

**CUSTOMER INSTALLED DUCT SYSTEM**

THIS SPECIFICATION CONTAINS BASIC INFORMATION WHICH DEFINES PPL MATERIAL & DESIGN REQUIREMENTS FOR THE CONSTRUCTION OF CONCRETE ENCASED DUCT SYSTEMS.

ALL DETAILS OF THIS SPECIFICATION SHALL BE STRICTLY FOLLOWED. ANY DEVIATION MUST BE APPROVED BY A PPL ENGINEER. UNAPPROVED DEVIATIONS ARE USUALLY COSTLY FOR THE CUSTOMER TO CORRECT & CAN RESULT IN DELAYS OR POSSIBLE REFUSAL TO CONNECT SERVICE.

OTHER ASSOCIATED SPECIFICATION:

- A-190974 - CONCRETE MATERIALS SPECIFICATION
- A-190975 - CONCRETE PLACEMENT SPECIFICATION
- 6-18-115 - INSTALLATION INSTRUCTIONS FOR CUSTOMER-INSTALLED CONDUIT SYSTEMS ON PPL TERMINAL POLES

<b>DISTRIBUTION CONSTRUCTION SPECIFICATIONS</b>  <b>PPL ELECTRIC UTILITIES CORPORATION</b>	Date: <u>9/25/02</u> Drafter: <u>RRC</u>
	Sponsor: <u>[Signature]</u> Approved: <u>[Signature]</u> Manager-Distribution Maintenance

**UNDERGROUND - STRUCTURAL**  
CUSTOMER REFERENCE SPECIFICATION

**NOTES:**

1. CONSTRUCTION PLAN - PPL WILL PROVIDE THE CUSTOMER WITH A CONSTRUCTION PLAN SHOWING THE PROPOSED LOCATION OF THE UNDERGROUND DUCT SYSTEM. ANY DEVIATIONS FROM THE PROPOSED DUCT ROUTE, DUE TO ON-SITE OBSTRUCTIONS, MUST BE APPROVED BY PPL THE CUSTOMER IS RESPONSIBLE FOR ANY NECESSARY CROSSING PERMITS.

2. DEPTH OF BURIAL - ROUGH GRADING TO WITHIN 6 INCHES OF FINAL GRADE SHOULD BE ESTABLISHED BEFORE TRENCH IS DUG. TRENCH MUST BE FREE OF HIGH SPOTS, ROCK PROJECTIONS, AND DEBRIS. MINIMUM DEPTH OF COVER SHALL BE AS FOLLOWS:

- SECONDARY/SERVICE DUCTS ----- 24 INCHES
- PRIMARY DUCTS ----- 30 INCHES
- DUCTS UNDER ROADWAY ----- 36 INCHES

3. CLEARANCE FROM EXISTING UNDERGROUND FACILITIES - THE CLEARANCE BETWEEN DUCT SYSTEMS AND EXISTING UNDERGROUND FACILITIES (T.V. CABLE, TELEPHONE CABLE, GAS AND WATER ETC.). PARALLELING IT SHALL IN NO CASE BE LESS THAN 24 INCHES. DUCT SYSTEMS WHICH PARALLEL A STEAM LINE SHALL HAVE A MINIMUM 6 FEET SEPARATION (CAN BE REDUCED IF DUCTS ARE PROPERLY INSULATED).

A DUCT SYSTEM WHICH CROSSES OVER OR UNDER EXISTING UNDERGROUND FACILITIES MUST HAVE THE FOLLOWING MINIMUM CLEARANCE:

- TELEPHONE 3 INCHES OF CONCRETE OR 12 INCHES OF EARTH
- GAS AND WATER MAINS 12 INCHES OF EARTH
- SEWERS 12 INCHES OF EARTH
- STEAM LINES 6 FEET OF EARTH (CAN BE REDUCED IF DUCT SYSTEM IS PROPERLY INSULATED)

IF THESE CLEARANCES CANNOT BE OBTAINED, INFORM PPL ENGINEER PRIOR TO CONSTRUCTION.

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4. JOINT TRENCH ELECTRIC AND COMMUNICATION

WHEN APPROVED BY PPL NEW ELECTRIC AND COMMUNICATION CONCRETE INCASED DUCTS MAY BE INSTALLED IN A JOINT TRENCH (SEE FIGURE #1). A MINIMUM OF TWELVE INCHES MUST BE MAINTAINED BETWEEN FACILITIES. A FOUR-INCH SOLID BARRIER SHALL BE CENTRALLY PLACED BETWEEN THE FACILITIES TO CREATE A DISTINCT SEPARATION. THE BARRIER SHALL EXTEND A MINIMUM OF FOUR INCHES ABOVE THE TOP OF THE CONCRETE ENCASED DUCT PACK.

