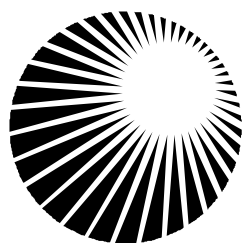


2004

# Specifications and Installation Guide for Underground Service to Residential Developments



Connecticut  
Light and Power



at&t



**Charter**  
COMMUNICATIONS®

A WIRED WORLD COMPANY™

*///CABLEVISION*



## **Safety Is Our First Priority**

**Do not open or enter existing electrical structures such as hand holes, transformers or switch vaults!**

**Contact CL&P at 1-800-286-2000 or 860-947-2000 in the Hartford area.**

**Ask for the Electric Service Designer in the area you are working to receive instructions.**

**This Booklet was created through a cooperative effort from the Connecticut cable television companies (CATV), SBC/CT and CL&P. The intent is to provide a consistent and simple construction standard for our valued trade allies, the developers who build homes for our customers, the local code enforcement officials who ensure compliance with the building codes and for our own employees. The ultimate goal is to make it easier for us all to do business with each other.**

**This booklet is organized in several sections, as follows:**

**CL&P Section – Includes requirements specific to the CL&P electrical facilities along with general information such as easements and environmental permits.**

**SBC Section – Includes an index of regional offices and telephone numbers and specific responsibilities for SBC and contractors/developers.**

**CATV Section – Includes indexes of CATV company system offices and a cross-reference of towns served by each CATV company. In addition, each CATV company has included specific information with regards to their company.**

**Photo Section – Includes color photographs with descriptive labeling, providing a visual description of the various installation scenarios.**

**CL&P Standards Section – Pages from CL&P's Distribution Systems Engineering Manual and Underground Standards which are referenced in the CL&P Section are contained in this section.**

# CL&P Specifications and Installation Guide for Underground Service to Residential Developments

## Required Lead Times

The following are lead times required by the Company. Failure to provide adequate lead time will lead to project delays.

Design lead time: 8 weeks

After the Company receives all required material (loads, easement information, street light layout, etc.)

Inspection: 3 working days

This is the time required to schedule a Company inspector to inspect construction.  
**In no case shall any trench or foundation be backfilled prior to the Company inspector's approval. Warning tape must be installed 12 inches above the conduit and verified by inspection.**

Installation will be scheduled when all requirements have been met.

Note: Any changes during construction which will affect the agreed upon schedule and project completion date must be communicated in a timely manner.



# **Requirements and Division of Responsibilities of Customer/Contractor and CL&P for Underground Residential Distribution Systems**

## **1. Scope**

- a. This document has been prepared as a guide in the installation of Underground Residential Distribution systems within residential developments.
- b. The terms of the Connecticut Light & Power Company's New Business Policy NB-21 (Electrical Distribution to New Residential Developments) apply and are incorporated in this document.
- c. The Company reserves the right to make the final interpretation of this document and its specifications. The Company's interpretation shall be binding on the Customer.
- d. The Company reserves the right to modify or amend this document and its specifications as it deems necessary.

## **2. General Requirements**

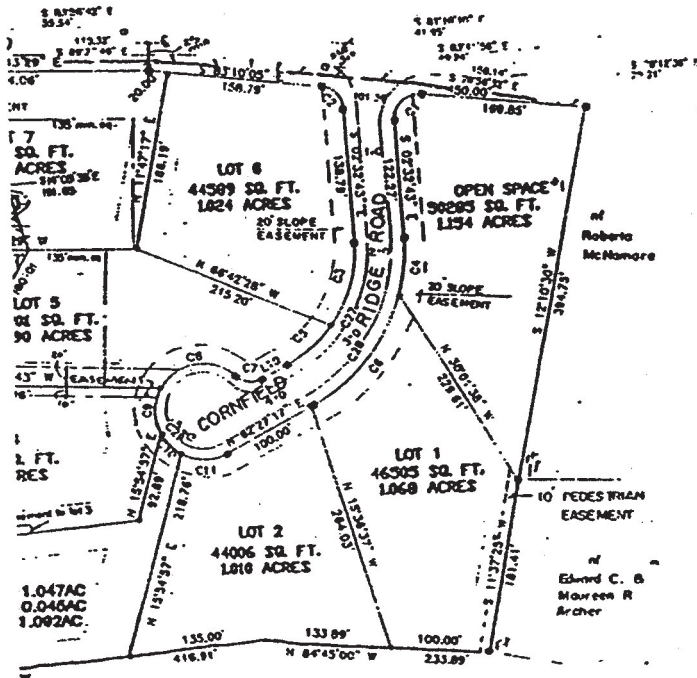
- a. Plans and Documents must be submitted along with name, address and phone number for:
  - Developer
  - Surveyor (Creating easement maps)
  - Attorney (Recording easement)

The customer will provide, in advance and at no cost to the Company, the following:

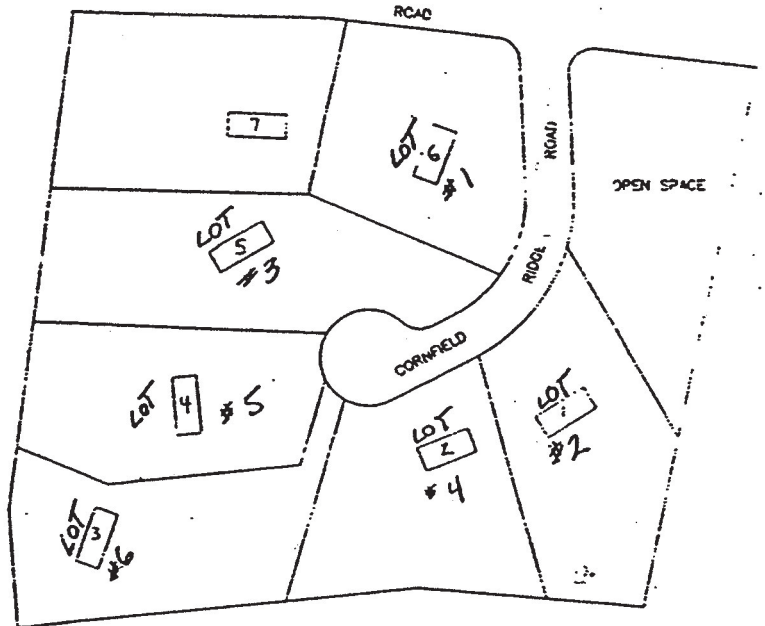
- Town approved A2 survey map recorded in Land Records (Exhibit A). The Company will not begin design work prior to receipt of the approved plans.
- A minimum of two copies of the approved Planning and Zoning development map showing property lines only, total number of house lots proposed and their locations, lot numbers and associated 911 address numbers. (See Exhibit B).
- One set of detailed development plans showing proposed location of houses, driveways, septic systems, etc. (See Exhibit C).
- A copy of all permits and approvals that have been obtained for constructing the development.
- Easements, drafted by the Company, for all facilities required to serve the development.
- A copy of a street light proposal for the development, approved by the municipality, or written notice from the municipality that street lighting will not be required; if installation is requested after construction is complete, additional costs, including the Company's tax liabilities, may be borne by the municipality and/or Customer if the tariff does not collect all costs of construction.

# SAMPLE of REQUIRED SUBMITTALS

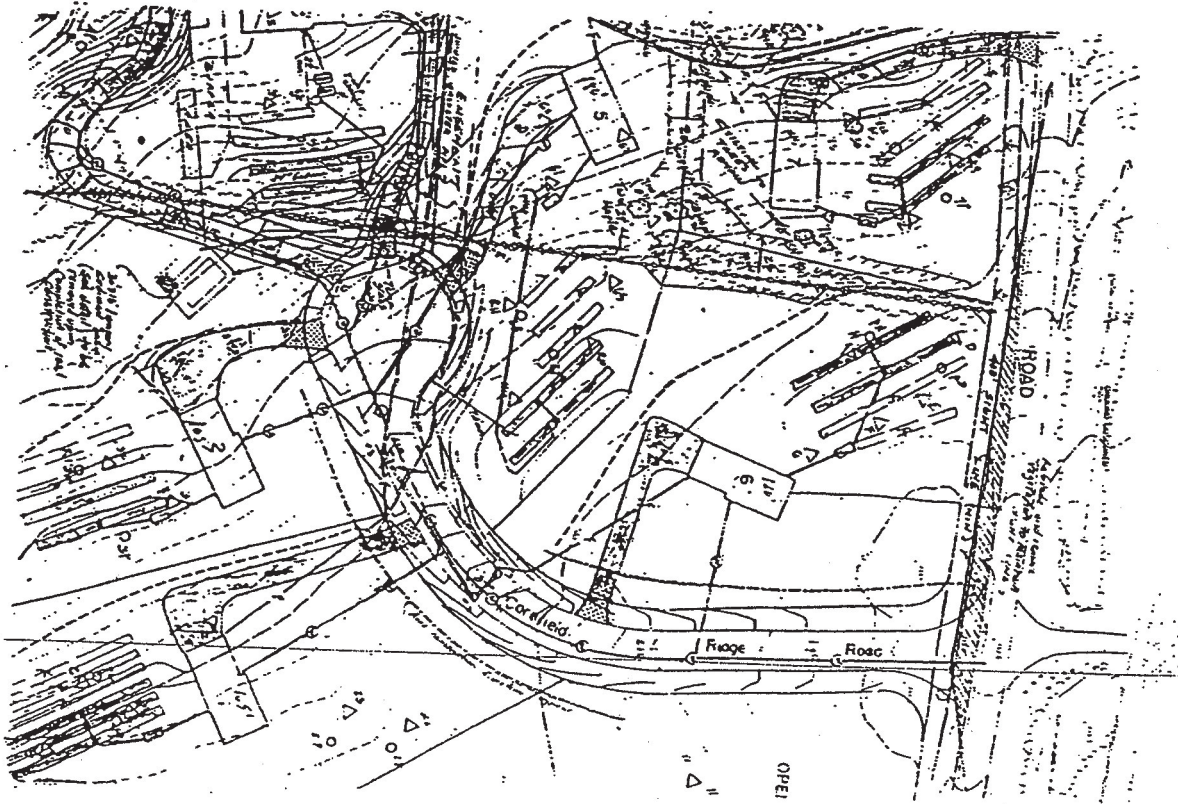
## EXHIBIT "A"



## EXHIBIT "B"



## EXHIBIT "C"



- A schedule of Customer's best estimate for the construction of homes in the development.
- Such other reasonable information that may be requested to confirm the viability of the development.

b. Code Compliance

All construction must be in accordance with the Company's Construction Standards, CL&P Information and Requirements for Electric Supply Below 600 Volts booklet as published by the Company, the Company's New Business Policy NB-21, and shall comply with all applicable codes and requirements.

c. Environmental Permits

The Customer will obtain any required environmental permits prior to the start of construction. In addition, the customer will certify to the Company that areas in which the Company is to perform installation or maintenance work is free of preexisting contamination by hazardous wastes or materials as defined in the Connecticut Remediation Standards, found in the Regulations of Connecticut State Agencies (RCSA) 22a-133k, and will indemnify the Company for any claims, costs, expenses, suits, demands, citations, fines or damages of any kind arising from the presence of any such contamination.

d. Customer Payment

**Construction shall not begin until after the Customer makes any required payment to the Company.**

3. Division of Responsibility

a. The Customer, at no cost to the Company, shall:

- prior to the start of the Company's construction, provide all applicable documents required for the Company to prepare easements for its facilities to be installed on private property.
- install conduit and foundations for Company-owned street lights.
- provide and install all other required foundations, handholes, vaults, grounding systems, and conduit including glue, warning tape, 1/4" diameter nylon pull line and conduit plugs, etc., as indicated on the Company's plan and related construction documents.
- supply Company-approved equipment only; equipment that is not approved shall not be used without the prior written consent of the Company.
- install all primary, secondary and service conduit from the Company's equipment to each meter location as designated by the Company.

- b. The Company will:
- develop the plan to provide underground electric service.
  - supply a list of approved manufacturers and their part numbers of equipment to be supplied by the Customer.
  - designate the location of all Company owned equipment and service entrance and meter location(s).
  - provide Company owned street light foundations as applicable for street light installations.
  - provide, install, own and maintain all transformers, Company owned street lights, primary and secondary cable, and services up to meter.
  - make all connections to Company equipment.
  - inspect the underground conduit system and equipment foundations installed by the Customer, prior to backfilling.
  - the Company will take ownership of the conduit system in the public way or eased areas upon inspection and acceptance.
4. Construction Schedule
- a. The Company may, at its discretion, construct the distribution line in segments, rather than all at once.
- b. Binder coat shall be installed prior to the start of installation of company facilities.
5. Construction Requirements
- a. Layout and Grading  
Final grades shall be established and easement boundaries, street, lot, and trench lines staked by the Customer before any trenching is started (except for Company inspected road crossings).
- b. Trenching  
The Customer shall adhere to the Company's construction plan specifying trench locations and depths and requirements specified in DTR 50.103 and DSEM 07.821, enclosed. Any changes are subject to approval by the Company.
- Trench location shall be in as direct a line as possible without reverse bends between distribution facilities and from the distribution facility to the customer service entrance.
  - In order to minimize cable pulling forces, no more than two bends (not including riser at house or pole) exceeding a total change in direction of 45 degrees shall be permitted.
  - Minimum burial depths specified for all electric conduit shall be maintained during all phases of construction. Any temporary mechanical protection required over buried conduit to prevent crushing or damage due to unusually heavy construction equipment shall be the responsibility of the Customer.

- The trench bottom shall be solid and relatively smooth, or undisturbed earth, well tamped, and free of any debris that may be detrimental to the conduit. Excavation shall be of a size and extent to permit proper installation of conduit and structures, as required.
- Where excavation is in rock, it shall be removed to 4 inches below the trench bottom. The over excavation shall be replaced with a bedding of gravel, sand or clean well tamped backfill.
- Any conditions not suitable for a stable foundation shall be reported to the Company Representative for recommendation.

c. Backfilling

The Company's representative shall be notified in advance of backfilling of any electric facility, i.e., conduit, vault, handhole, grounding, etc.

**If any facility is backfilled without the Company's prior approval, the Company reserves the right to require re-excavation of the facility.**

- Backfill shall not contain ashes, cinders, shell, frozen material, loose debris or stones larger than 2 inches in maximum dimension. All backfill shall be compacted.
- Trenches shall be immediately backfilled following conduit system inspection and approval by authorized Company representative.
- Backfilling shall be accomplished in a continuous manner from one structure to the next, and shall not be placed over any open-ended (unplugged) conduits.
- Approved red cable marking or "caution" tape shall be installed in the trench twelve inches above and directly over the conduit in accordance with Section 16-346-3 of the Regulations of CT State Agencies. Warning tape should also be visible above-ground at service stubs.

6. Inspection

- a. The Company's representative shall be responsible for the inspection of the conduit system being prepared and installed by the Customer, at various stages of installation.
- b. The inspection shall include, but not be limited to the following:
  - All trenches and excavations.
  - All material supplied by the Customer.
  - All backfill material during or after installation as applicable.
  - All vaults, handholes, grounding and other facilities, after setting in place, but prior to backfilling.
  - All conduit installations, including cemented joints, bends, sweeps, bell-ends, pull line and conduit plugs, prior to backfilling.
  - All conduit terminations at transformer structures, handholes, switch locations, riser poles and other applicable locations.

- All backfilling operations around structures and conduit runs.
- Installation of warning tape 12 inches above the conduit.
- Customer shall ensure conduits are free of any obstructions and debris.  
**Under no circumstances shall antifreeze or other chemical be put into conduit.**

7. Conduit / Installation

- Conduit shall be installed in accordance with Company Standards and Construction Plans which accompany this specification package. Refer to DSEM 07.821 and 07.822 which cover general requirements for conduit installation.
- Standard conduit shall be minimum 3 inch diameter, rigid PVC, heavy wall, sunlight resistant (6% - 7% titanium dioxide by weight), listed and labeled **electrical grade schedule 40 as per NEMA TC2-1990.**
- Bends used at house or pole risers shall have a minimum radius of 24 inches, with 36 inches preferred. **Minimum 48-inch radius sweeps are required within the conduit run.**
- Reverse bends shall not be allowed within the conduit run.**
- Conduit shall enter concrete vault perpendicular to the knockout. If this is not practicable contractors shall provide 22-1/2 or 45 degree schedule 40 PVC bend.
- Conduit in the trench should have a 4 inch per 100 feet downward pitch toward the distribution facility, if physically possible, to provide drainage away from the service entrance, and prevent stagnant water from collecting in ducts.
- Install conduit with all joints cemented, through knockout and extend 3 inches inside handhole. Terminate conduit run with end bell and permanently mark conduit destination on conduit end.
- Install ¼" diameter nylon pull line, including 10 feet of slack, in each duct and secure to conduit plugs at each end. Gaps around conduit at knockout openings shall be sealed with mortar to prevent backfill from entering distribution facilities.
- Minimum separation between electrical conduit and other utilities in the trench shall be as indicated in DTR 50.103.
- In general, road crossings shall be perpendicular to the traveled way. Refer to the specific construction plan for all installations.
- Road crossings shall have 30 inch minimum burial depth, top of conduit to finished grade, for both primary and secondary voltages. **Main electric trenches shall maintain conduit depths as shown in DTR 50.103; depth to the top of conduit below finished grade shall be no less**

**than twenty-four inches for secondary and street lighting, and thirty inches for primary.**

- l. In the event proper depth of conduit cannot be achieved, or where foreign objects threaten to interfere with the installation of conduit, the Company's representative may require steel conduit or concrete encasement of the conduit.
  - m. Unique conditions will be addressed in the Company construction plan.
  - n. Parallel installation of any conduits and other facilities directly above electrical system conduits are prohibited.
8. Single-Phase Padmounted Transformer or Switch Vault
- a. Padmounted transformer vault structures shall be located no further than 10 feet from a driveable surface.
  - b. All vaults shall be level and installed in accordance with DTR 58.185.
  - c. A minimum of six inches base course of crushed stone (3/4 inch max. stone size) or free-draining gravel shall be placed under all transformer vault excavations and shall be thoroughly compacted using a vibratory compactor. Certain soil conditions may require removal below normal depth and subsequent additional clean fill or stone added and compacted to insure sound base course for transformer vault.
  - d. Transformer vault pad/slab tops shall be three inches above final grade. In no instance shall final grades hamper proper access or operation of Company distribution equipment.
  - e. Install two 5/8" X 8' **vertically-driven**, galvanized steel ground rods spaced a minimum 8' apart in the trench adjacent to the vault. Do not install the ground rods inside or underneath the concrete vault. Leave a 10 foot coil of #6(minimum) bare solid copper ground wire for connection to the transformer. Telephone and cable company bond wires shall be provided and tied to Company ground rods with Company-approved connectors as shown in the enclosed Material list. Refer to Figures 8, 9 and 10. Such bonding or connection shall not interfere with connecting Company equipment.
  - f. A hill holder as shown in DTR 50.341 shall be installed where slopes exist that would undermine or cover equipment (i.e., transformers) due to sharp drop-off or rise of grade. A customer designed retaining wall may also be considered as an alternative in such cases.

NOTE: The Company shall require that equipment easements on private property be reasonably level. Also, all retaining walls shall fall outside of equipment easements and in no case shall they hamper door openings or placement of such equipment. Retaining wall design shall be approved by the Company.

- g. Transformer vault shall be completely backfilled prior to commencing any cable pulling.

9. Secondary Vault (Handhole)

- a. Vaults shall be installed in accordance with details shown in DTR 54.201 or DTR 54.203.
- b. Vaults shall be installed such that their covers will be flush with or slightly above finish grade. In no case shall final grade cover or hamper access to the handhole covers.
- c. A minimum of six inches base course of crushed stone (3/4 inch. max. stone size) or free-draining gravel shall be placed under all vault excavations and shall be thoroughly compacted using a vibratory compactor. Certain soil conditions may require excavation below normal depth. Additional clean fill or stone must be added and compacted to ensure a solid base course for the vault.
- d. Vaults shall only be placed within equipment easements. They shall not be placed within the sidewalk area or within the traveled way.
- e. Covers shall be secured to all vaults immediately upon completion of their installation and backfilling.

10. Riser Pole

- a. The Company shall designate conduit riser locations on the pole(s). Riser pole details shall be in accordance with DTR 12.057 and Figure 13.
- b. All spare riser bends shall be terminated in a coupling and plugged or capped, above ground at the pole base.
- c. 90° bends at a riser pole shall be galvanized steel. All steel riser bends shall be grounded in accordance with Company requirements, as shown in Figure 13.

11. Services

- a. All services shall be single-phase, three-wire, 120/240 volts nominal. Reference shall be made to the CL&P Information & Requirements for Electric Supply Below 600 Volts booklet.
- b. Provisions for future services shall be installed as shown in DTR 54.203 and Figure 10.

12. Streetlighting



Conventional streetlighting shall be installed in accordance with NU 5835, enclosed, and located where indicated on construction plans. Contact a Company representative for Premium Decorative or other street lighting options.

13. Other Utilities

Conduit, terminal enclosures or other structures belonging to other utilities shall be located so they do not interfere with electrical installations nor impede the operation or maintenance of electrical facilities. Refer to DSEM 07.822 for a sketch indicating the acceptable zone(s) for installation of above-ground facilities belonging to other utilities.

## **CL&P-Approved Manufacturers of Other Related Equipment**

### **Cover, Handhole, Hexagon/Round, 42" Dia., Fiberglass (SPC C-710)(SC 0174819)**

Advanced Materials Inc.	(AM-42)
Nordic	(NDC-42)

### **Extension, Hexagonal Handhole, Precast, 36" Dia. x 4" High (SPC E-946)(SC 0174901)**

Concast	(HE-44)	
United Concrete Products, Inc.		(By Desc)

### **Extension, Vault, Precast, 180-Deg. Section-36" Dia. x 4" H (SPC E-953)(SC0174870)**

Concast	(HE-42)	
United Concrete Products, Inc.		(by Desc)

### **Extension, Handhole, Lawn**

Fargo	(B-120K)	(SC 0174875)
PEN-CELL	(PE-20-5)	(SC 0174876)

### **Ground Rods (SC 0175362)**

Carolina	(By Desc)
Chance	(8578)
Joslyn	(J5328)

### **Ground Connector (SC 0178957)**

Blackburn	(JAB58H)	Joslyn	(J8492AB)
Burndy	(GRC58)	O-Z	(GRC-62-10B)
Dossert	(GN62)	Southport	(GC31)

### **Conduit Plugs, 3-inch**

Electrical Materials	(COND PL3)	(SC 0434785)
Jack Moon	(30D346U)	(SC 0175141)

### **Handhole, Lawn (SC 0174991)**

PEN-CELL	(PE-30-HDXP)
Carson	(1730183HGE20AUO)

### **Handhole, Sidewalk (SC 0174994)**

CDR	(PA12-1730-18)
Quazite	(PG1730BA18/HA17)

### **Handhole, Streetlight (SC 0174953)**

PEN-CELL	(PE-10X)
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### **Hill Holder**

Nordic - Available in 16", 20" and 32" height

### **Warning Tape (SC 0193693) – Red Munsell, 4 mil thick X 6" wide, labeled "CAUTION – ELECTRIC LINE BURIED BELOW"**

JB	(JBTR)
Panduit	HTU6R-E
Reef Indust.	By Description
Thor	SHLDTEC

## SINGLE PHASE CONDUIT SYSTEM INSPECTION CHECKLIST

The installation is subject to inspection and approval by the Company to ensure that all items listed below are installed as specified. Please use this checklist to ensure compliance. The Company will not install its facilities if any of these requirements are not met.

N*	Y*	<u>TRENCH / CONDUIT</u>
		Min. 30" depth from finished grade to top of primary conduit.
		Min. 24" depth from finished grade to top of secondary conduit
		Conduit minimum size 3" diameter Schedule 40 PVC, electrical grade.
		Min. 18" clearance in all directions between electric conduits and adjacent water, sewer, fuel, (oil or gas) lines, and building foundations.
		1/4-inch diameter nylon pull line, including 10 ft. of slack, installed and secured in conduit with conduit plugs at both ends.
		Clean backfill (with less than 2" stones) on-site for backfilling entire trench, (inspector may witness backfilling).
		Warning Tape – spot check.
		Conduit run conforms to layout in construction plan.
		No parallel conduits or other facilities directly above electrical system conduits.

		<u>SECONDARY VAULT (HANDHOLE)</u>
		6" of crushed stone or compacted free draining gravel under vault.
		Vault is level.
		Covers installed and properly secured.
		Conduit plugs with 1/4" diameter nylon pull line installed in all conduit ends.
		3" of conduit extended into vault and properly labeled.
		Gaps around conduit at knockouts sealed with cement mortar.
		Correct orientation to road and lot lines.

		<u>TRANSFORMER VAULT</u>
		6" crushed stone or compacted free-draining gravel under transformer vault.
		Vault is level.
		Top of pad surface 3" above final grade.
		3" of conduit extended into vault and properly labeled.
		Pulling eyes properly secured in place.
		Conduit plugs with 1/4" diameter nylon pull line installed in all conduit ends.
		Two ground rods properly installed, spaced a minimum 8 feet apart.
		Bond wires provided for Telephone and Cable companies – 10' minimum.
		Gaps around conduit at knockouts sealed with cement mortar.

