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<td>6-31-1</td>
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INSTRUCTIONAL GUIDE

Purpose
To provide specifications for trenching.

Compatible Unit Coding For "UT" Section

1. Trenching
   Excavation codes have been established for trench digging only. Use multipliers to accommodate a wide variation of widths and depths.

2. Backfill
   Backfill codes have been established to backfill a trench and remove native soil when required. Use multipliers to provide the correct quantity of backfill. Various types of backfill material are represented.

3. Street Repair
   Street repair codes have been established to perform various kinds of street repairs.

4. Encasement
   Use full strength concrete (MAG B), rated at a minimum of 2,500 psi, for maximum physical protection. Use 1-1/2 sack CLSM (5075315) for normal physical protection. Use DBS (5075316) for grouting around conduit in steel pipe sleeves. These types of encasement provide thermal conductivity for the cable.

5. Trench Shoring and Safety
   For trench shoring and safety specifications, refer to the Excavation Safety Resource Manual published by the Safety Services department. For supporting existing conduit banks for new excavations, see UKBS2 in conduit section.
Underground Distribution Construction Standards

REV. REMOVED 30" PROPERTY LINE & 2 1/2" FROM CONDUIT FOR SRP.

TRENCHING
CONDUIT STUB-OUT TO RESIDENCE
JOINT TRENCH WITH GAS

SIDE PROPERTY LINE
18" MIN.

FINAL GRADE

A. VERIFY MINIMUM COVER
FOR GAS & TELCO, CATV

B. 39" MIN. W/O GAS
WITH GAS B = A"+12"+3"

COMPACTED AT 85%-90% OF MAXIMUM
BACKFILL SOIL DENSITY PER ASTM
D698, AT OR NEAR OPTIMUM MOISTURE
MECHANICAL COMPACTION IS
NOT ALLOWED WITHIN 6" OF
ELECTRIC CONDUIT

ELECTRIC

12" MIN.

GAS

REV. DATE: 08/28/12
APPROVAL: B. PRIEST

ISSUE DATE: 04/02/02

8515E286.DGN

6-2-1
RESIDENTIAL STREET LIGHTING

STREET RIGHT-OF-WAY

LIGHT LOCATION PER CITY

SRP STREET LIGHT WIRE

EASEMENT

SRP WIRE AND CONNECTORS

J-BOX 5034692

P.O.D.

CITY STREET LIGHT WIRE

SRP WIRE AND CONNECTORS

FINAL GRADE

CITY STREET

LIGHT WIRE

P.O.D.

2'

SRP WIRE AND CONNECTORS

CITY LIGHT

P.O.D.

2'

SRP WIRE AND CONNECTORS

J-BOX 5034692

CITY STREET LIGHT AND WIRE

SRP WIRE AND CONNECTORS

FINAL GRADE

J-BOX 5034692

P.O.D.

CITY LIGHT

P.O.D.

CITY WIRE

SRP WIRE AND CONNECTORS

NOTES:

1. FOR CITY OWNED AND INSTALLED STREET LIGHTS TO BE SERVED BY SRP WITH UNDERGROUND WIRE, THE POINT OF DELIVERY (P.O.D.) WILL BE IN A JUNCTION BOX INSTALLED BY SRP OR AN APPROVED BOX INSTALLED BY THE CITY. THE CITY IS TO PROVIDE THE LOCATION OF THE LIGHTS.


3. THE CITY IS TO PROVIDE APPROPRIATE POLE GROUNDING IF METAL POLES ARE USED. THE CITY MAY INSTALL A GROUND ROD IN THE JUNCTION BOX IF THEY DO NOT DAMAGE SRP CONDUCTORS.

4. IN RESIDENTIAL STREETS, P.O.D. JUNCTION BOX IS TO BE AT FRONT OF UTILITY EASEMENT AND ON PROPERTY LINE BETWEEN LOTS.

5. IF TWO OR MORE CITY LIGHTS ARE TO BE CONNECTED IN SERIES AND SERVED FROM ONE SRP CONNECTION, THE CITY MUST STATE THE NUMBER AND SIZE OF LIGHTS TO BE SERVED.

COMMERCIAL/INDUSTRIAL AND MAJOR ROAD STREET LIGHTING

STREET RIGHT-OF-WAY

LIGHT LOCATION PER CITY

SRP STREET LIGHT WIRE

EASEMENT LINE

SRP WIRE AND CONNECTORS

J-BOX 5034692

P.O.D.

CITY STREET LIGHT WIRE

SRP WIRE AND CONNECTORS

FINAL GRADE

CITY LIGHT

P.O.D.

CITY WIRE

SRP WIRE AND CONNECTORS

NOTES:

1. FOR CITY OWNED AND INSTALLED STREET LIGHTS TO BE SERVED BY SRP WITH UNDERGROUND WIRE, THE POINT OF DELIVERY (P.O.D.) WILL BE IN A JUNCTION BOX INSTALLED BY SRP OR AN APPROVED BOX INSTALLED BY THE CITY. THE CITY IS TO PROVIDE THE LOCATION OF THE LIGHTS.


3. THE CITY IS TO PROVIDE APPROPRIATE POLE GROUNDING IF METAL POLES ARE USED. THE CITY MAY INSTALL A GROUND ROD IN THE JUNCTION BOX IF THEY DO NOT DAMAGE SRP CONDUCTORS.

4. IN RESIDENTIAL STREETS, P.O.D. JUNCTION BOX IS TO BE AT FRONT OF UTILITY EASEMENT AND ON PROPERTY LINE BETWEEN LOTS.

5. IF TWO OR MORE CITY LIGHTS ARE TO BE CONNECTED IN SERIES AND SERVED FROM ONE SRP CONNECTION, THE CITY MUST STATE THE NUMBER AND SIZE OF LIGHTS TO BE SERVED.

