APPENDIX D

UTILITY STANDARDS
<table>
<thead>
<tr>
<th>ITEM</th>
<th>ITEM DESCRIPTION</th>
<th>ESTIMATED QTY</th>
<th>BID UNIT</th>
<th>UNIT PRICE</th>
<th>TOTAL PRICE</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>TRENCH &amp; BACKFILL W/ SELECT BACKFILL</td>
<td></td>
<td>Feet</td>
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<td>2</td>
<td>FURNISH and INSTALL CONDUIT &amp; FITTINGS</td>
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<td>Feet</td>
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<tr>
<td>2a</td>
<td>5 inch SCH 40 PVC, gray (Power)</td>
<td>2160 Feet</td>
<td>Feet</td>
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<tr>
<td>2b</td>
<td>4 inch SCH 40 PVC, gray (Power)</td>
<td>2110 Feet</td>
<td>Feet</td>
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<tr>
<td>2c</td>
<td>2-1/2 inch SCH 40 PVC, gray (Power)</td>
<td>1440 Feet</td>
<td>Feet</td>
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<td>2d</td>
<td>1-1/4 inch ABS (sump drain)</td>
<td>30 Feet</td>
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<td>2e</td>
<td>4 inch SCH 40 PVC, green (Click! Network)</td>
<td>950 Feet</td>
<td>Feet</td>
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<tr>
<td>2f</td>
<td>2 inch SCH 40 PVC green (Click! Network)</td>
<td>4370 Feet</td>
<td>Feet</td>
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<td>3</td>
<td>FURNISH &amp; INSTALL TERMINAL POLE RISER ASSEMBLY</td>
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<td>3a</td>
<td>5 inch SCH 80 PVC, gray (Power)</td>
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<tr>
<td>3b</td>
<td>4 inch SCH 80 PVC gray (Power)</td>
<td>3 Each</td>
<td></td>
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<tr>
<td>3c</td>
<td>4 inch SCH 80 PVC gray (Click! Network)</td>
<td>5 Each</td>
<td></td>
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<td>4</td>
<td>FURNISH AND INSTALL CONCRETE STRUCTURES</td>
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</tr>
<tr>
<td>4a</td>
<td>444 Transformer Vault w/ Lid (use for all 1ph trans)</td>
<td>3 Each</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4b</td>
<td>554 Transformer Vault w/ Lid (use for all 3ph Trans)</td>
<td>2 Each</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4c</td>
<td>554 Junction Box w/ Lid</td>
<td>7 Each</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4d</td>
<td>684 Vault w/ Lid</td>
<td>1 Each</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4e</td>
<td>810 Vault &amp; Lid w/ switchgear cutout and man access</td>
<td>1 Each</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>CONCRETE STRUCTURE EXCAVATION &amp; BACKFILL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5b</td>
<td>444 Vault</td>
<td>3 Each</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5c</td>
<td>554 Vault</td>
<td>9 Each</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5d</td>
<td>684 Vault</td>
<td>1 Each</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5e</td>
<td>810 Vault</td>
<td>1 Each</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5f</td>
<td>264TA VAULT</td>
<td>3 Each</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5g</td>
<td>G2436-18 VAULT</td>
<td>12 Each</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>FURNISH AND INSTALL PLASTIC STRUCTURES</td>
<td></td>
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<td></td>
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<tr>
<td>6a</td>
<td>SSB 22-5/8” x 14-5/8” x 17” deep</td>
<td>3 Each</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>6b</td>
<td>L-SSB 33” x 20” x 17” deep</td>
<td>2 Each</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>6d</td>
<td>G2436-18 (vault) 27.25” x 38.75”</td>
<td>12 Each</td>
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<td></td>
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</table>

Engineering Estimate
12.00 ELECTRICAL DIVISION SPECIFICATIONS

12.01 Description of Work

The work to be performed under these specifications and contract consists of the installation of the civil portion of a complete underground electrical distribution and data system, which includes conduit, concrete vaults, plastic service boxes, pedestals, and pole risers as put forth in the Letter of Agreement between Tacoma Power and The City of Fife.

Each bidder is responsible for the inspection of the underground distribution system site prior to submitting his/her bid. See applicable drawing in project plan set.

Tacoma Power may make changes in plans, thereby reducing or increasing the proposed item quantities, the contract sum being adjusted accordingly. No allowance for anticipated profits will be paid to the contractor.

12.02 Location

The Project is located in the City of Fife, Pierce County, Washington. The Tacoma Power portion of this project is located along 34th Ave E from 12th St East to the south side of Hwy 99. In addition, the project will run along the north side of Hwy 99 starting at 34th Avenue East and continuing east approximately 600 feet, in the City of Fife, Pierce County, Washington.

12.03 Qualifications of Contractors

A qualified electrical contractor must be licensed in the State of Washington under Chapter 19.28, Revised Code of Washington (RCW). All work must be completed in accordance with the Tacoma Power Design, construction, and inspection standards.

12.04 Items to be furnished by the Contractor

The contractor shall furnish, provide and pay for all materials, including pre-cast concrete and plastic structures, conduit, conduit fittings, and conduit spacers. The contractor will also provide all labor, tools, equipment, transportation, and other facilities necessary for the execution and completion of the work in accordance with these specifications and as shown on the contract drawings.

12.05 Material Details

A. All components shall be delivered to the job site undamaged. Any component which is cracked or otherwise damaged so that the water tightness of the structure is impaired shall be replaced at “no cost” to Tacoma Power.

B. All concrete structures shall be supplied per Tacoma Power Construction Standard A-UG-1150 by an approved vendor as listed in Construction Standard C-UG-2000.

C. All junction boxes and vaults shall have to logo “TACOMA POWER” engraved on a plate permanently affixed or the logo cast into the concrete/fiberglass structure. The proposed logo is subject to approval by Tacoma Power as to
legibility (now and after twenty years exposure) and visibility/placement (i.e., is easily notice by a layperson casually inspecting the structure). Lids, access components, rises, frames, covers, vault sump drainage pipe and all other appurtenances shall be considered part of the vault structure.

D. Covers installed on the cutout openings located within the transformer vaults lids, must be a minimum of ¾” plywood, and secured prior to installation of the transformers by Tacoma Power crews.

E. All SPH 1432 pedestals shall be dark green in color.

F. All conduits shall have spacers that provide a minimum 2” clearance between each conduit. The minimum radius of elbows used in all conduit installations shall be 24” FOR 2 ½” conduit, 36” for 4” conduit, and a 48” radius for 5” conduit as specified in Std Dwg. C-UG-1100.

G. PVC Schedule 40 conduit supplied shall conform to ANSI/ASTM F512-77 or latest revision.

H. All new pre-cast concrete structures shall be internally grounded per Tacoma Power Standard A-UG-1150.

12.06 Construction Description - Vaults

The provisions of this section cover the installation of pre-cast concrete or plastic electrical and communication structures. This work includes excavation of all materials of whatever nature, shoring as necessary, pumping and controlling groundwater and surface water run-off, and the placement and compaction of all necessary backfill to final ground elevation.

The contractor shall be required to perform or provide the following specific items:

12.07 Excavation & Disposal of Materials

Excavate, backfill, compact (as required by the City of Fife) and restore landscape as needed for the trench line and electrical structure installation. The City of Fife may require mechanical tamping at some installations of pre-cast concrete electrical structures.

Excess material obtained from structure and/or trench excavation shall be removed from the construction area and disposed of by the contractor.

12.08 Installation Details

A. The contractor shall furnish and place all pre-cast concrete electrical and communication structures, as shown on the plans and detailed in Tacoma Power Construction Standard C-UG-1100.

B. Contractor shall install pedestals and services boxes supplied by Tacoma Power Data as shown on the contract drawing.

C. The contractor shall construct pads for the pre-cast concrete structures at the locations indicated on the drawings. The pads shall be constructed of 5/8” minus crushed rock compacted to a depth of nine (9) inches on undisturbed
soil, per C-UG-1500 and C-UG-1700. If the pad site has been over excavated, the excess depth shall be backfilled with compacted gravel.

D. Care shall be taken to place backfill around and under the ribs of the structures. Large rocks or other obstructions in the bottom of the excavation, which may cause damage to the structures, shall be removed.

E. Dewatering of the excavation area shall be done by the Contractor as necessary to allow the structure to be placed on firm, unyielding material.

F. All precast 810 concrete vaults shall include a 1 ¼” sump drain and pipe plumbed to a storm water catch basin as shown on the plans. The vault sump shall be core drilled to receive the drain pipe. PVC grey Schedule 40 Conduit shall be installed between the sump drain and the storm water catch basin as shown in the plans.

G. Core drilling and all other work necessary to install the vault drain pipes will be considered incidental to and included in the unit price for the conduit item used.

H. Transformer structures shall be set one (1) inch above surrounding finished grade with ground sloped away from the structure for drainage. The lid will set above final grade. Junction Boxes, Secondary Service Boxes (SSB’s) and vault structures will be set so the top of the lid is at finished grade.

I. All electrical conduits and ells (except pole risers) shall be installed in accordance with the contract drawings to provide the minimum cover shown. All conduits entering a vault shall extend 4” into the vault and do so at 90 degrees to the face of the vault. All conduits shall have bell ends installed and be grouted.

J. The contractor shall install the first 10ft section of each pole riser per C-UG-1200.

K. The contractor shall extend and cap all conduits a minimum of 2 feet beyond the concrete sidewalk where shown on the plans.

L. All spacers/saddles shall be Carlon or an approved equal.

M. The larger diameter conduit will be installed at the bottom of the trench with smaller diameter conduits installed above, using s saddles or conduit spacers to separate and hold the conduit in place.

12.09 **Trench Excavation and/or Backfill**

A. It is the intent that the primary electrical and communication conduit be placed in a common trench. The minimum trench width shall be 24 inches (as shown on the contract drawings), and not wider than practicable for installation of the cable and conduit. Trench depths shall be such as to provide the minimum cover from the top of the conduit to the final grade as shown on the contract drawings.
B. The depth of the trench may vary due to other utility crossing (i.e. Storm, water sanitary sewer etc.). The contractor shall coordinate work with other utilities to avoid conflict and at no expense to Tacoma Power.

C. The bottom of all trenches shall be smooth, uniform, free of all loose rock, stone, other sharp objects, and foreign material. Hand fill where large rocks are encountered and as directed by the engineer.

D. Imported backfill material shall be required for the trench so as to protect the conduit system before and after the final grade fill has been installed. Backfill material shall be Flowable Thermal Backfill (FTB) from the bottom of trench to a maximum cover of 3 inches above the top of the uppermost conduit. The remainder of the backfill material and compaction requirements shall meet the requirements of the City of Fife Public Works Engineer. Non-Traffic Mix FTB shall be formulated per Tacoma Power Standard C-UG-2050 and installed per Tacoma Power Construction Standard C-UG-1100.

12.10 **Coordination with other Utility Companies**

Other Utility Companies may wish to occupy the trench in some areas. It shall be the contractor’s responsibility to notify those companies sufficiently in advance of construction to allow them to schedule their installation activities to coincide with those of the contractor.

12.11 **Coordination with Tacoma Power**

It is shall be the contractor’s responsibility to maintain communication with Tacoma’s inspector to coordinate construction of the underground electrical system. The contractor will be required to schedule the work accordingly and shall keep Tacoma Power’s engineer informed of such schedules.

12.12 **Specifications and Drawings**

The contractor shall keep on the work site a copy of the drawings and the specifications and shall at all times give the engineer access thereto.

12.13 **Quantities and Unit Prices**

The quantities for which unit prices are indicated in the Proposal Sheets were calculated from Drawings supplied by Berger ABAM, (Engineering Consulting firm for the City of Fife, Public Works). Tacoma Power expressly reserves the right to increase or decrease those quantities during construction and to make reasonable changes in design without being responsible to the contractor in any way for extra costs, or loss, or for anticipated profits.

12.14 **Typical Contract Drawings**

Prior to beginning work, Tacoma Power will prepare and issue to the Contractor sufficient full-size drawings for construction at no cost.

The following list of standard drawings is made a part of these specifications. Copies of the standard drawings and full-size contract drawings are available at the Transmission & Distribution Construction Engineering Office at the Public Utilities Building, 3628 South 35th Street, or by writing to Margie Villanueva, P. O.
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<th>Sheet No.</th>
<th>Title</th>
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<td>Precast Concrete Vault Application &amp; Specification</td>
</tr>
<tr>
<td>C-SV-1200</td>
<td>1 thru 3</td>
<td>Residential Underground Service Boxes</td>
</tr>
<tr>
<td>C-SV-3200</td>
<td>1 thru 11</td>
<td>Customer Requirements – Commercial Underground Secondary Service; (reference for use of SSB only)</td>
</tr>
<tr>
<td>C-UG-1100</td>
<td>1 thru 9</td>
<td>Conduit and Vault Installations</td>
</tr>
<tr>
<td>C-UG-1200</td>
<td>1 thru 4</td>
<td>Pole Conduit Riser</td>
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<td>C-UG-1400</td>
<td>1 thru 11</td>
<td>Padmount Equipment Guard Posts Installation</td>
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<td>C-UG-1500</td>
<td>1 thru 5</td>
<td>Primary Distribution Junction Box</td>
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<td>C-UG-1700</td>
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<tr>
<td>C-UG-2000</td>
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<td>Precast Concrete Vault Approved Vendors</td>
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<td>C-UG-2050</td>
<td>1 thru 4</td>
<td>Thermal Backfill for UG Power Cable Installation</td>
</tr>
<tr>
<td>C-UG-8000</td>
<td>1 thru 2</td>
<td>Vegetation Management for Underground Systems</td>
</tr>
</tbody>
</table>

12.15 **Persons to be contacted**

The following is a list of persons who may need to be contacted prior to or during progress of the work.

**Tacoma Power:**

- **Mike Cassidy**  
  T & D Supervisor  
  253-502-8232

- **Steve Bain**  
  Utility Inspector  
  253-381-3023

- **Margie Villanueva**  
  Power Engineer III  
  253-502-8371

- **Ken Mathis**  
  Power Supervisor  
  253-502-8851

12.16 **Inspection**

A. **CONSTRUCTION INSPECTION**

An Inspector assigned by Tacoma Power will perform construction inspection and conduit proofing for Tacoma Power. The Inspector will be responsible for
insuring that the contractor is complying with the contract plans and specifications.

B. CONSTRUCTION INSPECTION CHECKLIST

The contractor shall be required to contact the City 24-hours in advance, weekends and holidays excluded, of all of the construction activities listed below, have the indicated activity inspected, and Tacoma Power's Inspector sign that the work was performed in accordance with the appropriate Construction Standards.

The checklist shall be posted near the construction site and be available for review by Tacoma Power at all times. These inspections shall be in addition to any required inspections by state or local jurisdictions.

1. One-call contact

2. Layout of structures and conduit

3. Structure installation prior to backfill
   a. Safe and legal excavation
   b. Escape ladder (if applicable)
   c. Level floor
   d. Correct grade and alignment

4. Conduit installation prior to backfill or encasement
   a. Correct number, size and spacing of conduit
   b. Perpendicular to structures at entry location

5. Conduit proofing
   a. Cleaned with rags
   b. Proper mandrel passes every duct
   c. Tru-tape installed

6. Riser and lid installation (if applicable)

7. Final

12.17 Electrical Conduit and Duct Lines

All proofing shall be accomplished after final grade is established.

The contractor will proof all conduits using a Tacoma Power approved mandrel, with an authorized Tacoma Power Inspector present. The conduits are to be swabbed and fished by the contractor upon completion of the installation. The contractor shall leave a 1/8-inch diameter polypropylene fish cord in each conduit.
12.18 **Work to be performed by Tacoma Power & Tacoma Power Data**

A. All primary cable will be installed by Tacoma Power. All secondary cable between the transformer and the Secondary Service Box will be installed by Tacoma Power.

B. Tacoma Power will furnish and install the switchgear, transformers, primary and secondary voltage cable, and the primary and secondary voltage electrical components.

C. Tacoma Power will frame all terminal poles and complete the pole risers.

D. Tacoma Power will make all terminations at the switchgears, transformers, junction boxes, and secondary service boxes.

E. Tacoma Power Data will install all communication cable, make terminations, splices, and complete terminate pole risers.

F. Tacoma Power will remove all of its solely owned overhead electrical facilities after the underground system is complete and electrically energized. Tacoma Power will remove the overhead conductors and cut off the top of the pole just above the highest attached communication cable. If no communication cables are left attached to the pole at the time of conductor removal, Tacoma Power will also remove the pole butt. If the pole was jointly owned, the non-Tacoma Power owner (Century Link at this time) will remove the pole butt. Tacoma Power will not be responsible for any construction delays associated with the pole removal process that are not directly within Tacoma Power’s control.
Application

This standard establishes the attachment requirements to utility pole structures owned and operated by Tacoma Power and communication facilities owned and operated by others. This standard does not apply to antennas or other radio frequency (RF) emitting communication devices.

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<td>11</td>
</tr>
<tr>
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<td>11</td>
</tr>
<tr>
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<td>12</td>
</tr>
</tbody>
</table>
Terms

The following are definitions of terms used in this standard (see Figure 1):

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint Utility</td>
<td>For the purposes of this standard, any entity (utility, public agency, telecom company, or other) other than the electrical supply utility that is attached to the structure.</td>
</tr>
<tr>
<td>Communication Space</td>
<td>The space on joint-use structures where communication facilities are separated from the supply space by the communication worker safety zone. This space is below the communication worker safety zone.</td>
</tr>
<tr>
<td>Communication Worker Safety Zone</td>
<td>That space as defined in National Electric Safety Code (NESC) Rule 235C4. This zone generally originates at the lowest point of the supply space. This space is intended to maintain a physical separation between supply and communication facilities. The minimum dimensions of this space shall at no time be violated.</td>
</tr>
<tr>
<td>Supply Space</td>
<td>The space on joint-use structures where supply facilities are separated from the communication space by the communication worker safety zone. This space is above the communication worker safety zone.</td>
</tr>
<tr>
<td>Distribution</td>
<td>Tacoma Power supply voltages of 7.2 kV to 15 kV.</td>
</tr>
<tr>
<td>Secondary</td>
<td>Tacoma Power supply voltages of 600 V or less.</td>
</tr>
<tr>
<td>Supply Neutral</td>
<td>Multi-grounded conductor for the supply system.</td>
</tr>
</tbody>
</table>

Attachment Requirements

Agreements, Permits and Codes

- Prior to attaching equipment to poles owned by Tacoma Power, a pole attachment agreement must be signed by all parties involved and the related pole attachment permit approved. Please contact Tacoma Power Business and Financial Mgmt Dept at pwrjointutilities@cityoftacoma.org.
- All attachments must meet the requirements for clearance and strength as specified by standard C-OH-9000 “Customer Requirements, Clearance Requirements for Overhead Joint Utility Construction” and the NESC, along with statutory, code, and other regulatory requirements established by the State of Washington, Pierce County, and local governments including the City of Tacoma.
- Attachments within the city limits of Tacoma must comply with the requirements of City of Tacoma Municipal Code, Title 16 and City of Tacoma franchise agreement.
Attachment Requirements (continued)

Figure 1  Illustration of Space Allocation on Pole

Supply Space

Supply neutral

Communication Worker Safety Zone

Communication Space

Telecom cables and messengers to attach to same side of pole as the supply neutral
Attachment Requirements (continued)

On poles owned by Tacoma Power and those co-owned with Century Link Communications (formerly known as: Qwest), the order of telecom cable attachments will be as follows (see Figure 2):

- Top attachment shall be Tacoma Power HFC / Click!
- Below Click! – Tacoma Fire
- Middle attachments other attachees
- Lowest attachment shall be Century Link (if present)

Figure 2

Cable Attachments on Pole in Communication Space

- Unless specifically designated by Tacoma Power, all poles shall be climbable to the requirements of the NESC.
Attachment Requirements (continued)

Requirements for joint utilities’ cables, messengers, guys and anchors.

<table>
<thead>
<tr>
<th>For...</th>
<th>Do This...</th>
</tr>
</thead>
</table>
| Cables and Messengers | - Attach to the same side of the pole as the supply neutral (see Figure 1).  
- If the supply neutral is on a crossarm, then the telecom cables shall be installed on the road side of the pole.  
- Telecom attachments shall maintain 12 in. minimum vertical separation from each other according to the NESC (see Figure 2). |
| Cables, Messengers, Guys and Anchors | Tension and/or guy the cable and/or messenger so that:  
- the angle of the existing structures is not altered.  
- pole buckling does not occur.  
- the sag characteristics of the supply conductors and existing telecom conductors are not altered.  
Also:  
- Install anchors no closer than 6 ft. to another anchor.  
- Attachment to existing Tacoma Power anchors will require prior approval by Tacoma Power. |

Risers

Telecom conduit risers shall follow the requirements below (see Figures 5 & 6):

- Risers shall be installed on standoff brackets. Standoff brackets shall be:
  - no lower than 8 ft. from the ground or other accessible surface.
  - mounted within 6 in. of the top end of any stick of conduit.
  - evenly spaced along the pole and no more than 10 ft. apart.
- If standoff brackets are already installed on the pole, the new riser(s) shall be attached to these standoffs.
- Spacing between the pole and conduit riser shall be a minimum of 4 in.
- Risers should be located on the field side of the pole and the pole quadrant most protected from traffic.
- The entire length of conduit riser should parallel the structure or pole, regardless of taper of the pole.
- The conduit can be extended to but no closer than 40 in. of the supply space.
- The total quantity of conduits on a pole for all the utilities shall not be more than 6 (six).
Attachment Requirements (continued)

Tagging  Telecom companies are required to install a tag on their cables at each pole. This benefits crews during pole replacements, repairs, and emergency service providers during emergencies. Tacoma Power has assigned identification codes to the organizations (identical to Seattle City Light, when applicable) as listed below.

<table>
<thead>
<tr>
<th>Code</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>Click!/U.P. School District</td>
</tr>
<tr>
<td>002</td>
<td>Tacoma Fire</td>
</tr>
<tr>
<td>003</td>
<td>Tacoma Traffic Signal</td>
</tr>
<tr>
<td>004</td>
<td>Comcast</td>
</tr>
<tr>
<td>005</td>
<td>Qwest/CenturyLink</td>
</tr>
<tr>
<td>006</td>
<td>Rainier Group</td>
</tr>
<tr>
<td>007</td>
<td>Port of Tacoma</td>
</tr>
<tr>
<td>008</td>
<td></td>
</tr>
<tr>
<td>009</td>
<td></td>
</tr>
<tr>
<td>010</td>
<td>Bethel School District</td>
</tr>
<tr>
<td>011</td>
<td>Pierce County</td>
</tr>
<tr>
<td>012</td>
<td>City of Lakewood</td>
</tr>
<tr>
<td>013</td>
<td>City of University Place</td>
</tr>
<tr>
<td>014</td>
<td>Electric Light Wave/Integra</td>
</tr>
<tr>
<td>015</td>
<td>Sprint</td>
</tr>
<tr>
<td>016</td>
<td>360 Networks/ZAYO</td>
</tr>
<tr>
<td>017</td>
<td>Tacoma Water</td>
</tr>
<tr>
<td>018</td>
<td>University of Washington</td>
</tr>
<tr>
<td>019</td>
<td>City of Fircrest</td>
</tr>
<tr>
<td>020</td>
<td>City of Fife</td>
</tr>
<tr>
<td>021</td>
<td>City of Tacoma Communications</td>
</tr>
<tr>
<td>022</td>
<td></td>
</tr>
<tr>
<td>023</td>
<td>Unite Private Networks</td>
</tr>
<tr>
<td>024</td>
<td>Cellnet</td>
</tr>
<tr>
<td>025</td>
<td>FatBeam</td>
</tr>
<tr>
<td>026</td>
<td>AT&amp;T</td>
</tr>
<tr>
<td>027</td>
<td>Astound/Wave Broadband</td>
</tr>
<tr>
<td>028</td>
<td>MCImetro</td>
</tr>
<tr>
<td>CPSD</td>
<td>Clover Park School District</td>
</tr>
<tr>
<td>CUST</td>
<td>Customer Owned</td>
</tr>
<tr>
<td>ELM</td>
<td>Elmhurst</td>
</tr>
<tr>
<td>EMAN</td>
<td>Franklin Pierce School District</td>
</tr>
<tr>
<td>PARK</td>
<td>Parkland</td>
</tr>
<tr>
<td>PSE</td>
<td>Puget Sound Energy</td>
</tr>
<tr>
<td>PW</td>
<td>Public Works</td>
</tr>
<tr>
<td>RUST</td>
<td>Town of Ruston</td>
</tr>
<tr>
<td>UNK</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Tag Specifications  Cable Identification tags shall be:

- Black on yellow (black numbering on yellow background).
- Minimum 2 in. x 3 in. size tags with numbers minimum 1 in. height.
- Non-conductive, UV resistant polyethylene.
Attachment Requirements (continued)

Pole Drilling

To maintain structural integrity of the pole, holes drilled into poles shall follow the table below (see Figure 3).

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holes on same side of pole</td>
<td>Holes on same side of pole shall be no closer than 6 in.</td>
</tr>
<tr>
<td>Holes perpendicular to each other</td>
<td>Holes that are perpendicular shall be no closer than 3 in.</td>
</tr>
<tr>
<td>Hole Treatment</td>
<td>• Douglas Fir Poles: Treat holes with Tacoma Power’s current approved preservative.</td>
</tr>
<tr>
<td></td>
<td>• Cedar Poles: Do not require treatment.</td>
</tr>
</tbody>
</table>

Figure 3  Pole Drilling

Pole drilling clearances are for structural integrity purposes only. Vertical clearances between telecommunications shall be maintained per the NESC (see Figure 2)

Enclosure Mounting

Site Selection

Pole locations selected for enclosure attachment shall be forwarded to the Tacoma Power New Services Engineering Office for review. Pole attachments are approved on a pole-by-pole basis and Tacoma Power reserves the right to deny attachment to any pole.

Selection Criteria for Enclosures on Pole

Enclosures should be mounted on clean tangent poles when possible.

Enclosures should not be mounted on poles that are in the following conditions:

- Deadend or double deadend corner poles with or without anchors
- Poles that have supply buck leads (distribution lines extending in three directions)
- Poles with switch handles that extend below the communication space
- Poles that have existing equipment boxes such as:
  - control boxes for Tacoma Power equipment
  - other power supply, battery, etc.
Enclosure Mounting  (continued)

**Location of Enclosures on Pole**

Enclosure mounting shall follow requirements listed below (see Figures 4 & 5):
- Mount under the transformer or other pole device.
- If transformer or other pole device does not exist, then mount enclosure in line with the OH distribution conductors and under the distribution crossarm. In the absence of a crossarm, mount enclosure under the distribution conductor and on the gain or pole tag side of the pole.
- No closer than 4 in. from the surface of the pole.
- Any power supply cable should be greater than 8 ft. from the ground.
- Enclosures mounted on poles with underground risers must allow at least a minimum quarter of a pole for climbing space.

**Ground Mounted Equipment**

- Subsurface handholes and ground mounted pedestals should be:
  - located on the road or field side of the pole or grouped with any existing handholes/pedestals.
  - be a minimum 4 ft (6 ft to 10 ft preferred) from base of pole (see standard A-OH-4007 “Clearances for Poles”)
- Do not install handholes/pedestals or underground conduit in the pole line where it would conflict with the future replacement of the pole.
- When the equipment must be placed in line with the pole, it should be located on the transformer, distribution crossarm, or other power equipment side of the pole.

**Location and Attachment of Service Riser**

Enclosures that require electrical service from Tacoma Power shall install electrical service risers as follows (see Figures 4 & 5):
- Follow all “Risers” requirements on page 5 of this standard.
- Service riser conduit shall be no smaller than 1-1/4 in. sch. 40 PVC and the first 10 ft. of conduit shall be PVC sch. 80.
- Conduit shall be continuous into enclosure.
- The additional conduit, weatherhead, conductor, and standoff brackets required to extend into the supply space shall be supplied on the pole for Tacoma Power to complete. Confirm with Tacoma Power T&D Construction Office.

**Electrical Inspection**

Electrical service for enclosures shall be inspected and approved by the Tacoma Power Electrical Inspection Office prior to energization.
Enclosure Mounting (continued)

Figure 4  Attachment Requirements for Enclosures and Risers

Labeling

Enclosures shall be labeled as follows:

- Clearly labeled with reflective, weather and UV resistant sign or decal on the road side surface of the enclosure.
- Label shall have the following information:
  - Name of owner
  - Reference, site or equipment ID number
  - 24 hr phone number to responsible person that will respond to emergencies in a timely manner

**NOTE:** Reference numbers along with the physical address of each enclosure installation must be included with the application for electrical service.
Enclosure Mounting (continued)

Figure 5  Pole Mounting of a Telecom Enclosure by Non-Qualified Electrical Workers

This segment of electrical service riser to be completed by Tacoma Power

Riser construction is limited to within 40” of the lowest supply space equipment

Telecom enclosure on same quarter of pole and under transformer or other pole device

Service conduit must be continuous into telecom enclosure

Communication Lines

40” min
Grounding Requirements

Metallic Messenger Bonding

Metallic and/or conductive messengers shall be bonded to the pole grounds as listed below:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of bonding points</td>
<td>The messengers shall be bonded per the requirements of the NESC to the pole ground.</td>
</tr>
<tr>
<td>Who makes the bonding connection?</td>
<td>The attaching utility shall make and maintain all bonding connections for their messengers and equipment.</td>
</tr>
<tr>
<td>Who supplies the pole ground?</td>
<td>Tacoma Power installs and maintains all pole grounds.</td>
</tr>
</tbody>
</table>

Nonmetallic Messengers

Bonding requirements of messengers are governed by the NESC. If the messenger meets the requirements of the NESC as nonconductive (Kevlar-type), bonding is not required.

Figure 6  Grounding of Telecom Conductors at Supports
Grounding Requirements (continued)

- All enclosures shall be bonded to existing pole grounds.
- Enclosures requiring electrical service (amplifiers, power supplies) shall be grounded per National Electric Code (NEC) (see Figure 7).

Figure 7  Grounding of Enclosures

---

Enclosure Grounding:

- Pole grounding conductor
- Enclosure bond to pole grounding conductor
- Enclosure grounding conductor per NESC
- 8 ft. Ground Rods 5/8" min
- Top of ground rod and grounding conductor recommended to be 6 in. below surface
- 1 ft. min
- 6 ft. min
Application

This standard describes the requirements for underground residential services up to 200A. For residential services greater than 200A, the customer should contact the New Services Engineering Office for further information.

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<tr>
<td>Responsibilities &amp; Inspections</td>
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</tr>
<tr>
<td>Underground Service to SSB</td>
<td>2</td>
</tr>
</tbody>
</table>

Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Inspector</td>
<td>Tacoma Power electrical inspection staff that inspect for compliance to the Tacoma Power standards, Tacoma Electrical Code, NEC, WAC and Electric Service Handbook requirements.</td>
</tr>
<tr>
<td>Electrical Secondary</td>
<td>Conduit and cables (less than 600 volts) that connect from the transformer to the SSB.</td>
</tr>
<tr>
<td>Electrical Service</td>
<td>Conduit and cables from the SSB to the meter base.</td>
</tr>
<tr>
<td>New Services Engineering Office</td>
<td>Tacoma Power engineering staff that provide design, cost estimates, and coordination of the residential underground secondary service project.</td>
</tr>
<tr>
<td>Secondary Service Box (SSB)</td>
<td>A plastic vault designed to contain the point of connection for the electrical service which connects the electrical secondary cables to the electrical service cables.</td>
</tr>
</tbody>
</table>

Responsibilities & Inspections

<table>
<thead>
<tr>
<th>Construction Area</th>
<th>Responsibility</th>
<th>Inspection by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of SSB</td>
<td>The New Services Engineering Office will work with the customer or their electrical contractor to determine the location of the SSB on the customer’s property.</td>
<td>New Services Engineering Office</td>
</tr>
<tr>
<td>Installation of SSB</td>
<td>The New Services Engineering Office will work with the customer or their electrical contractor to determine the installation of the SSB on the customer’s property.</td>
<td>New Services Engineering Office</td>
</tr>
<tr>
<td>Electrical Service</td>
<td>The customer or their electrical contractor will install the electrical service.</td>
<td>Electrical Inspector</td>
</tr>
<tr>
<td>Electrical Secondary</td>
<td><strong>Tacoma Power T&amp;D Construction Staff</strong></td>
<td>Not needed</td>
</tr>
</tbody>
</table>
## Underground Service to SSB

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| 1    | Establish location and final grade for the SSB.  
  - The SSB is usually found or placed at the property lot corner. If not, contact the **New Services Engineering Office**.  
  - SSB’s shall not be located in driveways or other areas subject to vehicular loading.  
  - SSB’s shall not be placed in a depression or in low areas that would tend to fill with water or silt.  
  - Ensure there are no rocks between SSB base and cover to avoid damage to the cover.  
  - The top of the SSB cover shall be 2 inches above final grade. |
| 2    | Dig trench from the meter base to the nearest side or end of the SSB.  
  - The trench shall be deep enough:  
    - at the SSB so the conduit elbow can be terminated vertically within the SSB.  
    - to maintain a minimum of **24 inches** of cover over the conduit.  
  - The trench should be dug as straight as possible and the trench bed leveled and free of rocks larger than 2 inches in diameter.  
  Note: Permanent structures are never to be constructed or moved on top of buried Tacoma Power conduit or cable. |
| 3    | Install conduit for electrical service.  
  - Conduit shall be 2.5” Sch. 40 gray PVC.  
  - Excavate beneath the SSB and insert the 90° conduit elbows.  
  - **All conduit must be at the same end of the SSB and grouped closely together (property side of the SSB preferred).**  
  - Conduit ends shall extend vertically 2 inches above the bottom of the SSB.  
  - Identify conduit ends with customer house address.  
  - Install bell ends on the conduit ends. Do not glue bell ends inside SSB.  
  - If the elevation of the SSB requires adjustment, contact **New Services Engineering Office** for assistance. |
| 4    | The electrical service conduit in the trench must be inspected and approved by the **Electrical Inspector (BEFORE Backfill).** |
| 5    | Backfill the trench.  
  - Use available clean material.  
  - Pieces of scrap cable and other construction items must not be buried in the trench.  
  - Large rocks must be removed and if native soil is rock, sand bedding may be required.  
  - Tamp the soil, leaving a slight mound to allow for settling. |
| 6    | Pull in electrical service cables from the meter base to the SSB.  
  - Leave 4 feet minimum of cable, measured from the top of the SSB, left inside the SSB.  
  - Ensure any parallel cables have matching phase tapes.  
  - Identify cables with customer house address. |
| 7    | Ensure the following has been done:  
  - All applicable fees are paid.  
  - All inspections have been passed. |
| 8    | **Tacoma Power T&D Construction Staff** will:  
  - install the SSB as necessary.  
  - pull in electrical secondary cables from the transformer to the SSB.  
  - energize the service. |
Customer Requirements
Residential Underground
Service Boxes

May 16, 2016

C-SV-1200

Figure 1  Typical Installation of SSB

Figure 2  Residential SSB Dimensions and Part #’s

Large SSB
- Base
  - PenCell Part# PE-30GS
  - Tacoma Power MID# 37920
- Cover
  - PenCell Part# PE-30PLX-TAC
  - Tacoma Power MID# 37921

Small SSB
A small SSB is available ONLY when maximum 2 conduits of 2.5” size enter the SSB.
- Base
  - PenCell Part# PE-20GS-2X
  - Tacoma Power MID# 19118
- Cover
  - PenCell Part# PE-20PL-2X-TAC
  - Tacoma Power MID# 19437
Application

Installation requirements for commercial services from Tacoma Power overhead or underground facilities. It applies to new construction or upgrades of older services. Electrical service may be provided in the following three methods:

I. Overhead Service
II. Underground Service from Padmount Transformer
III. Underground Service from Polemount Transformer (UGP)

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<tr>
<td>III – Underground Service from Polemount Transformer (UGP)</td>
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</tr>
<tr>
<td>Limitations</td>
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<td>Selection of SSB</td>
<td>5</td>
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<td>6-7</td>
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<tr>
<td>Installation of SSB (Precast Concrete Vault)</td>
<td>8-11</td>
</tr>
<tr>
<td>Conduit Entry</td>
<td>11</td>
</tr>
</tbody>
</table>

Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Inspector</td>
<td>Representative from Tacoma Power T&amp;D Construction Staff. A pre-construction meeting with the Construction Inspector must happen prior to any construction. Call 253-381-3023.</td>
</tr>
<tr>
<td>Electrical Inspector</td>
<td>Tacoma Power electrical inspection staff that inspect for compliance to the Tacoma Power standards, Tacoma Electrical Code, NEC, WAC and Electric Service Handbook requirements.</td>
</tr>
<tr>
<td>Electrical Secondary</td>
<td>Conduit and cables (less than 600 volts) that connect from the transformer to the SSB. Utility owned.</td>
</tr>
<tr>
<td>Electrical Service</td>
<td>Conduit and cables from the transformer to the service entrance or from the SSB to the service entrance. Customer owned.</td>
</tr>
<tr>
<td>New Services Engineer</td>
<td>Tacoma Power engineering staff that provide design, cost estimates, and coordination of the commercial secondary service project.</td>
</tr>
<tr>
<td>Secondary Service Box (SSB)</td>
<td>A plastic or concrete vault designed to contain the point of connection for the electrical service which connects the electrical secondary cables to the electrical service cables.</td>
</tr>
</tbody>
</table>
## Responsibilities and Inspections

<table>
<thead>
<tr>
<th>Construction Area</th>
<th>Responsibility</th>
<th>Inspection by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of SSB</td>
<td>The <strong>New Services Engineer</strong> will work with the <strong>customer's electrical contractor</strong> to determine the location of the SSB on the customer's property.</td>
<td>Construction Inspector</td>
</tr>
<tr>
<td>Installation of SSB</td>
<td>The <strong>customer's electrical contractor</strong> will install the SSB per this standard under the direction of the <strong>New Services Engineer</strong>.</td>
<td>Construction Inspector</td>
</tr>
<tr>
<td>Work in Road Right-of-Way</td>
<td>The <strong>customer's electrical contractor</strong> will be responsible for installing conduit in the road right-of-way per the requirements of the permitting agency. Permits to cut and restore the road and any other work in the road right-of-way must be obtained before work in the right-of-way can begin. A copy of the approved permit must be on site while the road work is being done.</td>
<td>Construction Inspector</td>
</tr>
<tr>
<td>Installation of Electrical Secondary Conduit and Pole Conduit Riser</td>
<td>The <strong>customer's electrical contractor</strong> will install conduit from the SSB to the pole and a portion of the conduit riser on the pole according to Customer Requirements Standard C-UG-1200, “Pole Conduit Riser”.</td>
<td>Construction Inspector</td>
</tr>
<tr>
<td>Completion of the Pole Conduit Riser</td>
<td><strong>Tacoma Power T&amp;D Construction Staff</strong></td>
<td>Not needed</td>
</tr>
<tr>
<td>Electrical Secondary Cables &amp; Connections</td>
<td><strong>Tacoma Power T&amp;D Construction Staff</strong> will:</td>
<td>Not needed</td>
</tr>
<tr>
<td></td>
<td>• install the electrical secondary cables from the pole to the SSB or from the padmount transformer to the SSB, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• make all connections at the SSB, at the pole and/or at the padmount transformer.</td>
<td></td>
</tr>
<tr>
<td>Electrical Service</td>
<td>The <strong>customer’s electrical contractor</strong> will install the electrical service.</td>
<td>Electrical Inspector</td>
</tr>
</tbody>
</table>
I – Overhead Service

An overhead service drop may be provided for services of up to 400A (the New Services Engineer will determine if a 600A service can be furnished) provided that it meets all criteria of the overhead service drop. Contact New Services Engineer for information.

II – Underground Service from Padmount Transformer

Underground service from a padmount transformer requires the installation of a primary underground system.

- Contact New Services Engineer.
- Pre-construction meeting with the Construction Inspector must happen prior to any construction.
- If the New Services Engineer determines an SSB is to be installed, see section “Selection of SSB” with Table 1 and Table 2 to help determine the size of SSB necessary per the size of electrical service.

III – Underground Service from Polemount Transformer (UGP)

In areas with an existing overhead electrical system, an underground service from a polemount transformer (UGP) may be provided for services in accordance with the limitations in the table below.

- Contact New Services Engineer
- Pre-construction meeting with the Construction Inspector must happen prior to any construction.

Limitations

UGP’s have the following limitations:

<table>
<thead>
<tr>
<th>Issue</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Service Panel Size</td>
<td>• Single Phase: 400A</td>
</tr>
<tr>
<td></td>
<td>• Three Phase: Contact New Services Engineer</td>
</tr>
<tr>
<td>Maximum Cable Size</td>
<td>• See section “Selection of SSB” with Table 1 and Table 2, unless approved by New Services Engineer</td>
</tr>
<tr>
<td>Minimum Wire Size</td>
<td>• #10 AWG</td>
</tr>
<tr>
<td>Maximum Distance from Pole to SSB</td>
<td>• 200 feet</td>
</tr>
<tr>
<td>Maximum Number of Conduit Bends from Pole to SSB</td>
<td>• 270° (degrees) of bends / elbows, including the 90° pole conduit riser elbow on the pole and the 90° conduit elbow into a bottomless plastic SSB (if applicable)</td>
</tr>
</tbody>
</table>
Underground Service from Polemount Transformer (UGP) *(continued)*

Figure 1   Typical Installation of UGP

Selection of Conduit From Pole to SSB

The size and number of conduits required for the electrical secondary are listed below:

<table>
<thead>
<tr>
<th>Size of Service Panel</th>
<th>Conduit (Quantity and Size)</th>
<th>Three Phase Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 200A</td>
<td>1 – 2.5”</td>
<td>Contact <em>New Services Engineer</em></td>
</tr>
<tr>
<td>300A to 400A</td>
<td>2 – 2.5”</td>
<td></td>
</tr>
</tbody>
</table>
Underground Service from Polemount Transformer (UGP) (continued)

Selection of SSB

The following tables will provide guidelines on how to select the type and size of SSB. In any case the customer’s electrical contractor shall coordinate with the New Services Engineer on the type and size of the SSB to be used on the project.