		<u>RISER POLE</u>
		90 degree galvanized steel bend installed as specified.
		Bend capped and secured to pole with pipe strap.
		Steel-PVC adapter and steel sweep not encased in concrete.
		Ground clamp and 6' ground conductor installed.
		Conduit riser located on field side of pole opposite direction of traffic.
		Riser path clear to top of pole.

**\*NOTE:**        **Y – Acceptable;**        **N – Deficient**

## CL&P and Customer/Contractor Responsibilities

ITEM	NU		CONTRACTOR	
	Provides	Installs	Provides	Installs
<b>HIGH VOLTAGE PRIMARY SYSTEM</b>				
Trench / Backfill			X	X
Conduit			X	X
¼-Inch Diameter Nylon Pull Line			X	X
Warning Tape (Red)			X	X
Transformer Box Pads			X	X
Switch Foundations			X	X
Handholes / Splice Boxes			X	X
Primary Cable	X	X		
Switching Devices	X	X		
Terminations	X	X		
Ground System per NU Standards			X	X
<b>LOW VOLT. SECONDARY SYSTEM</b>				
Trench / Backfill			X	X
Conduit			X	X
¼-Inch Diameter Nylon Pull Line			X	X
Warning Tape (Red)			X	X
Handholes / Splice Boxes / Pedestals			X	X
Cable / Wire	X	X		
Connectors	X	X		
Ground System per NU Standards			X	X
<b>CUSTOMER SERVICE ENTRANCE</b>				
Trench / Backfill			X	X
Conduit			X	X
Conductors			X	X
Connectors (at transformer)	X	X		
Connectors (at main switch)			X	X
Ground System per NU Standards			X	X
<b>TRANSFORMERS</b>				
Conventional	X	X		
Padmount	X	X		
<b>STREET LIGHTING</b>				
Trench / Backfill			X	X
Conduit			X	X
Bases	X			X
Warning Tape			X	X
<b>MISCELLANEOUS</b>				
Easement (granting of)			X	
Easement drawings / documents			X	
As-built drawings			X	
<b>STATE OF CONNECTICUT REQUIREMENT</b>				
Call Before You Dig Notification (800)-922-4454			X	

NU-Approved Precast Suppliers	NU Material Specification									
	SPC H-020 36" Round Handhole	SPC H-019 Hexagonal Handhole	SPC P-017 48"x48"x4" Pad - Enc	SPC P-009 42"x48"x4" Pad - XFMR	SPC P-010 Pad Plug for XFMR Pad	SPC P-013-014 76"x54"x36" Pad 75-300	SPC P-015-016 76"x70"x36" Pad 500 & >	SPC E-946 Extension-HH Hex 36"x4"	SPC E-953 Extension for HH 36"x4"	SPC C-710 42" FG Cover
<b>Advance Materials, Inc.</b> 11 Colton Road East Lyme, CT 06333 (203) 401-8097										X
<b>Arrow Concrete Products, Inc.</b> 539 Oronoque Road Milford, CT 06460 (203) 301-5091 or at 560 Salmon Brook Street Granby, CT 06035 (860) 653-5063	X	X	X	X		X	X			X
<b>Atlas Concrete Products, Inc.</b> 575 Wallingford Road Durham, CT 06422 (860) 349-1751	X			X		X	X			
<b>CEI Enterprises</b> 290 Town Hill Road New Hartford, CT 06057 (860) 485-8292										X
<b>Connecticut Precast Corporation</b> 555 Fan Hill Road Monroe, CT 06468 (203) 268-8688	X			X		X	X			
<b>Cromwell Concrete Products, Inc.</b> 667 Main Street Cromwell, CT 06416 (860) 529-3417	X	X	X	X	X	X				X
<b>Eastern Precast</b> Route 133 Brookfield, CT 06805 (203) 775-9380	X		X	X	X	X	X			X
<b>M&amp;M Precast Corp.</b> 39 Padanaram Road Danbury, CT 06811 (203) 743-5559	X			X						
<b>Jolley Precast, Inc.</b> 463 Putnam Road Danielson, CT 06239 (860) 774-9066	X	X	X	X			X			X
<b>A. Rotondo &amp; Sons, Inc.</b> 151 Old Farms Road Avon, CT 06001 (860) 673-3291						X	X			
<b>Superior Products</b> 1403 Meriden-Waterbury Road Milldale, CT 06467 (860) 621-3621	X			X	X					X
<b>United Concrete Products, Inc.</b> 173 Church Street Yalesville, CT 06492 (203) 269-3119	X	X	X	X		X	X	X	X	



This publication serves as a basic reference for the Contractor / Developer for the installation of SBC Connecticut facilities. Diagrams depicting phone in this booklet are for illustrative purposes only. Ideally, this document is to be used as a job aid and in conjunction with field meetings with SBC Connecticut Engineering personnel. A table with the SBC Connecticut Engineering offices, the main office telephone numbers, in-state toll free telephone numbers and the towns under their respective jurisdictions is shown below.

#### SBC Connecticut Engineering Areas

<b>Berkshire</b>	<b>Capitol</b>	<b>CENH</b>	<b>EAST</b>	<b>Gateway</b>
<b>866-262-4926</b> <b>203-575-6100</b>	<b>866-262-4797</b> <b>860-725-4349</b>	<b>866-262-4924</b> <b>203-553-6265</b>	<b>866-262-4927</b> <b>860-450-2775</b>	<b>866-262-4694</b> <b>203-383-6660</b>
Barkhamsted	Avon	Berlin	Andover	Ansonia
Beacon Falls	Bloomfield	Bethany	Ashford	Bridgeport
Bethel	Bolton	Branford	Baltic	Darien
Bridgewater	Burlington	Bristol	Bozrah	Derby
Brookfield	Canton	Cromwell	Brooklyn	Easton
Canaan	East Granby	Durham	Canterbury	Fairfield
Cheshire	East Hartford	East Haddam	Chaplin	Georgetown
Colebrook	East Windsor	East Hampton	Chester	Monroe
Cornwall	Ellington	East Haven	Clinton	New Canaan
Danbury	Enfield	Guilford	Colchester	Norwalk
Goshen	Farmington	Haddam/Higganum	Columbia	Old Greenwich
Harwinton	Glastonbury	Hamden	Coventry	Oxford
Hartland (west)	Granby	Killingworth	Deep River	Seymour
Kent	Hartford	Madison	East Lyme	Shelton
Litchfield	Hartland (EAST)	Marlborough	Eastford	Stamford
Middlebury	Manchester	Meriden	Essex	Stratford



# **SBC Connecticut Engineering Areas      Con't**

<b>Berkshire</b>	<b>Capitol</b>	<b>CENH</b>	<b>EAST</b>	<b>Gateway</b>
<b>866-262-4926</b>	<b>866-262-4797</b>	<b>866-262-4924</b>	<b>866-262-4927</b>	<b>866-262-4694</b>
<b>203-575-6100</b>	<b>860-725-4349</b>	<b>203-553-6265</b>	<b>860-450-2775</b>	<b>203-383-6660</b>
Morris	Rocky Hill	Middlefield	Franklin	Trumbull
Naugatuck	Simsbury	Middletown	Griswold	Weston
New Fairfield	Somers	Milford	Groton	Westport
New Hartford	South Windsor	Moodus	Hebron	Wilton
New Milford	Stafford Springs	New Britain	Hampton	
Newtown	Stafford	New Haven	Jewitt City	
Norfolk	Suffield	Newington	Killingly	
North Canaan	Tolland	North Branford	Lebanon	
Plymouth	Union	North Haven	Ledyard	
Prospect	Unionville	Orange	Lisbon	
Redding	Vernon	Plainville	Lyme	
Ridgefield	West Hartford	Plymouth	Mansfield	
Roxbury	Wethersfield	Portland	Montville	
Salisbury	Windsor	Southington	Mystic	
Sharon	Windsor Locks	Wallingford	New London	
Sherman		West Haven	North Stonington	
Thomaston		Westville	North Thompson	
Torrington		Woodbridge	Norwich	
Warren			Old Lyme	
Washington			Old Saybrook	
Waterbury			Plainfield	
Watertown			Pomfret	
Winchester			Preston	
Wolcott			Putnam	
			Salem	
			Scotland	
			Sprague	
			Sterling	
			Stonington	
			Thompson	
			Voluntown	
			Waterford	
			Westbrook	
			Willington	
			Windham	
			Woodstock	



## **SBC/ CONNECTICUT RESPONSIBILITIES**

1. Works with the contractor to establish an acceptable construction time line
2. Provides the contractor with a marked copy of the plot plan showing the telephone route, splice pit locations & road crossings
3. Ensures that the facilities are available and that the SBC Connecticut provided material is ordered.
4. Acts as liaison for SBC Connecticut Construction & contractor for conduit, marker tape & cable placement.
5. Provides technical support regarding acceptable fill, trench depth, type of construction, conduit placing, sealing of conduit, placement of marking tape, and other related construction issues

## **CONTRACTOR / DEVELOPER RESPONSIBILITIES**

1. Provides SBC Connecticut Engineering with an approved plot plan or AutoCAD disk
2. Coordinates with the SBC Connecticut Engineer the schedule for construction, the route of the cable, the design of the trenches and the anticipated completion date
3. Provides the main line trench for SBC provided spare conduit, direct buried cable, and/or conduit construction for cable placement. All technical details will be provided by SBC Network Engineering at the time of the site visit.
4. Places 1 SBC Connecticut provided spare conduit, & marking tape in the \*mainline trench. The ends of the conduit should be sealed and there should be no breaks in the conduit at the splice locations.
5. Road crossings and service trenches are to be provided by the Contractor. All technical details will be provided by SBC Network Engineering at the time of the site visit.





## **CONTRACTOR / DEVELOPER RESPONSIBILITIES continued**

6. The preferred choice for conduits placed at the Pedestal / \*\* service locations is for the conduit to be swept up above ground level. All technical details will be provided by SBC Network Engineering at the time of the site visit.
7. Provide 1 coil of the #6 AWG to the SBC facilities. The ground wire is to be commonly bonded to all the grounds placed at that location.
8. Service trenches may be direct buried or in conduit. Any \*\* service trench conduit should be a minimum of 2" schedule 40 or type "c" telecommunications with a pull rope placed in the conduit.
9. Agrees to provide the type of trench construction designated by the SBC CT engineer – (joint buried random or joint buried standard) trenches with EL. Primary & Tel. buried service wire must be joint buried standard
10. Furnishes the SBC Connecticut Engineer with a proposed trench detail schematic section
11. Guarantees excavation area to be within 4" of final grade for placement of cable. All lot lines & property corners should be marked in the field before the placement of SBC facilities.
12. Ensures R.O.W. / Easements for SBC are secured.
13. Construction and Inspection of trench for safety compliance in accordance with NESC, NEC, and/or any applicable local municipal guidelines.

\* Mainline trenches consist of the trench that contains the facilities that feed the entire development / project.

\*\* Service Trenches consist of the trenches that are used to feed the individual units or lots.



## SBC Connecticut Reference Numbers

**Project #**

ENGINEER INFO

**NAME:**

**TEL:**

**PAGER:**

CONSTRUCTION INFO

**LINE | SPLICING**

**NAME:**

|

**TEL:**

|

**PAGER:**

|



**DATE:**     /     /

**DEV. NAME:** \_\_\_\_\_

**TOWN:** \_\_\_\_\_

**Project #:** \_\_\_\_\_

SBC CONNECTICUT is requesting that you or your representative sign the bottom of this form in order to confirm agreements made by the representative of your company & SBC Connecticut on the date shown above.

It also confirms your receipt of the minimum requirements that are necessary to provide telephone service to your development.

SBC's requirements are based on the NESC - National Electrical Safety Code, NEC - National Electrical Code, and SBC tariffs. In some cases state or local rules and regulations may also apply.

If you need clarification at any time regarding SBC Connecticut construction requirements you may call any of the SBC Connecticut representatives listed on the previous page.

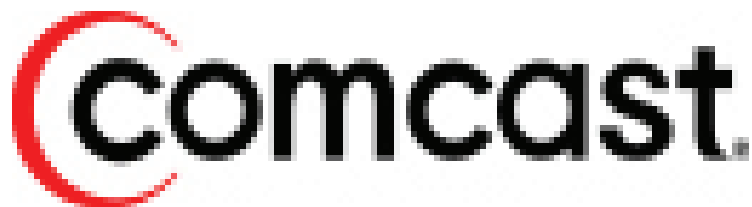
**NAME:** \_\_\_\_\_

**TITLE:** \_\_\_\_\_

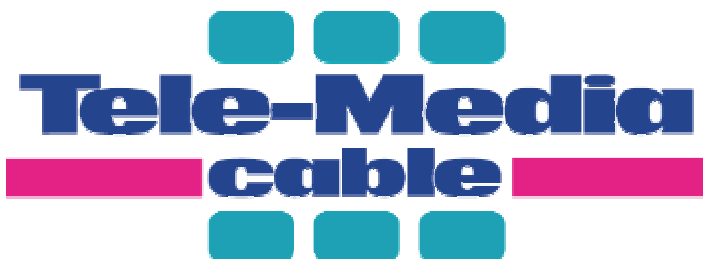
**SBC Connecticut Engineer to file signed copy with the completed work order**



*///CABLEVISION*



*Adelphia*  
*Your Link For Everything*



# CABLE TV UTILITY COMPANIES IN THE STATE OF CONNECTICUT

## **Adelphia - page 1**

**Old Lyme system towns** - Old Lyme, Lyme, Salem, East Haddam

**Norwich system towns** - Colchester, Bozrah, Norwich, Preston, Lisbon, Sprague, and Franklin

## **Cablevision - page 2**

**Litchfield system towns** - Watertown, Thomaston, Morris, Litchfield, Warren, Cornwall, Goshen, and Torrington

**Stamford system towns** - Greenwich, Stamford, Darien, New Canaan, Wilton, Norwalk, Westport and Weston

**Bridgeport system towns** - Redding, Easton, Fairfield, Bridgeport, Woodbridge, Stratford, Milford and Orange

## **Charter Communications - page 3**

**Newtown system towns** - Trumbull, Monroe, Newtown, Southbury, Woodbury, Bethlehem, Brookfield, Bridgewater, Roxbury, Washington, New Fairfield, Sherman, New Milford and Kent

**Winsted system towns** - Harwinton, New Hartford, Barkhamsted, Winsted and Colebrook

**Willimantic system towns** - Coventry, Columbia, Lebanon, Windham, Mansfield, Chaplin, Willington, Ashford, Eastford, Woodstock, Thompson, Pomfret, Brooklyn, Hampton, Scotland and Canterbury

## **Comcast - page 6**

**Danbury system towns** - Ridgefield, Bethel and Danbury

**Lakeville system towns** - Sharon, Salisbury, Norfolk, South Canaan and North Canaan

**Branford system towns** - Madison, Guilford, Branford, East Haven, North Haven, Wallingford and North Branford

**Middletown system towns** - Clinton, Westbrook, Old Saybrook, Essex, Deep River, Killingworth, Chester, Haddam, Durham, Middlefield, Middletown, Cromwell, Portland and East Hampton

**Hartford system towns** - Avon, Berlin, New Britain, Plainville, Bristol, Burlington, Farmington, Canton, Simsbury, Bloomfield, Hartford, West Hartford, Windsor and East Hartford

**Groton system towns** - Stonington, North Stonington, Voluntown, Groton and Ledyard

**Vernon system towns** - Marlborough, Hebron, Andover, Bolton, Vernon, Tolland and Ellington

**New Haven system towns** - New haven, West Haven and Hamden

# **CABLE TV UTILITY COMPANIES IN THE STATE OF CONNECTICUT**

## **Cox Communications - page 13**

Direct all construction-related inquiries to:

**Cox Communications**

**170 Utopia Road**

**Manchester, CT 06040 or**

**[www.cox.com/newengland/construction](http://www.cox.com/newengland/construction)**

**Cheshire system towns** - Cheshire, Meriden and Southington

**Enfield system towns** - Newington, Rocky Hill, Wethersfield, Glastonbury, Manchester, South Windsor, East Windsor, Windsor Locks, Granby, East Granby, Hartland, Suffield, Enfield, Somers, Stafford and Union

## **Eastern Ct. Cable - page 10**

**New London system towns** - Montville, Waterford, East Lyme and New London

**Sterling system towns** - Griswold, Plainfield, Sterling, Killingly and Putnam

## **Tele-Media - page 11**

**Waterbury system towns** - Prospect, Middlebury, Waterbury, Wolcott, Plymouth, Terryville, Pequabuck and south side of Thomaston

**Seymour system towns** - Shelton, Derby, Ansonia, Seymour, Oxford, Beacon Falls, Bethany, Naugatuck and Huntington

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**Underground Installation Procedures**

1. Before installation of any conduits , an area representative should be contacted. (860-889-6269) Adelphia services the following towns: Norwich , Colchester , Bozrah , Lisbon , Sprague , Franklin , and Preston in our Norwich system and Old Lyme , Lyme, East Haddam , Salem , and Haddam Neck in our Old Lyme system.
2. All conduits shall be 3" diameter schedule 40 PVC.
3. Reduced conduits of 2" schedule 40 PVC may be used for service drops only not to exceed 250 feet.
4. All conduits over 500' in length will require a pull box to be determined by your local representative.
5. All conduits will require a ¼ " nylon pull rope, and no more than three 90 degree radial sweeps will be allowed in any one run. All couplings, bell fittings, sweeps ,and terminal adapters shall be glued with schedule forty PVC cement.
6. All pedestal sites shall require a #6 copper ground wire to be bonded to power company's ground rod whenever possible.
7. Cable pedestals shall not be any closer than 18" to 24" to any other utility pedestal, handhole or transformer.
8. All cables at a dwelling shall be run on the exterior of that dwelling in the general area of the power meter for the purpose of bonding to powers ground .AT NO TIME WILL LB'S OR PLACING THE CABLE DIRECTLY INTO THE HOME BE PERMITTED.
9. In crossing of any property, other than the developers or homeowners, an easement must be provided directly to Adelphia.
10. All conduits must be buried a minimum of 18" below finished grade.
11. All conduits coming from a riser pole must be on the field side of the pole line away from oncoming traffic.
12. If any conduit is damaged during construction, it is the sole responsibility of the homeowner/builder to repair those conduits.
13. It shall be the contractor's responsibility to notify Call Before You Dig prior to any excavation.
14. All lot lines and road markers shall be in place prior to any placement of conduits and or cables.
15. A warning tape shall be supplied by Adelphia ,and shall be placed in all conduit areas.
16. Again ,please call your local company before starting any project , as to avoid any unnecessary delays in cable placement so you may receive your services in a timely manor.

ADELPHIA COMMUNICATIONS/ONE HILL TOP RD/NORWICH CT. 06360



## **CONDUIT INSTALLATION PROCEDURE**

**The following is the Conduit Installation Procedures for new underground developments and placement of conduits for any underground work for Cablevision in CT.**

### **Please be aware of the following requirements:**

1. All conduit used must be schedule 40 PVC. Only electrical sweeps are acceptable. A maximum of four sweep connections per conduit run are allowed.
2. All CATV conduits must be buried a minimum of 18" below final grade.
3. 2" conduit should only be used for house service lines up to 200' in length. All longer conduit runs need to be 3" or 4" conduit. If an access LB is to be installed to enter a building, 4" conduit and a 4" Access LB is required.
4. If 3" conduit is used, spans that are longer then 400' will need a pull point.
5. If 4" conduit is used, spans that are longer then 500' will need a pull point.
6. Conduit layouts for subdivisions must be designed by Cablevision and supplied to the developer prior to excavation and conduit installation. The developer must give ample time for Cablevision to complete the design process.
7. If applicable, sweeps will come up to the side or rear of any Power Transformer. The sweep ups should be within 3ft of the other utilities, but not closer then 18 inches.
8. Sweep up locations shall be grouped tightly together and sealed with Duct tape.
9. All conduits must have a pull string or rope installed. If there's not string/rope in the conduit, the job may be rescheduled.
10. If the conduit gets damaged during the backfilling of the trench or during construction of the project, it is the developer or homeowner's responsibility to repair the conduit back to specifications.
11. A #6 copper ground wire needs to be installed from all CL&P ground rods to the CATV sweep up locations for proper NEC bonding and grounding requirements.

Note: It is important to follow these procedures to avoid any delay at the time of CATV Installations. We will gladly meet on site to confirm the proper conduit installation...

For questions regarding the installation of conduits, feel free to call the following:

**Norwalk System (203-750-5629):** Norwalk, New Canaan, Westport, Wilton, Weston, Darien, Stamford, Greenwich

**Litchfield System (860-567-8547):** Litchfield (Northfield), Torrington, Thomaston, Goshen, Cornwall, Warren, Watertown (Oakville), Morris

**Bridgeport System (203-696-4764):** Bridgeport, Woodbridge, Orange, Milford, Stratford, Fairfield, Easton, Redding

**THANK YOU FOR YOUR COOPERATION & PLEASE, CALL B 4 U DIG !**



## **ENGINEERING REQUIREMENTS FOR UNDERGROUND CABLE IN THE STATE OF CONNECTICUT**

### **SUBDIVISIONS and MAIN LINE INSTALLATIONS**

- All main line conduits shall be 4-inch diameter schedule 40 PVC as per NEMA TC2-1990; any variations will be determined by cable representative.
- All conduits, sweeps, and couplers shall be glued.
- All conduits are to maintain size from one end to the other with no run being over 500 feet.
- All conduits at pedestal sites are to be swept up to finish grade grouped together and capped.
- 90-degree electrical sweeps are required at riser poles and at pedestal sites.
- No 90-degree sweeps in trench line unless authorized by cable representative.
- Trench depth required is 36 inches with some separation between conduits.
- All lot stubs shall be installed at a minimum of 10-feet onto each lot capped and marked in direction of lot.
- Pedestal sites will be determined by layout on the field print by cable representative.
- All pedestal sites will require a #6 ground wire bonded to power's ground whenever possible.
- Main line trench pedestal sites are to be located to the right rear side of the power company's vault and maintain a 24-inch clearance on all sides of adjacent utilities and driveways.
- Main line trench pedestal sites that are not next to the power company's vault site shall require an 8-foot ground rod and #6 copper ground wire at a minimum of 3' from road.
- A minimum of ¼ inch nylon pull rope must be installed and secured in all conduits.
- Developer is responsible for all work and materials and subject to inspection by cable representative before any services are installed.
- Warning tape will be provided by cable co. and needs to be buried one-foot above cable's conduit.

### **PRIVATE RIGHTS OF WAY (PROW)**

- All PROW's that have utilities feeding multiple lots are considered main line; see above requirements
- All PROW's that have utilities feeding one lot are to follow house lateral requirements.

## **STREET CROSSINGS**

- Terminating street crossings for main line will be brought up on left rear side of power's vault to keep from crossing conduits in the trench.

## **HOUSE LATERALS**

- House laterals under 250-feet shall be 2-inch conduit. Laterals over 250-feet will be 3-inch conduit.
- NO CONDUITS ARE TO BE BROUGHT DIRECTLY INTO A BASEMENT.

## ***COMMERCIAL and INDUSTRIAL PARKS and SINGLE BUILDINGS***

- All conduits are considered main line. See above requirements.
- \* You must call your local C.A.T.V. company's representative before you start any installation of any conduit and provide prints and utility meeting dates and times so that proper layout is done. This will ensure utility layout is correct.
- \* All the above requirements are standard; sometimes field conditions vary, if any variations in layout of trench line are needed or changed it must be approved by cable representative. Not following requirements may result in unfortunate delays in getting service.
- \* If you have any questions, please call your local construction representative. Phone numbers are on the following page.

## **Charter Communications**

### **Newtown system telephone numbers for engineering and construction**

Trumbull, Monroe, Newtown, Brookfield and Bridgewater      203-304-4001 ext. 44441  
or 203-304-4064

New Fairfield, New Milford, Sherman, Kent and Southbury      203-304-4024  
or 203-304-4064

Bethlehem, Roxbury, Washington and Woodbury      203-304-4001 ext. 44128

### **Winsted system telephone numbers for engineering and construction**

Harwinton, New Hartford, Barkhamsted, Winsted and Colebrook  
203-304-4001  
ext. 44128  
or 860-738-0575

### **Willimantic system telephone numbers for engineering and construction**

Coventry, Columbia, Lebanon, Windham, Mansfield, Chaplin, Willington, Ashford,  
Eastford, Woodstock, Thompson, Pomfret, Brooklyn, Hampton, Scotland and Canterbury  
860-456-8346  
ext 3036

### **Any cable TV line damaged during construction, whether UG or aerial, will need to be fixed immediately!**

Please call 1-800-543-0242 from anywhere for all towns serviced by Charter Communications 24/7 - **push 1 for dispatch.**



Please be advised Comcast has specifications regarding conduit sizes in relation to new underground construction.

### **Residential House Services**

(A house service is defined as service wire from the road to the house.)

All services 250' or less will require a 2" schedule 40 PVC conduit and a pull line consisting of at least 250 lbs. pulling strength.

All services greater than 250' but less than 500' will require a 3" schedule 40 PVC conduit with a ¼" rope as pull line.

Any service more than 900' shall not be installed prior to making contact with Comcast in order to determine pull box or amplifier locations as deemed necessary by Comcast.

All conduits need to be accessible and arrangements for cable installation shall be the responsibility of the developer by contacting Comcast.

All conduit bends shall be 36" radius bends

### **Residential Development**

(Main Line Trench)

All conduits placed within a new subdivision in a main line trench will be 3" schedule 40 PVC with a ¼" rope as pull line.