REV: UPDATED STOCK CODES

TRENCHING
CITY OWNED STREET LIGHTS
POINT OF DELIVERY DETAIL

ISSUE DATE: 10/25/88
REV. DATE: 07/31/13
APPROVAL: B. PRIEST

8-3-1
8513E516.DGN
1. PREFER RIGHT SIDE OF LOT SERVICE

2. TRAILERS ARE NOT REQUIRED TO HAVE 22K AIC RATED PANELS. SEE "ELECTRIC SERVICE SPECIFICATIONS" BOOK, GENERAL - FAULT CURRENT TABLES.

NOTE:

TRENCHING
SERVICE TO MOBILE HOMES
RENTAL OR PURCHASE LOTS
NOTES:
1. IDENTIFY CABLES PER MISCELLANEOUS SECTION OF THIS BOOK.
2. LOCATE THE SWITCH, FUSE, AND OR CAPACITOR BANK ON SIDE LOT LINES WHENEVER POSSIBLE AND DO NOT INSTALL IN FRONT OF HOUSES.
3. INSTALL EQUIPMENT AWAY FROM DRIVEWAYS. IF A DRIVEWAY IS WITHIN 2' OF THE EQUIPMENT, INSTALL A GUARD POST AS SHOWN IN THE UBG OF THE BASIC ASSEMBLY UNITS SECTION.
<table>
<thead>
<tr>
<th>Conductor Type</th>
<th>Acceptable Locations for Joint Trench With Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service, Secondary and #2 Primary</td>
<td>All Locations in Residential Subdivisions</td>
</tr>
<tr>
<td>Service, Secondary, #2 and 4/0 Primary</td>
<td>Commercial Private Property Only (Not in PUE)</td>
</tr>
<tr>
<td>Feeder</td>
<td>None (see note 2)</td>
</tr>
</tbody>
</table>

NOTES

1. All joint trench locations shall have a maximum back fill soil density per ASTM D698, at or near optimum moisture (see page 6-9-1). Mechanical compaction is not allowed within 6” of electrical conduit.

2. Joint use trench with feeder is not allowed because it presents an obstacle to future feeder access. The following acceptable alternatives will be allowed:
   A. A separate feeder and gas trench with a minimum of 2 feet of undisturbed earth between the two trenches.
   B. A shelf-type trench with six feet radial separation between the feeder and gas.
**TRENCH WIDTHS SHOWN ARE THE MINIMUM REQUIRED FOR ELECTRIC CONDUIT ONLY. TELCO, CATV AND GAS MUST BE CONTACTED ON A JOB-BY-JOB BASIS TO DETERMINE THEIR SPECIFIC TRENCH WIDTH AND SEPARATION NEEDS.**

1. 85% OF MAXIMUM BACKFILL SOIL DENSITY PER ASTM D698, AT OR NEAR OPTIMUM MOISTURE.

2. MECHANICAL COMPACTION NOT ALLOWED WITHIN 6" OF ELECTRICAL CONDUIT.
** JOINT GAS/ELECTRIC SUBDIVISION TRENCH SHELF-TYPE INSTALLATION **

** APPROXIMATELY 34" THIS DIMENSION NOT CRITICAL TO SRP **

STREET SIDE

HOUSE SIDE

48" MIN. COVER

** GAS LINE MUST BE INSTALLED ON SHELF. **

** TRENCH TO BE INSPECTED BY SRP **

(A) VERIFY SHELF STABILITY

(B) VERIFY CLEARANCES

(C) VERIFY GAS LINE IS FIRMLY IN PLACE ON SHELF DURING BEDDING.

TO ALLOW THIS TYPE OF CONSTRUCTION, SOIL MUST BE ABLE TO HOLD SHELF DURING INSTALLATION.

** TRENCH WIDTHS SHOWN ARE THE MINIMUM REQUIRED FOR ELECTRIC CONDUIT ONLY. TELCO, CATV AND GAS MUST BE CONTACTED ON A JOB-BY-JOB BASIS TO DETERMINE THEIR SPECIFIC TRENCH WIDTH AND SEPARATION NEEDS. **

** TRENCH WIDTHS SHOWN ARE THE MINIMUM REQUIRED FOR ELECTRIC CONDUIT ONLY. TELCO, CATV AND GAS MUST BE CONTACTED ON A JOB-BY-JOB BASIS TO DETERMINE THEIR SPECIFIC TRENCH WIDTH AND SEPARATION NEEDS. **

GAS LINE MUST BE INSTALLED ON SHELF.

ELECTRIC CONDUIT BANK

SEPARATION BACKFILL: CAN BE NATIVE, ABC, ABC SLURRY OR LEAN MIX BACKFILL. WATER SETTLING ALLOWED, MUST BE FIRM. (SEE PAGE 6-9-1)

PRIMARY/SECONDARY TRENCH

** SERVICE TRENCH **

GAS LINE MUST BE INSTALLED ON SHELF.

24" MIN. COVER

48" MIN. COVER

ISSUE DATE: 02/08/02

REV. DATE: 04/08/10

APPROVAL: B. PRIEST
SOIL TYPES, BACKFILL MATERIAL AND COMPACTION REQUIREMENTS

This information is to be superseded by any conflicting information that may be published in the SRP "Excavation Safety Resource Manual".

NOTES:
1. Measure trench depths from final grade stakes. Follow all trench depths specified on a job drawing. See clearance section for minimum cover and separation requirements.
2. Shore or slope trench walls as required by the latest revision of the SRP Excavation Safety Manual.
4. BACKFILL AND COMPACTION FOR CONDUIT IN NATIVE SOIL

Within 6 inches of the conduit, backfill material shall be free of broken concrete, paving, wood, glass or other solid material greater than 1-1/2 inches. This backfill shall contain more than 50 percent fines of a size that is 3/8 inch or smaller. The balance of the trench backfill shall be free of solid material greater than 4 inches in maximum dimension and shall contain more than 50 percent fines of a size that is 3/8 inch or smaller.

