

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO
1545	00-00115-00-BR	DUPAGE	97	83
STA. 1+31.77		TO STA. 5+50.00		
FED. ROAD DIST. NO.	ILLINOIS	FED. AID PROJECT		

CONTRACT 83961

### GROUND ELECTRODE MEASUREMENT

**SCOPE:**  
 GROUNDING TESTS SHALL BE DONE FOR MANHOLE GROUNDS, GROUND ROD CONNECTIONS AND COUNTERPOISE CONNECTIONS TO ENSURE THE INTEGRITY OF THE ELECTRODE INSTALLATION. TESTING OF THE GROUND SYSTEM AND CONNECTIONS SHALL BE DONE USING THE CLAMP-ON RESISTANCE TEST METHOD FOR GROUND RODS AND COUNTERPOISE.

CLAMP-ON GROUND RESISTANCE TEST (NORMAL TEST)/  
 THREE POINT FALL OF POTENTIAL TEST (NORMAL TEST)

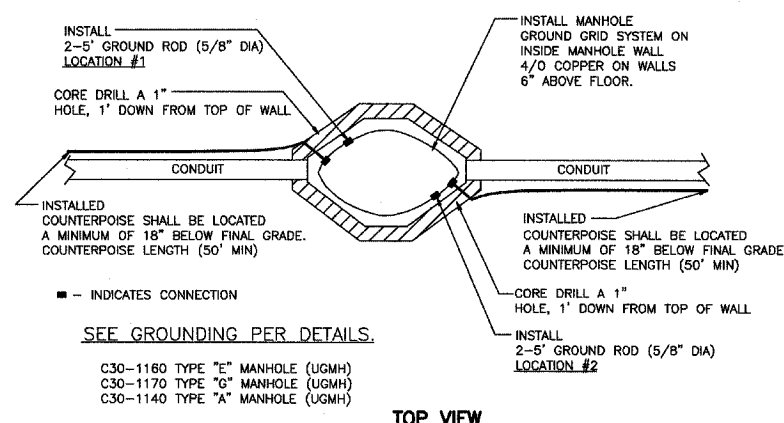
TESTS SHALL BE PERFORMED WHEN THE GROUND IS NOT FROZEN TO ELIMINATE HIGH RESISTANCE READINGS IN THE MANHOLES. THE CLAMP ON TEST SHALL BE DONE AT EACH GROUND ROD AND COUNTERPOISE CONNECTION AND FROM THE MANHOLE PERIMETER GROUND CABLE TO THE GROUND ROD. AEMC INSTRUMENT MODEL 3710, 3730, OR EQUIVALENT MAY BE USED. THE CLAMP ON GROUND METER SHALL CLAMPED ON TO THE POWER NEUTRAL BETWEEN THE UTILITY TRANSFORMER POLE GROUND, SWITCH GEAR GROUND AND THE SITE GROUND. THE USER MUST BE AWARE THAT A 0.7 V<sup>2</sup> READING INDICATES A CONTINUITY LOOP AND NOT A GROUND RESISTANCE. IF A POWER NEUTRAL IS NOT CLOSE TO THE NEW INSTALLATION THEN THE THREE POINT FALL OF POTENTIAL, GROUND RESISTANCE CAN BE USED.

ALL TESTING MATERIAL AND TOOLS ARE FURNISHED BY THE CONTRACTOR. THIS SPECIFICATION IS USED TO TEST HANDHOLES, SWITCH GEAR VAULTS, MANHOLES AND OTHER EQUIPMENT AS DIRECTED.

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### CLAMP ON METER TEST STANDARD MANHOLE

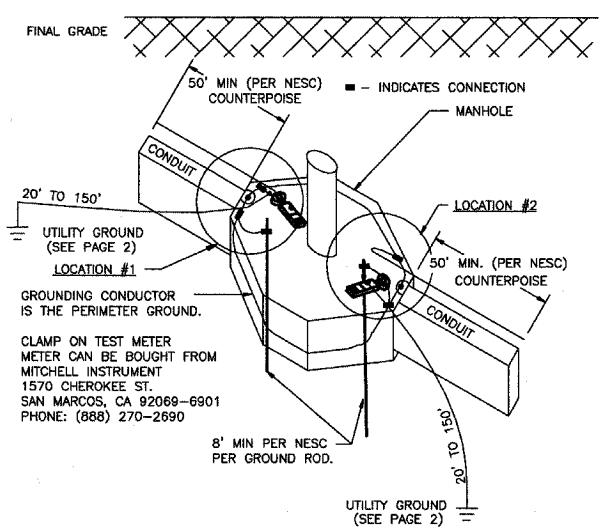
(GROUNDING WITH GROUND RODS AND COUNTERPOISE)