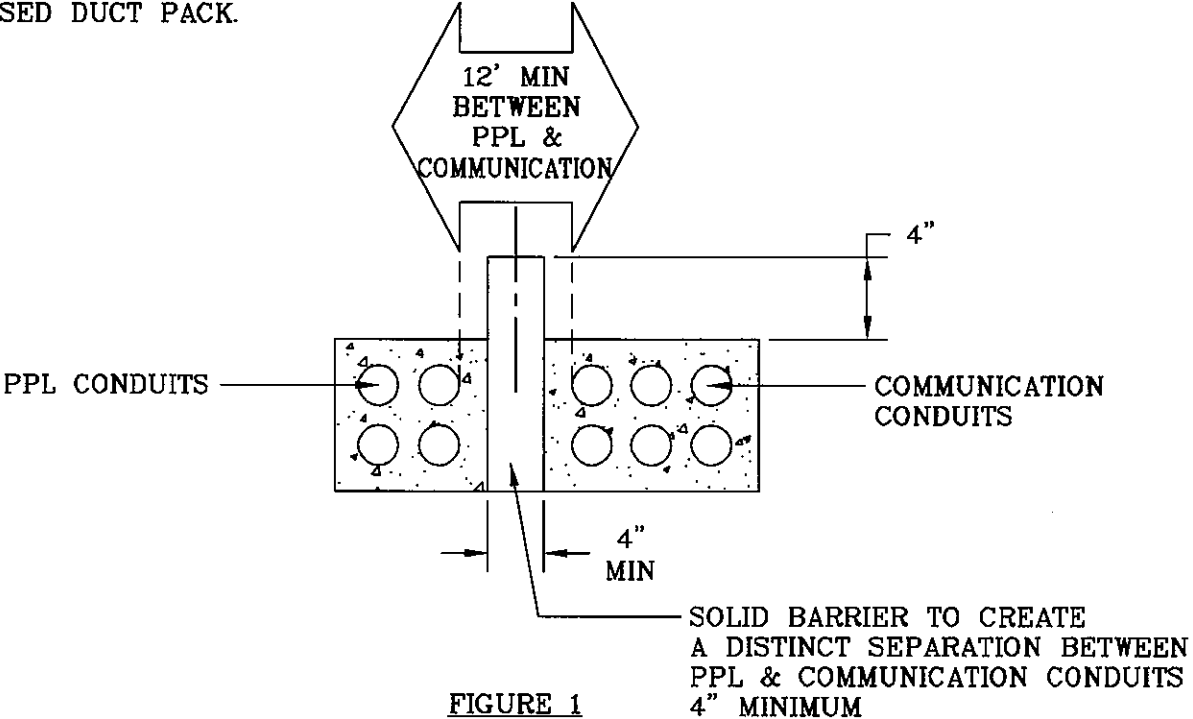


FIGURE 1

5. CONDUIT TYPES AND SIZES - THE MINIMUM SIZE CONDUIT TO BE USED FOR A DUCT SYSTEM IS 4 INCHES. PPL WILL SPECIFY THE USE OF 5 OR 6 INCH CONDUIT WHEN CUSTOMER INSTALLED SYSTEM IS FOR LARGE DIAMETER PRIMARY VOLTAGE CABLES. ALUMINUM CONDUITS AND FITTINGS ARE NOT ACCEPTABLE. THE FOLLOWING TYPES OF CONDUITS ARE ACCEPTABLE FOR DUCT PACK CONSTRUCTION:

TYPE	SIZE	RATING
PVC	4", 5", & 6"	TYPE I, EB
	4", 5", & 6"	TYPE II, SCH. 40
STEEL	4", 5", & 6"	RIGID OR INTERMEDIATE

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**UNDERGROUND - STRUCTURAL**  
CUSTOMER REFERENCE SPECIFICATION

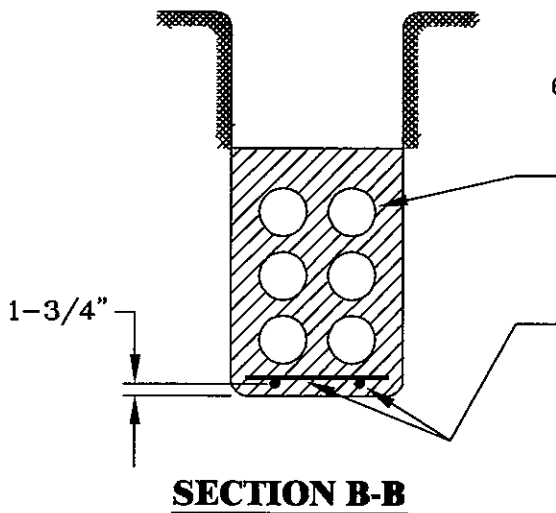
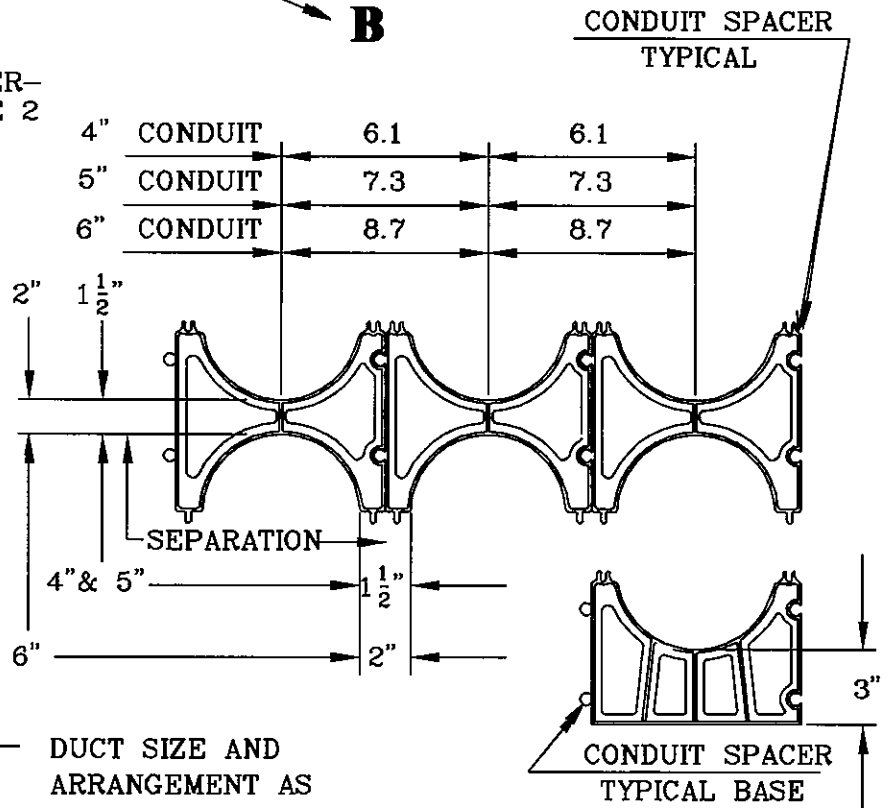
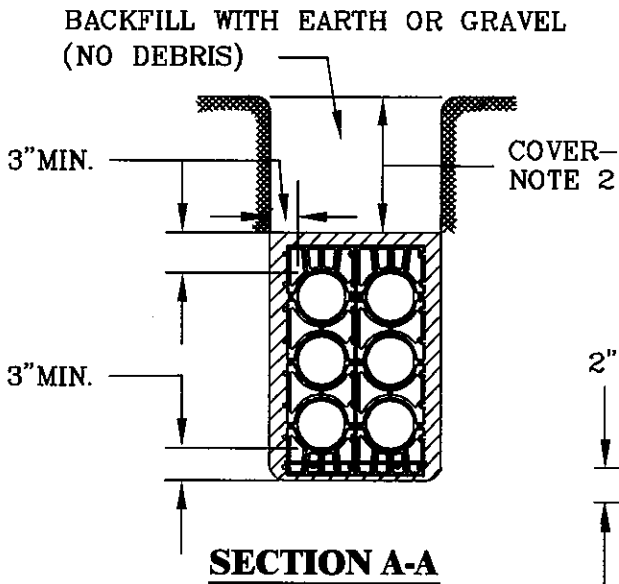
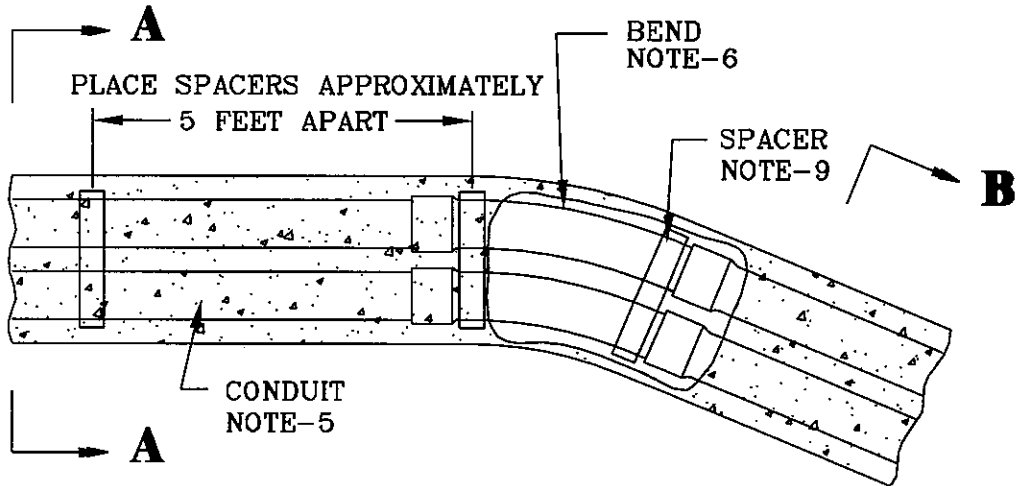
- 6. CONDUIT BENDS - BENDS IN 4 INCH CONDUIT SYSTEMS SHALL BE MINIMUM 36 INCH RADIUS. BENDS IN 5 OR 6 INCH CONDUIT SYSTEMS SHALL BE MINIMUM 48 INCH RADIUS. THE CONTRACTOR MAY USE PREFORMED BENDS OR BEND CONDUITS AT THE JOB SITE AS AS REQUIRED. ALL 90° BENDS MUST BE RIGID OR INTERMEDIATE GRADE GALVANIZED STEEL.
- 7. COUPLINGS - ALL PVC CONDUIT COUPLINGS MUST BE SOLIDLY CEMENTED. THREADED JOINTS IN STEEL CONDUIT MUST BE SEALED USING PLUMBER'S TEFLON TAPE.
- 8. BELL ENDS - ALL PVC DUCTS ENTERING MANHOLES, VAULTS, OR TRANSFORMER FOUNDATIONS SHALL HAVE BELL-ENDS. STEEL CONDUITS REQUIRE GROUNDING BUSHINGS.
- 9. CONDUIT ENCASUREMENT - MULTIPLE CONDUIT DUCT PACKS MUST HAVE BASE AND INTERMEDIATE SPACERS PLACED APPROXIMATELY EVERY 5 FEET. THE SPACERS MUST PROVIDE BOTH VERTICAL & HORIZONTAL CLEARANCE BETWEEN ADJACENT CONDUITS (FOR CONCRETE) OR NO LESS THAN 1-1/2 INCHES FOR 4" OR 5" CONDUITS & 2 INCHES FOR 6" CONDUITS.