- Bottomless plastic enclosure SSBs shall not be located in driveways, areas subject to vehicular loading, or in the public right-of-way.
- All precast concrete SSBs can be located in areas not subject to any vehicular loading, off-street or incidental traffic areas, or in the public right-of-way.
- All precast concrete SSBs shall have a non-skid type cover (see standard C-UG-2000 “Customer Requirements, Precast Concrete Vaults Approved Vendors”).
- All conduit quantities in Tables 1 and 2 are the sum total of electrical service and electrical secondary cables from customer and Tacoma Power respectively.

Table 1 – SSB Selection for Bottomless Plastic Enclosures (No Vehicular Loading)

<table>
<thead>
<tr>
<th>Tacoma Power Description</th>
<th>Total Conduit (Quantity and Size)</th>
<th>Cables (Max. Size)</th>
<th>Manufacturer and Model #</th>
<th>Tacoma Power MID #</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSB (Small)</td>
<td>2 – 2.5” only</td>
<td>250 kcmil</td>
<td>PenCell #PE-20GS-2X</td>
<td>Base #19118</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PenCell #PE-20PL-2X-TAC</td>
<td>Cover #19437</td>
</tr>
<tr>
<td>SSB (Large)</td>
<td>6 – 2.5” max or 4 – 4” max</td>
<td>350 kcmil</td>
<td>PenCell #PE-30GS</td>
<td>Base #37920</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PenCell #PE-30PLX-TAC</td>
<td>Cover #37921</td>
</tr>
</tbody>
</table>

Table 2 – SSB Selection for Precast Concrete Vaults (Off-Street, Incidental Traffic)

<table>
<thead>
<tr>
<th>Tacoma Power Description</th>
<th>Total Conduit (Quantity and Size)</th>
<th>Cables (Maximum Size)</th>
<th>Manufacturer and Model #</th>
<th>Tacoma Power MID #</th>
</tr>
</thead>
<tbody>
<tr>
<td>233 Vault</td>
<td>6 – 2.5” max or 4 – 4” max</td>
<td>350 kcmil</td>
<td></td>
<td>See C-UG-2000 “Customer Requirements, Precast Concrete Vaults Approved Vendors”</td>
</tr>
<tr>
<td>554 Vault</td>
<td>8 – 4” max</td>
<td>500 kcmil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>774 Vault</td>
<td>8 conduit max</td>
<td>750 kcmil</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If electrical service size exceeds 8 runs of 750 kcmil, New Services Engineer will determine quantity and size of SSBs or the use of a secondary service cabinet (see standard A-UG-1600 “Secondary Service Cabinet”)

Transmission & Distribution Standards Page 5 of 11
## Installation of SSB (Bottomless Plastic Enclosure)

### Step 1
Call *Construction Inspector* for pre-construction meeting prior to any construction.

### Step 2
Establish location and final grade for the SSB and install SSB.
- Select size of SSB per Table 1.
  - SSB covers shall have "Tacoma Power" embossed on them for identification purposes.
- **Bottomless SSBs shall not be located in driveways, areas subject to vehicular loading, or in the public right-of-way.**
- SSBs shall not be placed in a depression or in low areas that would tend to fill with water or silt.
- Ensure there are no rocks between SSB base and cover to avoid damage to the cover.
- The top of the SSB cover shall be:
  - 2 inches above final grade in landscaped areas.
  - flush with final grade in paved areas.

### Step 3
Establish location of and install pole conduit riser per standard C-UG-1200 “Customer Requirements, Pole Conduit Riser.”

### Step 4
Dig trench from the SSB to the service entrance and to the pole.
- Dig service and secondary trenches to the same side of the SSB, property side of SSB preferred.
- On private property, the trench shall be deep enough to maintain a minimum of **24 inches** of cover over the conduit.
- In road right-of-way, the trench shall be deep enough to maintain a minimum of **36 inches** of cover over the conduit.
- Permits from local governmental agency must be obtained before any work in the road right-of-way can begin and a copy of the approved permit on site while the road work is being done.
- The trench must be deep enough at the SSB so the conduit elbow(s) can be terminated vertically within the SSB.
- The trench should be dug as straight as possible and the trench bed leveled and free of rocks larger than 2 inches diameter.

### Step 5
Install conduit from SSB to the service entrance and to the pole.
- **From pole to SSB**, conduit shall be 2.5” or 4” Sch. 40 gray PVC.
- Excavate beneath the SSB and insert the 90° conduit elbows.
- All conduit must be at the same end of the SSB and grouped closely together (property side of the SSB preferred).
- Conduit ends shall extend vertically 2 inches above the bottom of the SSB.
- Identify conduit ends with customer building address.
- Install bell ends on the conduit ends. Do not glue bell ends inside SSB.
### Installation of SSB (Bottomless Plastic Enclosure) (continued)

<table>
<thead>
<tr>
<th></th>
<th>Inspections for conduit (BEFORE Backfill) are as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>From the service entrance to the SSB – inspection and approval by the <strong>Electrical Inspector</strong>.</td>
</tr>
<tr>
<td></td>
<td>From the pole to the SSB, including the SSB – inspection and approval by the <strong>Construction Inspector</strong>.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Backfill the trench.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Per the requirements of any permits and site requirements of Tacoma Power and others.</td>
</tr>
<tr>
<td></td>
<td>Use available clean material.</td>
</tr>
<tr>
<td></td>
<td>Pieces of scrap cable and other construction items must not be buried in the trench.</td>
</tr>
<tr>
<td></td>
<td>Large rocks must be removed and if native soil is rock, sand bedding may be required.</td>
</tr>
<tr>
<td></td>
<td>Tamp the soil, leaving a slight mound to allow for settling.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Pull in electrical service cables from the service entrance to the SSB.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Leave 4 feet minimum of cable, measured from the top of the SSB, inside the SSB.</td>
</tr>
<tr>
<td></td>
<td>Ensure any parallel cables have matching phase tapes.</td>
</tr>
<tr>
<td></td>
<td>Identify cables with customer building address.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Ensure the following has been done:</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>All applicable fees are paid.</td>
</tr>
<tr>
<td></td>
<td>All right-of-way and easement issues are resolved (if any).</td>
</tr>
<tr>
<td></td>
<td>All inspections have been passed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Tacoma Power <strong>T&amp;D Construction Staff</strong> will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>complete the pole conduit riser.</td>
</tr>
<tr>
<td></td>
<td>pull in electrical secondary cables from the pole to the SSB.</td>
</tr>
<tr>
<td></td>
<td>energize the service.</td>
</tr>
</tbody>
</table>
### Installation of SSB (Precast Concrete Vault)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Call <em>Construction Inspector</em> for pre-construction meeting prior to any construction.</td>
</tr>
</tbody>
</table>
| 2    | Establish location and final grade for the SSB and install the SSB.  
  - Select size of SSB per Table 2.  
    - SSB covers shall have "Tacoma Power" embossed on them for identification purposes.  
    - Concrete SSBs can be located in areas not subject to any vehicular loading, off-street or incidental traffic areas, or in the public right-of-way.  
    - SSBs shall not be placed in a depression or in low areas that would tend to fill with water or silt.  
    - The top of the SSB cover shall be:  
      - 6 inches above final grade in landscaped areas.  
      - flush with final grade in paved areas. |
### Installation of SSB (Precast Concrete Vault) (continued)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3</strong></td>
<td>Establish location of and install pole conduit riser per standard C-UG-1200 “Customer Requirements, Pole Conduit Riser”.</td>
</tr>
</tbody>
</table>
| **4** | Dig trench from the SSB to the service entrance and to the pole.  
- On private property, the trench shall be deep enough to maintain a minimum of **24 inches** of cover over the conduit.  
- In road right-of-way, the trench shall be deep enough to maintain a minimum of **36 inches** of cover over the conduit.  
- Permits from local governmental agency must be obtained before any work in the road right-of-way can begin and a copy of the approved permit on site while the road work is being done.  
- The trench should be dug as straight as possible and the trench bed leveled and free of rocks larger than 2 inches diameter. |
| **5** | Install conduit from SSB to the service entrance and to the pole (see Figure 3).  
- **From pole to SSB**, conduit shall be 2.5” or 4” Sch. 40 gray PVC.  
- Install conduit 4 inches minimum into the SSB perpendicular to the vault wall.  
- Identify conduit ends with customer building address.  
- Install bell ends on the conduit ends. Do not glue bell ends inside SSB.  
- Grout around knockouts. |
| **6** | Inspections for conduit (BEFORE Backfill) are as follows:  
- From the service entrance to the SSB – inspection and approval by the **Electrical Inspector**.  
- From the pole to the SSB, including the SSB – inspection and approval by the **Construction Inspector**. |
Underground Service from Polemount Transformer (UGP) (continued)

<table>
<thead>
<tr>
<th>Instruction</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7</strong></td>
<td>Backfill the SSB excavation as shown below:</td>
</tr>
<tr>
<td></td>
<td>- Clean fill as directed by the Construction Inspector</td>
</tr>
<tr>
<td></td>
<td>- Vault base 9&quot; min. of 5/8&quot; minus crushed rock well compacted and extending 12&quot; min. beyond the edge of the vault in all directions.</td>
</tr>
<tr>
<td><strong>8</strong></td>
<td>Backfill the trench.</td>
</tr>
<tr>
<td></td>
<td>- Per the requirements of any permits and site requirements of Tacoma Power and others.</td>
</tr>
<tr>
<td></td>
<td>- Use available clean material.</td>
</tr>
<tr>
<td></td>
<td>- Pieces of scrap cable and other construction items must not be buried in the trench.</td>
</tr>
<tr>
<td></td>
<td>- Large rocks must be removed and if native soil is rock, sand bedding may be required.</td>
</tr>
<tr>
<td></td>
<td>- Tamp the soil, leaving a slight mound to allow for settling.</td>
</tr>
<tr>
<td><strong>9</strong></td>
<td>Pull in electrical service cables from the SSB to the service entrance.</td>
</tr>
<tr>
<td></td>
<td>- Leave the following minimum length of each service cable, measured from the top of the SSB, inside the SSB:</td>
</tr>
<tr>
<td></td>
<td>- 233 or 554 vault – 10 feet of cable</td>
</tr>
<tr>
<td></td>
<td>- 774 vault – 15 feet of cable</td>
</tr>
<tr>
<td></td>
<td>- Ensure any parallel cables have matching phase tapes.</td>
</tr>
<tr>
<td></td>
<td>- Identify cables with customer building address.</td>
</tr>
<tr>
<td><strong>10</strong></td>
<td>Ensure the following has been done:</td>
</tr>
<tr>
<td></td>
<td>- All applicable fees are paid.</td>
</tr>
<tr>
<td></td>
<td>- All right-of-way and easement issues are resolved (if any).</td>
</tr>
<tr>
<td></td>
<td>- All inspections have been passed.</td>
</tr>
<tr>
<td><strong>12</strong></td>
<td>Tacoma Power T&amp;D Construction Staff will:</td>
</tr>
<tr>
<td></td>
<td>- complete the pole conduit riser.</td>
</tr>
<tr>
<td></td>
<td>- pull in electrical secondary cables from the pole to the vault.</td>
</tr>
<tr>
<td></td>
<td>- energize the service.</td>
</tr>
</tbody>
</table>
Conduit Entry

Conduit entering the vault shall consistently enter the left side knockouts on all sides. This is for the training of cable in the vault in the same direction. The Construction Inspector may approve exceptions on a site-by-site basis only. In any case, the service conduit entry and the secondary conduit entry shall allow all cables to be trained in the same clockwise or counter-clockwise direction (See Figure 3).
Application

Requirements for high voltage underground conduit systems, installed by customer or contractor, which will be owned and maintained by Tacoma Power. High voltage underground conduit installations shall be governed by this standard and any supplemental Tacoma Power specifications.

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<th>See Page</th>
</tr>
</thead>
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</tr>
<tr>
<td>Inspection</td>
<td>2</td>
</tr>
<tr>
<td>Separation from Other Utilities and Structures</td>
<td>2</td>
</tr>
<tr>
<td>Types of Conduit</td>
<td>2</td>
</tr>
<tr>
<td>Conduit Applications</td>
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<tr>
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<td>7 - 8</td>
</tr>
<tr>
<td>Installed</td>
<td>7</td>
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<td>Spacers and Hold Downs</td>
<td>7</td>
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<td>Concrete Specification</td>
<td>8</td>
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<td>Cold Joint Construction</td>
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<tr>
<td>Controlled Density Fill (CDF) Specification</td>
<td>8</td>
</tr>
<tr>
<td>Flowable Thermal Backfill (FTB) Specification</td>
<td>8</td>
</tr>
<tr>
<td>Conduit Installation</td>
<td>9</td>
</tr>
<tr>
<td>General</td>
<td>9</td>
</tr>
<tr>
<td>Into Vaults</td>
<td>9</td>
</tr>
<tr>
<td>Horizontal Directional Drilling (HDD)</td>
<td>9</td>
</tr>
<tr>
<td>Prove the Conduit</td>
<td>9</td>
</tr>
<tr>
<td>References</td>
<td>9</td>
</tr>
</tbody>
</table>
Customer Requirements
Conduit Installations,
High Voltage

C-UG-1100

September 7, 2017

General

- All materials and equipment required for the construction of the conduit system shall be furnished by the customer/contractor, unless specifically stated otherwise in the special conditions of the Letter of Agreement or Tacoma Power Construction Contract Specification.
- According to the Tacoma Power Customer Service Policies, all conduit will revert to Tacoma Power's ownership after construction has been completed, inspected, and approved by the Tacoma Power Construction Inspector.
- Permanent structures are never to be constructed or moved on top of buried Tacoma Power conduit or cable.

Inspection

- The customer/contractor shall contact the appropriate Tacoma Power Inspector at least 24 hours in advance of beginning construction.
- Construction work performed without prior notice to the Inspector will be subject to rejection.
- Materials or workmanship failing to meet the requirements of this standard will be rejected. Damaged or unacceptable materials shall not be used in the work.
- Materials delivered to the job site shall be subject to inspection by the Inspector.
- If required by the Tacoma Power Inspector, the customer/contractor must remove the rejected material and furnish and install, at customer/contractor expense, approved material and/or workmanship.
- No work shall be embedded in concrete, backfilled, or covered or concealed until it has been inspected and approved by the Tacoma Power Inspector.

Separation from Other Utilities and Structures

- Separation from Tacoma Power conduits and other utilities is detailed in NESC 320.B, “Separation From Other Underground Installations”.
- Typical separation is a minimum of 12 inches of earth, but lesser distances may be used where the parties agree.
- Conduit shall be installed a minimum of 3 feet from any structure.

Type of Conduit

The type of conduit for each application shall be determined by the Tacoma Power Engineer. The standard acceptable type of conduit is shown below:

<table>
<thead>
<tr>
<th>Conduit Type</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC</td>
<td>Sch. 40 or Sch. 80</td>
</tr>
<tr>
<td></td>
<td>Must conform to UL 651 and NEMA TC-2</td>
</tr>
<tr>
<td></td>
<td>Color: Gray</td>
</tr>
</tbody>
</table>

Transmission & Distribution Standards  Page 2 of 9
Conduit Applications

Conduits and encasement provide various *levels of protection* for cables. This table lists the different levels and typical applications. The Tacoma Power Engineer will specify which level(s) will be required.

<table>
<thead>
<tr>
<th>Installation</th>
<th>Typical Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sch. 40 PVC</td>
<td>Standard for installation in a trench and Horizontal Directional Drilling (HDD) (See “Horizontal Directional Drilling” on page 9).</td>
</tr>
<tr>
<td>Sch. 80 PVC</td>
<td>For areas where minimum cover is not possible and/or for heavy duty applications.</td>
</tr>
</tbody>
</table>
| Sch. 40 PVC Encased in CDF or FTB | Controlled Density Fill (CDF) encasement provides some added protection, and is used:  
  • For instant compaction when installation time is a factor.  
  • Local permitting jurisdiction, or third party, requires it.  
  • Under foundations as required.  
Flowable thermal backfill (FTB) offers an increase in cable ampacity; see standard C-UG-2050 “Customer Requirements, Thermal Backfill for UG Power Cable Installations”. |
| Sch. 40 PVC Encased in Concrete | Rarely used any more, only special conditions such as:  
  • Where a geotechnical analysis requires it, for example very heavy traffic in poor soils.  
  • Local permitting jurisdiction, or third party, requires it. |
| Warning Ribbon | Warning ribbon is installed 6” to 12” below final grade in those locations where minimum cover is not possible. |
| Red Dye Encasement | If local permitting jurisdiction, or third party, requires it. |

Conduit Components

**Elbows**

- All elbows shall be made to comply with ANSI Standard C80.1-83 and/or ASTM Standards F512, as appropriate.
- Elbow saddle blocks may be required on some bends depending on soils and pulling tensions.
- The minimum radius of elbow used in all conduit installations, unless otherwise specified by the Tacoma Power Engineer, shall be:

<table>
<thead>
<tr>
<th>Conduit Trade Size</th>
<th>2.5”</th>
<th>4”</th>
<th>5”</th>
<th>6”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Radius</td>
<td>36”</td>
<td>36”</td>
<td>48”</td>
<td>48”</td>
</tr>
</tbody>
</table>
Conduit Components (continued)

Pole Riser Transitions

The most common examples of conduit type transitions are at pole risers.

<table>
<thead>
<tr>
<th>Sch. 40 PVC to Sch. 80 PVC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred transition with Sch. 80 bell end.</td>
</tr>
</tbody>
</table>

| Alternate transition with Sch. 40 bell end, the sharp edge on the Sch. 80 end must be beveled or filed down. |

<table>
<thead>
<tr>
<th>Couplings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep socket couplings are required, where the socket depth (L) equals the conduit diameter (D).</td>
</tr>
</tbody>
</table>

Trenches for Conduit

Figure A Typical Trench

For uncompacted backfill, dome earth to allow for settling.

36” min cover

Undisturbed earth

Backfill free of large rocks

3” cover

2” bedding

Select backfill

Conduit
Trenches for Conduit (continued)

General
- The trench shall be straight from point to point.
- The bottom of all trenches shall be flat, smooth, uniform, and free of any and all rocks exceeding 2 inches, obstructions, sharp objects, buried timbers and pilings, and other debris encountered.
- Water in the trench shall be removed by pumping or draining as necessary.

Cover over Conduit
- The minimum cover over conduit shall be 36 inches, or the requirement of the local permitting jurisdiction, whichever is greater.
- Total cover is measured vertically from the final grade to the top of the conduit.
- At Tacoma Power Engineer's direction, the burial depth may be more or less than the standard 36 inch depth in order to accommodate installation.
- The customer/contractor is responsible for determining finished grades to assure that minimum burial depth requirements are met after conduit installation.

Sloping & Shoring
Trenches shall be prepared according to WAC 296-155 Part N, “Excavation, Trenching, and Shoring”.

Bedding and Cover
Select backfill includes the 2 inches of bedding and 3 inches of cover as shown in Figure A.
- No construction debris shall be left in the trench.
- Select backfill material shall be free of rocks exceeding 2 inches, obstructions, sharp objects that could cut the conduit, or any materials that will create pressure points that would crush the conduits during or after the bedding and backfill process.
- If the excavated material is found to be unsuitable for select backfill as determined by the Tacoma Power Inspector, the unsuitable material shall be hauled away and disposed of, and sand or Class B bank run gravel with 100% passing 2 inch screen shall be brought in.
- The select backfill shall be compacted evenly on both sides of the conduit to fill all voids, and shall be placed to prevent damage to the conduit.
- For un-compacted backfill, dome the top of the trench to allow for settlement.

Compaction
- Where compaction is required, backfill shall be mechanically tamped to 95% compaction in 6 inch lifts, or to the requirements of the local permitting jurisdiction whichever is greater.

Caution!
- Backhoe compactors (hoe-pacs) can generate tremendous forces, and should be used only for final compaction. Do not use within 30 inches of conduits to avoid damage.

Restoration and Cleanup
It shall be customer/contractor responsibility to restore all areas disturbed by construction back to a condition equal to or better than that which existed before construction.
**Trenches for Conduit (continued)**

**What to do**

Where trenching work will be conducted near trees, the trees should be removed. If this is not possible, follow these practices:

**Small Species Trees** (as determined by Tacoma Power Arborist) and/or for mature trees measuring less than 20 inches in diameter at 4.5 feet above grade.

- When space allows, trenching will be routed outside the drip line of existing tree(s).
- When tree roots 2 inches in diameter, or larger, are accidentally or unavoidably cut, they will be sawed flush on the tree side of the trench.
- Whenever possible, soil from a trench will be piled on the side of the trench farthest from the tree(s).
- Trenches will be back filled in a timely manner and compacted to no more than their original firmness when possible.
- Backfill will be kept clean of trash, chemicals or any other waste or debris.
Trenches for Conduit (continued)

**Trenching Near Trees (continued)**

**Large Species Trees** (as determined by Tacoma Power Arborist) and/or for mature trees measuring 20 inches or greater in diameter at 4.5 feet above grade.

- Tunneling under the tree roots at a depth of at least **36 inches** below grade is the preferred method when possible.
- If tunneling is not possible, maintain a minimum distance of **15 feet** from the trunk of the tree to the trench.

*For more information*

Contact a **Certified Arborist** at Tacoma Power.

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**Conduit Encased in Concrete, CDF or FTB**

**Installed**

- The conduits shall have a maximum cover of 3 inches in every direction. Anything higher becomes an underground wall for water or other utilities. There may be exceptions where underground obstructions require a higher limit.

- Where conduit transitions above-grade, the elbow shall be Sch. 80 PVC (or Steel if required by the local permitting jurisdiction).

**Spacers and Hold Downs**

- Conduit spacers shall be used in **all encased conduit applications**.
- Conduits and spacer assemblies are to be firmly secured and tied down. Hold down methods shall be used to control floating of conduits during the encasement process.
- The backfill material installed in trenches containing conduit spacers shall not contain rocks that exceed the edge-to-edge separation distance between conduits.
- The minimum space between conduits shall be **2 inches**.
- Concrete is to be hand-worked to completely fill all voids between conduits and earth or forms.
**Conduit Encased in Concrete, CDF or FTB (continued)**

**Concrete Specification**
Concrete for conduit encasement shall be Class “B” (3,000 psi at 28 days - 5 ¾ sack), as specified in Section 6-02.3(2) of the latest revision to the State of Washington Standard Specifications for Road, Bridge, and Municipal Construction. Surfaces upon which concrete is to be placed shall be free of standing water, mud, and debris. Absorptive surfaces against concrete to be placed shall be moistened.

**Cold Joint Construction**
When it is necessary to make cold joints in the concrete encasement, they shall be made on a uniformly sloping plane at the angle of repose of the fresh concrete and shall be roughened. Before beginning the next pour, the surface of previously placed concrete shall be thoroughly cleaned.

**Concrete Reinforcing**
- Systems of *up to 6 conduits* shall be reinforced with a minimum of two No. 4 reinforcing bars placed in the bottom of the conduit line.
- All reinforcing bars shall have a minimum concrete cover of 3 inches on the bottom and 2 inches on the sides.
- Special conditions such as extremely heavy wheel loads in soft soils, or conduit lines composed of *more than 6 conduits*, will necessitate special reinforcing requirements detailed by the Tacoma Power Engineer.
- Reinforcing steel shall be in accordance with the latest revision to the State of Washington Standard Specifications for Road, Bridge, and Municipal Construction, except that reinforcing steel shall conform to the requirements of ASTM Designation A-615, Billet Steel Bars for Concrete Reinforcement, including supplementary requirements 51, Grade 40.

**Controlled Density Fill (CDF) Specification**
- CDF mix shall consist of Portland cement, water, fine aggregate and, if required by the engineer, accelerating admixtures. The proportions of the CDF shall conform to a mix design that shall be submitted with test results to the engineer for approval.
- CDF shall have a 28 day unconfined compressive strength from a minimum of 50 psi to a maximum of 150 psi and have a consistency that will result in a flowable product at the time of placement which does not require manual means to move it into place. CDF shall have a slump, as tested by ASTM C 33, of not more than 10 inches.
- Fine aggregate shall be sand meeting the requirements of the State of Washington Standard Specifications for Road and Bridge Construction, “Fine Aggregate for Portland Cement Concrete”, 9.03.1(2).

**Flowable Thermal Backfill (FTB) Specification**
For FTB requirements, see standard C-UG-2050 “Customer Requirements, Thermal Backfill for UG Power Cable Installations”.
Conduit Installation

General

- All conduits shall be installed in accordance with the manufacturer’s recommendations. This includes adequate glue and seating ends into couplings or bell ends to their full depth.
- Curves in an otherwise straight conduit run must be approved by Tacoma Power.
- Conduits shall be placed so that they are on firm bearing for the length of the installation and shall be laid on as uniform a slope as possible.
- Provide adequate support on each side of conduit when conduit crosses over another utility, to prevent load transference onto other utilities.

Into Vaults

All conduits entering a vault shall follow the requirements of the following standards:

<table>
<thead>
<tr>
<th>Vault Type</th>
<th>See Customer Requirements Standard…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junction Box</td>
<td>C-UG-1500, Primary Junction Box Installation</td>
</tr>
<tr>
<td>Transformer Vault</td>
<td>C-UG-1700, Transformer Vault Installation</td>
</tr>
<tr>
<td>Precast Concrete SSB</td>
<td>C-SV-3200, Commercial Secondary Service</td>
</tr>
</tbody>
</table>

Horizontal Directional Drilling (HDD)

Tacoma Power requires Sch. 40 PVC, locking joint type conduit systems for HDD applications. HDPE conduit is not allowed.

The following are approved manufacturers for HDD conduit:

- Certa-Com by North American Pipe Corporation
- Can-Loc by Cantex
- Bore-Gard by Prime Conduit

Prove the Conduit

- After conduit installation is complete and final grade is established, the customer/contractor will be required to prove conduit integrity using a Tacoma Power approved mandrel and with the Tacoma Power Inspector present.
- After swabbing the conduits clean and proving that the conduits are free from debris and obstructions, the customer/contractor shall leave a silicone-coated nylon pull tape, or Tacoma Power approved equivalent, marked in feet and secured at both ends of each conduit.

References

- National Electric Safety Code (NESC), Section 32, Underground Conduit Systems
- “Trenching and Tunneling Near Trees: A Field Guide for Qualified Utility Workers” by Dr. James R. Fazio
Scope

This standard details Tacoma Power’s requirements for custom underground vaults that are constructed and installed by the Customer, but will be owned and maintained by Tacoma Power. All detail design work and system layout drawings are the responsibility of the Customer.

Inspection

- After having completed the necessary prior arrangements with Tacoma Power's Engineering Section, the Customer shall contact Tacoma Power’s Construction Inspector at least **24 hours** in advance of beginning construction. Construction work performed without prior notice to the Inspector will be subject to rejection.
- Materials or workmanship failing to meet this Standard’s requirements, or any such special requirements, will be rejected. If required by the Inspector, the Customer must remove the rejected material and furnish and install, at Customer's expense, approved material and/or workmanship.
- No work shall be backfilled, embedded in concrete, covered or concealed until it has been inspected and approved by the Inspector.
- Materials delivered to the job site shall be subject to inspection by the Inspector. Damaged or imperfect materials shall not be used in the work.

Vault Requirements

**Strength**

Vaults shall be designed to sustain all expected loads that may be imposed upon the structure including dead load, live load, equipment load, impact, load due to water table, frost, and any other load expected to be imposed upon the structure, to occur adjacent to the structure, or both. This shall include loads imposed by construction at the site. The structure shall sustain the combination of vertical and lateral loading that produces the maximum shear and bending moments in the structure.

**Pulling eyes**

There shall be a pulling eye installed opposite each duct line entering a manhole or vault and in direct line with the cable pull. Pulling eyes shall be installed with a **safety factor of 2** based on the expected applied load.
Vault Requirements (continued)

Manhole access openings

The minimum size of a manhole shall be designated by the Engineer.

1. Round access openings in a manhole containing supply cable shall not be less than 36 inches in diameter. A 36" x 36" spring loaded diamond plate cover may be used in place of the steel round cover in light-vehicular traffic areas, and approved by the Tacoma Power Engineer.

2. Openings shall be free of protrusions that will injure personnel or prevent a quick exit.

Manhole Covers

1. Manhole covers shall be weighted or designed so they cannot be easily removed without tools.

2. Covers shall be designed to not fall into manholes or protrude into manholes sufficiently far to contact cable or equipment.

3. Cover strength and their supporting structure shall be sufficient to sustain all applied loads.

4. Covers shall have a utility identifying of "TACOMA POWER" in 2" minimum height block letters.

Access

Vault or manhole openings shall be located so that safe access can be provided. When in the highway, they should be located outside of the paved roadway when practical. They should be located outside the area of street intersections and crosswalks whenever practical to reduce the traffic hazards to the people working at these locations.

Manholes should be located so they are not directly over cables or equipment. Where these openings interfere with curbs, etc., they can be located over the cable if one of the following is provided:

- A conspicuous warning sign
- A protective barrier over the cable
- A fixed ladder

Access doors

Where accessible to the public, access doors to utility tunnels and vaults shall be locked unless qualified persons are in attendance. Such doors are provided to prevent entry by unqualified persons.

EXCEPTION: This rule does not apply where the only means of locking is by padlock and the latching system is so arranged that the padlock can be closed on the latching system to prevent locking from the outside.
Vault Requirements (continued)

Ladders
Fixed ladders shall be corrosion resistant.

Drainage
Where drainage is into sewers, suitable traps or other means should be provided to prevent entrance of sewer gases into manholes, vaults, or tunnels.

Ventilation
Adequate ventilation to open air shall be provided for manholes, vaults, and tunnels having an opening into enclosed areas used by the public. In some cases, a forced air system may be required.

Conduit Entrance
Conduit entering a vault will be required to enter at a 90° angle to the wall. In no case will a conduit be allowed to enter a structure at other than perpendicular from horizontal or vertical. Standard end bells shall be installed and grouted at each conduit entrance into the structure. Where standard knockout slabs are not available, the Customer will be required to core-drill into the structure.

Typical Installations
Installation consists of the following:

1. Each vault shall be set on a minimum of 9 inches \(\frac{5}{8}\)" crushed rock.
2. A sump of 18 inches in diameter by 24 inches deep inside dimensions shall be furnished by the Customer. The Customer shall also be responsible for ensuring water-tightness of all structures.
3. The exterior surface of the vault shall be given two coats of dehydatine #4 per Federal Specification SS-A-701, manufactured by A.C. Horne, Inc. Coating shall be applied in accordance with manufacturer's recommendations and shall be cured before backfilling.
4. The Customer shall afford Tacoma Power the option of performing water tests. The cost to remove any water from the structures, if defective, shall be borne by the Customer.
5. The Customer also shall make all necessary repairs of defective structures to make them water-tight at their expense.
6. After a 30-day concrete curing time, the Customer shall paint the interior surfaces of the structures, excluding the floor, with one coat of Parker's Epo Tilt (#9145) or approved equal, and one coat of Kelly-Moore (#1680) Dura-Poxy+ acrylic enamel, or approved equal. All paint shall be applied in accordance with manufacturer's recommendations.
Vault Requirements (continued)

Grounding

- Vaults that are an integral part of the customer’s building, or buried under hard surface such as asphalt or concrete, shall have a bare 4/0 Cu wire that extends from the vault ground grid into the trench line a distance of 40 feet.

- Four 1½” plastic sleeves, one at each corner, shall be installed through the floor of vault (except buried type) for the purpose of ground rod insertion. They shall be located a minimum of 6 inches out from each wall and shall protrude through all slabs or footings by 1 inch.

- Grounding shall be as noted below.

Figure A  Grounding Requirements
Ownership

All conduit, vaults, and equipment in the right of way will revert to Tacoma Power’s ownership after all construction on the site has been completed. Customer-provided utility system vault rooms on private property will be owned by the Customer but provided for the exclusive use of Tacoma Power.

Sources

N.E.S.C. section 323, “Manholes, Handholes, and Vaults”

Tacoma Power standards:
- A-UG-011/S630.2201
- B-UG-426/S630.2201
- B-UG-427/S630.2202
- B-UG-409/D5.4002
Customer Requirements
Pole Conduit Riser

Application

Installation requirements for conduit risers installed on Tacoma Power poles.

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Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Inspector</td>
<td>Representative from Tacoma Power T&amp;D Construction Staff. A pre-construction meeting with the Construction Inspector must happen prior to any construction. Call 253-381-3023.</td>
</tr>
<tr>
<td>New Services Engineer</td>
<td>Tacoma Power engineering staff that provide design, cost estimates, and coordination of the commercial project.</td>
</tr>
</tbody>
</table>

Responsibilities and Inspections

<table>
<thead>
<tr>
<th>Construction Area</th>
<th>Responsibility</th>
<th>Inspection by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifying the pole and location of the riser</td>
<td>The New Services Engineering Office will work with the customer's electrical contractor to determine the location for the riser on Tacoma Power's pole.</td>
<td>Construction Inspector</td>
</tr>
<tr>
<td>Work in Road Right-of-Way</td>
<td>The customer's electrical contractor will be responsible for installing conduit in the road right-of-way per the requirements of the permitting agency. Permits to cut and restore the road and any other work in the road right-of-way must be obtained before work in the right-of-way can begin. A copy of the approved permit must be on site while the road work is being done.</td>
<td>Construction Inspector</td>
</tr>
<tr>
<td>Installation of the first ten feet of the pole conduit riser</td>
<td>Customer's electrical contractor</td>
<td>Construction Inspector</td>
</tr>
<tr>
<td>Completion of the pole conduit riser</td>
<td>Tacoma Power T&amp;D Construction Staff</td>
<td>Not needed</td>
</tr>
</tbody>
</table>
Conduit Requirements

- Conduit size shall be 2.5", 4", 5", or 6" as directed by New Services Engineer.
- Both the sweep and the first 10 feet of the riser shall be Sch. 80 PVC, gray.
- The remaining portion of the riser shall be Sch. 40 PVC, gray.
- All conduit and sweeps shall meet the requirements of the most recent edition of ASTM F512 "Standard Specification for Smooth-Wall Poly (Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation.
- The minimum radius of sweeps used in all pole riser conduit installations, unless otherwise specified by the Construction Inspector, shall be:

<table>
<thead>
<tr>
<th>TRADE SIZE</th>
<th>2.5&quot;</th>
<th>4&quot;</th>
<th>5&quot;</th>
<th>6&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweep Radius</td>
<td>36&quot;</td>
<td>36&quot;</td>
<td>48&quot;</td>
<td>48&quot;</td>
</tr>
</tbody>
</table>

Standoff Bracket Requirements

Tacoma Power has the following requirements for standoff brackets (see Figure 1):

- Hot dip galvanized with 1-5/8" C channel, 15 to 24 inch length.
- 2-piece steel galvanized binding member clamps suited to conduit size and type. Wire clamps are not acceptable.
- Fit bracket closely to pole shape by bending straps before lag-bolting and firmly lag-bolt to pole.

Figure 1 Standoff Bracket Requirements
Installation Practices

Quantity of Risers

The total quantity of conduits on a pole for all the utilities shall not be more than 6 (six). If additional space is required for risers, contact the Construction Inspector.

Riser Location

- If standoff brackets are already installed on the pole, the new riser(s) shall be attached to these standoffs.
- If a riser is not already on the pole, the Construction Inspector must approve the riser location.
- When practical, risers will be located on the field side of the pole, and the pole quadrant most protected from traffic. See Figure 2.

Figure 2 Pole Conduit Riser Location Opposite of Direction of Traffic
Installation Practices (continued)

Construction Notes

- When excavating at the base of the pole, contact the Construction Inspector. No more than 1/4 of pole circumference and no more than 1/2 of the pole's buried depth may be exposed during excavation. Poles are set at 10% of the total pole length plus 2 feet.

- A full 10 foot piece of rigid Sch. 80 PVC conduit shall be the first section of conduit up the pole to at least 8 feet above the ground line.

- The lowest standoff bracket must be no closer than 8 feet to the ground, or other accessible surface.

- Conduits will be supported by brackets evenly spaced along the pole and no more than 10 feet apart.

- All conduits shall be temporarily capped with plastic caps or plugs, not tape.

- Spacing between the pole and conduit riser shall be a minimum of 4 inches.

- Maintain a 1 inch separation between risers to allow for cable locating equipment.

- If more than one conduit will be on the same side of the bracket, the higher voltage will be closest to the pole.

- The entire length of conduit riser should parallel the structure or pole, regardless of taper of the pole.
Application

Installation requirements of precast concrete junction box vaults and associated conduit installations. All excavation work required by this standard shall conform to the safety requirements of WAC 296-155 Part N (Excavation, Trenching, and Shoring) and any other applicable regulations.

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</tr>
<tr>
<td>Construction Notes</td>
<td>3</td>
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</tr>
<tr>
<td>Trench</td>
<td>4</td>
</tr>
<tr>
<td>Conduit Size and Type</td>
<td>5</td>
</tr>
<tr>
<td>Conduit Entry</td>
<td>5</td>
</tr>
<tr>
<td>Conduit Terminations</td>
<td>5</td>
</tr>
</tbody>
</table>

Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Inspector</td>
<td>Representative from Tacoma Power T&amp;D Construction Staff. <strong>A pre-construction meeting with the Construction Inspector must happen prior to any construction. Call 253-381-3023.</strong></td>
</tr>
<tr>
<td>New Services Engineer</td>
<td>Tacoma Power engineering staff that provide design, cost estimates, and coordination of the commercial project.</td>
</tr>
</tbody>
</table>

Inspection Requirements

The Construction Inspector will inspect all electrical contractor construction of primary junction boxes and associated conduit installations.

Vault and Cover Requirements

<table>
<thead>
<tr>
<th>Single Phase</th>
<th>Precast Concrete Vault and Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. of 4 Primary (15kV) Cables</td>
<td>Tacoma Power Vault 444 with Junction Box Cover #2</td>
</tr>
<tr>
<td></td>
<td>Vault 4'-0&quot; x 4'-0&quot; x 3'-6&quot;</td>
</tr>
<tr>
<td></td>
<td>Cover 4'-0&quot; x 4'-0&quot; x 6&quot;</td>
</tr>
<tr>
<td>Three Phase</td>
<td>Precast Concrete Vault and Cover</td>
</tr>
<tr>
<td>5 to 12 Primary (15kV) Cables</td>
<td>Tacoma Power Vault 554 with Junction Box Cover #3</td>
</tr>
<tr>
<td></td>
<td>Vault 4'-8&quot; x 4'-8&quot; x 3'-6&quot;</td>
</tr>
<tr>
<td></td>
<td>Cover 4'-8&quot; x 4'-8&quot; x 6&quot;</td>
</tr>
</tbody>
</table>
Installation of Vault and Cover

Figure 1  Vault Foundation and Backfill

The foundation shall be prepared as follows, as directed by the Construction Inspector. See Figure 1.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavation for Vault</td>
<td>The Construction Inspector will direct the excavation requirements.</td>
</tr>
<tr>
<td>Vault Foundation</td>
<td>Vault foundation shall be minimum of 9 inches of 5/8&quot; minus crushed rock, well compacted, extending a minimum of 12 inches beyond the edge of the vault in all directions.</td>
</tr>
<tr>
<td>Backfill Material</td>
<td>Clean fill or better as directed by the Construction Inspector.</td>
</tr>
<tr>
<td>Compaction at Subgrade</td>
<td>Compaction requirements will be determined by the Construction Inspector.</td>
</tr>
<tr>
<td>Final Grade</td>
<td>The elevation difference between the top of the vault cover and final grade shall be:</td>
</tr>
<tr>
<td></td>
<td><strong>Type of final surface</strong></td>
</tr>
<tr>
<td>Landscaped</td>
<td></td>
</tr>
<tr>
<td>Paved Surface</td>
<td></td>
</tr>
</tbody>
</table>
Installation of Vault and Cover *(continued)*

**Figure 2** Sloping Installations

For junction box vaults installed on a slope, the *minimum* dimensions for clearances are:

- Front clearance = 8 feet
- Side clearance = 8 feet

---

**Construction Notes**

- The junction box vault must be kept clear of any *obstructions*, such as:
  - fences, mail boxes, rockeries, berms, and vegetation.
  - bark, sod, ground cover mulch, and rocks, etc., on any part of the structure.
  - trees and bushes extending into the clearance area.
- Phone and TV pedestals must be installed behind the vault on back corners as shown above.
- The clearance area grade shall be level and a retaining wall shall be provided when required by the Tacoma Power Engineer.
  - A wooden, concrete or rockery wall shall have 1 to 4 maximum allowable slope to the property line.
- Typical structures are located in a utility easement, or on a public right-of-way, *not* on private property.
Installation of Conduit

**Figure 3** General Conduit Layout Into Vault

---

**Trench**

The depth of trench and backfill for primary conduit is listed below:

<table>
<thead>
<tr>
<th>Issue</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
<td>A minimum of 36 inches of cover is required over the primary conduit. With prior approval, exceptions may be granted by the <strong>New Services Engineer</strong>.</td>
</tr>
<tr>
<td>Backfill</td>
<td>The trench shall be backfilled with clean fill or better as directed by the <strong>Construction Inspector</strong>.</td>
</tr>
</tbody>
</table>
Installation of Conduit (continued)

Conduit Size & Type

The conduit shall be installed per the requirements listed below unless otherwise directed by the New Services Engineer:

<table>
<thead>
<tr>
<th>Issue</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of Conduit</td>
<td></td>
</tr>
<tr>
<td>Single Phase</td>
<td>2.5 inch</td>
</tr>
<tr>
<td>Three Phase</td>
<td>4 inch</td>
</tr>
<tr>
<td>Color and Minimum Grade of Acceptable Conduit</td>
<td>Gray, Sch. 40 PVC</td>
</tr>
</tbody>
</table>

Conduit Entry

Conduit entering the vault shall consistently enter the left side knockouts on all sides. This is for the training of cable in the vault to be in the same direction. The Construction Inspector may approve exceptions on a site-by-site basis only. In any case, all conduit entry into the vault shall allow all cables to be trained in the same clockwise or counter-clockwise direction (see Figure 3).

