

APPENDIX G

MANITOBA HYDRO STREET LIGHT DOCUMENTS

MANITOBA HYDRO STREET LIGHT DOCUMENTS

INDEX

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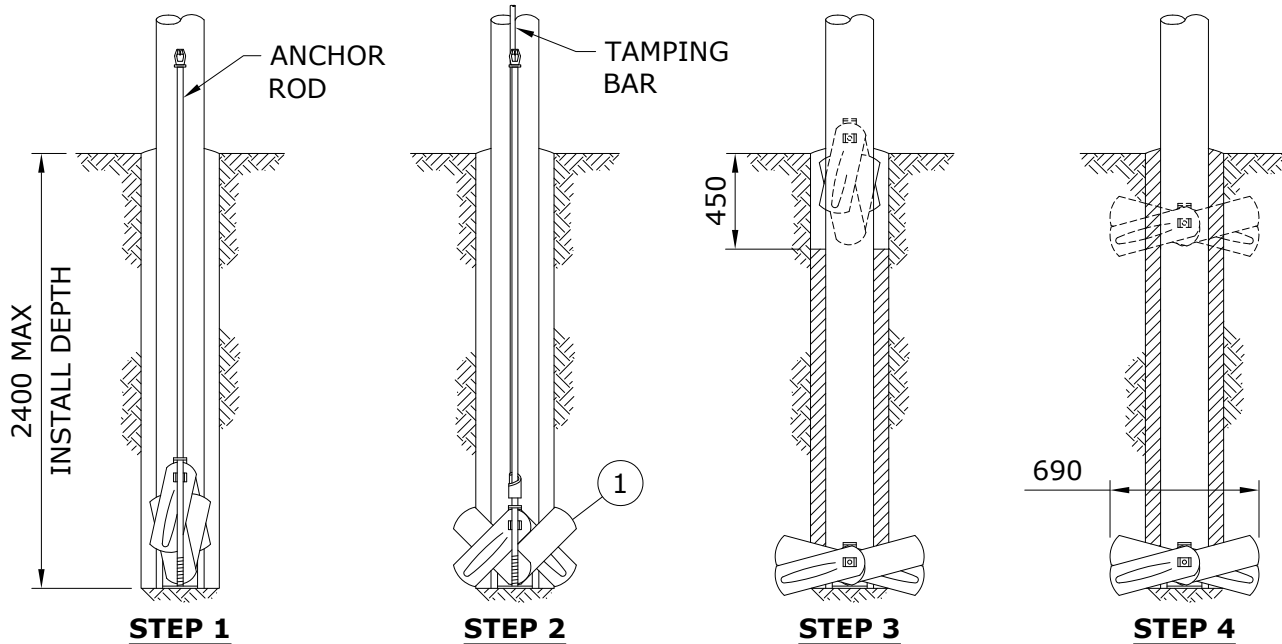
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PART 1: MANITOBA HYDRO ELECTRICAL STANDARDS

INSTALLATION INSTRUCTIONS



- STEP 1:** SCREW A 3/4" ANCHOR ROD (NOT INCLUDED WITH ANCHOR) INTO THE POLE KEY AND LOWER THE ASSEMBLY, IN THE CLOSED POSITION, INTO THE HOLE ON THE SIDE OPPOSITE THE STRAIN.
- STEP 2:** EXPAND THE KEY INTO SOLID EARTH WITH AN EXPANDING/TAMPING BAR.
- STEP 3:** WHEN THE KEY IS FULLY EXPANDED, REMOVE THE ROD AND REFILL HOLE, CAREFULLY COMPACTING SOIL BACKFILL IN STAGES, TO WITHIN 450mm OF THE GROUND LEVEL.
- STEP 4:** INSTALL A SECOND POLE KEY ON THE OPPOSITE SIDE OF THE POLE FROM THE ORIGINAL KEY, AND EXPAND INTO SOLID EARTH WITH A TAMPING BAR.

MATERIAL LIST

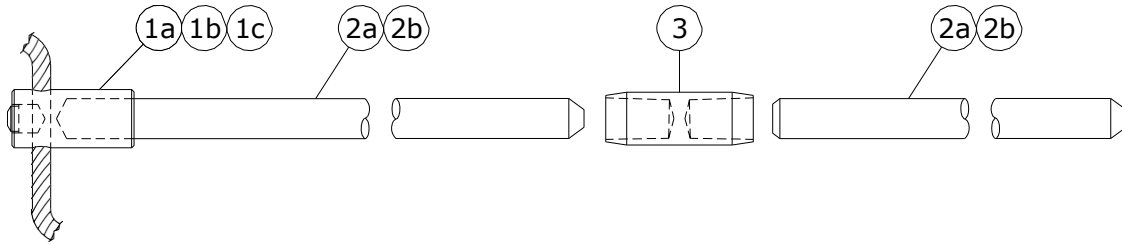
ITEM No.	DESCRIPTION	MH CIIC CODE
1.	EXPANDING POLE KEY, 690mm (27 1/4") EXPANDED WIDTH, 276 sq. in. EXPANDING AREA	02 20 01
2.	ROD, ANCHOR, 3/4" x 7'	71 31 34
3.	BAR, TAMPING, 10'	06 10 60

NOTES:

- USE WITH SLACK SPANS (SEE CD42-30) AND LIGHTLY LOADED POLES WHERE A GUY & ANCHOR CANNOT BE USED (LOADS LESS THAN 3000N).
- POLE KEYS ARE INTENDED FOR USE WITH POLES 60' OR SHORTER.
- WHERE POLE SETTING DEPTH EXCEEDS THE MAXIMUM PRACTICAL INSTALLATION DEPTH, THE HOLE SHOULD BE BACKFILLED AND TAMPED TO MAX DEPTH PRIOR TO INSTALLATION.
- DIMENSIONS SHOWN ARE MILLIMETRES.

APPROVED ORIGINAL DRAWING SEALED BY D.R. ORR 15-10-22	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
	23-12	3	ADDED NOTE 2, 3, & INSTALL DEPTH DIMENSION	COMPONENTS AND INSTALLATION OF EXPANDING POLE KEY ANCHORS	
	17-04	2	REVISED NOTE 1		
	16-12	1	REVISED ANCHOR ROD, STEP 4, ITEM NO. 3, & NOTE 1		
DRAWN C.A.	CHECKED G.D./C.W.	DATE 15-06	CD 44-30		SHT 0001 OF 1
					REV 03

1-04430-DA-24200-0070



COPPERWELD - SECTIONAL

ITEM No.	DESCRIPTION	MH CIIC
1a	HAMMERLOCK FOR #2 & #4 CU	04 60 24
1b	HAMMERLOCK FOR 1/0 & 2/0 CU	06 62 13
1c	HAMMERLOCK FOR 3/0 & 4/0 CU	06 62 14
2a	10' CU-WELD ROD SECTIONAL (SEE NOTE 2)	71 70 10
2b	6' CU-WELD ROD SECTIONAL	00 68 26
3	COUPLING CU-WELD	00 52 27

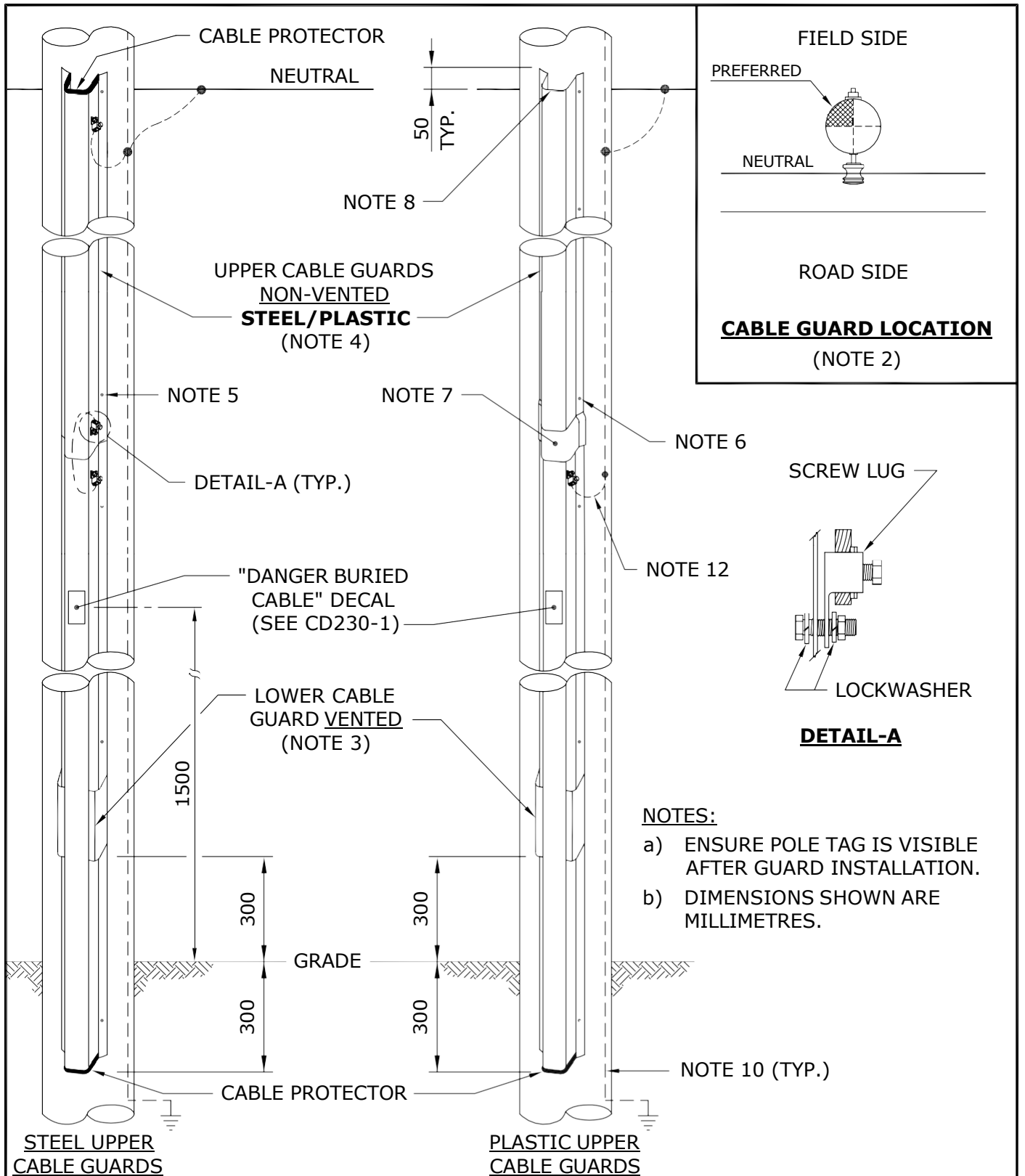
NOTES:

1. FOR 3/4" GROUND RODS. IF A 5/8" GROUND ROD IS ENCOUNTERED, IT IS TO BE REPLACED WITH A 3/4" ROD.
2. FIRST GROUND ROD SHALL BE A 10' ROD.
3. FOR 06-62-14 HAMMERLOCK FOR 3/0 & 4/0 CU WHEN USED ON 3/0 CU, HAMMER DRIVE PIN FLUSH WITH TOP OF CONNECTOR AS PER MANUFACTURER'S INSTRUCTIONS.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 99-01-04

APPROVED ORIGINAL DRAWING SEALED BY D.R. ORR 21-06-01		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
		21-04	4	REVISED ITEM 1b & 1c, ADDED NOTE 3, REMOVED ITEM 4 & 5, RESEALED	GROUND ROD MATERIAL DETAIL				
		13-01	3	ADDED HAMMERLOCK CONNECTOR					
		08-07	2	ADDED ELECTRONIC IGNITER & REVISED TABLE					
DRAWN C.A.		CHECKED G.D.		DATE 21-01		CD 50-7		SHT 0001 OF 1	REV 04

1-04430-DA-56800-0003



SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 15-10-29		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
		23-06	5	ADDED SHEET 3	CABLE GUARD DETAILS ON DIP/RISER POLES				
		16-04	4	REVISED NOTE					
		15-10	3	ADDED NOTE a), RESEALED					
DRAWN C.A.		CHECKED K.S.		DATE 15-10		CD 200-63		SHT 0001 OF 3	REV 05

1-04431-DA-52090-0034

NOTES:

1. FOR CABLE GUARD SELECTION GUIDE, REFER TO DRAWING CD200-66.
2. TO PROVIDE A SAFER CLIMBING SURFACE AND TO PREVENT VEHICULAR DAMAGE TO THE CABLE GUARD, THE PREFERRED ATTACHMENT OF THE CABLE GUARD TO THE POLE SHOULD BE IN THE QUADRANT AS SHOWN.
3. THE LOWER CABLE GUARD SHALL BE GALVANIZED STEEL AND VENTED.
4. UPPER CABLE GUARD SHALL BE PLASTIC FOR THE 50mm & 90mm GUARDS AND GALVANIZED STEEL FOR THE 130mm GUARD.
5. ATTACH GALVANIZED STEEL CABLE GUARD TO POLE WITH 3/8" LAG SCREWS (72-60-03).
6. ATTACH THE PLASTIC CABLE GUARD TO THE POLE WITH #16 x 2" WOOD SCREWS (72-95-10), C/W FLAT WASHERS (86-10-04).
7. POSITION THE LAP-JOINT OF THE PLASTIC CABLE GUARD DOWN & OVER LAPPED A MINIMUM OF 25mm ONTO THE VENTED CABLE GUARD.
8. ENSURE THAT THE INNER EDGE IS BEVELLED.
9. CABLE GUARD TO EXTEND 50mm ABOVE THE NEUTRAL CONDUCTOR.
10. GROUNDING AND BONDING CONDUCTORS SHALL BE #4 BARE COPPER.
11. FOR GROUNDING CONNECTIONS, REFER TO DRAWING CD200-60.
12. BOND VENTED CABLE GUARD AT THIS POINT.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 99-11-03

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 15-10-29	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS			
	23-06	3	ADDED SHEET 3	CABLE GUARD DETAILS ON DIP/RISER POLES			
	16-04	2	ADDED FLAT WASHERS TO NOTE 6				
	15-10	1	RESEALED				
DRAWN C.A.	CHECKED K.S.		DATE 15-10	CD 200-63		SHT 0002 OF 3	REV 03

1-04431-DA-52090-0034

SECONDARY CABLE	TYPICAL USAGE
#4 AL. CONCENTRIC NEUTRAL	STREET LIGHT CIRCUITS
1/0 AL. TRIPLEX	SECONDARY RESIDENTIAL SERVICES AND HEAVILY LOADED STREET LIGHT CIRCUITS WHERE VOLTAGE DROP MAY BE A PROBLEM
4/0 AL. TRIPLEX	SECONDARY RESIDENTIAL SERVICES
350 TRIPLEX	SECONDARY RESIDENTIAL SERVICES
4/0 AL. TRIPLEX	THREE PHASE SECONDARY SERVICES ADD #2 Cu BARE NEUTRAL UP TO 200 AMP
350 AL. QUADRAPLEX	THREE PHASE SECONDARY SERVICES 400 AMP OR 200A OVER 75m
750 AL. OR 1000 CU.	THREE PHASE SECONDARY SERVICES OVER 400 AMPS

NOTE:

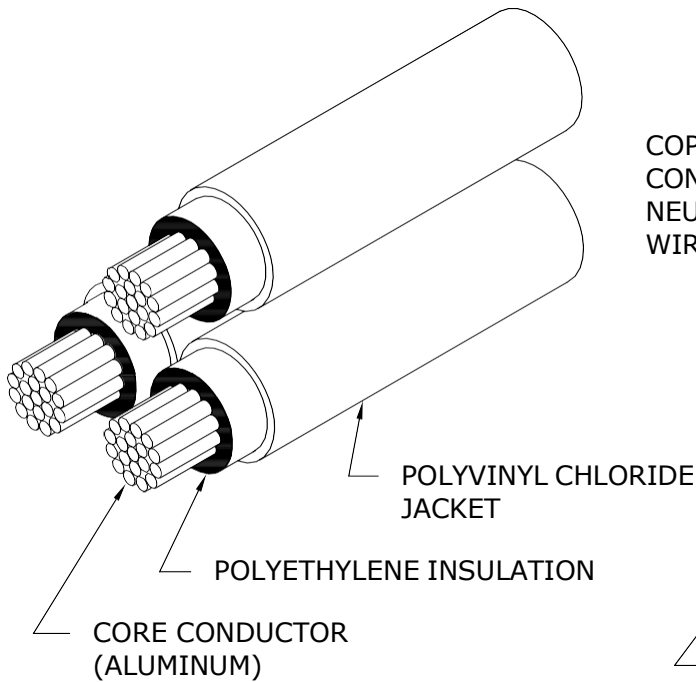
SEE CD225-4 FOR SIZING AND SPACING OF SINGLE AND THREE PHASE CONDUCTORS.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 88-03-29

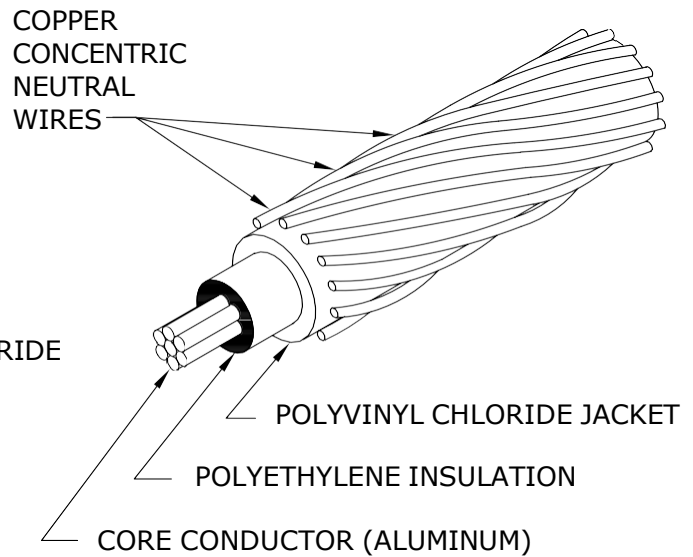
APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 17-01-25	17-01	11	ADDED 4/0 AL TRIPLEX TO TABLE, RESEALED	UNDERGROUND SECONDARY CABLE	
	06-03	10	ADDED NOTE AND 350 TRIPLEX		
	99-04	9	4/0 AL. TRIPLEX, NOTE CHANGED		
DRAWN C.A.	CHECKED K.S.	DATE 17-01		CD 210-12	SHT 0001 OF 2 REV 11

1-04431-DA-58041-0008

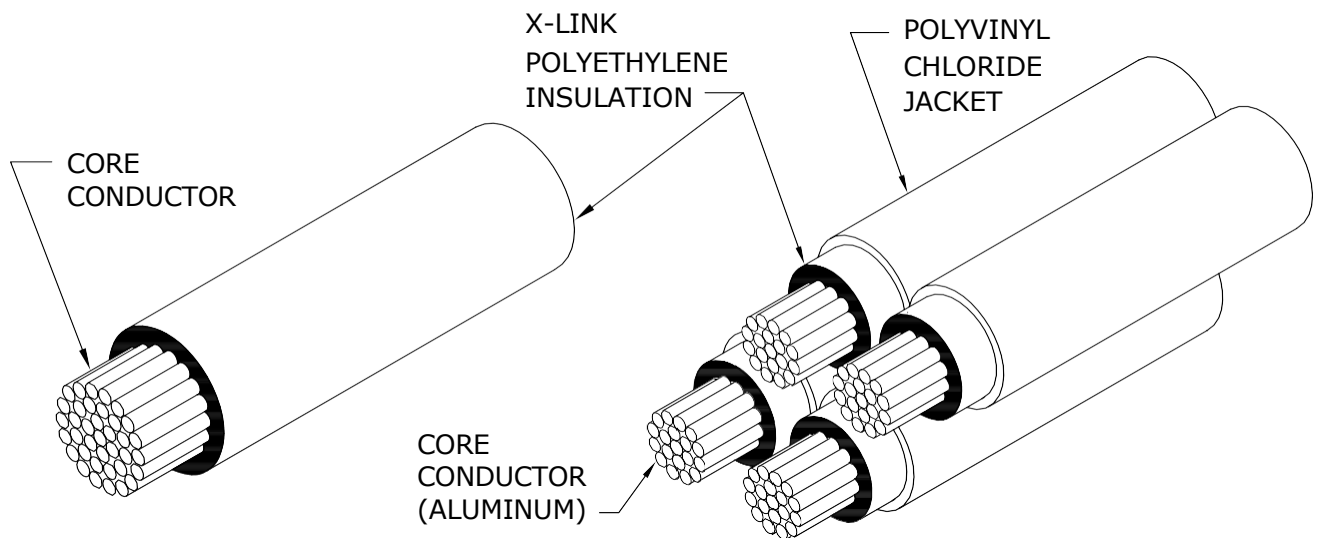
BASIC CONSTRUCTION OF UNDERGROUND SECONDARY CABLES



1/0 & 4/0 AND 350 TRIPLEX



4 CONCENTRIC NEUTRAL CABLE



750 kcmil (AL) & 1000 kcmil (CU) RWU

350 kcmil QUADRAPLEX

APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03		REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS				
		06-03	2	REPLACED 4/0 TRIPLEX WITH 4/0 & 350 TRIPLEX	UNDERGROUND SECONDARY CABLE				
		95-01	1	C/N WIRES NO LONGER TINNED					
		93-07	0	500 MCM DELETED 350 750 kcmil ADDED FORMERLY CD210-3					
DRAWN W.B./CAD		CHECKED B.H.		DATE 93-07		CD 210-12		SHT 0002 OF 2	REV 02

