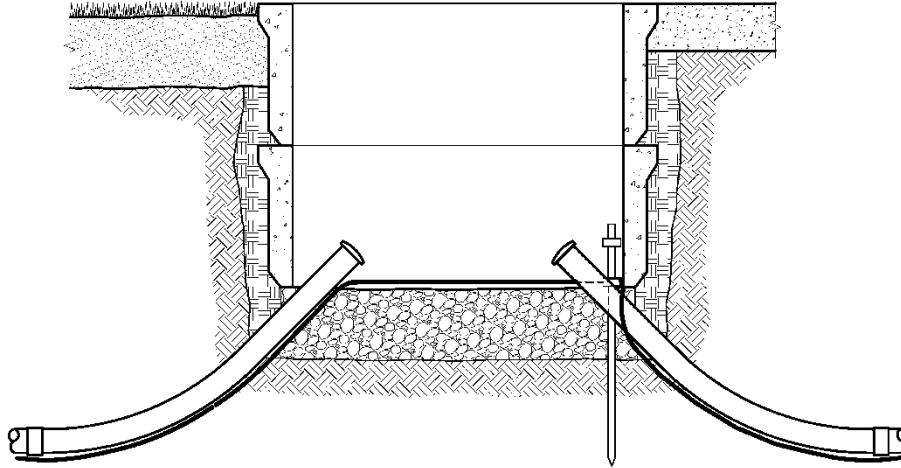


Secondary Handhole Installation and Grounding



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.

Standard Coordinator
Brett Hanson

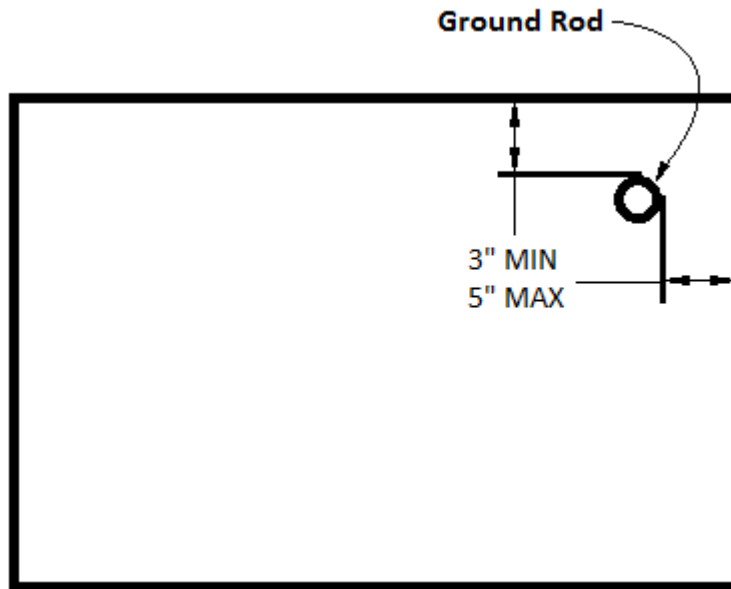
Standards Engineering Supervisor
Brett Hanson

Division Director
Bob Risch

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.