Conduit Terminations

Conduit shall be terminated as detailed below:

<table>
<thead>
<tr>
<th>Issue</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Termination of Conduit Inside the Vault</td>
<td>The conduit into the junction box vault shall:</td>
</tr>
<tr>
<td></td>
<td>• be perpendicular to the vault wall.</td>
</tr>
<tr>
<td></td>
<td>• extend 4 inches into the vault.</td>
</tr>
<tr>
<td></td>
<td>• have bell ends on the conduit ends. Do not glue bell ends.</td>
</tr>
<tr>
<td></td>
<td>• be sealed into the vault with grout around the knockouts.</td>
</tr>
<tr>
<td>Termination of Conduit “stubs” Beyond the Vault (when required)</td>
<td>The conduit ends shall:</td>
</tr>
<tr>
<td></td>
<td>• be terminated 5 feet minimum beyond the vault.</td>
</tr>
<tr>
<td></td>
<td>• install conduit coupling and cap prior to backfill in order to prevent the backfill material from entering the conduit.</td>
</tr>
<tr>
<td></td>
<td>• be marked with a length of 2.5” Sch. 40 PVC conduit extending vertically a minimum of 4 feet above grade with a “Call Before You Dig” sticker.</td>
</tr>
</tbody>
</table>
Application

Installation requirements of precast concrete transformer vaults and associated conduit and cables. All excavation work required by this standard shall conform to the safety requirements of WAC 296-155 Part N (Excavation, Trenching, and Shoring) and any other applicable regulations.

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</tr>
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<td>Installation of Vault and Cover</td>
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</tr>
<tr>
<td>Installation of Vault and Cover Materials</td>
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</tr>
<tr>
<td>Foundation and Backfill for Vault</td>
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<td>Guard Posts</td>
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<tr>
<td>Construction Notes</td>
<td>5</td>
</tr>
<tr>
<td>Installation of Conduit</td>
<td>6-8</td>
</tr>
<tr>
<td>Electrical Primary Trench</td>
<td>7</td>
</tr>
<tr>
<td>Electrical Secondary Trench – Utility Owned (if any)</td>
<td>7</td>
</tr>
<tr>
<td>Electrical Service Trench – Customer Owned</td>
<td>7</td>
</tr>
<tr>
<td>Electrical Primary and Secondary (if any) Conduit Size &amp; Type</td>
<td>7</td>
</tr>
<tr>
<td>Electrical Service Conduit Size &amp; Type</td>
<td>7</td>
</tr>
<tr>
<td>Conduit Entry</td>
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</tbody>
</table>

Terms

<table>
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<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Inspector</td>
<td>Representative from Tacoma Power T&amp;D Construction Staff. <strong>A pre-construction meeting with the Construction Inspector must happen prior to any construction. Call 253-381-3023.</strong></td>
</tr>
<tr>
<td>Electrical Inspector</td>
<td>Tacoma Power electrical inspection staff that inspect for compliance to the Tacoma Power standards, Tacoma Electrical Code, NEC, WAC and Electric Service Handbook requirements.</td>
</tr>
<tr>
<td>Electrical Primary</td>
<td>Conduit and cables (7.2 kV to 15 kV) that connect from the Tacoma Power electrical system to the transformer vault.</td>
</tr>
<tr>
<td>Electrical Secondary</td>
<td><strong>If there is an SSB,</strong> conduit and cables (less than 600 volts) that connect from the transformer vault to the SSB. Utility owned.</td>
</tr>
<tr>
<td>Electrical Service</td>
<td>Conduit and cables <strong>from the transformer vault or the SSB (if there is one)</strong> to the service entrance. Customer owned.</td>
</tr>
<tr>
<td>New Services Engineer</td>
<td>Tacoma Power engineering staff that provide design, cost estimates, and coordination of the commercial service project.</td>
</tr>
<tr>
<td>Secondary Service Box (SSB)</td>
<td><strong>If there is an SSB</strong> it will be a plastic or concrete vault designed to contain the point of connection for the electrical service which connects the electrical secondary cables to the electrical service cables. See C-SV-3200 &quot;Customer Requirements Commercial Secondary Service&quot; for SSB installations.</td>
</tr>
</tbody>
</table>
Responsibilities and Inspections

<table>
<thead>
<tr>
<th>Construction Area</th>
<th>Responsibility</th>
<th>Inspection by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of Transformer Vault</td>
<td>The New Services Engineer will work with the customer’s electrical contractor to determine the location of the transformer vault on the customer’s property.</td>
<td>Construction Inspector</td>
</tr>
<tr>
<td>Installation of Transformer Vault</td>
<td>The customer’s electrical contractor will install the transformer vault per this standard under the direction of the New Services Engineer.</td>
<td>Construction Inspector</td>
</tr>
<tr>
<td>Work in Road Right-of-Way</td>
<td>The customer’s electrical contractor will be responsible for installing conduit in the road right-of-way per the requirements of the permitting agency. Permits to cut and restore the road and any other work in the road right-of-way must be obtained before work in the right-of-way can begin. A copy of the approved permit must be on site while the road work is being done.</td>
<td>Construction Inspector</td>
</tr>
<tr>
<td>Installation of Primary Conduit</td>
<td>The customer’s electrical contractor will install the primary conduit to the transformer vault.</td>
<td>Construction Inspector</td>
</tr>
<tr>
<td>Installation of Electrical Secondary (if any)</td>
<td>The customer’s electrical contractor will install conduit from the transformer vault to the SSB (if any). Tacoma Power T&amp;D Construction Staff will install the electrical secondary cables from the transformer vault to the SSB (if any).</td>
<td>Construction Inspector</td>
</tr>
<tr>
<td>Electrical Service</td>
<td>The customer’s electrical contractor will install the electrical service.</td>
<td>Electrical Inspector</td>
</tr>
<tr>
<td>Length of Electrical Service Cables in Transformer Vault</td>
<td>The customer’s electrical contractor will pull in enough electrical service cable length to satisfy the Tacoma Power requirements of cable wrap in the transformer vault per the vault and transformer size (see page 8).</td>
<td>Construction Inspector</td>
</tr>
<tr>
<td>Installation of Primary Cables</td>
<td>The Tacoma Power T&amp;D Construction Staff will install the primary cables to the transformer vault.</td>
<td>Not Needed</td>
</tr>
<tr>
<td>Cable Connections Inside the Transformer</td>
<td>The Tacoma Power T&amp;D Construction Staff will make all primary, secondary and/or service connections inside the transformer.</td>
<td>Not Needed</td>
</tr>
</tbody>
</table>
# Vault and Cover Requirements

## Vault & Cover Materials

The tables below list the precast concrete single phase (1Φ) and three phase (3Φ) transformer vaults and covers.

<table>
<thead>
<tr>
<th>1Φ Transformers</th>
<th>Precast Concrete Vault and Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 to 75 kVA</td>
<td>Tacoma Power Vault 444 with Transformer Cover #1</td>
</tr>
<tr>
<td></td>
<td><strong>Vault</strong> 4’-0” x 4’-0” x 3’-6”</td>
</tr>
<tr>
<td></td>
<td><strong>Cover</strong> 4’-0” x 4’-0” x 6”</td>
</tr>
<tr>
<td>100 to 167 kVA</td>
<td>Tacoma Power Vault 554 with Transformer Cover #1</td>
</tr>
<tr>
<td></td>
<td><strong>Vault</strong> 4’-8” x 4’-8” x 3’-6”</td>
</tr>
<tr>
<td></td>
<td><strong>Cover</strong> 4’-8” x 4’-8” x 6”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3Φ Transformers</th>
<th>Precast Concrete Vault and Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 to 300 kVA</td>
<td>Tacoma Power Vault 554 with Transformer Cover #2</td>
</tr>
<tr>
<td></td>
<td><strong>Vault</strong> 4’-8” x 4’-8” x 3’-6”</td>
</tr>
<tr>
<td></td>
<td><strong>Cover</strong> 5’-6” x 4’-8” x 6”</td>
</tr>
<tr>
<td>500 to 1500 kVA</td>
<td>Tacoma Power Vault 774 with Transformer Cover #1</td>
</tr>
<tr>
<td></td>
<td><strong>Vault</strong> 7’-0” x 7’-0” x 3’-6”</td>
</tr>
<tr>
<td></td>
<td><strong>Cover</strong> 8’-0” x 8’-0” x 8”</td>
</tr>
<tr>
<td>2000 to 2500 kVA</td>
<td>Tacoma Power Vault 774 with Transformer Cover #2</td>
</tr>
<tr>
<td></td>
<td><strong>Vault</strong> 7’-0” x 7’-0” x 3’-6”</td>
</tr>
<tr>
<td></td>
<td><strong>Cover</strong> 8’-0” x 10’-0” x 8”</td>
</tr>
</tbody>
</table>
Installation of Vault and Cover

Figure 1 Vault Foundation and Backfill

The foundation shall be prepared as follows as directed by the Construction Inspector. See Figure 1.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavation for Vault</td>
<td>The Construction Inspector will direct the excavation requirements.</td>
</tr>
<tr>
<td>Vault Foundation</td>
<td>Vault foundation shall be minimum of 9 inches of 5/8” minus crushed rock, well compacted, extending a minimum of 12 inches beyond the edge of the vault in all directions.</td>
</tr>
<tr>
<td>Backfill Material</td>
<td>Clean fill or better as directed by the Construction Inspector.</td>
</tr>
<tr>
<td>Compaction at Subgrade</td>
<td>Compaction requirements will be determined by the Construction Inspector.</td>
</tr>
<tr>
<td>Final Grade</td>
<td>Surrounding final grade shall be to the bottom of the vault lid.</td>
</tr>
</tbody>
</table>
Installation of Vault and Cover (continued)

Guard Posts

Guard posts may be required by the New Services Engineer to protect vaults against damage due to vehicular traffic. See C-UG-1400 “Customer Requirements, Padmount Equipment Guard Posts Installation” for guard post construction and placement.

Figure 2

Sloping Installations

For transformer vaults installed on a slope, the minimum dimensions for clearances are:

- Front clearance = 8 feet
- Side clearance = 8 feet

Construction Notes

- The transformer vault must be kept clear of any obstructions, such as:
  - fences, mail boxes, rockeries, berms, and vegetation.
  - bark, sod, ground cover mulch, and rocks, etc., on any part of the structure.
  - trees and bushes extending into the clearance area.
- Phone and TV pedestals must be installed behind the vault on back corners as shown above.
- The clearance area grade shall be level and a retaining wall shall be provided when required by the New Services Engineer.
  - A wooden, concrete or rockery wall shall have 1 to 4 maximum allowable slope to the property line.
Installation of Conduit

Figure 3    General Conduit Layout into Vault

TOP VIEW

Conduit Termination as Directed by Construction Inspector

Electrical Primary

Left Side Knock Out

90°

4"
### Installation of Conduit (continued)

#### Electrical Primary Trench

<table>
<thead>
<tr>
<th>Issue</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
<td>A minimum of 36 inches of cover is required over the primary conduit. With prior approval, exceptions may be granted by the New Services Engineer.</td>
</tr>
<tr>
<td>Backfill</td>
<td>The trench shall be backfilled with clean fill or better as directed by the Construction Inspector.</td>
</tr>
</tbody>
</table>

#### Electrical Secondary Trench – Utility Owned (if any)

<table>
<thead>
<tr>
<th>Issue</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
<td>As directed by the Construction Inspector. Generally, a minimum of 24 inches of cover is required over the conduit.</td>
</tr>
<tr>
<td>Backfill</td>
<td>The trench shall be backfilled with clean fill or better as directed by the Construction Inspector.</td>
</tr>
</tbody>
</table>

#### Electrical Service Trench – Customer Owned

<table>
<thead>
<tr>
<th>Issue</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
<td>Generally, a minimum of 24 inches of cover is required over the conduit.</td>
</tr>
<tr>
<td>Backfill</td>
<td>The trench shall be backfilled with clean fill or better and inspected by the Electrical Inspector.</td>
</tr>
</tbody>
</table>

#### Electrical Primary and Secondary (if any) Conduit Size & Type

Primary and secondary (if any) conduit shall be installed per the requirements listed below unless otherwise directed by the New Services Engineer:

<table>
<thead>
<tr>
<th>Issue</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of Conduit</td>
<td></td>
</tr>
<tr>
<td>Single Phase</td>
<td>2.5 inch</td>
</tr>
<tr>
<td>Three Phase</td>
<td>4 inch</td>
</tr>
<tr>
<td>Color and Minimum Grade of Acceptable Conduit</td>
<td>Gray, Sch. 40 PVC</td>
</tr>
</tbody>
</table>

#### Electrical Service Conduit Size & Type

Color and minimum grade of service conduit shall be gray, sch. 40 PVC.

#### Conduit Entry

All conduit entering the vault shall consistently enter the left side knockouts on all sides. This is for the training of cable in the vault to be in the same direction (see Figure 3).
Installation of Conduit (continued)

Conduit Terminations
Conduit shall be terminated as detailed below:

<table>
<thead>
<tr>
<th>Issue</th>
<th>Action</th>
</tr>
</thead>
</table>
| Termination of Conduit *Inside* the Vault | The conduit into the transformer vault shall:  
- be perpendicular to the vault wall.  
- extend 4 inches into the vault.  
- have bell ends on the conduit ends. Do not glue bell ends.  
- be sealed into the vault with grout around the knockouts. |
| Termination of Conduit *stubs* *Beyond* the Vault (when required) | The conduit ends shall:  
- be terminated 5 feet minimum beyond the vault.  
- install conduit coupling and cap prior to backfill in order to prevent the backfill material from entering the conduit.  
- be marked with a length of 2.5” Sch. 40 PVC conduit extending vertically a minimum of 4 feet above grade with a “Call Before You Dig” sticker. |

Electrical Service Cable Requirements

Maximum Quantity and Size
The maximum quantity and size of electrical service cables that can be pulled into a transformer vault shall be 10 cables of up to 750 kcmil per phase.

Lengths inside the Vault
Minimum electrical service cable lengths per vault/transformer size to be pulled into the vault for termination on the transformer are listed below:

<table>
<thead>
<tr>
<th>Vault Type</th>
<th>Transformer Size</th>
<th>Service Cable Length per Run Required in Vault *</th>
</tr>
</thead>
<tbody>
<tr>
<td>444</td>
<td>1Φ, 25 to 75 kVA</td>
<td>20 feet</td>
</tr>
<tr>
<td>554</td>
<td>1Φ, 100 to 167 kVA</td>
<td>25 feet</td>
</tr>
<tr>
<td>554</td>
<td>3Φ, 45 to 300 kVA</td>
<td>25 feet</td>
</tr>
<tr>
<td>774</td>
<td>3Φ, 500 to 2500 kVA</td>
<td>30 feet</td>
</tr>
</tbody>
</table>

* The Construction Inspector may adjust electrical service cable lengths for certain vault/conduit configurations. Contact the Construction Inspector to coordinate a meeting to discuss adjusting the electrical service cable lengths.
Application

This standard is to inform Tacoma Power's customers about the requirements for vegetation adjacent to underground electrical devices.

Purpose

When this standard is adhered to, Tacoma Power will be able to operate and maintain its equipment quickly and safely. This means better reliability for customers.

Vegetation Clear Zone

Figure 1  Typical landscaping with Vegetation Clear Zone around electrical equipment.

WARNING!
Tacoma Power may have to remove excess vegetation in the Clear Zone during switching operations or emergency conditions.
Vegetation Clear Zone (continued)

<table>
<thead>
<tr>
<th>What is a Vegetation Clear Zone?</th>
<th>The <strong>Vegetation Clear Zone</strong> is the area adjacent to electrical and communication equipment that needs to be kept clear for our electrical crews to work safely and efficiently.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Allowed</td>
<td>Shrubs, trees, and any structures such as buildings, fences, mail boxes, rockeries, berms or decks that would extend into the clearance area. Also, take care that bark, sod, mulch, and other landscaping materials don't cover any electrical devices or enclosures.</td>
</tr>
<tr>
<td>Acceptable</td>
<td>Grass, gravel, and low-growing ground covers.</td>
</tr>
<tr>
<td>Planting Tips</td>
<td>▪ Don’t change grade levels around utility devices.</td>
</tr>
<tr>
<td></td>
<td>▪ Allow room for plants to grow and mature.</td>
</tr>
<tr>
<td></td>
<td>▪ Remember to keep all utility equipment accessible for service at all times.</td>
</tr>
<tr>
<td></td>
<td>▪ Never dispose of liquids through grates of below-grade transformers.</td>
</tr>
<tr>
<td>For More Information</td>
<td>▪ Call (253) 502-8469, Tacoma Power Grounds Maintenance Department, for more information on acceptable plants and clearances.</td>
</tr>
<tr>
<td></td>
<td>▪ Call 811 or (800) 424-5555 to contact the Utilities Underground Location Center to have all local utilities contacted free of charge.</td>
</tr>
</tbody>
</table>
Customer Requirements
Thermal Backfill for Underground Power Cable Installations
C-UG-2050

August 11, 2014

Application
Flowable Thermal Backfill (FTB) is placed around power cable conduit runs to more effectively *dissipate heat generated by the cables* into the surrounding environment. FTB is a uniform and efficient heat conducting medium that also provides 100% compaction, structural support, and mechanical protection for the conduit systems.

Why use FTB?

- Multiple cables in conduit installed in the same trench will experience mutual heating and run hotter.
- Multiple conduits in a common trench add air insulation which holds in heat.
- Communication duct banks parallel to the power trench insulate heat and cause the power cables to run hotter.
- Other heat sources that are either parallel or cross the power trench will reduce heat dissipation and cause the power cables to run hotter and/or create hot spots.
- All of the above conditions may require de-rating of the current carrying capacity of the power cables unless the heat can be dissipated.
- Using FTB around the power ducts helps disperse the heat from the trench line to the surrounding air.

When to Install FTB
Use FTB when a power trench has any of the following:

- 3 or more feeder conduits (include spare feeder conduits in the count).
- 4 or more feeder and distribution conduits combined.
- When a communication duct line is within 12 inches and parallels the feeder trench line (for trenches containing 2 or more feeders).
- When the power conduits are within 2 feet of a secondary heat source, such as a steam line or another underground feeder crossing. FTB use is needed only in conflict areas.

Performance vs. Cost
Industry consultants report a common *5% to 10%* increase in cable ampacity with the use of thermal backfills. See standard E-GR-1500, “Data for Underground Primary Cables” for cable ampacities.

Similar to Controlled Density Fill (CDF) backfill, FTB does not need to be compacted, hardens quickly so that backfill can be completed the following day, and readily fills into all trench cavities without vibration.

Expect an approximate *10 %* increase in cost for FTB over CDF backfill.
FTB Selection

The approved FTB local mix designs are available for the following compressive strength ratings:

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Non-Traffic Mix (300 psi FTB)</th>
<th>Traffic Mix (1000 psi FTB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corliss</td>
<td>J5201FTB</td>
<td>J5201FTSB</td>
</tr>
<tr>
<td>Glacier</td>
<td>0307</td>
<td>3253</td>
</tr>
</tbody>
</table>

Other suppliers may be available if approved by the Tacoma Power Engineer. See the following “FTB Components” section for more information on FTB components.

FTB Components

Components

The proportions of all FTB components are balanced such that when the specified amount of water is added a uniform mix will be obtained that will not segregate when installed by pouring. No substitution of materials is permitted.

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement</td>
<td>Normal Portland cement conforming to ASTM Designation C150. The quality of the cement determines the compressive strength.</td>
</tr>
<tr>
<td>Fluidizer</td>
<td>Class &quot;C&quot; or &quot;F&quot; fly ash. The amount of fly ash influences the flow.</td>
</tr>
<tr>
<td>Fine Aggregate</td>
<td>Concrete sand with a particle size distribution meeting ASTM C33 limits for fine aggregates. This governs thermal properties.</td>
</tr>
<tr>
<td>Medium Aggregate</td>
<td>The maximum aggregate gravel size shall be 3/8&quot; minus. This also governs thermal properties.</td>
</tr>
</tbody>
</table>

Additives

No other additives shall be added. Any deviations may lead to problems with flow and water demand which in turn would affect soil thermal resistivity and strength.

Under no circumstances shall air entrainment additives be added. The only remedy available to the Contractor if an air entrainment additive is included in the mix is to physically remove all of the FTB from the cable trench and start over.

Installation

Water

It is recommended to add slightly less than the required amount of water at the batching plant. Should there be a need to add more water to achieve a good homogeneous flow; this can always be done at the job site prior to the pour.

Batching

Batching shall be done at a central plant and the blended FTB supplied by ready mix concrete trucks (ASTM C94). The FTB shall be supplied and transported in such a way as to minimize segregation and facilitate installation.
Installation (continued)

Pouring
The ends of the trench shall be secured by bulkhead or earth fill.

The FTB is to be installed by pouring into the trench and completely filling all the voids without causing excessive segregation. No vibration or compaction is allowed.

At the discretion of the Contractor, the flow may be adjusted slightly by changing the amount of water slightly (as long as no segregation occurs, and the FTB fills all the voids completely when poured).

Pumping
For pumping applications the flow may have to be modified. Changes to the mixture to facilitate pumping shall be submitted to Tacoma Power 30 days prior to installation.

Bleed Water
The FTB is in a slurry form so it can flow and fill all voids. The slurry phase will quickly consolidate, resulting in excess bleed water. The Contractor shall make provisions to allow this bleed water to be contained, drained, or be pumped away in an environmentally acceptable manner.

Temperature Restrictions
FTB shall not be placed on frozen ground. At the time of placement, FTB must have a minimum temperature of 40°F. Mixing and placing shall stop when air temperature is 38°F or less and falling.

Conduit Buoyancy
Conduits to be encased in FTB shall be installed with spacers and hold downs (see C-UG-1100) to be adequately anchored so that they do not float during FTB placement. Tie-Downs and/or FTB piles should all be installed at regular intervals depending on quantity and size of conduits, i.e., the overall buoyancy of the duct bank. Other methods may be used if approved by the Tacoma Power Engineer.

Quality Control

With thermal backfills, the quality is in the mix. If it is properly formulated and blended, then the installation and final product performance will meet the specifications. Information for various tests and reports may be required should the Tacoma Power Engineer deem them necessary.

Thermal Resistivity Test & Values
The FTB should have a thermal resistivity Rho (ρ) of less than 40°C-cm/Watt when moist and less than 100°C-cm/Watt when in place and totally dry. If testing should be required, samples shall be sent to Geotherm, Inc., or an alternate testing laboratory approved by the Tacoma Power Engineer.

Some typical values for RHO (ρ) that are commonly used:

<table>
<thead>
<tr>
<th>Backfill Material</th>
<th>Thermal Rho (ρ) °C-cm/Watt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moist native soil</td>
<td>90</td>
</tr>
<tr>
<td>Concrete</td>
<td>55</td>
</tr>
<tr>
<td>FTB</td>
<td>40</td>
</tr>
</tbody>
</table>
Other Factors

Other factors can change the soil thermal resistivity:

- **Moisture** is critical to soil thermal resistivity. Sand, for example, dries out easily resulting in high Rho values.
- **Burial depth** also has a small impact on cable ampacity. Tests have shown reducing depth from 36” to 30” (to top of enclosure) will increase ampacity by 1-3%.
- Soil thermal resistivity decreases with **compaction**.

### Sources

<table>
<thead>
<tr>
<th>Standard</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM C31</td>
<td>Standard Practice for Making and Curing Concrete Test Specimens in the Field</td>
</tr>
<tr>
<td>ASTM C33</td>
<td>Standard Specification for Concrete Aggregates</td>
</tr>
<tr>
<td>ASTM C94</td>
<td>Standard Specification for Ready-Mixed Concrete</td>
</tr>
<tr>
<td>ASTM C172</td>
<td>Standard Practice for Sampling Freshly Mixed Concrete</td>
</tr>
<tr>
<td>IEEE 442</td>
<td>IEEE Guide For Soil Thermal Resistivity Measurements</td>
</tr>
</tbody>
</table>

**Thermal Resistivity Consultant**

Geotherm Inc.
561 E Elliot Road # 155
Chandler, AZ 85225-1119
480-892-9723
www.geotherm.net

Flowable Thermal Backfill (FTB™) is a Geotherm Trade Mark
Application

Precast concrete vault descriptions, applications and accessories used in Tacoma Power’s underground system.

Vault Applications

<table>
<thead>
<tr>
<th>Application</th>
<th>233</th>
<th>444</th>
<th>554</th>
<th>684</th>
<th>687</th>
<th>774</th>
<th>810</th>
<th>5106</th>
<th>814</th>
<th>818</th>
<th>10X20</th>
<th>E3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Secondary Service</td>
<td>■</td>
<td></td>
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<tr>
<td>1Φ Junction Box</td>
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<tr>
<td>3Φ Junction Box</td>
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<tr>
<td>1Φ PM Tfrmr 25 to 75 kVA</td>
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<tr>
<td>1Φ PM Tfrmr 100 to 167 kVA</td>
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<td>■</td>
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<tr>
<td>3Φ PM Tfrmr, 45 to 300 kVA</td>
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<tr>
<td>3Φ PM Tfrmr 500 to 2500 kVA</td>
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<td>■</td>
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<tr>
<td>1-position inlet &amp; outlet vacuum switch cabinet</td>
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<tr>
<td>3Φ Primary Metering Cabinet</td>
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<td></td>
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<tr>
<td>Secondary Service Cabinet</td>
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<td>■</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Feeder Splice Vault, Single Circuit</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>E3</td>
</tr>
<tr>
<td>Feeder Splice Vault, Multiple Circuits</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td>■</td>
<td>■</td>
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<td></td>
</tr>
<tr>
<td>Switchgear Vault, Padmount</td>
<td></td>
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<tr>
<td>Urban Junction Box</td>
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<tr>
<td>Feeder Junction Box</td>
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<tr>
<td>Switchgear Vault, Submersible</td>
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<tr>
<td>Feeder Pull Vault, Multiple Circuits</td>
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<tr>
<td>Maintenance Only</td>
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</tr>
</tbody>
</table>

General Notes

- All vaults and covers (except for 233 and E3 vaults) shall be self-grounding (internally grounded), concrete-encased electrodes with grounding/bonding inserts, meeting all the provisions of NESC Rule 094B6.
- All vault bases, covers (except for E3 covers), doors and risers shall be constructed to AASHTO H20 traffic loading or better.
- All doors (hatches) rated for off-street/incidental (unintentional) traffic locations only.
- Only 687, 814, 818, and 10x20 vaults with manhole covers able to be placed in traffic locations.
- All vault covers shall have Meadow-Burke fittings at each corner according to manufacturer’s specifications.
- All weights listed are approximate only.
233 Vault

DESCRIPTION: Vault, concrete, type 233, 3ft-8in x 2ft-8in x 3ft base, cover is 2ft-8in x 3ft-8in x 6in with 24in x 36in hinged diamond plate aluminum door, knockouts shall be minimum 16in x 16in each end and minimum 12in x 18in – two (2) sets each side.

<table>
<thead>
<tr>
<th>Material</th>
<th>MID#</th>
</tr>
</thead>
<tbody>
<tr>
<td>233 Vault Base (2,000 lbs)</td>
<td>35057</td>
</tr>
<tr>
<td>233 Vault Cover Standard (450 lbs)</td>
<td>34669</td>
</tr>
<tr>
<td>233 Vault Cover Non-skid (450 lbs)</td>
<td>34671</td>
</tr>
<tr>
<td>233 Riser, 6in (290 lbs)</td>
<td>39828</td>
</tr>
</tbody>
</table>

APPLICATION: Commercial Secondary Service Box.
DESCRIPTION: Vault, concrete, type 444, 4ft x 4ft x 3ft-6in base, junction box cover #2 is 4ft x 4ft x 6in with 3ft x 3ft hinged diamond plate aluminum door, transformer cover #1 is 4ft x 4ft x 6in with 12in x 28in blockout opening
444 Vault (continued)

<table>
<thead>
<tr>
<th>Material</th>
<th>MID#</th>
</tr>
</thead>
<tbody>
<tr>
<td>444 Vault Base (4,0000 lbs)</td>
<td>21163</td>
</tr>
<tr>
<td>444 Transformer Cover #1 (for 1Φ Transformers 25 to 75 kVA) (900 lbs)</td>
<td>19451</td>
</tr>
<tr>
<td>444 Transformer Cover #1 (for 1Φ Transformers 25 to 75 kVA), Blockout Opening Formed as a Knockout * (900 lbs)</td>
<td>46371</td>
</tr>
<tr>
<td>444 Junction Box Cover #2 Standard (900 lbs)</td>
<td>19447</td>
</tr>
<tr>
<td>444 Junction Box Cover #2 Non-Skid (900 lbs)</td>
<td>19449</td>
</tr>
<tr>
<td>444 Riser, 6in (440 lbs)</td>
<td>39970</td>
</tr>
<tr>
<td>444 Riser, 12in (1100 lbs)</td>
<td>43252</td>
</tr>
</tbody>
</table>

* Special order only

APPLICATION: 1Φ Junction Box, Small 1Φ Padmount Transformers (25 kVA to 75 kVA).
554 Vault

DESCRIPTION: Vault, concrete, type 554, 4ft-8in x 4ft-8in x 3ft-6in base, single-phase transformer cover #1 is 4ft-8in x 4ft-8in x 6in with 12in x 28in blockout opening, three-phase transformer cover #2 is 5ft-6in x 4ft-8in x 6in with 20in x 44in blockout opening, junction box cover #3 is 4ft-8in x 4ft-8in x 6in with 3ft x 3ft hinged diamond plate aluminum door, junction box cover #4 is 4ft-8in x 4ft-8in x 6in with integral 36in manhole frame and cover.

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554 Vault (continued)

<table>
<thead>
<tr>
<th>Material</th>
<th>MID#</th>
</tr>
</thead>
<tbody>
<tr>
<td>554 Vault Base (4,000 lbs)</td>
<td>21165</td>
</tr>
<tr>
<td>554 Transformer Cover #1 for 1Φ Transformers 100 to 167 kVA (1,630 lbs)</td>
<td>19457</td>
</tr>
<tr>
<td>554 Transformer Cover #2 for 3Φ Transformers 45 to 300 kVA and 1-Position In &amp; Out Vacuum Switch Cabinet (1,550 lbs)</td>
<td>19459</td>
</tr>
<tr>
<td>554 Junction Box Cover #3 Standard (1,400 lbs)</td>
<td>19453</td>
</tr>
<tr>
<td>554 Junction Box Cover #3 Non-skid (1,400 lbs)</td>
<td>19455</td>
</tr>
<tr>
<td>554 Junction Box Cover with 36in Manhole Frame and Cover #4 (1,250 lbs)</td>
<td>64807</td>
</tr>
<tr>
<td>554 Riser, 6in (540 lbs)</td>
<td>39972</td>
</tr>
<tr>
<td>554 Riser, 12in (1,100 lbs)</td>
<td>43254</td>
</tr>
</tbody>
</table>

**APPLICATION:** 3Φ Junction Box, Large 1Φ Transformers (100 kVA to 167 kVA), Small 3Φ Transformers (45 kVA to 300 kVA), 1-Position In & Out Vacuum Switch Cabinet or Commercial Secondary Service Box.

**Note:** 554 vault with 36in manhole cover not intended for traffic locations. Place in parking lot, driveway or alley way locations only.
684 Vault

DESCRIPTION: Vault with cover, concrete, type 684, 9ft-1in x 7ft-1in x 4ft-9in, two (2) 3ft x 3ft hinged diamond plate aluminum doors in cover

<table>
<thead>
<tr>
<th>Material</th>
<th>MID#</th>
</tr>
</thead>
<tbody>
<tr>
<td>684 Vault Base (11,000 lbs)</td>
<td>21169</td>
</tr>
<tr>
<td>684 Cover Standard (5,000 lbs)</td>
<td>63355</td>
</tr>
<tr>
<td>684 Cover Non-Skid (5,000 lbs)</td>
<td>21171</td>
</tr>
</tbody>
</table>

APPLICATION: Feeder splice/pull-box for single circuit for off-street/incidental (unintentional) traffic locations.
687 Vault

**DESCRIPTION:** Vault with cover, concrete, type 687, 9ft-1in x 7ft-1in x 8ft-2in, 36in manhole access

<table>
<thead>
<tr>
<th>Material</th>
<th>MID#</th>
</tr>
</thead>
<tbody>
<tr>
<td>687 Vault Base (10,000 lbs)</td>
<td>39978</td>
</tr>
<tr>
<td>687 Vault Cover with 36in Manhole Access (10,000 lbs)</td>
<td>63356</td>
</tr>
</tbody>
</table>

**APPLICATION:** Feeder splice/pull-box for multiple circuits for traffic locations.
Manhole Frame and Cover, 36in, H20 Traffic Loading

**DESCRIPTION:** Frame and cover, manhole, 36in, rated for H20 traffic loading, to meet AASHTO Designation M306-10, cover is 38-5/16in diameter, ductile iron, to have four (4) 1in dia. lifting holes, lettered “TACOMA POWER” in 2in raised letters, frame is gray iron, all such castings are to be the EJ 1581 series or approved equal.

<table>
<thead>
<tr>
<th>Material</th>
<th>MID#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manhole Frame and Cover, 36in, H20 Loading (550 lbs)</td>
<td>20558</td>
</tr>
<tr>
<td>Manhole Cover only, 36in, H20 Loading (375 lbs)</td>
<td>19426</td>
</tr>
<tr>
<td>Riser, 4in * (340 lbs)</td>
<td>39976</td>
</tr>
</tbody>
</table>

* also available in 6in and 12in from vendor

**APPLICATION:** Manhole access cover for 687 vaults in traffic locations.

**Note:** 554 vault with 36in manhole frame and cover not intended for traffic locations. Placement in parking lot, driveway or alley way locations is acceptable.
DESCRIPTION: Vault, concrete, type 774, 7ft x 7ft x 3ft-6in base, 3Φ transformer/primary metering cabinet cover #1 is 8ft x 8ft x 8in with 20in x 60in blockout opening, 3Φ transformer cover #2 is 8ft x 10ft x 8in with 20in x 60in blockout opening, secondary service cabinet cover #3 is 8ft x 8ft x 6in with 3ft x 2ft hinged diamond plate aluminum door and 36in x 42in blockout opening, secondary service box cover #4 is 7ft-1in x 7ft-1in x 8in with two (2) 3ft x 3ft hinged diamond plate aluminum doors
### 774 Vault (continued)

<table>
<thead>
<tr>
<th>Material</th>
<th>MID#</th>
</tr>
</thead>
<tbody>
<tr>
<td>774 Vault Base (7,500 lbs)</td>
<td>21167</td>
</tr>
<tr>
<td>774 Transformer (500 kVA to 1500 kVA) or Primary Meter Cabinet Cover #1, 8ft x 8ft (5,600 lbs)</td>
<td>19461</td>
</tr>
<tr>
<td>774 Transformer (2000 kVA to 2500 kVA) Cover #2, 8ft x 10ft (7,200 lbs)</td>
<td>19463</td>
</tr>
<tr>
<td>774 Secondary Service Cabinet Cover #3 (5,000 lbs)</td>
<td>50893</td>
</tr>
<tr>
<td>774 Secondary Service Box Cover #4 Standard (4,000 lbs)</td>
<td>67541</td>
</tr>
<tr>
<td>774 Secondary Service Box Cover #4 Non-skid (4,000 lbs)</td>
<td>67540</td>
</tr>
<tr>
<td>774 Riser, 6in (1,200 lbs)</td>
<td>39974</td>
</tr>
<tr>
<td>774 Riser, 12in (2,000 lbs)</td>
<td>43256</td>
</tr>
</tbody>
</table>

**APPLICATION:** Large 3Φ Transformers (500 kVA to 2500 kVA), 3Φ Primary Metering Cabinet, Secondary Service Cabinet, or Commercial Secondary Service Box.
DESCRIPTION: Vault with cover, concrete, type 810, 10ft-8in x 8ft-8in x 8ft-2in, padmount switchgear cover #1 is 8ft-8in x 10ft-8in x 1ft-6in with 3ft x 3ft hinged diamond plate aluminum door and 70in x 64in blockout opening, splice vault cover #2 has two (2) 3ft x 4ft-6in hinged diamond plate doors.

<table>
<thead>
<tr>
<th>Material</th>
<th>MID#</th>
</tr>
</thead>
<tbody>
<tr>
<td>810 Vault Base (Lower Section 10,200 lbs / Middle Section 9,200 lbs)</td>
<td>60564</td>
</tr>
<tr>
<td>810 Switchgear Cover #1 Standard (9,200 lbs)</td>
<td>63354</td>
</tr>
<tr>
<td>810 Switchgear Cover #1 Non-Skid (9,200 lbs)</td>
<td>60566</td>
</tr>
<tr>
<td>810 Splice Vault Cover #2 Non-Skid (7,900 lbs)</td>
<td>39980</td>
</tr>
<tr>
<td>810 Riser/Reducer (76” x 76” x 4”) for Type 10 Switch (1,000 lbs)</td>
<td>70489</td>
</tr>
</tbody>
</table>

APPLICATION: Padmount Switchgear or Feeder splice/pull-box for off-street/incidental (unintentional) traffic locations.
5106 Vault

**DESCRIPTION:** Vault base with cover and riser, concrete, Type 5106, 11ft-10in x 6ft-4in x 3ft-8in base with 11ft-10in x 6ft-4in x 8in riser and 10ft-6in x 5ft x 6in cover, cover has two (2) 3ft x 4ft-6in hinged diamond plate aluminum doors.
5106 Vault (continued)

<table>
<thead>
<tr>
<th>Material</th>
<th>MID#</th>
</tr>
</thead>
<tbody>
<tr>
<td>5106 Vault Base (10,000 lbs) with Cover Non-Skid (3,500 lbs) and 8in Riser (3,500 lbs)</td>
<td>48250</td>
</tr>
</tbody>
</table>

**APPLICATION:** Used in urban sidewalks for high load density areas (i.e. multi-floor buildings and/or numerous commercial and residential customers) where outage coordination for a new service installation would be difficult. All three (3) tap boxes placed on same sidewall providing enough working room to pull new customer cables into an energized junction box avoiding outages to existing customers.
814 Vault

**Cover**
- BONDING INSERT, INTERNAL (marked “BOND” in Green)
  - 2” Dia from bottom opening (2 ea. opening x 2)

**Riser**
- BONDING INSERT, Internal, 2 sides (marked “BOND” in Green)

**Vault Base**
- Middle Section
  - BONDING INSERT, Internal, 2 sides (marked “BOND” in Green)
  - BONDING INSERT, Internal & External, 2 sides (marked “BOND” in Green)

**Vault Base**
- Lower Section
  - GROUNDING INSERT Internal, 2 sides / Floor (marked “GRD” in Red)
  - Trench Sump w/ Galvanized Grates

**Dimensions:**
- 15'-8" x 9'-8"
- 9'-6"
- 8'-0"
- 6'-0"
- 3'-0"
- 1'-0"

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Transmission & Distribution Standards
Page 15 of 24
814 Vault (continued)

DESCRIPTION: Vault with cover, concrete, type 814, 15ft-8in x 9ft-8in x 9ft-4in, with two (2) 42in manhole access in cover, two (2) 42in manhole frame and cover and 4” concrete riser included

<table>
<thead>
<tr>
<th>Material</th>
<th>MID#</th>
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<tbody>
<tr>
<td>814 Vault Base (Lower Section 17,000 lbs / Middle Section 11,700 lbs / Riser 9,200 lbs) and Cover (16,000 lbs) with two (2) 42in manhole access, two (2) 42in manhole frame and cover and 4” concrete riser included</td>
<td>48256</td>
</tr>
</tbody>
</table>

APPLICATION: 600A UG feeder junction box or feeder pull vault for multiple circuits. For off-street/incidental (unintentional) traffic locations, use 554 Junction Box Cover #3 (standard MID 19453 or non-skid MID 19455) with 554 riser(s) (6in MID 39972 or 12in MID 43254). In traffic areas, use the 42” manhole frame & cover (MID 67978) with 4in riser(s) (MID 68010). Risers are used to set the vault deep enough to allow for future street and sidewalk grinding/grade adjustment.
818 Vault

- **Cover**
  - Lifting Anchor
  - Equipment Channel
  - 1 ea. side x 2 side

- **Riser**
  - Equipment Channel
  - 2 ea. side x 2 side

- **Vault Base (Middle Section)**
  - BONDING INSERT, INTERNAL, 2 sides (marked "BOND" in Green)
  - Knockout
  - 2 ea. side x 4 side

- **Vault Base (Lower Section)**
  - BONDING INSERT, INTERNAL
  - 2" Diag from bottom opening (2 ea. opening x 2)
  - 18"x18" Knockout
  - 2 ea. side x 4 side

- **Additional Features**
  - GROUNDING INSERT
  - Internal, 2 sides / Floor (marked "GRD" in Red)
  - Trinch Sump w/ Galvanized Grate
  - Rigging Eye
  - 1 ea. corner
  - 2 ea. corner
  - 2 ea. side x 4 side
818 Vault (continued)

**DESCRIPTION:** Vault with cover, concrete, type 818, 19ft-8in x 9ft-8in x 9ft-4in, with two (2) 42in manhole access in cover, two (2) 42in manhole frame and cover and 4” concrete riser included

<table>
<thead>
<tr>
<th>Material</th>
<th>MID#</th>
</tr>
</thead>
<tbody>
<tr>
<td>818 Vault Base (Lower Section 16,700 lbs / Middle Section 11,700 lbs / Riser 9,200 lbs) and Cover (16,000 lbs) with two (2) 42in manhole access, two (2) 42in manhole frame and cover and 4” concrete riser included</td>
<td>48387</td>
</tr>
</tbody>
</table>

**APPLICATION:** 600A UG feeder junction box or feeder pull vault for multiple circuits. For off-street/incidental (unintentional) traffic locations, use 554 Junction Box Cover #3 (standard MID 19453 or non-skid MID 19455) with 554 riser(s) (6in MID 39972 or 12in MID 43254). In traffic areas, use the 42” manhole frame & cover (MID 67978) with 4in riser(s) (MID 68010). Risers are used to set the vault deep enough to allow for future street and sidewalk grinding/grade adjustment.
10X20 Vault

- Vault Base Middle Section
  - BONDING INSERT, Internal, 2 sides (marked “BOND” in Green)
  - BONDING INSERT, Internal, 2 sides / Floor (marked “GRD” in Red)
  - GROUNDING INSERT Internal, 2 sides / Floor (marked “GRD” in Red)

- Riser
  - BONDING INSERT, Internal & External, 2 sides (marked “BOND” in Green)

- Cover
  - Lifting Anchor 3 ea. side x 2 side
  - BONDING INSERT, INTERNAL (marked “BOND” in Green) 2” Dia from bottom opening (2 ea. opening x 2)

- Vault Base Lower Section
### 10X20 Vault (continued)

**DESCRIPTION:** Vault, panel, with cover, concrete, type 10’ x 20’, 21ft-6in x 11ft-6in x 10ft-6in, with two (2) 42in manhole access and 8ft x 4ft blockout in cover, with 9ft x 5ft cover for blockout, two (2) 42in manhole frame and cover and 4” concrete riser included.