UNDERGROUND SECONDARY CABLE

VOLTAGE RATING	600V	600V	600V	600V	1000V	1000V	1000V
CORE CONDUCTOR SIZE	#4	1/0	4/0	350 kcmil	750 kcmil	1000 kcmil	1000 kcmil
CORE CONDUCTOR MATERIAL	ALUM.	ALUM.	ALUM.	ALUM.	ALUM.	ALUM.	COPPER
TYPE OF CABLE	C/N	TRIPLEX	TRIPLEX	TRIPLEX OR QUADPLEX	1-COND.	1-COND.	1-COND.
NEUTRAL SIZE AND TYPE	#6 CU. Concentric Neutral	1/0 ALUM.	4/0 ALUM.	350 kcmil ALUM.	NONE	NONE	NONE
MIN. BENDING RADIUS (mm)	125	115	150	180	250	300	300
DC RESISTANCE @ 20°C (OHMS/km)	1.360	0.538	0.269	0.163	0.076	0.057	0.035
** DIRECT BURIED AMPACITY (@ 20°C ambient)	125	215	300	420	* 725	* 840	* 1080
VENTED CABLE GUARD AMPACITY (@ 20°C ambient)	100	175	250	330	575	680	855
*** BURIED DUCT AMPACITY (@ 20°C ambient)	70	130	195	265	425	495	630
CONDUCTOR DIAMETER (mm)	5.4	8.9	12.7	15.8	25	26.9	26.9
NOMINAL DIA. OVER INSUL. (mm)	8.6	12.5	16.5	21.6	31.4	33.5	33.5
NOMINAL DIA. OVER JACKET (mm)	12.74	14.7	17.8	22.8	N/A	N/A	N/A
LINEAL MASS (kg/km)	N/A	760	1320	2200/2900	1330	1369	4983
COLD SHRINK END CAPS (MH CIIC)	N/A	15 31 40	15 31 40	15 31 60	15 31 75	15 31 75	15 31 75
HEAT SHRINK END CAPS (MH CIIC)	03 67 31	03 67 31	03 67 31	03 67 30	01 79 82	03 48 63	03 48 63

* PROVIDED MULTIPLE CONDUCTORS PER PHASE ARE SPACED AS SHOWN IN DRAWING CD225-4.

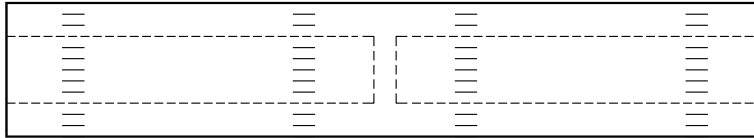
** CABLES DIRECTLY BURIED OUT OF PADMOUNT TRANSFORMERS OR PEDESTALS.

*** CABLES IN NON-VENTED CABLE GUARDS OR IN CONDUITS LONGER THAN 2 METRES.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 16-03-30		REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS					
		17-01	5	REVISED TABLE	STANDARD UNDERGROUND SECONDARY CABLE DATA					
		16-03	4	ADDED 1000 kcmil ALUM. COND., REVISED DATE, RESEALED						
		08-12	3	ADDED COLD & HEAT SHRINK CAPS AND LINEAL MASS TO TABLE						
DRAWN C.A.		CHECKED J.R.		DATE 16-03		CD 210-15			SHT 0001 OF 1	REV 05

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- FOR SPLICING SECONDARY ALUMINUM/COPPER CONDUCTORS.
- NOT SUITABLE FOR USE ON PRIMARY CONDUCTORS.
- COMPLETE WITH BARRIER TO PREVENT MOISTURE MIGRATION.
- FILLED WITH SYNTHETIC INHIBITOR.
- STAMPED WITH CONDUCTOR AND DIE SIZE.
- **COMPRESSION TOOL DIE MUST MATCH DIE NUMBER STAMPED ON CONNECTOR.**
- WIRE BRUSH ALL CONDUCTORS PRIOR TO INSTALLING CONNECTOR.

*** UNDERGROUND SECONDARY CABLE COMPRESSION CONNECTORS**

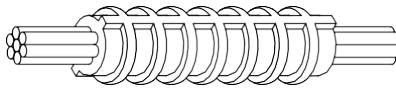
CONDUCTOR SIZE		STORES CODE	TOOL (DIES)	
FROM	TO		PREFERRED	ALTERNATE
#4	#4	74 27 64	Y35 (UCSA 22)	** MD6 (WCSA 22, BG)
1/0	#2	74 27 30		
1/0	1/0	74 27 65		
4/0	1/0	74 27 67	Y35 (UCSA 24)	** MD6 (WCSA 24, 249)
4/0	4/0	74 27 68		
350	4/0	74 27 78	Y35 (UCSA 28)	---
350	350	74 27 72		
750	500	74 27 27	Y46/ADPT (UCSA 30)	---

* FOR CONNECTING INSULATED ALUMINUM TO BARE COPPER, REFER TO DRAWING CD215-13.

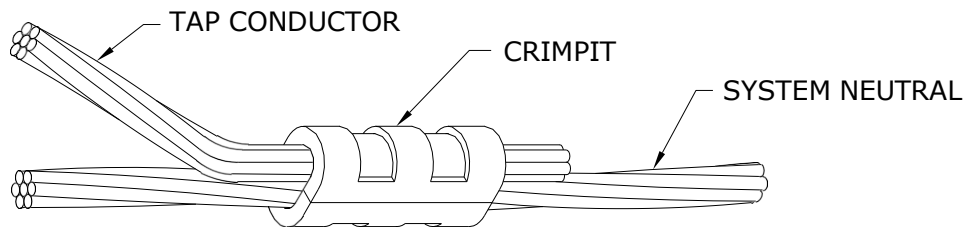
** ROTATE MD6 TOOL 180° AFTER EVERY CRIMP.

APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS			
				UNDERGROUND SECONDARY CABLE COMPRESSION CONNECTORS			
	95-09	2	350-4/0 CONNECTOR ADDED				
	95-01	1	NOTE ON MD6 TOOL ADDED				
DRAWN W.B./CAD	CHECKED G.W.	DATE 93-07	CD 210-21			SHT 0001 OF 1	REV 02

- COMPRESSION TOOL DIE MUST MATCH DIE NUMBER STAMPED ON CONNECTOR.
- WIRE BRUSH CONDUCTORS PRIOR TO INSTALLING COMPRESSION CONNECTORS.



UNDERGROUND NEUTRAL COMPRESSION CONNECTORS			
CONDUCTOR SIZE		STORES CODE	TOOL (DIES)
FROM	TO		
#4	#4	74 32 04	MD6 (162)
#2	#2	74 32 02	MD6 (163)
2/0	2/0	74 31 26	MD6 (166)
4/0	4/0	74 31 28	Y35 (168)
350	350	74 32 31	Y35 (267)



UNDERGROUND NEUTRAL "C" TYPE (CRIMPIT) COMPRESSION CONNECTORS * (FOR USE ON COPPER CONDUCTORS ONLY)			
CONDUCTOR SIZE		STORES CODE	TOOL (DIES)
RUN	TAP		
#6 - #4	#6	74 41 10	MD6 (BG)
#4	#4	74 40 90	MD6 (BG)
#2	#4	74 40 80	MD6 (WC)
#2	#2	74 40 70	MD6 (WC)
1/0 - 2/0	1/0 - 2/0	74 41 12	Y35 (UO)
3/0 - 250	#6 - 2/0	74 41 15	Y35 (U997)
3/0 - 250	3/0 - 250	74 41 16	Y35 (U997)
300 - 500	#6 - 2/0	54 23 60	Y46 (P1011)
300 - 500	3/0 - 250	18 30 74	Y46 (P1011)

* FOR CONNECTING BARE COPPER TO INSULATED ALUMINUM, REFER TO DRAWING CD215-13.

APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS			
	10-12	2	ADDED CONNECTOR	UNDERGROUND NEUTRAL COMPRESSION CONNECTORS			
	95-01	1	NOTES REARRANGED				
	93-07	0	CONNECTORS ADDED, FORMERLY CD210-8				
DRAWN W.B./CAD	CHECKED K.C.H.		DATE 93-07	CD 210-24		SHT 0001 OF 1	REV 02

THERE ARE THREE METHODS FOR SPLICING 600 VOLT UNDERGROUND SECONDARY CABLES:

- 1) HEAT SHRINK INSULATING TUBING SPLICE
- 2) PRE-STRETCHED INSULATING TUBING SPLICE
- 3) TAPED SPLICE

750 kcmil AND 1000 kcmil CABLES, USED IN CONJUNCTION WITH 3-PHASE COMMERCIAL SERVICES, SHALL NOT BE SPLICED, EXCEPT FOR EMERGENCY REPAIRS.