THE TRENCH SHALL BE DUG WIDE ENOUGH TO ALLOW A MINIMUM 3 INCH THICK CONCRETE CONCRETE ENVELOPE AROUND THE CONDUITS. PROVIDE ADEQUATE BRACING SO CONDUITS DO NOT FLOAT IN WET CONCRETE. PPL MAY SPECIFY EPOXY COATED REINFORCING RODS WHERE SOIL CONDITIONS ARE UNSTABLE. IF CONCRETE CANNOT BE POURED IN ONE CONTINUOUS RUN BETWEEN ENDS, TAPER THE FIRST POUR SO THE NEXT POUR WILL BOND WITHOUT CREATING A SHEAR LINE.

ALLOW AT LEAST 18 HOURS TO ELAPSE BEFORE BACKFILLING TRENCH. DO NOT BACKFILL WITH LARGE ROCKS, BROKEN SECTIONS OF PAVEMENT, OR TRASH.

- 10. CLEAN DUCTS - ALL DUCTS SHALL BE CLEANED BY PULLING A MANDREL OR STIFF BRISTLED BRUSH, FOLLOWED BY A BALL OF CLEAN RAGS. THIS PROCEDURE WILL REMOVE EARTH, SAND, STONES, OR WATER LEFT IN DUCTS. SEAL ENDS AFTER CLEANING.
- 11. CONCRETE-CONCRETE FOR ENCASING DUCTS SHALL BE 1:2:4 MIX (AGGREGATE SHALL BE #1B STONE) WITH A 5 INCH SLUMP IN ACCORDANCE WITH SPECIFICATION A-190974. HIGH EARLY CONCRETE SHALL NOT BE USED WHEN AMBIENT TEMPERATURE IS ABOVE 40°F SINCE THE LARGE AMOUNT OF HEAT DEVELOPED IN CURING MAY DAMAGE OR DEFORM THE CONDUITS. ALLOW AT LEAST 18 HOURS TO ELAPSE BEFORE BACKFILLING TRENCH.
- 12. PULL WIRE (FISH) - PROVIDE EMPTY CONDUITS WITH A PLASTIC ROPE WITH A BREAKING STRENGTH OF AT LEAST 200 LBS. ALLOW A MINIMUM OF 24 INCHES OF SPARE AT EACH END OF THE CONDUIT RUN.

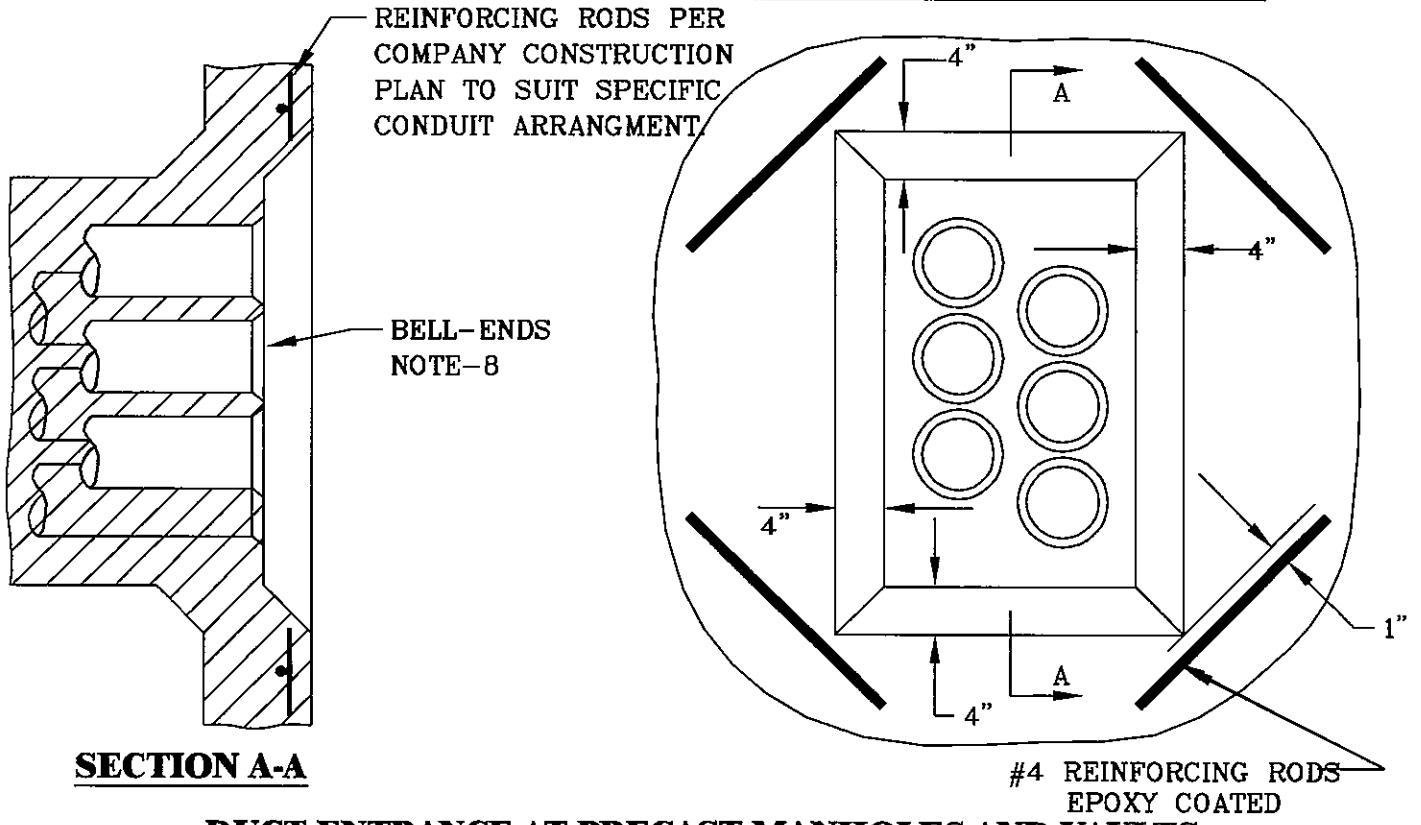
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DUCT SIZE AND  
ARRANGEMENT AS  
SPECIFIED.