<table>
<thead>
<tr>
<th>Material</th>
<th>MID#</th>
</tr>
</thead>
<tbody>
<tr>
<td>10’ X 20’ Vault Base (Base 24,800 lbs / Riser 28,350 lbs / Middle Section 35,400 lbs) and Cover (14,700 lbs) with two (2) 42in manhole access, two (2) 42in manhole frame and cover and 4” concrete riser included</td>
<td>48257</td>
</tr>
</tbody>
</table>

**APPLICATION:** Submersible switchgear vault with multiple feeder circuits. For off-street/incidental (unintentional) traffic locations, use 554 Junction Box Cover #3 (standard MID 19453 or non-skid MID 19455) with 554 riser(s) (6in MID 39972 or 12in MID 43254). In traffic areas, use the 42” manhole frame & cover (MID 67978) with 4in riser(s) (MID 68010). Risers are used to set the vault deep enough to allow for future street and sidewalk grinding/grade adjustment.
Manhole Frame and Cover, 42in, H20 Traffic Loading

**DESCRIPTION:** Frame and cover, manhole, 42in, rated for H20 traffic loading, to meet AASHTO Designation M306-10, cover is 44-1/4in diameter, ductile iron, to have six (6) 1in dia. lifting holes, lettered “TACOMA POWER” in 2in raised letters, frame is gray iron, all such castings are to be the EJ 1843/1845 series or approved equal.

<table>
<thead>
<tr>
<th>Material</th>
<th>MID#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manhole Frame and Cover, 42in, H20 Loading (650 lbs)</td>
<td>67978</td>
</tr>
<tr>
<td>Manhole Cover only, 42in, H20 Loading (450 lbs)</td>
<td>67979</td>
</tr>
<tr>
<td>Riser, 4in * (340 lbs)</td>
<td>68010</td>
</tr>
</tbody>
</table>

* also available in 6in and 12in from vendor

**APPLICATION:** Manhole access cover for 814, 818, and 10’ x 20’ vaults in traffic locations.
## Vault Accessories

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>MID#</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rack</td>
<td>Rack</td>
</tr>
<tr>
<td></td>
<td>Support</td>
<td>24&quot; - 52143</td>
</tr>
<tr>
<td></td>
<td></td>
<td>55&quot; - 52144</td>
</tr>
<tr>
<td></td>
<td>Cable <em>racks</em> and <em>supports</em> are used for supporting cable runs in vaults.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Support</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7&quot; - 52145</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14&quot; - 52146</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18&quot; – 52147</td>
</tr>
<tr>
<td></td>
<td>Spring nut (exempt)</td>
<td>34872</td>
</tr>
</tbody>
</table>

[Diagram of a rack and support system with labels for rack and support.]
**DESCRIPTION:** Vault, concrete, E-3, 3ft x 3ft-6in x 2ft-6in base, open bottom, 7in x 14in blockout openings centered on each 3ft end, 7in x 14in blockout openings on each 3ft-6in side offset 1ft from end of base, transformer cover #1 is 3ft x 3ft-6in x 3in cover with 1ft x 2ft-1in blockout opening centered 4in from end, junction box cover #2 is 3ft x 3ft-6in x 4in cover with 2ft x 3ft hinged aluminum door.

**APPLICATION:** For maintenance only, use for 1Φ padmount transformer or 1Φ junction box in areas with existing underground cable/conduit. Can be used as a secondary service box (SSB). Vault is not self-grounding, must bond to existing grounding or install separate grounding electrode. E3 vaults and covers are rated for pedestrian loads only; not rated for off-street/incidental (unintentional) traffic.

<table>
<thead>
<tr>
<th>Material</th>
<th>MID#</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3 Vault Base (1,200 lbs)</td>
<td>43824</td>
</tr>
<tr>
<td>E3 Vault Transformer Cover #1 (700 lbs)</td>
<td>43825</td>
</tr>
<tr>
<td>E3 Vault Junction Box Cover #2 Non-skid (800 lbs)</td>
<td>67985</td>
</tr>
</tbody>
</table>
FOR MAINTENANCE ONLY

Split Riser

**DESCRIPTION:** Riser, Concrete, two (2) piece split, 3ft x 3ft-6in, with 2ft x 1ft-9in blockout opening when fit together

<table>
<thead>
<tr>
<th>Material</th>
<th>MID#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two Piece Riser, 4in, Two-Piece* (400 lbs)</td>
<td>60729</td>
</tr>
<tr>
<td>Two Piece Riser, 6in, Two-Piece (500 lbs)</td>
<td>50896</td>
</tr>
</tbody>
</table>

* Special order only

**APPLICATION:** For maintenance only, used to provide concrete pad for existing 1-Φ padmount transformers, where the original pad has failed or is too low, without having to disconnect the UG primary and secondary cables.
### Customer Requirements

**Precast Concrete Vaults**

**Approved Vendors**

C-UG-2000

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## Application

List of approved vault vendors and their material identification (MID) numbers for vaults used in Tacoma Power underground construction.

<table>
<thead>
<tr>
<th>Description</th>
<th>Tacoma Power MID#</th>
<th>Oldcastle Precast MID#</th>
<th>H2 Pre-Cast MID#</th>
</tr>
</thead>
<tbody>
<tr>
<td>233 Base</td>
<td>35057</td>
<td>233-LA</td>
<td>VB-TP233</td>
</tr>
<tr>
<td>233 Cover (standard)</td>
<td>34669</td>
<td>23-2436</td>
<td>VL-TP233-2436</td>
</tr>
<tr>
<td>233 Cover (nonskid)</td>
<td>34671</td>
<td>23-2436-NS</td>
<td>VL-TP233-2436SN</td>
</tr>
<tr>
<td>233 6in Riser</td>
<td>39828</td>
<td>23R-6</td>
<td>VR-TP233-6</td>
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## Customer Requirements

### Precast Concrete Vaults

#### Approved Vendors

C-UG-2000

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LETTER OF AGREEMENT

May 30, 2017

City of Fife
Mr. Subir Mukerjee
City Manager, City of Fife
3725 Pacific Hwy E
Fife, WA 98424-1135

Dear Mr. Mukerjee:

Subject: 34th Avenue East between Highway 99 and 12th Street East

This Letter of Agreement will memorialize the understanding of Tacoma Power, a division of Tacoma Public Utilities, a department of the Cities of Tacoma (hereinafter referred to as "Tacoma") and the City of Fife (hereinafter referred to as "Fife") as to the scope of work and payment provisions for the project involving the underground conversion of Tacoma’s facilities in conjunction with Fife’s road improvements on 34th Avenue East, from Highway 99 north to 12th Street East, along Highway 99 from 34th Ave E to a point approximately 400 feet east. Overall, there will be approximately 2500 feet of underground conversion (hereinafter referred to as the "Project").

It is the understanding of Tacoma and Fife that the overhead distribution system along 34th Ave East as described above can be converted to an underground electrical system for an estimated cost of $691,400. The cost estimate includes the civil (conduit and vaults) and electrical (cables and equipment) systems, along with removal of the existing poles and overhead conductors, all of which will remain the property of Tacoma. This estimate does not include any cost associated with Street Light/Traffic Signal circuits and/or any electrical service additions or deletions that are a part of the Project. These items of work are not within Tacoma’s scope of work provided by this Letter Agreement.

It is agreed and understood that Tacoma will utilize Tacoma Power forces to complete the items of work listed below to complete Tacoma’s scope of work. It is agreed and understood that Fife will be responsible for construction bidding and contracting functions observing public works competitive bidding and prevailing wage laws in performing the items of work Fife has agreed to complete as described below.
FIFE’S CONSTRUCTION RESPONSIBILITY (CIVIL PORTION)

Fife shall:

Provide and install the entire civil system including but not limited to the trench and backfill work, the placement of conduit and vaults, according to the plans and specifications (provided by Tacoma) to be included by Fife in the bid documents. Fife will also be responsible for conversion of all secondary services and all restoration.

Fife will be responsible for making all payments to their contractor(s). All work to be performed on Tacoma’s facilities by Fife’s contractor(s) must first be approved by a Tacoma Power Construction Inspector.

It is agreed and understood that all of Tacoma’s customers within the project area must accept underground electrical service following completion of the project unless Fife allows existing customers to continue to receive overhead service through the use of service poles.

If Fife does not allow overhead service to a customer, then Fife is responsible for assuring that the customer(s) takes all the necessary steps required in order to receive new underground service. This includes, but is not limited to, trenching, conduit, and cable for the converted service.

All service conversions on private property will be the sole responsibility of the customer and Fife. No costs for service entrance changes or underground service conduit, cable, or service reconnection, will be the liability of Tacoma. An electrical permit and inspection by Tacoma is required for each service that is converted. Tacoma shall have no obligation to accelerate the permitting process.

Fife and/or its’ contractor(s) shall coordinate all activities and schedules associated with the project.

TACOMA’S CONSTRUCTION RESPONSIBILITY (ELECTRICAL PORTION)

Tacoma shall:

Provide and install all necessary primary cable, terminations, pad mounted transformers and switchgear.

Frame all terminal poles and complete the terminal pole risers.

Provide and install all secondary cables from the transformer to the secondary service box and associated terminations. Remove all its wholly owned poles in the project area following installation of the underground system, conversion of all customer electric services to
Underground, and removal of all other utilities attached to poles. This excludes poles for electrical facilities greater than 15,000 volts. Fife shall coordinate removal of poles owned by other entities.

Provide a copy of its construction plan to each of the utilities currently attached to the poles to be removed as a result of the project. Tacoma will work cooperatively with the other utilities in converting overhead systems to underground; however, it will be Fife’s responsibility to obtain commitments from the other utilities, and to assure that those utilities will work cooperatively with Tacoma. Tacoma shall not be liable for delay or any impacts associated with the failure of other utilities and/or telecommunication entities to timely remove or relocate their facilities from poles or elsewhere, in advance of the above referenced project, or any other unforeseen circumstance over which Tacoma has limited or no control.

OTHER

Based upon information provided by Fife, Tacoma estimates its total construction time for its scope of work to be 45 working days commencing with and following the completion of the civil system. Working days are Monday through Friday, excluding holidays, and may not be consecutive. Work time each work day is 8:00 a.m. to 4:30 p.m. Fife, not Tacoma will assure that work days and work times are coordinated with the other utilities and the electrical contractor converting secondary services.

Fife shall be responsible for coordinating Tacoma Power’s estimated 45 working day schedule with other utilities and contractors to avoid scheduling conflicts, job site congestion, and delays with Tacoma Power’s work.

Tacoma Power will provide a construction drawing, a set of construction standards, and technical specifications to be included in Fife’s Request for Bid package, for use with Tacoma’s scope of work only.

PAYMENT

Under the terms of Section 5 (attached for reference) of the franchise agreement, if Fife desires to underground aerial utilities and more than 50% of the aerial facilities are impacted by a Public Improvement Project, Fife will pay 50% of the actual cost of converting the existing overhead facilities to underground. Those costs set forth in Sections 5(c) 3, and 5(c) 4, of the franchise shall not be used in calculating the total project cost. Since this is a cooperative effort between the two parties, with no intended profits or windfalls, the final billing and costs to be paid by Fife and Tacoma shall be 50% of all actual costs incurred to complete those items within its scope of work for the project including the removal of overhead facilities.

Costs incurred that are solely associated with Click! Network infrastructure, are subject to a separate Cable TV Franchise Agreement and will not be included in the cost share described in the above paragraph. Fife’s cost to convert Click! Network only facilities from Overhead to Underground will be tracked and funded separately by Tacoma.
Payment arrangements will be by mutual agreement between Fife and Tacoma. Tacoma's historical experience with this type of project indicates the cost ratio for the civil and electrical portions are approximately 1/3 and 2/3, respectively. With this in mind, both parties agree to provide monthly cost updates although invoicing and payments will not occur until Project completion or within two (2) months after Tacoma's work is complete, whichever occurs first.

Monthly invoicing shall occur thereafter unless both parties agree to alternate arrangements in writing. Fife agrees it will remit payment to Tacoma within thirty (30) days following receipt of Tacoma's invoice for any balance due. In the event Fife fails to pay any amount to Tacoma when due hereunder, Fife shall pay interest on such unpaid sum from thirty (30) calendar days after the date due at the rate of 1% per month with a three dollar ($3.00) minimum interest payment.

In the event Fife incurs costs associated with the completion of work at the direction of Tacoma for the benefit of Tacoma, Tacoma agrees to remit payment to Fife within thirty (30) days following receipt of Fife's invoice for any balance due. In the event Tacoma fails to pay any amount to Fife when due hereunder, Tacoma shall pay interest on such unpaid sum from thirty (30) calendar days after the date due at the rate of 1% per month with a three dollar ($3.00) minimum interest payment.

Disputes of billing amounts will be brought to the attention of both parties within 15 days of receipt the invoice.

INDEMNIFICATION / INSURANCE

It is agreed and understood that Tacoma and Fife mutually and reciprocally agree to indemnify and hold each other harmless from any and all claims of bodily injury or property damage arising from their respective acts of negligence in the performance of the work contemplated by this Agreement, pursuant to RCW 4.24.115; that they waive immunity under title 51 RCW, and agree that this provision has been mutually negotiated. It is further agreed and understood that Fife shall require the contractor awarded the contract for the project contemplated by this Agreement to have in place during the performance of all work required by this Agreement, a policy of Commercial General Liability (CGL) coverage providing coverage for claims of bodily injury and property damage arising from its work contemplated by this Agreement, with policy limits of no less than $1,000,000 combined single limit of liability per occurrence, $2,000,000 general aggregate, with the City of Tacoma named as an additional insured. Said policy CGL policy shall have a self-insured retained limit of no more than $10,000. The CGL policy shall be written on an occurrence policy form not a "claims made" form, and endorsed providing primary coverage for Tacoma, and non-contributing to Tacoma’s insurance program.

PROPERTY RIGHTS

The current preliminary road design does not reflect that there currently exists adequate right-of-way to accommodate the required utility structures; therefore, the issues pertaining to
the acquisition of property rights must be addressed in advance of any final design and construction.

Tacoma will identify and Fife shall pay any and all cost for the acquisition of easements and any other property rights necessary to install vaults, switchgear, transformers and associated electrical and data facilities for the Project; and Fife shall pursue those actions necessary to secure any necessary property rights, for the installation of facilities by Tacoma for the Project.

All questions and correspondence regarding Tacoma’s scope of work shall be directed to:

Margie Villanueva,
T&D Line Engineering,
205-502-8371
PO BOX 11007, Tacoma, WA 98411

This Letter of Agreement is pursuant to and incorporates by reference the Franchise authorized by City of Fife Ordinance No. 1497-03 granted to Tacoma by Fife on September 23, 2003, and is intended to realize its objectives. In the event of any material inconsistencies between the Franchise and this Agreement, this Agreement shall control only with respect to this project.

AGREED:

Chris Robinson
Power Superintendent/COO
Tacoma Power

Subir Mukerjee
City Manager
City of Fife

William A. Gaines
Director of Utilities/CEO
Tacoma Public Utilities

Approved as to form: Legal

Recommended

Russ Blount
Public Works Director
City of Fife

Finance:
ORDINANCE NO. 1497-03

AN ORDINANCE OF THE CITY OF FIFE, WASHINGTON, GRANTING UNTO THE CITY OF TACOMA DEPARTMENT OF PUBLIC UTILITIES, LIGHT DIVISION, A MUNICIPAL CORPORATION, ITS SUCCESSORS AND ASSIGNS, THE RIGHT, PRIVILEGE, AUTHORITY AND NONEXCLUSIVE FRANCHISE FOR TWENTY YEARS, TO CONSTRUCT, MAINTAIN, OPERATE, REPLACE AND REPAIR AN ELECTRICAL LIGHT AND POWER SYSTEM, IN, ACROSS, OVER, ALONG, UNDER, THROUGH AND BELOW CERTAIN DESIGNATED PUBLIC RIGHTS-OF-WAY OF THE CITY OF FIFE, WASHINGTON.

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ORDINANCE NO. 1497-03

WHEREAS, the City of Tacoma Department of Public Utilities, Light Division has requested that the City Council of Fife grant it a nonexclusive franchise; and

WHEREAS, the City Council of Fife has the authority to grant franchises for the use of its streets and other public properties (RCW 35A.47.040); NOW, THEREFORE,

THE CITY COUNCIL OF THE CITY OF FIFE, WASHINGTON, DOES ORDAIN AS FOLLOWS:

Section 1. Franchise Granted. Pursuant to RCW 35A.47.040, the City of Fife, a Washington municipal corporation (hereinafter the "City"), hereby grants to City of Tacoma, Department of Public Utilities, Light Division, a municipal corporation organized under the laws of the State of Washington (hereinafter "Grantee"), its successors, legal representatives and assigns, subject to the terms and conditions hereinafter set forth, a franchise for a period of twenty (20) years, beginning on the effective date of this ordinance.

This franchise grants the Grantee the right, privilege and authority to construct, operate, maintain, replace, and use all necessary equipment and facilities including telecommunication infrastructure, for an electric utility system, in, under, on, across, over, through, along or below the public right-of-ways and public places located in the City of Fife, as already in existence or as may be approved under City permits issued pursuant to this franchise.

For the purposes of the franchise the following words and phrases shall have the following meaning:

"changeover date" means the date that Grantee's initial electric rate ordinance amendment, applying specific franchise rates on Grantee's customers within the City of Fife, becomes
effective. Said ordinance amendment shall also eliminate Grantee’s rate Schedule M (City of Fife utility tax). Effective this date, the City shall no longer levy a utility tax on Grantee.

“electric utility system” means all plant, facilities, equipment, wires, conduit, meters, telecommunication infrastructure, generation equipment, and transmission and distribution poles as may be necessary to provide electric utility service for customers. It does not include cable television business activities.

“electric utility service” means all actions directly related to providing electric power and energy to retail end-use customers. It does not include provision of cable television service.

“Gross Earnings Tax” means the tax(es) imposed on Department of Public Utilities, Light Division, by the City of Tacoma based upon or calculated using the gross earnings of the Grantee.

“gross revenue” means money or funds received by Grantee by reason of transaction of retail electric utility service business including sales of electric power and energy to customers within the City. Gross revenue does not include: (a) uncollected amounts; (b) amounts received from condemnation award or condemnation settlement; (c) amounts received as compensation or reimbursement of damages to or protection of any property of Grantee; (d) amounts received as compensation for or in aid to construction; (e) discounts, returns, allowances and repossessions; (f) amounts received from energy consumption, maintenance and operation for street lights to the City; (g) amounts received from Grantee’s rental lights, and (h) repayments for conservation initiatives.

Section 2. Non-exclusive Franchise Grant. This franchise is granted upon the express condition that it shall not in any manner prevent the City from granting other or further franchises in, along, over, through, under, below or across any of said right-of-ways, streets, avenues or all other public lands and properties of every type and description. Such franchise shall in no way prevent or prohibit the City from using any of said roads, streets or other public properties or affect
its jurisdiction over them or any part of them, and the City shall retain power to make all necessary changes, relocations, repairs, maintenance, establishment, improvement, dedication of same as the City may deem fit, including the dedication, establishment, maintenance, and improvement of all new rights-of-ways, thoroughfares and other public properties of every type and description. It is provided, however, City agrees not to compete with Grantee as an electric utility system or provider of electric service at retail in the current service area of the Grantee during the period of this franchise.

Section 3. Relocation of Electrical Facilities. The Grantee agrees and covenants at its sole cost and expense, to protect, support, temporarily disconnect, relocate or remove from any street, any component of its electric utility distribution system when so required by the City by reason of traffic conditions or public safety, widening, relocating or improvement of existing rights-of-way, streets or avenues, or change or establishment of street grade, provided that the Grantee shall in all such cases have the privilege to temporarily bypass, in the authorized portion of the same street upon approval by the City, any section of electrical line or facility required to be temporarily disconnected or removed. The provisions of this section shall not be applicable if the relocation is due to a private development, use or activity. Provided further that when street widening or improvement is desired by the City, that the City will acquire sufficient right-of-way to accommodate all utilities including Grantee's distribution system.

If the City determines that a project (other than a project due to a private development, use or activity) necessitates the relocation of the Grantee's then existing facilities, the City shall:

- At least one hundred and eighty (180) days prior to commencement of construction of such project, provide the Grantee with plans and written notice requiring such relocation, unless another time period for the notice is agreed to by the parties for a particular project.
• Provide the Grantee with copies of pertinent portions of the plans and specifications for such project and a proposed location for the Grantee's facilities so that the Grantee may relocate its facilities in other City right-of-way in order to accommodate such project.

After receipt of such notice and such plans and specifications, the Grantee shall complete relocation of its facilities at no charge or expense to the City (except as hereinafter provided) so as to accommodate the project construction schedule.

The Grantee may, after receipt of written notice requesting a relocation of its facilities, submit to the City written alternatives to such relocation. The City shall evaluate such alternatives and advise the Grantee in writing if one or more of the alternatives are suitable to accommodate the work, that would otherwise necessitate relocation of the Grantee's facilities. If so requested by the City, the Grantee shall submit additional information to assist the City in making such an evaluation. The City shall give each alternative proposed by the Grantee full and fair consideration. In the event the City ultimately determines in its sole discretion that there is no other reasonable alternative, the Grantee shall relocate its facilities as otherwise provided in this Section. Provided, however, the parties agree to exercise good faith, reasonable and timely decision making especially when issues arise in the field pertaining to relocations. The provisions of this Section shall survive the expiration or termination of this franchise.

The provisions of this Section shall in no manner preclude or restrict the Grantee from making any arrangements it may deem appropriate when responding to a request for relocation of its facilities by any person or entity other than the City, where the facilities to be constructed by said person or entity are due to a private development, use or activity, provided that such arrangements do not unduly delay a City construction project.

The City on occasion will be constructing, reconstructing and/or relocating roads, streets,
public ways, areas or facilities within the right-of-way or property which will require Grantee to install and/or relocate part of its electric utility system. Grantee will be relying on the alignment, lines and grades as set forth in City’s approval plans wherein Grantee thereafter constructs or reconstructs its electric utility system in accordance with City’s requirements and City standards. Therefore, if City thereafter again adjusts and/or revises the alignment, line or grade for a road, street, public way or area, before this part of the Grantee’s electric utility system has been in place for fifteen (15) years (commencing with the initial City revision), then City agrees to reimburse Grantee a pro rata share of the total relocation costs based on fifteen (15) year life expectancy for the portion of Grantee’s electric utility system that is affected by the City revision unless differently agreed to in writing by City and Grantee at the time of the installation or relocation. This Section is not applicable to a conversion when the existing electric utility system is overhead and it is desired to convert to underground, as such conversions are covered by Section 5 herein, or by other arrangements as mutually agreed.

Section 4. Consideration for Franchise. (a) The consideration for this franchise includes, but is not limited to, the mutual and individual benefits of this franchise that allow each of the parties the ability to make long term planning decisions in light of the provisions set forth herein, the waiver of permit fees, as provided in Section 11 of this franchise, the non-competition provisions as provided in Section 18 of this franchise, and any fees that may be charged pursuant to RCW 35.21.860(b).

(b) If the City grants to any other retail electric or energy provider a franchise or allows any other retail electric or energy provider to operate under terms that are over-all more favorable than those set forth herein, Grantee shall have the right to initiate negotiations with the City to modify the provisions of this franchise that Grantee believes are over-all less favorable to it than those authorized or allowed to said providers.
(c) If there is a substantial change in the law or circumstances beyond the control of either party hereto that substantially adversely affects said party, including without limitation a change in state or federal law that would allow the City the opportunity to tax and assess additional revenue from the Grantee for the Grantee’s operations under this franchise, then said party may initiate negotiations of the provisions of this franchise to address the terms affected by the change in the law or circumstances, and the parties agree to negotiate in good faith to address said concerns and to accomplish the original intent of both parties.

Any modification to the provisions of this franchise pursuant to this Section 4 shall be by mutual agreement of the parties.

Section 5. Undergrounding of Facilities. (a) In any area of the City in which there are no aerial facilities, or in any area in which telephone, electric power wires and cables have been placed underground, the Grantee shall not be permitted to erect poles or to run or suspend wires, cables or other facilities thereon, but shall lay such wires, cables or other facilities underground in the manner required by the City. Provided that, except for high voltage lines, the electric service and distribution lines in areas that are to be served by the Grantee and that were not previously served by the Grantee shall be undergrounded.

(b) Whenever the City may desire the undergrounding of the aerial utilities in an area of the City, the Grantee agrees to cooperate with the City in its efforts to obtain funding therefore, including any City proposal to create a Local Improvement District (L.I.D.) to provide such funding, as follows:

(1) Seventy percent (70%) of the total actual cost of converting the Grantee’s existing overhead primary electrical distribution system (i.e. 15 KV and less) and data lines to underground shall be provided by the City, including without limitation funds from assessments against the property owners within the L.I.D. Assessments will be in
accordance with applicable law;

(2) Thirty percent (30%) of the total actual cost of converting the Grantee’s existing overhead primary electrical distribution system and data lines to underground shall be provided for by the Grantee;

(3) Any project charges for the undergrounding of items other than the electrical distribution system covered under this franchise, such as secondary electrical services, telephone, fire alarm, cable TV, and street lighting circuits, will not be included when determining the amount to be paid by the Grantee;

(4) Conversion of the secondary electrical service on private property is not to be included in the computation of the allocation of payments to be made by the Grantee. The customer must supply and install the secondary conductor, power conduit and Grantee’s data conduit from the meter to the secondary electrical service box located near the property line;

(c) Whenever the City may desire the undergrounding of the aerial utilities in an area of the City in conjunction with a City Public Works Improvement Project (street widening, sewer installation, curb and sidewalk installation, street lighting, traffic signal, etc.) and more than 50% of these aerial facilities are affected by or must be relocated as a result of such Public Improvement Project, the Grantee agrees to cooperate with the City's proposal to underground the aerial facilities as follows:

(1) Fifty percent (50%) of the total actual cost of converting the Grantee’s existing overhead primary electrical distribution system and data lines to underground shall be provided by the City. (Total actual cost shall include trenching, vaults, conduit, cable, data conduit and cable, switch gears, transformers, restoration, etc.)

(2) Fifty percent (50%) of the total actual cost of converting the Grantee’s existing
overhead primary electrical distribution system and data lines to underground shall be provided by the Grantee. (Total actual cost shall include trenching, vaults, conduit, cable, data conduit and cable, switch gears, transformers, restoration, etc.)

(3) Any project charges for the undergrounding of items other than the electrical distribution system covered under this franchise, such as secondary electrical services, telephone, fire alarm, cable TV, and street lighting circuits, will not be included when determining the amount to be paid by the Grantee;

(4) Conversion of the secondary electrical service on private property is not to be included in the computation of the allocation of payments to be made by the Grantee. The customer must supply and install the secondary conductor, power conduit and Grantee's data conduit from the meter to the secondary electrical service box located near the property line.

In the event sufficient right-of-way is not available to allow relocation of the Grantee's existing aerial system due to the requirements of a City Public Works Project and undergrounding is therefore required, then all of the above provisions (Subsection (c)(1) - (4)) shall apply.

(d) Grantee may elect to install conduit for data use in trenches where existing overhead data lines are not present for no additional share of trenching costs. The City may elect to have Grantee install conduit in Grantee's trenches for the City's use, provided the City agrees to reimburse Grantee for the incremental cost difference. The incremental cost shall be the actual cost of the conduit plus the labor to install it, without profit markup.

Notwithstanding anything to the contrary in this Section, this Section 5 shall not apply where wetlands or other obstructions make undergrounding impractical, or to electric lines of greater than 15 kV.

Section 6. Transmission Facilities.
Wherever existing transmission line poles are subject to relocation as necessary for a City Public Works Improvement Project (street widening, sewer installation, curb and sidewalk installation, street lighting, traffic signal, etc.), the Grantee agrees to cooperate with the City's proposal to have Grantee install alternate structures (typically tubular steel poles) rather than Grantee's standard wood poles, provided the City agrees to reimburse Grantee for the incremental cost difference. The incremental cost shall be the difference between the estimated cost of wood pole construction and alternate structure construction, without profit markup.

Section 7. The Grantee's Maps, Records and Plans. After construction of any electrical work is complete, and at a reasonable time thereafter, upon the City's request, the Grantee shall provide to the City at no cost, a copy of all as-built plans and maps.

Section 8. Excavations. (a) During any period of relocation, construction or maintenance, all surface structures, if any, shall be erected and used in such places and positions within said public right-of-ways and other public properties so as to interfere as little as practicable with the free passage of traffic and the free use of adjoining property, and the Grantee shall at all times post and maintain proper barricades and comply with all applicable safety regulations during such period of construction as required by the ordinances of the City or the laws of the State of Washington.

(b) Whenever the Grantee shall excavate in any public right-of-way or other public property for the purpose of installation, construction, repair, maintenance or relocation of its cable or equipment, it shall apply to the City for a permit to do so and upon obtaining a permit shall give the City at least twenty-four (24) hours written notice during the normal work week of the Grantee's intent to commence such work. In no case shall any work commence within any public right-of-way or other public property without a permit, except as otherwise provided in this franchise ordinance. During the progress of the work, the Grantee shall not unnecessarily obstruct
the passage or proper use of the right-of-way or other public property, and shall file as-built plans
or maps with the City showing the proposed and final location of its facilities.

(c) If either the City or the Grantee at any time plans to make excavations in any area
covered by this franchise and as described in this Section, the party planning such excavation shall
afford the other, upon receipt of a written request to do so, the first opportunity to use such
excavation at no additional cost, provided that:

(1) Such joint use shall not unreasonably delay the work of the party causing the excavation
to be made;

(2) Such joint use shall be arranged and accomplished on terms and conditions satisfactory
to both parties;

(3) Either party may deny such request for safety reasons; and

(4) If either party increases the size of the original excavation, said party shall be
responsible for the extra cost associated with the additional excavation.

The provisions of this Section shall survive the expiration, revocation or termination by
other means of this franchise.

Section 9. Restoration after Construction. The Grantee shall, after abandonment
approved under Section 15 herein, or installation, construction, relocation, maintenance, or repair
of electrical facilities within the franchise area, restore the surface of the street, right-of-way or
public property to at least the same condition the property was in immediately prior to any such
installation, construction, relocation, maintenance or repair, unless other arrangements are
mutually agreed to by both parties for a particular project. The Public Works Director shall have
final approval of the condition of such streets, rights-of-way and public places after restoration.
All concrete encased monuments that have been disturbed or displaced by such work shall be
restored pursuant to all federal, state and local standards and specifications. The Grantee agrees to
promptly complete all restoration work and to promptly repair any damage caused by such work to the franchise area or other affected area at its sole cost and expense. The provisions of this Section shall survive the expiration, revocation or termination by other means of this franchise.

Section 10. Emergency Work — Permit Waiver. In the event of an emergency in which any of the Grantee's facilities located in or under any street are broken, damaged, or if the Grantee's construction area is otherwise in such a condition as to immediately endanger the property, life, health or safety of any individual, the Grantee shall immediately take the proper emergency measures to repair its facilities, to cure or remedy the dangerous conditions for the protection of property, life, health or safety of individuals without first applying for and obtaining a permit as required by this franchise. However, this shall not relieve the Grantee from the requirement of obtaining any permits necessary for this purpose, and the Grantee shall apply for all such permits not later than the next succeeding day during which the City offices are open for business.

Section 11. Dangerous Conditions, Authority for City to Abate. Whenever construction, installation or excavation of facilities authorized by this franchise has caused or contributed to a condition that appears to substantially impair the lateral support of the adjoining street or public place, or endangers the public, an adjoining public place, street utilities or City property, the Public Works Director may direct the Grantee, at the Grantee's own expense, to take actions to restore such lateral support, and/or protect the public, adjacent public places, City property or street utilities; and such action may include compliance within a prescribed time.

In the event that the Grantee fails or refuses to promptly take the actions directed by the City, or fails to fully comply with such directions, or if emergency conditions exist which require immediate action, the City may enter upon the property and take such actions as are necessary to protect the public, adjacent streets, or street utilities; or to maintain the lateral support thereof, or
actions regarded as necessary safety precautions; and the Grantee shall be liable to the City for the costs thereof. The provisions of this Section shall survive the expiration, revocation or termination of this franchise.

Section 12. Permits and Fees. Grantee shall be required to obtain all permits from the City necessary for work in the City and/or in the City's rights-of-way. In consideration of this franchise, including the factors set forth in Section 4, and the payments by Grantee provided in Section 18 hereof, Grantee shall not further be subject to any permit fees associated with Grantee's activities (except those undertaken due to a private development, activity or use) through the authority granted in this franchise ordinance or under the laws of the City.

The Grantee shall promptly reimburse the City for any and all costs the City reasonably incurs in response to any emergency caused by the negligence of the Grantee. City agrees to process Grantee's and Grantee's contractors' permits in the same expeditious manner as other permit applicants' permits are processed. Permits may be processed by facsimile or electronic mail.

Section 13. City's Reservation of Rights. Pursuant to RCW 35.21.860, the City is precluded from imposing a franchise fee on an electrical energy business, except for administrative expenses directly related to receiving and approving a permit, and to inspecting plans and construction.

The City hereby reserves its right to impose a franchise fee on the Grantee for purposes other than to recover its administrative expenses, if the Grantee's operations as authorized by this franchise change so that not all uses of the franchise are those of an electrical energy business or, if statutory prohibitions on the imposition of such fees are removed. In either instance, the City also reserves its right to require that the Grantee obtain a separate franchise for its change in use, which franchise may include provisions intended to regulate the Grantee's operations, as allowed under
applicable law. Provided however, if a franchise fee is desired to be imposed, the City and Grantee agree to renegotiate this franchise as further set forth in Section 4, so to preserve the original intent of the parties.

Section 14. Indemnification. The Grantee hereby releases, covenants not to bring suit and agrees to indemnify, defend and hold harmless the City, its officers, employees, agents and representatives from any and all claims, costs, judgments, awards or liability to any person, including claims by the Grantee's own employees to which the Grantee might otherwise be immune under Title 51 RCW, arising from injury or death of any person or damage to property, monetary losses, including refunds of charges or fees paid by customers, of which it is alleged or proven that the acts or omissions of the Grantee, its agents, servants, officers or employees in performing this franchise caused or contributed thereto, including claims arising against the City by virtue of the City's ownership or control of the rights-of-way or other public properties, by virtue of the Grantee's exercise of the rights granted herein, including payment of any monies to the City, or by virtue of the City's permitting the Grantee's use of the City's rights-of-way or other public property, based upon the City's inspection or lack of inspection of work performed by the Grantee, its agents and servants, officers or employees in connection with work authorized on the City's property or property over which the City has control, pursuant to this franchise or pursuant to any other permit or approval issued in connection with this franchise.

Inspection or acceptance by the City of any work performed by the Grantee at the time of completion of construction shall not be grounds for avoidance of any of these covenants of indemnification. Said indemnification obligations shall extend to claims which are not reduced to a suit and any claims that may be compromised prior to the culmination of any litigation or the institution of any litigation.

In the event that the Grantee refuses the tender of defense in any suit or any claim, said
tender having been made pursuant to the indemnification clauses contained herein, and said refusal is subsequently determined by a court having jurisdiction (or such other tribunal that the parties shall agree to decide the matter), to have been a wrongful refusal on the part of the Grantee, then the Grantee shall pay all of the City's costs for defense of the action, including all reasonable expert witness fees and reasonable attorneys' fees and the reasonable costs of the City, including reasonable attorneys' fees of recovering under this indemnification clause.

In the event of liability for damages arising out of bodily injury to persons or damages to property caused by or resulting from the concurrent negligence of the Grantee and the City, its officers, employees and agents, the Grantee's liability hereunder shall be only to the extent of the Grantee's negligence unless otherwise provided by law. It is further specifically and expressly understood that the indemnification provided herein constitutes the Grantee's waiver of immunity under Title 51 RCW, solely for the purposes of this indemnification. This waiver has been mutually negotiated by the parties.

The provisions of this Section shall survive the expiration, revocation or termination of this franchise.

Section 15. Insurance. Grantee is currently self-insured and has excess insurance coverage for potential liability in excess of its self-insured retention amounts. To the extent that Grantee is legally obligated by this franchise, Grantee's self-insurance fund and/or insurance policies shall provide protection to City in amounts equivalent to the levels set forth hereinbelow. Grantee's general comprehensive liability policy that includes automobile liability coverage (if such a policy continues to be obtained), shall have an endorsement naming City and its officers and employees as additional insureds for their actions pursuant to this franchise.

The amounts of insurance coverage that the Grantee shall maintain, whether by self insurance or insurance policies shall not be less than the following, or the equivalent thereof:
A. Automobile Liability insurance with limits no less than $1,000,000 Combined Single Limit per accident for bodily injury and property damage; and

B. Commercial General Liability insurance, written on an occurrence basis with limits no less than $1,000,000 combined single limit per occurrence and $2,000,000 aggregate for personal injury, bodily injury and property damage. Coverage shall include but not be limited to: blanket contractual; products/completed operations; broad form property damage; explosion, collapse and underground; and employer's liability.

C. The coverage amounts set forth in A and B above shall be reviewed no less frequently than once every five (5) years, and such coverage amounts shall be adjusted as necessary to reflect inflation, changes in standards of liability, higher damage awards or other relevant changes in circumstances.

Any deductibles or self-insured retentions must be declared to and approved by the City. Payment of deductible or self-insured retention shall be the sole responsibility of the Grantee.

Any insurance policy(ies) obtained by the Grantee to comply herewith shall name the City (its officers, employees and volunteers,) as an additional insured with regard to activities performed by or on behalf of the Grantee. The coverage shall contain no special limitations on the scope of protection afforded to the City, its officers, officials, employees or volunteers. In addition, the insurance policy shall contain a clause stating that coverage shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability. The Grantee's insurance shall be primary insurance with respect to the City, its officers, officials, employees and volunteers. Any insurance policy or policies obtained by the Grantee to comply with this clause shall be endorsed to state that coverage shall not be suspended,
voided, canceled by either party, reduced in coverage or in limits except with the prior written agreement of the City.

Any failure to comply with the insurance reporting provisions of the policies required herein shall not affect coverage provided to the City, its officers, officials, employees or volunteers.

Section 16. Abandonment of the Grantee's Facilities. No electrical system facility located within the public right-of-way by the Grantee may be abandoned by the Grantee without the express written consent of the City. Underground conduit or wires may be left in place when abandoned by Grantee. Any plan for abandonment or removal of the Grantee's facilities must be first approved by the Public Works Director, and all necessary permits must be obtained prior to such work. The provisions of this Section shall survive the expiration, revocation or termination of this franchise.

In the event the Grantee has a joint pole agreement with another party, pursuant to which Grantee may remove its portion of the pole, prior to removing its portion of any pole located in the City, the Grantee shall notify the City of its intention to remove its portion of the pole.

Section 17. Street Vacations. City may have occasion to vacate certain streets, public ways or areas that have Grantee's lines and facilities located thereon. City agrees to notify Grantee of such an occurrence and to reserve an easement for Grantee's lines and facilities when a street, public way or area is vacated. If it is not feasible for City to reserve an easement for Grantee's line(s) and facilities, the proponents of the vacation shall be required (by City) as part of land use or other permitting approvals, to reimburse Grantee all costs to relocate said line(s) and facilities.

Section 18. Modification and Annexation. The City and the Grantee hereby reserve the right to alter, amend or modify the terms and conditions of this franchise upon written agreement of both parties to such alteration, amendment or modification. In the event of a City annexation or
change in boundaries, City agrees to provide Grantee's Power Superintendent written notice of any such annexation or boundary change 60 days prior to the effective date thereof. After Grantee's Power Superintendent receives notification of said annexation or change in boundaries, Grantee agrees to make any necessary adjustments to Grantee's internal documents and customer records in order to reflect said annexation or boundary modifications.

The parties' respective chief operating or administrative officer may by letter agree to procedures or plans to implement the terms of this franchise.

Section 19. Exercise of City Authority. The parties acknowledge that the City has authority to operate its own electric utility and also has authority to contract with other public or private entities for the purchase of electrical energy. Grantee's long range planning would be improved, and its rate structure stabilized if the City did not elect to exercise its authority in the service area of the Grantee. Therefore, Grantee agrees that for and in consideration of the City not exercising its authority to operate its own electric utility in the service area served by Grantee, and not levying a Utility Tax, or not contracting with other public or private entities for the purchase of electrical energy in said service area, and the other factors of consideration set forth in Section 4 of this franchise, Grantee shall pay to the City an amount equal to three percent (3%) of the total gross revenues Grantee receives from Grantee's electric utility service customers located within the City that are served from Grantee's electric utility system. The payments to the City shall be made quarterly, in four equal payments each year, on or before March 31, June 30, September 30, and December 31 of each year during the term hereof. Except as provided below, such payments shall be based on the gross revenues received by Grantee in the preceding year, and such payments shall be calculated and submitted to the City using the form appended hereto as Attachment 1. It is further provided that nothing herein shall be deemed to impair the authority of the City to exercise its governmental powers.
Until the changeover date (as defined in Section 1), application of the City’s existing utility tax will continue and payment will be made on Grantee’s revenues accrued prior to said date. After the changeover date, the quarterly payments due to the City through 2003 shall be based on the gross revenues received by Grantee each quarter. For the first franchise administration fee payment, the gross revenues will commence to accrue as of the changeover date and will continue until the end of the initial quarter. During 2003, franchise administration fee payments shall be made within 30 days of quarter end. (i.e. changeover date of May 31, revenues accrued from May 31 through June 30 will have the franchise administration fee applied and franchise administration fee payment would be made on or before July 30. If changeover date occurred in second quarter, the third quarter 2003 payment would be on revenues from July 1 through September 30 and paid on or before October 30). In 2004, franchise administration fee payments will be based on total gross revenues received from Grantee’s customers from within the City for 2003, less amounts paid to the City for the Fife Municipal Tax accrued prior to the changeover date.

After appropriate action by the City Council of Fife that shall include at least one year notice to Grantee (for implementation), the City may require that Grantee adjust the franchise administration fee amount to a higher or lower percentage of gross revenues, provided however, the percentage shall not exceed the percentage amount of tax that a municipality may impose on a private electric utility pursuant to RCW 35.21.865 and RCW 35.21.870 (as may be amended).

