

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94	1999-161-1	COOK	75	9
STA.		TO STA.		
FED. ROAD DIST. NO.		ILLINOIS FED. AID PROJECT		
D-91-411-99				

APPLICATION

THESE NOTES COVER THE PROCEDURE TO BE FOLLOWED WHEN INSTALLING CONCRETE ENCASED CONDUIT BY THE MONOLITHIC METHOD. THIS METHOD CONSISTS OF BUILDING UP THE LAYERS OF CONDUIT ON SPACERS AND THEN POURING THE CONCRETE ENCASEMENT IN A MONOLITHIC MASS.

REFERENCE MADE TO "COMED STANDARD C4171, CONDUIT RUN INSTALLATION, MONOLITHIC METHOD", MODIFIED FOR PROJECT SPECIFIC CONDITIONS FOR ADDITIONAL REQUIREMENTS.

GENERAL

FOR TYPE AND SIZE OF CONDUIT REFER TO ELECTRICAL DRAWINGS.

SPLIT CONDUIT SHALL BE USED TO REBUILD OR CHANGE THE LOCATION OF EXISTING DUCTS THAT CONTAIN CABLES, AS SHOWN IN COMED STANDARD C4175.

CONNECTIONS FOR CONDUIT OF DIFFERENT SIZES AND MATERIALS ARE SHOWN ON COMED STANDARDS C4162 AND C4163.

ALL CONDUIT WITH BROKEN ENDS SHALL BE CUT, AND USED WHENEVER POSSIBLE.

TRENCH PREPARATION

THE PREPARATION OF THE TRENCH FOR CONDUIT RUNS SHALL BE AS PRESCRIBED IN CONSTRUCTION STANDARD C4050. WHERE UNSTABLE SOIL IS ENCOUNTERED, CONDUIT SHALL BE PLACED ON A CONCRETE BASE, LAYING THE CONDUIT AFTER THE CONCRETE IS LEVELED AND STARTS TO SET. AT THIS POINT THE BASE OF THE CONCRETE WILL SUPPORT THE CONDUIT AND PERMIT THE BASE SPACERS TO BE DEPRESSED AND TO FIND AN EVEN BEARING WHILE THE BASE CONCRETE IS STILL YEILDING. THE BASE CONCRETE IS BY VOLUME: 1 PART PORTLAND CEMENT EM48000, 3 PARTS #2 TORPEDO SAND EM48002, AND 5 PARTS 3/4 INCH TO #4 GRAVEL (NOT CRUSHED STONE) EM48005.

IF THE CONDUIT DOES NOT REST ON UNDISTURBED EARTH WITHIN 3 FEET OF MANHOLE OR VAULT, BRIDGE THE GAP TO THE UNDISTURBED EARTH WITH A 6 INCH BASE OF REINFORCED CONCRETE. THIS CONCRETE SHALL BE A "DENSE SHEATHING" WITH #4 REINFORCING BARS ON 6 INCH CENTERS, 3 INCHES FROM THE BOTTOM. CONCRETE MIX FOR SHEATHING

(a) READY-MIXED

READY MIXED CONCRETE DELIVERED TO THE JOB SHALL BE SPECIFIED AS 3000 POUNDS PER SQUARE INCH MINIMUM (AT 28 DAYS) CONCRETE. THE COARSE AGGREGATE SHALL BE PEA GRAVEL. THE FINE AGGREGATE SHALL BE #2 TORPEDO SAND, EM48002. SLUMP AT POINT OF DELIVERY SHALL NOT BE MORE THAN 4 INCHES NOR LESS THAN 2 INCHES.

MINIMUM CEMENT CONTENT SHALL BE 3 1/2 BAGS OF TYPE 1 PORTLAND CEMENT PER CUBIC YARD. FLY ASH SHALL BE INCORPORATED IN THE MIX ON THE BASIS OF 20 POUNDS PER SACK OF CEMENT. INCLUDE AIR ENTRAINMENT AGENT TO ENTRAIN BETWEEN 4 AND 6 PERCENT OF AIR IN CONCRETE.