SEE GROUNDING PER DETAILS.  
 C30-1160 TYPE "E" MANHOLE (UGMH)  
 C30-1170 TYPE "G" MANHOLE (UGMH)  
 C30-1140 TYPE "A" MANHOLE (UGMH)

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### SAMPLE INSTALLATION (CLAMP ON METER)



**NOTE:**

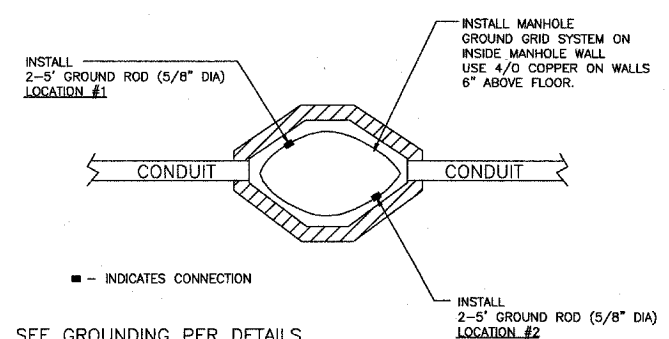
OBSERVE ALL SAFETY REQUIREMENTS AND THEN REMOVE COVERING ON THE GROUND CONDUCTOR IF PRESENT AND PROVIDE SUFFICIENT ROOM FOR THE MODEL 3710/3730 JAWS, WHICH MUST BE ABLE TO CLOSE EASILY AROUND THE CONDUCTOR. THE JAWS CAN BE PLACED AROUND THE GROUND ROD ITSELF.  
 NOTE: THE CLAMP MUST BE PLACED SO THAT THE JAWS ARE IN AN ELECTRICAL PATH FROM THE SYSTEM NEUTRAL OR GROUND WIRE TO THE GROUND ROD, OR COUNTERPOISE.

SELECT THE CURRENT RANGE "A". CLAMP ON TO THE GROUND CONDUCTOR AND MEASURE THE GROUND CURRENT. THE MAXIMUM CURRENT RANGE IS 30 A. IF THE GROUND CURRENT EXCEEDS 5 A, GROUND RESISTANCE MEASUREMENTS ARE NOT POSSIBLE. DO NOT PROCEED FURTHER WITH THE MEASUREMENT. REMOVE THE CLAMP-ON TESTER FROM THE CIRCUIT, NOTING THE LOCATION FOR MAINTENANCE, AND CONTINUE TO THE NEXT TEST LOCATION. RECORD CURRENT ON DATA SHEET.

AFTER NOTING THE GROUND CURRENT, SELECT THE GROUND RESISTANCE RANGE "Ω" (OHM) AND MEASURE THE RESISTANCE DIRECTLY. THE READING YOU MEASURE WITH THE 3710/3730 INDICATES THE RESISTANCE OF THE ROD, RESISTANCE OF THE COUNTERPOISE, BUT ALSO OF THE CONNECTION TO THE SYSTEM NEUTRAL AND ALL BONDING CONNECTIONS BETWEEN THE NEUTRAL AND THE ROD.

RECORD 2 OR 4 RESISTANCE READINGS ON DATA SHEET. IF ANY ONE READING IS ABOVE 25 OHMS, CONTACT DPU-E IMMEDIATELY.  
 SEND COMPLETED DATA SHEET TO THE PROJECT ENGINEER AND RECORDS.

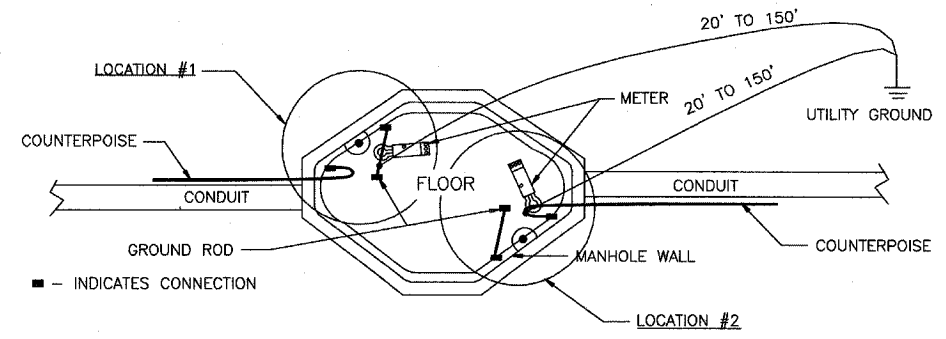
### STANDARD MANHOLE (GROUNDING WITH RODS)