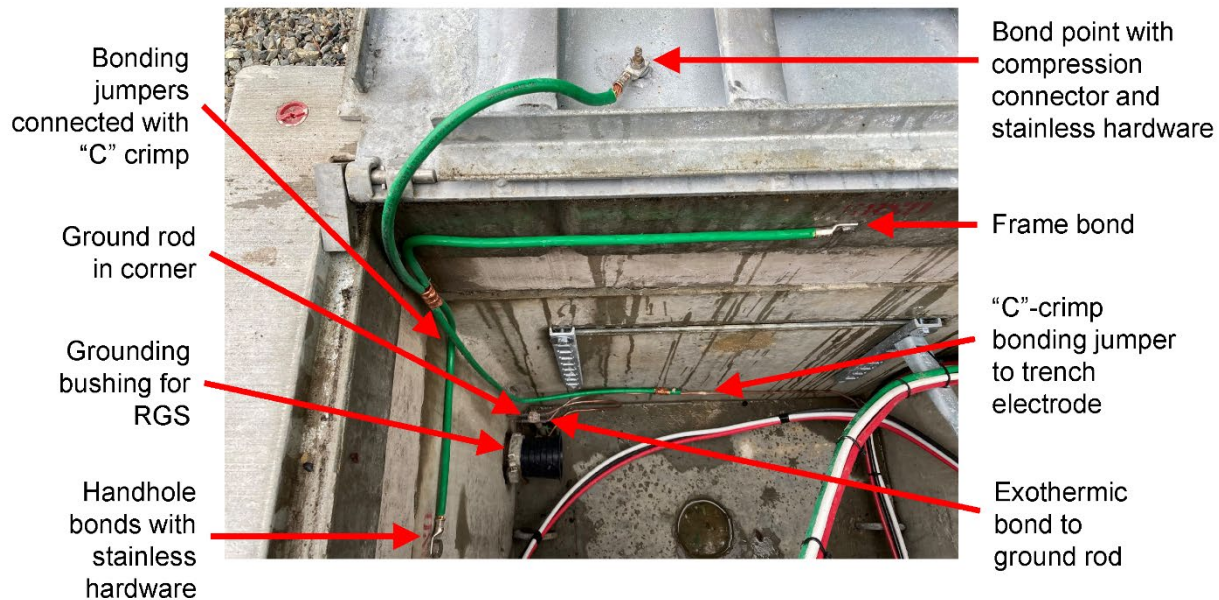
Figure 4.1.1 Ground Rod Location, Plan View



4.1.2. Grounding Connections

See Figure 4.1.2. Bond any metal conduits with bushings (Stock No. 013270).

Figure 4.1.2. Handhole Wiring



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 |

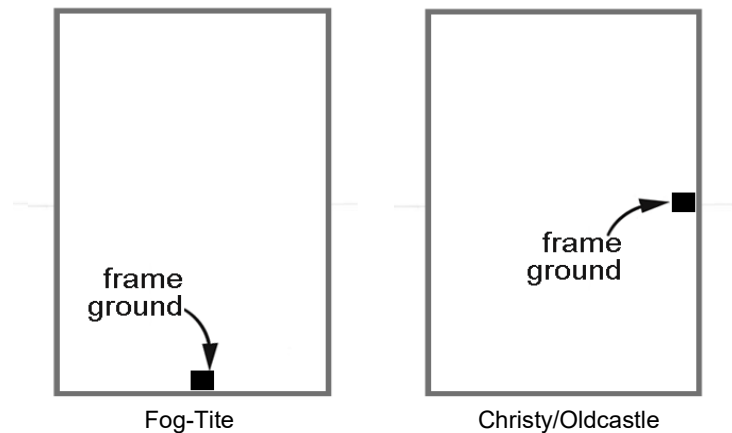
4.1.4. Grounding Method A (Example: 17" x 28" Handhole, Heavy or Medium Traffic)

Use precast handhole (Stock No. 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 #6 AWG THWN ground wire (Stock No. 612288) from frame using factory bolt and crimp-on lug (Stock No. 677065) to trench electrode using connector per SCL 6773.5 or 6773.61.
3. For streetlight service points only, bond neutral conductor to a green #6 AWG THWN ground wire (Stock No. 612288) with an irreversible connection. Connect ground wire to ground rod electrode with an exothermic 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 bonding.

Rigid steel conduits shall be bonded.

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. When site conditions require more than 12 inches of rise, a Type 6 handhole or larger is required. Type 6 is limited to a maximum of 30 inches of risers.