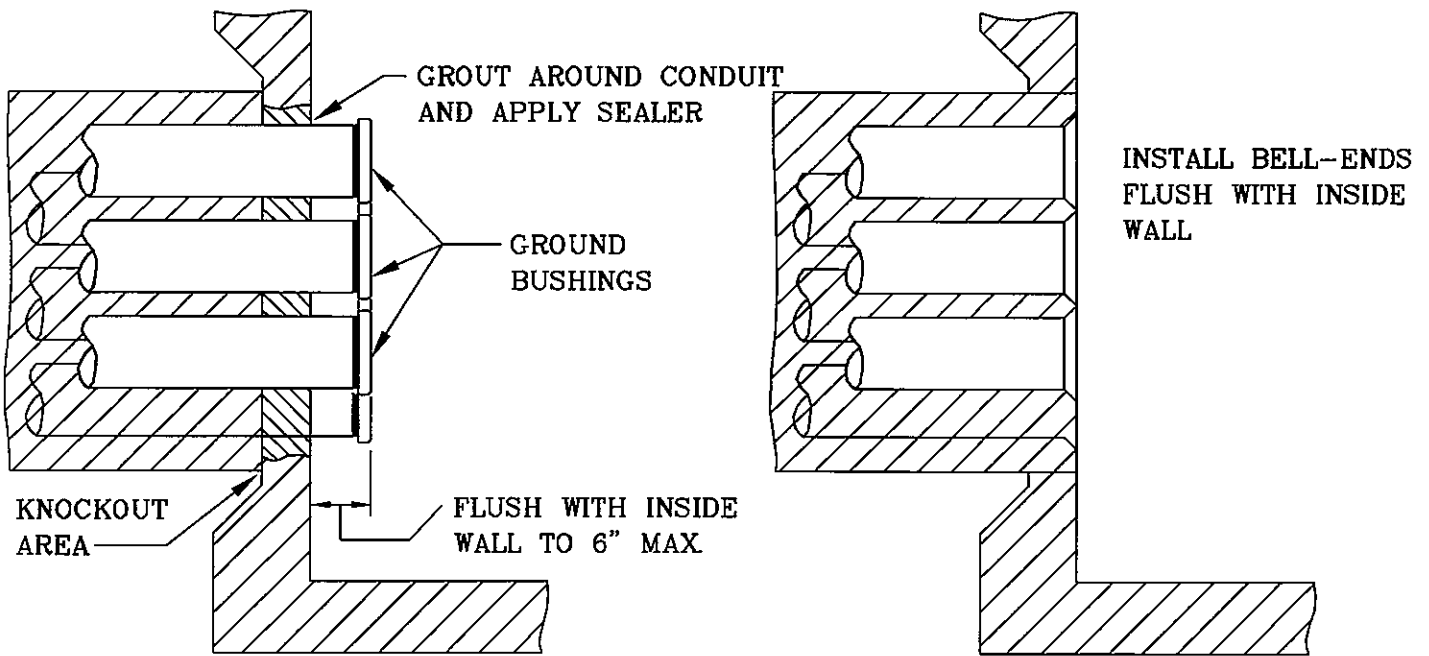
PLACE #4 REINFORCING  
RODS - 24" O.C.  
(SPECIFIED BY ENGINEER  
FOR UNSTABLE SOIL CONDITIONS)

