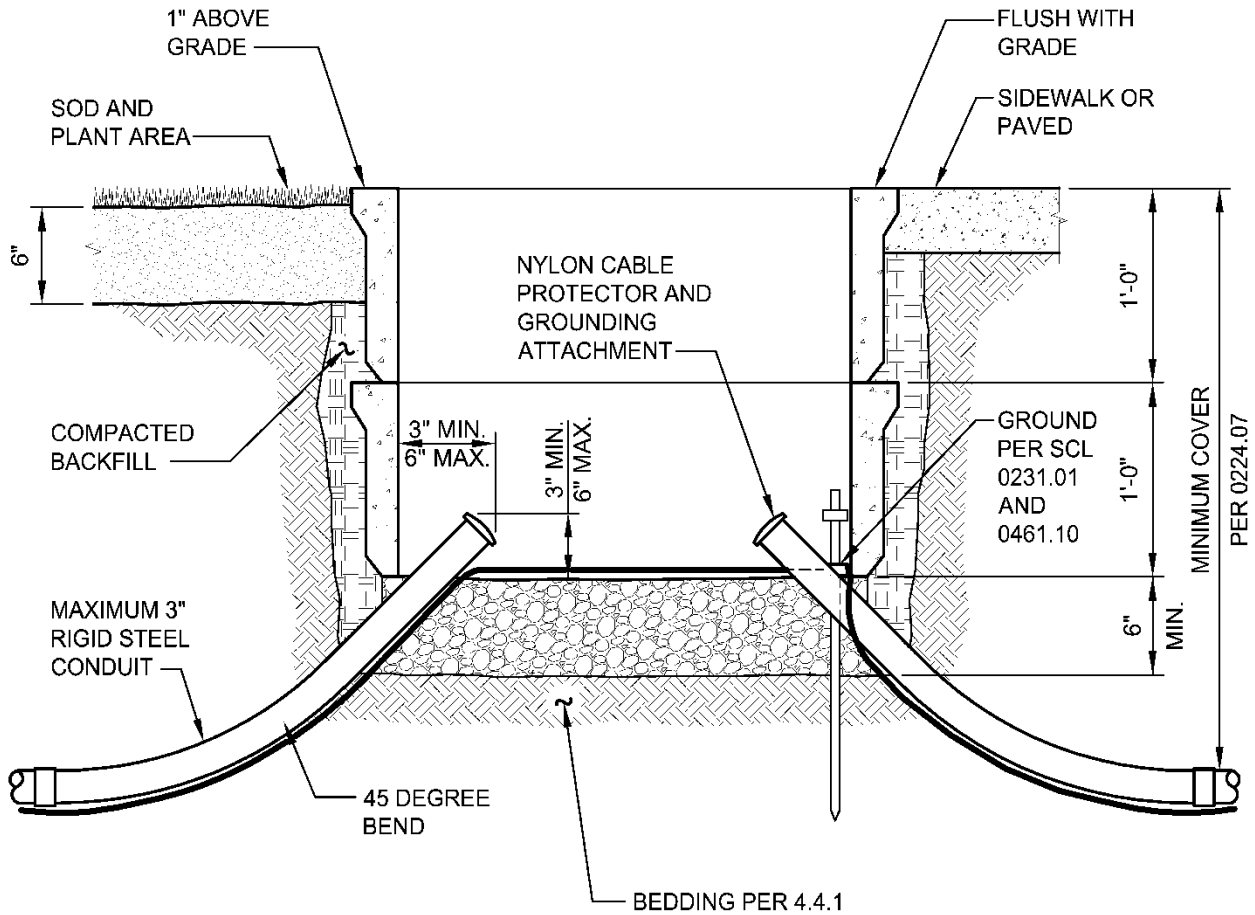
Handholes shall not be located in an area subject to heavy traffic.

Handholes shall be placed to avoid collecting surface water.

**4.3.1 Open Bottom Handhole**

Typical open bottom secondary handhole installation shall conform to Figure 4.3.1.