GENERAL INSTRUCTIONS:

1. a) FOR 1/0 AND 4/0 TRIPLEX CABLES:

- REMOVE ANY DAMAGED OR CONTAMINATED PORTIONS OF CABLE.
- TRAIN CABLES INTO FINAL POSITION (DO NOT SNAKE IN TRENCH).
- CUT CABLES SQUARE AND BUTT ENDS.
- STAGGER SPLICES.
- PROCEED TO STEP 2.

b) FOR #4 CONCENTRIC NEUTRAL CABLE:

- REMOVE ANY DAMAGED OR CONTAMINATED PORTIONS OF CABLE.
- TRAIN CABLES INTO FINAL POSITION WITH ENDS OVERLAPPING C/L BY 150mm.
- TIGHTLY TWIST CONCENTRIC NEUTRAL WIRES INTO A BUNDLED CONDUCTOR FOR APPROXIMATELY 250mm AND TEMPORARILY FOLD BACK.
- CUT OFF APPROXIMATELY 100mm OF CABLE FROM EACH END.
- PROCEED TO STEP 2.

2. SELECT APPROPRIATE SLEEVE AND DIE ACCORDING TO DRAWING CD210-21.

3. SELECT SPLICING METHOD (FOR CORRECT MANUFACTURED SPLICES, REFER TO TABLE ON SHEET 2 of 3).

NOTE:

FOR SPLICING BARE COPPER NEUTRAL WIRE TO INSULATED ALUMINUM CABLE, REFER TO DRAWING CD215-13.

4. REMOVE JACKET AND INSULATION FROM CABLES AS PER FIGURE 1 OR FOLLOW MANUFACTURERS INSTRUCTIONS; BE CAREFUL NOT TO NICK INSULATION OR CONDUCTOR.

5. CLEAN CONDUCTOR WITH WIRE BRUSH. INSTALL CONNECTOR.

NOTE:

EXCEPT FOR TAPED SPLICE, SLIDE TUBING OVER ONE CONDUCTOR BEFORE INSTALLING CONNECTOR.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 17-10-11		REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS				
		17-10	3	REMOVED RAYCHEM RAYVOLVE SPLICING, RESEALED	SPLICES FOR UNDERGROUND SECONDARY CABLES				
		96-05	2	NOTES REVISED, SHEET 3 ADDED					
		95-01	1	NOTES 3, 7 & TABLE ADDED					
DRAWN C.A.		CHECKED K.S.		DATE 17-10		CD 215-12		SHT 0001 OF 3	REV 03

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6. CLEAN JACKET (50mm), INSULATION, AND CONNECTOR WITH AN APPROVED CLEANING SOLVENT (S.C.# 43 11 95).

7. COMPLETE SELECTED SPLICE (AS CHOSEN IN STEP 3).

NOTE:

TO COMPLETE #4 CONCENTRIC NEUTRAL SPLICE, PROCEED TO STEP 8.

8. FOR #4 CONCENTRIC NEUTRAL CABLE: (CONT'D)

- a) APPLY 1 LAYER OF 1/4 STRETCHED 50mm WIDE RUBBER MASTIC TAPE (S.C.#78 55 28) OVER CENTRE OF COMPLETED SPLICE.
- b) TRAIN TWISTED CONCENTRIC NEUTRAL WIRE (STEP 1b) INTO FINAL POSITION ALLOWING ADEQUATE CLEARANCE FOR MD6 PRESS.
- c) PLACE "C" TYPE COMPRESSION CONNECTOR OVER TWISTED WIRES AND CRIMP. REFER TO DRAWING CD210-24.
- d) TRIM OFF PROTRUDING WIRES AND COMPRESS WITH PLIERS ELIMINATING ANY SHARP ENDS.
- e) APPLY A 100mm STRIP OF 50mm WIDE RUBBER MASTIC TAPE OVER CONNECTOR AND PROTRUDING WIRES.

NOTE:

SHINY SIDE AGAINST CONNECTOR AND THE 100mm LENGTH PARALLEL TO CONNECTOR AND WIRE.

- f) FORM TAPED CONCENTRIC NEUTRAL CONNECTION AND WIRES AROUND SPLICE AND CABLE.
- g) APPLY 2 LAYERS 3/4 STRETCHED COLD WEATHER VINYL TAPE (S.C.#78 55 98) OVER TAPED CONCENTRIC NEUTRAL CONNECTION AND SPLICE, APPROXIMATELY 50mm WIDE.

MANUFACTURED SPLICES FOR SECONDARY CABLES		
CONDUCTOR SIZE	TYPE OF SPLICE	STORES CODE
#4 TO 1/0	PRESTRETCHED	85 13 10
4/0 TO 350	PRESTRETCHED	85 13 40
	HEAT SHRINK	85 13 50

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 17-10-11		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
		17-08	4	REVISED TABLE, RESEALED	SPLICES FOR UNDERGROUND SECONDARY CABLES				
		15-02	3	REMOVED RAYVOLVE SPLICE FROM TABLE					
		08-03	2	REVISED TABLE AND NOTE 6					
DRAWN C.A.		CHECKED K.S.		DATE 17-08		CD 215-12		SHT 0002 OF 3	REV 04

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FOR TAPED SPLICE

TAPES SHALL ONLY BE APPLIED DIRECTLY FROM ROLL ONTO SPLICE, HALF LAPPED AND STRETCHED TO 3/4 OF THEIR ORIGINAL WIDTH.

1. APPLY 3 LAYERS OF SELF-AMALGAMATING ETHYLENE PROPYLENE RUBBER (E.P.R.) TAPE (S.C.#78 55 23) AS PER FIGURE 2.
2. APPLY 2 LAYERS OF COLD WEATHER VINYL TAPE (S.C.#78 55 98) AS PER FIGURE 2.

OR

APPLY 3 LAYERS OF SELF-AMALGAMATING HIGH TEMPERATURE SILICONE TAPE (S.C.#03 74 67). VINYL TAPE IS NOT REQUIRED.

NOTE:
DIMENSIONS SHOWN
ARE MILLIMETRES.

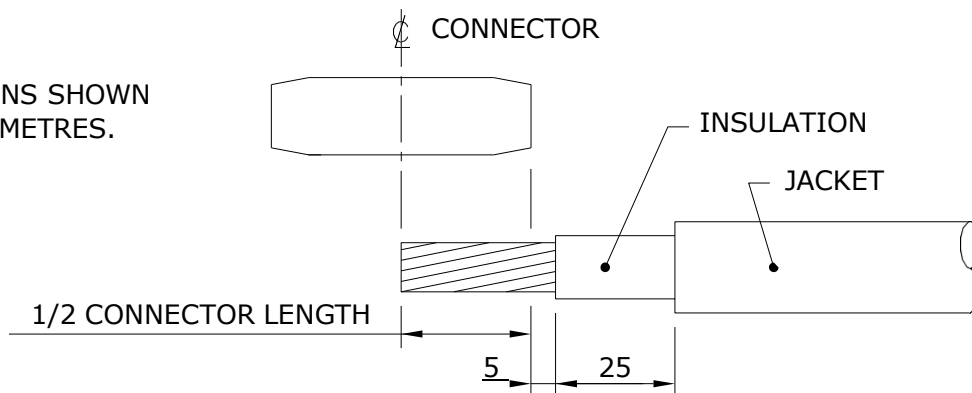


FIGURE 1

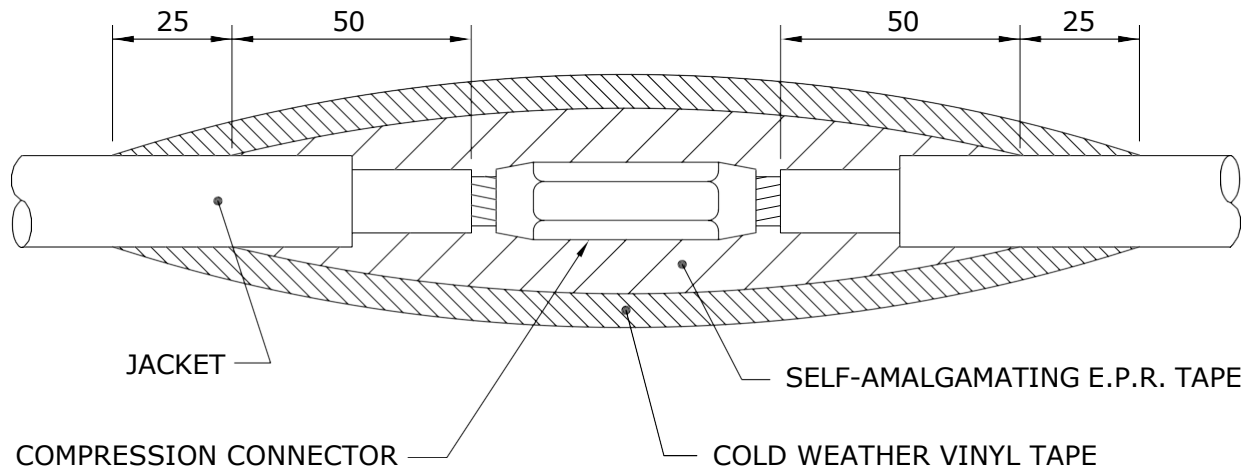


FIGURE 2

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 97-01-08

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 17-10-11		REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS				
					SPLICES FOR UNDERGROUND SECONDARY CABLES				
		17-10	2	RESEALED					
		10-12	1	REVISED COMPRESSION CONNECTOR AND NOTE 2					
DRAWN C.A.		CHECKED K.S.		DATE 17-10		CD 215-12		SHT 0003 OF 3	REV 02

CABLE PREPARATION:

- ① REMOVE PVC (POLYVINYL CHLORIDE) JACKET TO DIMENSION "A" PLUS 25mm.
- ② REMOVE POLYETHYLENE INSULATION TO DIMENSION "A" PLUS 5mm.
USE ABRASIVE TAPE (SC. 78 50 04) ON ALL CONNECTON SURFACES.
- ③ INSTALL ROD CONNECTOR AS PER TABLE BELOW AND FIGURE 1.

CONDUCTOR SIZE	* ROD CONNECTOR STORES CODE No.	PRESS	DIE
1/0 ALUMINUM	74 27 62	Y35/MD6	CSA 22
4/0 ALUMINUM	74 27 69	Y35/MD6	CSA 24

* ROD IS FACTORY CRIMPED INTO CONNECTOR

- ④ CONNECT BARE COPPER STRANDED WIRE TO ROD CONNECTOR AS PER TABLE BELOW. USE ABRASIVE TAPE ON ALL CONNECTON SURFACES.