**DUCT ENTRANCE AT FIELD POURED MANHOLES AND VAULTS**



**SECTION A-A**

**DUCT ENTRANCE AT PRECAST MANHOLES AND VAULTS**

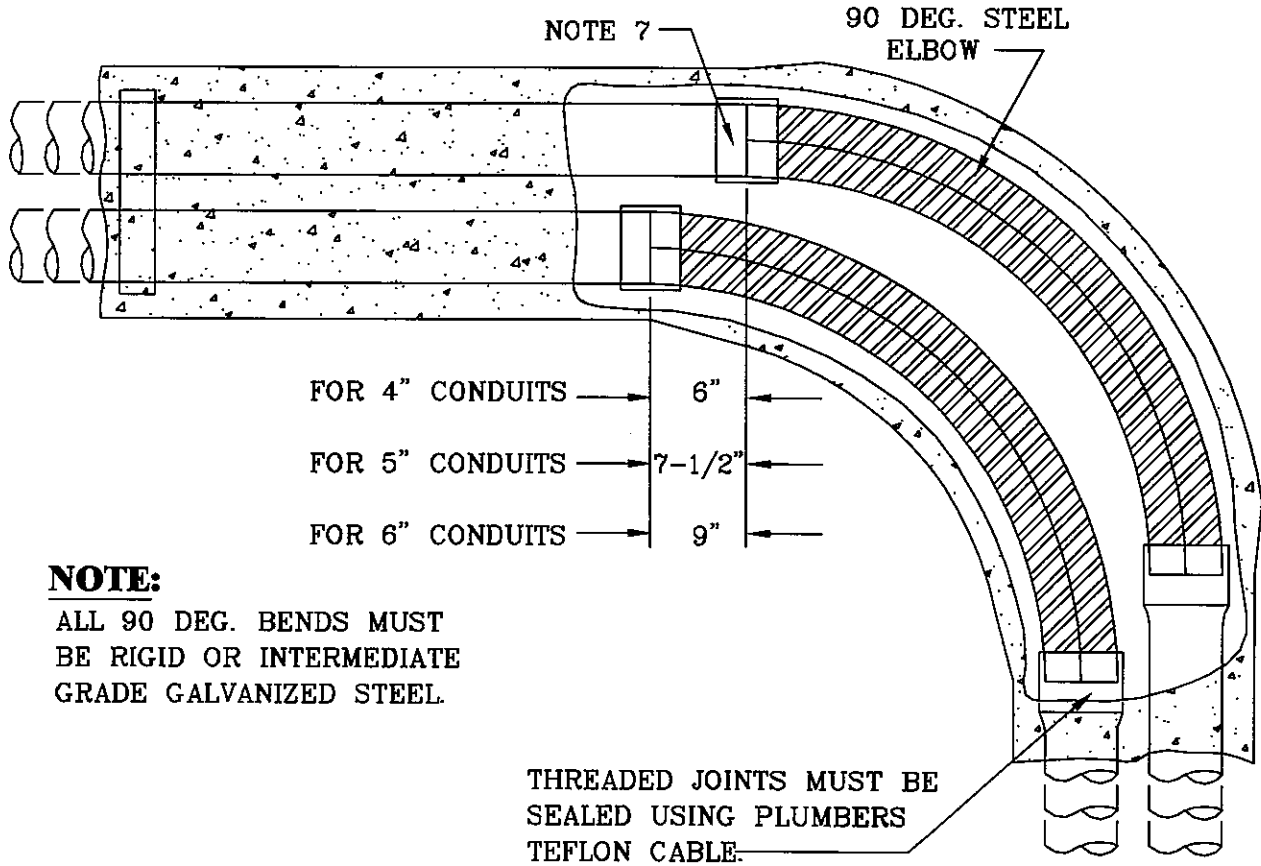


**STEEL CONDUITS**

**PVC CONDUITS**

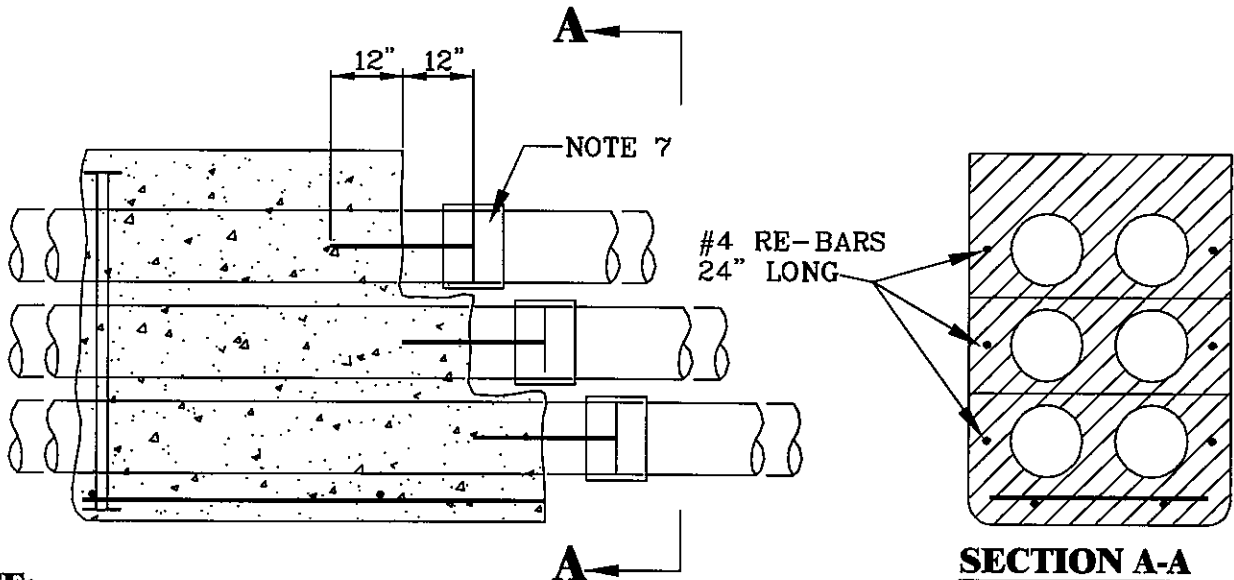
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	Approved: <i>[Signature]</i> Manager-Distribution Maintenance