EXCEPT AS OTHERWISE DESIGNATED IN THIS STANDARD, READY-MIXED CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF SPECIFICATIONS FOR READY-MIXED CONCRETE (ASTM C94 LATEST EDITION). READY-MIXED CONCRETE SHALL BE PLACED WITHIN 1 HOUR AFTER WATER HAS BEEN ADDED TO THE MIX.

(b) BATCH-MIXED

WHEN THE CONCRETE IS MIXED ON THE JOB, A PREBAGGED CEMENT MIX CONSISTING BY WEIGHT OF 70 PERCENT PORTLAND CEMENT AND 30 PERCENT FLY ASH SHALL NORMALLY BE USED. THE CONCRETE MIX PROPORTIONS BY VOLUME (RODDED SATURATED SURFACE DRY BASIS) SHALL BE 1 PART OF PREBAGGED MIX (1 BAG IS 1 CUBIC FOOT), 3 1/2 PARTS #2 TORPEDO SAND EM48002, AND 2 1/2 PARTS PEA GRAVEL. MAXIMUM WATER CONTENT, INCLUDING FREE SURFACE MOISTURE IN AGGREGATES, SHALL NOT EXCEED 7 GALLONS PER BAG OF CEMENT MIX. SLUMP SHALL BE AS SPECIFIED ABOVE UNDER READY-MIXED CONCRETE.

IN THE EVENT THAT THE PREBAGGED CEMENT MIX IS NOT AVAILABLE, 1 BAG OF TYPE I PORTLAND CEMENT (EM48000) SHALL BE SUBSTITUTED FOR 1 BAG OF THE CEMENT MIX. WATER CONTENT, SLUMP, AND CONCRETE MIX PROPORTIONS SHALL REMAIN AS STATED IN THE PRECEDING PARAGRAPH.

THE AGGREGATES SHALL BE MEASURED BEFORE BEING PUT IN THE MIXER, AND SHALL BE IN SUCH PROPORTIONS THAT ONE FULL BAG OF CEMENT WILL BE USED IN EACH BATCH. ALL CONCRETE SHALL BE MIXED FOR A MINIMUM OF TWO MINUTES IN A MACHINE MIXER.

HAND MIXING SHALL NOT BE DONE EXCEPT BY SPECIAL PERMISSION OF THE ENGINEER. NO MORTAR OR CONCRETE SHALL BE "RETEMPERED" EITHER BY REMIXING OR BY THE ADDITION OF ANY MATERIALS OR ADMIXTURES. THE DRUM OF THE MIXER SHALL BE COMPLETELY EMPTIED BEFORE RECEIVING MATERIALS FOR THE SUCCEEDING BATCH. CONCRETE THAT HAS OBTAINED ITS INITIAL SET BEFORE BEING PLACED SHALL BE DISCARDED AND NOT USED ON THE JOB.

COLD WEATHER CONCRETING (BELOW 40° F)

INGREDIENTS OF CONCRETE POURED WHEN THE SURROUNDING AIR IS BELOW 40° F SHALL BE HEATED SO THAT THE TEMPERATURE OF THE CONCRETE AFTER PLACEMENT IS NEITHER LOWER THAN 55° F NOR GREATER THAN 65° F. PLUG ENDS OF CONDUIT RUN TO PREVENT AIR CIRCULATION. PROTECT CONCRETE FROM FREEZING FOR A MINIMUM OF 48 HOURS.

WHEREVER POSSIBLE, ALL CONCRETE MATERIALS AND ALL REINFORCEMENT, FORMS, FILLERS AND GROUND WITH WHICH CONCRETE IS TO COME IN CONTACT SHOULD BE FREE FROM FROST.