CONDUCTOR SIZE	CONNECTOR STORES CODE No.	PRESS	DIE
COPPER ROD TO #4 COPPER STRANDED	74 40 90	Y35/MD6	WBG
COPPER ROD TO #2 COPPER STRANDED	74 40 70	MD6	WC

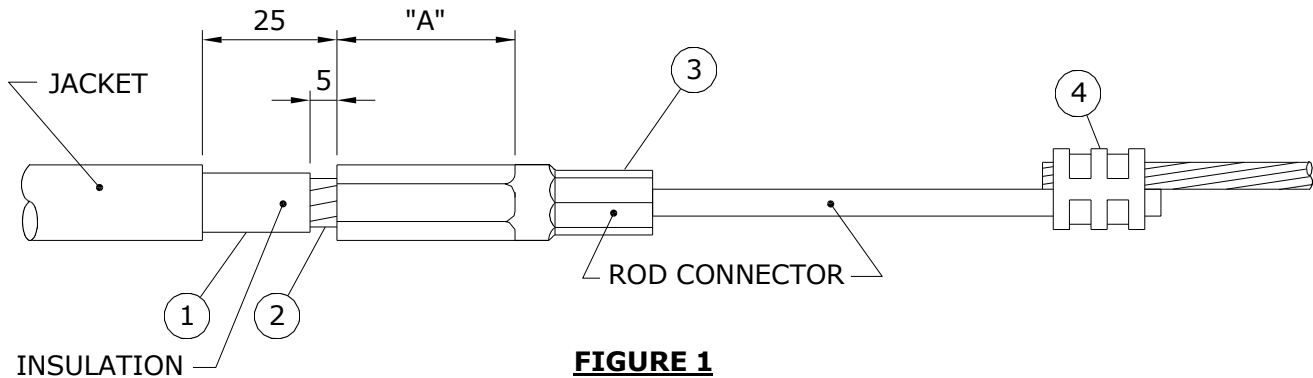


FIGURE 1

NOTE: DIMENSIONS SHOWN ARE MILLIMETRES.

APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
	08-11	2	SPLICING SECONDARY NEUTRAL (BARE COPPER TO INSULATED ALUMINUM)	
	94-10	1		
DRAWN W.B./CAD	CHECKED B.H./K.C.H.	DATE 94-06	CD 215-13	
			SHT 0001 OF 2	REV 02

TAPING:

- ⑤ ABRASE ROD PORTION OF ROD CONNECTOR WITH ABRASIVE TAPE AS SHOWN IN FIGURE 2.
- ⑥ CLEAN JACKET, INSULATION & ROD CONNECTOR WITH AN APPROVED CLEANING SOLVENT (S.C.# 43 11 95).
- ⑦ CUT ONE PIECE OF RUBBER MASTIC TAPE (S.C. 78 55 28) INTO EITHER A 50mm WIDE x 75mm LONG STRIP FOR 1/0 CONNECTOR OR A 50mm WIDE x 125mm LONG STRIP FOR 4/0 CONNECTOR.
- ⑧ APPLY THE PRECUT STRIP OF RUBBER MASTIC TAPE 1/4 STRETCHED, SHINING SIDE DOWN ONTO THE ROD AS SHOWN IN FIGURE 2.
- ⑨ APPLY 2 LAYERS OF HALF LAPPED 3/4 STRETCHED SELF AMALGAMATING ETHYLENE PROPYLENE RUBBER TAPE (S.C.# 78 55 23) AS SHOWN IN FIGURE 2.
- ⑩ APPLY 2 LAYERS OF HALF LAPPED 3/4 STRETCHED COLD WEATHER VINYL TAPE (S.C.# 78 55 98) AS SHOWN IN FIGURE 2.

NOTE:

WHEN INSTALLING A MANUFACTURED SPLICE INCLUDE STEPS 5 THRU 8 WITH THE MANUFACTURERS INSTRUCTIONS. THIS WILL PROVIDE THE PROPER INSULATION AND MOISTURE SEAL.

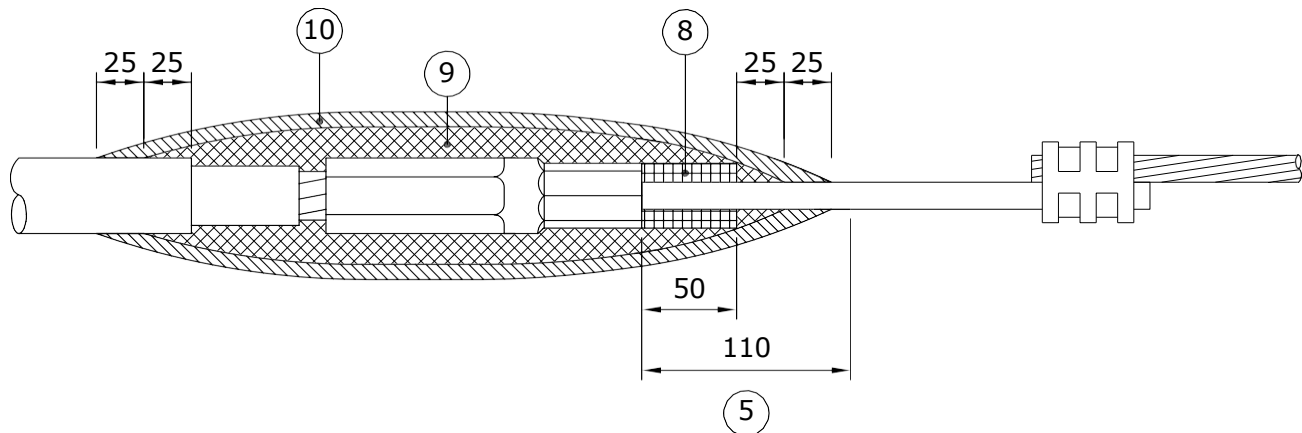
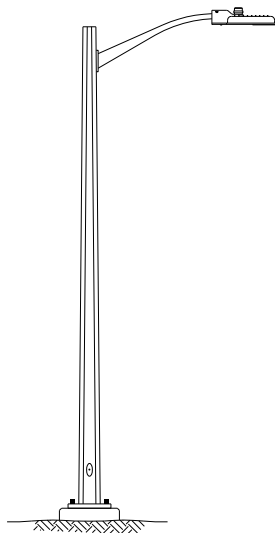


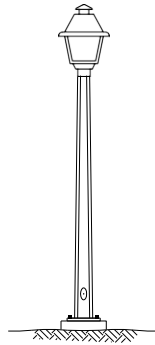
FIGURE 2

NOTE: DIMENSIONS SHOWN ARE MILLIMETRES.

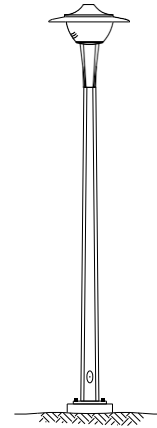
APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03		REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS				
					SPLICING SECONDARY NEUTRAL (BARE COPPER TO INSULATED ALUMINUM)				
		08-11	2	REVISED NOTE 6 & COMPRESSION CONNECTOR					
		94-10	1	TAPING PROCEDURE REVISED					
DRAWN W.B./CAD		CHECKED K.C.H.		DATE 94-06		CD 215-13		SHT 0002 OF 2	REV 02



STRAIGHT SHAFT



**POST-TOP BM
COLONIAL**
(BASE MOUNTED)



**POST-TOP BM
CONTEMPORARY**
(BASE MOUNTED)

POLE TYPE	COLOUR	MOUNTING HEIGHT m (ft)	ARM REACH m **	BOLT SQUARE mm	BOLT CIRCLE mm	STORES CODE NO.	CABLE LENGTH m ***
STRAIGHT SHAFT	GALVANIZED	7.7 (25)	1.8	179 - 206 (SLOTTED)	254 - 292 (SLOTTED)	05-05-78	11
STRAIGHT SHAFT *	GALVANIZED	9.1 (30)	3.0	197 - 206 (SLOTTED)	279 - 292 (SLOTTED)	05-05-79	14
STRAIGHT SHAFT	GALVANIZED	10.7 (35)	3.0	206	292	05-05-80	15
STRAIGHT SHAFT ****	GALVANIZED	10.7 (35)	3.0	206	292	06-02-01	15
STRAIGHT SHAFT	GALVANIZED	13.7 (45)	3.0	243	343	05-05-81	18
STRAIGHT SHAFT	GALVANIZED	16.8 (55)	1.8	N/A	483	75-46-55	20
STRAIGHT SHAFT	GALVANIZED	19.8 (65)	1.8	N/A	483	75-46-65	23
POST-TOP BM COLONIAL	BLACK POWDER COAT	4.7 (15)	N/A	179 - 206 (SLOTTED)	254 - 292 (SLOTTED)	75-41-15	6
POST-TOP BM CONTEMPORARY	GALVANIZED	6.1 (20)	N/A	179 - 206 (SLOTTED)	254 - 292 (SLOTTED)	75-41-22	7

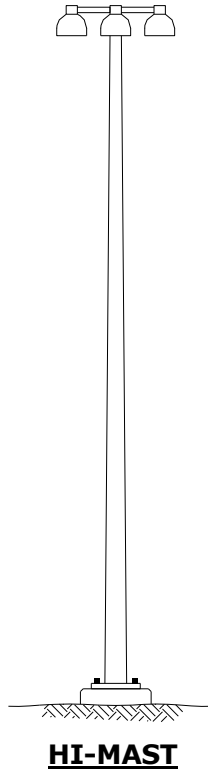
NOTES:

- * FOR REPLACEMENT PURPOSES; NOT TO BE USED FOR NEW INSTALLATIONS.
- ** DO NOT MOUNT ALUMINUM ARM ON 16.8m AND 19.8m. DO NOT USE ALUMINUM ARMS WITH 1000W HPS LUMINAIRES. STRAIGHT SHAFT POLES CAN ACCOMMODATE A MAXIMUM OF 2 ARMS.
- *** LENGTH OF 2 CONDUCTORS #12 CABLE REQUIRED PER POLE.
- **** POLE INCLUDES A 1 1/8" DIAMETER HOLE AT 5m (STREET SIDE) FOR DECORATIVE LIGHTING RECEPTACLE. WIRE AS PER CD315-24.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 89-04-28