<table>
<thead>
<tr>
<th>STOCK CODE</th>
<th>MATERIAL</th>
<th>DESCRIPTION</th>
<th>RECOMMENDED COMPACTION METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>5075319</td>
<td>GRANULAR</td>
<td>Well graded unwashed sand and gravel used in compacted subgrades for pavements and general backfill</td>
<td>Steel Wheel, vibratory plate or rubber-tired compaction</td>
</tr>
<tr>
<td></td>
<td>Mag Aggregate Base coarse (ABC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sand</td>
<td>Soil mostly made of particles less than 3/16 &quot; in size, but containing little or no silt or clay</td>
<td>Steel Wheel, vibratory plate or rubber-tired compaction</td>
<td></td>
</tr>
<tr>
<td>NATIVE SOIL</td>
<td>Soil placed by nature that has not been altered by man and meets requirements of Note 4</td>
<td>Sheepsfoot or rubber-tired roller (kneading)</td>
<td></td>
</tr>
</tbody>
</table>

5. Use other backfill if it is more economical. Notify Civil Inspectors at least 48 hours prior to start of work to arrange for compaction testing.
6. Compact backfill to at least the percentage of maximum density listed in the following M.A.G. specification (as determined by ASTM D698) unless otherwise specified.

Contact the municipality concerned for repair requirements when a trench will be under pavement. The following table applies when there are no supplemental municipal requirements.
M.A.G. SPEC. 601-2
Modified to meet most MAG Agency requirements.

A. Under or within 2’ existing or proposed pavement, curb, gutter or sidewalk
   Native .......... 95%
   Granular....... 100%
   All 95%

B. On any utility easement street, road or alley right-of-way outside limits of ‘A’
   90%

C. Around and under any structures or pad mounted equipment or exposed utilities
   95%

D. All other areas
   80%

NOTE: Do not use machine compaction within 6 inches of cable or conduit.

SLURRY BACKFILL MIXES (NO COMPACTION REQUIRED)

<table>
<thead>
<tr>
<th>STOCK NO.</th>
<th>ABBV.</th>
<th>SLURRY TYPE</th>
<th>DESCRIPTION</th>
<th>COARSE AGGREGATE ASTM C33</th>
<th>FINE AGGREGATE</th>
<th>SLUMP RANGE</th>
<th>MIN. CEMENT CONTENT (LBS/CU. YD.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5075311</td>
<td>ASB</td>
<td>Aggregate Slurry Backfill</td>
<td>Washed gravel and sand or clean ABC, no cement, backfill around wood and concrete transmission line poles and in trenches (no loads). NO. 67 [3/4” (19mm) NOM. MAX.]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5075313</td>
<td>CLSM 1/2 Sack</td>
<td>Controlled Low Strength Material w/ 1/2 Sack Cement PCY</td>
<td>Washed gravel and sand or clean ABC, with cement, trench backfill (low load areas-streets and lots).</td>
<td>MIXES IN ACCORDANCE WITH MAG 728 (13)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5075314</td>
<td>CLSM 1 Sack</td>
<td>Controlled Low Strength Material w/ 1 Sack Cement PCY</td>
<td>Washed gravel and sand or clean ABC, with cement, trench backfill in low load areas (streets and lots). Use in lieu of CLSM 1/2 Sack as required by cities.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5075315</td>
<td>CLSM 1- 1/2 Sack</td>
<td>Controlled Low Strength Material w/1- 1/2 Sack Cement PCY</td>
<td>Washed gravel and sand or clean ABC, with cement, structural backfill under foundations and as thermal fill and/or mechanical protection of duct banks.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5075316</td>
<td>DBS</td>
<td>Duct Bank Backfill w/Sand Slurry</td>
<td>Grout for pumping around conduits placed in pipe sleeves.</td>
<td>NONE</td>
<td>NOTE 11</td>
<td>6&quot;-9&quot;</td>
<td>376</td>
</tr>
</tbody>
</table>

7. When trenching in an area where many undercrossings of other utility lines or conflicts are encountered, installation of conduit under all of the conflicts is more difficult. Wider trenches should be used for these installations.

8. Water flooding of trenches, in order to provide compaction, is only allowed provided the volume of water does not saturate the backfill, water pressure does not displace the backfill, and is pre-approved by ESE. (Standing water is an indication of saturation.)

9. Trench spoil shall be placed 6 to 10 ft. from edge of a trench. If not possible, trench spoil may be placed on one side of the trench, within 4 ft. of the edge, provided the opposite side of the trench is level, without obstructions, and accessible by men and equipment.

10. If compaction is uneconomical around or under structures, pad mounted equipment or exposed utilities, CLSM 1/2 Sack (5075313) may be used.

11. Fine aggregates (sand) shall be in accordance with ASTM C33.

12. Fine aggregates 45-50% of the total aggregate weight.

13. Purchaser may request material at lower slumps.

Underground Distribution Construction Standards

TRENCHING SOIL TYPES, BACKFILL MATERIAL AND COMPACITION REQUIREMENTS

Updated stock code numbers.

ISSUE DATE: 06-25-90
REV. DATE: 01-26-15
APPROVAL: B. Priest
NOTES

1. Excavate 4’ below pad. Pit shall extend on all sides 4” past edge of pad.

2. Backfill material under transformer pad shall be CLSM 1/2” sack material item 5075313. For installations in which service conduits require racking and encasement, backfill material shall be 1-1/2 sack CLSM material item 5075315.
UTCRA  Cut and remove asphalt.  
Per Linear foot.