CONDUIT INSTALLATION

THE STANDARD ARRANGEMENT AND SEPARATION OF DUCTS AND THE THICKNESS OF CONCRETE SHEATHING SHALL BE AS SHOWN ON COMED STANDARD C4090. IF SPECIAL ARRANGEMENTS ARE REQUIRED, THE SECTIONAL OUTLINE OF DUCTS SHALL BE SHOWN ON THE INSTALLATION DRAWINGS. TRANSPOSITION OF DUCTS FOR VARIOUS STANDARD FORMATIONS SHALL BE MADE PER COMED STANDARDS C4130-36. BUT SHALL BE DONE ONLY WHEN SPECIFIED ON THE DRAWINGS OR SPECIALLY AUTHORIZED BY THE ENGINEER AFTER UNFORESEEN OBSTRUCTIONS ARE UNCOVERED.

THE FIRST LAYER OF CONDUIT SHALL BE LAID ON PLASTIC BASE SPACERS, (4 INCH SI 402327(MAINTENANCE ONLY), 5 IN SI 402328) HORIZONTALLY LOCKED, WHICH WILL PROVIDE A 3-INCH LAYER OF CONCRETE BELOW THE CONDUIT. THEY SHALL BE PLACED AT INTERVALS OF APPROXIMATELY 5 FEET. SUCCEEDING LAYERS ARE PLACED ON PLASTIC INTERMEDIATE SPACERS (4 INCH SI 402325 (MAINTENANCE ONLY), 5 INCH SI 402326) VERTICALLY LOCKED TO PREVIOUSLY PLACED SPACERS. THE CONDUIT COUPLINGS SHALL BE STAGGERED SO THAT NO COUPLING IS IN-LINE WITH THE COUPLING ON AN ADJACENT CONDUIT. WHEN THE REQUIRED LAYERS OF CONDUIT ARE BUILT-UP, THE ENTIRE ASSEMBLY SHALL BE BRACED TO PREVENT LATERAL AND VERTICAL MOVEMENT. WHEN THE INSTALLATION OF SPLIT DUCT IS SPECIFIED, PLACE SPACERS AT THREE FOOT INTERVALS.

THE CONCRETE SHALL BE THOROUGHLY SPADED AND PUDDLED IN AND AROUND THE CONDUIT PACKAGE. BRACING SHALL BE REMOVED WHEN CONCRETE HAS STARTED TO SET AND THERE IS NO FURTHER DANGER THAT DUCTS WILL FLOAT OR MOVE OUT OF ALIGNMENT. HOLES LEFT BY BRACING SHOULD THEN BE FILLED WITH GROUT.

IN FORMATIONS GREATER THAN 4 DUCTS HIGH, THE PREFERRED PRACTICE IS TO INSTALL THE FORMATION IN TWO LAYERS WITH THE CONCRETE BEING POURED IN TWO STEPS. THIS WILL PREVENT THE SPACERS FROM SPREADING OUT UNEVENLY AND CREATING UNEVEN VARIANCES IN CLEARANCES BETWEEN CONDUITS. THIS PROCEDURE WILL ALSO ENSURE THAT THERE IS A CONCRETE ENVELOPE AROUND EVERY DUCT AND DECREASE VERTICAL DROP TO THE LOWEST POSSIBLE DISTANCE WHEN POURING THE CONCRETE.

UNFINISHED CONSTRUCTION

IF THE CONDUIT RUN MUST BE TEMPORARILY LEFT UNFINISHED DURING CONSTRUCTION, CONDUIT SHALL BE CLOSED WITH PLASTIC CONDUIT PLUGS. IF THE CONDUIT RUN IS TO BE DEAD-ENDED, FOR COMPLETION AT SOME FUTURE TIME, THE END OF EACH CONDUIT SHALL BE PLUGGED AND STAGGERED APPROXIMATELY 3 INCHES FROM THE ADJACENT CONDUIT. THE END OF THE CONCRETE SHEATHING SHALL BE STEPPED BACK APPROXIMATELY 6 INCHES FOR EACH HORIZONTAL ROW OF CONDUIT. THE ENDS OF THE INSTALLED CONDUIT SHALL EXTEND BEYOND THE SHEATHING TO PERMIT CONNECTION TO FUTURE CONDUIT.