All conduits need to be accessible and arrangements for cable installation shall be the responsibility of the developer by contacting Comcast

**Comcast will reserve the right to refuse cable installation if any of these specifications are not met.**



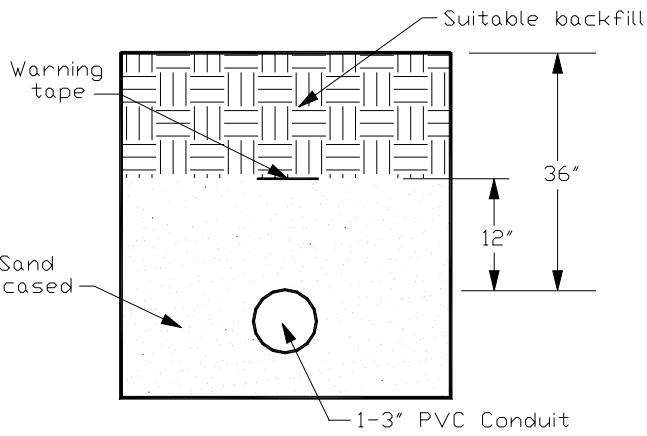
## Comcast Trench, Direct Buried, and Conduit Placement Specifications

Below is a list of Comcast required underground specifications in which the developer is responsible for providing and adhering to:

- 1.) A scaled print of the project showing the lot layout. (Provided by the Power Company)
- 2.) Main line trench is to provide a minimum of 24" of cover to all cables and consist of a minimum of 6" sand base with 12" of sand cover on cables.
- 3.) A warning tape (provided by Comcast) is to be placed by the excavator at least 12" above the cable/conduit.
- 4.) 3" PVC schedule 40 is to be placed under all paved areas and swept up above grade (36" radius on all bends) with a ¼" nylon pull rope.
- 5.) All conduit(s) placed in main line trench shall be 3" schedule 40 with a ¼" pull rope.
- 6.) At no time should conduit(s) be installed until Comcast has provided a layout of conduit placement.
- 7.) A conduit(s) layout will be provided by Comcast and will be based on the local electric providing company.
- 8.) All conduits shall be left accessible and swept above ground level at each point of service, which is depicted by the local electric provider and defined on the Comcast layout design.
- 9.) It shall be the developers' responsibility to provide a minimum of 48 hours notice to Comcast to arrange cable placement.
- 10.) All conduit bends shall be 36" radius bends.

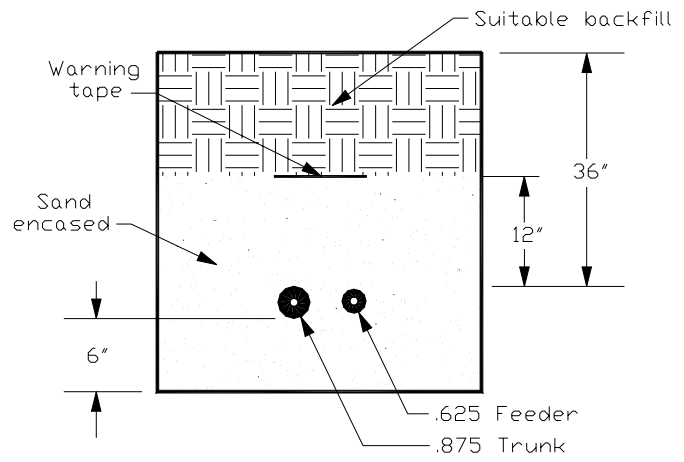
# 1 DUCT STRUCTURE

SCALE: N.T.S.



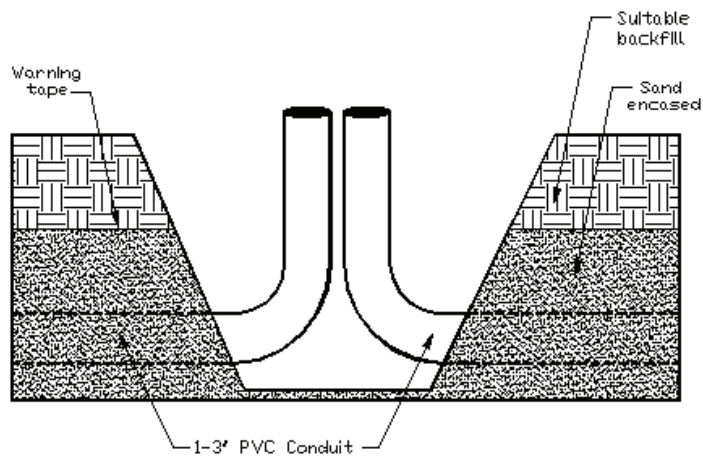
# DIRECT BURIED CABLE(S)

SCALE: N.T.S.



# POINT of SERVICE AREA

SCALE: N.T.S.

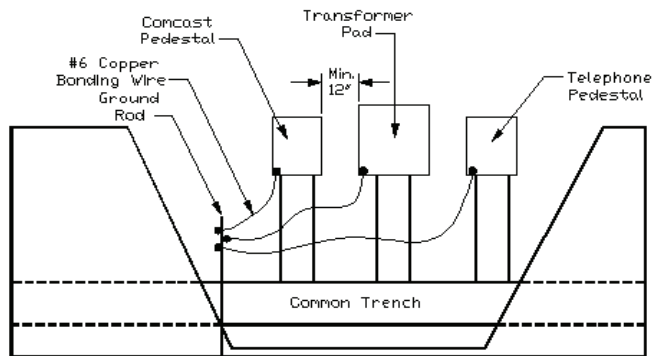


**comcast**  
3/31/03 TMP



## JOINT TRENCH EQUIPMENT LOCATIONS

SCALE: N.T.S.



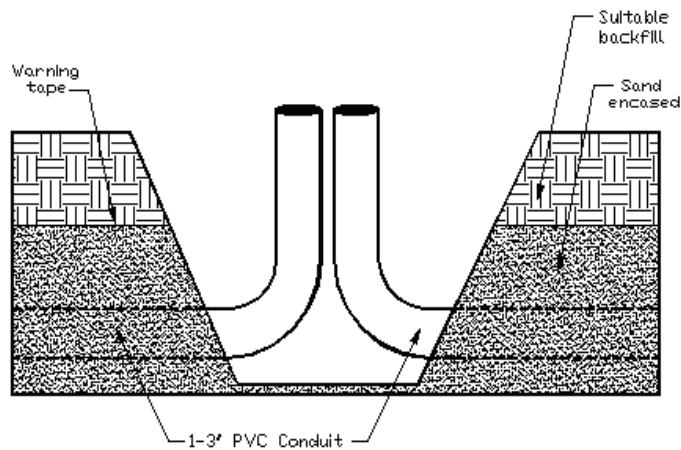
### THREE COMMON PEDESTAL SIZES:

Medium Pedestal- 12\"L X 12\"W X 28\"H  
 Medium (cat house)- 28\"L X 12\"W X 16\"H  
 Large (dog house)- 18\"L X 31\"W X 17\"H

**comcast**  
3/31/03 TMP

## POINT of SERVICE AREA

SCALE: N.T.S.



**comcast**  
3/31/03 TMP

# **Eastern Connecticut Cable Television**

## **Guidelines for CATV Installations**

### **Interiors:**

Type of cable required for runs shorter than 150' : Rg-6 Quad-shield coax.

Type of cable required for runs longer than 150' : Rg-11 Quad-shield coax.

Mud-rings should be used instead of full enclosures in the wall (for each television outlet).

A plywood board in each closet or electrical room for us to mount a lock-box must be provided.

All wires must be “home-run” to a central location (elect closet) on each floor.

Additional outlets in each unit can be split from living-room location unless high-speed internet will be desired. In these cases a “home-run” will be required for **every** outlet.

In residential applications all wires must be “home-run” to a location next to the power company meter for grounding purposes.

### **Exteriors:**

#### **Underground**

All conduits should be 3” schedule 40.

The distance between handholes should not exceed 500 feet.

Keep a 30” minimum between cable enclosures and power vaults/transformer pads.

A ¼” nylon pull chord placed in each conduit will be required.

PVC sweeps are acceptable in all locations but should be kept to a minimum.

Conduit ends should sweep up together in a bundle.

Don't use “LB's” anywhere in the conduit run.

Conduit ends must be exposed and ¼” pull chords must be installed before we can pull cables.

#### **Overhead**

Wherever a power riser is used, a second riser should be used for communications (catv and phone).

# **TELE – MEDIA CABLE**

**80 GREAT HILL RD  
SEYMOUR CT. 06483**

**PHONE 203-732-0146  
FAX 203-734-3425**

## **CONSTRUCTION SPECIFICATIONS**

### **PUBLIC UTILITY EASEMENTS IN PUBLIC RIGHT OF WAY**

- 1) All conduits to be 3 inch schedule 40 PVC.
- 2) All conduits sweeps and couplers shall be glued.
- 3) All conduits to be buried to a minimum of 18 inches from final grade to top of conduit.
- 4) All conduits to have a minimum of ¼ inch nylon rope installed and secured to a conduit plug.
- 5) All conduits at sweep up locations to be grouped tightly together.
- 6) 90-degree electrical sweeps with a minimum radius of 24 inches to be used at riser poles and pedestal locations only. No 90's to be used in trench line.
- 7) All sweeps in conduit run to be a minimum 48-inch radius.
- 8) All Conduits to be swept up 6 inches above finish grade at right rear of electric transformer with a minimum of 18 inches clearance on all sides of adjacent utilities.
- 9) A # 6 copper ground wire needs to be installed from all power company ground rods to the sweep up location, this ground wire should be brought above grade and a 3-foot coil taped to conduit bundle.
- 10) Pull locations may be required depending on length of run and terrain. Location to be determined on site by a Tele-Media representative.

### **HOUSE SERVICES**

1. Any services under 250 feet will require a 2 inch schedule 40 conduit from our pedestal location to or near power meter location at house.
2. Any service over 250 feet will require a 3 inch schedule 40 conduit from our pedestal location to house, this conduit should not go directly into basement but be swept up outside the foundation near the power meter location.
3. Any service over 400 feet will require a pull location to be swept up in the area of any electric or telephone pull location. In the case there are no electric or telephone pull locations, a location will be designated by a Tele – Media representative.
4. All conduits are to have a pull rope installed and secured to a conduit plug.

### **PRIVATE RIGHTS OF WAY (PROW)**

1. On PROW's that service multiple lots or are longer than 250 feet from last Tele-Media mainline plant location or service 4 or more units will require 3 inch schedule 40 conduit. This conduit should be brought to the power and telephone room.
2. Smaller buildings with less than 4 units and are under 250 feet last Tele-Media mainline plant location will require a 2 inch schedule 40 conduit..
3. All conduits are to have a pull rope installed and secured to a conduit plug.

## COMMERCIAL BUILDINGS

1. All buildings that are over 250 feet from last Tele-Media mainline plant location or service 4 or more units will require 3-inch schedule 40 conduit. This conduit should be brought to the power and telephone room.
2. Smaller buildings with less than 4 units and are under than 250 feet last Tele-Media mainline plant location will require a 2 inch schedule 40 conduit.
3. All conduits are to have a pull rope installed and secured to a conduit plug.

Communication and information is the key to any successful project. When scheduling utility site meetings, it is incumbent upon the Project Manager to contact Tele-Media (TMC). During the meeting the Project Manager should be prepared to provide TMC with an approved subdivision map with lot numbers and discuss possible utility trench locations.

Keep in mind that TMC requires 5 days advanced notice to install cabling and/or conduits (where applicable) in utility and service trenches.

If you have any questions, do not hesitate to call the Engineering Department at the following numbers:

<b>Construction Manager</b>	<b>203-732-0146 x 654</b>
<b>Project Manager</b>	<b>203-732-0146 x 653</b>
<b>Draftsman/Designer</b>	<b>203-732-0146 x 656</b>
<b>Construction Assistance</b>	<b>203-732-0146 x 640</b>

***TMC's goal is to provide service on the date requested. By working together the customer will not experience unnecessary delays in service activation.***



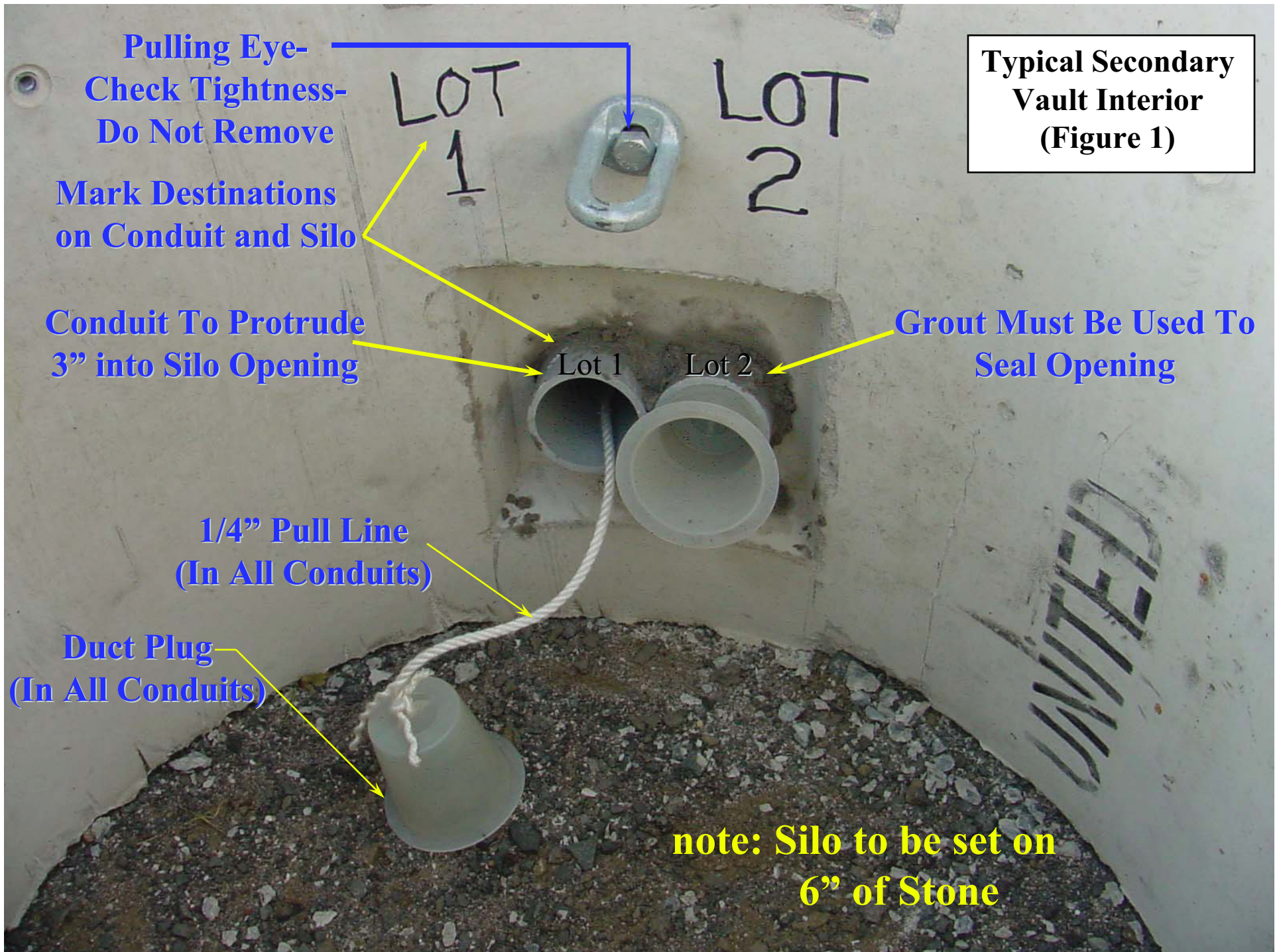
## **Developers Guidelines for Conduit Installation**

1. Prior to the installation of any conduit, a Cox Communications Field Engineer must be contacted to verify all of the below requirements. That information can be obtained by calling (401)615-1873.
2. Contact must be made at least 8 weeks prior to any cable placement dates at which time a to-scale development lot plan with lot numbers and 911 confirmed address numbers must be provided. Two days advance notice must be provided prior to conduit inspection, with a three day inspection window. Five days advance notice must be provided prior to cable placement, with a three day placement window.
3. A conduit installation plan must be obtained from the Field Engineer, for the purpose of dictating exact conduit types and sweep/splice points, prior to any conduit installation.
4. All required conduit will be the responsibility of the developer to provide. Cox will take ownership of the conduit system in the public way or eased areas upon inspection and acceptance.
5. Main line conduits must be 3" diameter, rigid PVC, heavy wall, listed and labeled electrical grade schedule 40 as per NEMA TC2-1990.
6. Any conduit span greater than 400' must include a pull point, the location of which must be determined with the Field Engineer.
7. Service conduits up to 250-feet can be 2" in diameter. Any service over 250-feet in length must be 3" in diameter, rigid PVC, heavy wall, listed and labeled electrical grade schedule 40 as per NEMA TC2-1990.
8. Main cable conduits must maintain conduit depths of 30-inches from the top of the conduit to the finished grade. Service conduits must maintain conduit depths of 24-inches from the top of the conduit to the finished grade.
9. 90 degree sweeps or bends must be a minimum of 36-inches in length at any splice location, riser pole or structure. Bends within a conduit run must be a minimum of 48-inches in length.
10. Conduits designated to be swept up at a splice location must be swept up 3" above finish grade, grouped together and capped.
11. All conduits, sweeps and couplers must be glued with PVC cement.
12. All conduit runs must have a 1/4" nylon pull rope installed within it with both ends protruding from the cap and secured on the exterior of the conduit with tape.
13. Any pull rope that is not accessible or is bound within the conduit will be the developer's responsibility to rectify.
14. Warning tape must be installed 12-inches above the top of any conduit with visible tails at each splice location.
15. Splice point/pedestal locations will be the responsibility of the developer to determine that they are on lot lines and will not conflict with any future structures such as driveways or sidewalks. It will also be the responsibility of the developer to insure that all splice point/pedestal locations are placed in conformance with CL&P guidelines.
16. Splice point/pedestal locations require a #6 ground wire bonded to the power ground wherever possible. Any splice point/pedestal locations that are not near a power company vault location will require an 8-foot vertically-driven ground rod with #6 ground wire attached and secured at the splice/pedestal location.
17. Service conduit stubs will be installed up to the property line for any future service.

18. Any conduit feeding a structure must be swept up at the exterior of that structure near the power meter for the purpose of providing an exterior ground/splice point. No conduit should be run from a pedestal or pole directly into a basement.
19. Should antifreeze or any other chemical be detected within a conduit, Cox reserves the right to decline to pull its facilities through that conduit until it has been cleared to its satisfaction.
20. Please refer to the “2004 Specifications and Installation Guide for Underground Service to Residential Developments” photo section for detailed illustrations on conduit placement techniques.



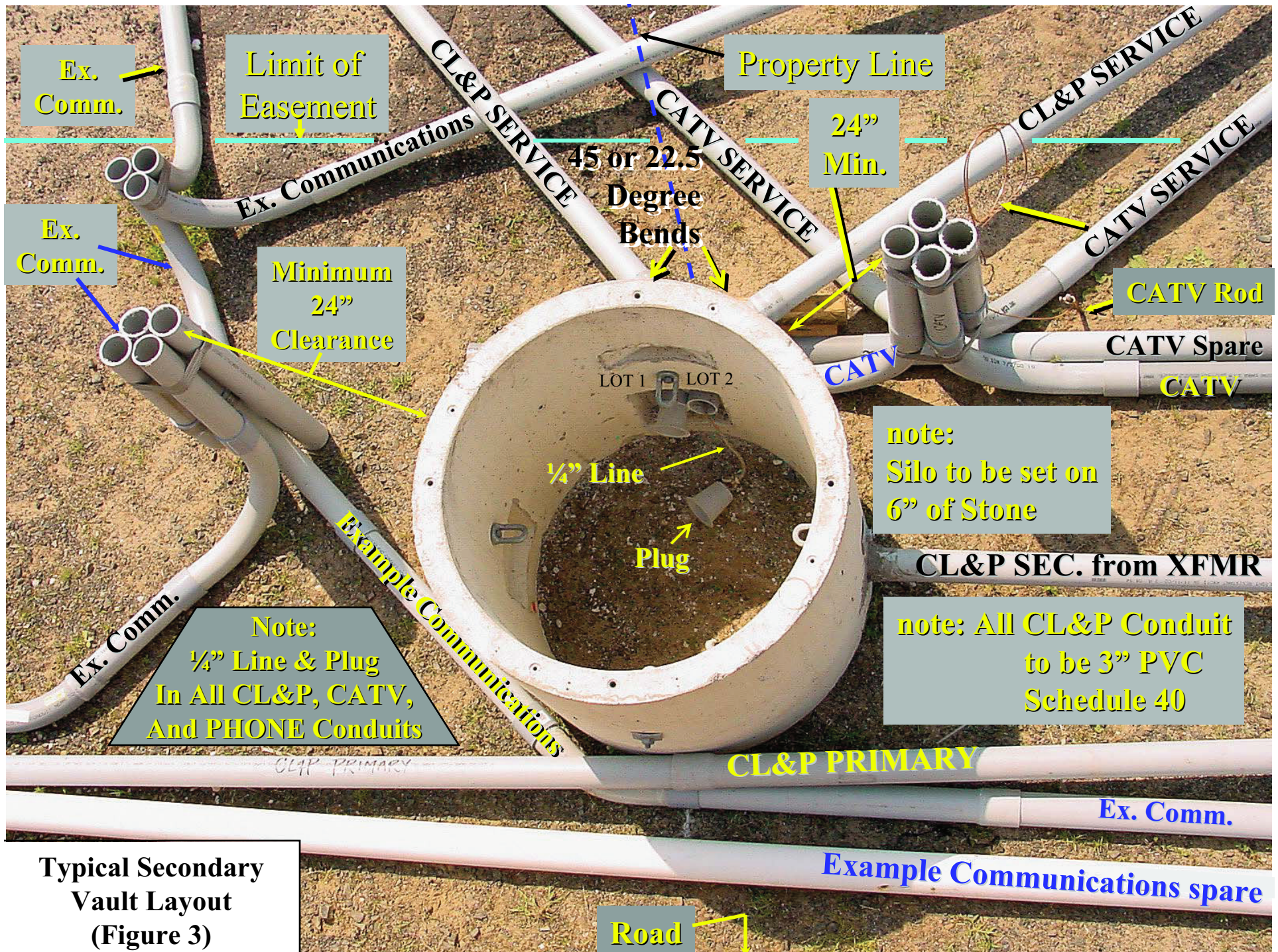
**Typical Secondary  
Vault Interior  
(Figure 1)**