UTCRC  Cut and remove concrete. Compatible unit codes for cutting and removing paved areas.  
DOES NOT INCLUDE TRENCHING OR BACKFILL.  
Per Linear Foot.

UTCP  Compatible unit code for 3000 PSI concrete patching only, covers 2' x 2' area, 4” thick.  
Use for areas 60 square feet or less (stock #5075323).

UTSW  Compatible unit code for 3000 PSI concrete new sidewalk, covers 4' x 1' area, 4” thick.  
To be used for areas greater than 60 square feet (stock #5075323).

UTEXS  Compatible unit code for excavations at or near existing facilities.  
Approximately 15 cubic feet. Includes 2.25 man-hours only.

UTEX  Compatible unit code for excavations at or near existing facilities.  
Approximately 30 cubic ft. Includes 4.5 man-hours only.

UTEXH  Compatible unit code for hand-dig at or near existing facilities.  
Approximately 30 cubic ft. Includes 12 man-hours only.

UTDP  This compatible unit will be used to communicate to Construction the need for a dust  
control plan and permit. This unit must be shown on lines 13 through 18 of the grid  
sketch by Design personnel.

Underground Electrical extensions in excess of 2,000 linear feet in length outside a  
subdivision currently under construction will require the dust control plan and permit.

UTT  Marker tape; install directly on top of primary direct buried cables or conduits. Use when  
required by other authorities.

Red Concrete  
Red concrete colorant for underground duct banks shall be dry powdered Mix Ready Disintegrating Bag  
Concrete Colorant as manufactured by Davis Colors and supplied locally by Border Products, or equal  
product. Color shall be Baja Red or equal color, mixed at the rate of 9 pounds of dry colorant per cubic  
yard of concrete (SRP stock number 5075320, MAG ‘C’ 2000 psi). Colorant shall be added to the  
concrete mix at the job site by the Ready-Mix truck operator, and then mixed in accordance with the  
manufacturer’s recommendations until thoroughly blended (typically at charging speed for 5 minutes).

Note: All Compatible Unit hours include backfill time.
1. Trench depths and conduit cover are to be measured from final grade stakes. All trench depths or conduit cover requirements specified on a job drawing shall be followed.

2. These trench codes provide man-hours for excavation only and do not provide for trench backfill.

3. The total trench footage length will be shown in the grid as standard trench, either UTP for primary or UTS for secondary, street light, or service. When trench is provided by customer, this is the only coding required on the job grid.

4. Non standard trench locations will be identified on the job order sketch with required width and depth dimensions given.

5. When trenching is provided by SRP, non standard trenches shall have 2 compatible unit codes in the grid, UTP plus the UTPX, to adjust the time for digging.

6. When specified depth cannot be obtained because of solid rock, a minimum earth cover of 24" is acceptable, provided a minimum 2" encasement of concrete surrounds the conduit.

7. Use example shown to figure length of UTPX trench, unless the entire trench is non standard.

8. If secondary/service or street light must be placed in P.U.E. or road R.O.W., use UTP trench dimensions and enter UTS as the compatible unit.

9. Provides 1.5 times regular man-hours.

10. Trench bottom to be smooth and free of sharp rocks. Where excavation is in rock, bottom of trench to have protective layer of clean, level, tamped backfill or sand.

NOTES:

REV. CORRECTED TRENCH DEPTH TYPO.

ISSUE DATE: 01/15/87

REV. DATE: 03/06/13

APPROVAL: B. PRIEST

Underground Distribution Construction Standards

SRP

PROPRIETARY MATERIAL
<table>
<thead>
<tr>
<th>Trench Depth (feet)</th>
<th>6</th>
<th>12</th>
<th>18</th>
<th>24</th>
<th>30</th>
<th>18</th>
<th>24</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>-0.9</td>
<td>-0.8</td>
<td>-0.7</td>
<td>-0.6</td>
<td>-0.4</td>
<td>—</td>
<td>—</td>
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<tr>
<td>2.5</td>
<td>-0.9</td>
<td>-0.7</td>
<td>-0.6</td>
<td>-0.4</td>
<td>-0.3</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>3</td>
<td>-0.8</td>
<td>-0.7</td>
<td>-0.5</td>
<td>-0.3</td>
<td>-0.2</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>3.5</td>
<td>-0.8</td>
<td>-0.6</td>
<td>-0.4</td>
<td>-0.2</td>
<td>0.0</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>4</td>
<td>-0.8</td>
<td>-0.6</td>
<td>-0.3</td>
<td>-0.1</td>
<td>0.1</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<td>4.5</td>
<td>-0.8</td>
<td>-0.5</td>
<td>-0.3</td>
<td>0.0</td>
<td>0.3</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>5</td>
<td>-0.7</td>
<td>-0.4</td>
<td>-0.2</td>
<td>0.1</td>
<td>0.4</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Personnel in Trench Require Protection*

| 6 | — | -0.3 | 0.0 | 0.3 | 0.7 | 0.4 | 0.8 | 1.1 |
| 7 | — | -0.2 | 0.2 | 0.6 | 0.9 | 1.2 | 1.6 | 1.9 |
| 8 | — | -0.1 | 0.3 | 0.8 | 1.2 | 2.1 | 2.6 | 3.0 |
| 9 | — | — | 0.5 | 1.0 | 1.5 | 3.3 | 3.8 | 4.3 |
| 10 | — | — | 0.7 | 1.2 | 1.8 | 4.7 | 5.2 | 5.8 |
| 11 | — | — | 0.8 | 1.4 | 2.1 | 6.3 | 6.9 | 7.5 |
| 12 | — | — | 1.0 | 1.7 | 2.3 | 8.1 | 8.8 | 9.4 |
| 13 | — | — | 1.2 | 1.9 | 2.6 | — | — | — |
| 14 | — | — | 1.3 | 2.1 | 2.9 | — | — | — |
| 15 | — | — | 1.5 | 2.3 | 3.2 | — | — | — |