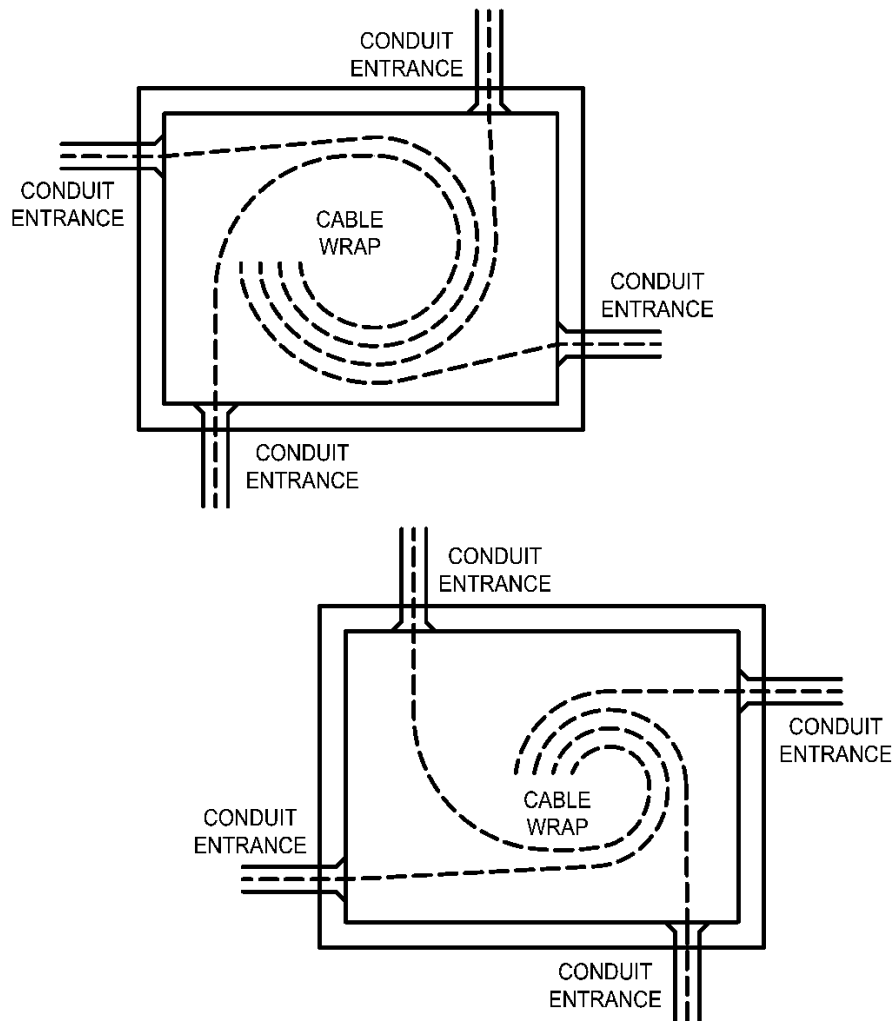
Conduits entering bottomless handholes shall be limited to 3 inches in diameter.

Table 4.2 Handhole Types and Allowed Conduits

| Handhole Type | Conduit Diameter Allowed (in) | | |
|---------------|-------------------------------|-----|-----|
| | 2 | 3 | 4 |
| 1 | Yes | Yes | No |
| 2 or 3030 | Yes | Yes | No |
| 3 | Yes | Yes | No |
| 5 | Yes | Yes | Yes |
| 6 | Yes | Yes | Yes |

^a 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 and have an H-30-rated lid.

In backfill, aggregate, and planted areas, handholes shall be installed with a 1-inch reveal 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.