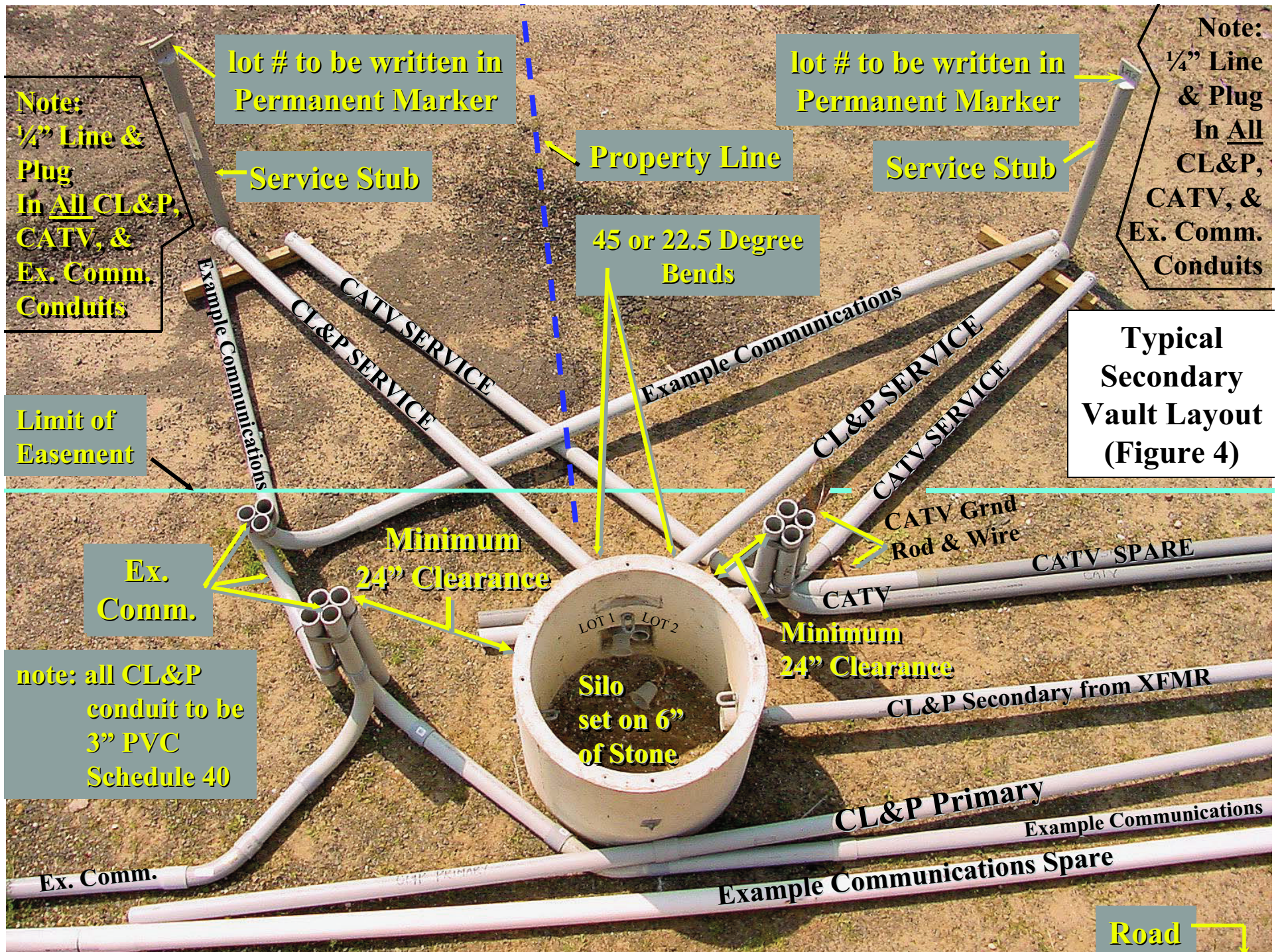














**note: All CL&P Conduit to be 3" PVC Schedule 40**

**Conduit Plug**

**LOT 1 STUB PIPE**

**10' Service Stub From Secondary Vault**

**1/4" Pull Line**

**Service Stub**

**Typical Service Stub (Figure 5)**

**note: All CL&P Conduit to be 3" PVC Schedule 40**

**Conduit Plug**

**LOT 1 STUB PIPE**

**10' Service Stub From Secondary Vault**

**1/4" Pull Line**

**Service Stub**

**Typical Service Stub (Figure 5)**

**note: All CL&P Conduit to be 3" PVC Schedule 40**

**Conduit Plug**

**LOT 1 STUB PIPE**

**10' Service Stub From Secondary Vault**

**1/4" Pull Line**

**Service Stub**

**Typical Service Stub (Figure 5)**

**note: All CL&P Conduit to be 3" PVC Schedule 40**

**Conduit Plug**

**LOT 1 STUB PIPE**

**10' Service Stub From Secondary Vault**

**1/4" Pull Line**

**Service Stub**

**Typical Service Stub (Figure 5)**

**note: All CL&P Conduit to be 3" PVC Schedule 40**

**Conduit Plug**

**LOT 1 STUB PIPE**

**10' Service Stub From Secondary Vault**

**1/4" Pull Line**

**Service Stub**

**Typical Service Stub (Figure 5)**

**note: All CL&P Conduit to be 3" PVC Schedule 40**

**Conduit Plug**

**LOT 1 STUB PIPE**

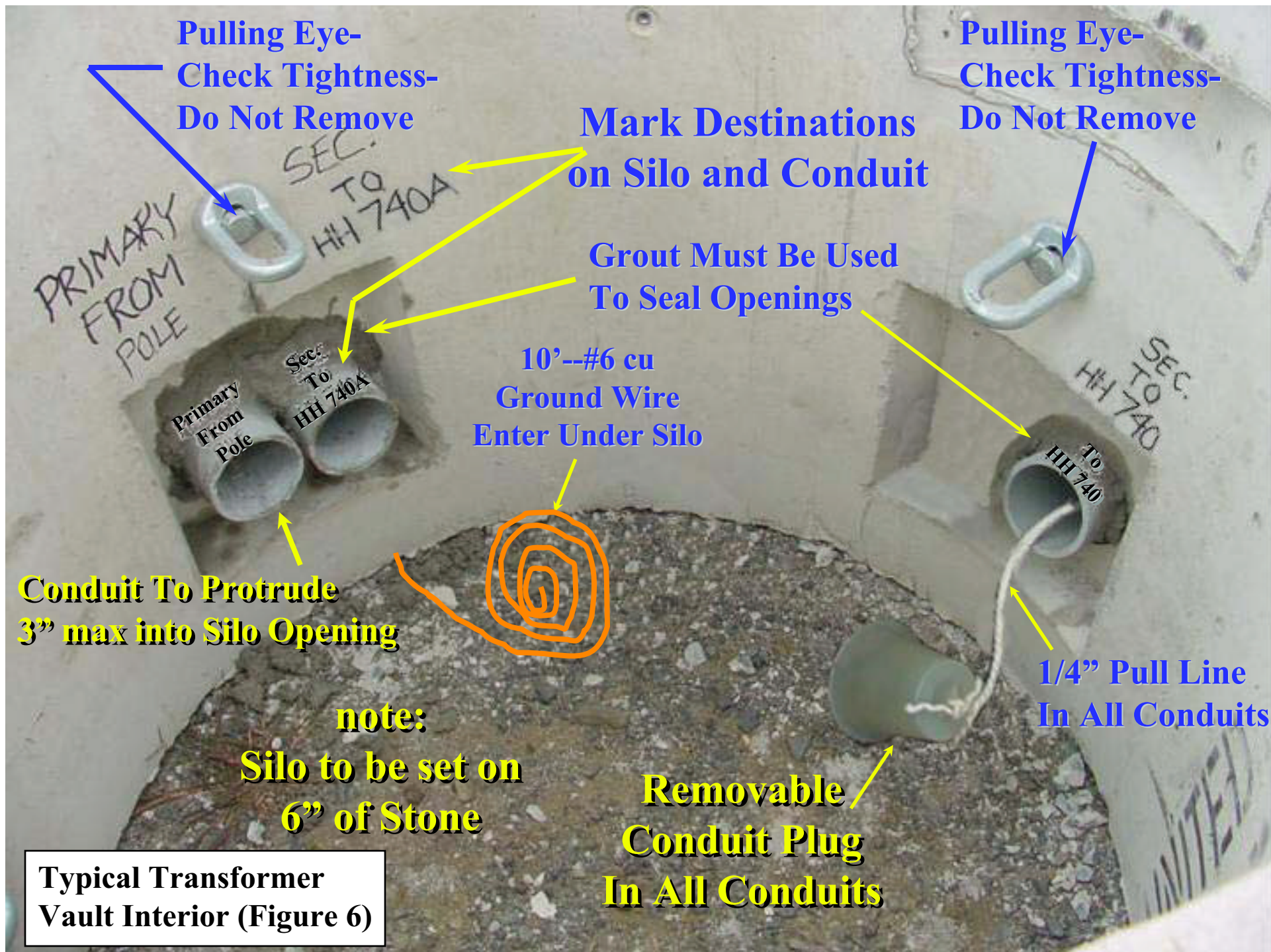
**10' Service Stub From Secondary Vault**

**1/4" Pull Line**

**Service Stub**

**Typical Service Stub (Figure 5)**







**note: Install Removable  
Plugs and Pull Lines  
In All Conduits**

**Pulling Eye-  
Check Tightness-  
Do Not Remove**

**Typical  
Transformer  
(or Switch)  
Vault Interior  
(Figure 7)**

SEC.  
TO  
HH 740A

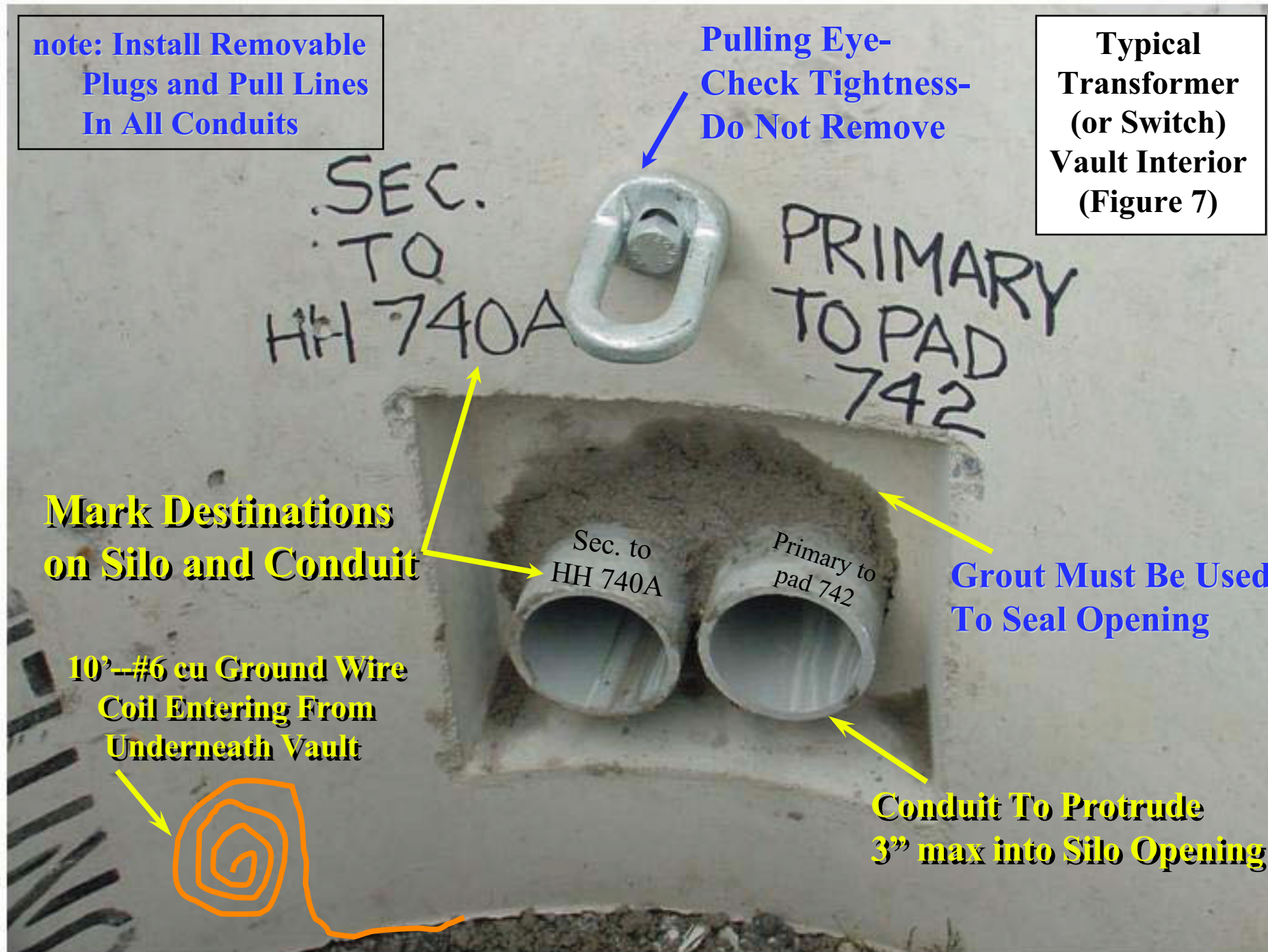
PRIMARY  
TO PAD  
742

**Mark Destinations  
on Silo and Conduit**

**10'--#6 cu Ground Wire  
Coil Entering From  
Underneath Vault**

**Grout Must Be Used  
To Seal Opening**

**Conduit To Protrude  
3" max into Silo Opening**





lot # to be written in Permanent Marker

note: Silos set on 6" of Stone

Property Line

lot # to be written in Permanent Marker

Service Stub

Minimum 30" Clearance

Minimum 30" Clearance

Service Stub

Duct Plug & 1/4" Pull Line In all conduits

Easement

All CI&P conduit to be 3" PVC Schedule 40

6'-#6 cu Ground Wire Coil

CATV

CATV Spare

CL&P Service

CL&P Primary

CL&P Secondary

Ex. Comm.

Grout Fill

See Figure 12

8' min. apart

Road Crossing

10' coil-#6 Cu Ground Wire Entering Under Silo

8' Ground Rod (driven in the trench)

10' coil-#6 Cu Ground Wire Entering Under Silo

8' Ground Rod (driven in the trench)

Typical Transformer & Service Vault (Figure 8)

See Figure 12

See Figure 12

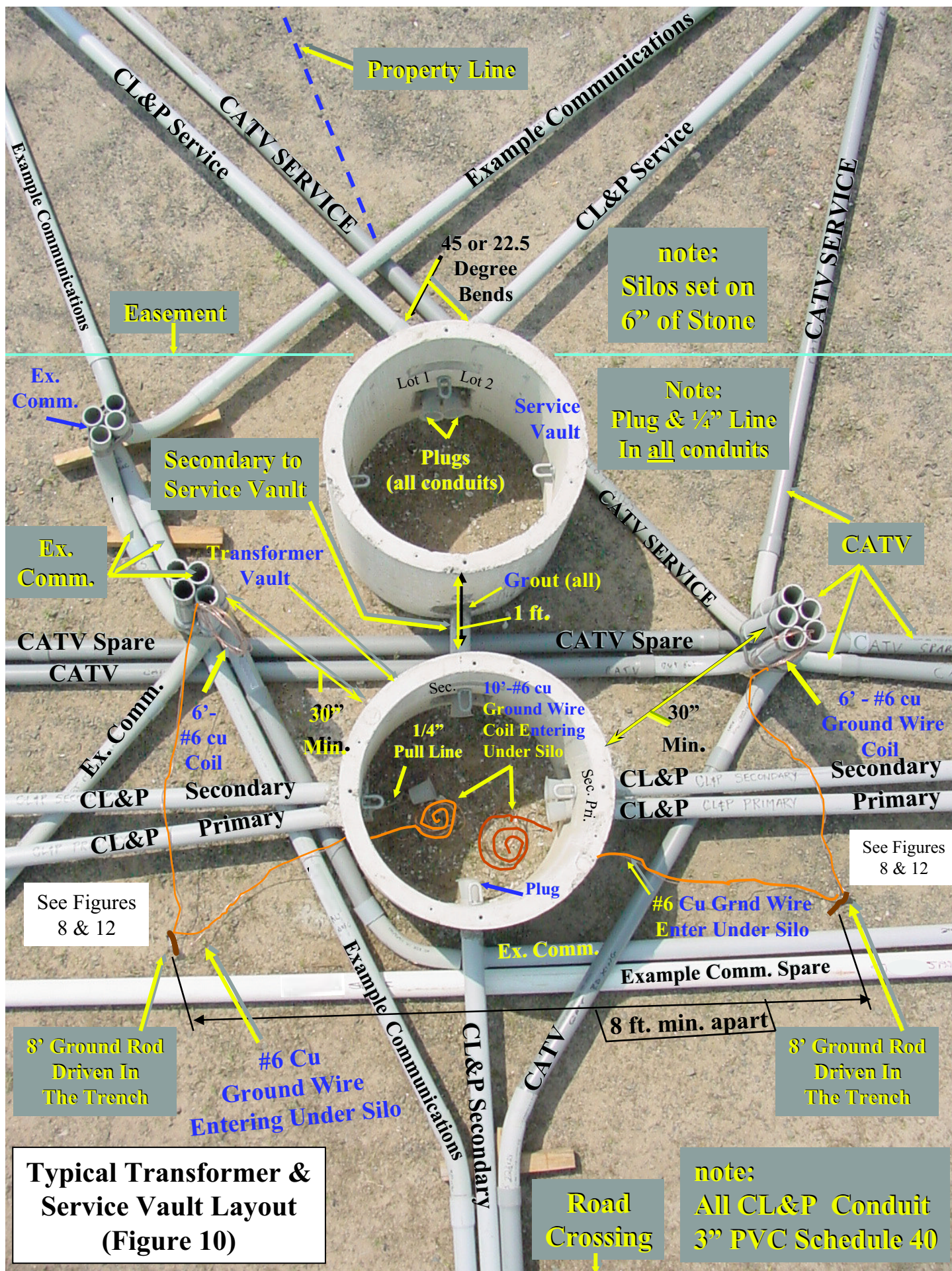
8' min. apart

See Figure 12

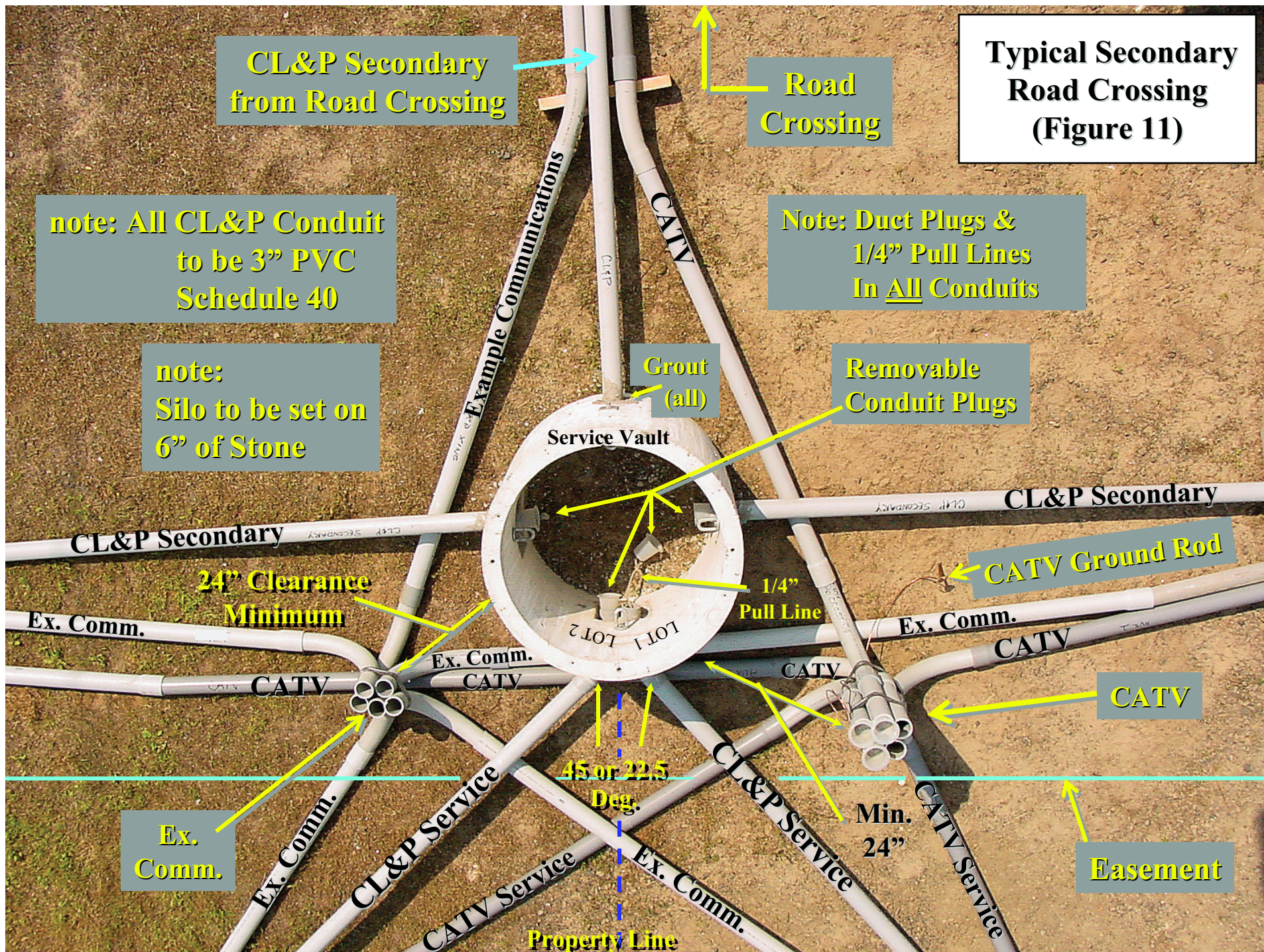












Typical Secondary Road Crossing (Figure 11)



**6' Coil - #6 Copper  
For Phone Ground**

**Service Vault**

**note:  
Silos set on  
6" of Stone**

**Typical Transformer  
(or Switch) Vault  
Ground Rod (Figure 12)**

**(Two required-  
One on each side)**

**Transformer Vault**

**note:  
All CL&P Conduit to  
be 3" PVC Schedule 40**

**Grout Must Be  
Used To Seal  
Openings**

**#6 Copper  
Ground Wire  
10' Coil Inside Silo,  
Entering From  
Underneath**

**CL&P**

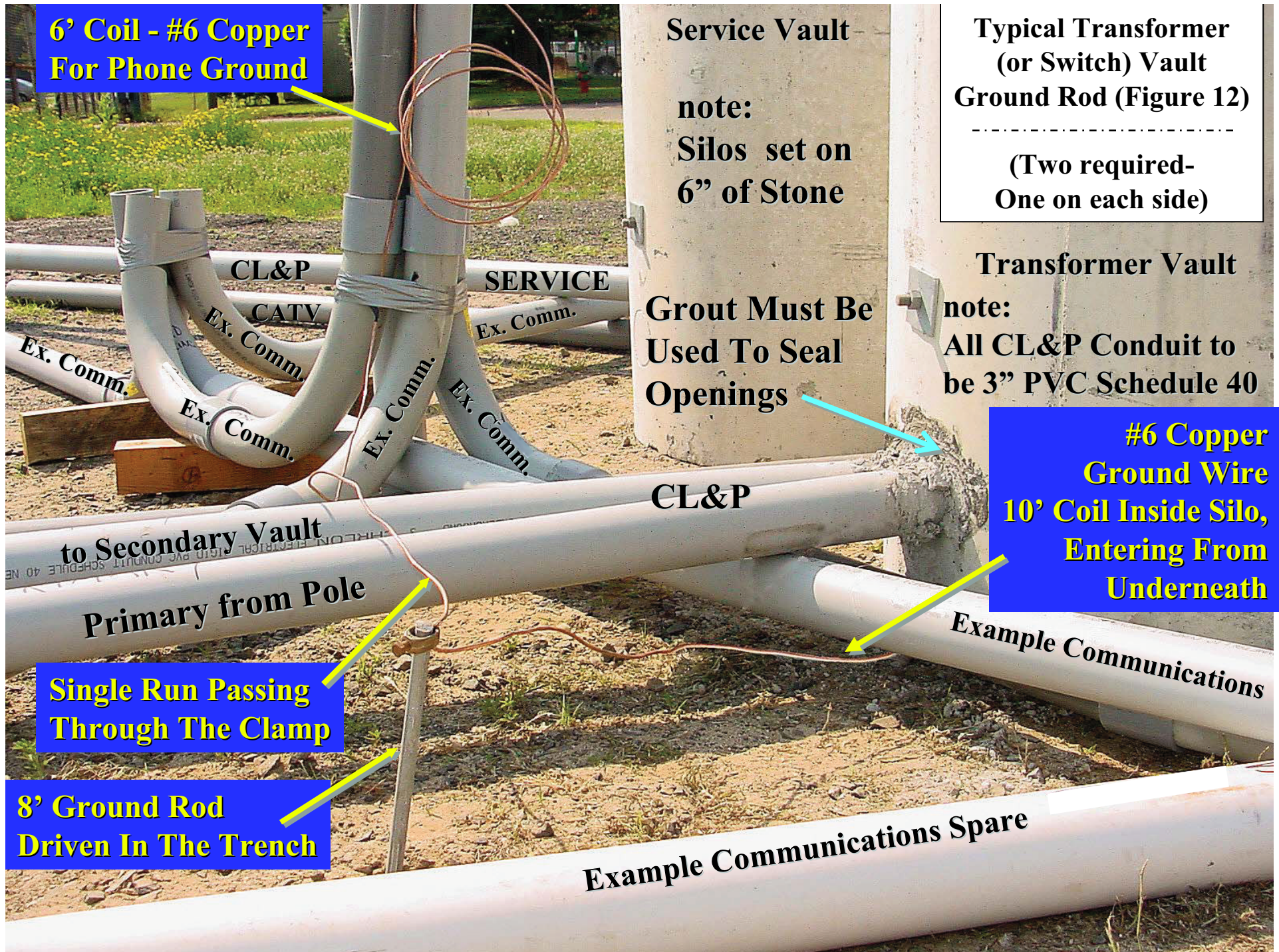
**Example Communications**

**to Secondary Vault  
Primary from Pole**

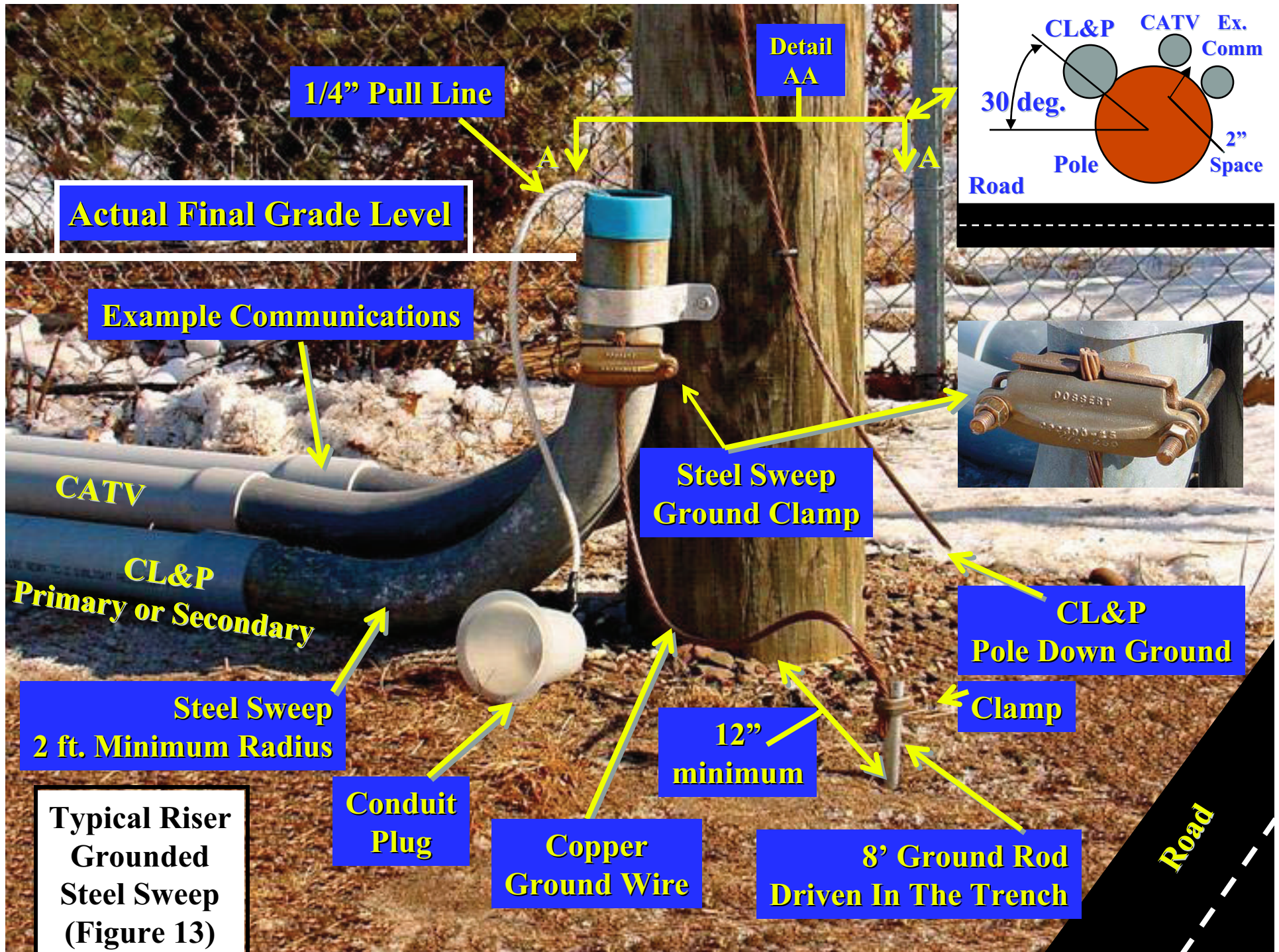
**Single Run Passing  
Through The Clamp**