* See Excavation Safety Resource Manual

NOTES
1. The multipliers on this chart are used to calculate and adjust construction man-hours and material when digging and/or backfilling trenches that are different than the "standard" Compatible Units.
2. The multipliers are used with Compatible Units UTPX, UTPCX, UTNBPX, UTSBPX, UTABPX, and UT1BPX to add or delete the differences from the standard primary trench Compatible Units.
3. When a negative multiplier is needed in the Compatible Unit Estimating (CUE) application, enter "C" in the Work Function field, and a negative value in the Quantity field. This entry will launch the Expanded/Subtracting From field where the trench type CU being adjusted is entered.
4. Use the values in the chart that are the closest to the actual trench dimensions by rounding up or down.
5. These multipliers and the UTPX code may not be used with the trench code UTS.
6. See pg. 6-14-1 for an example.
EXCAVATION BACKFILL CODES

1. UTNBP = complete native backfill for a UTP trench
2. UTNBS = complete native backfill for a UTS trench
3. UTNBPX = native backfill, use for adding or deleting man-hours for non-standard trench (see UT-X chart)
4. UTABP = complete ABC backfill (5075318) for a UTP trench
5. UTABX = complete ABC backfill (5075318) for UTS trench
6. UTABPX = ABC backfill (5075318), used for adding or deleting man-hours and material for non-standard size trench (see UT-X chart)
7. UTLBP = complete lean mix backfill (CLSM 1/2 sack 5075313) of a UTP trench
8. UTLBS = complete lean mix backfill (CLSM 1/2 sack 5075313) of a UTS trench
9. UTLBPX = lean mix (CLSM 1/2 sack 5075313) used for adding or deleting man-hours and material for non-standard size trench (see UT-X chart)
10. UTSBP = complete slurry backfill (CLSM 1-1/2 sack 5075315) of a UTP trench
11. UTSBS = complete slurry backfill (CLSM 1-1/2 sack 5075315) of a UTS trench
12. UTSBPX = slurry (CLSM 1-1/2 sack 5075315) used for adding or deleting man-hours and material for non-standard size trench (see UT-X chart)
13. UT1BP = complete 1 sack backfill (5075314) of a UTP trench
14. UT1BS = complete 1 sack backfill (5075314) of a UTS trench
15. UT1BPX = 1 sack (5075314) used for adding or deleting man-hours and material for non-standard size trench (see UT-X chart)

NOTES:
The UT-X chart (pg. 6-11-2) is to be used when calculating man-hour and material adjustments for non-standard primary trench backfill when the following conditions exist:

1. The trench is narrower, shallower, wider and/or deeper than the standard UTP trench by 6" or more.
2. The backfill consists of two or more different types (i.e. ABC and native will be used to fill the trench).
3. There is a concrete encased conduit bank partially backfilling the trench and adjustment to the remaining amount of backfill needs to be made.

   Exception: Trenches requiring sloping assume a duct bank will be installed. Time and material have been adjusted already.

4. Anytime it is known that approximately one foot or more of the trench bottom will be completely filled with something other than the native fill. Excess native fill cannot be placed back into the trench and will have to be hauled off site.

5. The man-hours include time to haul away native backfill.
STREET CROSSING SURFACE REPAIR CODES

1. UTSRAP= Asphalt Concrete (A.C.) Hot mix pavement street repair for a UTP trench, 1' X 2' width X 2" depth (0.06 ton hot mix asphalt). See note 5.

2. UTSRAPX= Same as #1 but in 1 sq. ft. increments (0.03 ton hot mix asphalt). See notes 1 and 5.

3. UTSRC= Concrete street repair, 1' X 4' width X 8" depth (0.1 cubic yard stock #5075323).

4. UTSRCX= Same as #3 but in 1 sq. ft. increments (0.03 cubic yard stock #5075323). See note 1.

5. UTSRAC= ABC and A.C. pavement course repair, 1' X 4' width X 2" depth (0.1 ton hot mix asphalt). See note 5.

6. UTSRACX= Same as #5 but in 1 sq. ft. increments (0.03 ton hot mix asphalt). See notes 1 and 5.

7. UTSRCA= Compacted ABC or 1 sack CLSM and A.C. pavement course repair, 1' X 4' width X 2" depth each (0.15 cubic yard stock #5075134 & 0.10 ton hot mix asphalt). See note 5.

8. UTSRCA= Same as #7 but in 1 sq. ft. increments (0.04 cubic yard stock #5075134 & 0.03 ton hot mix asphalt). See notes 1 and 5.

9. UTRGC= Curb and gutter repair (rolled or square) for one foot of length (0.04 cubic yard stock #5075323).

NOTES

1. Multiply the length of the repair (in feet) times the width of the repair (in feet) for the quantity to be used. Round off dimensions to nearest foot.

2. Minimum trench width in public right-of-way is 12".

3. These codes may be used to repair asphalt or concrete in other locations, not in a public right-of-way (e.g. parking lots or private driveways).

4. Spoil removal time is included in the Concrete, CLSM and ABC Backfill Compatible Unit codes.

5. Hot mix asphalt shall meet the governing municipalities' requirements.
This example requires a 24" wide by 70" (6 feet) deep trench with a UKB3 duct bank installed in it. The backfill is native, except for the street crossing, because the city has required a specific type of street repair with CLSM, under the paved portion of the street.

1. First, account for the necessary standard trench digging codes in the grid:
   A. The standard trench digging code will always be in the grid with the actual length of the trench. In this case, 235 feet of primary trench is needed.

   The grid shows UTP = 235

   B. Extra time is needed to dig because the trench is 6 feet deep. Using the UT-X chart, look up the multiplier for a 2-foot wide by 6-foot deep trench, which is 0.3. Multiply the length of the trench being dug, in this case all 235 feet, by the multiplier, 235 x 0.3 = (70.5), round to 71.