C30-1160 TYPE "E" MANHOLE (UGMH)  
 C30-1170 TYPE "G" MANHOLE (UGMH)  
 C30-1140 TYPE "A" MANHOLE (UGMH)

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### PLACEMENT OF METER FOR READING



UTILITY GROUND:  
 TRANSFORMER CASE  
 SWITCH GEAR CASE  
 FUSE/PLUG CAN CASE  
 NEUTRAL ON CABLE  
 GROUND ON POLE  
 INDEPENDENT GROUND SET

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### DATA SHEET FOR RECORDING GROUND RESISTANCE BY THE FALL OF POTENTIAL METHOD.

INSPECTOR \_\_\_\_\_ LOCATION \_\_\_\_\_ JOB NO. \_\_\_\_\_

TEST INSTRUMENT: \_\_\_\_\_  
 MANUFACTURER: \_\_\_\_\_  
 MODEL NO: \_\_\_\_\_  
 CALIBRATION DATE: \_\_\_\_\_

TEST METHOD USED  
 1) 3 POINT ELECTRODE AC "FALL-OF-POTENTIAL"

LOCATION	TEST METHOD	NO. OF RODS	ROD SIZE & LENGTH	DISTANCE BETWEEN RODS (FT.)	AUX. ELECTRODE TEST POINT (FT.)		RESISTANCE OHMS	REMARKS
					P2	C2		

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### DATA SHEET FOR RECORDING GROUND RESISTANCE MEASUREMENT BY THE CLAMP ON GROUND RESISTANCE TEST METHOD

LOCATION #1	LOCATION #2	INSTALL FEET OF GROUND RODS TOTAL PER LOCATION		INSTALL FEET OF COUNTERPOISE TOTAL PER LOCATION		MEASURED RESISTANCE OF GROUND RODS (OHMS)		MEASURED RESISTANCE OF COUNTERPOISE (OHMS)		MEASURED RESISTANCE OF GROUND RODS AND COUNTERPOISE (OHMS)		SOIL CONDITION i.e. ROCK, CLAY SAND, WET OR DRY		METHOD OF CONNECTION TO GROUND RODS i.e. CADWELD BOLTED, IMPACT, CRIMP.		CURRENT READING (AMPS)	MEASURED WATER LEVEL IN MANHOLE (FT)	REMARKS
		#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2			

NOTE:  
 A HIGH READING INDICATES ONE OR MORE OF THE FOLLOWING:  
 1) POOR GROUND RODS.  
 2) OPEN GROUND CONDUCTOR.  
 3) HIGH RESISTANCE, DUE TO POOR CONNECTIONS ON RODS, HARDWARE & CLAMPS.  
 4) METER CLAMP IS IMPROPERLY CLOSED.  
 5) FAULTY METER.

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DATE: \_\_\_\_\_  
 TYPE OF METER AND MFG.: \_\_\_\_\_  
 MANHOLE NUMBER + TYPE: \_\_\_\_\_  
 POLE NUMBER + SIZE: \_\_\_\_\_  
 STREET ADDRESS: \_\_\_\_\_  
 NAME OF PERSON PERFORMING TEST: \_\_\_\_\_  
 V.F.: \_\_\_\_\_  
 TEMPERATURE (AIR): \_\_\_\_\_  
 SIZE OF GROUND RODS: 5/8 DIA COPPER CLAD, UNLESS NOTED  
 SIZE OF CABLE FOR GROUND WIRE AND/OR COUNTERPOISE IS 4/0 COPPER (BARE) 7 STRAND, UNLESS NOTED

CITY OF NAPERVILLE/DEPARTMENT OF PUBLIC UTILITIES -- ELECTRIC

CALL J.U.L.I.E. 48 HRS. PRIOR TO CONSTRUCTION

PROJECT TITLE <b>BAILEY RD. BRIDGE DUCTBANK INSTALLATION</b>	MAP NO. -	CAD FILE #/NO. 0058199001C17.JWG
PROJECT DESCRIPTION <b>COORDINATED WITH BRIDGE IMPROVEMENT</b>	DRAWN BY <b>JK</b>	PROJECT NO. <b>EU12-06-04</b>
DATE 05-15-07	WORK PERMIT NO. <b>58199</b>	COMPLETED BY
ISSUED	APPN	SCALE <b>NTS</b>
ENGINEER <b>RPS</b>	DATE 5/15/07	SHEET <b>17 OF 23</b>