**8' Ground Rod  
Driven In The Trench**

**Example Communications Spare**

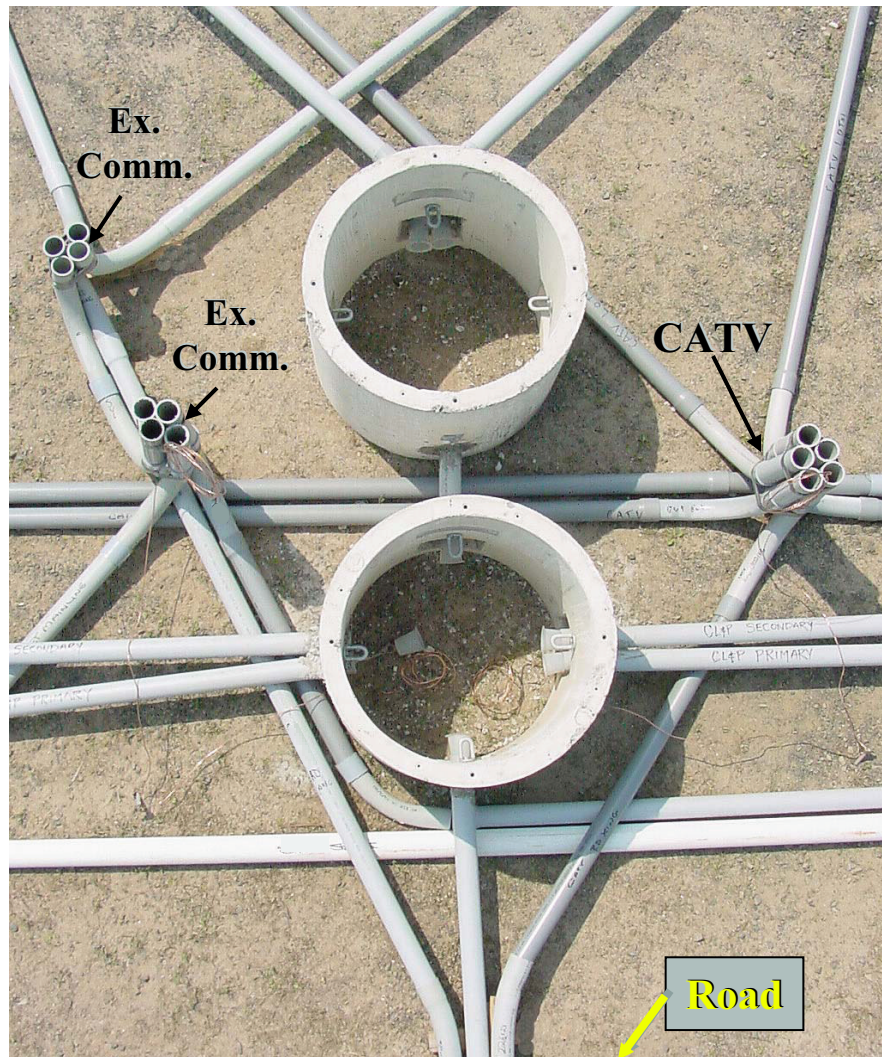




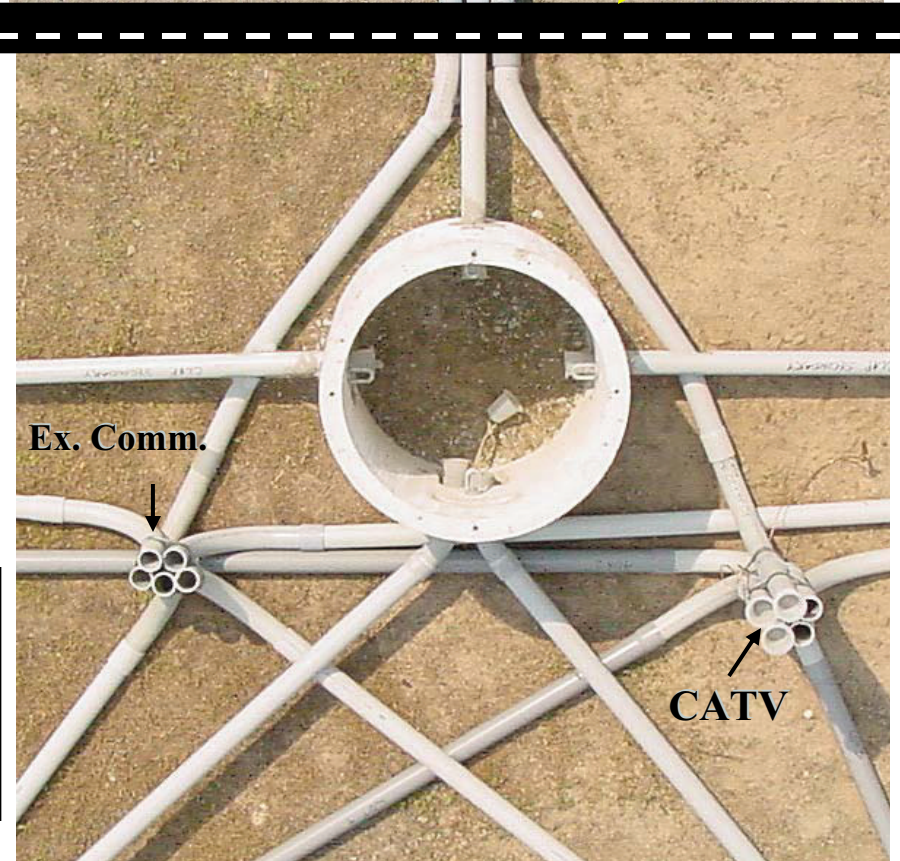




**For Specific  
Information  
Details  
See Figure 10**



**For Specific  
Information  
Details  
See figure 11**



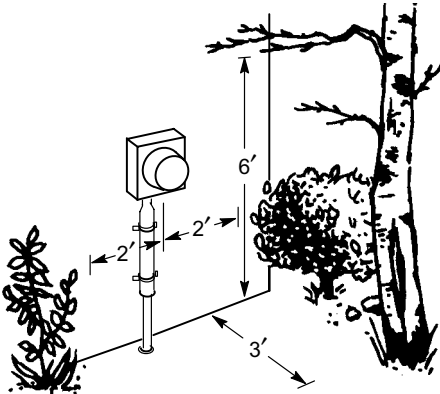
**Typical  
Road Crossing  
Layout  
(Figure 14)**

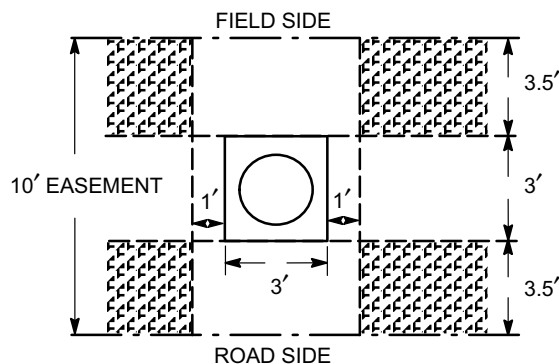
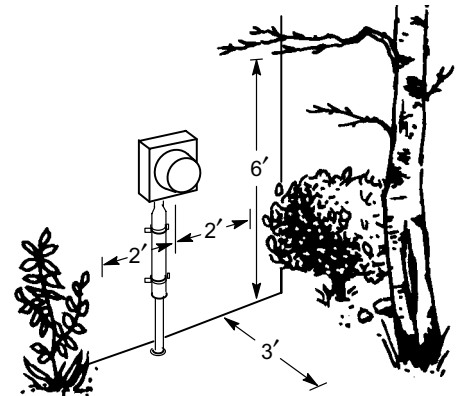
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**SCOPE** - This Standard covers the general requirements for electric utility installation of single-phase direct-buried cables in conduit.

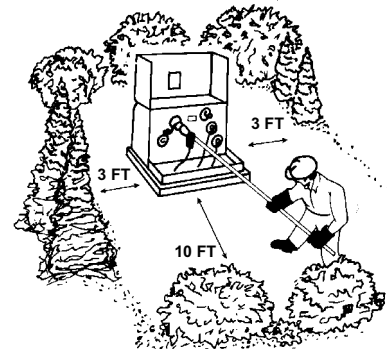
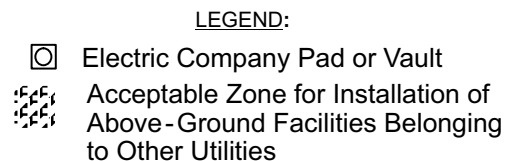
**GENERAL** - The preferred method of providing electrical service is installation of direct-buried electrical cables in conduit. All installations of electrical cables in conduit shall adhere to the 1997 NESC (National Electrical Safety Code), in addition to the following requirements:

1. **TRENCH** - Trench location shall be in as direct a line as possible without reverse bends between distribution facilities and from the distribution facility to the customer service entrance. In order to minimize cable pulling forces, no more than two bends (not including riser at house or pole) exceeding a total change of 45 degrees shall be permitted.
  - a. The trench bottom shall be undisturbed or relatively smooth earth, well tamped, and free of any debris that may be detrimental to the conduit. Excavation shall be of a size and extent to permit proper installation of conduit and structures as required.
    - 1) Where excavation is in rock, it shall be removed to 4 inches below the trench bottom. The over excavation shall be replaced with a bedding of gravel, sand or clean, well tamped backfill.
    - 2) Backfill shall not contain ashes, cinders, shells, frozen material, loose debris, or stones larger than 2 inches in maximum dimension. Backfill shall be compacted.
  - b. Conduit in the trench should have a 4 inch per 100 feet downward pitch toward the distribution facility, if physically possible. (This provides drainage away from service entrance, prevents stagnant water in duct.)
  - c. Trench shall be of such depth to accommodate 30 inches minimum cover for primary and secondary cables in conduit installed along the roadway easement, and 24 inches minimum cover for secondary or service cables in conduit on private property.
2. **CONDUIT** - Standard conduit shall be minimum 3-inch diameter, rigid PVC, heavy wall, sunlight resistant (6%-7% titanium dioxide by weight), Schedule 40 as per NEMA TC2-1990.
  - a. Limit the number of electric utility conduits to a maximum of four per trench.
  - b. Install conduit, with all joints cemented, through knockout and extend 4 inches inside handhole. Terminate conduit run with end bell (e.g., **SC 0177110** for 3-inch diameter). Conduit destination shall be permanently marked on conduit end.
  - c. Gaps around conduit at knockout openings shall be sealed with cement mortar to prevent backfill entering the handhole.
  - d. A 1/4-inch-diameter nylon pull line shall be installed in each duct, including 10 feet of slack, and secured to conduit plug. Each end of the conduit shall be sealed with a conduit plug (e.g., **SC 0175141** for 3-inch diameter), and left accessible.
  - e. Bends in the conduit run shall have a minimum radius of 48 inches. This requirement does not include bends used at house or pole risers where the bend radius shall be a minimum of 24 inches, with 36 inches preferred.
3. **PRIMARIES** - For primary in conduit, a separate bare copper grounded neutral conductor and anodes are not required.
  - a. Install primary in conduit at a minimum depth of 30 inches below finished grade.

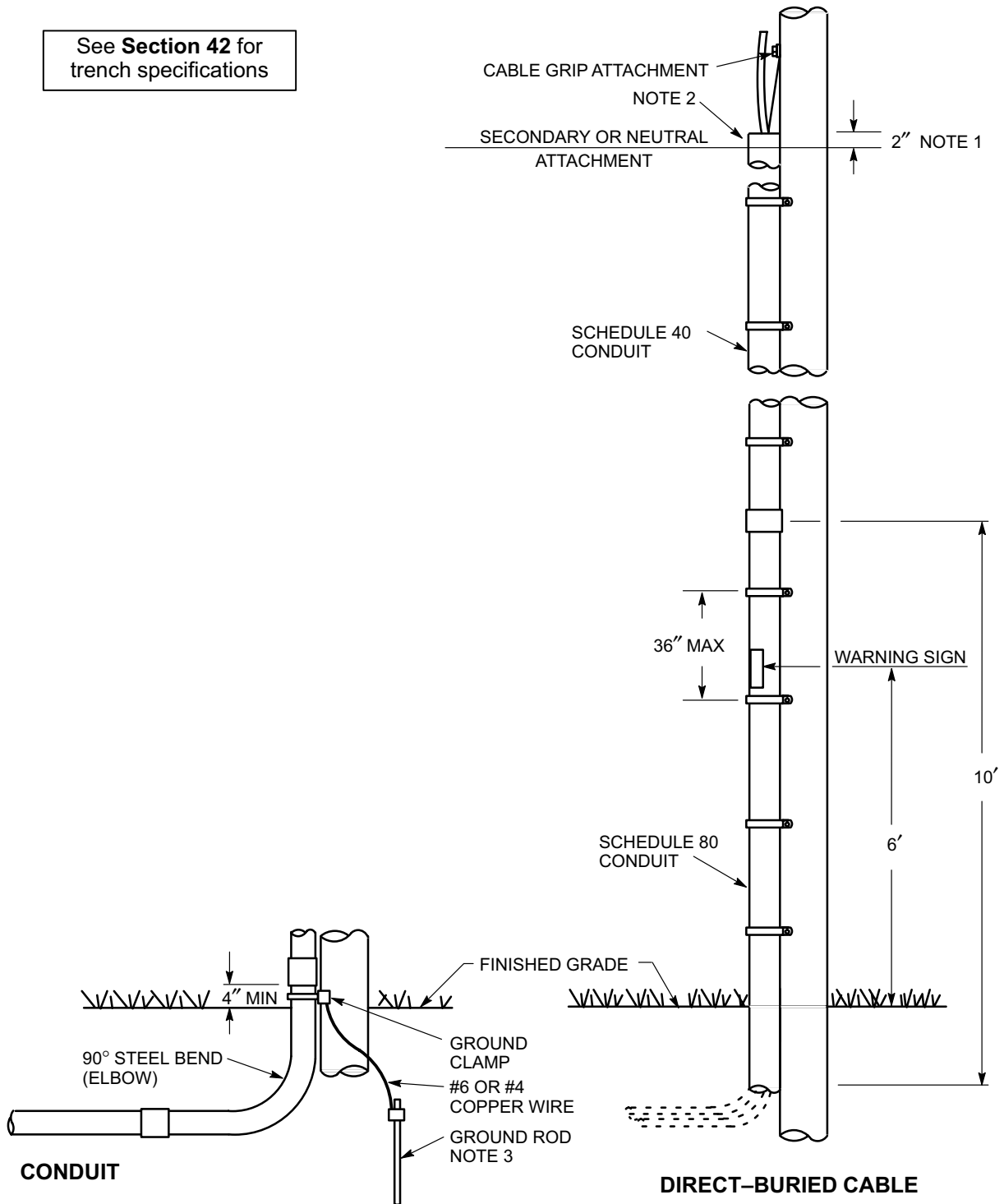
- b. Because of grounding requirements, each section of primary in conduit is limited to a maximum of 750 feet when other utilities are in the trench. When the electric utility is sole occupant in the trench, each section of primary in conduit is limited to a maximum length of 1700 feet. (Note: Length may be limited to 1000 feet if district utilizes 1000-foot emergency primary reel trailer.)
  - c. The Company reserves the right to limit runs where cable pulling forces exceed recommended maximums.
  4. **SECONDARIES and SERVICES** - The Company reserves the right to limit services in conduit which require a cable installation pulling force in excess of 2000 pounds.
    - a. Conduit for secondaries and services on private property shall be installed at a minimum depth of 24 inches below finished grade.
    - b. Secondaries or services in conduit, installed in the same trench as primaries or on public right-of-way, shall be at a minimum depth of 30 inches below finished grade.
    - c. A clearance zone of 4' wide x 3' deep x 6' high is required at the customer end of the service. Keep shrubs, debris, fences, and other structures clear of this area. (Refer to sketch at right.)
  5. **GROUNDING** - Primaries shall be grounded at all handholes, structures and enclosures.
    - a. The grounding interval for primaries in the trench with other utilities shall be not less than eight per mile.
    - b. For primaries with sole occupancy in the trench, the grounding interval shall be not less than four per mile.
  6. **OTHER UTILITIES** - Conduit, terminal enclosures, or structures belonging to other utilities shall be located such as to not interfere with electrical installations nor impede the operation and maintenance of electrical facilities.
    - a. The acceptable zone for installation of above-ground facilities belonging to other utilities is as shown below.
- 



- b. No shrubs, fences, or permanent structures can be placed within 10 feet of the front and 3 feet of the sides and back of pad-mounted transformers. The Company has the right to remove these obstructions without notice to the owner. For additional clearances see **DTR 42.047** and **DTR 42.061**.



See **Section 42** for  
trench specifications



#### Notes

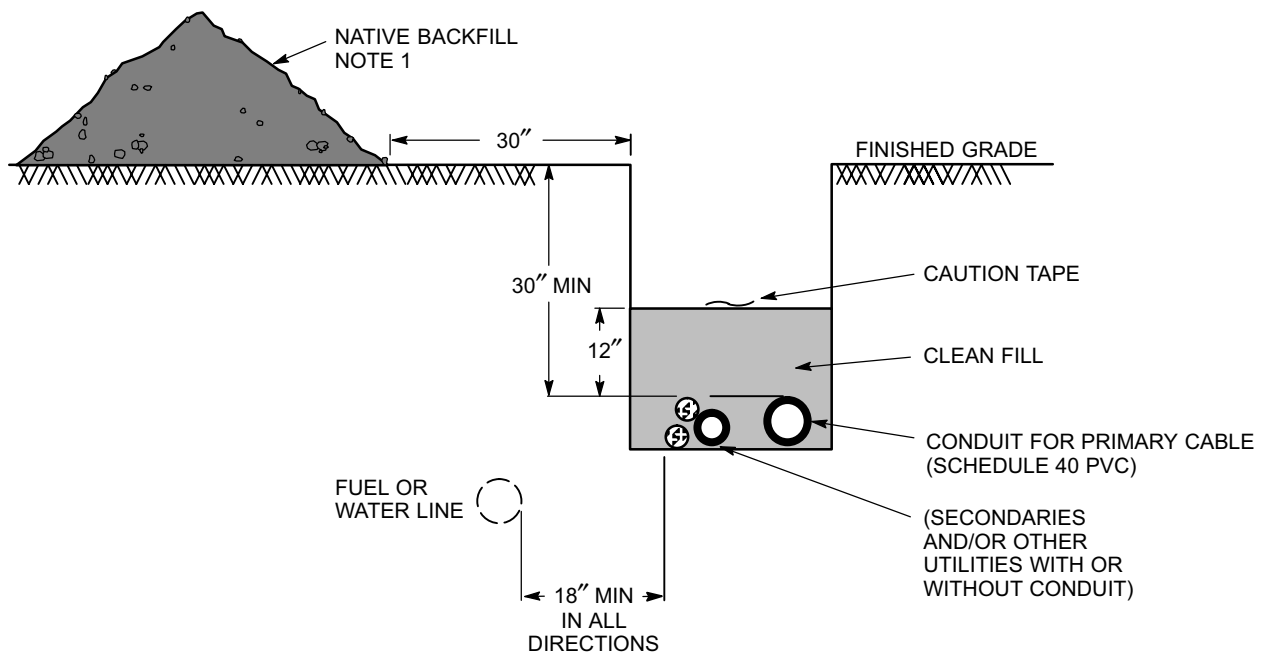
1. Top of conduit to extend at least 2 inches above the neutral/secondary attachment.
2. Seal the conduit from water entry at top of the riser for services installed in the conduit for the entire run. See **DTR 12.010**.
3. Steel conduit must be grounded. If the steel elbow is installed in a nonmetallic conduit installation, it must also be grounded. Use 5/8" x 8' galvanized steel ground rod.

ORIGINAL	<b>SECONDARY AND SERVICE RISERS – 600 VOLT CABLE</b>			
11/23/76				
APPROVED				
11/2/99				
	NORTHEAST UTILITIES	CONSTRUCTION STANDARD	DTR 12.057	6

**SCOPE** – All direct-buried primary cables shall be of the jacketed type. The cables may be random-laid with the secondaries and other utilities under certain conditions, detailed in **DTR 44.101**.

**INSTALLATION IN TRENCH** – All direct-buried cables shall be installed at a depth of at least 30 inches in the following order:

1. Ensure that the bottom of the trench is well-tamped and free of rocks.
2. Install the conduit, gluing all couplings.
3. Install secondaries and other utility cables or conduits in the trench.
4. Backfill with 12 inches clean fill not to contain stones larger than 2 inches in maximum diameter.
5. Install cable warning tape 12 inches over the conduit.
6. Fill in the remainder of the trench with native backfill.
7. Install pull line, including 10 feet of slack, and secure to conduit plug at each end of conduit run.



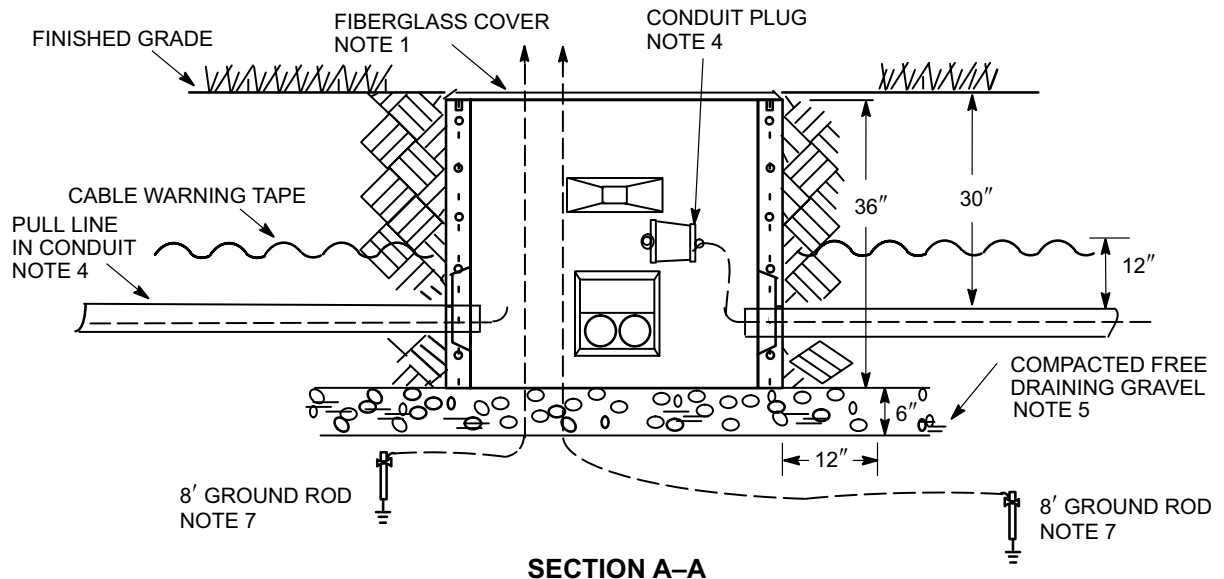
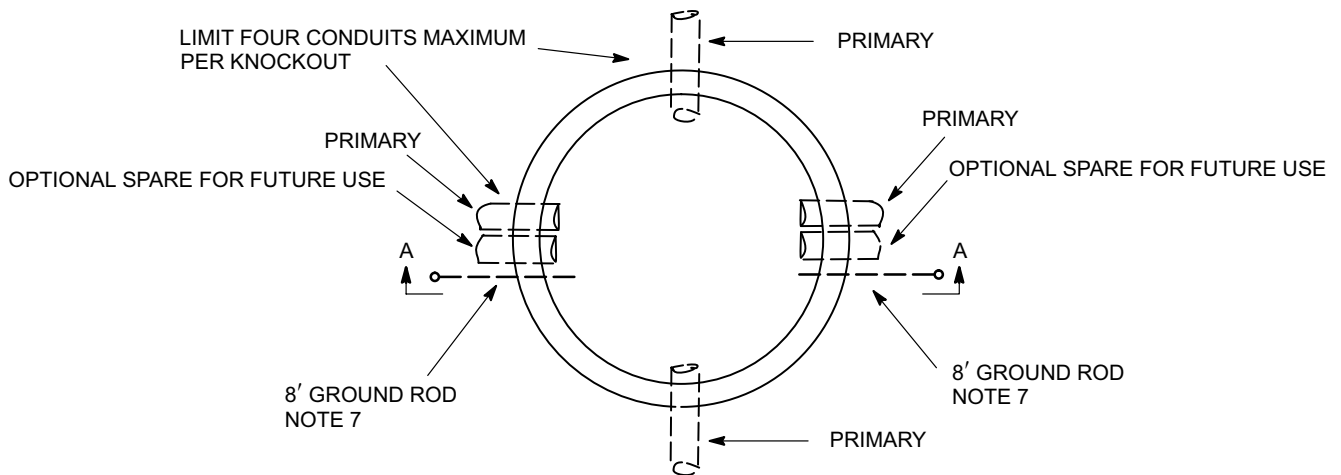
**CROSS SECTION OF JOINT TRENCH**

**Notes**

1. The trench shall be backfilled immediately following placement of the conduit.
2. 1/4-inch-diameter nylon pull line and plastic conduit plugs to be supplied and installed by contractor.