   The grid shows UTPX = 71

   C. To cut and remove the asphalt, show the length of cut required.

   The grid shows UTCRA = 50

   Note: This completes digging of the trench and removal of asphalt.
2. Second, account for the necessary standard trench backfill codes in the grid. The standard trench backfill codes will always be in the grid with the actual trench length of each type of backfill required. This case has multiple types of backfill required.

A. Native backfill may be used for the entire trench except under the asphalt. Per the example, 185 feet will have native backfill.
   
   The grid shows: UTNBP = 185

B. Next, calculate man-hours and material. This trench has been partially filled with a duct bank and is deeper than the standard. Using the UT-X chart, look up the multiplier for the size of trench remaining to be filled with native backfill. In this case, the multiplier is 0.1 (2 ft. wide x 5 ft. deep).
   
   Multiply the length of trench: 185 x 0.1 = 18.5, round to 19.

   The grid shows: UTNPBX = 19

3. Controlled Low Strength Material backfill is required for the road-crossing portion of the trench.

   The grid shows: UTSBP = 50

4. Calculate the man-hours and material as in 2.B. Using the UT-X chart, the multiplier is the same as 2.B. Multiply 50 ft. x 0.1 = 5.0

   The grid shows: UTSBPX = 5.0

5. A.C. pavement repair is required for the street-crossing portion of the trench. Standard repair is for a 2 ft. wide trench with 1 ft. on each side for "T" top.

   The grid shows: UTSRAC = 50

6. Adjustment for additional trench width is not required in this case. For this type of repair in any other width trench, use the Compatible Unit UTSRACX instead for the actual width involved.
Gopher Bore
No Casing

Entrance Pit
Exit Pit

2' Min. Clear Area Required on Both Sides of Each Pit

"If installing conduit increase to 30'.

NOTES:
1. This bore is installed with a gopher (unguided).
2. Plastic conduit sized at least 1/2" smaller than the bore may be installed but must be called for separately.
3. No multiple bores may be installed.
4. For 2" & 3" bores, maintain a minimum clearance of 2' from other utilities to avoid possible damage. For 4" & 5" bores, maintain a minimum clearance of 3'.
5. Maximum length of this bore is 80'.
6. This bore is mainly for use under sidewalks, driveways and parking lots.
7. Entrance and exit pits shall be shored or sloped as required by the SRP excavation safety manual, latest revision.
8. Compatible units must be requested on a per foot basis.
**AUGER BORE**  
**CASING**  
**(BY CONTRACTOR)**

<table>
<thead>
<tr>
<th>CASING SIZE</th>
<th>MAXIMUM LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot; BORE</td>
<td>120'</td>
</tr>
<tr>
<td>18&quot; BORE</td>
<td>180'</td>
</tr>
<tr>
<td>24&quot; BORE</td>
<td>300'</td>
</tr>
<tr>
<td>30&quot; BORE</td>
<td>300'</td>
</tr>
</tbody>
</table>

SEE NOTE 7

2. **SEE UKB3C-UKB12C FOR CONDUIT ARRANGEMENTS.**

3. **USE DB TYPE CONDUITS INSIDE BORE CASING.**

5. **LARGER CASINGS THAN CALLED FOR MAY BE REQUIRED IF RIVER ROCK OR ADVERSE CONDITIONS ARE ENCOUNTERED.**

7. **COMPATIBLE UNITS MUST BE REQUESTED ON A PER FOOT BASIS.**

8. **CONTACT ELECTRIC SYSTEM ENGINEERING TO ORDER CONDUIT SPACERS.**

SEE "CONDUIT" SECTION, "CONDUIT IN BORE CASING".

---

**NOTES:**

1. **THIS CASING IS INSTALLED WITH A BORE AUGER MACHINE. MINIMUM CASING THICKNESS SHALL BE:**
   - 12 INCH I.D. CASING = 3/16”
   - 18 INCH I.D. CASING = 1/4”
   - 24 INCH I.D. CASING = 1/4”
   - 30 INCH I.D. CASING = 5/16”

THE GRADE OF STEEL SHALL BE ASTM A-283, GRADE C. CASINGS OF GREATER THICKNESS MAY BE REQUIRED FOR SOME OR ALL OF DIFFICULT INSTALLATIONS OR FOR OTHER GOVERNING AGENCY'S REQUIREMENTS.

2. **SEE UKB3C-UKB12C FOR CONDUIT ARRANGEMENTS.**

3. **USE DB TYPE CONDUITS INSIDE BORE CASING.**

4. **THE INSIDE CASING AREA AROUND THE CONDUITS MUST BE FILLED WITH GROUT TO PROVIDE ADEQUATE COOLING FOR THE CONDUCTORS AND MUST BE INSTALLED BY PRESSURE PUMPING.**
   - A. INSTALL A 2” PVC CONDUIT THROUGH THE BORE CASING (ON TOP OF THE RACKED CONDUITS INSIDE) FROM END TO END.
   - B. GROUT ONE END OF CASING TO CAP. (END OPPOSITE GROUT PUMPING EQUIPMENT)
   - NOTE: SUFFICIENT FORCE MUST BE MAINTAINED ON THE 2” CONDUIT WHILE PUMPING TO ENSURE COMPLETE CASING FILL
   - D. THE EXCESS 2” CONDUIT WILL NEED TO BE CUT OFF AS IT IS FORCED OUT OF THE CASING.
   - E. FILL CASING COMPLETELY FROM END CAP TO FILLING END.