Whenever during the term of this franchise the City of Tacoma imposes on Grantee a Gross Earnings Tax for retail electrical service in excess of three percent (3%), Grantee shall give the City written notice of such increase, and on and after the effective date that such increase is reflected in Grantee’s rates, the percentage of gross revenues paid by the Grantee to the City pursuant to this Section 18, may be increased, at the request of the City, to equal the percentage of the Gross Earnings Tax.
Section 20. Forfeiture and Revocation. In the event of a violation or failure by Grantee to perform any material obligation or material duty hereunder or to comply with any material provision of this franchise, the City may elect, without any prejudice to any of its other legal rights and remedies, to obtain an order from the superior court having jurisdiction compelling the Grantee to comply with the provisions of this franchise, and to recover damages and costs incurred by the City by reasons of the Grantee's failure to comply or perform.

If the Grantee willfully violates or fails to comply with any material provision of this franchise, or through willful misconduct or gross negligence fails to heed or comply with any notice given the Grantee by the City under the provisions of this franchise, then the Grantee shall, at the election of the Fife City Council, forfeit all rights conferred hereunder and this franchise may be revoked or annulled by the Council after a hearing is held with reasonable notice to the Grantee.

Section 21. Remedies to Enforce Compliance. In addition to any other remedy provided herein, the City reserves the right to pursue any remedy to compel or force the Grantee and/or its successors and assigns to comply with the terms hereof, and the pursuit of any right or remedy by the City shall not prevent the City from thereafter declaring a forfeiture or revocation for breach of the conditions herein.

Section 22. City Ordinances and Regulations. Nothing herein shall be deemed to direct or restrict the City's ability to adopt and enforce all necessary and appropriate ordinances made in the exercise of its police powers in the interest of public safety and for the welfare of the public. The City shall have the authority at all times to control by appropriate regulations the location, elevation, manner of construction and maintenance of any facilities by the Grantee, and the Grantee shall promptly conform with all such regulations, unless compliance would cause the Grantee to violate other requirements of law. The City acknowledges that if it adopts an ordinance
requiring the undergrounding of Grantee's overhead electric utility system (in whole or part), that Grantee's cost reimbursement for such conversion may be in increased electric rates applicable to Grantee's customers within the City.

In order that electric utility related requirements, including, but not limited to the electric code, energy code, customer service policies, etc., be uniform within Grantee's service area, for Grantee's customers within the City, the City agrees to acknowledge the Grantee's authority to enforce its codes and policies and the City agrees to adopt by ordinance the Grantee's codes and policies, and subsequent versions, on said subjects as those adopted or promulgated by Grantee's legislative and/or other appropriate authority.

Section 23. Cost of Publication. The cost of the publication of this franchise shall be borne by the Grantee, provided that if such cost exceeds $1,000, the excess amount may be deducted from the administrative fee to be paid to City.

Section 24. Acceptance. Within sixty days after the passage and approval of this franchise, this franchise may be accepted by the Grantee by its filing with the City Clerk an unconditional written acceptance thereof. Failure of the Grantee to so accept this franchise within said period of time shall be deemed a rejection thereof by the Grantee, and the rights and privileges herein granted shall, after the expiration of the sixty day period, absolutely cease and determine, unless the time period is extended by ordinance duly passed for that purpose.

Section 25. Survival. All of the provisions, conditions and requirements of Sections 3, Relocation of Electrical Transmission Facilities; 10, Dangerous Conditions; 13, Indemnification; and 15, Abandonment of the Grantee's Facilities, of this franchise shall be in addition to any and all other obligations and liabilities the Grantee may have to the City at common law, by statute, or by contract, and shall survive this franchise to the Grantee, and any renewals or extensions thereof (however, such survival period extends only through the applicable statute of limitations period).
All of the provisions, conditions, regulations and requirements contained in this franchise shall further be binding upon the successors, legal representatives and assigns of the Grantee and all privileges, as well as all obligations and liabilities of the Grantee shall inure to its successors, legal representatives and assigns equally as if they were specifically mentioned wherever the Grantee is named herein.

Section 26. Severability. If any section, sentence, clause or phrase of this franchise should be held to be invalid or unconstitutional by a court of competent jurisdiction, such invalidity or unconstitutionality shall not affect the validity or constitutionality of any other section, sentence, clause or phrase of this franchise. In the event that any of the provisions of this franchise are held to be invalid by a court of competent jurisdiction, the City reserves the right to reconsider the grant of this franchise and may amend, repeal, add, replace or modify any other provision of this franchise, or may terminate this franchise.

Section 27. Assignment. This franchise may not be assigned or transferred without the written approval of the City, which approval shall not be unreasonably withheld. In the event Grantee desires to assign this franchise to a successor, Grantee shall pay the reasonable cost for the City's review of the creditworthiness, service capability, and business practices of the proposed assignee.

Section 28. Notice. Any notice or information required or permitted to be given to the parties under this franchise may be sent to the following addresses unless otherwise specified:

City of Fife
5411 23rd Street East
Fife, WA 98424
Attn: City Manager

Tacoma Power
3628 South 35th Street
Tacoma, WA 98409-3115
Attn: Power Superintendent

Section 29. Effective Date. This Ordinance has first been submitted to the Fife City Attorney; granted an approving vote of at least a majority of the City Council at a regular meeting after initial introduction on August 12, 2003, and been published at least once in a newspaper of general circulation in the City of Fife. This franchise ordinance shall be effective thirty (30) days after execution and pursuant to RCW 80.32.040 is subject to referendum under the general laws of this state.

ADOPTED by the City Council this 23rd day of September, 2003.

CITY OF FIFE

[Signature]
William J. Malinen, City Manager

Attest:

[Signature]
Marlyn Campbell, City Clerk

Approved as to Form:

[Signature]
Gregory A. Jacoby, Assistant City Attorney
FIGURE 1
SUBSIDIARY CONDUIT INSTALLATION
RISER POLE EXAMPLE

Riser Pole

6 in. (152 mm)  Two Hole Grp

30 in. (762 mm)

90° Bend

Conduit Joint

Subsidiary Conduit
CONDUIT DESIGN

SECTION 8

CUBIC YARDS OF CONCRETE PER 100 FEET OF TRENCH

FOR LARGER FORMATS:
PLASTIC: 35"W

NOTE: OPTIONAL FOR STRAIGHT RUNS OF PLASTIC

SINGLE-BULK CONDUIT (ALL TYPES) ON CURVES

CENTURYLINK STANDARDS

OSP ENGINEERING HANDBOOK

NOVEMBER 1995
Updated 05/02

www.gopherstateonecall.org
651-454-0002 — Metro / 800-252-1166 — Greater MN

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Non Skid Covers Available

FOR DETAILS, SEE REVERSE>>

Items Shown Are Subject To Change Without Notice

Issue Date: April 2016

CenturyLink Standards

264-TA

CENTURY LINK PID# 2306738

Non Skid Covers Available

FOR DETAILS, SEE REVERSE>>

Items Shown Are Subject To Change Without Notice

Issue Date: April 2016
CenturyLink Standards

TOP SECTION
No. 467-T42C
7,216 lbs.

BASE SECTION
No. 467-B
7,199 lbs.

42" Dia. Access

CENTURY LINK PID# 2306746
FOR DETAILS, SEE REVERSE>>

Items Shown Are Subject To Change Without Notice
Issue Date: April 2016

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Mailing Address
PO Box 588
Auburn, WA 98071

Phone: 800-892-1538
Fax: 253-735-4201
Email: opauburn@oldcastle.com

Delivering Reliability
PLAN VIEW

2-Ton Lift Anchor
4 Places in Top

2" Dia. Ground Rod Knockout
2 Places in Floor

Bonding Ribbon
2 Each Side, 2 Sides
Top & Bottom

Galvanized "C" Channel, 5'-0" Lg.
4 Each Side, 2 Sides

12" Dia. Sump
w/ Polymer Cover

SECTION AA

SECTION BB

1'-3"
3'-7"
3'-11"
8'-0"
4'-1"
6'-6"
6'-9"
6'-6"
6'-8"
11'-11"
2'-2"
2'-0"
7'-0"

Galvanized "C" Channel, 2'-0" Lg.
4 Each End, 2 Ends

Term-A-Duct = 4" Dia.
For 4.35" Dia. Pipe
6 Each End, 2 Ends

CENTURY LINK PID# 2306746

SCALE: 3/8" = 1'-0"

CenturyLink Standards

467-TA

© 1995-2016 Oldcastle Precast, Inc.
ProFORM® Series Non-Metallic Pedestals

Dome
- Single point self-locking
- Integral flood protection available
- Increased splice capacity
- Lift-off handles

Mounting Plate
- "Slide and secure" snap in ease
- Universal mounting pattern
- Wire grooming
- Bonding flexibility
- High capacity splice ladder
- Secure splice ladder snap
- "C" bracket option
- Splice bracket option

Short Split/Rehab Base
- Split/rehab base
- Ease of installation
- In ground stability
- Self-supporting base
- Integral spade base
- Molded in ground line
- Front access service wire channel
- Temporary service grommets

Integral Spade Base

Dimensions

<table>
<thead>
<tr>
<th>Pedestal</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<tbody>
<tr>
<td>Short Self-Supporting Base</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Pro6</td>
<td>45-in.</td>
<td>35-in.</td>
<td>30-in.</td>
<td>9-in.</td>
<td>6.5-in.</td>
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<tr>
<td>Pro8</td>
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<td>35-in.</td>
<td>30-in.</td>
<td>10.5-in.</td>
<td>8-in.</td>
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<tr>
<td>Pro10</td>
<td>45-in.</td>
<td>35-in.</td>
<td>30-in.</td>
<td>12-in.</td>
<td>10.8-in.</td>
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<tr>
<td>Pro12</td>
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<td>35-in.</td>
<td>30-in.</td>
<td>14.5-in.</td>
<td>11.5-in.</td>
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<tr>
<td>Pro14</td>
<td>51-in.</td>
<td>38-in.</td>
<td>36-in.</td>
<td>17.7-in.</td>
<td>17.7-in.</td>
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<td>38-in.</td>
<td>36-in.</td>
<td>23.6-in.</td>
<td>17.6-in.</td>
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<td>Pro1830</td>
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<td>38-in.</td>
<td>36-in.</td>
<td>33.8-in.</td>
<td>21.8-in.</td>
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<td>Integral Spade Base</td>
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<td>Pro6</td>
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<td>9-in.</td>
<td>6.5-in.</td>
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<td>8-in.</td>
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<tr>
<td>Pro10</td>
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<td>30-in.</td>
<td>12-in.</td>
<td>10.8-in.</td>
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<td>Pro12</td>
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<td>35-in.</td>
<td>30-in.</td>
<td>14.5-in.</td>
<td>11.5-in.</td>
</tr>
</tbody>
</table>

* Height of closure above ground.

EMERSON
Network Power
**Signature Pedestal Housing (SPH™) Series**

Houses active and passive equipment such as a mini-bridger tap/splitter, or a line extender tap/splitter combo.

**Specifications**

- **Dimensions:**
  - 12" x 12" x 32" (305mm x 305mm x 813mm) (cover interior dimensions)
  - 13" x 11.5" x 15" (330mm x 292mm x 381mm) (base interior dimensions)

- **Shipping:** 1 per carton, 12 per pallet
- **Weight:** 35 lbs (16 kg) carton

**Features**

- 600 Series HDC cover designed for maximum heat dissipation
- Self-Lock self-latching cover with various lock head options
- Complete 360° access working area
- Universal bracketry provides a wide range of equipment mounting options
- Base accommodates multiple ducts and conduits
- Location strips for customized labeling and identification

**Bracketry**

- B1– MB-8315
- B2 – MB-8314
- B3– MB-8315 (2 ea.)
- B4 – MB-8314 (2 ea.)
- B94 – MB-0606 (B90, B91, B93 Not Shown)

**Locking Options**

- L00 – Standard Self-Locking System & Hasp
- LH1 – Hex Head Self-Locking System
- LS1 – Channell Star Self-Locking System
- L01 – Standard Self-Locking System
- L08 – Standard Self-Locking System & Channell Padlock
- L09 – Standard Self-Locking System & Highfield Lock
- L90 – Standard Self-Locking System & Highfield Lock with Steel Tether
- LH9 – Hex Head Self-Locking System & Highfield Lock

**Accessories**

A08-600 Series Cover with Anti-insect Vents
Signature Pedestal Housing (SPH™) Series

ORDERING INFORMATION

EASY STEPS:
1. Determine Size
2. Select Cover Option
3. Designate Color
4. Select Mounting Brackets
5. Select Locking Option
6. Designate Additional Options

Signature Pedestal Housing

1. Determine Size
   Width – 12” x 12”

2. Select Cover Option
   6 – 600 Series Cover

3. Designate Color
   C1 – Light Green
   C2 – Beige
   C3 – Dark Green
   C4 – Brown
   C5 – Grey
   C6 – Granite
   C7 – Sandstone
   C8 – Red Brick

4. Select Mounting Brackets
   B1 – MB-8315
   B2 – MB-8314
   B3 – MB-8315 [2 ea.]
   B4 – MB-8314 [2 ea.]
   B90 – MB-0613
   B91 – MB-0612
   B93 – MB-0611
   B94 – MB-0606

5. Select Locking Option*
   L00 – Standard Self-Locking System & Hasp
   LH1 – Hex Head Self-Locking System
   LS1 – Channell Star Self-Locking System
   L01 – Standard Self-Locking System
   L08 – Standard Self-Locking System & Channell Padlock
   L09 – Standard Self-Locking System & Highfield Lock
   L90 – Standard Self-Locking System & Steel Tether Highfield Lock
   LH9 – Hex Head Self-Locking System & Highfield Lock

6. Designate Additional Options
   A08 – Anti-insect Vents
   A26 – Pedestal Identification Strip

Example: SPH12126C1B1LH1A08
SPH1212: 600 Series Cover, Light Green, MB8315 Bracket, Hex Head Self-Locking System, Anti-insect Vents

*Additional Self-Lock options available (not shown).
BODY SPECIFICATIONS

Cover Weight (Split 1/2 Cover)  50 lbs [23 kg]
Pit Weight  129 lbs [59 kg]
Assembled Weight  229 lbs [105 kg]

ADDITIONAL BODY DEPTHS

- 10" [254 mm]  56 lbs [26 kg]
- 16" [406 mm]  67 lbs [30 kg]
- 24" [610 mm]  88 lbs [40 kg]
- 30" [762 mm]  108 lbs [49 kg]
**BULK424T072**

**HDPE STRUCTURAL FOAM / CHANNELL SHIELD COVER**

**Channell’s SGLB Assembly**

**FEATURES:**
- Vault body: 24 X 36 X 24 inches (Open Floor)
- HDPE Body – Channell Polymer Cover - Load Rated Tier 22 (ANSI/SCTE 77 2010)
- 1 SHIELD Cover, Tier 22, with Slip Resistant Tread
- 2 Cover locking bolts, 9/16 stainless steel hex head bolts 3/8-16 UNC x 3 ½” thread bolts with washers
- 2 Box self centering stainless steel corrosion resistant nuts
- 2 Temporary drop doors: 1 each side
- Minimum of 2 lifting slots in cover equipped with stainless steel pins (slots approximately ¾” x 2”)
- 4 Reinforced polymer step racks, 2 per side
- 2 lifting slots approximately ¾” x 4” with stainless steel lifting pins.

**WEIGHT & SHIPPING:**
- Cover Weight: 50 lbs
- Box Weight: 55 lbs
- Assembly Weight: 105 lbs
- Loaded Pallet Weight: 210 lbs
- Per Pallet #: 2
- Pallet Dimensions: 58”L x 40”W x 42”H

**LOAD RATINGS:**
- ANSI/SCTE 77 TIER 22
- Proof Load: 33,750 lbf

<table>
<thead>
<tr>
<th>Inside Dimensions</th>
<th>Length</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>34.75”</td>
<td>23”</td>
<td>24”</td>
</tr>
</tbody>
</table>

[Diagram of HDPE Body, Channell SHIELD Cover, and Lift Pin for Handhole Cover]

[Image of Channell Logo]
L Series 1730-18

Light Duty

Flush Cover
Material: HDPE
Weight: 10.0 lbs.
Model: 1730-3B
Option: ABS

T-Cover
Material: HDPE
Weight: 10.0 lbs.
Model: 1730-4B Bolt Down
1730-4L Captive L-Bolt Lock

Body
Material: HDPE
Weight: 26.0 lbs.
Model: 1730-18

Colors Available
Green, Gray or Black

Note: For use in non-vehicular traffic situations only. We do not recommend installation in concrete or asphalt.Weights and dimensions may vary slightly.

Revision Date 4/2003
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CLICK Standards

L Series 1730-18

Light Duty

Static Vertical Load Rating
(Design Load; Test Load)

- ASTM C657 – A-0.3, 300 lbf/ft²
- SCTE – Light Duty, Pedestrian; 3,000 lbf

Shipping Configuration

- Unit, 16 assemblies, = 92.5 cu. ft., 717.0 lbs.

<table>
<thead>
<tr>
<th>Material Property</th>
<th>ASTM Test Method</th>
<th>Typical Value</th>
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<tbody>
<tr>
<td>Type, Class, Category</td>
<td>D 1248</td>
<td>III, A, 3</td>
</tr>
<tr>
<td>Density, g/cm³</td>
<td>D 1505</td>
<td>0.950 min., not to exceed 0.965</td>
</tr>
<tr>
<td>Tensile Strength, at break, psi</td>
<td>D 638</td>
<td>3,000 to 4,400</td>
</tr>
<tr>
<td>Elongation, at break, %</td>
<td>D 638</td>
<td>400</td>
</tr>
<tr>
<td>Tensile Impact, ft-lb/in²</td>
<td>D 1822</td>
<td>27</td>
</tr>
<tr>
<td>Flexural Modulus, psi</td>
<td>D 790</td>
<td>120,000 min., not to exceed 240,000</td>
</tr>
<tr>
<td>Low Temperature Brittleness, F50, at °C</td>
<td>D 746</td>
<td>&lt;75</td>
</tr>
<tr>
<td>Hardness, Shore D</td>
<td>D 2240</td>
<td>66</td>
</tr>
<tr>
<td>Deflection Temperature, at 66 psi, °F</td>
<td>D 648</td>
<td>150° min., not to exceed 200°</td>
</tr>
<tr>
<td>Electrical Dielectric Strength, V/mil</td>
<td>D 149</td>
<td>400 min., not to exceed 600</td>
</tr>
</tbody>
</table>

Molded Product²

- Chemical Resistance | D 543 | Very Resistant |
- Water Absorption | D 570 | Less than 1% weight change |

Note: For use in non-vehicular traffic situations only. We do not recommend installation in concrete or asphalt. Weights and dimensions may vary slightly.

Shipping Information

- UNIT
<table>
<thead>
<tr>
<th>Dim.</th>
<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Height</td>
<td>48&quot;</td>
</tr>
<tr>
<td>B</td>
<td>Length</td>
<td>40&quot;</td>
</tr>
<tr>
<td>C</td>
<td>Width</td>
<td>48&quot;</td>
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</tbody>
</table>

Units: 16 per pallet
Weight: 616 lbs. per pallet

- FLUSH COVER
<table>
<thead>
<tr>
<th>Dim.</th>
<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>A</td>
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<td>68&quot;</td>
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<tr>
<td>B</td>
<td>Length</td>
<td>40&quot;</td>
</tr>
<tr>
<td>C</td>
<td>Width</td>
<td>48&quot;</td>
</tr>
</tbody>
</table>

Units: 120 per pallet
Weight: 1,240 lbs. per pallet

- T-COVER
<table>
<thead>
<tr>
<th>Dim.</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Height</td>
<td>73&quot;</td>
</tr>
<tr>
<td>B</td>
<td>Length</td>
<td>40&quot;</td>
</tr>
<tr>
<td>C</td>
<td>Width</td>
<td>48&quot;</td>
</tr>
</tbody>
</table>

Units: 120 per pallet
Weight: 1,240 lbs. per pallet

BODY

- Dim. | Description | Value |
- A    | Height     | 80"   |
- B    | Length     | 40"   |
- C    | Width      | 48"   |

Units: 16 per pallet
Weight: 456 lbs. per pallet

All information contained in this brochure was current at the time of printing. Because of Oldcastle Precast's policy of ongoing research and development, the Company reserves the right to discontinue or update product information without notice.
**CLICK Standards**

**CARSON**

**Pomona, California**
Toll-Free: 800.735.5566
Phone: 909.634.3020
Fax: 800.827.7111

---

**21972**

**M Series 24-Vaults**

**Medium Duty**

**Polymer Concrete Covers**
*See OPTIONS SECTION:*
- Light Weight Cover

<table>
<thead>
<tr>
<th>Model</th>
<th>Cover Type</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>2424-PC</td>
<td>2424 Cover</td>
<td>98.0 lbs.</td>
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<tr>
<td>A. 23-5/8&quot; (600 mm)</td>
<td>B. 23-5/8&quot; (600 mm)</td>
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<tr>
<td>2436-PC</td>
<td>2436 Cover</td>
<td>140.0 lbs.</td>
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<tr>
<td>A. 35-3/8&quot; (899 mm)</td>
<td>B. 23-3/4&quot; (603 mm)</td>
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<tr>
<td>2448-PC</td>
<td>2448 Cover</td>
<td>180.0 lbs.</td>
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<tr>
<td>A. 47-5/8&quot; (1,210 mm)</td>
<td>B. 23-5/16&quot; (692 mm)</td>
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</tr>
<tr>
<td>2460-PC</td>
<td>2460 Cover</td>
<td>201.0 lbs.</td>
</tr>
<tr>
<td>A. 59-1/8&quot; (1,502 mm)</td>
<td>B. 23-3/4&quot; (603 mm)</td>
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**Bodies (2424-xx, 2436-xx, 2448-xx, 2460-xx)**

**Material:** HDPE

<table>
<thead>
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<th>Model</th>
<th>Weight</th>
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<tbody>
<tr>
<td>2424-18</td>
<td>Model: 2424-18</td>
</tr>
<tr>
<td>D. 31.4&quot; (797 mm)</td>
<td>C. 26.4&quot; (666 mm)</td>
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<tr>
<td>2436-18</td>
<td>Model: 2436-18</td>
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<tr>
<td>D. 43&quot; (1,092 mm)</td>
<td>C. 38&quot; (995 mm)</td>
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<td>2448-18</td>
<td>Model: 2448-18</td>
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<td>D. 55.25&quot; (1,403 mm)</td>
<td>C. 50.3&quot; (1,278 mm)</td>
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<td>2460-18</td>
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<tr>
<td>D. 66.9&quot; (1,699 mm)</td>
<td>C. 61.9&quot; (1,572 mm)</td>
</tr>
</tbody>
</table>

**Extension** (as part of a complete unit)
*height in 6", 12" and 18" increments*

**Material:** HDPE

**Model:** 2424-18X

**Options (see OPTIONS SECTION)**
- Floors
- Duct Terminations
- Light Weight Covers
- Drains

**Colors Available**
- Body: Grey
- Cover and Ring: Gray or Green
APPENDIX E

PLANS FOR LOVE’S REDEVELOPMENT
<table>
<thead>
<tr>
<th>Plan Name</th>
<th>Description</th>
<th>Revision</th>
<th>Code</th>
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<td>M-24.60-04</td>
<td>WSDOT LINE SYMBOL</td>
<td>J-15.15-02</td>
<td>WSDOT TIMBER POLE</td>
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<tr>
<td>F-10.12.03</td>
<td>WSDOT CURB AND GUTTER</td>
<td>J-40.10-04</td>
<td>WSDOT JUNCTION BOX</td>
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<td>F-30.10-03</td>
<td>WSDOT SIDEWALK</td>
<td>J-50.12-00</td>
<td>WSDOT LOOP DETECTORS</td>
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<td>F-10.42-00</td>
<td>WSDOT EXTRUDED CURB</td>
<td>J-40.36-02</td>
<td>WSDOT NEMA BOX</td>
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<td>J-60.11-00</td>
<td>WSDOT DEFLECTION FITTING</td>
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<td>D-3.09-00</td>
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<td>D-3.10.01</td>
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<td>J-21.16-01</td>
<td>WSDOT BEACON</td>
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<td>WSDOT GUARDRAIL</td>
<td>J-40.10-04</td>
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CATCH BASIN FRAME AND VANED GRATE OR MANHOLE RING AND COVER

RECTANGULAR ADJUSTMENT SECTION OR CIRCULAR ADJUSTMENT SECTION

FLAT SLAB TOP

SEPARATE BASE PRECAST

INTEGRAL BASE PRECAST WITH RISER (48'-72' ONLY)

SEPARATE BASE PRECAST

INTEGRAL BASE PRECAST WITH RISER

REINFORCING STEEL (TYP.)

GRAVEL BACKFILL FOR PIPE ZONE BEDDING

NOTES

1. No steps are required when height is 4' or less.
2. The bottom of the precast catch basin may be sloped to facilitate cleaning.
3. The rectangular frame and grate may be installed with the flange up or down. The frame may be cast into the adjustment section.
4. Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum. Provide a 1.5" minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification 9-04.3.

CATCH BASIN DIMENSIONS

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<th>MIN. BASE THICKNESS</th>
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<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
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PIPE ALLOWANCES

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1. Corrugated Polyethylene Storm Sewer Pipe (Standard Specification 9-05.20)
2. (Standard Specification 9-05.12(1))
3. (Standard Specification 9-05.12(2))
NOTES

1. This frame is designed to accommodate 20" (in) x 24" (in) grates or covers as shown on Standard Plans B-30.20, B-30.30, B-30.40, and B-30.50.

2. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC x 2" (in) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

3. Refer to Standard Specification Section 9-05.15(2) for additional requirements.
NOTES
1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC x 2" (in) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

2. Alternative reinforcing designs are acceptable in lieu of the rib design.

3. Refer to Standard Specification Section 9-05.15(2) for additional requirements.

4. For frame details, see Standard Plan B-30.10.
1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (16 mm) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

2. Refer to Standard Specification Section 9-05.15(2) for additional requirements.

3. For frame details, see Standard Plan B-30.10.

BOLT-DOWN DETAILS
SEE NOTE 1

RECESSED ALLEN HEAD CAP SCREW
304 S.S. 5/8" (16 mm) - 11 NC x 2" (51 mm)

GRATE
FRAME
HOLE

SECTION A

SECTION B

24"

7 OR 8 EQUAL SPACES

DIRECTION OF FLOW

ISOMETRIC
**NOTES**

1. The gasket and groove may be in the seat (frame) or in the underside of the cover. The gasket may be "T" shaped in section. The groove may be cast or machined.

2. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 3 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 5/8" - 1 NC x 2" Allen head cap screw by being tapped, or other approved mechanism. Location of bolt down holes varies by manufacturer.

3. For bolt-down manhole ring and covers that are not designated "Watertight," the neoprene gasket, groove, and washer are not required.

4. Washer shall be neoprene (Detail "B").

5. In lieu of blind pick notch for manhole covers, a single 1" pick hole is acceptable. Hole location and number of holes may vary by manufacturer.

6. Alternative reinforcing designs are acceptable in lieu of the rib design.

7. For clarity, the vertical scale of the Cover Section has been exaggerated, it is 1.5 times the horizontal scale (1H:1.5V).

**SPECIFY LETTERING**

**ISOMETRIC VIEW**

**CIRCULAR FRAME (RING) AND COVER**

**STANDARD PLAN B-30.70-03**

**SHEET 1 OF 1 SHEET**

**APPROVED FOR PUBLICATION**

Washington State Department of Transportation
WELDED GRATES FOR GRATE INLET

STANDARD PLAN B-40.20-00

END

TOP

CROSS BARS - 3/8" ROUND, OR RECTANGULAR OR HEXAGONAL
BAR OF EQUIVALENT AREA.

TOP

CROSS BARS - 3/8" ROUND, OR RECTANGULAR OR HEXAGONAL
BAR OF EQUIVALENT AREA.

SIDE

SIDE

GRATE "A"
(APPROXIMATE WEIGHT 215 LBS)

GRATE "B"
(APPROXIMATE WEIGHT 215 LBS)
NOTES

1. The Contract may specify a rotated inlet installation. Orient the grates in the frame so they intercept flow.

2. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC x 2" (in) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

3. Refer to Standard Specification Section 9-05-16(2) for additional requirements.

4. Frame and Grates shall be Ductile Iron.
**Grates for Drop Inlet**

**Standard Plan B-50.20-00**

**Sheet 1 of 1**

**Graeme For Publication**

**Washington State Department of Transportation**

**Drawn By: Mark Bluna**

**Types:**
- **Type 1:**
  - 3 1/2" x 1/2" x 34 1/2" Structural Tubing (Typ.)
  - 3 1/2" x 3 1/2" x 5/16" x 33 1/4" Structural Tubing (Typ.)
  - Grind Top and Bottom Flush After Welding
- **Type 2:**
  - 3 1/2" x 1/2" x 34 1/2" Steel Plate (Typ.)
  - Grind Top and Bottom Flush After Welding
- **Type 3:**
  - 3 1/2" x 1/2" x 34 1/2" Steel Plate (Typ.)
  - OPTIONAL 1" MAX. VENT HOLES ON BOTTOM FOR GALVANIZING
  - Grind Top and Bottom Flush After Welding

**Sections:**
- **Section A:**
  - 3 1/2" x 3 1/2" x 5/16" x 33 1/4" Structural Tubing (Typ.)
- **Section B:**
  - 3 1/2" x 1/2" x 33 1/4" Steel Plate (Typ.)
- **Section C:**
  - 3 1/2" x 1/2" x 34 1/2" Steel Plate (Typ.)
  - OPTIONAL 1" MAX. VENT HOLES ON BOTTOM FOR GALVANIZING

**Notes:**
- Three Spaces 5 1/4" 34 1/2"
- Optional 1" Max. Vent Holes on Bottom for Galvanizing
- Grate for Drop Inlet
- GRATES FOR DROP INLET

**Expiry:**
- July 1, 2001
1. See Standard Specifications Section 7-08.3(3) for Pipe Zone Backfill.
2. See Standard Specifications Section 9-03.12(3) for Gravel Backfill for Pipe Zone Bedding.
4. For sanitary sewer installation, concrete pipe shall be bedded to spring line.

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<th>SIZE</th>
<th>MINIMUM DISTANCE BETWEEN BARRELS</th>
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END SECTION LENGTH SHALL BE AT LEAST SIX TIMES THE DIAMETER OF THE PIPE (SEE STD. SPEC. 7-02.3(1))

NOTES

1. The culvert ends shall be beveled to match the embankment or ditch slope and shall not be beveled flatter than 4H:1V. When slopes are between 4H:1V and 6H:1V, shape the slopes in the vicinity of the culvert end to ensure that no part of the culvert protrudes more than 4" above the ground line.

2. Field cutting of culvert ends is permitted when approved by the Engineer. All field-cut culvert pipe shall be treated with treatment as shown in the Standard Specifications or General Special Provisions.

THERMOPLASTIC PIPE

1. The culvert ends shall be beveled to match the embankment or ditch slope and shall not be beveled flatter than 4H:1V. When slopes are between 4H:1V and 6H:1V, shape the slopes in the vicinity of the culvert end to ensure that no part of the culvert protrudes more than 4" above the ground line.

2. Field cutting of culvert ends is permitted when approved by the Engineer. All field-cut culvert pipe shall be treated with treatment as shown in the Standard Specifications or General Special Provisions.

CONCRETE PIPE

METAL PIPE

FOR CULVERTS 30" DIAMETER OR LESS

BEVELED END SECTIONS

STANDARD PLAN B-70.20-00

EXPRES JLY 1 2007

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

HAROLD G. BURGESS 6-1-06

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
1. Refer to Standard Plan C-19 and C-20.11 for additional details not shown on this plan.

2. Extend shoulder pavement to provide a base for the extruded curb. See Contract Plans for exceptions to distances shown.

3. Use a single block or combination of blocks (no more than two (2) to achieve the actual 12" (in) offset. See Standard Specification Section 9-16.3(2). Wood blocks shall be secured to the posts with anti-rotation nails. If combination blocks are used, the adjacent blocks shall be toenailed with two 16d galvanized nails to prevent block rotation.

4. Wood blocks are shown. Blocks of an approved alternative material may be used. See Standard Specification Section 9-16.3(2).

5. All posts for any standard barrier run shall be of the same type: timber or steel.

**SLOPE EMBANKMENT TABLE**

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>W (FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2H : 1V or FLATTER</td>
<td>2.5' MIN.</td>
</tr>
<tr>
<td>STEEPER THAN 2H : 1V</td>
<td>4.0' MIN.</td>
</tr>
<tr>
<td>BUT NOT</td>
<td></td>
</tr>
<tr>
<td>STEEPER THAN 1H : 1V</td>
<td></td>
</tr>
</tbody>
</table>

**BEAM GUARDRAIL TYPE 31**

**STANDARD PLAN C-20.10-04**
1. The implementation of the Manual for Assessment of Safety Hardware (MASH) criteria may result in the acceptance of guardrail terminal systems currently not shown on this plan. Non-Flared terminals shall be selected from the WSDOT Qualified Products List (QPL) or approved through the WSDOT Request for Approval of Materials (RAM) process.

2. This terminal is MASH compliant at Test Level Three (TL-3) and may be used for all posted speeds.

3. An MSKT-SP-MGS (TL-3) as manufactured by Road Systems, Inc. or SOFTSTOP (TL-3) as manufactured by Trinity Highway Products, LLC shall be installed according to manufacturer's recommendations.

4. A reflectorized object marker shall be installed according to manufacturer's recommendations.

5. When snow load post washers and snow load rail washers are required by the Contract, the snow load rail washers shall not be installed within the terminal limits.

6. Terminal shall be installed at a widening, ensuring the end piece is entirely off the shoulder. While this terminal does not require an offset at the end, a taper is recommended. For the MSKT-SP-MGS (TL-3), a maximum taper of 25 : 1 or flatter over the length of the terminal is allowed with a maximum offset of 24" (in) over 50' (ft).

For the SOFTSTOP (TL-3) a maximum taper of 25 : 1 or flatter is allowed over the system length of 50' - 9 1/2" with a maximum offset of 24" (in) at the anchor post.

7. For terminal details, see WSDOT approved manufacturer's drawings.

8. These terminals are supplied with steel posts only. They can be used with beam guardrail Type 31 runs composed of steel or wood guardrail posts.
NOTES
1. Attach guardrail to bridge rail or concrete barrier with 7/8" (22 mm) diameter bolts in accordance with Standard Spec. 9-06.8(4), with thin slab fender inserts or resin-bonded anchors. See Contract Plans.
2. If the last guardrail post is 3' (900 mm) or less from the end of the bridge barrier, this attachment and blockout is not necessary.
3. This case is also applicable for F-shape and vertical faces with no curbs.
4. When B connection is used with Type 1A Transition, the maximum spacing between bolts is 6' - 3".
5. See Bridge Plans for additional connection details.
6. Wood blocks shown. Blocks of alternate material may be used. See Standard Specification 9-16.3 (2).
7. Steel posts shown. Timber posts may be used.
Notes:
1. This guardrail transition is for connection to a vertical concrete shape, a single slope, or a safety-shape barrier. The toe of the single slope and the safety-shape barrier shall be tapered or the barrier blocked out so that the toe of the barrier does not project past the face of the approach guardrail.
2. See Standard Plan C-24.10 for details regarding connection to bridge rail or traffic barrier.
3. For details of typical components, see Standard Plans C-15 and C-20.10.

Beam Guardrail Transition Section Type 21 - Pay Limit

Beam Guardrail Type 31 - Pay Limit

See Contract Plans for specified connection.

12 Spaces @ 3' - 1 1/2"

6' - 3"

3' - 1 1/2"

NOTE: Transition pay limit shall include end section for connection to barrier or fixed object.

12-Gage

6' - 3"

6' - 3"

10-Gage

W/Beam Guardrail

12-Gage

W6 x 15 - 7' - 0" Long

Steel post with 6 x 8 block

W6 x 12 - 7' - 6" Long Steel Post

W6 x 12 Block

W6 x 8.5 or W6 x 9 - 6' - 0" Long Steel Post with 6 x 12 Block

4 1/4"

LEFT (MIRROR OF RIGHT)

3/4" DIAM. HOLE THROUGH BLOCK (TYP.)

7' - 3 1/2"

2" - 1 1/2"

3' - 1 1/2"

1' - 0 1/4"

3/4" (IN) X 2 1/2" (IN) SLOT (TYP.)

29/32" (IN) X 1 1/8" (IN) SLOT (TYP.)

29/32" (IN) X 1 1/8" (IN) SLOT (TYP.)

3/4" (IN) X 2 1/2" (IN) SLOT (TYP.)

3/4" (IN) X 2 1/2" (IN) SLOT (TYP.)
1. Wire rope loops shall be 3'-8" long, except for the top loop of the Barrier Terminal, which shall be 2'-0" long.

2. Except for the locations of the wire rope loops, the dimensions shown in END VIEW "A" are typical for both ends of a Barrier Section or opposing ends of Barrier Terminals.

3. Connecting and Drift Pin head designs vary among different manufacturers. Pin designs that are shaped differently than those shown in the detail are acceptable, if the bearing surface is within the minimum and maximum widths specified.

4. The vertical spacing of the Wire Rope Loops in a Barrier Terminal is determined by the end of the Barrier Segment to which it is being connected. See BARRIER CONNECTION DETAIL (Sheet 2).
WIRE ROPE LOOP DETAIL

1 3/4" I.D. LOOP

WIRE SEIZING - SHALL BE EIGHT WRAPS
OF 16 CAGE WIRE WITH THE ENDS TWISTED
TOGETHER, OR EQUIVALENT FASTENING.

WIRE ROPE LOOPS

PLATE WASHER
1/8" THICK

2" MIN.
2 1/2" MAX.

1" DIAM. PIN WITH
ROUNDED BOTTOM EDGES

SEE NOTE 3
CONNECTING PINS
AND DRIFT PINS

SIDE VIEW

BARRIER TERMINAL

BARRIER CONNECTION DETAIL

CONCRETE BARRIER
TYPE 2
STANDARD PLAN C-8
SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

HIGH-PERFORMANCE BARRIER

SECTION A
4'-0" BARRIER SHOWN LEVEL

SECTION B
4'-0" BARRIER FOR USE WITH A 0" (IN) TO 3" (IN) MAX. GRADE SEPARATION

SECTION C
4'-0" BARRIER FOR USE WITH A GREATER THAN 3" (IN) TO 6" (IN) MAX. GRADE SEPARATION

GENERAL NOTES:
1. 3/4" IN CHAMFER (TYP.)
2. 1 1/2" CLR (TYP.)
3. #5 (TYP.)
4. E8 (TYP.)
5. 5 EQUAL SPACERS
6. GRADE SEPARATION 3" MAX.
7. GRADE SEPARATION 6" MAX.
1. Reinforcing steel dimensions and clearances are shown for stationary form construction. When slipform construction is used, increase reinforcing steel clearances to the outside surfaces of the barrier to 2 1/2" (in) and adjust the rebar dimensions as required.

2. When connecting between cast-in-place and precast single-slope barrier, provide a Blockout, Rebar Grid, and added rebar, as shown in Standard Plan C-70.10.

3. The actual dimensions will vary as the grades change and the barrier transitions in height and width. The dimensions may be interpolated for intermediate barrier heights.

4. For barrier with a 2'-10" reveal, see Sheet 2. For High-Performance Barrier with a 3'-6" reveal, see Sheet 3.
NOTES

1. When connecting between cast-in-place and precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown on Standard Plan C-79.10.

2. See the Contract Plans for conduit placement.

3. Grounding Conductor shall be non-insulated #4 AWG stranded copper; provide 3'-0" min. stack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.

4. Install Conduit Coupling flush with top of foundation. Do not glue PVC stubout.

5. This plan shall be used for 40' (ft) and 50' (ft) Light Standards with 16" (ft) max. length double mast arms.

6. Concrete shall be Class 4000.

7. This spread footing is designed for an allowable soil bearing pressure of 2500 psf or better.
1. This Barrier/Foundation combination has been designed in accordance with AASHTO LRFD Test Level 4 requirements. The horizontal vehicle impact force at the top of the barrier is taken at 54 kips for Strength and Extreme Limit States, and 10 kips for footing stability ( overturning and sliding) in the Service Limit State.

2. When connecting between cast-in-place and precast Single-Slope Barrier, provide a Connection Blockout and Rebar Grid as shown on Standard Plan C-70.10.

3. Grounding conductor shall be non-insulated #4 AWG stranded copper; provide 3' - 0" min. slack. Clamp steel reinforcing bar with connector suitable for use embedded in concrete.

4. See the Contract Plans for conduit placement.

5. Install Conduit Coupling flush with top of foundation. Do not glue PVC stubout.

6. This plan shall be used for 40' (ft) and 50' (ft) Light Standards with 16' (ft) max. length double mast arms.

7. Concrete shall be Class 4000.

8. The factored soil bearing resistance shall equal or exceed the following:
   - i) Service limit state = 6 ksf
   - ii) Strength limit state = 24 ksf
   - iii) Extreme limit state = 48 ksf
KEY NOTES

- Geotextile for underground drainage class A, moderate survivability (only needed if a geogrid is used for geosynthetic reinforcement)
- 1'-0" min. Geotextile overlap, top & bottom

1. For the values of "L," see sheet 3, and for the values of "Sv" see sheet 2.
2. For Geosynthetic Wall Construction Sequence, see sheet 4.
3. "\( A_s \)" is the peak seismic ground acceleration as defined and applied in the AASHTO LRFD Bridge Design Specifications, Articles 3.10.4.1 and 11.6.5.
4. The long-term geosynthetic design strength \( T_{al} \) shall be determined in accordance with WSDOT Standard Practice TP25. See Qualified Products List (QPL), Appendix "D," for products in which \( T_{al} \) has been determined. \( H \) and \( Z \) are graphically defined.
5. "L," the geosynthetic reinforcement length behind the wall face, is graphically defined. The maximum factored bearing stress acts in the vertical direction at the base of the wall. The load factors used are as specified in the AASHTO LRFD Bridge Design Specifications for each specified limit state.
6. Fascia or facing type shall be selected from Standard Plans D-3.10 or D-3.11 and called out in the Contract Plans. Region is to coordinate with the Geotechnical Services and Bridge & Structures offices.