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS			
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 21-07-30	21-07	4	ADDED STRAIGHT SHAFT, REMOVED DAVIT BM & SQUARE BM, REVISED NOTES, RESEALED	STANDARD STEEL STREET LIGHT POLES			
	13-01	3	ADDED CONTEMPORARY AND COLONIAL POLES				
	DRAWN	CHECKED	DATE				
C.A.	L.D.	21-07		CD 300-1		SHT	REV
						0001 OF 1	04

1-04431-DA-25620-0001



POLE TYPE	COLOUR	MOUNTING HEIGHT m (ft)	ARM REACH m	BOLT SQUARE mm	BOLT CIRCLE mm	STORES CODE NO.	CABLE LENGTH m
HI-MAST	GALVANIZED	30.5 (100)	N/A	PER DESIGN	PER DESIGN	N/A	N/A

NOTE:

HI-MAST POLES ARE DESIGNED PER INSTALLATION.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 89-04-28

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS			
	21-07	3	REMOVED STRAIGHT SHAFT, UPDATED NOTES	NON-STANDARD STREET LIGHT POLES			
	18-04	2	ADDED SHEET 2, TABLE & NOTES, RESEALED				
	92-11	1	CHANGE ALUM. TO STEEL ARM				
DRAWN C.A.	CHECKED J.R.	DATE 18-04		CD 300-2		SHT 0001 OF 2	REV 03

1-04431-DA-25620-0002

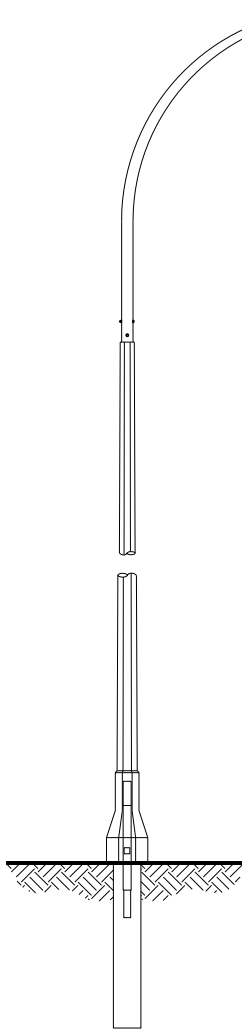
THERE ARE A NUMBER OF STYLES AND TYPES OF STREET LIGHT POLES WHICH HAVE BEEN USED, IN LIMITED QUANTITIES, IN ORDER TO MEET ROADWAY LIGHTING REQUIREMENTS IN SPECIAL CIRCUMSTANCES.

DAVIT TYPE STREET LIGHT POLES WITH DOUBLE AND TRIPLE ARM ARRANGEMENTS HAVE BEEN PURCHASED TO LIGHT INTERSECTIONS WITH UNUSUAL ROADWAY CONFIGURATIONS. STRAIGHT SHAFT ALUMINUM POLES WITH TAPERED ALUMINUM BRACKET ARMS HAVE BEEN USED FOR BRIDGE LIGHTING AND IN OTHER CIRCUMSTANCES, PRIMARILY FOR ESTHETIC REASONS.

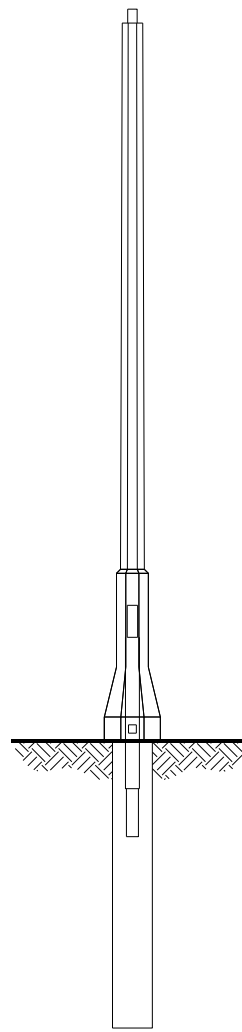
SPECIAL STREET LIGHT POLES HAVE BEEN USED AT LARGE HIGHWAY INTERCHANGES AND ON MAJOR ROADWAYS WHERE HIGHER MOUNTING HEIGHTS CAN BE USED EFFECTIVELY TO DRASTICALLY REDUCE THE NUMBER OF POLES WHICH WOULD OTHERWISE BE REQUIRED. THE TWO MOST COMMON STYLES OF POLES USED TO ACHIEVE SUCH HIGHER MOUNTING HEIGHTS (i.e. 16.8m, 19.8m AND 30.5m).

NON-STANDARD STREET LIGHT POLES ARE, ON OCCASION, AVAILABLE FROM CENTRAL STORES, BUT GENERALLY, NON-STANDARD STREET LIGHT POLES MUST BE PURCHASED AS REQUIRED.

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS			
			NON-STANDARD STREET LIGHT POLES			
DRAWN C.A.	CHECKED L.D.	DATE 18-04	CD 300-2		SHT 0002 OF 2	REV 00



DAVIT DB
(DIRECT BURIAL)



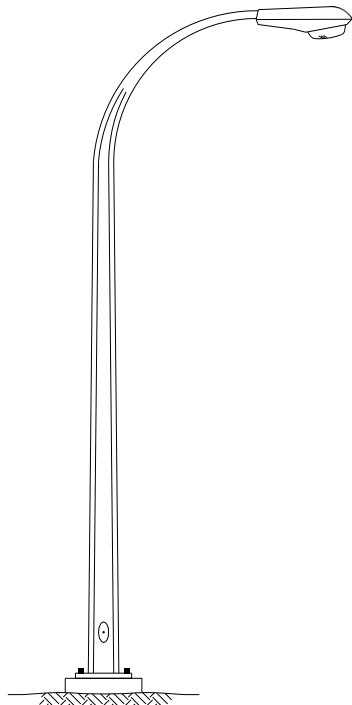
POST-TOP DB
(DIRECT BURIAL)

POLE TYPE	COLOUR	MOUNTING HEIGHT m (ft)	ARM REACH m	STORES CODE NO.	CABLE LENGTH m *
POST-TOP DB	BLACK	4.7 (15)	N/A	03 67 39	6
DAVIT DB	BLACK	11.3 (37)	3.0	03 65 29	15
DAVIT DB	BLACK	13.7 (45)	3.0	03 65 30	18

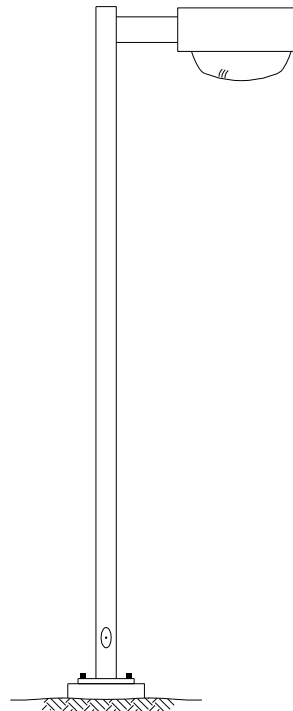
NOTES:

* LENGTH OF 2 CONDUCTORS #12 CABLE REQUIRED PER POLE.

APPROVED ORIGINAL DRAWING SEALED BY D.R. ORR 13-02-12	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
			STANDARD CONCRETE STREET LIGHT POLES	
DRAWN C.A.	CHECKED L.D./D.O.	DATE 13-01	CD 300-3	SHT 0001 OF 1
				REV 00



DAVIT BM
(BASE MOUNTED)



SQUARE BM
(BASE MOUNTED)

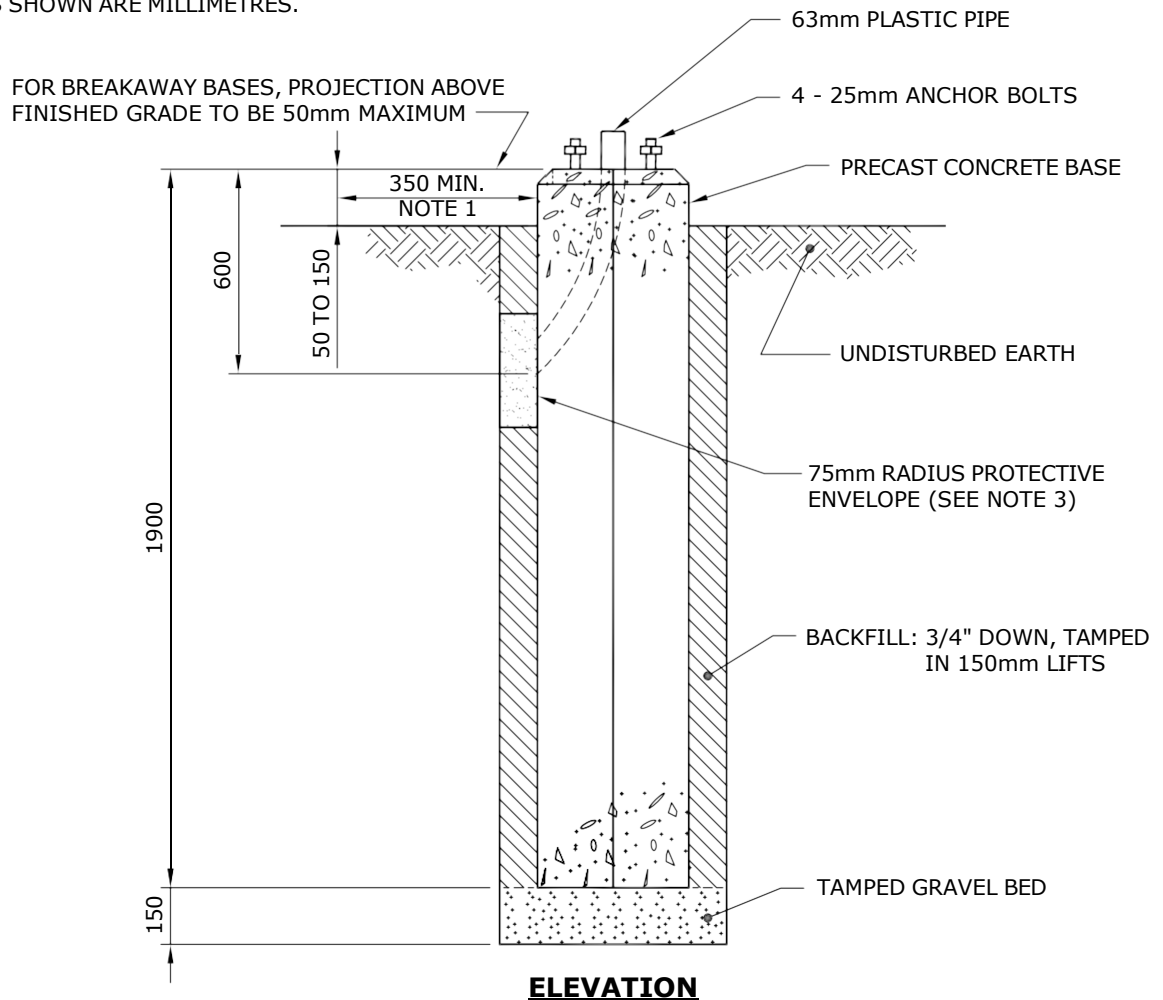
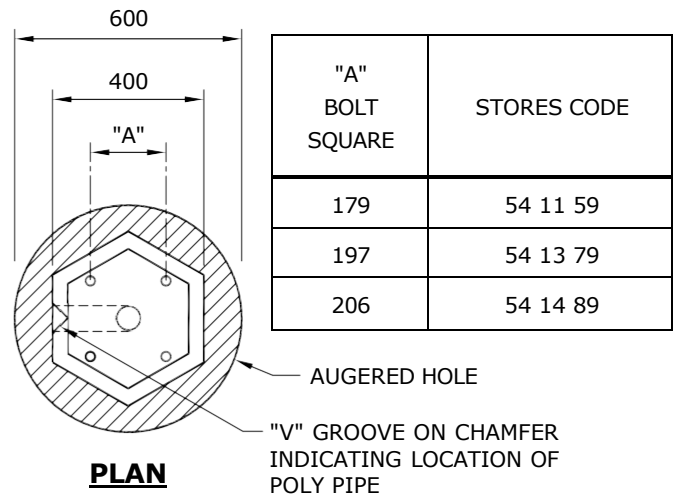
POLE TYPE	COLOUR	MOUNTING HEIGHT m (ft)	ARM REACH m	BOLT SQUARE mm	BOLT CIRCLE mm	STORES CODE NO.	CABLE LENGTH m
DAVIT BM	GALVANIZED	7.7 (25)	1.8	179	254	75 42 26	11
DAVIT BM	GALVANIZED	9.1 (30)	2.4	197	279	75 43 30	13
DAVIT BM	GALVANIZED	10.7 (35)	3.0	206	292	75 44 36	15
DAVIT BM	GALVANIZED	13.7 (45)	3.0	243	343	75 46 45	18
SQUARE BM	DARK BRONZE	6.1 (20)	0.5	179	254	75 42 20	8
SQUARE BM	DARK BRONZE	10.7 (35)	0.5	206	292	75 45 30	14