ORIGINAL	<b>SINGLE-PHASE PRIMARY CABLE INSTALLATION</b>				CT/MA
6/24/98					
APPROVED	<b>DIRECT-BURIED – IN CONDUIT</b>				
12/18/00					
	NORTHEAST UTILITIES	CONSTRUCTION STANDARD	DTR 50.103	3	



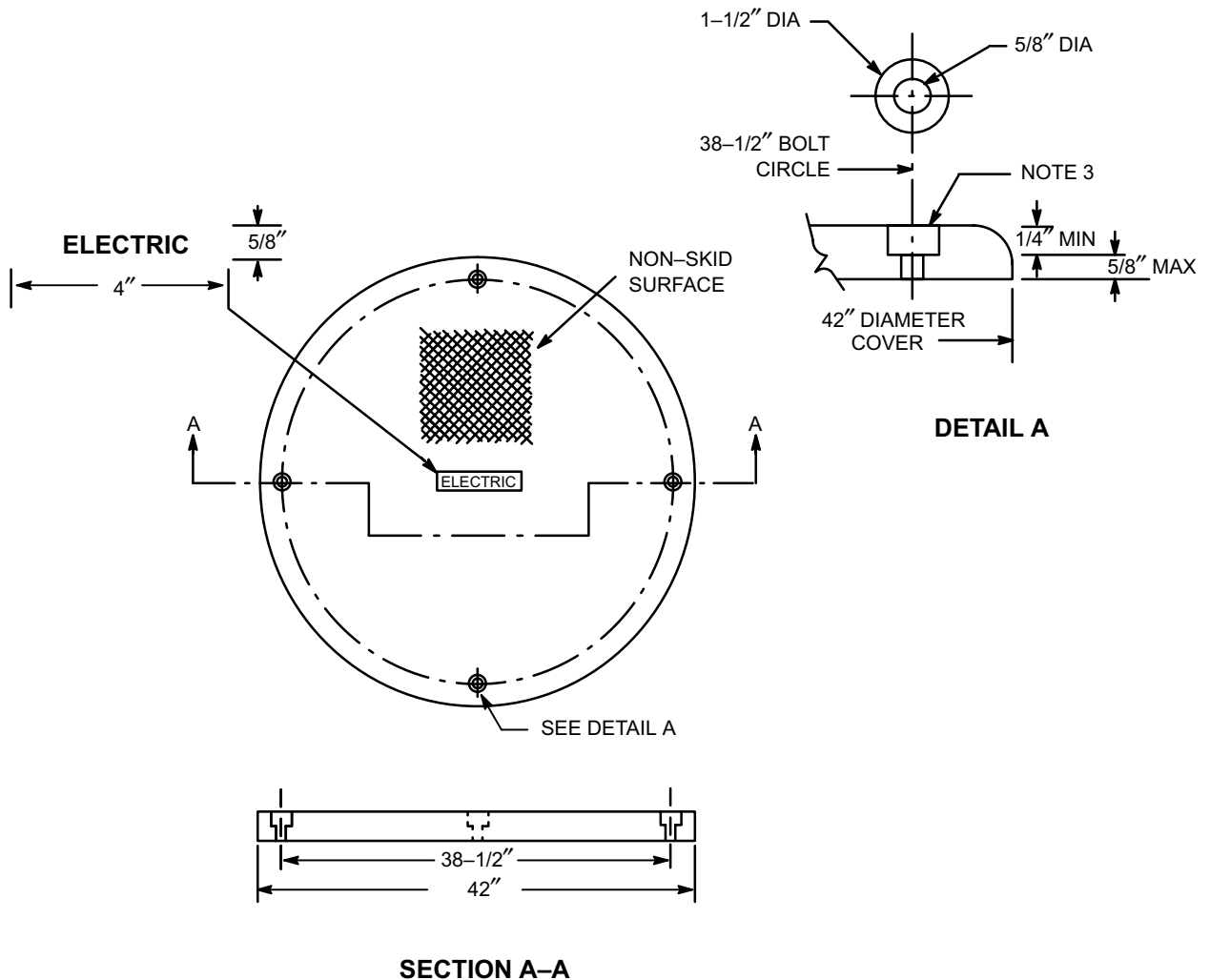


SECTION A-A

**Notes**

1. Install 36" D x 36" H round handhole, **SPC H-020**, and fiberglass cover, **SPC C-710**.
2. Install conduit, with all joints cemented, through knockout to 4 inches inside handhole. Terminate conduit run with end bell (e.g., **SC 0177110** for 3-inch diameter). Conduit destination to be permanently marked on conduit end. Conduit shall be minimum 3-inch-diameter, Schedule 40 PVC. Limit four 4-inch-diameter conduits per knockout.
3. Gaps around conduit at knockout openings shall be sealed with cement mortar to prevent backfill from entering handhole.
4. Install a 1/4-inch-diameter nylon pull line in each duct, including 10 feet of slack, and secure to conduit plug (e.g., **SC 0175141** for 3-inch diameter). Plugged conduit to be left accessible.
5. Install on virgin or well tamped gravel. Where poor soil exists, remove to 6 inches below bottom of handhole and backfill with compacted clean gravel, free of foreign matter and debris, and extending 12 inches past edge of structure. Remaining backfill shall not contain ashes, frozen material, debris or stones larger than 2 inches in maximum dimension.
6. When installing cable, utilize pulling eyelets provided in handhole.
7. Galvanized steel ground rods to be installed in trench adjacent to handhole. See **DTR 56.221**.
8. For loadbreak junction connector installation, refer to **DTR 50.111** for pad-mounted or **DTR 50.269** for submersible.

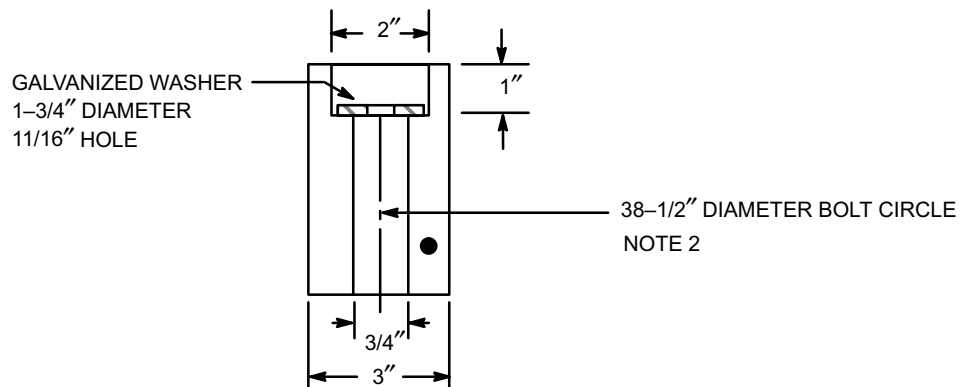
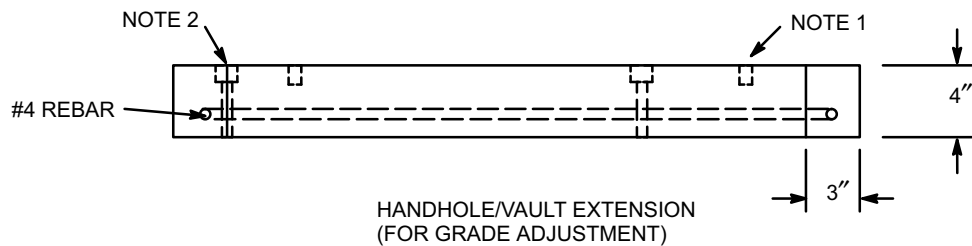
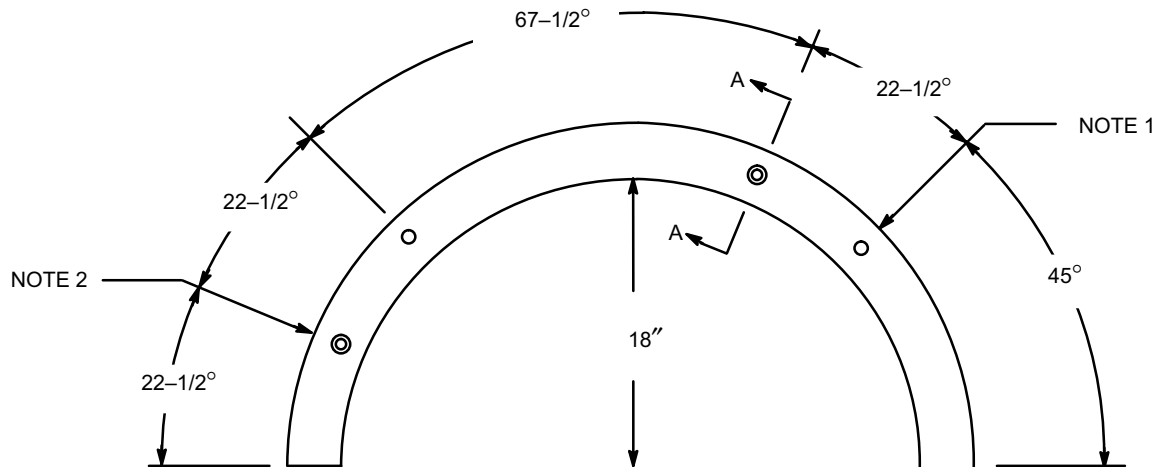
ORIGINAL	<b>DIRECT-BURIED IN CONDUIT – INSTALLATION OF HANDHOLE SINGLE-PHASE CABLE – LOADBREAK JUNCTION CONNECTOR</b>			
10/22/99				
APPROVED				
12/21/01	NORTHEAST UTILITIES	CONSTRUCTION STANDARD	DTR 50.107	2



#### Notes

1. Cover shall conform to ASTM D790.
2. DESIGN LOADING shall be 4,500 pounds applied at the center of the cover over a 6" X 6" area. The cover will be supported by a 36-inch ID ring. The total deflection of the cover shall not exceed 4 inches with load applied for 5 minutes.
3. Plywood core designs shall be encapsulated in a fiberglass-reinforced polyester laminate a minimum of 1/8 inch thick on all surfaces, consisting of a spray up of chopped glass and resin totaling 5 ounces per square foot of surface. The glass content will be a minimum of 25 percent on the top, and will be increased on the bottom if necessary to meet the design loading specified in NOTE 1. The plywood core will comply with the American Plywood Association Standard PS 1-1974, DFPA GRADE, GROUP 1, EXTERIOR C-C or better.
4. The cover shall be permanently embossed with both manufacturer's name and the word "ELECTRIC" as shown.
5. The resin and the gel coat will be pigmented dark green, and there shall be no exposed glass on any surface.
6. A stainless steel or brass washer, 1-3/8 inch OD with a 5/8-inch hole, will be epoxied into the pentahead recess. There should be no exposed wood in the recess.

ORIGINAL	<b>COVER – HANDHOLE – HEXAGONS AND ROUND 42-INCH DIAMETER</b>			
5/13/86				
APPROVED				
6/14/97				
	NORTHEAST UTILITIES	MATERIAL SPECIFICATION	SPC C-710	3



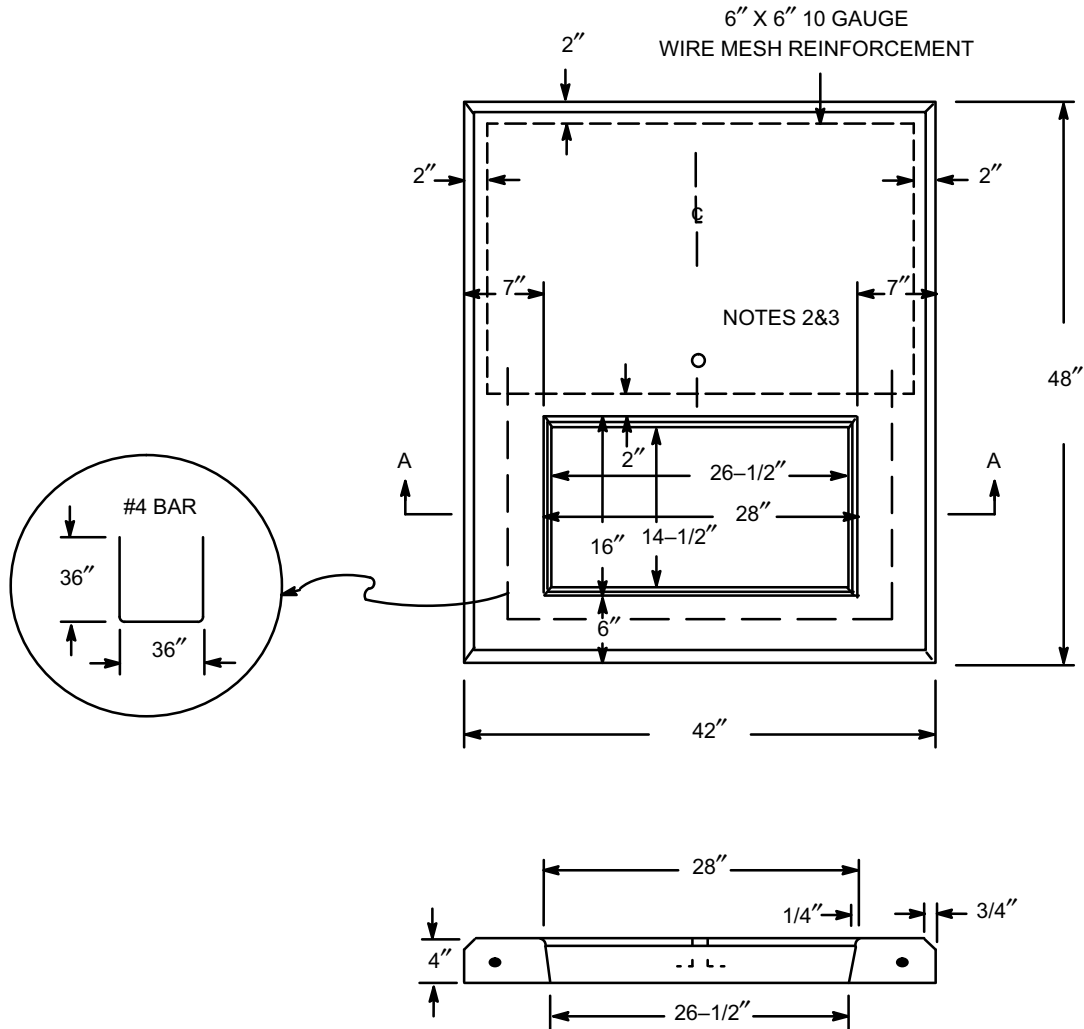
#### SECTION A-A

#### NOTES

1. Two zinc alloy iron inserts 3/8 inch – 16 x 1-1/2 inches on 38-1/2 inch bolt circle.
2. Two holes equally spaced on 38-1/2 inch bolt circle.
3. Final 28 day concrete strength 4000 psi.
4. Concrete and concrete design shall be in accordance with ACI 318-1986 latest revision thereof.
5. Manufacturer's identification and month/year when manufactured shall be legibly marked in/on concrete on the inner side.
6. Construction tolerances shall allow for the mating of two 180 degree segments, on NU SPC's H-020 and V-025, to achieve a 360 degree extension.

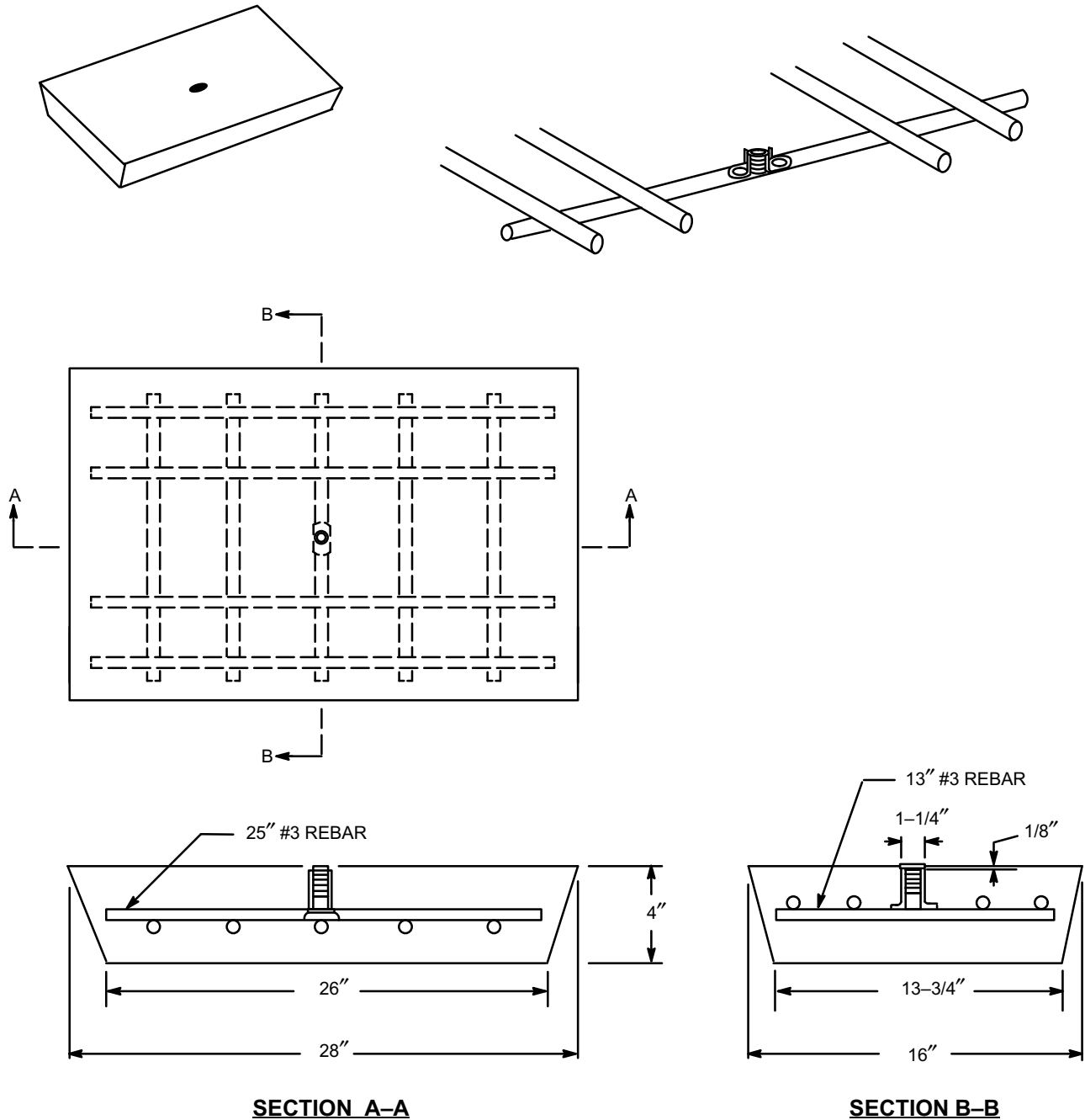
ORIGINAL	<b>EXTENSION – HANDHOLE/VAULT – PRECAST CONCRETE</b>			
8/5/70				
APPROVED	<b>180 DEGREE SEGMENT X 36" DIAMETER X 4" HIGH</b>			
6/1/91				
	NORTHEAST UTILITIES	MATERIAL SPECIFICATION	SPC E-953	8



**SECTION A-A****NOTES**

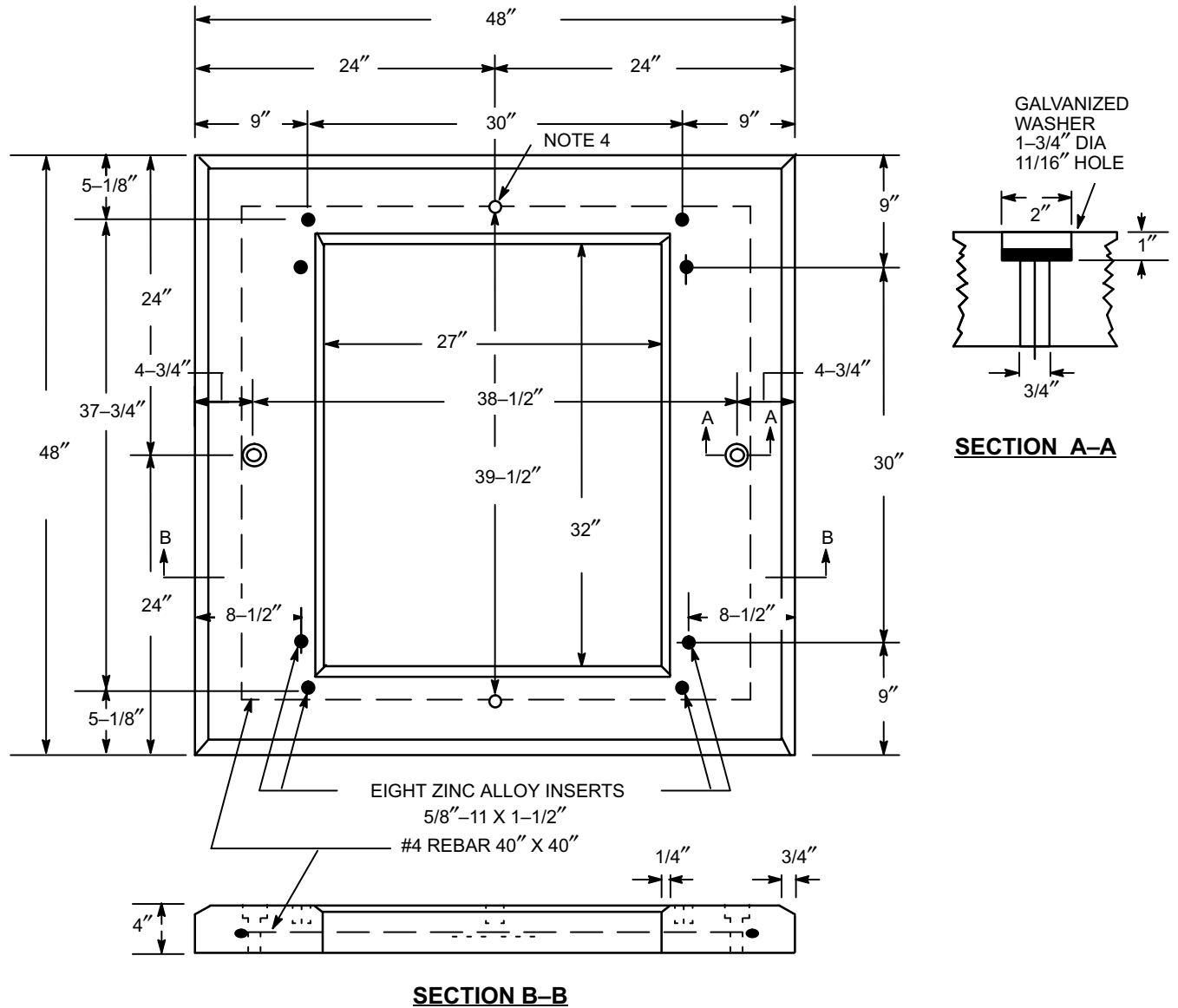
1. Final 28 day concrete strength to be 5000 psi.
2. A 3/4 inch coil loop insert (Dayton F63) with an insert locator plug (Dayton T21) for lifting the pad at the center of gravity with a swivel plate.
3. Manufacturer's identification and month/year when manufactured shall be legibly marked in/on concrete in the top near the center.
4. Concrete and concrete design shall be in accordance with ACI 318-1986.