5. **LARGER CASINGS THAN CALLED FOR MAY BE REQUIRED IF RIVER ROCK OR ADVERSE CONDITIONS ARE ENCOUNTERED.**

6. **AREA FOR SPOIL NEEDS TO BE PROVIDED FOR AT THE JOB SITE. IF NOT POSSIBLE, SPECIAL ARRANGEMENTS MUST BE MADE TO HAUL SPOIL OFF-SITE AND RETURN IT. THE AVERAGE SIZE ENTRANCE PIT WILL NEED AN AREA 25’ SQUARE FOR SPOILS.**

7. **COMPATIBLE UNITS MUST BE REQUESTED ON A PER FOOT BASIS.**

8. **CONTACT ELECTRIC SYSTEM ENGINEERING TO ORDER CONDUIT SPACERS.**

SEE "CONDUIT" SECTION, "CONDUIT IN BORE CASING".
GUIDED BORING

COMPATIBLE UNITS FOR GENERATING ESTIMATED COSTS:

1. OUTSIDE CONTRACTORS PROVIDE ALL GUIDED BORES. To generate estimated job costs, do not use the "G" (Gift) work function, since SRP is responsible for the costs.

2. Listed below are the guided boring compatible units. Choose the appropriate CU depending on the diameter and length of the bore. Enter the actual bore footage into the compatible unit estimating system.

3. The guided boring compatible units listed below include costs associated with bore pits, such as backfill, and concrete and asphalt cutting and repair.

GUIDED BORING, 200 LINEAR FEET OR LESS

<table>
<thead>
<tr>
<th>CU</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTHG41</td>
<td>4&quot; Guided Bore</td>
</tr>
<tr>
<td>UTHG61</td>
<td>6&quot; Guided Bore</td>
</tr>
<tr>
<td>UTHG81</td>
<td>8&quot; Guided Bore</td>
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<tr>
<td>UTHG101</td>
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<tr>
<td>UTHG121</td>
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<tr>
<td>UTHG141</td>
<td>14&quot; Guided Bore</td>
</tr>
<tr>
<td>UTHG161</td>
<td>16&quot; Guided Bore</td>
</tr>
</tbody>
</table>

GUIDED BORING, MORE THAN 200 LINEAR FEET

<table>
<thead>
<tr>
<th>CU</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTHG42</td>
<td>4&quot; Guided Bore</td>
</tr>
<tr>
<td>UTHG62</td>
<td>6&quot; Guided Bore</td>
</tr>
<tr>
<td>UTHG82</td>
<td>8&quot; Guided Bore</td>
</tr>
<tr>
<td>UTHG102</td>
<td>10&quot; Guided Bore</td>
</tr>
<tr>
<td>UTHG122</td>
<td>12&quot; Guided Bore</td>
</tr>
<tr>
<td>UTHG142</td>
<td>14&quot; Guided Bore</td>
</tr>
<tr>
<td>UTHG162</td>
<td>16&quot; Guided Bore</td>
</tr>
</tbody>
</table>
1. CONDUIT STUB UP INTO TRANSFORMER PAD IS TO BE PER DETAIL ON PAGE 9-11-1.
2. EVERY CONDUIT END SHALL BE CAPPED BUT NOT GLUED.
3. CUSTOMER SERVICE CONDUIT EXTENSION IS TO BE PER ELECTRIC SERVICE SPECIFICATION (E88) PAGES 317-320.
4. AREA UNDER PAD MUST BE COMPACTED PER TRENCH SPECIFICATIONS AND LEVEL TO FINAL GRADE.
5. PAD TO BE SET ON TOP OF SINGLE PHASE CONDUIT STUB-UP FORM.

NOTES:
NOTES:

1. CONDUIT STUB UP INTO TRANSFORMER PAD IS TO BE PER DETAIL ON PAGE 9-11-1.
2. EVERY CONDUIT END SHALL BE CAPPED BUT NOT GLUED.
3. CUSTOMER SERVICE CONDUIT EXTENSION IS TO BE PER ELECTRIC SERVICE SPECIFICATIONS (ESS) PAGES 317-320.
4. AREA UNDER PAD MUST BE COMPACTED PER TRENCH SPECIFICATIONS AND LEVELLED TO FINAL GRADE.
5. PAD TO BE SET ON TOP OF SINGLE PHASE CONDUIT STUB UP FORM.
TRENCHING
RESIDENTIAL CONDUIT SYSTEM
LARGE LOT

NOTE:
- STREET LIGHT CONDUIT應在近側或財產界線時 possibility.

IF PROPERTY LINE IS OFFSET
4" TO 60 INCHES IN THE FAR
dIRECTION, STREET CROSSING
MUST BE ON FAR SIDE OF
PROPERTY LINE.

SEE DETAILS ON
PAGE 8-108 & 9-312

STREET LIGHT
STUB OUT
(AS REQUIRED)

SERVICE STUB OUTS
SHALL HAVE ELECTRONIC
MARKER UBM15

NOTE:
- MUST BE ON FAR SIDE OF
EASEMENT LINE WHENEVER POSSIBLE.
- STREET CROSSING TO BE
ON NEAR SIDE OF PROPERTY
LINE WHENEVER POSSIBLE.

APPROVAL: B.PRIEST
REV. DATE: 04/11/10
ISSUE DATE: 03/15/93
Underground Distribution Construction Standards

PROPRIETARY MATERIAL

TRENCHING
SERVICE STUB-OUT LOCATION
FRONT LOT INSTALLATION

ISSUE DATE: 01-15-87
REV. DATE: 05-10-10
APPROVAL: B. Priest

6-21-1

UG6-21-1.doc
1. Street light conductors will be connected when secondary is installed.

2. A T-tap connector shall be installed at the end of the secondary run when the services are installed. If the location of the second meter cannot be determined, stub service out as shown.