NOTES
### Wall Geometry and Reinforcement Layer Location

<table>
<thead>
<tr>
<th>Total Wall Height, H (ft)</th>
<th>Depth Below Wall Top at Face, z (ft)</th>
<th>Geosynthetic Wall Type 1</th>
<th>Geosynthetic Wall Types 2 and 4</th>
<th>Geosynthetic Wall Type 3</th>
<th>Geosynthetic Wall Type 5</th>
<th>Geosynthetic Wall Types 6 and 8</th>
<th>Geosynthetic Wall Type 7</th>
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<tbody>
<tr>
<td>Up to 5</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** See Note 4, sheet 1.
1. Set form on completed lift.

2. Unroll geosynthetic and position it so that a 4'-0" wide "tail" drapes over the form. If a geogrid is used for the geosynthetic reinforcement, position geotextile to prevent backfill from spilling through geogrid openings.

3. Place the backfill until the backfill is up to half of the required vertical geosynthetic layer spacing.

4. Place a windrow to slightly greater than full lift height against the form.

5. Place the geosynthetic "tail" over the windrow and lock into place with backfill.

6. Complete backfilling until the compacted backfill layer thickness is equal to the required vertical geosynthetic layer spacing.

7. The form may be left in place while constructing the next layer (see note 2) otherwise, reset the form and repeat the sequence.

NOTES (SHEET)

1. Use of the Temporary Form System, as detailed in this plan, is optional.

2. To help maintain the wall face batter, leave the form system for the preceding layer in place while constructing the next layer. When the upper layer is complete, remove the form system from the lower layer and reset it for the next layer. See below.
NOTES
1. All bars shown on this plan shall be ASTM A706 unless otherwise specified in the Contract.
2. Safety cable or fence required when 1'H ≥ 10' - 0".
3. All cast-in-place concrete shall be class 4000.

CAST-IN-PLACE PERMANENT GEO SYNTHETIC WALL
FASCIA AND FACING
STANDARD PLAN D-3.10-01

TYPICAL SECTION
PERMANENT GEO SYNTHETIC RETAINING WALL
WITH CAST-IN-PLACE CONCRETE FASCIA

KEY NOTES
1. "V" ROWS OF 1/4" #4 DOWEL REINFORCEMENT PLACED BETWEEN GEO SYNTHETIC LAYERS AT 2'-0" O.C. HORIZONTAL SPACING. SEE TABLE. VERTICAL SPACING BETWEEN ROWS TO BE EQUAL AS MULTIPLES OF "V" ALLOW. ROWS MAY BE STAGGERED. SEE STD. PLAN D-3.08 FOR "Vv." 
2. INCREASE THE COVER AS REQUIRED TO ACCOMMODATE ARCHITECTURAL FEATURES AND FINISH.
3. CONSTRUCTION JOINT WITH RUGGED SURFACE
4. 2" L.D. PVC PIPE FOR DEEP HOLE IN WALL FACING - PLACE BETWEEN GEO SYNTHETIC LAYERS APPROX. 9" DEEP AT 12'-0" HORIZONTAL SPACING. LENGTH TO EXTEND TO OUTER SURFACE OF SPECIFIED WALL. DEEP HOLES SHALL BE KEPT CLEAN TO ALLOW CONCRETE TO ENTER. SEE STD. PLAN D-3.08, FOR DETAILS NOT SHOWN.
5. VERTICAL CONSTRUCTION JOINT IN FASCIA @ 2'-0" O.C. WITH 1/2" PREMOLDED JOINT FILLER (SEE STD. PLAN D-10.48, "SPLIT ELEVATION")
6. VERTICAL CONSTRUCTION JOINTS IN FOOTING @ 12'-0" O.C. MAX. (SEE STD. PLAN D-10.48, "SPLIT ELEVATION") IF THE FOOTING IS STEPED, PROVIDE 2'-0" NON-CONTACT LAP SPACES FOR THE #4 BARS AT EACH STEP.
7. COORDINATE WALL FINISH AND CONFIGURATION WITH STATE BRIDGE AND STRUCTURES ARCHITECT PER WSDOT DESIGN MANUAL 730.04(2).
8. THE #4 BARS AND INTERIOR #4 BARS SHALL BE USED ONLY IF THE FACE IS VERTICAL.

APPROXIMATE FINAL BATTER FOR FACE OF GEO SYNTHETIC LAYERS
FOR THE VALUES OF "X", SEE STANDARD PLAN D-3.08, SHEET 1.

APPROXIMATE FINAL BATTER FOR FACE OF GEO SYNTHETIC LAYERS
FOR THE VALUES OF "X", SEE TABLE.
DUAL-FACED CEMENT CONCRETE TRAFFIC CURB AND GUTTER

CEMENT CONCRETE TRAFFIC CURB AND GUTTER

DEPRESSED CURB SECTION

FACE OF CURB

MATCH ROADWAY SLOPE

ROADWAY

VARIES 12" TO 24"

VARIES 10" TO 22"

SEE CONTRACT

1" (IN) R.

1" (IN) R.

2.0" (IN) R.

MATCH ROADWAY SLOPE

ROADWAY

1/2" (IN) R.

2.0" (IN) R.

NOTE


CEMENT CONCRETE PEDESTRIAN CURB

CEMENT CONCRETE PEDESTRIAN CURB

AT CURB RAMPS, LANDINGS, AND DRIVEWAY ENTRANCES

CEMENT CONCRETE OR ASPHALT CONCRETE SIDEWALK OR PATH

1/2" (IN) R.

6.0" (IN) TO 0.0" (IN)

3/8" (IN) PREMOLDED JOINT FILLER

WHEN ADJACENT TO CEMENT CONCRETE SIDEWALK

CEMENT CONCRETE CURB, RAMP, LANDING, OR DRIVEWAY ENTRANCE

3/8" (IN) PREMOLDED JOINT FILLER

CEMENT CONCRETE PEDESTRIAN CURB

AT CURB RAMPS, LANDINGS, AND DRIVEWAY ENTRANCES

DUAL-FACED CEMENT CONCRETE TRAFFIC CURB

CEMENT CONCRETE TRAFFIC CURB

MOUNTABLE CEMENT CONCRETE TRAFFIC CURB

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

CEMENT CONCRETE CURBS

STANDARD PLAN F-10.12-03

SHEET 1 OF 1 SHEET

DRAWN BY FERN LIDDELL

BURLINGTON, WA 98233

MAY 6, 2014 3:31 PM

CEMENT CONCRETE CURBS

STANDARD PLAN F-10.12-03

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
SPACING OF ANCHOR BARS
(FOR TYPES 4, 5, AND 6)

NOTE
JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.

EXTRUDED CURB
STANDARD PLAN F-10.42-00

APPROVED FOR PUBLICATION
Washington State Department of Transportation
WITH RAISED EDGE

CURB NOT INCLUDED IN BID ITEM - SEE STANDARD PLAN F-10.12

FINISHED GRADE 1" (IN) BELOW TOP OF CONCRETE SURFACE

NOTE

1. Four feet of the sidewalk width shall be the minimum pedestrian accessible route free of vertical and horizontal obstructions. Gratings, Access Covers, Junction Boxes, Cable Vaults, Pull Boxes and other appurtenances within the sidewalk must have slip resistant surfaces, be flush with surface, and match grade of the sidewalk.

CURB FACE DETAIL

EXTEND SIDEWALK TRANSVERSE EXPANSION JOINTS TO INCLUDE CURB (FULL DEPTH)

PREMOLDED JOINT FILLER

BROOMED FINISH (TYP.)

CEMENT CONCRETE CURB (CURB AND GUTTER SHOWN) NOT INCLUDED IN BID ITEM SEE STANDARD PLAN F-10.12

SIDEWALK ADJACENT TO WALL DETAIL

CONTRACTION JOINT IN BOTH CURB AND SIDEWALK

ISOMETRIC VIEW JOINT AND FINISH DETAIL

EXPANSION JOINT IN BOTH CURB AND SIDEWALK

CEMENT CONCRETE SIDEWALK

STANDARD PLAN F-30.10-03

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STATE DESIGN ENGINEER

DRAWN BY: USA CFORD

MAY 6 2014 1:41 PM

3040890330100

C. E. PATRICK, P.E.

PROFESSIONAL ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
1. For "W", Horizontal distance from edge of traveled way to center of nearest post, and "V", Vertical distance from edge of traveled way to bottom of sign, see Standard Plan G-20.10.
3. Top of concrete foundations shall be smooth, dense and uniform to finished groundline.
5. Slip Base and all other materials shall meet the requirements of Standard Specification 9-08.
6. When a 2 1/4" (in) insert is used, the insert shall be a minimum of 7 feet.
**ASSEMBLY NOTES**

1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are shown on this plan only to illustrate how the parts are assembled.

2. Do not tighten any single Slip Plate Bolt to the recommended torque before prelightening the other bolts. Progressively tighten the three Slip Plate Bolts in 10 ft-lbs increments, alternately, to a final torque of 40 ft-lbs on each.

3. Slip Base assembly and all other materials shall meet the requirements of Standard Specifications 9-06 and 9-26.

**STEEL SIGN SUPPORT TYPES SB-1, SB-2 & SB-3 INSTALLATION DETAILS**

**STANDARD PLAN G-24.40-06**

**DRAWN BY:**

**FERN LIDDELL**

**SHEET 2 OF 4 SHEETS**

**APPROVED FOR PUBLICATION**

**Carpenter, Jeff**

**Feb 29 2016 12:34 PM**

**Washington State Department of Transportation**

**STEEL SIGN SUPPORT TYPES SB-1, SB-2 & SB-3 ~ 8" (IN)**
NOTES

1. For "W", Horizontal distance from edge of traveled way to center of nearest post, and "V", Vertical distance from edge of traveled way to bottom of sign, see Standard Plan G-20.10.
3. Top of concrete foundation shall be smooth, dense, and uniform to finished ground line.
4. Field drill posts to accept angle and cold galvanized holes.
6. Slip Base assembly and all other materials shall meet the require-
ASSEMBLY NOTES

1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are shown on this plan only to illustrate how the parts are assembled.

2. Do not tighten any single Slip Plate Bolt to the recommended torque before pretightening the other bolts. Progressively tighten the three Slip Plate Bolts in 10 ft-lb increments, alternately, to a final torque of 40 ft-lbs on each.

3. Use only Slip Base manufacturer supplied hardware that meets the requirements of Standard Specifications 9-06 and 9-28.
NOTES
1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are shown on this plan only to illustrate how the parts are assembled.
2. For "H1", refer to the Sign Specification Sheet in the Contract.
3. A 2" (in) post with a 2 1/4" (in) PSST anchor or a 2 1/4" (in) post with a 2 1/2" (in) PSST anchor may be substituted. See Contract Plans.
4. Perforated square steel post shall meet the requirements of Standard Specification 9-06.
5. Use only base connection manufacturer supplied hardware that meets the requirements of Standard Specifications 9-06 and 9-28.
1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are shown on this plan only to illustrate how the parts are assembled. Use only base connection manufacturer supplied hardware that meets the requirements of Standard Specification 9-06.

2. For Steel Sign Support Foundations, see Standard Plan G-25.10.


4. Maximum of 34 lbs/ft in a 7" (ft) wheel path.

5. On fill slopes, the maximum sign height is 9' (ft) for posts closest to the edge of traveled way.

PRECAST CONCRETE BARRIER
EDGE OF PAVED EMBANKMENT WIDENING

CONCRETE BARRIER TRANSITION TYPE 2
TO BRIDGE F-SHAPE - SEE STD. PLAN C-8f

WIRE ROPE LOOPS
- SEE STANDARD PLAN C-8

NOTE:
OMIT TAPERED BARRIER TOE
BACK OF PAVEMENT SEAT
BRIDGE F-SHAPE TRAFFIC BARRIER

PRECAST CONCRETE BARRIER
EDGE OF PAVED EMBANKMENT WIDENING

CONCRETE BARRIER TRANSITION TYPE 2
TO BRIDGE F-SHAPE - SEE STD. PLAN C-8f

WIRE ROPE LOOPS
- SEE STANDARD PLAN C-8

NOTE:
OMIT TAPERED BARRIER TOE
BACK OF PAVEMENT SEAT
BRIDGE F-SHAPE TRAFFIC BARRIER

PRECAST CONCRETE BARRIER
EDGE OF PAVED EMBANKMENT WIDENING

CONCRETE BARRIER TRANSITION TYPE 2
TO BRIDGE F-SHAPE - SEE STD. PLAN C-8f

WIRE ROPE LOOPS
- SEE STANDARD PLAN C-8

NOTE:
OMIT TAPERED BARRIER TOE
BACK OF PAVEMENT SEAT
BRIDGE F-SHAPE TRAFFIC BARRIER

SINGLE SLOPE CONCRETE BARRIER
(DUAL FACE)

CONCRETE BARRIER CONNECTION TO BRIDGE TRAFFIC BARRIER

NOTE:
OMIT REVELED ENDS ON TOP OF BRIDGE TRAFFIC BARRIER
WHEN CONNECTING TO CONCRETE BARRIERS.
NOTES
1. Mounting brackets with steel straps shall be a stainless steel band and buckle system product or an approved equal. Mounting brackets shall be universal channel clamps; steel straps shall be 3/16" (in) wide and 0.030" (in) thick.

2. All signs installed on mast arms or standards (poles) require windbeams. All signs shall be installed with horizontal edges level. A skewed windbeam is required only when the sign is mounted within 12" (in) of the mast arm base (see Detail "A").

3. The street name sign shall be a maximum of 36 square feet and the sign height is a maximum of 3' (ft); signs larger than 36 square feet require a special design mast arm and signal pole.

SIGN INSTALLATION ON SIGNAL AND LIGHT STANDARDS STANDARD PLAN G-30.10-04
### SIGN INSTALLATION ON SIGNAL OR LIGHT STANDARD

#### DIMENSIONS

<table>
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<th>Y</th>
<th>C</th>
<th>D</th>
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<td>6”</td>
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<td>3-0”</td>
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<tr>
<td>4’-0”</td>
<td>2-8”</td>
<td>1-3”</td>
<td>9”</td>
</tr>
</tbody>
</table>

**NOTE:**

Any Lane Use Sign greater than 7.5 sq ft. requires a Special Design Mast Arm and Signal Pole.

---

**MOUNTING BRACKET AND STEEL STRAP (SEE NOTE 1)**

**LEVEL**

**BACK OF SIGN PANEL**

**3/16” (IN) ALUMINUM RIVET (TYP.) > 4” (IN) MAX SPACING**

**SIGN PANEL**

**SECTION B**
NOTES

1. Mounting brackets with steel straps shall be a stainless steel band and buckle system product or an approved equal. Mounting brackets shall be one bolt, flared leg; steel straps shall be 3/4" (in) wide and 0.030" (in) thick.

2. Sign braces are required for sign widths of 48" (in) or greater. For sign widths of 36" (in), the sign braces are only installed when specified in the contract.

3. Sign braces are typically necessary on large sign panels that are exposed to high winds, traffic generated wind buffeting, or when snow thrown from plows might impact the sign.

4. A nylon washer shall be placed between the sign and the steel washer when the sign face has Type III, IV, VIII or IX sheeting.

5. Signs 48" (in) or greater can be pinned together, back to back.

6. For signs installed back to back on a single post, no bracing is required.

SIGN BRACING

STANDARD PLAN G-50.10-02

Sheet 1 of 2 sheets

Approved for publication:
Department of Transportation

Washington State Department of Transportation

DRAWN BY: FERN LIDDLE

Nisbet, John
Jun 22, 2015 9:50 AM
**SIGN BRACE DIMENSIONS**

<table>
<thead>
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<th>SIGN TYPE</th>
<th>YIELD</th>
<th>DIAMOND-SHAPED</th>
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<tr>
<td>A 1/3 SIGN WIDTH - 1 3/4&quot;</td>
<td>1/2 SIGN WIDTH - 2 1/4&quot;</td>
<td>1/2 SIGN WIDTH - 1&quot;</td>
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<table>
<thead>
<tr>
<th>SIGN POST TYPE</th>
<th>4&quot;x6 OR 6&quot;x6 TIMBER POST</th>
<th>6&quot;x8 TIMBER POST</th>
<th>3&quot; DIAM STEEL PIPE</th>
<th>2 1/2&quot; SQUARE TUBE</th>
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<tbody>
<tr>
<td>B 5 1/2&quot;</td>
<td>7 1/2&quot;</td>
<td>4 3/4&quot;</td>
<td>2 1/2&quot;</td>
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</tr>
</tbody>
</table>

**NOTE**

1. For sign installations on round steel posts, see Standard Plan G-30.10, sheet 2 of 2.
**Concrete Footing**

- **Commercial Concrete** 6" x 1/4" DIAM. STEEL BAR

**Section A**

- **Finished Grade**
- **Concrete Footing - Commercial Concrete** 6" x 1/4" Diam. Steel Bar

**Plan View**

- **Round Footing**
- **Square Footing**

**Front View**

- **Steel Cap Plate**
- **1/2" Reflective Tape (Typ.)**
- **Steel Pipe - ASTM A 53, NPS 3 (2" Nom.), Schedule 80**
- **1/2" Reflective Tape (Typ.)**

**Side View**

- **5/16" Drilled Hole**

**Paint Assembly**

- Paint assembly with a "Highly Visible" color (Safety Yellow is acceptable)

**NOTE**

This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.
When distance detailed in Typical Foundation Plan is greater than 5' (ft), this conductor shall be omitted.

The Contractor shall install the conduits in the locations shown. Conduits shall extend 2" (in) above the coupling. The grounded end bushing on GR5 conduit and the end bushing on PVC conduit shall extend 3" (in) max. above the coupling. The conduit containing unused utility conductors shall extend into the utility chase.

The ground rods, drain tiles, uncocciulted conduits, and #4 rebar (90° with 30° (in) logo), may be omitted if no transformer or service cabinet is to be installed.

The cabinets shall be attached to the foundation with 4 each: 1/2" (in) × 10" (in) × 2" (in) × 4" (in) anchor bolts (see detail on Sheet 4 of 6), washers, and nuts conforming to Standard Specification 9-06-S(1) and hot-dip galvanized after fabrication in accordance with AASHTO M 232. Locate anchor bolts per cabinet manufacturer. Stainless steel epoxy anchors may be used as an alternative, and shall be 13/2" (in) diameter x 6" (in), or 5/8" (in) diameter x 9" (in). All threaded rod (conforming to ASTM F993), washers (conforming to ASTM A240), and bolts (conforming to ASTM F994), shall be Type 304 stainless steel. Bolts shall extend 1/2" (in) min. to 2" (in) max. above the concrete pad, prior to placing.

Verify front locations from manufacturer prior to placing conduit in foundation.

Foundations installed in, or adjacent to, sidewalks shall be constructed with the top flush with the sidewalk surface and grade, not including concrete risers for cabinets. Omit chamfers where foundation abuts sidewalk.

If the slope is 3:1 or steeper, special considerations may be necessary for safety reasons. Coordinate with Maintenance and Project Engineer.

Verify pad size and location with Project Engineer.

Field bend #4 rebar around the Generator Anti-Theft Tie-Down Unit when required.

See Standard Plans J-10.21 and J-10.22 for additional details for Type B and Type E Service Cabinets.

As an alternate, #3 rebar spaced at 5' - 0" O.C. longitudinally and transverse may be used.

**CONSTRUCTION NOTES**

1. Drive ground rods before placing concrete. Move rod(s) and drain tiles with cover(s) as required to achieve full ground penetration. Maintain a 6' (ft) minimum clearance between ground rods and 6" (in) from foundation edge as detailed on Standard Plan J-60.05.

2. GRS conduits penetrating all cabinets shall be terminated with grounding end bushing and bonded to the cabinet grounding bus. All PVC conduits penetrating cabinet shall be terminated with end bushings.

3. Install conduit couplings on all conduits. Place coupling tops flush with top of concrete. If PVC conduits are specified, the conduit stub and end bushing shall not be glued to the coupling.

4. 4" (in) diam. × 1/2" (in) deep sump. Slope foundation within cabinet footing toward sump. Drainpipe shall consist of stainless steel, polyethylene or copper tubing.

5. The Type D Service shall not be installed on a raised section. All other cabinets shall be installed on 3 1/2" (in) or 9" (in) cabinet footing.

6. Cabinet power supply conduit.

7. Conduits for service grounding electrodes.

8. When distance detailed in Typical Foundation Plan is greater than 6' (ft), this conductor shall be deleted.
Without transfer switch, allow 6" (in) between cabinets.
With transfer switch, allow 38" (in) between cabinets.

7 1/2" (in) Diam. Bolt Circle
For at least Four Bolt Holes @ 3/4" (in) Diam. Each

18" (In) x 18" (In) x 18" (In) DRAINAGE WELL

3/8" (IN) PREMOLDED JOINT FILLER

#4 HOOP (SEE NOTE 14) WELDED WIRE FABRIC (WWF)

CONCRETE OR HMA MATERIAL

3/4" (IN) CHAMFER

TO SERVICE CABINET

GENERATOR ANTI-THEFT TIE-DOWN UNIT

#4 REBAR - 90° WITH 30" (IN) LEGS (2 PLACES)

1/4" (IN) STEEL PLATE (TYP.)

#3 REBAR

3/8" (IN) POLYETHYLENE DRAIN TUBE

1/2" II

1/8,......,.,+-1

3/8" (IN) DRIP TUBE

3/8" (IN) STUB

1/4" (IN) STEEL PLATE {TYP.)

#3 REBAR

3/4" (IN) HOLE WITH COVER

5/8" (IN) x 2" x 4" (IN) ANCHOR BOLT (TYP.) = ASTM A307

CONDUIT TO ADJACENT JUNCTION BOX (SEE CONTRACT FOR NUMBER AND SIZE OF CONDUITS) (TYP.)

GENERATOR ANTI-THEFT TIE-DOWN UNIT

SINGLE-CABINET FOUNDATION

(15 KVA TRANSFORMER SHOWN)

WHEN INSTALLATION IS NOT IN ACCORDANCE WITH THESE DRAWINGS, REFER TO PAGES SHEET 1 AND 2 FROM MILLBROOK DEVELOPMENT:

304 STRETCH CABINET 48" (IN) HEIGHT, 24" (IN) WIDTH, 22" (IN) DEPTH MAX.

3/4" (IN) SLIPFITTER

3" (IN) x 5" (IN) HAND HOLE WITH COVER

1/2" STEEL PIPE - HOT-DIP GALVANIZED

4" (IN) PIPE FLANGE

4" (IN) STEEL PIPE - HOT-DIP GALVANIZED

3/8" (IN) REBAR - EACH CORNER (SEE NOTE 18)

#4 REBAR - EACH CORNER (SEE NOTE 12)

18" (IN) x 18" (IN) x 18" (IN) DRAINAGE WELL

WELDED WIRE FABRIC 4 x 4 - W4.0 x W4.0 - SEE STD. SPEC. 9-07.7 (SEE NOTE 20)

WELDED WIRE FABRIC 4 x 4 - W4.0 x W4.0 - SEE STD. SPEC. 9-07.7 (SEE NOTE 20)

3" (IN) x 5" (IN) HAND HOLE WITH COVER

3/8" (IN) x 2" x 4" (IN) ANCHOR BOLT (TYP.) = ASTM A307

4" (IN) HOOP (SEE NOTE 14)

4" (IN) HOOP (SEE NOTE 14)

CONDUIT TO ADJACENT JUNCTION BOX (SEE CONTRACT FOR NUMBER AND SIZE OF CONDUIT) (TYP.)

2-0" ROUND OR SQUARE

3/8" (IN) REBAR IN EACH CORNER (SEE NOTE 18)

#4 BARS AT APPROXIMATELY 1'-0" CENTERS
CONTROLLER CABINET FOUNDATION NOTES

1. Slope conduit reserve area floor 1/4" (in) per 1' (ft) to the sump in the center.

2. All other dimensions shall be approved by the Engineer.

3. Provide 2" (in) clearance between conduit and edge of foundation well for cable slack.

4. For the rest of the foundation, see Standard Plan J-10.20 for details.
NOTES
2. Where shown in the plans, install plate (R10-32P) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" above the Accessible Pedestrian Signal (APS) assembly. Add 14" (in) to the PPB post height to accommodate plaque and leave a 2" (in) space between signs.
4. Junction Box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.
5. Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete: Provide 3'-0" min. slack. Attach to pole grounding stud with a full circle crimp-on connector (crimped with a manufacturer recommended crimper).

ACCESSIBLE PEDESTRIAN PUSHBUTTON WITH CURB BASE

STANDARD PLAN J-20.11-02

SECTIONS

- PLAN VIEW
- BASE PLATE DETAIL
- ANCHOR BOLT TEMPLATE
- GROUNDING CONNECTION DETAIL

REINFORCING STEEL BENDING DIAGRAM

1. See Standard Spec. S-87(1/2)

DIMENSIONS ARE OUT TO OUT
NOTES
1. Clamping bolts shall be tightened to 50 ft-lbs max. torque. After state inspection, burr threads to prevent nut rotation. DO NOT OVERTIGHTEN.
2. The final height of the Anchor Bolts shall be below the top of the slip plate assembly to ensure proper function of the slip base.
3. Supplemental grounding conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete: Provide 3'-0" min. slab. Attach to pole grounding stud with a full circle crimp-on connector (crimped with a manufacturer recommended crimper).
4. Junction box serving the Standard shall preferably be located 5'-0" (10'-0" Max.) from the Standard.
5. Provide cable tie at wiring entering the junction box (for slip base installations only) — See Detail A, Standard Plan J-28.70.
6. Keeper Plates shall not extend beyond the edges of the pole base plate.

TYPE PS, TYPE 1, RM & FB SIGNAL STANDARD FOUNDATION DETAILS
STANDARD PLAN J-21.10-04

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
STATE DESIGN ENGINEER

APPROVED FOR PUBLICATION
Jan 26 2014 4:29 PM
### ALTERNATE #1

**CONCRETE CAST DIRECTLY AGAINST UNDISTURBED EARTH, DRILLED SHAFT (CLASS 4000P)**

- **Clamp Conducting Wells Using Threaded Rods/Reinforcement**
- **Ground Slope**
  - **4:1**
- **Top of Foundation Level**
  - **4 1/2' MAX.**
- **Concrete**
  - **3 1/2' MAX.**
- **Anchor Bolt**
  - **1 1/2' CLR**

---

### ALTERNATE #2

**CONCRETE CAST WITHIN A CORRUGATED METAL PIPE, IN-SITU FORM (CLASS 4000P)**

- **Concrete**
  - **2 1/2' MAX.**
- **Ground Slope**
  - **4 1/2' MAX.**
- **Anchor Bolt**
  - **1 1/2' CLR**

---

### Table for Found. Depth

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<tr>
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**NOTES**

1. This structure is not to be used according the FBE 990.05.01 or AASHTO Standard Specifications for Highway Bridges.
2. The concrete covers of the reinforcing steel shall be provided for the connection to the reinforcing steel at the bottom of the construction.
3. The footing and foundation details shall be provided for the construction of the foundation.
4. The concrete covers of the reinforcing steel shall be provided for the connection to the reinforcing steel at the top of the construction.
5. The concrete covers of the reinforcing steel shall be provided for the connection to the reinforcing steel at the bottom of the construction.
6. The footing and foundation details shall be provided for the construction of the foundation.
7. The concrete covers of the reinforcing steel shall be provided for the connection to the reinforcing steel at the top of the construction.
8. The footing and foundation details shall be provided for the construction of the foundation.
9. The concrete covers of the reinforcing steel shall be provided for the connection to the reinforcing steel at the bottom of the construction.
10. The footing and foundation details shall be provided for the construction of the foundation.
11. The concrete covers of the reinforcing steel shall be provided for the connection to the reinforcing steel at the top of the construction.
12. The footing and foundation details shall be provided for the construction of the foundation.
13. The concrete covers of the reinforcing steel shall be provided for the connection to the reinforcing steel at the bottom of the construction.
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21. The concrete covers of the reinforcing steel shall be provided for the connection to the reinforcing steel at the bottom of the construction.
22. The footing and foundation details shall be provided for the construction of the foundation.
23. The concrete covers of the reinforcing steel shall be provided for the connection to the reinforcing steel at the top of the construction.
24. The footing and foundation details shall be provided for the construction of the foundation.
25. The concrete covers of the reinforcing steel shall be provided for the connection to the reinforcing steel at the bottom of the construction.
26. The footing and foundation details shall be provided for the construction of the foundation.
27. The concrete covers of the reinforcing steel shall be provided for the connection to the reinforcing steel at the top of the construction.
28. The footing and foundation details shall be provided for the construction of the foundation.
29. The concrete covers of the reinforcing steel shall be provided for the connection to the reinforcing steel at the bottom of the construction.
30. The footing and foundation details shall be provided for the construction of the foundation.
# Foundation Reinforcement Detail

Concrete cast directly against undisturbed earth, drilled shaft

**ALTERNATE #1**

- Conduit size and quantity as shown in the contract: cap both ends.
- Clamp conductor to steel reinforcing with listed connector suitable for use embedded in concrete.

**ALTERNATE #2**

- Paper or cardboard form shall not stay in-place

## ALTERNATE #1 Drilled Shaft-Type Construction - Depth "D"

For lateral bearing pressure = 2500 PSF & Ø = 34", 1500 PSF & Ø = 28", 1000 PSF & Ø = 26"

<table>
<thead>
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<th>Ground Slope</th>
<th>3H: 1V or Flatter</th>
<th>3H: 1V to 2H: 1V</th>
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<td>1000 PSF</td>
<td>Foundation Type</td>
<td>Allowable Lateral Bearing Pressure (LBS)</td>
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<tr>
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<td>Pole Class - Resultant Horizontal Tension (LBS)</td>
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<tr>
<td>1900</td>
<td>2700</td>
<td>3700</td>
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<td>4'-0&quot; Square</td>
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| 1500 PSF     | Foundation Type    | Allowable Lateral Bearing Pressure (LBS) |
|              | Pole Class - Resultant Horizontal Tension (LBS) | |
| 1900         | 2700              | 3700             | 4800 | 5600 | 6300 | 7200 |
| 3'-0" Round  | 1'-0"             | 1'-0"            | 1'-0"| 1'-0"| 1'-0"| 1'-0"|
| 3'-0" Square | 1'-0"             | 1'-0"            | 1'-0"| 1'-0"| 1'-0"| 1'-0"|
| 4'-0" Round  | 1'-0"             | 1'-0"            | 1'-0"| 1'-0"| 1'-0"| 1'-0"|
| 4'-0" Square | 1'-0"             | 1'-0"            | 1'-0"| 1'-0"| 1'-0"| 1'-0"|

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<th>Foundation Type</th>
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<tr>
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## ALTERNATE #2 Corrugated Metal Pipe Type Construction - Depth "D"

For lateral bearing pressure = 2500 PSF & Ø = 23", 1500 PSF & Ø = 18", 1000 PSF & Ø = 17"

<table>
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<th>3H: 1V to 2H: 1V</th>
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<td>Pole Class - Resultant Horizontal Tension (LBS)</td>
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<td>1900</td>
<td>2700</td>
<td>3700</td>
</tr>
<tr>
<td>3'-0&quot; Round</td>
<td>1'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
<tr>
<td>3'-0&quot; Square</td>
<td>1'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
<tr>
<td>4'-0&quot; Round</td>
<td>1'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
<tr>
<td>4'-0&quot; Square</td>
<td>1'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
</tbody>
</table>

| 1500 PSF     | Foundation Type    | Allowable Lateral Bearing Pressure (LBS) |
|              | Pole Class - Resultant Horizontal Tension (LBS) | |
| 1900         | 2700              | 3700             | 4800 | 5600 | 6300 | 7200 |
| 3'-0" Round  | 1'-0"             | 1'-0"            | 1'-0"| 1'-0"| 1'-0"| 1'-0"|
| 3'-0" Square | 1'-0"             | 1'-0"            | 1'-0"| 1'-0"| 1'-0"| 1'-0"|
| 4'-0" Round  | 1'-0"             | 1'-0"            | 1'-0"| 1'-0"| 1'-0"| 1'-0"|
| 4'-0" Square | 1'-0"             | 1'-0"            | 1'-0"| 1'-0"| 1'-0"| 1'-0"|

<table>
<thead>
<tr>
<th>2500 PSF OR GREATER</th>
<th>Foundation Type</th>
<th>Allowable Lateral Bearing Pressure (LBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900</td>
<td>2700</td>
<td>3700</td>
</tr>
<tr>
<td>3'-0&quot; Round</td>
<td>1'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
<tr>
<td>3'-0&quot; Square</td>
<td>1'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
<tr>
<td>4'-0&quot; Round</td>
<td>1'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
<tr>
<td>4'-0&quot; Square</td>
<td>1'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
</tbody>
</table>

**Notes**

1. This structure has been designed according to the fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signs. Basic wind velocity 90 mph. Design life/Recurrence interval 50 years, and Fatigue Category III.
2. Foundations are designed for Type IV and V Strain Pole Standards with a maximum mast arm length of 16" - 0".
3. Foundations not within the parameters of this standard require Special Design. Contact the WSDOT Bridge and Structures Office for the Engineer for Special Foundation Design.
4. Where a foundation is constructed within a Media Filter Drain, the foundation depth shown in the Contract Plans shall be increased by the depth of the Media Filter Drain.
5. The top 2 feet of the foundation shall use a smooth form (such as paper or cardboard). After the concrete has cured, this entire form shall be removed.
1. This plan depicts the Steel Light Standard types and terms commonly referred to in the Contract. All Steel Light Standards are fabricated in accordance with the Standard Specifications and the Contract Provisions.

2. The Luminaire Pole height shall not exceed 50' (H1).

3. Slip Bases shall not be installed on 50' (H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.

4. The optimal location of the Luminaire head is over the edge of the traveled way. Based on the placement of the Steel Light Standard foundation, the position of the Luminaire head may vary. See Standard Plan J-28.22.

5. Light Standard mast arm orientation is typically perpendicular to roadway centerline.

NOTES


2. The Strap Templates shall be held in place by nuts, 8" (in) to the top of the foundation and 3" (in) from the bottom of the anchor bolts. Eighteen heavy duty hex nuts and six round washers are required for a slip base assembly. Eighteen heavy duty hex nuts and six plate washers are required for a fixed base assembly.

3. Use Steel Light Standard Foundation Type A on level ground or slopes not exceeding 4H : 1V. Use Type B for slopes steeper than 4H : 1V, but not exceeding 2H : 1V. Stipes steeper than 2H : 1V shall require a special design.

4. These foundations are designed for a minimum of 2000 PSF (TYPE A) or 1500 PSF (TYPE B) allowable lateral bearing pressure for the soil. A special foundation shall be required for soil with allowable lateral bearing pressure lower than 1500 PSF.

5. The Luminaire Pole height shall not exceed 50' (ft) (H1).

6. Slip bases shall not be installed on 50' (ft) (H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.

7. Slip bases are required on poles installed inside the Design Clear Zone, and on poles installed behind traffic barrier that are within the traffic barrier deflection zone.

8. Foundations constructed within Media Filter Drains shall be increased in depth by the depth of the Media Filter Drain.

9. Exposed portions of the foundation shall be formed to create a Class 2 surface finish. All forming shall be removed upon completion of foundation construction.

10. For excavation, concrete placement, and backfill options, see METHOD 1 and METHOD 2 on Sheet 2 of 2.

11. The anchor bolts shall be high-strength steel, manufactured from ASTM F1554 Grade 105, with heavy hex nuts and hardened washers. Galvanize the anchor bolts according to ASTM F2329.

12. The foundation shall be grounded in accordance with the requirements of Standard Specification 8-20.3(4).

CONSTRUCTION METHODS

METHOD 1
NO SUBSURFACE FORM

This option is used only when the existing soil in the hole will remain standing and the cement concrete can be placed without causing the soil to collapse. Concrete shall be cast directly against undisturbed soil.

Auger the hole for the foundation. Use a paper or cardboard form to achieve a smooth finish on the final exposed cement concrete. Support the form as necessary to remain plumb.


Place the concrete foundation.

After concrete has cured, remove the paper or cardboard form portion.

Construct the embankment widening (if required).

METHOD 2
METAL (SUBSURFACE) FORM REQUIRED

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" (in) diameter corrugated metal (pipe) form. The corrugated metal form shall not extend more than 5" (in) +/- 1" (in) below any portion of the foundation that will remain exposed upon final grading. Continue forming to full height using a paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.


Place the concrete foundation.

After concrete has cured, remove the paper or cardboard form portion.

Backfill with controlled-density fill or compacted borrow in accordance with Standard Specification 8-20.3(2).

Construct the embankment widening (if required).
HEAVY HEX NUT (TYP.) - SIZE TO MATCH ANCHOR BOLT - SEE TABLE - STD. PLAN J-28.30
ROUND WASHER (TYP.) - SIZE TO MATCH ANCHOR BOLT
LUMINAIRE POLE
POLE BASE PLATE
K EEPER PLATE
ANCHOR/SLIP PLATE ASSEMBLY - SEE STD. PLAN J-28.30
CAPPED CONDUIT
SLIP BASE FOUNDATION - SEE STD. PLAN J-28.30
2" (IN) DIAM. x 3/4" (IN) GROUT WELL (TYP.)

NOTES
1. 50' (H1) poles with double mast arms or poles weighing in excess of 1000 LBS shall not be installed on a slip base.
2. Galvanizing shall be in accordance with AASHTO M 111.
3. See Standard Plans C-8b, C-85.15, and J-28.60 for foundation and base plate requirements when light standards are mounted on cement concrete traffic barrier.
4. See Standard Specification Sections 6-03.3(33) and 8-20.3 (4) for the torque requirements for all of the anchor bolt installations. Install 1" (in) diameter clamping bolts in all slip bases to a torque of 95 Foot-Pounds. See Standard Specification Section 8-20.3 (13A). DO NOT OVERTIGHTEN. After state inspection, burr threads to prevent nut rotation.
1. Galvanize the Elbow Assembly after fabrication according to AASHTO M 111. All bolts, nuts, and related hardware shall be galvanized after fabrication per ASTM F2329.


3. The presence of pedestrian railing shall be verified prior to light standard fabrication. When pedestrian railing is present or to be installed, locate hand hole as detailed in the Bridge Pedestrian Barrier details.


STEEL LIGHT STANDARD ELBOW DETAIL

FOR LUMINAIRE POLES WITH SINGLE MAST ARM 12'-0" OR LESS AND DOUBLE MAST ARMS 8'-0" OR LESS, MOUNTED ON BRIDGE OR RETAINING WALLS.
1. Each wire shall be physically separated by at least 1/4" (ln) so that sealing material can fill in between the wires; where heat shrink tubing is used for the outer splice enclosure, it shall meet one of the following requirements:
   a. Have separate ports for each conductor ("Y"Wye or "X" shaped tubing).
   b. Have rubber electrical mastic tape wrapped around each conductor to ensure a weather-proof seal. See Rubber Electrical Mastic Tape Installation Detail, Standard Plan J-60.05.

2. Heat shrink tubing shall extend a minimum of one inch onto the original wire insulation of each wire in the splice. Rigid splice enclosures shall be centered over the crimped connection.

3. Electrical tape used in splicing applications shall be 3/4" (ln) wide, be UL listed under UL 510, and be CSA Certified under C22.2 No. 197-M1883.

4. Crimp splices shall be installed with an approved crimping tool for the type and size of crimp splice used. Pliers and similar multi-purpose tools may not be used.

---

**NOTES**

- **EQUIPMENT BONDING JUMPER** - FROM RMC CONDUIT
  - NOTE: AND MAY BE SAME WIRE
- **EQUIPMENT GROUNDING CONDUCTOR**
- **CABLE TIE** - 120 POUND TENSILE STRENGTH, BLACK
- **APPLICATION FOR FIXED BASE SIMILAR, EXCEPT NO CABLE TIE IS REQUIRED AT JUNCTION BOX**
- **24" (IN) MIN. SLACK REQUIRED TO ALLOW QUICK DISCONNECTS TO BE PULLED OUTSIDE HARD HOLES (IN) MIN.**

---

**CONNECTION AND INTERNAL SEALING DETAILS**

WHEN USING WRAPPED VINYL ELECTRICAL TAPE:
- INSTALL TWO LAYERS OF SPIRAL WRAPPED TAPE,
- EACH SPIRAL LAYER SHALL HAVE AN OVERLAP OF 1/2 OF THE TAPE WIDTH (SEE DIAGRAM ABOVE).