ORIGINAL	<b>PAD – PRECAST CONCRETE – TRANSFORMER</b>			
4/23/70				
APPROVED	<b>167 KVA MAXIMUM – 42" X 48" X 4"</b>			
8/1/91				
	NORTHEAST UTILITIES	MATERIAL SPECIFICATION	SPC P-009	11

**NOTES**

1. Final 28 day concrete strength to be 3500 psi minimum.
2. A 3/4 inch coil loop insert (Dayton F-63) with an insert locator plug (Dayton T-21) for lifting the pad at the center of gravity with a swivel plate.
3. Threaded insert shall be plastic capped to stop dirt buildup.
4. Threaded inserts shall be greased on inside to prevent corrosion.
5. Manufacturer's name and month/year of construction shall be legibly marked in concrete on the bottom.

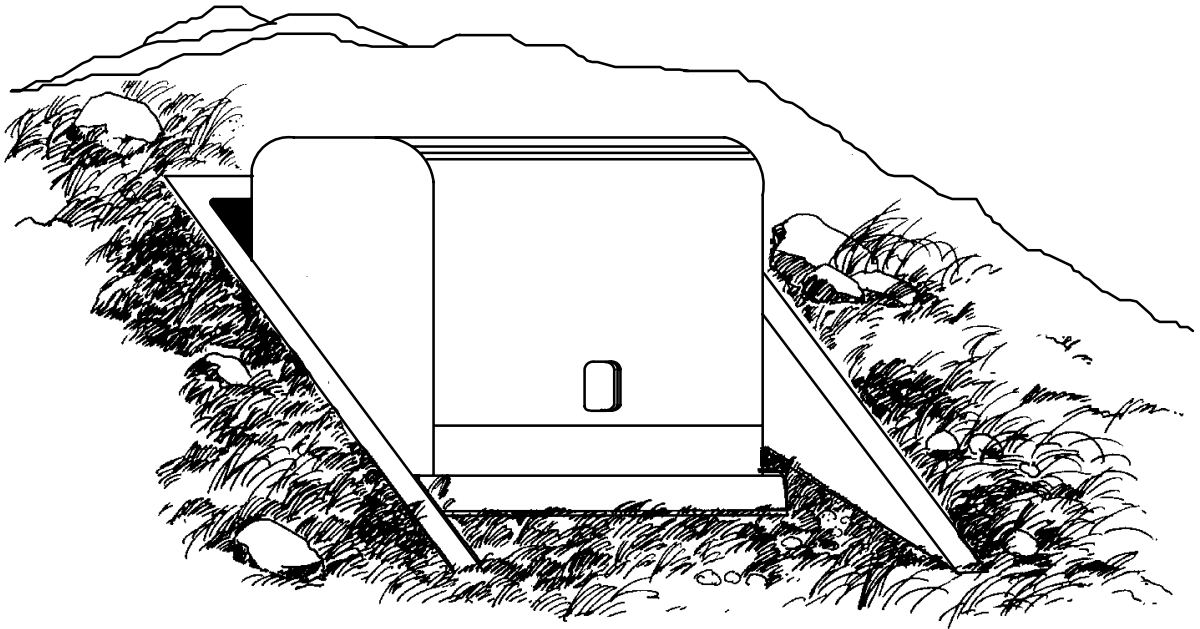
ORIGINAL	<b>PAD – PLUG – PRECAST CONCRETE – 16" X 28" X 4"</b> <b>FOR THE 42" X 48" X 4" PAD</b>			
5/13/86				
APPROVED				
8/1/91	NORTHEAST UTILITIES	MATERIAL SPECIFICATION	SPC P-010	2



#### NOTES

1. Final 28 day concrete strength to be 5000 psi.
2. Manufacturer's identification and month/year when manufactured shall be legibly marked in/on concrete in the top within 4 inches of the opening.
3. Concrete and concrete design shall be in accordance with ACI 318-1986.
4. Two 3/4 inch coil loop inserts (Dayton F63) with an insert locator plug (Dayton T21) for lifting the pad with a swivel plate.

ORIGINAL	<b>PAD – ENCLOSURE – PRECAST CONCRETE</b>			
2/17/76				
APPROVED	<b>48" X 48" X 4"</b>			
11/1/94				
	NORTHEAST UTILITIES	MATERIAL SPECIFICATION	SPC P-017	9

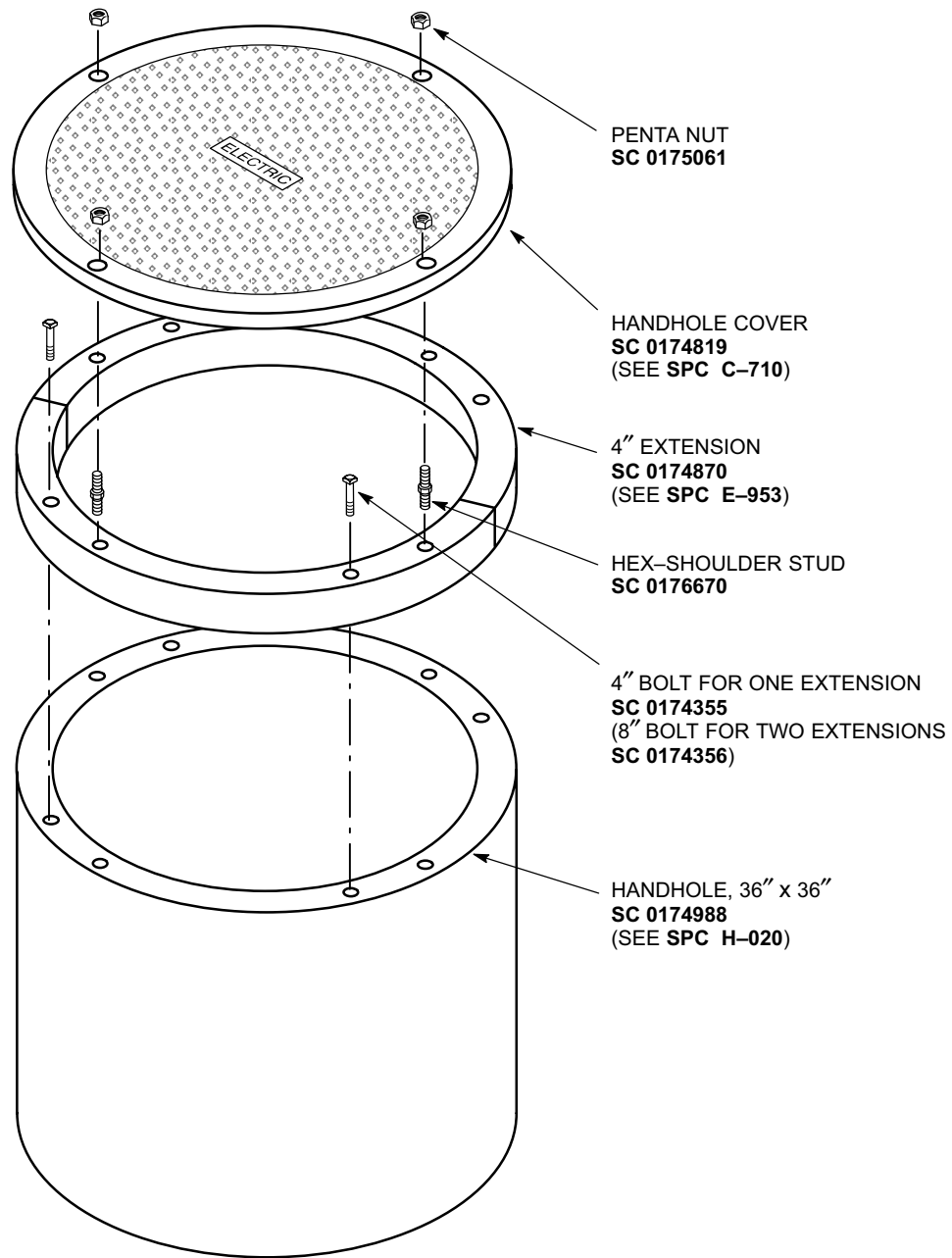


#### Notes

1. Use with any single-phase pad-mounted or submersible transformer or single-phase switchgear.
2. Depending on steepness of the grade, select either 16- or 32-inch-high model.
3. Always place hill holder with the back toward the grade. Do not install with the side of the hill holder facing the grade; this product is not designed to support side loads.
4. Make sure that 2-inch flange is properly secured with an adequate amount of soil to prevent the hill holder from being removed or vandalized.

ORIGINAL	<b>HILL HOLDER – DIRECT-BURIED SYSTEM</b>			
6/22/90				
APPROVED				
11/2/99				
	NORTHEAST UTILITIES	CONSTRUCTION STANDARD	DTR 50.341	2

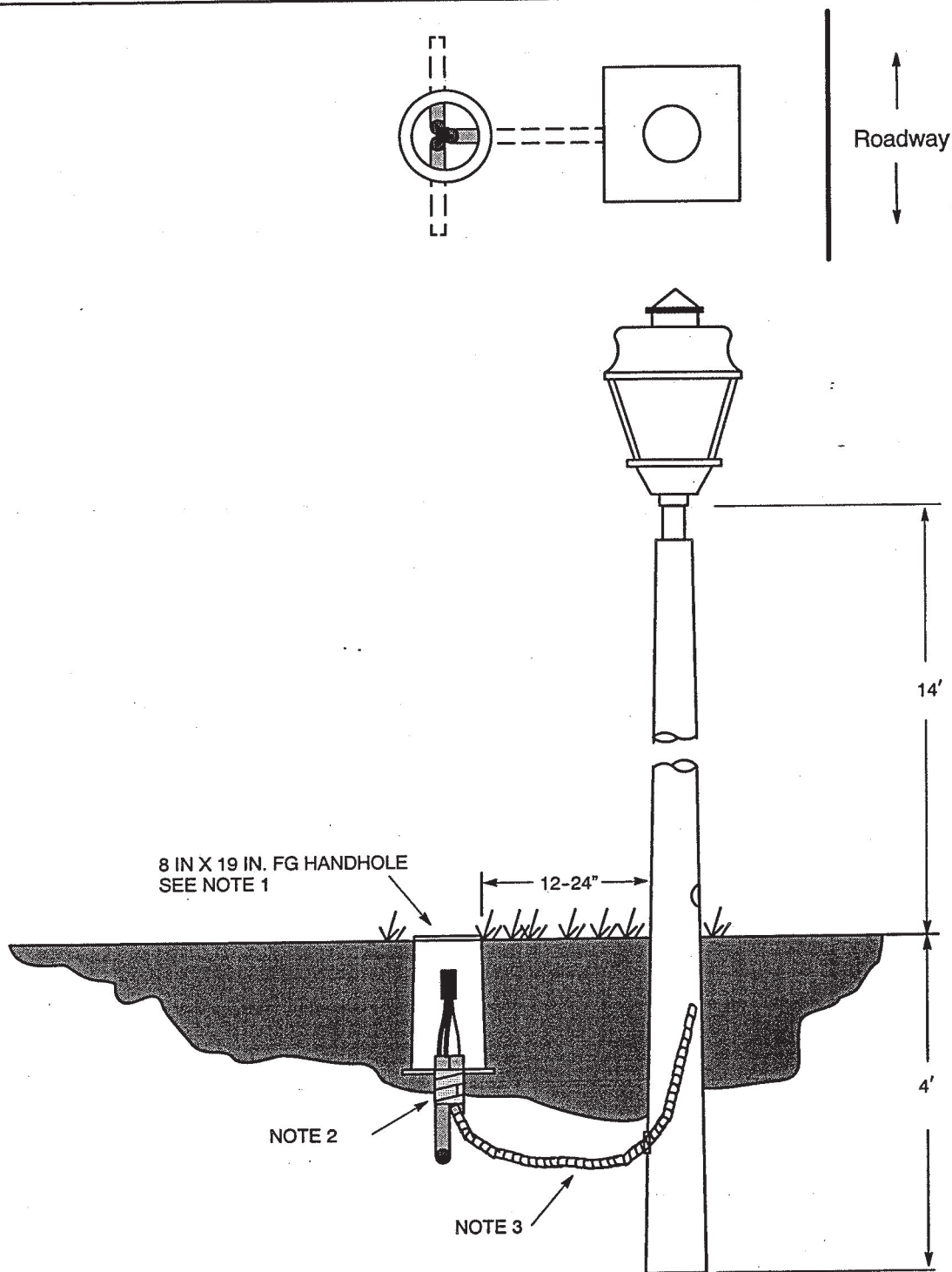




#### Notes

1. Fiberglass cover – Install stud with 1–1/4–inch end down and 1–inch end up.
2. Use extensions for grade adjustments only.
3. Use stud and penta nut with fiberglass cover.

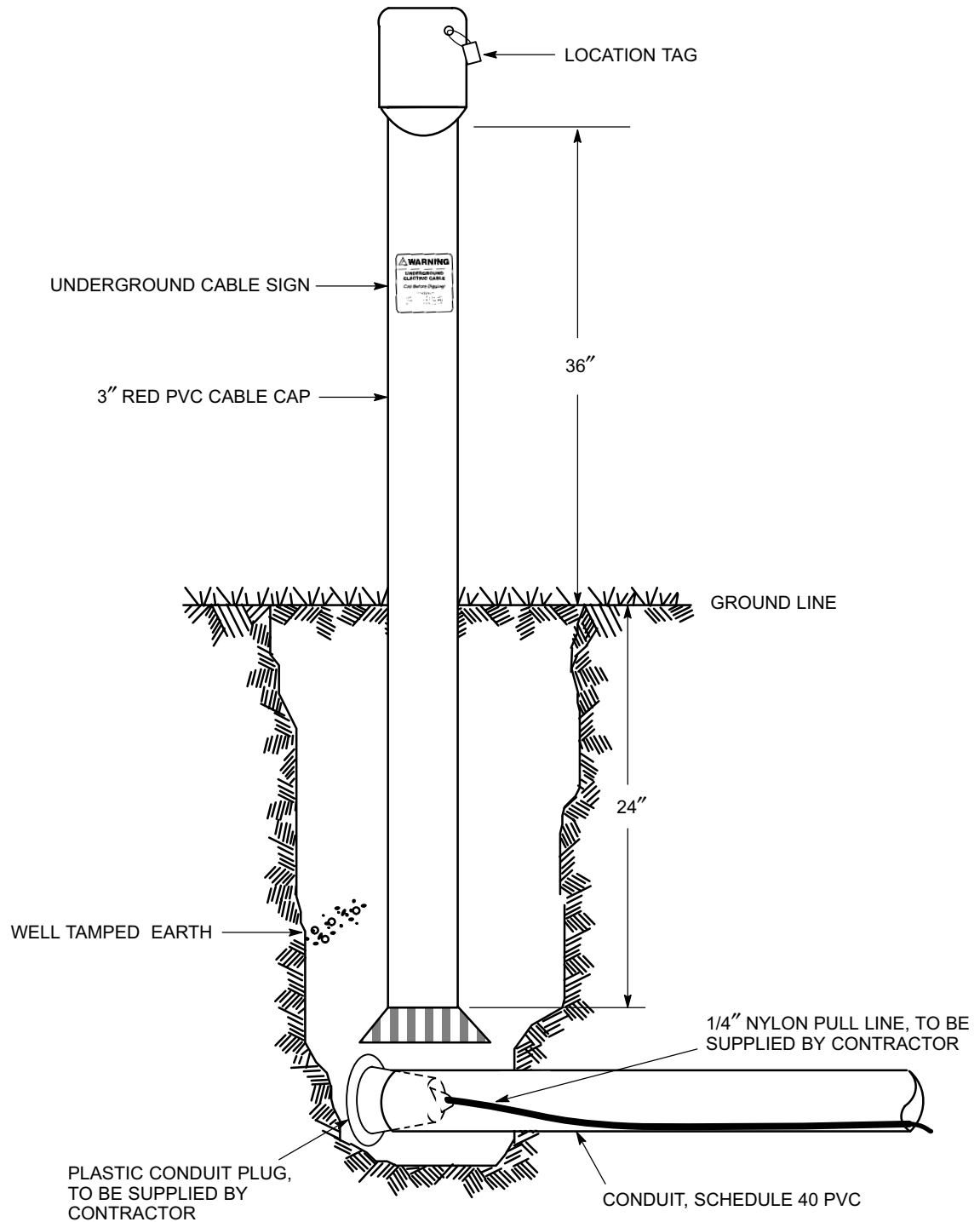
ORIGINAL	<b>COVER AND GRADE EXTENSIONS ROUND HANDHOLE</b>			
5/25/88				
APPROVED				
12/18/00				
	NORTHEAST UTILITIES	CONSTRUCTION STANDARD	DTR 50.401	5



#### Notes

1. Fiberglass handhole, SC 0174953, shall be on field side of pole set flush with ground.
2. Secure 90 degree bends and end of flexible conduit together with duct tape. Top of conduits shall extend no more than 6 inches up into enclosure. Install 1/4-inch pull rope with tags identifying conduit destination.
3. Install flexible non-metallic conduit, 1-1/4" maximum O.D., and extend up into pole for streetlight conductors. Install 1/4 pull rope from handhole to top of pole.

ORIGINAL	<b>STREET LIGHT HANDHOLE CONDUIT SYSTEM</b>			
6/5/02				
APPROVED				
	NORTHEAST UTILITIES	CONSTRUCTION STANDARD	NU 5835	



#### Notes

1. Install temporary deadend of direct-buried conduit at the property line where customer's service trench is to end if customer is not ready for service.
2. Remove PVC cable cap, extend conduit, and pull cable when service is extended to building.

ORIGINAL	<b>DIRECT-BURIED IN CONDUIT – SECONDARY AND SERVICE CABLE TEMPORARY DEADEND – 600 VOLTS AND BELOW</b>			
6/24/98				
APPROVED				
12/18/00	NORTHEAST UTILITIES	CONSTRUCTION STANDARD	DTR 54.118	2

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**GENERAL** – The 1997 edition of the National Electric Safety Code requires the installation of a separate bare conductor installed in direct contact with the earth and in close proximity to the jacketed primary conductors under certain random lay conditions. This conductor reduces touch potentials on communication cables to safe levels.

**1. Direct–Buried Primaries – Communications Direct Buried Or In Conduit**

- a. A bare grounded copper neutral conductor is required.
  - 1) For single phase – install in close proximity to the primary cable.
  - 2) For three phase – install in close proximity to the primary cable. Where a bare copper neutral conductor is part of the assembly, a separate conductor is not required.
- b. For those instances where short sections of conduit are installed, such as road crossings, as part of an overall direct–buried cable installation, the bare neutral conductor may be installed in the same conduit as the primary.

**2. Primaries In Conduit – Communications Direct Buried Or In Conduit**

- a. If communications are **direct buried**, a bare copper neutral conductor is required.
  - 1) For single phase – install outside the conduit but in close proximity to it.
  - 2) For three phase – install outside the conduit but in close proximity to it.
- b. If communications are **in conduit**, then no separate neutral conductor is required because deliberate separation is maintained.

**3. Primaries In Conduit Or Direct Buried – No Communications**

No bare neutral is required.

**Notes**

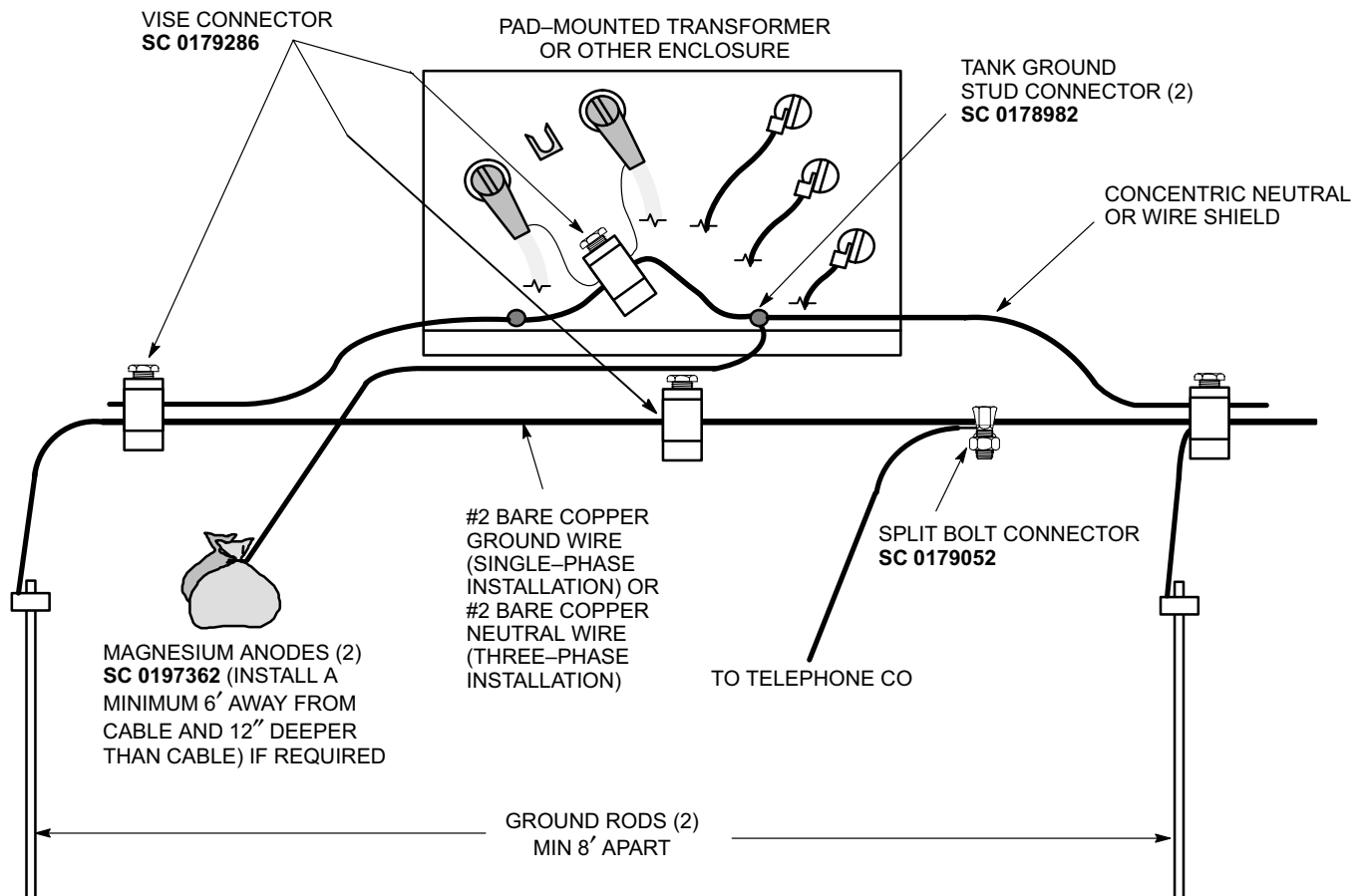
- 1. Random lay is defined as having less than 12 inches of separation between power and communication cables and at least one of the parties is direct buried.
- 2. At least four grounds per mile shall be installed as shown in **DTR 56.221**.
- 3. For primary cables through 500 kcmil, the bare neutral conductor shall be size #2. For 750 and 1000 kcmil cables, the bare neutral conductor shall be size 2/0.
- 4. Magnesium anodes are required for protection of bare copper wire and exposed neutral wire. See **DTR 56.221** for installation details.

ORIGINAL	<b>DIRECT–BURIED JACKETED PRIMARY CABLES RANDOM–LAY INSTALLATION REQUIREMENTS</b>			
7/17/91				
APPROVED				
10/24/97				
	NORTHEAST UTILITIES	DESIGN & APPLICATION STANDARD	<b>DTR 44.101</b>	<b>1</b>

**SCOPE** – Since concentric neutrals or wire shields of high-voltage jacketed cables are not in contact with the earth, other means must be employed to assure that a low-resistance grounding system is established. Therefore, all grounding shall be installed as shown in the diagram below.

**INSTALLATION** – All neutrals and bare wires shall be interconnected. The #2 bare copper ground wire and the concentric neutrals or wire shields shall be sleeved through with vise connectors except when bare wire is not required, as indicated in **DTR 44.101**. When bare wire is not required, attach the ground rods to the concentric neutral, wire shield, or tank ground stud connector.