**UNDERGROUND - STRUCTURAL**  
CUSTOMER REFERENCE SPECIFICATION



**NOTE:**

ALL 90 DEG. BENDS MUST BE RIGID OR INTERMEDIATE GRADE GALVANIZED STEEL.



**NOTE:**

THE DUCT RUN SHOULD BE ENCASED BY MAKING ONE CONTINUOUS POUR. IF SEVERAL POURS ARE NECESSARY, TAPER THE END AS SHOWN ABOVE SO THE NEXT POUR WILL BOND WITHOUT CREATING A SHEAR LINE.

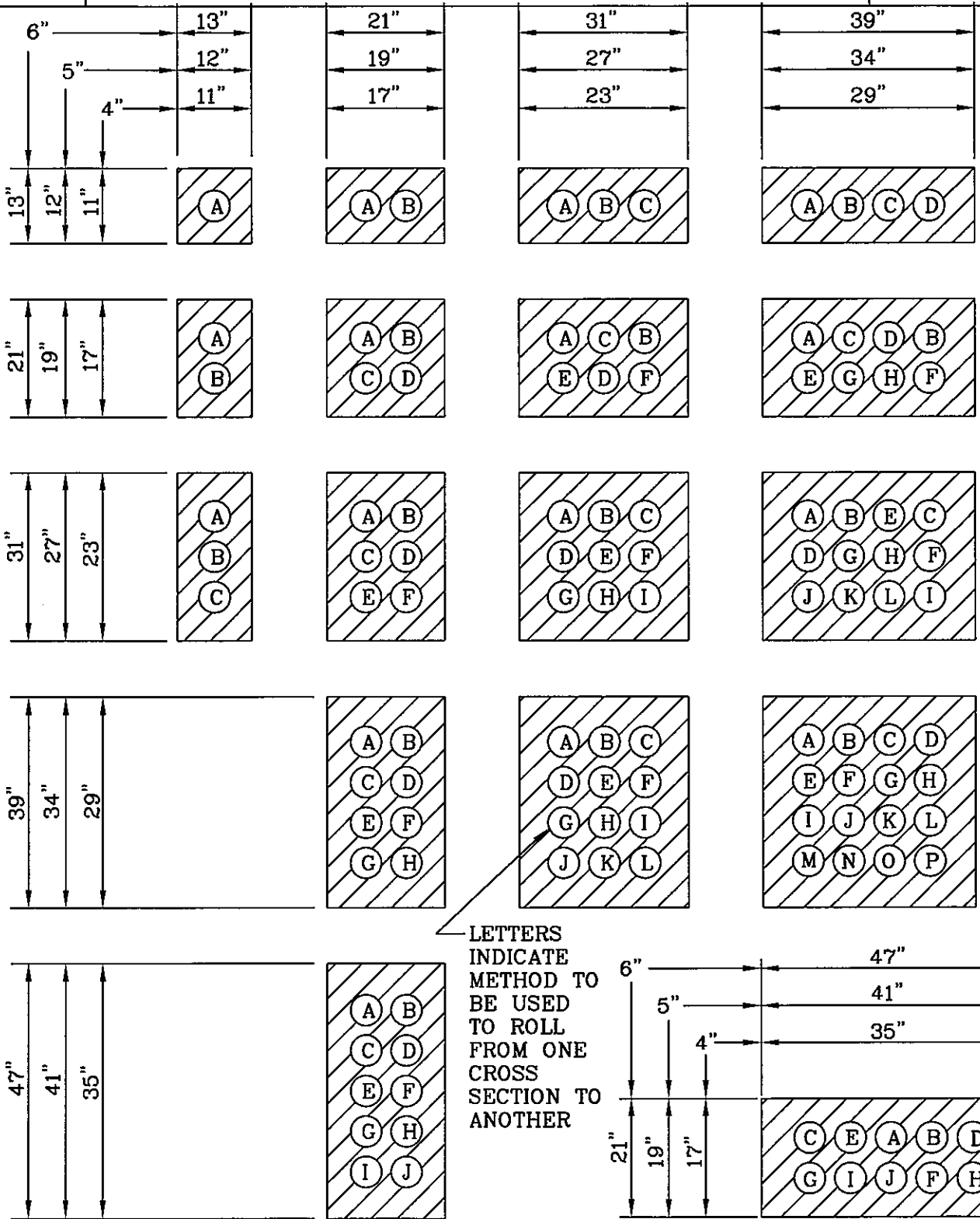
DISTRIBUTION CONSTRUCTION SPECIFICATIONS