---

**STEP 1 - CRIMP CONNECTION**

CONNECTOR ASSEMBLY - SEE CONNECTOR AND INTERNAL SEALING DETAILS BELOW

**LIMITS OF SPICE ENCLOSURE - 5" MIN.**

**STEP 2 - WRAP CONNECTION**

**TAPE OVERLAP DIAGRAM**

WHEN USING WRAPPED VINYL ELECTRICAL TAPE:
- INSTALL TWO LAYERS OF SPIRAL WRAPPED TAPE,
- EACH SPIRAL LAYER SHALL HAVE AN OVERLAP OF 1/2 OF THE TAPE WIDTH (SEE DIAGRAM ABOVE).
JUNCTION BOX DIMENSION TABLE

<table>
<thead>
<tr>
<th>MARK</th>
<th>ITEM</th>
<th>TYPE 4</th>
<th>TYPE 5</th>
<th>TYPE 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>OVERALL LENGTH</td>
<td>39&quot;</td>
<td>48&quot;</td>
<td>56&quot;</td>
</tr>
<tr>
<td>B</td>
<td>OVERALL WIDTH</td>
<td>34&quot;</td>
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<td>31&quot;</td>
<td>40&quot;</td>
<td>48&quot;</td>
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<tr>
<td>D</td>
<td>JUNCTION BOX WIDTH</td>
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<td>29&quot;</td>
<td>36&quot;</td>
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<tr>
<td>E</td>
<td>LID OPENING LENGTH</td>
<td>24&quot;</td>
<td>33 3/8&quot;</td>
<td>41 1/8&quot;</td>
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<td>F</td>
<td>LID OPENING WIDTH</td>
<td>19&quot;</td>
<td>22 1/8&quot;</td>
<td>29 1/4&quot;</td>
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<td>G</td>
<td>TYPE 4 LID LENGTH</td>
<td>24&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>TYPE 4, 5 &amp; 6 LID WIDTH</td>
<td>19&quot;</td>
<td>21 7/8&quot;</td>
<td>29&quot;</td>
</tr>
<tr>
<td>I</td>
<td>TYPE 5 &amp; 6 LID LENGTH</td>
<td>16 3/8&quot;</td>
<td>20 3/8&quot;</td>
<td></td>
</tr>
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<td>INSIDE BOX LENGTH</td>
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<td>28&quot;</td>
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</tr>
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<td>K</td>
<td>INSIDE BOX WIDTH</td>
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<td>17&quot;</td>
<td>24&quot;</td>
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<tr>
<td>L</td>
<td>STIFFENER SPACING</td>
<td>VARIES</td>
<td>VARIES</td>
<td>VARIES</td>
</tr>
<tr>
<td>M</td>
<td>STIFFENER SPACING</td>
<td>VARIES</td>
<td>VARIES</td>
<td>VARIES</td>
</tr>
<tr>
<td>N</td>
<td>STIFFENER LENGTH</td>
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<td>21 1/8&quot;</td>
<td>28 1/4&quot;</td>
</tr>
<tr>
<td>O</td>
<td>CAPACITY - CONDUIT DIAM.</td>
<td>6&quot;</td>
<td>12&quot;</td>
<td>24&quot;</td>
</tr>
</tbody>
</table>

NOTES
1. All box dimensions are approximate. Exact configurations vary among manufacturers.
2. All lid thicknesses are minimum.
3. Lid perimeter shall bear on frame. Mill to bearing seat and lid perimeter for full even contact after fabrication of frame and lid. Lid and frame units with uneven bearing will be rejected.
4. The installed lid and frame shall fit with full even contact around the perimeter of a junction box after installation. Care shall be taken to prevent debris accumulation on the contact surfaces.
5. A 1/4-20 NC x 1" (in) S. S. ground stud shall be welded to the bottom of each lid: (2) each S. S. nuts and (3) each S. S. flat washers.
6. The hinges shall allow the lids to open 180°. When lid assembly is Ductile Iron (Alternative) and equipped with Safety Bars, lids shall open 110°.
7. Bolts and nuts shall be liberally coated with anti-seize compound.
8. Connect Equipment Bonding Jumper to ground stud on lid. As an alternative to ground stud connection, the Equipment Bonding Jumper shall be attached to the front face of the hinge pocket with a 5/16-18 NC x 1" (in) S. S. bolt, (2) each S. S. nuts, and (3) each S. S. flat washers. Equipment bonding jumper shall be #6 AWG min. x 4" (ft) of tinned bared copper.
11. Unless otherwise noted in the plans or approved by the Engineer, Junction Boxes, Cable Vaults, and Pull Boxes shall not be placed within the traveled way or paved shoulders. All Junction Boxes, Cable Vaults, and Pull Boxes placed within the traveled way or paved shoulders shall be Heavy-Duty. Heavy-Duty Junction Boxes shall not be installed in sidewalks, walkways, and shared use paths.
12. Distance between the top of the conduit and the bottom of the Junction Box lid shall be 6" (in) min. to 8" (in) max., for final grade of new construction only. See Standard Specification 9-20.3(5). Where adjustments are to be made to existing Junction Boxes, or for interim construction stages during the contract, the limits shall be from 6" min. to 10" (in) max. See Standard Specification 9-20.3(5).
13. Junction Box Types 4, 5, or 6 may be equipped with Ductile Iron (Alternative) Lid(s) and a Cast Iron (Alternative) Frame. Junction box shall meet the requirements of Standard Specification 9-29.2 and shall be in accordance with approved shop drawings.

STANDARD PLAN J-40.20-03

HEAVY-DUTY JUNCTION BOX TYPES 4, 5, & 6

SECTION A

ISOMETRIC VIEW

TYPE 5 AND 6 SHOWN
COVER MARKING DETAIL

1. All box dimensions are approximate. Exact configurations vary among manufacturers.
2. Minimum lid thicknesses are shown. Junction Boxes installed in sidewalks, walkways, and shared-use paths shall have a slip-resistant coating on the lid and lid cover plate and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, or shared-use path. The non-slip lid shall be identified with permanent markings on the underside, indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8" (n) line thickness formed with a mild steel weld bead and shall be placed prior to hot-dip galvanizing.
3. Lid support members shall be 3/16" (n) min. thick steel C, L, or T shape, welded to the frame. Exact configurations vary among manufacturers.
4. A 1/4-20 NC x 3/4" (n) S. S. ground stud shall be welded to the bottom of each lid; include (2) S. S. nuts and (2) S. S. flat washers.
5. The hinges shall allow the lids to open 180°.
6. Bolts and nuts shall be liberally coated with anti-seize compound.
7. Connect Equipment Bonding Jumper to ground stud on lid. As an alternative to the ground stud connection, the Equipment Bonding Jumper shall be attached to the front face of the hinge pocket with a 5/16-20 NC x 3/4" (n) S. S. bolt, (2) each S. S. nuts, and (2) each S. S. flat washers. Equipment Bonding Jumper shall be #8 AWG min. + 4" (n) of tinned bared copper.
8. The System Identification letters shall be 1/8" (n) line thickness formed by a mild steel weld bead. See Cover Marking detail. Grind off diamond pattern before forming letters. See Standard Specification 9-29.3(4) for details.
9. See the Standard Specifications for alternative reinforcement and class of concrete.
11. Capacity - conduit diameter = 24" (n)
12. Lid Bolt Down Attachment Tab provides a method of retrofitting by using a mechanical process in lieu of welding. Attachment Tab shown depicts a typical component arrangement; actual configurations of assembly will vary among manufacturers. See approved manufacturers’ shop drawing for specifics.
13. Unless otherwise noted in the plans or approved by the Engineer, Junction Boxes, Cable Vaults and Pull Boxes shall not be placed within the sidewalk, walkway, shared use path, traveled way or paved shoulders. All Junction Boxes, Cable Vaults, and Pull Boxes placed within the traveled way or paved shoulders shall be Heavy-Duty.
14. Distance between the top of the conduit and the bottom of the Junction Box lid shall be 6" (n) min. to 8" (n) max. for final grade of new construction only. See Standard Specification 8-20.3(6). Where adjustments are to be made to existing Junction Boxes, or for interim construction stages during the contract, the limits shall be from 6" (n) min. to 10" (n) max. See Standard Specification 8-20.3(6).
1. Junction Box shall be constructed of 12-gage, Type 304 stainless with steel welded seam construction. Finish shall be #4 for backbox and #4 for the cover. Mounting Tabs shall be constructed of 12-gage, Type 304 stainless steel. All hardware shall be Type A304 Stainless Steel.

2. The System Identification letters shall be 1/8” line thickness formed by engraving, stamping, or with a stainless steel weld bead. See Standard Specification 9-29.2(4) for details.

3. Conduit Capacity = 8” (4” per end).
NOTES:
1. A Heavy Duty Lid is required for all Pull Boxes placed in the traveled way or paved shoulder. A Standard Duty Lid shall be used for all other locations, including boxes placed in sidewalks (does not include driveways, walkways, or shared use paths).
2. The Heavy Duty Lid thickness shall be 9" (in) for all new installations. Where an existing Pull Box is to have a new Heavy Duty Lid installed, the lid thickness shall either be 6" (in), where no overlay is called for in the Contract, or it shall be fabricated such that the lid is flush with the top of the new overlay.
3. Minimum lid thickness shown. The diamond pattern shall be a minimum of 3/32" (in) thick.
4. Standard Duty Pull Boxes installed in sidewalks, walkways, or shared-use paths shall have a slip-resistant coating on lid and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, or shared-use paths. The non-slip lid shall be identified with permanent marking on the underside indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture. The permanent marking shall be 1/8" (in) line thickness formed with a weld bead and shall be placed prior to hot-dip galvanizing.
5. For Standard Duty Lids, attach a 1/4-20 UNC x 1" (in) S. S. ground stud, coated with anti-seize compound. For Heavy Duty Lids, install a 1/2-13 UNC x 1 1/4" (in) S. S. bolt in a 5/8" (in) diameter bored hole in the ductile iron lid gusset as a ground stud. All ground studs shall include (3) S. S. nuts and (2) S. S. flat washers.
6. See Contract Plans and Standard Plan J-60.05 for bonding jumper requirements. Bonding jumper between lid and frame shall be #8 AWG (min.) x 4" (ft) tapered braided copper.
7. The system identification letters shall be 1/8" (in) line thickness formed by casting or with a mild steel weld bead. See COVER MARKING DETAIL. See Standard Specification 9-20.2(4). Ductile iron lettering shall be recessed.
8. Cement concrete shall be Class 4000.
9. Plastic plugs shall be put into the lid inserts after fabrication and the lid installation.
10. Capacity - conduit diameter = 40" (in).
11. Excavate material, place 8" (in) crushed surfacing pad per Standard Specification Section 8-20.3(6).
12. This drawing depicts a typical Pull Box assembly. Reinforcing not shown. Each manufacturer's Pull Box assembly will vary. Refer to the approved manufacturer's shop drawings for all dimensions and the actual arrangement.
13. The lid is an assembly consisting of the metal lid(s) and frame, reinforcing steel, brass ground inserts, and concrete.
14. Field bend #3 reinforcing bar to allow conduit into the Pull Box. Field bend reinforcing bar back into place, wire tie in (2) places, and cast in commercial concrete (commercial concrete only allowed for box bottom/wall completion).
NOTES

1. A Heavy Duty Lid is required for all Cable Vaults placed in the traveled way or paver shoulder. A Standard Duty Lid shall be used for all other locations, including vaults placed in sidewalks (does not include driveways), walkways, or shared use paths.

2. The Heavy Duty Lid thickness shall be 9" (in) for all new installations. Where an existing Cable Vault is to have a new Heavy Duty Lid installed, the lid thickness shall either be 6" (in), when no overlay is called for in the Contract, or it shall be fabricated such that the lid is flush with the top of the new overlay.

3. Minimum lid thickness shown. The diamond pattern shall be a minimum of 3/32" (in) thick.

4. Standard Duty Cable Vaults installed in sidewalks, walkways, or shared-use paths shall have a slip-resistant coating on the lid and shall be installed with the surface flush with and matched to the grade of the sidewalk, walkway, or shared-use paths. The non-slip lid shall be identified with permanent marking indicating the type of surface treatment (see Contract Documents for details) and the year of manufacture.

5. For Standard Duty Lids, attach a 1/4-20 UNC × 1" (in) S. S. ground stud, coated with anti-squeeze compund. For Heavy Duty Lids, install a 1/2-13 UNC × 11/4" (in) S. S. bolt in a 5/8" (in) diameter cored hole in the ductile lid gusset as a ground stud. All ground studs shall include (3) S. S. nuts and (2) S. S. flat washers.

6. See Contract Plan Sheets and Standard Plan J-90.00 for Bonding Jumper requirements. Bonding jumper lid and frame shall be #8 AWG (min.) x 4" (ft) tinned braided copper.

7. The system identification letters shall be 1/8" (in) line thickness formed by casting or using a mild steel weld bead. See COVER MARKING DETAIL, Standard Specification S-23.2(A). Ductile iron lettering shall be recessed.

8. Cement concrete shall be Class 4000.

9. Plastic plugs shall be put into the lid after fabrication and the lid installation.

10. Capacity - conduit diameter = 60" (in).

11. Excavate material, place 6" (in) crushed surfacing pad per Standard Specification S-20.3(6).

12. This drawing depicts a typical Cable Vault assembly. Reinforcing not shown. Each manufacturer’s Cable Vault assembly will vary. Refer to the approved manufacturer’s shop drawings for all dimensions and the actual arrangement.

13. The lid is an assembly consisting of the metal lid(a) and frame, reinforcing steel, brass ground insert, and concrete.

14. Field bend #3 reinforcing bar to allow conduit into the Cable Vault. Field bend reinforcing bar back into place, wire tie in (2) places and cast in commercial concrete (commercial concrete only allowed for bottom/wall completion).
NOTES

1. Raised Pavement Markers Types 2YY and 2W shall be spaced at 80’ (ft) intervals on tangents and on horizontal curves with a radius of 1500’ (ft) or more, and at 40’ (ft) intervals on horizontal curves having radii of less than 1500’ (ft). Center the RPMs in the gaps between the pavement marking lines.

2. Type 2Y RPMs, when specified, shall be placed outside the left edge line at 80’ (ft) intervals. See “LEFT EDGE OF LANE PLACEMENT DETAIL.”

3. Recessed pavement markers, when specified, shall be installed at the locations shown for Type 2W RPMs on multilane one-way roadways, and Type 2YY RPMs on two-lane two-way roadways.

4. The Type 2W RPMs placed on multilane one-way roadways and all RPMs set in recesses shall have an abrasion-resistant coating.

5. Do not recess side-to-side RPMs on Wide Dotted Lane Lines.

TYPE 2 RPM RAISED FACE COLORS

<table>
<thead>
<tr>
<th>TYPE 2W</th>
<th>YELLOW AND YELLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE 2Y</td>
<td>WHITE – ONE SIDE ONLY</td>
</tr>
<tr>
<td>TYPE 2Y</td>
<td>YELLOW – ONE SIDE ONLY</td>
</tr>
</tbody>
</table>

WALSH, BRIAN

LONGITUDINAL MARKING SUPPLEMENT WITH RAISED PAVEMENT MARKERS

STANDARD PLAN M-20.30-04

SHEET 1 OF 2 SHEETS
SECTION A

TWO-WAY ROADWAY RECESSED PAVEMENT MARKER DETAILS
FOR USE WHERE SPECIFIED IN CONTRACT

SECTION B

ONE-WAY ROADWAY RECESSED PAVEMENT MARKER DETAILS
FOR USE WHERE SPECIFIED IN CONTRACT
NOTES

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC x 2" (in) Allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

2. Refer to Standard Specification Section 9-06.15(2) for additional requirements.

3. For frame details, see Standard Plan B-30.10.
NOTES

1. Junction Box shall be constructed of 12-gage Type 304 stainless steel weld joint construction. Finish shall be #2B for backbox and #4 for the cover. Mounting Tab shall be constructed of 12-gage Type 304 stainless steel. All hardware shall be Type A304 Stainless Steel.

2. The System Identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a stainless steel weld bead. See Standard Specification 8-29.2(4) for details.

3. Conduit Capacity ± 8" (4" per end).
1. For Installation Notes and Details see Standard Plan J-50.15.
3. All of the loop lead-in wires shall return to the Junction Box.
4. For Splice Detail, see Standard Plan J-50.15.
5. For Loop numbering Layout Details, see sheet 3.
6. For additional Induction Loop Details, see Standard Plan J-50.15.
TYPE 3 STOP LINE LOOP WIRING DIAGRAM
SERIES SPLICE SHOWN

TYPE 3 ADVANCE LOOP WIRING DIAGRAM

TYPE 3 SAMPLING LOOP WIRING DIAGRAM
SERIES SPLICE SHOWN

NOTES
Loop numbering layout will be similar to Loop Numbering Layout Detail, Sheet 3
NOTES
1. Install Galvanized Steel Rigid Metal Conduit (RMC) between the Junction Box(es) Type 1 and the DX fitting(s) "A". PVC Conduit may be used only in stationary-form barriers. Connect to RMC using a PVC adapter.
   RMC Conduit may be used in stationary-form barriers, but it shall be used in slip-form barriers.
3. Pipe wrap tape shall be 2" wide, 20 mil thick, and installed with 1" minimum overlap.

KEY NOTES
- Junction Box (mount box so cover is flush with the barrier face with a 0" tolerance protruding beyond the barrier face and 1/8" recessed).
- Type DX Deflection (DX) fitting with Internal Bonding Jumper.
- Wrap Conduit Pipe from Conduit Deflection Fitting to 1" beyond (inside) barrier surface.
- 1" -0" long, 3/4" thick expanded closed-cell foam sleeve around conduit and conduit fitting. After placing wire ties, duct tape seams and ends to seal and prevent concrete from bonding with fitting and conduit.
- Where conduit in a structure is routed across a joint, wrap the conduit pipe for 1"-0" on each side of the joint.
- 10"-0" long section of RMC conduit.
- Deflection Fitting shall be in neutral state after installation.
**CONDUIT INSTALLATION IN TRAFFIC BARRIER ON RETAINING WALL**

**STANDARD PLAN J-60.11-00**

**CONDUIT DEFLECTION FITTING "B" DETAIL**

CONDUIT FITTING - TYPE DX - FOR DEFLECTION OF 30° AND 3/4" MOVEMENT

CONDUIT FITTING - TYPE DX FOR DEFLECTION OF 30° AND 3/4" MOVEMENT. CONDUIT PIPES PLACED THROUGH RETAINING WALL TRAFFIC BARRIER SHALL BE FITTED WITH DEFORMATION FITTINGS AT MAXIMUM SPACING OF 120. THE DEFLECTION FITTINGS SHALL BE PLACED AT THE TRAFFIC BARRIER OPEN JOINT THAT COINCIDES WITH THE RETAINING WALL STEM EXPANSION JOINT NEAREST THE TRANSVERSE CONSTRUCTION JOINT IN THE WALL FOOTING.

**CONDUIT DEFLECTION FITTING "A" DETAIL**

CONDUIT FITTING - TYPE DX - PLACE AT CONDUIT PIPE EXIT FROM STRUCTURE

3/4" CLOSED-CELL FOAM SLEEVE - WRAP 1 TO 2 TIMES AROUND CONDUIT AND CONDUIT FITTING

3/4" TIMES AROUND CONDUIT AND CONDUIT FITTING

PLACE @ EXIT FROM STRUCTURE

CONDUIT PIPE

CONDUIT PIPE

PREMOLDED JOINT FILLER

PREMOLDED JOINT FILLER

CONCRETE

CONCRETE

WIRE TIE (TYP.) - (3) REQUIRED

WIRE TIE (TYP.) - (3) REQUIRED

TIES @ 2 1/2"

TIES @ 2 1/2"

SPACING

SPACING

CONDUIT PIPE

CONDUIT PIPE

PIPE WRAP TAPE

PIPE WRAP TAPE

PVC (TYP)

PVC (TYP)

CONDUIT Fitting TYPE DX- PLACE AT CONDUIT PIPE EXIT FROM STRUCTURE

CONDUIT FITTING TYPE DX - FOR DEFLECTION OF 30° AND 3/4" MOVEMENT

CONDUIT FITTING - TYPE DX FOR DEFLECTION OF 30° AND 3/4" MOVEMENT. CONDUIT PIPES PLACED THROUGH RETAINING WALL TRAFFIC BARRIER SHALL BE FITTED WITH DEFORMATION FITTINGS AT MAXIMUM SPACING OF 120. THE DEFLECTION FITTINGS SHALL BE PLACED AT THE TRAFFIC BARRIER OPEN JOINT THAT COINCIDES WITH THE RETAINING WALL STEM EXPANSION JOINT NEAREST THE TRANSVERSE CONSTRUCTION JOINT IN THE WALL FOOTING.
NOTES

1. See the Contract Plans for locations of crosswalk centerlines.

2. To the maximum extent possible, curb ramp centerline should be perpendicular to the crosswalk centerline.

3. To the maximum extent possible, crosswalks should be perpendicular to the centerline of the traveled way.
NOTES

1. Dotted Extension Line shall be the same color as the line it is extending.

2. Edge Line shall be white on the right edge of traveled way, and yellow on the left edge of traveled way (on one-way roadways). Solid Lane Line shall be white.

3. The distance between the lines of the Double Centerline shall be 12" everywhere, except 4" for left-turn channelization and narrow roadways with lane widths of 10 feet or less. Local Agencies (on non-state routes) may specify a 4" distance for all locations. The distance between the lines of the Double Lane Line shall be 4".

LONGITUDINAL MARKING PATTERNS

STANDARD PLAN M-20.10-02
LEFT-TURN LANE
(SEE NOTE 3)

TWO-WAY LEFT-TURN LANE

END TWO-WAY LEFT-TURN LANE

NOTES
1. Raised pavement markers shall be installed only when specified in the Contract Plans.
2. See the Standard Plans for marker designation.
3. The portion labeled “OPTIONAL” is used only when the Optional Marked Deceleration Tape (see Standard Plans M-3.10 and M-3.20) is specified in the Contract Plans.

Type 2L (SL) Traffic Arrow

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

LONGITUDINAL MARKING SUPPLEMENT WITH RPMs ~ TURN LANES
STANDARD PLAN M-20.40-03

Approved for publication: May 15, 2015

Sheet 1 of 2 sheets

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016

EFFECTIVE: AUGUST 3, 2015 TO July 31, 2016
Use the dimensions shown on this plan for each type of Traffic Arrow being placed on roadways with a posted speed limit of 40 mph or lower.
NOTE
1. If Rumble Strips are present, install marking outside of the Rumble Strip.
CONSTRUCTION NOTES:
1. CONSTRUCT PEDESTRIAN LUMINAIRE POLE FOUNDATION PER CITY OF FIFE STD PLAN #1. FURNISH AND INSTALL NEW PEDESTRIAN LUMINAIRE POLE, GFCI OUTLET, ARM, DECORATIVE BASE AND ALL ASSOCIATED CONDUIT AND WIRING SEE DETAIL ON SHEET IL101.PAINT ALL ELEMENTS OF POLE AND ACCESSORIES PER SPECIAL PROVISIONS & CITY OF FIFE REQUIREMENTS.
2. SIGNAL POLE MOUNTED LUMINAIRE SEE SIGNAL PLANS FOR LUMINAIRE, POLE, CONDUIT, AND WIRING INSTALLATION.
3. FURNISH AND INSTALL NEW TYPE 1 JUNCTION BOX PER WSDOT STD PLAN J-40.10-04.
5. FURNISH AND INSTALL NEW WEMA BOX PER WSDOT STD PLAN J-40.30-01.
7. COORDINATE REMOVAL OF EXISTING LUMINAIRE WITH PROPERTY OWNER.
8. COORDINATE REMOVAL OF EXISTING LUMINAIRE WITH TACOMA POWER.
10. FURNISH AND INSTALL NEW TYPE 8 JUNCTION BOX PER WSDOT STD PLAN J-40.30-04.
11. INSTALL NEW CONDUIT USING HORIZONTAL DIRECTIONAL BORING.
12. INSTALL NEW COBRAHEAD LUMINAIRE AND POLE ON CAST IN PLACE BARRIER (SEE CIVIL PLANS) AT LUMINAIRE BOLTS OUT PER WSDOT STD PLAN J-40.11-01. INSTALL NEW WIRING THROUGH CONDUIT IN BARREL PER WSDOT STD PLAN J-40.11-02.
13. PROTECT IN PLACE EXISTING LUMINAIRE POLE AND ALL ASSOCIATED WIRING, CONDUIT AND JUNCTION BOXES.
14. CONSTRUCT NEW PEDESTRIAN LUMINAIRE POLE FOUNDATION PER CITY OF FIFE STD PLAN #1. EXCEPT MATCH ANCHOR BOLT PATTERN FROM RELOCATED LUMINAIRE POLE. RELOCATE EXISTING LUMINAIRE POLE FOUNDATION TO NEW FOUNDATION AND INSTALL NEW CONDUIT AND WIRING.
15. REMOVE EXISTING LUMINAIRE SALVAGE PER SPECIAL PROVISIONS FURNISH AND INSTALL NEW LUMINAIRE ON EXISTING LUMINAIRE POLE AND DAVIT ARM.
16. FURNISH AND INSTALL NEW LUMINAIRE POLE AND DAVIT ARM ON BARRIER WALL (SEE CIVIL PLANS) PER WSDOT STD PLAN J-28.40-02. FURNISH AND INSTALL LUMINAIRE POLE AND ARM WITH 120W LED DROP ACORN FIXTURE INSTALL NEW WIRING THROUGH CONDUIT IN BARRIER.
17. INSTALL CONDUIT IN SHARED TRENCH.
18. INSTALL CONDUIT IN BARRIER PER WSDOT STD PLAN J-40.11-00.
19. PROVIDE CONDUIT TO EXISTING JUNCTION BOX AND SPOLE TO EXISTING ILLUMINATION CIRCUIT.

GENERAL NOTES:
1. SEE LUMINAIRE SCHEDULE ON LIN101 & LIN102 FOR LUMINAIRE ASSIGNMENTS.
1. The following precautions must be observed with construction thrust blocks:
   - Blocks must be poured against undisturbed soil.
   - The pipe joint and bolts must be accessible.
   - Blocks must have a compressive strength of 2,000 lbs at 28 days.
   - Blocks must be positioned to counteract the direction of the resultant thrust force.
   - Plastic wrap between pipe and concrete thrust block shall be provided.

2. All pipes shall be properly bedded see standard bedding details.

3. To determine thrust at pressures other than 200 psi shown, multiply thrust obtained in the table by the ratio of the pressure by 100.

Example: thrust on a 12" diameter bend at 125 psi:

\[
\frac{19,900 \times 125}{100} = 24,875,000
\]

4. To determine the volume of the thrust block:

Example: (150 lb/c.f. weight of concrete)

\[
125 \times 100 \times 100 = 125,500 \text{ c.f.}
\]

5. To determine the bearing area of the thrust block in square feet (s.f.) see Table 1, bearing value of soil.

Example: 24,375 lbs 12,000 lbs/s.f. of area

6. Provide two 1-inch minimum diameter rods on valves up through 10-inch diameter valves larger than 10-inches requiring special tie rod design.

### Table 1

<table>
<thead>
<tr>
<th>Size</th>
<th>Thrust at Fittings in Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>2&quot;</td>
<td>1,140</td>
</tr>
<tr>
<td>3&quot;</td>
<td>3,140</td>
</tr>
<tr>
<td>4&quot;</td>
<td>7,010</td>
</tr>
<tr>
<td>6&quot;</td>
<td>12,460</td>
</tr>
<tr>
<td>8&quot;</td>
<td>18,530</td>
</tr>
<tr>
<td>10&quot;</td>
<td>22,750</td>
</tr>
<tr>
<td>12&quot;</td>
<td>25,485</td>
</tr>
<tr>
<td>14&quot;</td>
<td>28,500</td>
</tr>
</tbody>
</table>

### Notes:
1. Piping between lines 5 inches and 9 inches shall have standard slope of 6% such that Elong A is higher than Elong B.
2. No copper or aluminum pipe should be used.
3. Provide two 1-inch minimum diameter rods on valves up through 10-inch diameter valves larger than 10-inches requiring special tie rod design.

### Construction Details:
- Plastic wrap between pipe and concrete thrust block shall be provided.
- Blocks must be poured against undisturbed soil.
- All pipes shall be properly bedded see standard bedding details.
- Blocks must be positioned to counteract the direction of the resultant thrust force.
- Plastic wrap between pipe and concrete thrust block shall be provided.

### Design Details:
- The following precautions must be observed with construction thrust blocks:

### Table 1

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Safe Bearing Loads (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clay</td>
<td>200</td>
</tr>
<tr>
<td>Sand</td>
<td>100</td>
</tr>
<tr>
<td>Sand &amp; Clay</td>
<td>500</td>
</tr>
<tr>
<td>Hard Shale</td>
<td>3,000</td>
</tr>
</tbody>
</table>

### Thrust Block Design:

#### Example:
- Thrust on a 12" diameter bend at 125 psi:

\[
\frac{19,900 \times 125}{100} = 24,875,000
\]

#### Example:
- Thrust at pressures other than 200 psi shown, multiply thrust obtained in the table by the ratio of the pressure by 100.

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- Thrust at pressures other than 200 psi shown, multiply thrust obtained in the table by the ratio of the pressure by 100.

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- Thrust at pressures other than 200 psi shown, multiply thrust obtained in the table by the ratio of the pressure by 100.

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#### Example:
- Thrust at pressures other than 200 psi shown, multiply thrust obtained in the table by the ratio of the pressure by 100.
**LEGEND**

- G: VEHICLE DISPLAY
- S: PEDESTRIAN DISPLAY
- I: STREET NAME
- H: AERIAL JUNCTION BOX
- A: PRE-EMPT DETECTOR
- P: RADAR DETECTOR

**SIGNAL STANDARD IDENTIFICATION TAG DETAIL**

- STD. NO. XXXX
- MANUFACTURER
- APPROVED DRAWING NO.
- FAB. DATE

**SITE NO. 02**

- SITING RP: 0220
- MANUFACTURER
- APPROVED DRAWING NO.
- FAB. DATE

**REMARKS**

- TIMBER POLE: ELEV. 120' (FT)
- POLE ORIENTATION AND ATTACHMENT POINT ANGLES
- LOCATION STATION
- BEARING

**POLE AND ATTACHMENT POINT DETAILS**

- STANDARDS
- STD. NO. 02
- MANUFACTURER
- APPROVED DRAWING NO.
- FAB. DATE

**SPAN LAYOUT CHART**

<table>
<thead>
<tr>
<th>SPAN LENGTH (FT)</th>
<th>OFFSET DISTANCE (FT)</th>
<th>POLE TYPE</th>
<th>WEIGHT (LBS)</th>
<th>TALLIES</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>POLE</td>
<td>4000</td>
<td>4000</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>POLE</td>
<td>4000</td>
<td>4000</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>POLE</td>
<td>4000</td>
<td>4000</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>POLE</td>
<td>4000</td>
<td>4000</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**

- OFFSET Distances measured from pole.
- All spans with signal heads or signs shall include a second messenger cable as a tether wire to secure the bottom of each signal head and sign panel.
- **WSDOT STANDARD SPECIFICATION 10.20.3.10A, BURIED DEPTH SHALL BE 10% OF POLE DEPTH PLUS 2.7 ft.**

**SIGNAL STANDARD DETAIL CHART**

<table>
<thead>
<tr>
<th>LINE</th>
<th>FIELD LOCATION</th>
<th>POLE MOUNTING HEIGHT (FT)</th>
<th>LUMINAIRE MOUNTING HEIGHT (FT)</th>
<th>POLE CLASS</th>
<th>LUMINAIRE ARM ANGLE</th>
<th>STEEL TENSION</th>
<th>NO. FOE</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B-CUT INT 4+14.2</td>
<td>X</td>
<td>279</td>
<td>52</td>
<td>52</td>
<td>1800</td>
<td>1600</td>
<td>5.5</td>
</tr>
<tr>
<td>2</td>
<td>B-CUT INT 4+14.2</td>
<td>X</td>
<td>299</td>
<td>40</td>
<td>90</td>
<td>50</td>
<td>50</td>
<td>750</td>
</tr>
<tr>
<td>3</td>
<td>C-CUT INT 12+35.5</td>
<td>X</td>
<td>299</td>
<td>40</td>
<td>16</td>
<td>50</td>
<td>4500</td>
<td>4500</td>
</tr>
<tr>
<td>4</td>
<td>C-CUT INT 18+60.0</td>
<td>X</td>
<td>299</td>
<td>40</td>
<td>16</td>
<td>50</td>
<td>4500</td>
<td>4500</td>
</tr>
<tr>
<td>5</td>
<td>C-CUT INT 18+60.0</td>
<td>X</td>
<td>299</td>
<td>40</td>
<td>16</td>
<td>50</td>
<td>4500</td>
<td>4500</td>
</tr>
<tr>
<td>6</td>
<td>C-CUT INT 3+07.2</td>
<td>X</td>
<td>260</td>
<td>FB</td>
<td>FB</td>
<td>FB</td>
<td>FB</td>
<td>5.5</td>
</tr>
</tbody>
</table>

**NOTE**

- CLASS I: TEMPORARY TIMBER STRAIN POLE SEE SG307
- CLASS II: TEMPORARY TIMBER STRAIN POLE SEE SG307

- gb - TIMBER POLE ELEV. 120' (FT)
- POLE ORIENTATION AND ATTACHMENT POINT ANGLES
APPENDIX G

POTHOLING INFORMATION
**TEST HOLE DATA SHEET**

**APS Job #: 4435**  
**Data: 6-22-17**

**Overlay layers:**
- **Concrete:** 4'
- **Dirt:**

<table>
<thead>
<tr>
<th>Pothole#</th>
<th>Overlay Thickness:</th>
<th>4&quot; inches</th>
<th>Utility type: B.F. (gas, water, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Size:</td>
<td>2&quot; inches</td>
<td>Utility Material: PVC</td>
<td></td>
</tr>
</tbody>
</table>

**Pipe Direction (circle one):**
- E & W
- N & S
- SW & NE
- SE & NW

**Soil Cond:**
- Gravel
- Sand

**Width of Structure if necessary:**

**Top of utility from grade:** 44" inches

**Bottom of utility from grade:** 46" inches

**Additional utilities found in same location:**
- E & W
- N & S
- SW & NE
- SE & NW

**Test hole#:**

**Utility Type:**

**Top:**

**Bot:**

**Size:**

**Ut Material:**

**Overlay Thick:**

**Utility Configuration:**
- Facing east
- O 2" PVC

**Vacuum Crew:**

**Lead:** Rob, John, Tyler

**Helper:**

**Notes:**

---

**Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.**

**Be sure to include a description of each permanent marker.**

**Any known building address, or side street address in the vicinity should be included.**
<table>
<thead>
<tr>
<th>Overlay layers:</th>
<th>Utility Size: 12 inches</th>
<th>Utility Material: Steel</th>
<th>Soil Cond. X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pothole: 3</td>
<td>Must be filled</td>
<td>Utility type: SD (gas, water, etc.)</td>
<td></td>
</tr>
<tr>
<td>Top of utility from grade: 51&quot; inches</td>
<td>Bottom of utility from grade: 63&quot; inches</td>
<td>Width of Structure if necessary:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional utilities found in same location:</th>
<th>E &amp; W</th>
<th>N &amp; S</th>
<th>SW &amp; NE</th>
<th>SE &amp; NW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test hole: 2</td>
<td>Utility Type: SD</td>
<td>Top: 70&quot;</td>
<td>Bot:</td>
<td>Size:</td>
</tr>
</tbody>
</table>

Utility Configuration:

Vacuum Crew:

Lead: Tyler / Matt
Helper:

Notes:

Measure down on Manhole, Pit 2 doesn't exit Manhole, we did a measure down

Sketch to include street name(s), North arrow, distance to permanent markers & distance to fogline or centerline.

Be sure to include a description of each permanent marker.

Any known building address or side street address in the vicinity should be included.
## APS Test Hole Data Sheet

### APS Job # 4439  
Data: 6-5-19

<table>
<thead>
<tr>
<th>Pothole#</th>
<th>Overlay Thickness</th>
<th>Utility Type</th>
<th>Utility Material</th>
<th>Soil Cond</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>6” inches</td>
<td>Gas</td>
<td>DNF inches</td>
<td>Sand</td>
</tr>
</tbody>
</table>

### Overlay Layers:

<table>
<thead>
<tr>
<th>Width</th>
<th>Concrete</th>
<th>Sand</th>
</tr>
</thead>
<tbody>
<tr>
<td>6”</td>
<td>[X]</td>
<td></td>
</tr>
</tbody>
</table>

### Utility Size:

<table>
<thead>
<tr>
<th>Top of utility from grade</th>
<th>Bottom of utility from grade</th>
<th>Width of Structure if necessary</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNF inches</td>
<td>DNF inches</td>
<td>DNF inches</td>
</tr>
</tbody>
</table>

### Additional Utilities Found in Same Location:

<table>
<thead>
<tr>
<th>E &amp; W</th>
<th>N &amp; S</th>
<th>SW &amp; NE</th>
<th>SE &amp; NW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Test Hole:

<table>
<thead>
<tr>
<th>Utility Type</th>
<th>Top</th>
<th>Bot</th>
<th>Size</th>
<th>Ut Material</th>
<th>Overlay Thick</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Utility Configuration:

<table>
<thead>
<tr>
<th>Lead</th>
<th>Helper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tyler / Matt</td>
<td></td>
</tr>
</tbody>
</table>

### Notes:

We potted down to 10 ft by 4 ft wide and did not find the gas line.

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.

Be sure to include a description of each permanent marker.

Any known building address, or side street address in the vicinity should be included.
TEST HOLE DATA SHEET

APS Job # 4435
Data: 6-7-17

Pothole#: 5
Overlay Thickness 9 inches.
Utility type: Com (gas, water, etc.)

Overlay layers:
- Asphalt 9"
- Dirt

Utility Size: ___ inches
Utility Material: Concrete duct
Soil Cond. Hardpan

Pipe Direction (circle one)
- E & W
- N & S
- SW & NE
- SE & NW

Top of utility from grade: 46” inches.
Bottom of utility from grade: 65” inches.
Width of Structure if necessary: 36” inches.

Additional utilities found in same location:
- E & W
- N & S
- SW & NE
- SE & NW

Test hole#
Utility Type:
Top:
Bot:
Size:
Ut Material:
Overlay Thick:

Utility Configuration:
- Facing NW
  Top: 46”
  Bot: 59”

Vacuum Crew:
Lead: Rob Tyler
Helper: Josiah

Notes:
- Might be a com duct.
- Top of concrete duct was uneven. Concrete slanted to one side. Duct might be broken but not sure?

Sketch to include street name(s), North arrow, distance to (2) permanent markers & distance to fogline or centerline.
Be sure to include a description of each permanent marker.
Any known building address, or side street address in the vicinity should be included.
### TEST HOLE DATA SHEET

**APS Job #: 4435**  
**Data: 6-7-17**

<table>
<thead>
<tr>
<th>Pothole#:</th>
<th>6</th>
<th>Overlay Thickness</th>
<th>5&quot; inches.</th>
<th>Utility type: H2O (gas, water, etc.)</th>
</tr>
</thead>
</table>

#### Overlay layers:
- Asphalt 5"

#### Pipe Direction (circle one)
- E & W
- N & S
- SW & NE
- SE & NW

- Top of utility from grade: 53" inches.
- Bottom of utility from grade: 61" inches.
- Width of Structure if necessary: [ ] inches.

#### Additional utilities found in same location:
- E & W
- N & S
- SW & NE
- SE & NW

- Test hole# [ ]
- Utility Type [ ]
- Top [ ]
- Bot [ ]
- Size [ ]
- Ut Material [ ]
- Overlay Thick [ ]

#### Utility Configuration:
- Facing North

#### Vacuum Crew:
- Lead: Rob / Tyler
- Helper: Josiah

#### Notes:

---

Sketch to include street name(s), North arrow, distance to (2) permanent markers & distance to fogline or centerline.  
Be sure to include a description of each permanent marker  
Any known building address, or side street address in the vicinity should be included.
**TEST HOLE DATA SHEET**

**APS Job #: 4435**
**Date: 6-21-17**

<table>
<thead>
<tr>
<th>Pothole#: 7</th>
<th>Overlay Thickness: 6.5&quot; inches.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Size:</td>
<td>Utility Material: Concrete duct</td>
</tr>
<tr>
<td></td>
<td>Soil Cond.: Rocky + Loose W+Soil</td>
</tr>
</tbody>
</table>

**Pipe Direction (circle one):**
- E&W
- N&S
- SW & NE
- SE & NW

**Top of utility from grade:** 61" inches.
**Bottom of utility from grade:** 93" inches.
**Width of Structure if necessary:** 60" inches.

**Additional utilities found in same location:**
- E & W
- N & S
- SW & NE
- SE & NW

**Utility Configuration:** Facing West
- Top: 61"
- Top: 64"
- N.A. 60"
- Bot: 93"

**Vacuum Crew:**
- **Lead:** Rob
- **Helper:** Josiah

**Notes:**
- Ground kept caving in because of loose soil. Could not get south bottom edge of concrete duct. Ground caves in at 52" deep.

---

Sketch to include street name(s), North arrow, distance to (2) permanent markers & distance to fogline or centerline.
Be sure to include a description of each permanent marker.
Any known building address, or side street address in the vicinity should be included.
### TEST HOLE DATA SHEET

**APS Job # 4435**  
**Data: 6-22-17**

<table>
<thead>
<tr>
<th>Overlay layers:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N.A.</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pothole#</th>
<th>Overlay Thickness</th>
<th>Utility type: <strong>com</strong> (gas, water, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>- inches</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Utility Size:</th>
<th>Utility Material: <strong>concrete duct</strong></th>
<th>Soil Cond: <strong>Rocky</strong></th>
<th>Pipe Direction (circle one): E &amp; W</th>
</tr>
</thead>
<tbody>
<tr>
<td>- inches</td>
<td></td>
<td></td>
<td>N &amp; S</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Top of utility from grade: 51&quot;</th>
<th>Bottom of utility from grade: 64&quot;</th>
<th>Width of Structure if necessary: N.A. inches.</th>
</tr>
</thead>
</table>

### Additional utilities found in same location:  
E & W  N & S  SW & NE  SE & NW

<table>
<thead>
<tr>
<th>Test hole#</th>
<th>Utility Type</th>
<th>Top</th>
<th>Bot</th>
<th>Size</th>
<th>Ut Material</th>
<th>Overlay Thick</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Utility Configuration: Facing West

<table>
<thead>
<tr>
<th>Top: N.A.</th>
<th>Top: 51&quot;</th>
<th>Bot: N.A.</th>
<th>Bot: 64&quot;</th>
</tr>
</thead>
</table>

### Vacuum Crew:

<table>
<thead>
<tr>
<th>Lead:</th>
<th>Helper:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rob</td>
<td>Josiah</td>
</tr>
</tbody>
</table>

### Notes:

could not get south edge of concrete duct, because it is under a concrete retaining wall. Found north edge of concrete duct only. Found com in grass.

---

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.  
Be sure to include a description of each permanent marker.  
Any known building address, or side street address in the vicinity should be included.
TEST HOLE DATA SHEET

APS Job # 4435
Data: 6-7-17

Overlay layers:
- Asphalt 7"
- Dirt

Utility Size: 8" inches
Utility Material: A.C.

Pipe Direction (circle one)
E & W
N & S
SW & NE
SE & NW

Top of utility from grade: 51" inches
Bottom of utility from grade: 59" inches

Width of Structure if necessary: __________ inches

Additional utilities found in same location:
E & W  N & S  SW & NE  SE & NW

Test hole#: __________
Utility Type: __________
Top: __________
Bot: __________
Size: __________
Ut Material: __________
Overlay Thick: __________

Utility Configuration: Facing North

H2O
8" A.C.