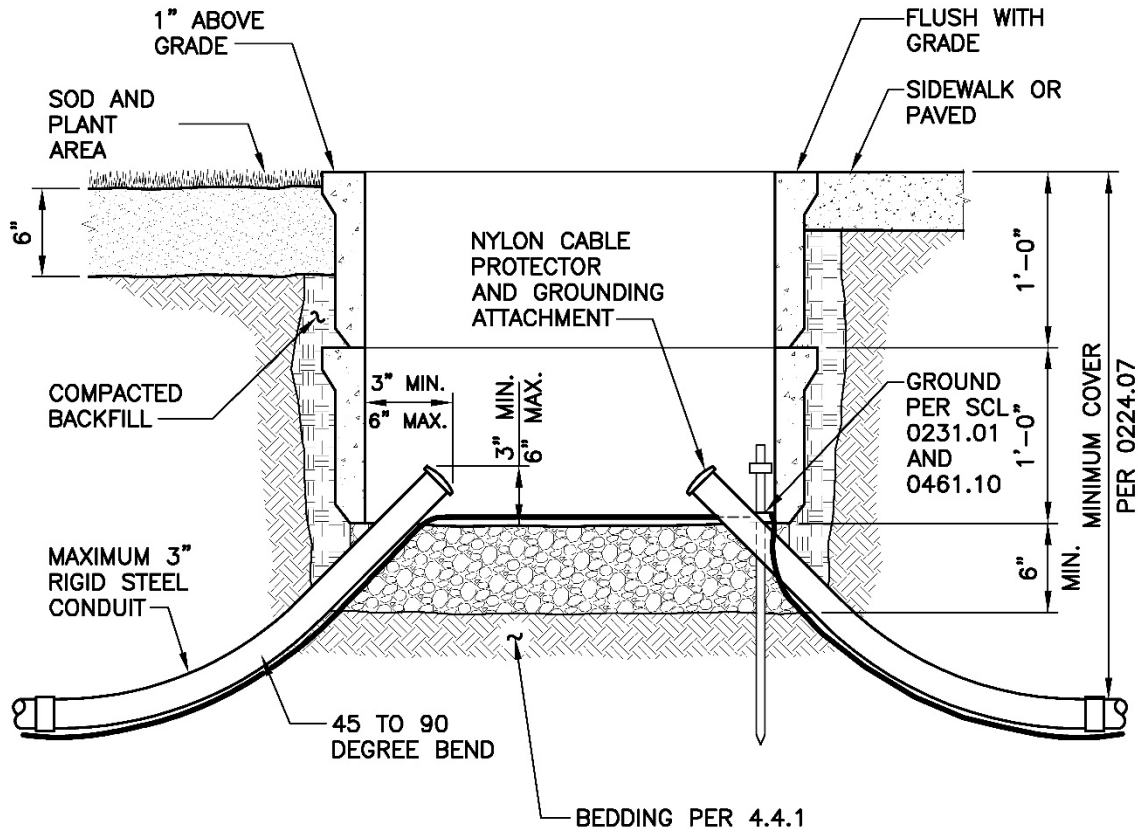
Handholes shall not be located in an area subject to heavy traffic.