**PPL ELECTRIC UTILITIES CORPORATION**

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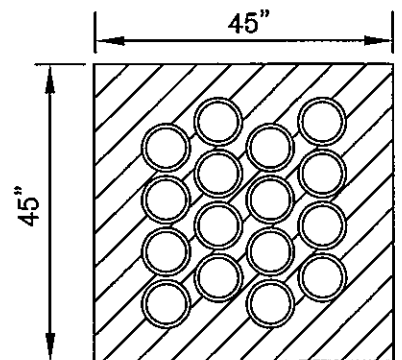
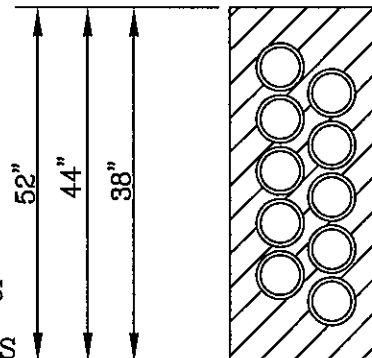
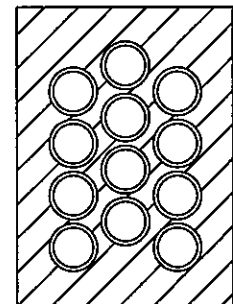
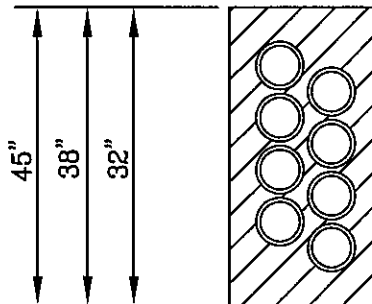
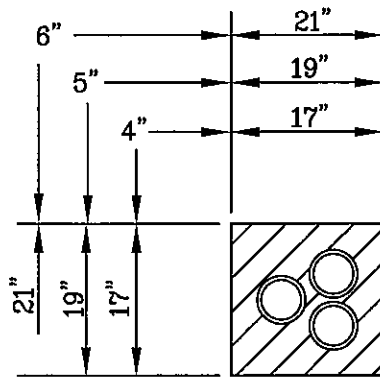
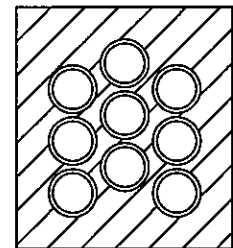
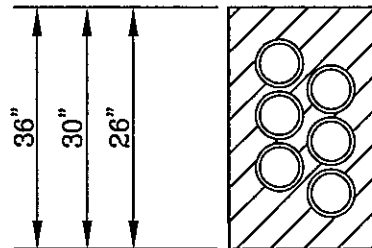
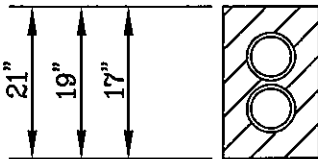
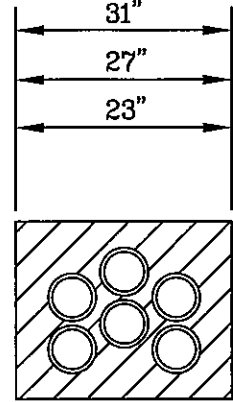
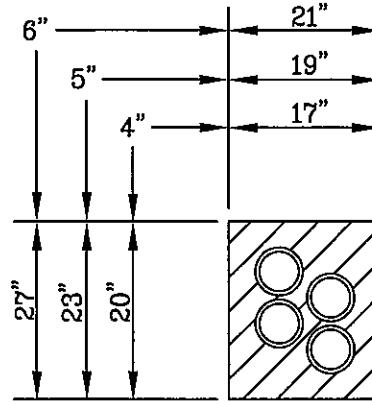
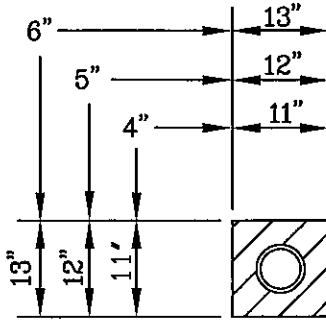
Approved: [Signature]  
Manager-Distribution Maintenance



LETTERS  
INDICATE  
METHOD TO  
BE USED  
TO ROLL  
FROM ONE  
CROSS  
SECTION TO  
ANOTHER

**TYPICAL DUCT CROSS SECTION**

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	Approved: <u>Mark R. Barnes</u> Manager-Distribution Maintenance



**NOTE:**

CONDUITS ARE STAGGERED AT  
MANHOLE AND VAULT ENTRANCES  
TO PROVIDE ADDITIONAL  
CLEARANCE FOR TRAINING CABLES

**TYPICAL DUCT ENTRANCES AT MANHOLES AND VAULTS**

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