Vacuum Crew:
Lead: Rob / Tylor
Helper: Josiah

Notes:

Sketch to include street name(s), North arrow, distance to (2) permanent markers & distance to fogline or centerline.
Be sure to include a description of each permanent marker
Any known building address, or side street address in the vicinity should be included
APs

Test Hole Data Sheet

Pathhole: 10
Overlay Thickness: 5 inches
Utility Type: gas

Utility Size: 6 inches
Utility Material: STW
Soil Cond. soft

Pipe Direction (circle one)

Top of utility from grade: 41 inches
Bottom of utility from grade: 47 inches

Width of Structure if necessary:

Additional utilities found in same location:
E & W N & S SW & NE SE & NW

Test hole:
Utility Type:
Top:
Bottom:
Size:
Util Material:
Overlay Thick:

Utility Configuration:

Vacuum Craw:
Lead:
Helper:

Notes:

Sketch to include street name(s). North arrow, distance to (3) permanent markers & distance to fogline or centerline.
Be sure to include a description of each permanent marker.
Any known building address, or side street address in the vicinity should be included.
### TEST HOLE DATA SHEET

**APS Job #**: 4435  
**Date**: 6-9-17

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; Pervious Wet Sand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bottom of utility from grade: 52&quot; inches.</td>
</tr>
<tr>
<td>E &amp; W N &amp; S SW &amp; NE SE &amp; NW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Width of Structure if necessary: inches.</td>
</tr>
</tbody>
</table>

**Pipe Direction (circle one)**

**Additional utilities found in same location:**

<table>
<thead>
<tr>
<th>Test hole#</th>
<th>E &amp; W</th>
<th>N &amp; S</th>
<th>SW &amp; NE</th>
<th>SE &amp; NW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Type:</td>
<td>Top:</td>
<td>Bot:</td>
<td>Size:</td>
<td>Ut Material:</td>
</tr>
</tbody>
</table>

**Utility Configuration:** Fairing North

**Vacuum Crew:**
- **Lead:** Tyler
- **Helper:** Bear

**Notes:**

---

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.  
Be sure to include a description of each permanent marker  
Any known building address, or side street address in the vicinity should be included.
Utility Type: Gas Water

Pipe Direction (circle one): E/W

Top of utility from grade: 43 inches

Bottom of utility from grade: inches

Width of Structure if necessary: inches

Asphalt

Additional utilities found in same location: E & W  N & S  SW & NE  SE & NW

Utility Configuration:

Vacuum Crew:
Lead: Matt
Helper: Bear

Notes:
hole filling with water type & size not verified, brief visual appears to be 6-8

Sketch to include street name(s). North arrow, distance to (3) permanent markers & distance to fogline or centerline.
Be sure to include a description of each permanent marker
Any known building address, or side street address in the vicinity should be included.
**Test Hole Data Sheet**

- **APS Job #:** 4435
- **Date:** 6-9-11

### Overlay Layers

- **Pothole:** 13
- **Overlay Thickness:** X
- **Utility Size:** 14" inches
- **Utility Material:** Steel
- **Utility Type:** SS
  - (gas, water, etc.)
- **Soil Condition:** Wet
- **Pipe Direction:** E & W
- **Top of utility from grade:** 94" inches
- **Bottom of utility from grade:** 108" inches
- **Width of Structure if necessary:**

### Additional Utilities Found in Same Location

<table>
<thead>
<tr>
<th>E &amp; W</th>
<th>N &amp; S</th>
<th>SW &amp; NE</th>
<th>SE &amp; NW</th>
</tr>
</thead>
</table>

### Test Hole Details

- **Utility Type:**
- **Top:**
- **Bot:**
- **Size:**
- **Ut Material:**
- **Overlay Thick:**

### Utility Configuration

- **Facing West**
- **14"**

### Vacuum Crew

- **Lead:** Tyler
- **Helper:** Bear

### Notes

- Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.
- Be sure to include a description of each permanent marker.
- Any known building address, or side street address in the vicinity should be included.
## TEST HOLE DATA SHEET

**APS Job #** 4435  
**Date:** 6/12/17

<table>
<thead>
<tr>
<th>Pothole#</th>
<th>14</th>
<th>Overlay Thickness</th>
<th>4&quot;</th>
<th>Utility Type</th>
<th>H2O (gas, water, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Size</td>
<td>8&quot;</td>
<td>Utility Material</td>
<td>AC</td>
<td>Soil Cond.</td>
<td>Wet gravel</td>
</tr>
<tr>
<td>Pipe Direction (circle one)</td>
<td>E &amp; W</td>
<td>Top of utility from grade</td>
<td>50&quot;</td>
<td>inches.</td>
<td></td>
</tr>
<tr>
<td>SW &amp; NE</td>
<td>Bot of utility from grade</td>
<td>38&quot;</td>
<td>inches.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE &amp; NW</td>
<td>Width of Structure if necessary</td>
<td>inches.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Additional utilities found in same location:

<table>
<thead>
<tr>
<th>Position</th>
<th>E &amp; W</th>
<th>N &amp; S</th>
<th>SW &amp; NE</th>
<th>SE &amp; NW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bot</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ut Material</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overlay Thick</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Utility Configuration:

- Facing North

### Vacuum Crew:

- **Lead:** Tjw
- **Helper:** Bear

### Notes:

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.

Be sure to include a description of each permanent marker.

Any known building address, or side street address in the vicinity should be included.
**TEST HOLE DATA SHEET**

**APS Job #: 4435**  
**Data: 6-9-17**

| Pothole#: | 15 | Overlay Thickness: | 4" | Utility type: SS  
|----------|----|--------------------|----|--------------------
| (gas, water, etc.) |
| Utility Size: | inches | Utility Material: |
| Top of utility from grade: | 79" | inches |
| Bottom of utility from grade: | inches |
| Pipe Direction (circle one): | E & W | N & S | SW & NE | SE & NW |
| Soil Cond: | Wet | Clay |
| Width of Structure if necessary: | inches |

**Additional utilities found in same location:**

<table>
<thead>
<tr>
<th>E &amp; W</th>
<th>N &amp; S</th>
<th>SW &amp; NE</th>
<th>SE &amp; NW</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Test hole #:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Utility Type:</th>
<th>Top:</th>
<th>Bot:</th>
<th>Size:</th>
<th>Ut Material:</th>
<th>Overlay Thick:</th>
</tr>
</thead>
</table>

**Utility Configuration:**

<table>
<thead>
<tr>
<th>34th Ave E Concrete Cut</th>
<th>26'6&quot;</th>
<th>12'6&quot;</th>
<th>H2O Meter</th>
</tr>
</thead>
</table>

**Vacuum Crew:**

<table>
<thead>
<tr>
<th>Lead:</th>
<th>Helper:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tyler</td>
<td>Beer</td>
</tr>
</tbody>
</table>

**Notes:**

We could not visualize the pipe due to the side walls collapsing from water.

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.  
Be sure to include a description of each permanent marker  
Any known building address, or side street address in the vicinity should be included.
Pothole: 10
Overlay Thickness: X inches.
Utility type: SS (gas, water, etc.)

Utility Size: DNF inches
Utility Material: DNF
Soil Cond.: Wet Clay

Pipe Direction (circle one):
- E & W
- N & S
- SW & NE
- SE & NW

Top of utility from grade: DNF inches.
Bottom of utility from grade: DNF inches.
Width of Structure if necessary: DNF inches.

Additional utilities found in same location:

Test hole:
Utility Type: __________ Top: ______ Bot: ______ Size: ______ Ut Material: ______ Overlay Thick: ______

Utility Configuration:

Vacuum Crew:
Lead: Tyler
Helper: Bear

Notes:
We potholed 10½' down and still could not find utility.

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.
Be sure to include a description of each permanent marker.
Any known building address, or side street address in the vicinity should be included.
TEST HOLE DATA SHEET

Pipehole: 17
Overlay Thickness: 4" inches
Utility Type: Gas

Utility Size: 6" inches
Utility Material: STW

Pipe Direction (circle one)
E & W
N & S
SW & NE
SE & NW

Top of utility from grade: 33" inches
Bottom of utility from grade: 39" inches

Width of Structure if necessary: __________ inches.

Additional utilities found in same location:
E & W  N & S  SW & NE  SE & NW

Test hole #______________
Utility Type: __________  Top: __________  Bot: __________  Size: __________  Ut Material: __________  Overlay Thick: __________

Utility Configuration: north

Vacuum Crew:
Lead: Mark
Helper: Bear

Notes:

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.
Be sure to include a description of each permanent marker.
Any known building address, or side street address in the vicinity should be included.
Pothole: 18"
Overlay Thickness: 7" inches
Utility Type: H2O
(gas, water, etc.)
Utility Size: 8" inches
Utility Material: AC
Soil Cond: Wet
Pipe Direction (circle one):
E & W
N & S
SE & NW
SW & NE
Top of utility from grade: 44" inches
Bottom of utility from grade: 52" inches
Width of Structure if necessary: ____________ inches

Additional utilities found in same location:
E & W
N & S
SW & NE
SE & NW

Test hole # ____________
Utility Type: ____________
Top: ____________
Bot: ____________
Size: ____________
Ut Material: ____________
Overlay Thick: ____________

Utility Configuration: Facing North

Vacuum Crew:
Lead: Tyler
Helper: Bear

Notes:

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.
Be sure to include a description of each permanent marker
Any known building address, or side street address in the vicinity should be included
# Test Hole Data Sheet

**APS Job #: 4435**  
**Date: 6-8-17**

**Pothole #: 19**  
**Overlay Thickness: 3**

**Utility Type:** Water

**Utility Sizes:**
- 6" (asphalt)
- Gas/Water etc.

**Utility Material:** CI

**Pipe Direction (circle one):**
- E & W
- N & S
- SW & NE
- SE & NW

**Top of utility from grade:** 48" inches

**Bottom of utility from grade:**

**Width of Structure if necessary:**

**Additional utilities found in same location:**

**Test hole #:**

**Utility Type:**

**Top:**

**Bot:**

**Size:**

**Util Material:**

**Overlay Thick:**

**Utility Configuration:** North

**Vacuum Crew:**

**Lead:** Matt

**Helper:** Bear

**Notes:**

Hole wet brief visual appears to be (CI 6")?

---

**Sketch:**

Include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.  
Be sure to include a description of each permanent marker.  
Any known building address, or side street address in the vicinity should be included.
**Test Hole Data Sheet**

**APS Job #:** 4435  
**Date:** 6/18/17

<table>
<thead>
<tr>
<th>Pothole #</th>
<th>Overlay Thickness</th>
<th>Utility Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>5&quot; inches</td>
<td>Gas</td>
</tr>
</tbody>
</table>

**Overlay Layers:**
- **5' Asphalt**

**Utility Size:** 6'/1.25 inches  
**Utility Material:** STW  
**Soil Cond.:** Crushed rock & Sand

**Pipe Direction:**
- **SW & NE**

**Top of Utility from Grade:** 38" inches

**Bottom of Utility from Grade:** 51" inches

**Width of Structure if Necessary:** ____________ inches

**Additional Utilities Found in Same Location:**
- **E & W**
- **N & S**
- **SW & NE**
- **SE & NW**

**Test Hole #:** ____________

**Utility Type:** ____________  
**Top:** ____________  
**Bot:** ____________  
**Size:** ____________  
**Ut Material:** ____________  
**Overlay Thick:** ____________

**Utility Configuration:** north / west

**Sketch:**
- Water values
- 29'-2" centerline
- 9'-9" from pump (34 Ave E)

**Vacuum Crew:**
- **Lead:** Matt
- **Helper:** Bear

**Notes:**

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fowl line or centerline.  
Be sure to include a description of each permanent marker.  
Any known building address, or side street address in the vicinity should be included.
**TEST HOLE DATA SHEET**

**APS**

**APS Use # 4435**  
**Date 6-8-17**

### Overlay layers:

<table>
<thead>
<tr>
<th>Pothole#</th>
<th>Overlay Thickness</th>
<th>Utility type</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td></td>
<td>Gas</td>
</tr>
</tbody>
</table>

**Utility Size:** 1.25 inches  
**Utility Material:** S&W  
**Soil Cond:** 30 ft

**Pipe Direction (circle one):**
- [ ] E & W
- [ ] N & S
- [ ] SW & NE
- [ ] SE & NW

**Top of utility from grade:** 39 in
**Bottom of utility from grade:** 41 in

**Width of structure if necessary:**

### Additional utilities found in same location:

<table>
<thead>
<tr>
<th>Test hole#</th>
<th>E &amp; W</th>
<th>N &amp; S</th>
<th>SW &amp; NE</th>
<th>SE &amp; NW</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Utility Type</th>
<th>Top</th>
<th>Bot</th>
<th>Size</th>
<th>Ut Material</th>
<th>Overlay Thick</th>
</tr>
</thead>
</table>

**Utility Configuration:** Post

- 1/14" 0 S&W

**Vacuum Crew:**

- **Lead:** Matt
- **Helper:** Bear

**Notes:**

---

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.  
Be sure to include a description of each permanent marker.  
Any known building address, or side street address in the vicinity should be included.
APs Job # 4435  
Data: 6-9-17

Pothole#: 22  
Overlay Thickness: 7" inches.  
Utility type: H2O (gas, water, etc.)

Utility Size: 8" inches  
Utility Material: AC  
Soil Cond.: Clay

Pipe Direction (circle one)  
E & W  N & S  SW & NE  SE & NW

Top of utility from grade: 48" inches.  
Bottom of utility from grade: 56" inches.  
Width of Structure if necessary: ____________ inches.

Additional utilities found in same location:

Test hole#__________

Utility Type:__________  
Top:__________  
Bot:__________  
Size:__________  
Ut Material:__________  
Overlay Thick:__________

Utility Configuration: Facing North

8"

Vacuum Crew:

Lead: Tyler
Helper: Bear

Notes:

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.
Be sure to include a description of each permanent marker.
Any known building address, or side street address in the vicinity should be included.
**Test Hole Data Sheet**

**APS Job # 4435**  
**Data: 6-21-17**

**Did not dig**

**Pothole #: 23**  
**Overlay Thickness:** inches

**Utility Type:** Com  
(gas, water, etc.)

**Overlay Layers:**

<table>
<thead>
<tr>
<th>Utility Size: inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Material:</td>
</tr>
<tr>
<td>Soil Cond:</td>
</tr>
</tbody>
</table>

**Pipe Direction (circle one):**

- E & W
- N & S
- SW & NE
- SE & NW

<table>
<thead>
<tr>
<th>Top of utility from grade: inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom of utility from grade:</td>
</tr>
</tbody>
</table>

| Width of Structure if necessary: inches |

**Additional utilities found in same location:**

<table>
<thead>
<tr>
<th>E &amp; W</th>
<th>N &amp; S</th>
<th>SW &amp; NE</th>
<th>SE &amp; NW</th>
</tr>
</thead>
</table>

**Test hole #:**

<table>
<thead>
<tr>
<th>Utility Type:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top:</td>
</tr>
<tr>
<td>Bot:</td>
</tr>
<tr>
<td>Size:</td>
</tr>
<tr>
<td>Ut Material:</td>
</tr>
<tr>
<td>Overlay Thick:</td>
</tr>
</tbody>
</table>

**Utility Configuration:**

**Vacuum Crew:**

**Lead:** Rob

**Helper:** Josiah

**Notes:**

- Com does not locate.
- No one calls locates down.
- Did not dig.
- Com might not be at that location.

---

Sketch to include street name(s), North arrow, distance to (2) permanent markers & distance to fogline or centerline.

Be sure to include a description of each permanent marker.

Any known building address, or side street address in the vicinity should be included.
TEST HOLE DATA SHEET

APS Job # 4435  Data: 6-9-17

Overlay layers:

Pipe Direction (circle one):
- E & W
- N & S
- SW & NE
- SE & NW

Utility Size: 2" inches  Utility Material: Yellow MD

Overlay Thickness: 4" inches  Top of utility from grade: 35" inches

Utility type: Gas
(gas, water, etc.)

Soil Cond. Compact

Bottom of utility from grade: 37" inches

Width of Structure if necessary: ____________ inches

Additional utilities found in same location:

Test hole#:

Utility Type:________  Top:____  Bot:____  Size:____  Ut Material:____  Overlay Thick:____

Utility Configuration: Facing North

Vacuum Crew:

Lead: Tyler

Helper: Bear

Notes:

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.

Be sure to include a description of each permanent marker

Any known building address, or side street address in the vicinity should be included
**TEST HOLE DATA SHEET**

**APS Job #:** 4435  
**Date:** 6-12-19

<table>
<thead>
<tr>
<th>Pothole #: 25</th>
<th>Overlay Thickness: 6&quot; inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Size: 6&quot; inches</td>
<td>Utility Material: PVC</td>
</tr>
<tr>
<td>Pipe Direction (circle one)</td>
<td>Utility type: SS (gas, water, etc.)</td>
</tr>
<tr>
<td>E &amp; W</td>
<td>Soil Cond: wet gravel</td>
</tr>
<tr>
<td>N &amp; S</td>
<td></td>
</tr>
<tr>
<td>SW &amp; NE</td>
<td></td>
</tr>
<tr>
<td>SE &amp; NW</td>
<td></td>
</tr>
</tbody>
</table>

**Pipe Direction (circle one):**
- E & W
- N & S
- SW & NE
- SE & NW

**Top of utility from grade:** 56" inches

**Bottom of utility from grade:** 62" inches

**Width of Structure if necessary:**

**Additional utilities found in same location:**

**Test hole #:**

**Utility Type:**
- Top:
- Bot:
- Size:
- Ut Material:
- Overlay Thick:

**Utility Configuration:** Facing North

![Sketch of utility configuration](image)

**Vacuum Crew:**

**Lead:** Tyw

**Helper:** Bear

**Notes:**

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.

Be sure to include a description of each permanent marker

Any known building address, or side street address in the vicinity should be included.
# TEST HOLE DATA SHEET

**APS Job #** 4435  
**Date:** 6-20-17

## Overlay Layers:
- Asphalt 9.5" D:NT

## Utility Details:
- **Pothole:** 26
- **Overlay Thickness:** 9.5" inches
- **Utility Type:** H2O (gas, water, etc.)
- **Utility Size:** 8" inches
- **Utility Material:** Steel
- **Soil Condition:** Rocky
- **Pipe Direction (circle one):** E&W
- **Top of utility from grade:** 46" inches
- **Bottom of utility from grade:** 54" inches
- **Width of Structure if necessary:**

## Additional Utilities Found in Same Location:
- E & W
- N & S
- SW & NE
- SE & NW

## Utility Configuration:
- Facing East
- Water

## Vacuum Crew:
- **Lead:** Rob
- **Helper:** Josiah

## Notes:
- Looks like black plastic around steel pipe.

---

Sketch to include street name(s), North arrow, distance to (2) permanent markers & distance to fogline or centerline.  
Be sure to include a description of each permanent marker.  
Any known building address, or side street address in the vicinity should be included.
APPLIED PROFESSIONAL SERVICES, INC.

TEST HOLE DATA SHEET

APS Job #: 4435
Date: 6-20-17

Pothole#: 27
Overlay Thickness: 4" inches
Utility: H2O
(gas, water, etc.)

Utility Size: 8" inches
Utility Material: A.C.

Pipe Direction (circle one)
E & W
N & S
SW & NE
SE & NW

Top of utility from grade: 42" inches
Bottom of utility from grade: 50" inches

Soil Cond.: Rocky

Additional utilities found in same location:

Test hole#
Utility Type: Top: Bot: Size: Ut Material: Overlay Thick:

Utility Configuration: Facing North

Vacuum Crew:
Lead: Rob
Helper: Josiah

Notes:
Did not find thrust restraint at pothole location?

Sketch to include street name(s), North arrow, distance to (2) permanent markers & distance to foul line or centerline.
Be sure to include a description of each permanent marker
Any known building address, or side street address in the vicinity should be included.
# Test Hole Data Sheet

**APS Job #** 4435  
**Date:** 6-21-17

**Did not dig**

| Pothole# | Overlay Thickness | Utility type: **Com**  
|-----------|-------------------|---------------------|

<table>
<thead>
<tr>
<th>Utility Size</th>
<th>Utility Material</th>
<th>Soil Cond.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Pipe Direction (circle one)</th>
<th>Top of utility from grade</th>
<th>Bottom of utility from grade</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E &amp; W</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>N &amp; S</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SW &amp; NE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SE &amp; NW</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Width of Structure if necessary</th>
</tr>
</thead>
</table>

**Additional utilities found in same location:**

<table>
<thead>
<tr>
<th>E &amp; W</th>
<th>N &amp; S</th>
<th>SW &amp; NE</th>
<th>SE &amp; NW</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Test hole#</th>
<th>Utility Type</th>
<th>Top</th>
<th>Bot</th>
<th>Size</th>
<th>Ut Material</th>
<th>Overlay Thick</th>
</tr>
</thead>
</table>

**Utility Configuration:**

<table>
<thead>
<tr>
<th>Vacuum Crew:</th>
</tr>
</thead>
</table>

**Lead:** Rob  
**Helper:** Josiah

**Notes:**

- **Com does not locate.**  
- **No one calls locates down by One Call service.**  
- **Did not dig.**  
- **Com might not be at that location.**

---

Sketch to include street name(s), North arrow, distance to (2) permanent markers & distance to fogline or centerline.  
Be sure to include a description of each permanent marker  
Any known building address, or side street address in the vicinity should be included.
TEST HOLE DATA SHEET

APL Job # 1535  Data: 6-9-17

Overlay layers:

- 4" Concrex
- Wet
- Dirt

Pipe Direction (circle one)
- E & W
- N & S
- SW & NE
- SE & NW

Utility Size: 4" inches  Utility Material: PVC

Overlay Thickness: 4" inches

Top of utility from grade: 30" inches
Bottom of utility from grade: 34" inches

Width of Structure if necessary: _ inches

Utility Configuration: FACING WEST

Vacuum Crew:
Lead: Tyur
Helper: Bear

Notes:

Additional utilities found in same location:
E & W  N & S  SW & NE  SE & NW

Test hole:
Utility Type: ____________ Top: __ Bot: __ Size: __ Ut Material: ____________ Overlay Thick: ____________

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.
Be sure to include a description of each permanent marker
Any known building address, or side street address in the vicinity should be included.
TEST HOLE DATA SHEET

APS Job # 4435  Data: 6-12-11

Overlay layers:

- 5" Asphalt
- 3" Base
- 2" Sandy Rock
- 1" Clay

Pipe Direction (circle one):
- E & W
- N & S
- SW & NE
- SE & NW

Utility Configuration:
- Facing North

Overlay Thickness: 5" inches
Utility Size: 4" inches
Utility Material: Steel
Pipe Direction: E & W
Top of utility from grade: 44" inches
Bottom of utility from grade: 48" inches
Width of Structure if necessary: __________ inches

Additional utilities found in same location:
- E & W
- N & S
- SW & NE
- SE & NW

Utility Configuration:

- 4"

Vacuum Crew:

- Lead: Tyler
- Helper: Bear

Notes:

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.
Be sure to include a description of each permanent marker.
Any known building address, or side street address in the vicinity should be included.
**Test Hole Data Sheet**

**APS Job #: 4435**

**Date: 6-20-17**

<table>
<thead>
<tr>
<th>Pothole#: 31</th>
<th>Overlay Thickness ___ inches.</th>
<th>Utility type: <strong>Sewer</strong> (gas, water, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Size: 8” inches</td>
<td>Utility Material: <strong>D-I</strong></td>
<td>Soil Cond. <strong>Rocky + P. Rock + Wet</strong></td>
</tr>
<tr>
<td>Top of utility from grade: 28” inches.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottom of utility from grade: 36” inches.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe Direction (circle one)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E &amp; W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N &amp; S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW &amp; NE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE &amp; NW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Width of Structure if necessary: ___ inches.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional utilities found in same location:</th>
<th>E &amp; W</th>
<th>N &amp; S</th>
<th>SW &amp; NE</th>
<th>SE &amp; NW</th>
</tr>
</thead>
</table>

| Test hole# | | | | |
| Utility Type: | | | | |
| Top: | | | | |
| Bot: | | | | |
| Size: | | | | |
| Ut Material: | | | | |
| Overlay Thick: | | | | |

**Utility Configuration:** Facing East

**Vacuum Crew:**

**Lead:** Bob

**Helper:** Josiah

**Notes:**

---

Sketch to include street name(s), North arrow, distance to (2) permanent markers & distance to fogline or centerline.

Be sure to include a description of each permanent marker.

Any known building address, or side street address in the vicinity should be included.
## TEST HOLE DATA SHEET

**APS Job #:** 4435  
**Date:** 6-9-17

### Overlay layers:
- **12"** Asphalt  
- **Wet** Gravel

### Pothole:
- **31**  
- **Overlay Thickness:** 12" inches  
- **Utility Size:** 8" 12" inches  
- **Utility Material:** AC  
- **Utility Type:** H2O (gas, water, etc.)  
- **Soil Cond:** Wet gravel

### Pipe Direction (circle one):
- E & W  
- N & S  
- SW & NE  
- SE & NW

- **Top of utility from grade:** 57" inches  
- **Bottom of utility from grade:** 69" inches  
- **Width of Structure if necessary:**

### Additional utilities found in same location:
- E & W  
- N & S  
- SW & NE  
- SE & NW

### Test hole:
- Utility Type:  
- Top:  
- Bot:  
- Size:  
- Ut Material:  
- Overlay Thick:

### Utility Configuration: Facing West

### Vacuum Crew:
- **Lead:** Tyler  
- **Helper:** Bear

### Notes:

---

**Sketch** to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.  
Be sure to include a description of each permanent marker  
Any known building address, or side street address in the vicinity should be included.
Pothole#: 32

Overlay Thickness __ inches.

Utility Size: 1/2 __ inches
Utility Material: D.B.
Utility Type: Com (gas, water, etc.)

Pipe Direction (circle one)

Top of utility from grade: 27__ inches.
Bottom of utility from grade: 27.5__ inches.

Width of Structure if necessary: __ inches.

Overlay layers:

N.A.

Additional utilities found in same location:

E & W  N & S  SW & NE  SE & NW

Test hole#:

Utility Type:

Top:

Bot:

Size:

Ut Material:

Overlay Thick:

Utility Configuration:

Facing West

com

1/2 D.B.

Vacuum Crew:

Lead: Bob

Helper: Josiah

Notes:

Only found one .5" D.B. Com.
Could not find another .5" D.B. Com.
Needs to be relocated by One Call Service.

Sketch to include street name(s), North arrow, distance to (2) permanent markers & distance to fogline or centerline.
Be sure to include a description of each permanent marker
Any known building address, or side street address in the vicinity should be included
TEST HOLE DATA SHEET

APS Job # 4435
Data: 6-20-17

Pothole#: 33
Overlay Thickness = inches.
Utility type: Sewer (gas, water, etc.)

Overlay layers:
Utility Size: 8" inches
Utility Material: D-1
Soil Cond: Rocky + P. Rock + Wet

Pipe Direction (circle one)
E & W
N & S
SW & NE
SE & NW

Top of utility from grade: 29.5" inches.
Bottom of utility from grade: 37.5" inches.
Width of Structure if necessary: ____________ inches.

Additional utilities found in same location:
E & W
N & S
SW & NE
SE & NW

Test hole# ____________
Utility Type: ____________
Top: ____________
Bot: ____________
Size: ____________
Ut Material: ____________
Overlay Thick: ____________

Utility Configuration: Facing North

Vacuum Crew:
Lead: Rob
Helper: Josiah

Notes:

Sketch to include street name(s), North arrow, distance to (2) permanent markers & distance to fogline or centerline.
Be sure to include a description of each permanent marker
Any known building address, or side street address in the vicinity should be included
Pothole#: **34**  Overlay Thickness: _ ___ inches.

Utility Size: **6" inches**  Utility Material: **Steel**  Soil Cond.: **Rocky**

Pipe Direction (circle one)

- E & W
- N & S
- SW & NE
- SE & NW

Top of utility from grade: **32" inches**

Bottom of utility from grade: **38" inches**

Width of Structure if necessary: _ ___ inches.

Additional utilities found in same location:

<table>
<thead>
<tr>
<th>E &amp; W</th>
<th>N &amp; S</th>
<th>SW &amp; NE</th>
<th>SE &amp; NW</th>
</tr>
</thead>
</table>

Test hole#: __________

Utility Type: __________  Top: __________  Bot: __________  Size: __________  Ut Material: __________  Overlay Thick: __________

Utility Configuration: **Facing East**

- 6" Sewer

Vacuum Crew:

- Lead: **Rob**
- Helper: **Josiah**

Notes:

Sketch to include street name(s), North arrow, distance to (2) permanent markers & distance to fogline or centerline.

Be sure to include a description of each permanent marker.

Any known building address, or side street address in the vicinity should be included.
Pothole #: 35  Overlay Thickness: 4" inches  
Utility Type: Storm  
(gas, water, etc.)  
Utility Size: 14" inches  
Utility Material: Concrete  
Soil Cond.: Rocky  
Pipe Direction (circle one)  
E & W  
SW & NE  
SE & NW  
Top of utility from grade: 23.5" inches  
Bottom of utility from grade: N.A. inches  
Width of Structure if necessary: N.A. inches  
Additional utilities found in same location:  
Test hole#:  
Utility Type:  
Top:  
Bot:  
Size:  
Ut Material:  
Overlay Thick:  
Utility Configuration: Facing North  
Vacuum Crew:  
Lead: Rob  
Helper: Josiah  
Notes:  
Could not get a good size measurement with tape, because of large rocks on top of pipe. Looks like a 14" or 16" concrete pipe.  
Sketch to include street name(s), North arrow, distance to (2) permanent markers & distance to fogline or centerline.  
Be sure to include a description of each permanent marker  
Any known building address, or side street address in the vicinity should be included.
**TEST HOLE DATA SHEET**

**APS Job #: 4435**  
**Data: 6-20-17**

### Overlay layers:

<table>
<thead>
<tr>
<th>Overlay</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt</td>
<td>4&quot;</td>
</tr>
<tr>
<td>Dirt</td>
<td></td>
</tr>
</tbody>
</table>

### Utility Information:

- **Pothole #: 36**  
- **Overlay Thickness: 4" inches**  
- **Utility Type:** Storm (gas, water, etc.)
- **Utility Size:** 16" inches
- **Utility Material:** Concrete
- **Soil Cond.: Rocky**
- **Pipe Direction (circle one):** E & W (N & S)
- **Top of utility from grade:** 17" inches
- **Bottom of utility from grade:** 33" inches
- **Width of Structure if necessary:**

### Additional utilities found in same location:

<table>
<thead>
<tr>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>E &amp; W</td>
</tr>
<tr>
<td>N &amp; S</td>
</tr>
<tr>
<td>SW &amp; NE</td>
</tr>
<tr>
<td>SE &amp; NW</td>
</tr>
</tbody>
</table>

### Test hole information:

- **Utility Type:**
- **Top:**
- **Bot:**
- **Size:**
- **Ut Material:**
- **Overlay Thick:**

### Utility Configuration:

- **Facing North**
- **Storm 16"**

### Vacuum Crew:

- **Lead:** Rob
- **Helper:** Josiah

### Notes:

Sketch to include street name(s), North arrow, distance to (2) permanent markers & distance to fogline or centerline.  
Be sure to include a description of each permanent marker  
Any known building address, or side street address in the vicinity should be included.
### TEST HOLE DATA SHEET

**APS Job #** 4435  
**Date:** 6-22-17

<table>
<thead>
<tr>
<th>Pothole#</th>
<th>Overlay Thickness</th>
<th>Utility Material</th>
<th>Utility Type</th>
<th>Soil Cond.</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>7&quot; inches</td>
<td>DNF</td>
<td>Com</td>
<td>Soft</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pipe Direction</th>
<th>Top of utility from grade</th>
<th>Bottom of utility from grade</th>
<th>Width of Structure if necessary</th>
</tr>
</thead>
<tbody>
<tr>
<td>E &amp; W</td>
<td>3nf</td>
<td>3nf</td>
<td>3nf</td>
</tr>
<tr>
<td>N &amp; S</td>
<td>3nf</td>
<td>3nf</td>
<td>3nf</td>
</tr>
<tr>
<td>SW &amp; NE</td>
<td>3nf</td>
<td>3nf</td>
<td>3nf</td>
</tr>
<tr>
<td>SE &amp; NW</td>
<td>3nf</td>
<td>3nf</td>
<td>3nf</td>
</tr>
</tbody>
</table>

**Overlay layers:**
- 7" Concrete
- Soft

**Additional utilities found in same location:**
- E & W
- N & S
- SW & NE
- SE & NW

**Test hole#**

**Utility Configuration:** Facing East

**Vacuum Crew:**
- **Lead:** Tyler / John / Rob
- **Helper:** Josiah

**Notes:**
We potholed down 9 ft by 3 ft wide and did not find utility.

---

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.  
Be sure to include a description of each permanent marker.  
Any known building address, or side street address in the vicinity should be included.
## TEST HOLE DATA SHEET

### APS Job #: 4435  Date: 6-21-17

### Overlay layers:

<table>
<thead>
<tr>
<th>Pothole#</th>
<th>Overlay Thickness = inches.</th>
<th>Utility type: Telephone vault corner (gas, water, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td></td>
<td>Concreate</td>
</tr>
</tbody>
</table>

### Utility Size:
- E & W
- N & S
- SW & NE
- SE & NW

### Pipe Direction (circle one):
- E & W
- N & S

### Utility Material:
- Vault Corner
- Soil Cond. Sand + Brick

### Top of utility from grade:
- 37''

### Bottom of utility from grade:
- N.A. inches

### Width of Structure if necessary:
- N.A. inches

### Additional utilities found in same location:

<table>
<thead>
<tr>
<th>Test hole# 38A</th>
<th>E &amp; W</th>
<th>N &amp; S</th>
<th>SW &amp; NE</th>
<th>SE &amp; NW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Type:</td>
<td>Vault Corner</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top:</td>
<td>51''</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bot:</td>
<td>N.A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size:</td>
<td>N.A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ut Material:</td>
<td>Vault Corner</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overlay Thick:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Utility Configuration:

- Facing West
- Top: 51''
- Top: 37''

### Vacuum Crew:

- Lead: Rob
- Helper: Josiah

### Notes:

- Sketch to include street name(s), North arrow, distance to (2) permanent markers & distance to fogline or centerline.
- Be sure to include a description of each permanent marker.
- Any known building address, or side street address in the vicinity should be included.
**TEST HOLE DATA SHEET**

**APS Job #: 4435**

**Date: 6.21.17**

<table>
<thead>
<tr>
<th>Pothole#: 39</th>
<th>Overlay Thickness: — inches.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Size: — inches</td>
<td>Utility Material: —</td>
</tr>
<tr>
<td>Soil Cond.</td>
<td>Loose Soil, Gravel, Rocks, Wet</td>
</tr>
<tr>
<td>Bottom of utility from grade: — inches.</td>
<td></td>
</tr>
</tbody>
</table>

**Pipe Direction (circle one)**
- E & W
- N & S
- SW & NE
- SE & NW

**Utility Configuration:** Facing North
- Top: 39”
- Top of Vault Edge.

**Vacuum Crew:**
- **Lead:** Rob
- **Helper:** Josiah

**Notes:**
39” To top of vault edge to the East. Could not find edge of vault corners because it looks like it is under a parking lot. To the South is under a retaining wall.

**Additional utilities found in same location:**
- E & W
- N & S
- SW & NE
- SE & NW

**Test hole**
- 39-A
- Top of: Vault
- Utility Type: Vault
- Top: 39”
- Bot: N.A
- Size: N.A
- Material: Vault
- Overlay Thick: —

**Sketch**
- Private parking lot
- Telephone pole
- Vault lid
- Asphalt pavement edge
- Top of vault #3408

**Address:** 3410 7th Ave E

**Notes:**
- Sketch to include street name(s), North arrow, distance to (2) permanent markers & distance to fogline or centerline.

Be sure to include a description of each permanent marker.

Any known building address, or side street address in the vicinity should be included.
TEST HOLE DATA SHEET

APS Job # 4435
Data: 6-22-17

Overlay layers:
- Pothole#: 39A
- Overlay Thickness: X inches
- Utility Size: X inches
- Utility Material: Concrete
- Utility Type: Vault Corner (gas, water, etc.)
- Soil Cond: Soft Sand
- Pipe Direction (circle one)
  - E & W
  - N & S
  - SW & NE
  - SE & NW
- Top of utility from grade: 39" inches
- Bottom of utility from grade: X inches
- Width of Structure if necessary: X inches

Additional utilities found in same location:
- E & W
- N & S
- SW & NE
- SE & NW

Test hole#: 39B
- Utility Type: Vault Corner
- Top: 39" in
- Bot: X in
- Size: X in
- Ut Material: Concrete
- Overlay Thick: X

Utility Configuration:
- Facing South
  - 39" SE
  - 39" NE

Vacuum Crew:
Lead: Tyler / John
Helper:
Notes:

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.
Be sure to include a description of each permanent marker.
Any known building address, or side street address in the vicinity should be included.
**TEST HOLE DATA SHEET**

**APS Job # 4435**  
**Data: 6-22-17**

<table>
<thead>
<tr>
<th>Pothole#:</th>
<th>Overlay Thickness inches</th>
<th>Utility type: F.O. (gas, water, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overlay layers:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Size: inches</td>
</tr>
<tr>
<td>E &amp; W</td>
</tr>
<tr>
<td>N &amp; S</td>
</tr>
<tr>
<td>SW &amp; NE</td>
</tr>
<tr>
<td>SE &amp; NW</td>
</tr>
</tbody>
</table>

**Additional utilities found in same location:**

<table>
<thead>
<tr>
<th>Test hole#</th>
<th>E &amp; W</th>
<th>N &amp; S</th>
<th>SW &amp; NE</th>
<th>SE &amp; NW</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Utility Type:</th>
<th>Top:</th>
<th>Bot:</th>
<th>Size:</th>
<th>Ut Material:</th>
<th>Overlay Thick:</th>
</tr>
</thead>
</table>

**Utility Configuration:**

**Vacuum Crew:**

**Lead:** Rob  
**Helper:** Tosi

**Notes:**

Did not dig because no F.O. Located at that location. Tried to locate F.O. but does not locate. Need One Call Service to locate B.F. Line.

---

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.  
Be sure to include a description of each permanent marker.  
Any known building address, or side street address in the vicinity should be included.
Pothole#: 41  Overlay Thickness X inches. Utility type: Com (gas, water, etc.)

Utility Size: 10" thick inches  Utility Material: Concrete Bar  Soil Cond: Rock

Pipe Direction (circle one)
E & W
N & S
SW & NE
SE & NW

Top of utility from grade: 42" inches.
Bottom of utility from grade: 52" inches.

Width of Structure if necessary: 24" inches.

Additional utilities found in same location:
E & W  N & S  SW & NE  SE & NW

Test hole#
Utility Type: Top: Bot: Size: Ut Material: Overlay Thick:

Utility Configuration: Facing East

T = 42"
B = 52"
W = 24"

Vacuum Crew:

Lead: Tyler / John

Helper:

Notes:

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.

Be sure to include a description of each permanent marker.

Any known building address, or side street address in the vicinity should be included.
**TEST HOLE DATA SHEET**

**APS Job #** 4136  
**Date:** 10-22-17

**Pothole #:** 42  
**Overlay Thickness:** X inches  
**Utility Type:** Com (gas, water, etc.)

**Overlay Layers:**
- Utility Size: 10” thick inches
- Utility Material: Concrete Duct
- Soil Cond.: Compact
- Pipe Direction (circle one):
  - E & W
  - N & S
  - SW & NE
  - SE & NW
- Top of utility from grade: 56” inches
- Bottom of utility from grade: 106” inches
- Width of Structure if necessary: 24” inches

**Additional utilities found in same location:** E & W  N & S  SW & NE  SE & NW

**Test hole #**
- Utility Type:
- Top:
- Bot:
- Size:
- Ut Material:
- Overlay Thick:

**Utility Configuration:** Facing East

**T = 56”**
**B = 46”**
**W = 24”**

**Vacuum Crew:**
- **Lead:** Tyler / Smith
- **Helper:**

**Notes:**

---

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.

Be sure to include a description of each permanent marker.

Any known building address, or side street address in the vicinity should be included.
TEST HOLE DATA SHEET

APS Job #: 4435
Date: 6-22-17

Pothole#: 43
Overlay Thickness: 9" inches
Utility Type: Com
(gas, water, etc.)

Utility Size: 10" thick inches
Utility Material: Concrete, Dirt, Soil, Cond, Gravel

Pipe Direction (circle one)
- E & W
- N & S
- SW & NE
- SE & NW

Top of utility from grade: 47" inches
Bottom of utility from grade: 57" inches
Width of Structure if necessary: 24" inches

Additional utilities found in same location:
E & W
N & S
SW & NE
SE & NW

Test hole#________
Utility Type:________
Top:________
Bot:________
Size:________
Ut Material:________
Overlay Thick:________

Utility Configuration: Facing East

T = 47"
B = 57"
W = 24"

Vacuum Crew:
Lead: Tyler / John
Helper:

Notes:

Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to foiline or centerline.
Be sure to include a description of each permanent marker
Any known building address, or side street address in the vicinity should be included
**TEST HOLE DATA SHEET**

**APS Job # 4435**

**Date: 6-22-17**

**Overlay layers:**
- **Asphalt:** 8"
- **Dirt:**

**Utility Size:**
- **Utility Material:** Concrete

**Pipe Direction (circle one):**
- E & W
- N & S
- SW & NE
- SE & NW

**Top of utility from grade:**
- **59"** inches.

**Bottom of utility from grade:**
- **N.A.** inches.

**Width of Structure if necessary:**
- **24"** inches.

**Utility Configuration:** Facing West

**Top:** 59"

**Bot:** N.A. 24"

**Vacuum Crew:**
- **Lead:** Rob
- **Helper:** Josiah

**Notes:**
- At 2' deep ground Kelp
- Undersoil because of sand and wet
- By feel only with air knife
- Spent hours but could not vac out soil to see duct

**Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline.
Be sure to include a description of each permanent marker.
Any known building address, or side street address in the vicinity should be included.
**TEST HOLE DATA SHEET**

**APS Job # 4135**
**Date: 6-10-17**

<table>
<thead>
<tr>
<th>Pothole#</th>
<th>Overlay Thickness</th>
<th>Utility type</th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>X inches</td>
<td>SS (gas, water, etc.)</td>
</tr>
</tbody>
</table>

**Overlay layers:**

- Utility Size: DNF inches
- Utility Material: DNF
- Top of utility from grade: DNF inches
- Bottom of utility from grade: DNF inches
- Width of Structure if necessary: __________ inches

**Additional utilities found in same location:**

<table>
<thead>
<tr>
<th>E &amp; W</th>
<th>N &amp; S</th>
<th>SW &amp; NE</th>
<th>SE &amp; NW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test hole#</td>
<td>__________</td>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

**Utility Configuration:**

**Vacuum Crew:**

- **Lead:** Tyler
- **Helper:** Bear

**Notes:**

> We potholed down to 10 ft and 4½ ft wide and did not find utility.

**Sketch to include street name(s), North arrow, distance to (3) permanent markers & distance to fogline or centerline. Be sure to include a description of each permanent marker. Any known building address, or side street address in the vicinity should be included.**