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

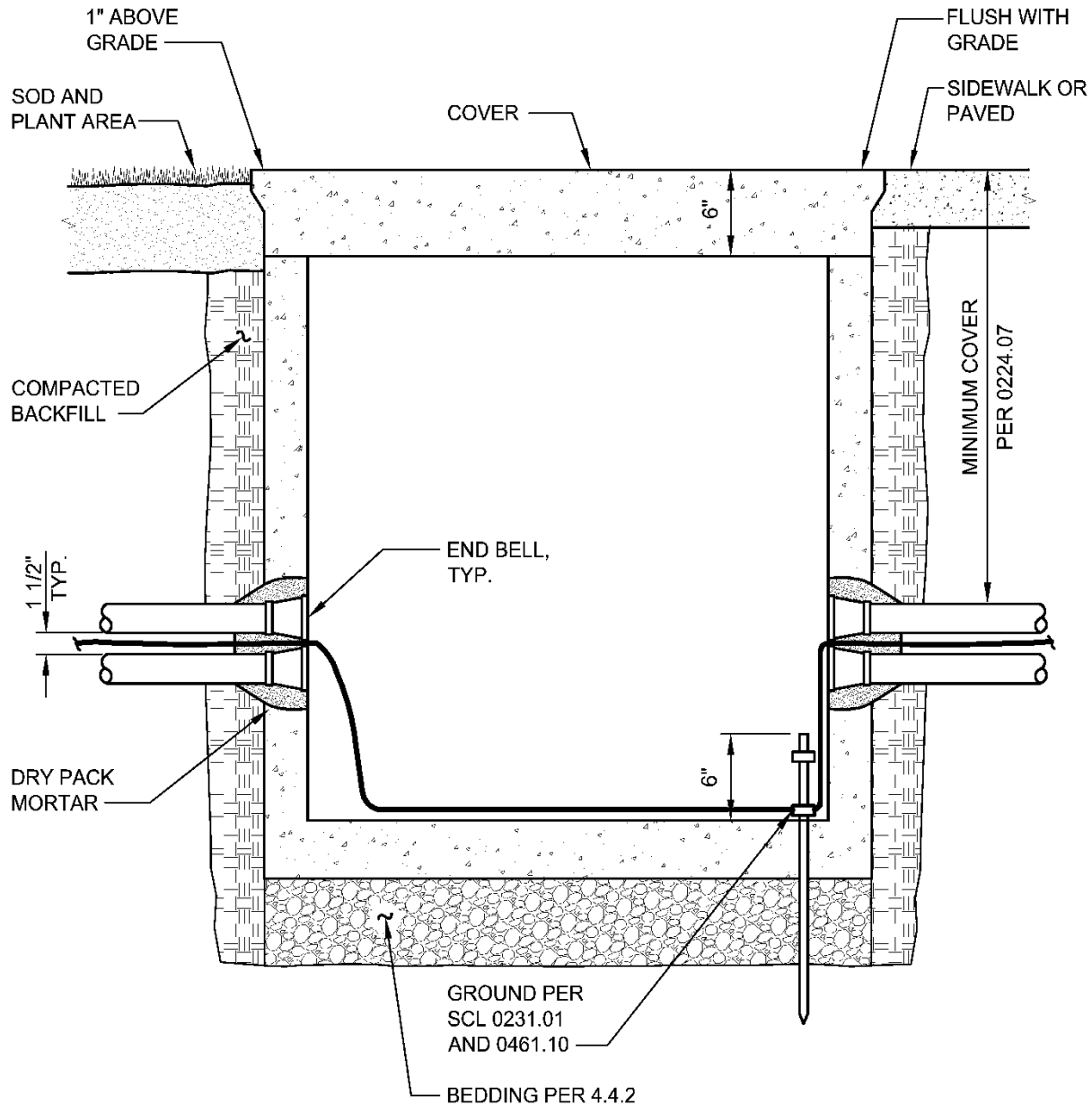


Note: Bends entering bottomless handholes shall be permitted to be standard (STD) radius.

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.
If minimum cover shown in Figure 4.3.2 exceeds what can be met with a single 12-inch riser, the next size larger handhole shall be installed.

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.

5. Material List

| Description | Stock No. |
|-----------------------------------|------------------|
| Handhole, without cover | |
| Type 2 precast | 012978 |
| Type 2 handhole stacking riser | 720402 |
| Fiberglass | 720393 |
| 233 | 013183 |
| 444 | 013093 |
| Conduit, entering handhole | |
| 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 |
| Steel conduit grounding | |
| 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 6773.5; "Connector, Pressure Tap, Copper"

SCL Material Standard 6773.61; "Connector, Thin-Wall, Pressure-Tap, Copper"

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

7. Sources

Chao, Yaochiem; SCL Standards Engineer and originator of 0231.01

Lu, Curtis; SCL Standards Engineer and subject matter expert for 0231.01

Perander, Eivind; SCL Engineer and subject matter expert for 0231.01

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"