IN INSTANCES WHERE THE CONDUIT ENDS MAY NOT BE EASILY LOCATED, INSTALL AN ELECTRONIC MARKER (SI 649207) TO ASSIST IN LOCATION. AFTER CONDUIT IS INSTALLED, BACKFILL THE HOLE COVERING THE CONDUIT ENDS APPROXIMATELY 6 TO 12 INCHES AND INSERT MARKER IN HOLE ABOVE THE CONDUIT END. LAY MARKER ON FLAT GROUND AND CONTINUE BACKFILLING, INSURING THAT THE MARKER STAYS IN A HORIZONTAL POSITION SO THAT IT MAY BE LOCATED BY THE LOCATOR TOOL.

TRANSPOSING AROUND OBSTRUCTIONS

WHEN SMALL OBSTRUCTIONS ARE ENCOUNTERED, AND IT IS NOT ECONOMICAL OR DESIRABLE TO INSTALL THE CONDUIT RUN BELOW THE OBSTRUCTION, THE CONDUIT PACKAGE MAY BE TRANSPOSSED. IN SUCH AN OPERATION, A 1-INCH SPACE SHALL BE LEFT ABOVE AND BELOW, BETWEEN THE CONCRETE SHEATH AND THE OBSTRUCTION. A 6 INCH GAP SHALL BE LEFT AROUND UTILITIES THAT ARE OBSTRUCTIONS. EACH PORTION OF THE TRANSPOSSED CONDUIT SECTION SHALL BE INSTALLED AS A DOUBLE REVERSE CURVE USING A MINIMUM RADIUS OF 300 FEET.

THE SPACE BETWEEN THE TWO PORTIONS OF THE TRANSPOSSED SECTION SHALL BE COMPLETELY FILLED WITH CONCRETE TO WITHIN 3 INCHES OF EACH SIDE OF THE OBSTRUCTION. THIS SPACE SHALL BE FILLED WITH #2 TORPEDO SAND (EM48002).

CONDUIT BELLS

ALL CONDUIT SHALL TERMINATE AT A POURED MANHOLE IN PLASTIC CONDUIT ENTRANCE BELLS AS SHOWN ON STANDARD C4231. ALL CONDUIT SHALL TERMINATE AT A NETWORK CENTER OR VAULT PER C4250, IF CONDUIT PLUGS ARE USED. THEY SHOULD BE REMOVED AFTER CONSTRUCTION IS COMPLETED UNLESS OTHERWISE SPECIFIED.

BACKFILLING

AFTER THE CONCRETE SHEATHING HAS ATTAINED ITS INITIAL SET, THE TRENCH SHALL BE BACKFILLED IN ACCORDANCE WITH COMED STANDARD C235. APPROVED SAND AND PEA GRAVEL MIXTURE PLACED IN 12" LIFTS AND COMPACTED TO 95% MODIFIED PROCTOR AT OPTIMUM MOISTURE CONTENT. LAKE SAND SHALL NEVER BE USED FOR BACKFILL IN CONDUIT TRENCHES BECAUSE OF ITS POOR HEAT-CONDUCTING PROPERTIES.

WHEN LAKE SAND, PEAT, CINDERS, SLAG, OR OTHER MATERIAL WITH POOR HEAT CONDUCTING PROPERTIES ARE ENCOUNTERED IN THE CONDUIT EXCAVATION, THERMAL BACKFILL SHALL BE ADDED AROUND AND ABOVE THE CONDUIT, AS SPECIFIED ON THE INSTALLATION PLANS OR BY THE OWNER'S ENGINEER. THIS THERMAL BACKFILL WILL BE PER COMED EM48008 OR BANK RUN GRAVEL FROM A LOCATION APPROVED BY A TEMPERATURE CONTROL ENGINEER.