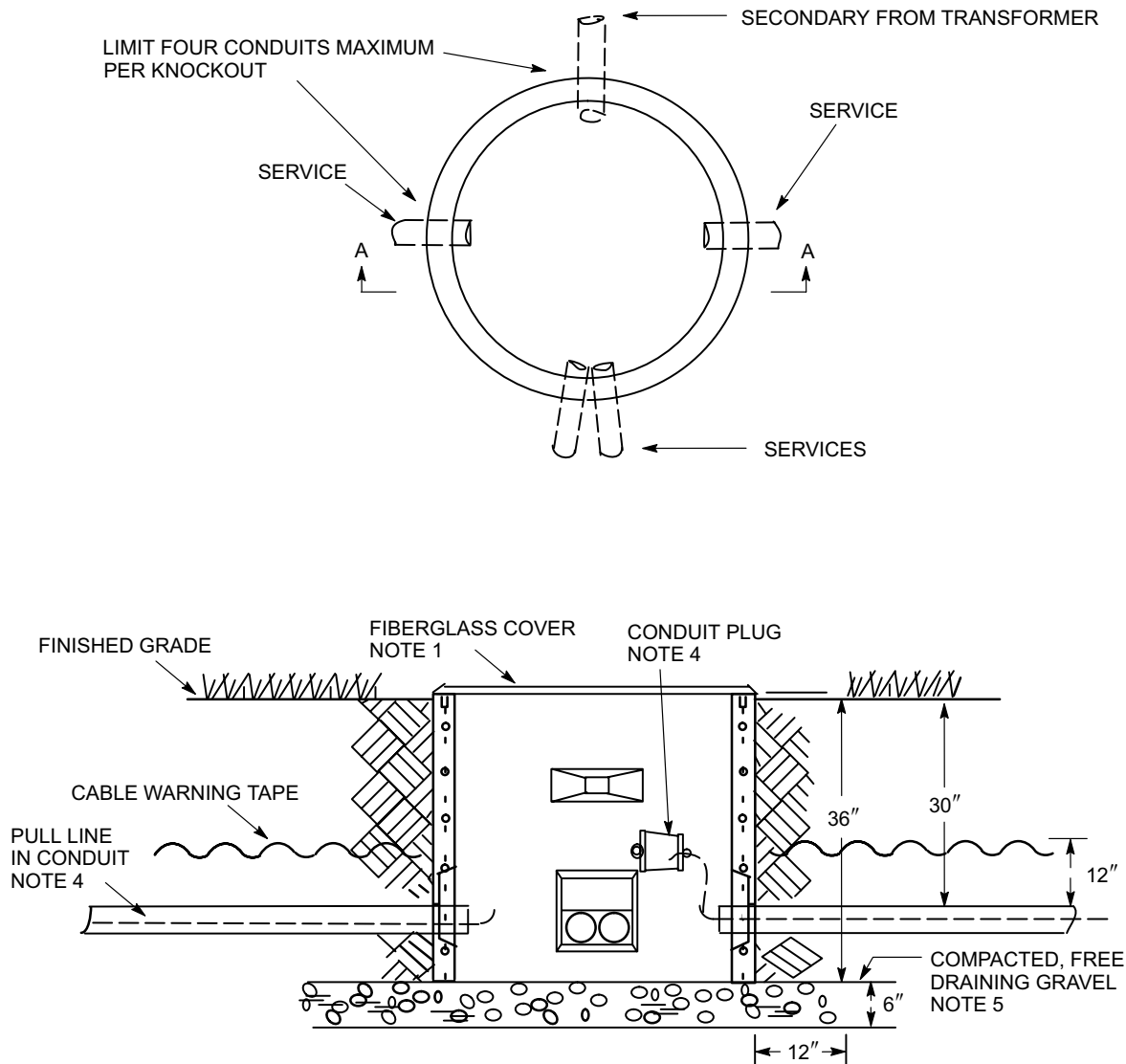
Magnesium anodes shall be installed for corrosion protection of the bare #2 copper ground wire and any exposed neutral wire. Two (2) Type H-1, 17-pound, magnesium bag anodes **SC 0197362** shall be installed at each transformer or switching enclosure, below-grade or pad-mounted, at a depth of no less than 42 inches, or 12 inches below the installed cable depth, and at least 6 feet away from the cable. To allow for ease of testing, the lead wire from each anode shall be connected to the system neutral by means of a connector at the low-voltage tank ground of pad-mounted transformers, and to the neutrals or ground wire in switching enclosures.



#### Notes

1. All ground connections to be #6 solid copper **SC 0177657**.
2. To facilitate testing of anode, connect anode lead wire to transformer secondary ground stud or to the bare #2 copper wire in the switching enclosure with a split bolt connector.
3. Galvanized steel ground rods are to be installed in the trench adjacent to the handhole. Do not install the ground rods in the handhole underneath the transformer.
4. Neutral and ground wire are to be crimped to prevent inadvertent opening.

ORIGINAL	<b>JACKETED PRIMARY CABLE – GROUNDING</b>				CT/MA
2/4/91					
APPROVED	NORTHEAST UTILITIES				CONSTRUCTION STANDARD
11/2/99					
	DTR 56.221		6		

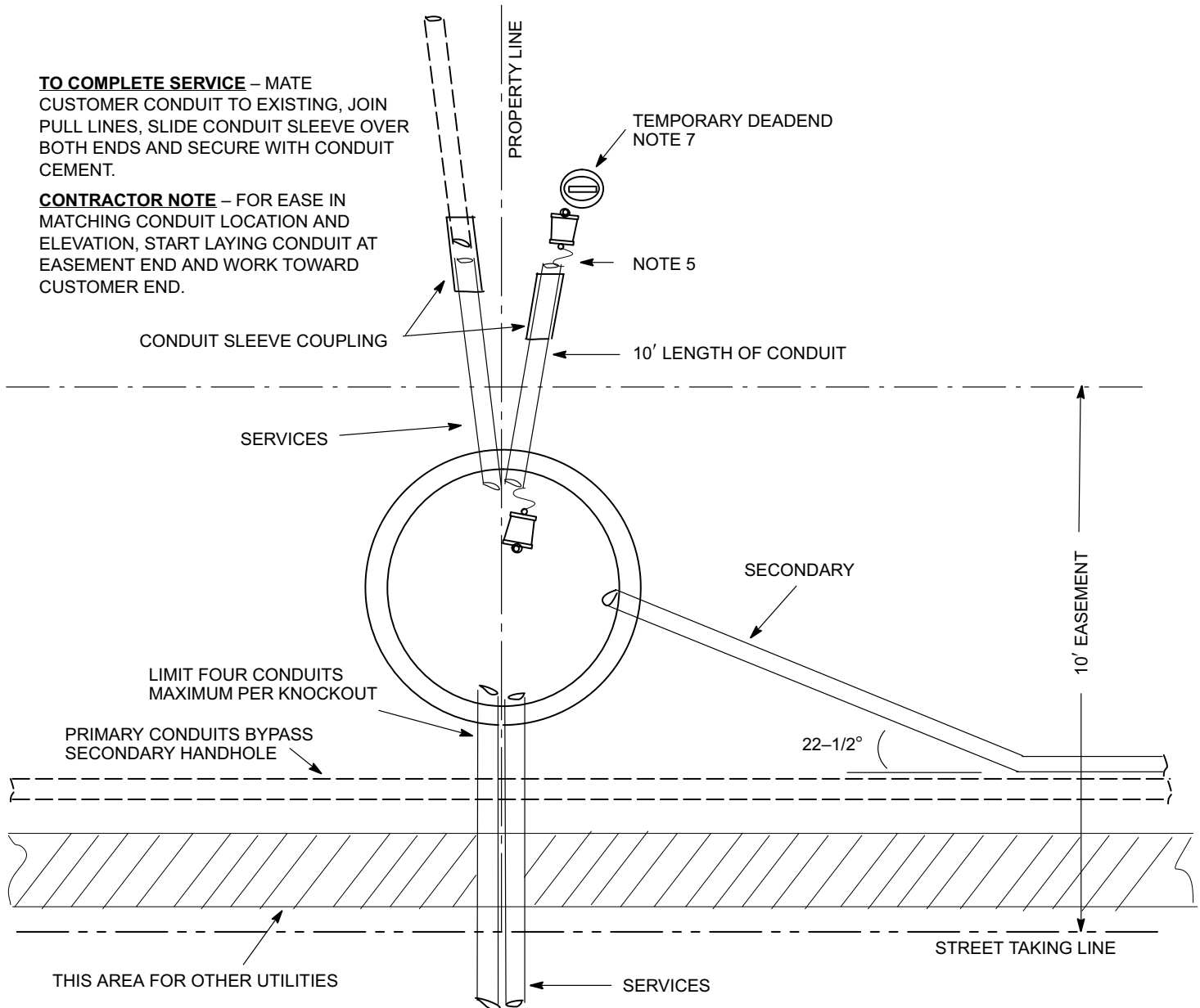


SECTION A-A

**Notes**

1. Install 36" D x 36" H round handhole, **SPC H-020**, and fiberglass cover, **SPC C-710**.
2. Install conduit, with all joints cemented, through knockout to 4 inches inside handhole. Terminate conduit run with end bell (e.g., **SC 0177110** for 3-inch diameter). Conduit destination to be permanently marked on conduit end. Conduit shall be minimum 3-inch-diameter, Schedule 40 PVC. Limit four 4-inch-diameter conduits per knockout.
3. Gaps around conduit at knockout openings shall be sealed with cement mortar to prevent backfill from entering handhole.
4. Install 1/4-inch-diameter nylon pull line in each duct, including 10 feet of slack, and secure to conduit plug (e.g., **SC 0175141** for 3-inch diameter). Plugged conduit to be left accessible.
5. Install on virgin or well tamped gravel. Where poor soil exists, remove to 6 inches below bottom of handhole and backfill with compacted clean gravel, free of foreign matter and debris, and extending 12 inches past edge of structure. Remaining backfill shall not contain ashes, frozen material, debris or stones larger than 2 inches in maximum dimension.
6. When installing cable, utilize pulling eyelets provided in handhole.
7. Refer to **DTR 54.203** for details on conduit stubs.

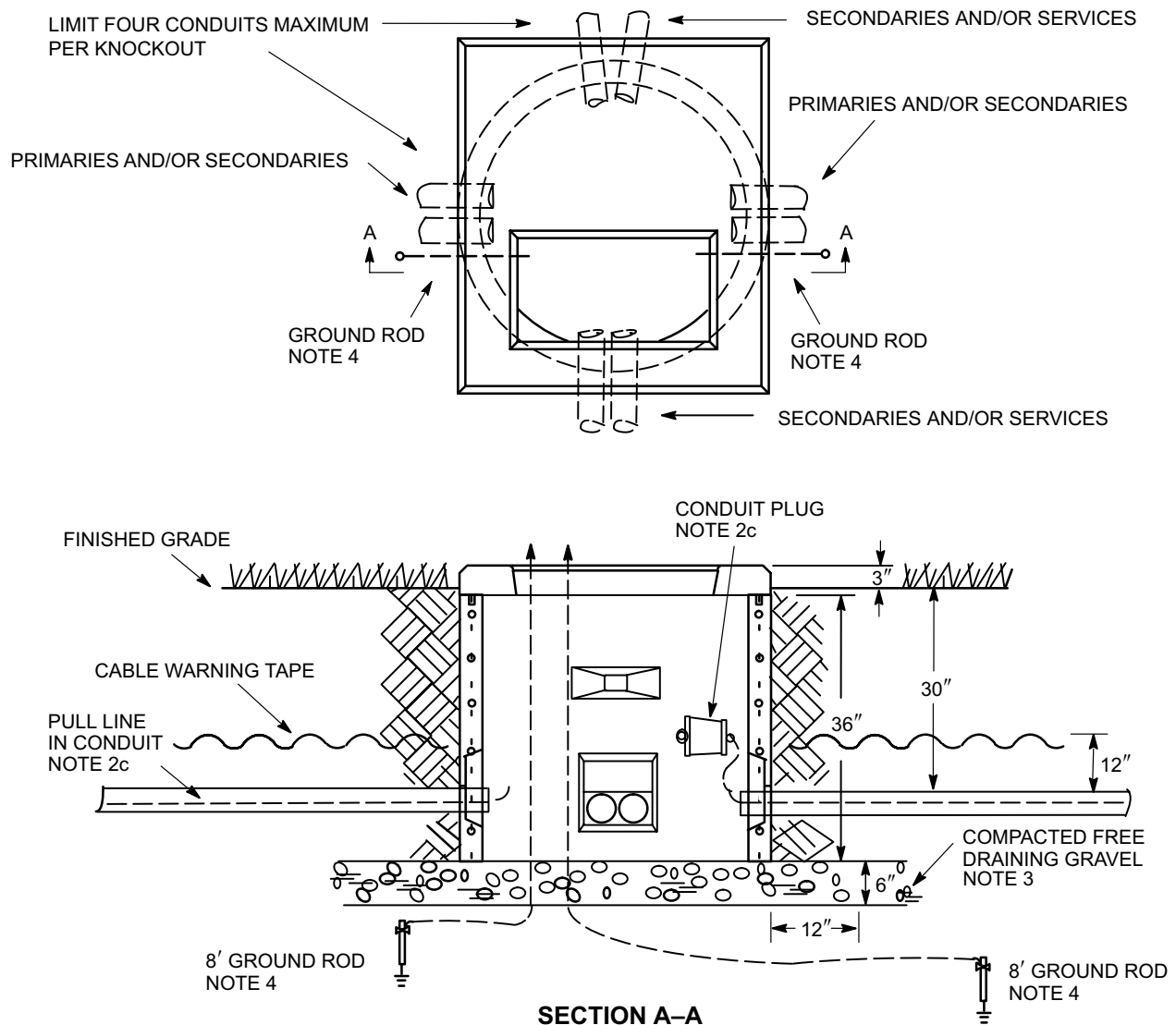
ORIGINAL	<b>DIRECT-BURIED IN CONDUIT – HANDHOLE ACROSS STREET</b>			
10/22/99				
APPROVED	<b>SINGLE-PHASE CABLE – SECONDARY/SERVICE</b>			
12/21/01				
	NORTHEAST UTILITIES	CONSTRUCTION STANDARD	DTR 54.201	2



### Notes

1. Install 36" D x 36" H round handhole **SPC H-020, SC 0174988**, and fiberglass cover **SPC C-710, SC 0174819**.
2. Install on virgin or well tamped gravel. Where poor soil exists, remove to 6 inches below bottom of handhole and backfill with compacted clean gravel, free of foreign matter and debris, and extending 12 inches past edge of structure.
3. Install conduit, with all joints cemented, through knockout to 4 inches inside handhole. Conduit destination to be permanently marked on conduit end. Conduit shall be minimum 3-inch-diameter, Schedule 40 PVC. Limit four 4-inch-diameter conduits per knockout.
4. Gaps around conduit at knockout openings shall be sealed with cement mortar to prevent backfill from entering handhole.
5. Install a 1/4-inch-diameter nylon pull line in each duct, including 10 feet of slack, and secure to conduit plug (e.g., **SC 0175141** for 3-inch diameter). Plugged conduit to be left accessible.
6. When installing cable, utilize pulling eyelets provided in handhole.
7. Refer to **DTR 54.118** for details on installation of temporary deadend.

ORIGINAL	<b>DIRECT-BURIED IN CONDUIT – INSTALLATION OF HANDHOLE 600 VOLTS AND BELOW – SINGLE-PHASE – SECONDARY/SERVICE</b>			
10/22/99				
APPROVED				
12/21/01				
	NORTHEAST UTILITIES	CONSTRUCTION STANDARD	DTR 54.203	2

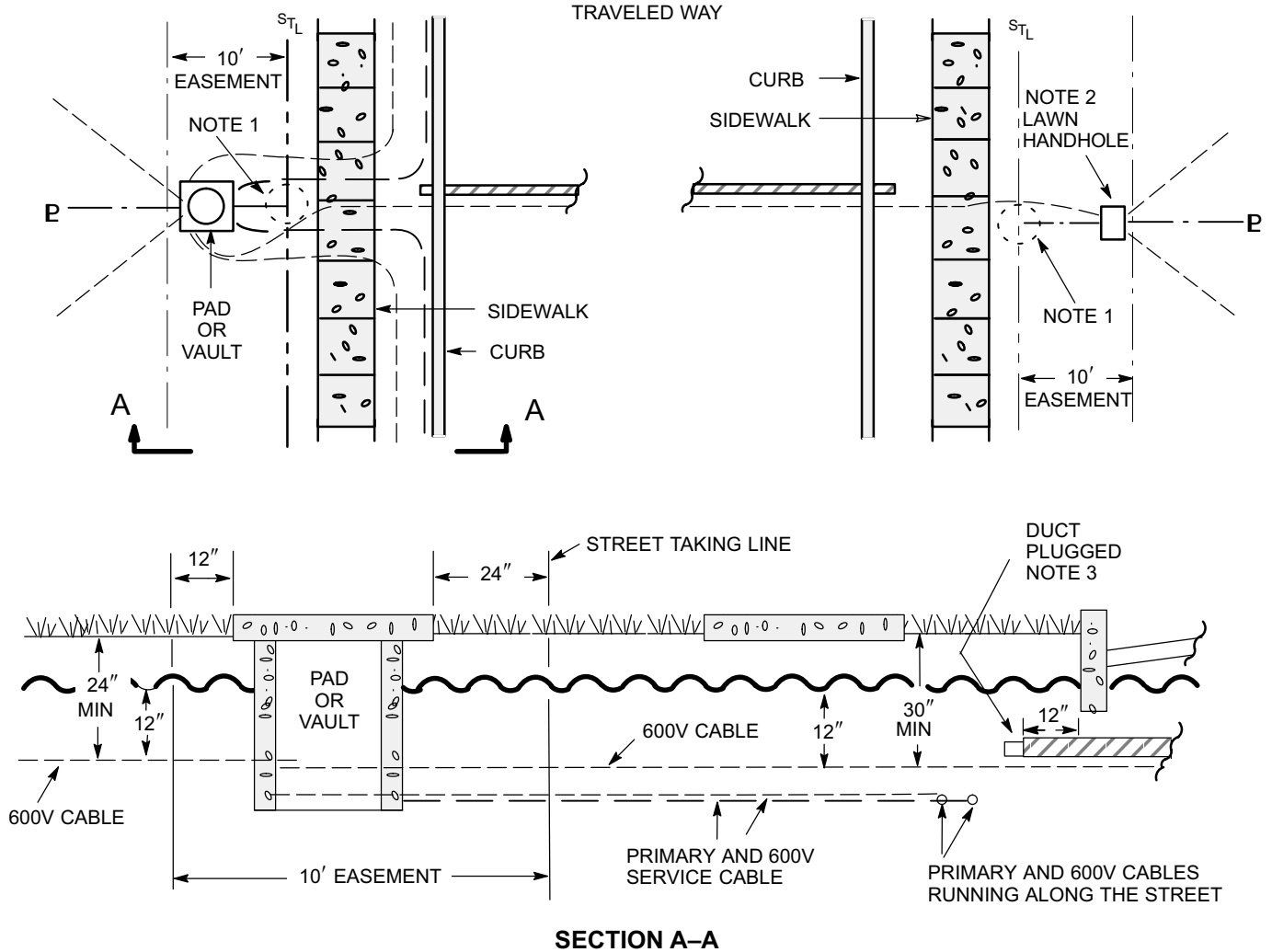


### Notes

1. Install 42" x 48" x 4" pad, **SPC P-009** and 36" D x 36" H round handhole, **SPC H-020**.
2. Install conduit, with all joints cemented, through knockout to 4 inches inside handhole. Terminate conduit run with end bell (e.g., **SC 0177110** for 3-inch diameter). Conduit destination to be permanently marked on conduit end. Conduit shall be minimum 3-inch-diameter, Schedule 40 PVC. Limit four 4-inch-diameter conduits per knockout.
  - a. Primaries and secondaries in conduit to be installed at 30 inches below grade.
  - b. Services in conduit to be installed at 24 inches below grade.
  - c. Install a 1/4-inch-diameter nylon pull line in each duct, including 10 feet of slack, and secure to conduit plug (e.g., **SC 0175141** for 3-inch-diameter). Plugged duct to be left accessible.
  - d. Gaps around conduit at knockout openings shall be sealed with cement mortar to prevent backfill from entering handhole.
3. Install on virgin or well tamped gravel. Where poor soil exists, excavate to 6 inches below bottom of handhole and backfill with compacted clean gravel, free of foreign matter and debris, extending 12 inches past edge of structure. Remaining backfill shall not contain ashes, frozen material, debris, or stones larger than 2 inches in maximum dimension.
4. Galvanized steel ground rods to be installed in trench adjacent to handhole. See **DTR 56.221**.
5. Refer to **DTR 58.107** for transformer connections.
6. Refer to **DTR 54.203** for details on conduit stubs.

ORIGINAL	<b>DIRECT-BURIED IN CONDUIT – INSTALLATION OF CONCRETE PAD FOR SINGLE-PHASE PAD-MOUNTED TRANSFORMERS</b>			
10/22/99				
APPROVED				
12/21/01				
NORTHEAST UTILITIES		CONSTRUCTION STANDARD		DTR 58.185
				2

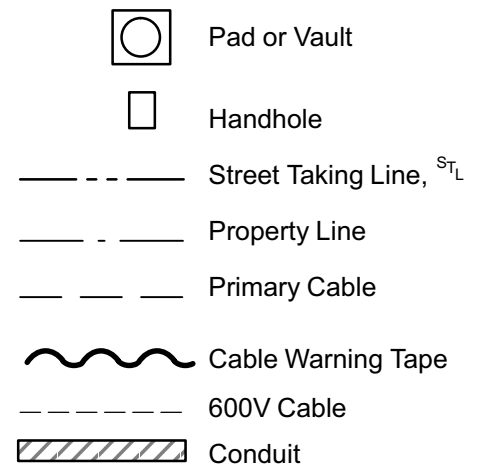




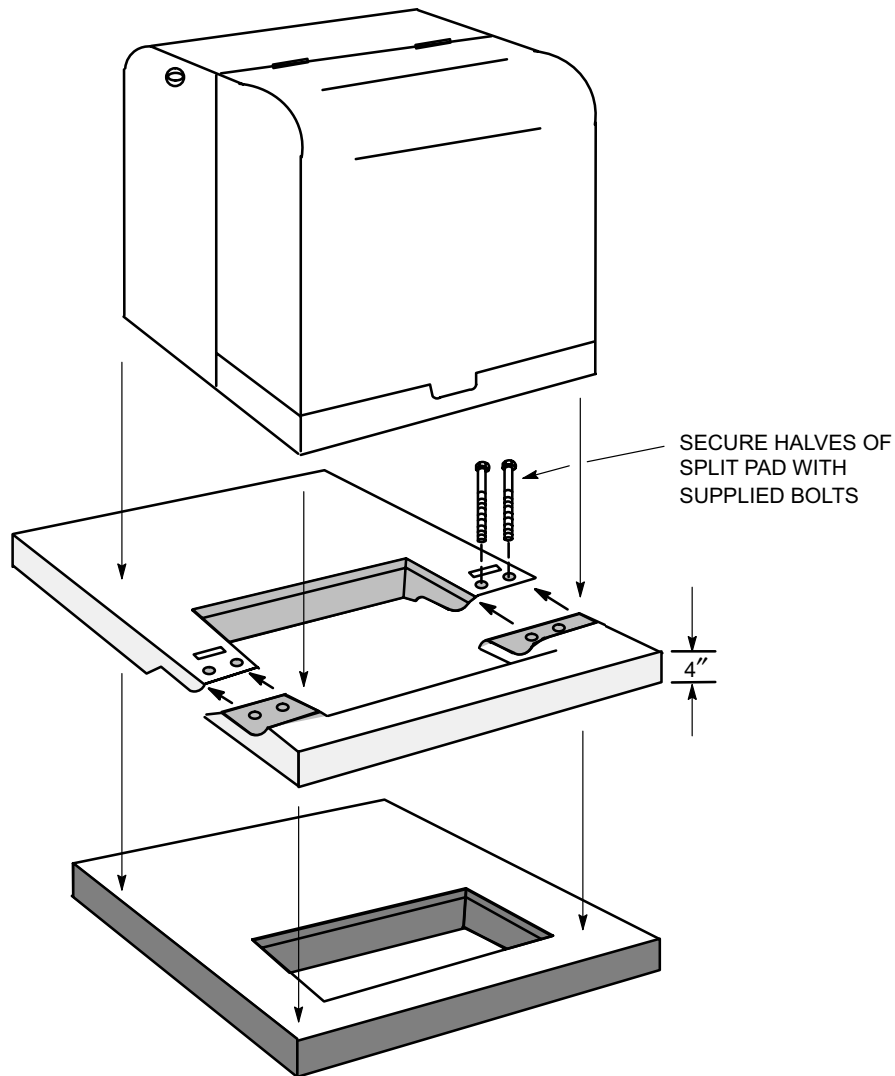
#### Notes

1. Maintain minimum clearance of 18 inches (24 inches preferred space for boundary marker placement) at the intersection of Street Taking Line and Property Line.
2. The preferred location for the handhole is on the property line near field side of easement area.
3. On original installation in areas subjected to vehicular traffic (except for residential driveways) direct bury all cable at a minimum depth of 30 inches. Also place an empty PVC conduit plugged at both ends in the same trench with the cable. Conduit to be used in event of cable failure. If trench must be closed before cable can be installed, bury conduit and pull cable into conduit at a later time.
4. Cable warning tape shall be installed 12 inches above a buried facility.
5. Location of facilities may be varied to accommodate major variations in terrain.
6. Where environmental issues exist, refer to **DSEM Section 06.32**.

#### LEGEND



ORIGINAL	<b>DIRECT-BURIED RESIDENTIAL DISTRIBUTION CONSTRUCTION TYPICAL LAYOUT</b>			
9/17/70				
APPROVED				
1/25/02				
	NORTHEAST UTILITIES	DESIGN & APPLICATION STANDARD	<b>DTR 42.031</b>	<b>11</b>



#### Notes

1. Make sure that there is enough slack in the primary and secondary cables to allow for raising the transformer.
2. The split pad is to be placed on top of the existing concrete pad.
3. For additional height, a second or third split pad can be installed, one over the other.
4. The transformer can be secured to the split pad with transformer clips installed in the adjustable struts with 3/8" x 1-1/2" bronze bolts, **SC 0174429**.

ORIGINAL	<b>GRADE ADJUSTMENT</b>			
9/28/87				
APPROVED	<b>SINGLE-PHASE – PAD-MOUNTED TRANSFORMER</b>			
11/2/99				
	NORTHEAST UTILITIES	CONSTRUCTION STANDARD	<b>DTR 58.195</b>	<b>3</b>

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