**Figure 4.3.1. Open Bottom Handhole, Elevation View**

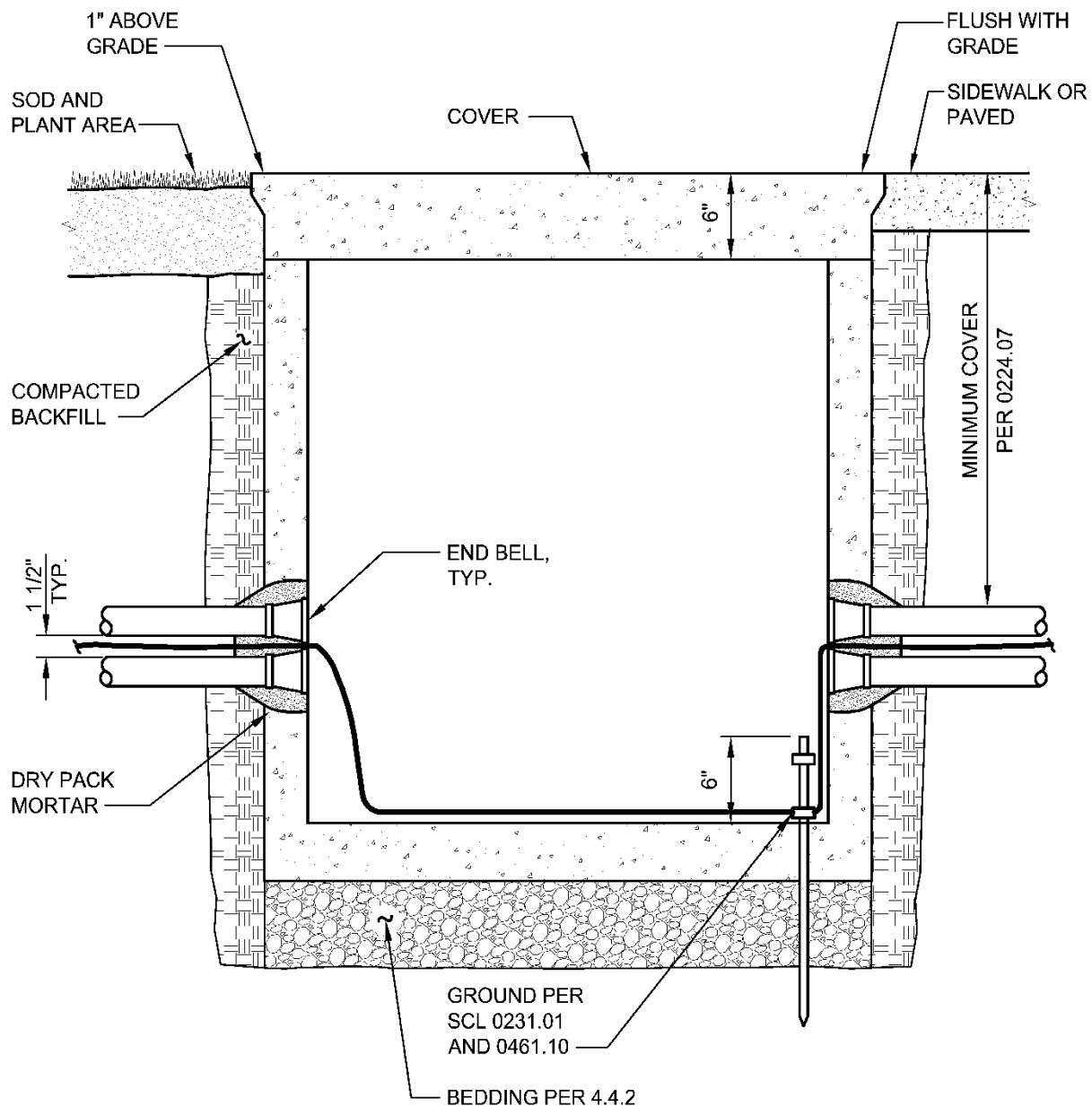


Note: In Looped Radial areas, bends entering bottomless handholes shall be permitted to be standard (STD) radius.

### 4.3.2 Closed Bottom Handhole

All penetrations shall be located in the wall knockout areas and performed by core drill.  
End bells shall be PVC type DB-120 conduit and installed flush with the inside wall of the handhole.  
Closed bottom secondary handhole installation shall conform to Figure 4.3.2.  
Conduit shall be grouted both inside and outside of the handhole.

**Figure 4.3.2. Closed Bottom Handhole, Elevation View**



#### **4.4 Bedding**

##### **4.4.1. Open Bottom Handholes**

Handholes shall be bedded on a minimum of 6 inches of 3/8-in washed gravel, mineral aggregate Type 9.

##### **4.4.2. Closed Bottom Handholes**

The bedding material shall consist of 4 inches to 12 inches of stable base material.

If the excavation bottom is saturated prior to placing bedding material, then over-excavate area as directed by SCL engineer and place cobbles (3 inches to 8 inches stone – no broken concrete).

If excavation is not saturated prior to placing bedding material, compact bottom of excavation with two full compacting operations at right angles to each other with a mechanical compactor.

Place a layer of crushed rock (aggregate grade of 1-1/4 inches minus), screed and compact to a minimum thickness of 4 inches, and add 1/2 to 1-1/2 inches of sand to create a level surface.



**5. Material List**

<b>Description</b>	<b>Stock No.</b>
<b>Handhole, without cover</b>	
Type 2 precast	012978
Type precast extension	720402
Fiberglass	720393
233	013183
3030	013187
444	013093
<b>Conduit, entering handhole</b>	
Straight - Schedule 40 PVC	
2 in	734530
3 in	734532
4 in	734523
Straight - Steel	
2 in	734741
3 in	734743
4 in	734745
Elbow - Steel, 90°	
2 in	734820
3 in	734822
4 in	734824
End Bell – DB120 PVC	
2 in	734938
3 in	734940
4 in	734942
<b>Steel conduit grounding</b>	
Grounding insulated bushing	
2 in	731531
3 in	013270
4 in	012857
Grounding clamp	
2 in	676283
3 in	676285
4 in	676286

## 6. References

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

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

**SCL Construction Standard 1716.07**; "Streetlight Handhole and Conduit Requirements"

**SCL Material Standard 7203.01**; "Precast Reinforced Concrete Handholes—General"

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## 7. Sources

**Chao, Yaochiem**; SCL Standards Engineer, originator, and subject matter expert for 0231.01 (yaochiem.chao@seattle.gov)

**Lu, Curtis**; SCL Standards Engineer and subject matter expert for 0231.01 (curtis.lu@seattle.gov)

**Perander, Eivind**; SCL Engineer and subject matter expert for 0231.01 (eivind.perander@seattle.gov)

**SCL Construction Standard U2-13.1/NVH-50**; "Typical Handhole with Conduit" (canceled)

**2017 City of Seattle Standard Specifications for Road, Bridge and Municipal Construction**; Section 9-03.16, "Mineral Aggregate Chart"