PAVING, CURBS, SIDEWALKS

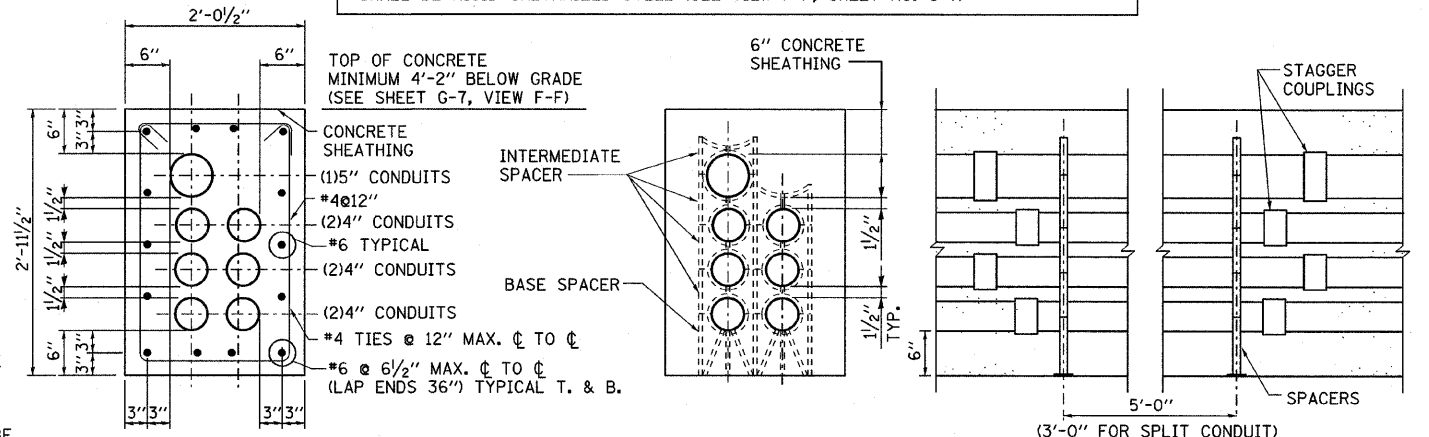
REPLACEMENT OF PAVING, CURBS, AND SIDEWALKS SHALL BE DONE IN ACCORDANCE WITH THE STATE REQUIREMENTS.

CONDUIT PREPARATION

AFTER THE CONCRETE SHEATHING HAS ATTAINED ITS INITIAL SET, EACH DUCT SHALL BE RODDED AND MANDREL. FURNISHED BY THE OWNER SHALL BE PULLED THROUGH THE DUCT. WHEN A PREVIOUSLY DEAD-ENDED CONDUIT RUN IS EXTENDED, THE ENTIRE RUN SHALL BE RODDED AND MANDRELED. CONDUIT RUNS CONTAINING OR TERMINATING IN SMALL RADIUS BENDS THAT WILL NOT PERMIT THE PASSAGE OF A STANDARD SIZE MANDREL SHALL BE MANDRELED THROUGH THEIR STRAIGHT PORTION PRIOR TO THE CONSTRUCTION OR INSTALLATION OF THE BENDS. THE MANDRELING OF SMALL RADIUS BENDS SHALL BE DONE WITH A FLEXIBLE MANDREL NO SMALLER IN DIAMETER THAN 1/2 INCH LESS THAN THE NOMINAL DIAMETER OF THE BEND.

WHEN REQUESTED, THE CONTRACTOR SHALL, AS A PART OF THE MANDRELING OPERATION, PULL IN AND LEAVE IN CERTAIN DESIGNATED DUCTS A #8 GALVANIZED STEEL PULL WIRE (EM31110) OR A 1/4 INCH POLYETHYLENE CORD (SI714113), THAT WILL BE FURNISHED BY THE OWNER.

NOTE:
ALL EMBEDDED CONDUIT SHALL BE PVC EXCEPT FOR THE FIRST SECTION OF CONDUIT BEGINNING AT THE INNER FACE OF THE EXISTING TRANSFORMER VAULT WALL, WHICH SHALL BE RIGID GALVANIZED STEEL (SEE VIEW F-F, SHEET NO. G-7)



CONCRETE ENCASED ELECTRICAL CONDUIT DETAILS

REVISIONS	
NAME	DATE

ILLINOIS DEPARTMENT OF TRANSPORTATION	
SITE DETAILS	
SCALE: VERT. NO SCALE	DRAWN BY: T.K.
HORIZ. NO SCALE	CHECKED BY: K.F.
DATE: 3/23/2010	



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 USER NAME = WJSEB