3. Refer to CONNECTORS, SPLICES AND TERMINATIONS section for installation of T-tap and street light conductors where applicable.
NOTE

Cable shall be identified per Miscellaneous section, Procedure #1.
NOTES
1. For typical service entrance details, see Electric Service Specifications.
2. Locate meter on corner of building nearest to the transformer or junction box. Location must be approved by SRP prior to installation of meter loop.
NOTES
1. No improvement shall be made which will prevent access to the j-box (i.e. paving or concrete cover).
2. For service other than 1 Ø, 200 amp, consult Electric Service Specifications for conduit size.
3. Maximum service length shall be 100 ft. with equivalent bends not exceeding 270°.
4. Contact Policies, Procedures and Standards for situations not covered.
* SRP service conduit shown; phone conduit is as specified by TELCO.
NOTES
1. No improvement shall be made which will prevent access to the j-box (i.e. paving or concrete cover).
2. For service other than 1 Ø, 200 amp, consult Electric Service Specifications for conduit size.
3. Maximum service length shall be 100 ft. with equivalent bends not exceeding 270°.
4. Contact Policies, Procedures and Standards for situations not covered.
* SRP service conduit shown; phone conduit is as specified by TELCO.
NOTES
1. This installation, as indicated, is when transformer location is unknown.
2. If location is known, cable shall be extended to that point and looped.
3. Mark the cable with dymo tape indicating which existing facilities they are located between.
   (Example: from PE-0603 to PE-0604)
NOTES:

1. Asphalt concrete (AC) shall meet the governing municipalities’ requirements for repair in road right-of-way.

2. When trench is parallel to the curb:
   a. CITY OF TEMPE -
      Remove and replace asphalt to curb if 18” or less.
   b. CITY OF MESA -
      Remove and replace asphalt to curb if 48” or less.

3. The job order drawing will specify which type trench backfill and street repair is required.

4. Backfills are defined on pages 6-9-1 and 6-9-2.

Underground Distribution Construction Standards

REV: UPDATED STOCK CODES.

TRENCHING STREET CROSSING SURFACE REPAIRS

REV. DATE: 01/26/15
APPROVAL: B. PRIEST

ISSUE DATE: 11/06/91

8515E139.DGN
1. Slope trench from 48" at property or easement line to
   30' at 8' in from the line. Sub-cut 1/2 triplex and
   cap ends with vinyl caps (63-1000 & 63-1002)

2. Mark location with cable marker (63-2775)

**DETAIL 'A'**

**DETAIL 'B'**

Junction box (63-7140) to be used only in townhouse
developments or where specified on construction drawings.
NOTES:

1. IDENTIFY CABLES PER THE MISCELLANEOUS SECTION OF THIS BOOK.

2. CONNECT STREET LIGHT CONDUCTORS AT XFMTR. WHEN STREET LIGHTS MUST BE INSTALLED
   AT PAD MOUNTED EQUIPMENT LOCATIONS/LOT LINE, LOCATE THE STREET LIGHT POLES A
   MINIMUM OF 18" FROM EITHER SIDE OF EQUIPMENT TO ALLOW FOR MAINTENANCE AND OPERATION.
   IF LOCATED NEXT TO PAD MOUNTED TRANSFORMER, PLACE LIGHT POLE ON SECONDARY SIDE OF
   TRANSFORMER TO ALLOW FOR MAINTENANCE AND OPERATION.

3. THE TRANSFORMER SHOULD BE LOCATED AWAY FROM DRIVEWAYS. IF A DRIVEWAY IS WITHIN 2' OF
   THE TRANSFORMER, INSTALL A GUARD POST AS SHOWN IN UBG OF THE BASIC ASSEMBLY
   UNITS SECTION.
TYPICAL EXAMPLE

FOR DEVELOPMENTS ON ONE SIDE OF STREET ONLY

STREET

8" FRONT LOT EASEMENT

TYPICAL EXAMPLE

SERVICE IN CUSTOMER'S CONDUIT

METER

LOT

LOT
TRENCHING
TRANSFORMER AND SECONDARY LOCATION
FRONT LOT INSTALLATION

1. CABLES SHALL BE IDENTIFIED PER UNDERGROUND MISCELLANEOUS SECTION PROCEDURE OF THE STANDARDS BOOK.

2. A MOLE CONNECTOR SHALL BE INSTALLED AT THE END OF THE SECONDARY RUN WHEN THE SERVICES ARE INSTALLED. (SEE SERVICE STUB-UP DETAIL IN THIS SECTION.)

3. STREET LIGHT CONDUCTORS WILL BE CONNECTED AT XFMR WHEN SECONDARY IS INSTALLED, SEE LIGHTING SECTION FOR STREET LIGHT CONDUCTOR STUB-UP DETAIL. WHEN STREET LIGHTS MUST BE INSTALLED AT PAD MOUNTED EQUIPMENT LOCATIONS/LOT LINE, THE STREET LIGHT POLES SHALL BE LOCATED A MINIMUM OF 18" FROM EITHER SIDE OF EQUIPMENT TO ALLOW FOR MAINTENANCE AND OPERATION. IF LOCATED NEXT TO PAD MOUNTED TRANSFORMER, LIGHT POLE SHOULD BE SET ON SECONDARY SIDE OF TRANSFORMER TO ALLOW FOR MAINTENANCE AND OPERATION. REFER TO UNDERGROUND CABLE AND ACCESSORIES SECTION OF THE STANDARDS BOOK FOR INSTALLATION OF CONNECTORS AND STREET LIGHT CONDUCTOR WHERE APPLICABLE.

4. THE TRANSFORMER SHOULD BE LOCATED AWAY FROM DRIVEWAYS. IF A DRIVEWAY IS WITHIN 2' OF THE TRANSFORMER, A GUARD POST MUST BE INSTALLED AS SHOWN IN UBG OF THE BASIC ASSEMBLY UNITS SECTION.
Typical Example

(for developments on one side of street only)