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 21-07-30	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
			DISCONTINUED STREET LIGHT POLES	
DRAWN C.A.	CHECKED L.D.	DATE 21-07	CD 300-4	SHT 0001 OF 1
				REV 00

7.7 - 10.7 STREET LIGHT POLES

NOTES:

1. FOR FUTURE ACCESS TO LOWER PORTION OF PLASTIC PIPE, LOCATE "V" GROOVE SIDE OF BASE TO ROADWAY PROVIDED THAT:
 - a) A MIN. HORIZONTAL SEPARATION OF 350mm IS MAINTAINED TO ANY PAVED SURFACE OR STRUCTURE; OR
 - b) IF LESS THAN 350mm, ROTATE BASE 90°
2. ROUTE UNDERGROUND CABLES DIRECTLY INTO PLASTIC PIPE.
3. IN BACKFILL AREA, ENCASE UNDERGROUND CABLES IN A 75mm RADIUS ENVELOPE OF EXCAVATED MATERIAL OR SAND TO PROTECT CABLES. DO NOT BACKFILL WITH EXCAVATED MATERIAL OR SAND MORE THAN 1/6 OF THE WAY AROUND BASE.
4. SEE CD300-9 FOR ANCHOR ROD TIGHTENING METHOD.
5. DIMENSIONS SHOWN ARE MILLIMETRES.

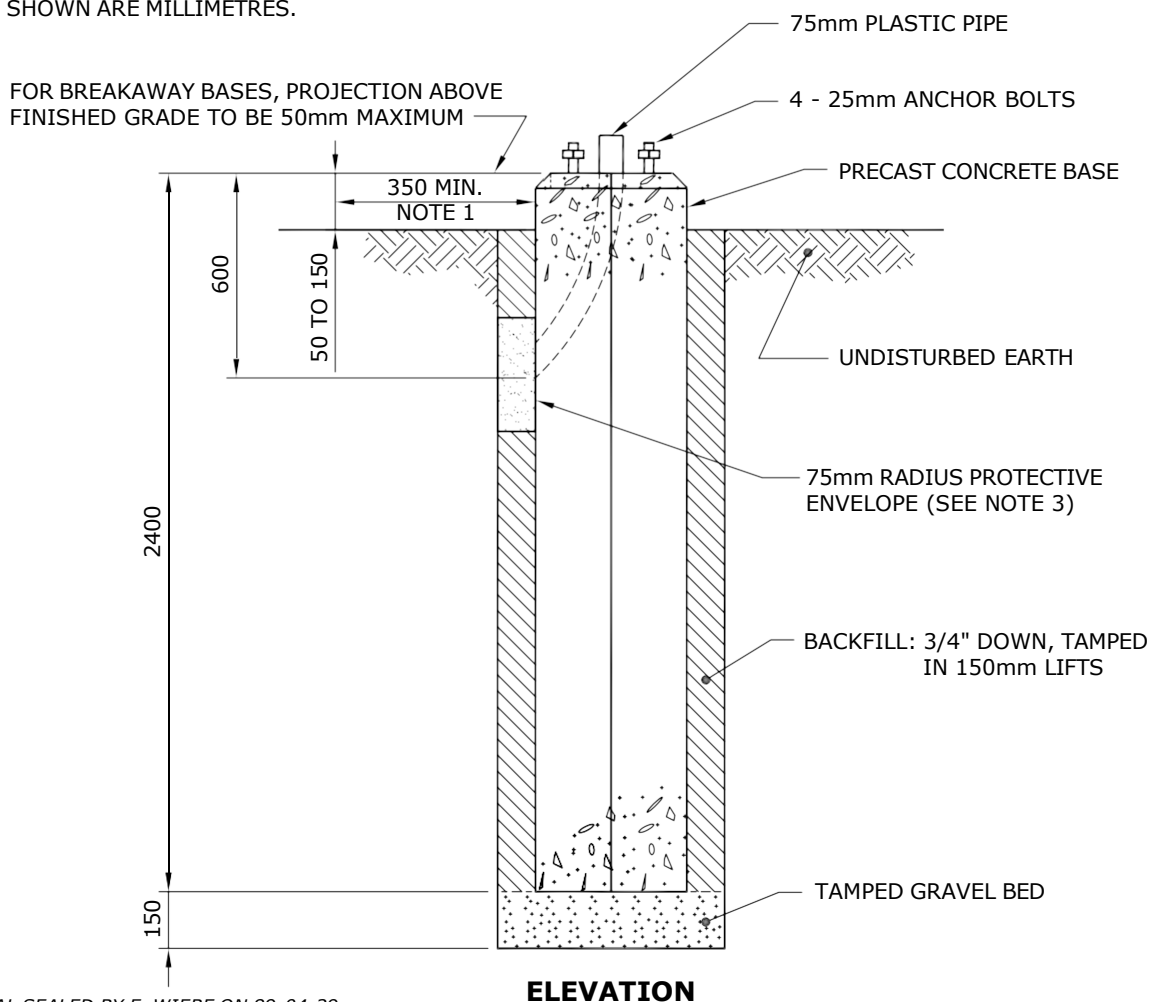


APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-29	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS			
	10-08	3	CHANGED BACKFILL NOTES, AND ADDED SHEET 3	INSTALLATION OF PRECAST CONCRETE BASE			
	99-05	1	SHEET 2 of 2 ADDED, 7.7 - 10.7 STREET LIGHT ADDED				
	96-10	1	V-GROOVE LOCATION, POLY PIPE SIZE NOTES CHANGED				
DRAWN W.B./CAD	CHECKED L.D./K.C.H.		DATE 88-06	CD 300-6		SHT 0001 OF 3	REV 03

1-04431-DA-24620-0001

NOTES:

-
- The diagram shows a bolt square with a hexagonal center. The overall width is 600. The width of the hexagonal center is 450. The width of the hexagonal center is labeled "A". The diagram also shows a cross-section of a pipe with a hexagonal hole. The hole is labeled "AUGERED HOLE". The hole is labeled "V" GROOVE ON CHAMFER INDICATING LOCATION OF POLY PIPE.
- | | |
|-----------------------|-------------|
| "A"
BOLT
SQUARE | STORES CODE |
| 243 | 00 06 67 |



SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 89-04-29

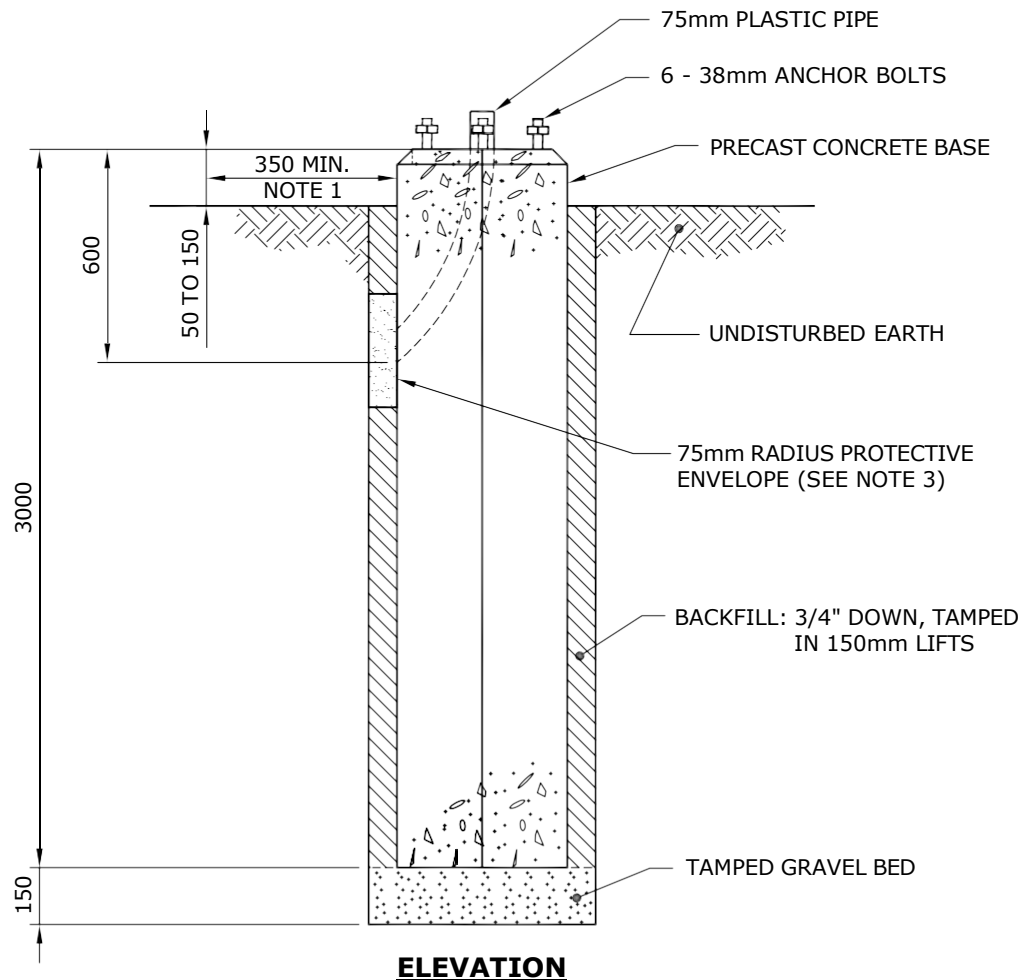
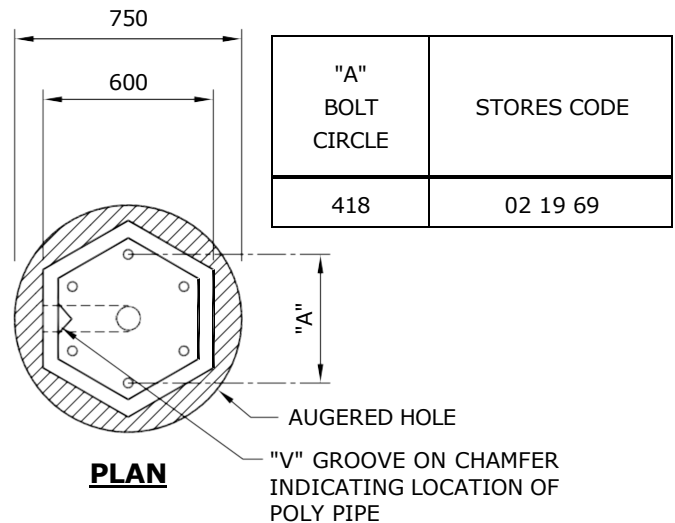
APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 23-01-31	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS			
				INSTALLATION OF PRECAST CONCRETE BASE			
	23-01	2	ADDED 50mm NOTE FOR BREAKAWAY BASES, RESEALED				
	10-08	1	CHANGED BACKFILL NOTES, AND ADDED SHEET 3				
DRAWN C.A.	CHECKED L.D.		DATE 23-01	CD 300-6		SHT	REV
			0002 OF 3			02	

1-04431-DA-24620-0001

16.8m & 19.8m STREET LIGHT POLE

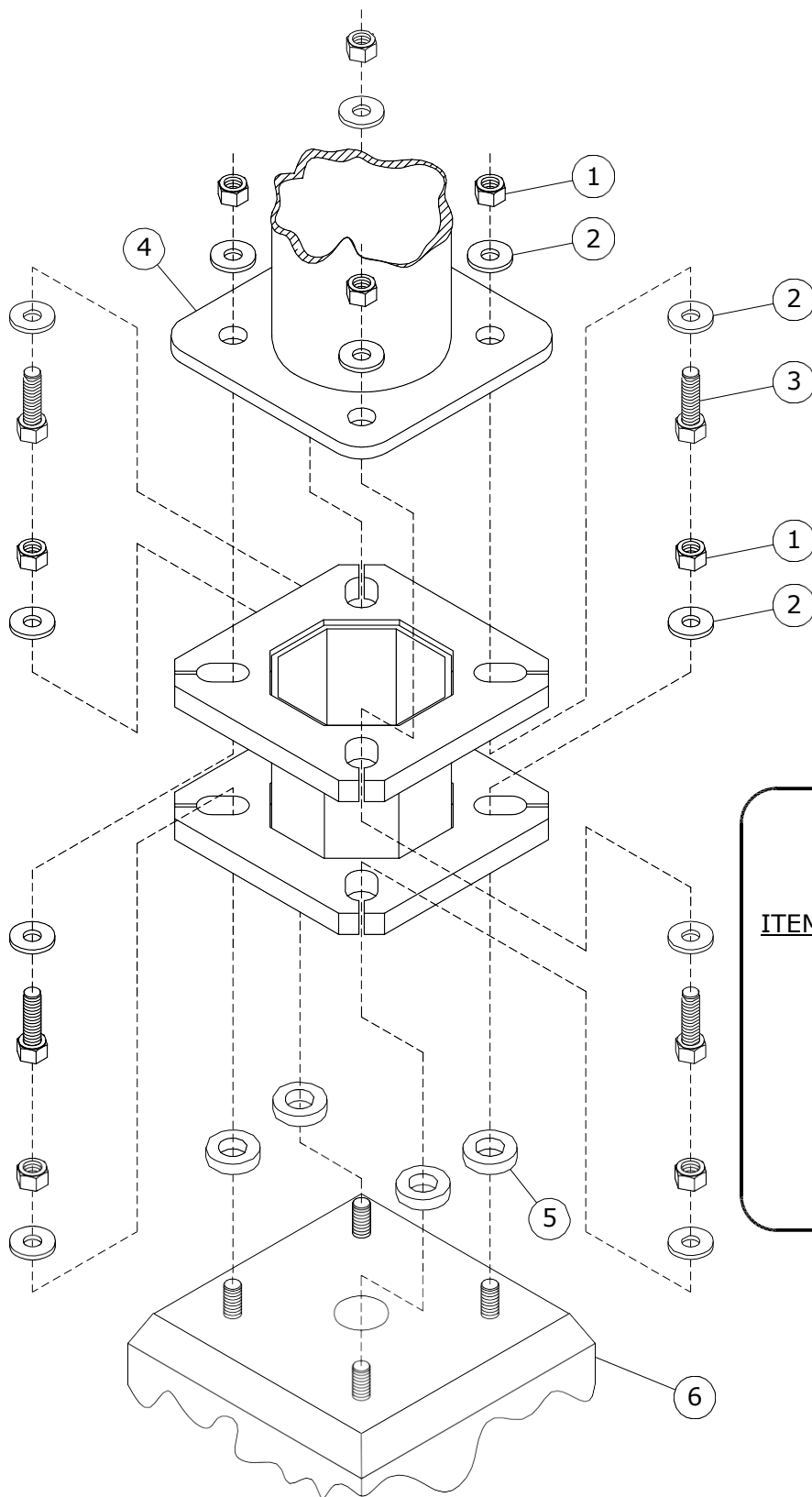
NOTES:

1. FOR FUTURE ACCESS TO LOWER PORTION OF PLASTIC PIPE, LOCATE "V" GROOVE SIDE OF BASE TO ROADWAY PROVIDED THAT:
 - a) A MIN. HORIZONTAL SEPARATION OF 350mm IS MAINTAINED TO ANY PAVED SURFACE OR STRUCTURE; OR
 - b) IF LESS THAN 350mm, ROTATE BASE 90°
2. ROUTE UNDERGROUND CABLES DIRECTLY INTO PLASTIC PIPE.
3. IN BACKFILL AREA, ENCASE UNDERGROUND CABLES IN A 75mm RADIUS ENVELOPE OF EXCAVATED MATERIAL OR SAND TO PROTECT CABLES. DO NOT BACKFILL WITH EXCAVATED MATERIAL OR SAND MORE THAN 1/6 OF THE WAY AROUND BASE.
4. SEE CD300-9 FOR ANCHOR ROD TIGHTENING METHOD.
5. DIMENSIONS SHOWN ARE MILLIMETRES.



APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY K.C. HAMILTON 10-08-13				INSTALLATION OF PRECAST CONCRETE BASE	
DRAWN C.A.	CHECKED L.D./K.C.H.	DATE 10-08	CD 300-6		SHT 0003 OF 3
					REV 00

1-04431-DA-24620-0001



MATERIAL LIST

<u>ITEM No.</u>	<u>DESCRIPTION</u>
1.	NUT 1" - UNC
2.	WASHER 1"
3.	BOLT 1" - UNC
4.	LIGHT STANDARD
5.	SHIMS - AS REQUIRED
6.	FOUNDATION

CIIC# 04 92 81

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 19-10-08		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS			
				ANCHOR BASE ADAPTER INSTALLATION 254mm BCD TO 292mm BCD (4.7m TO 10.7m STANDARDS)			
DRAWN C.A.		CHECKED L.D.	DATE 19-10	CD 300-8		SHT	REV
						0001 OF 2	00

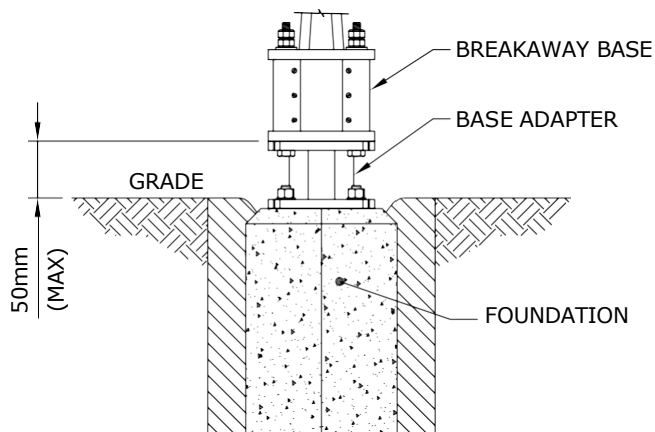
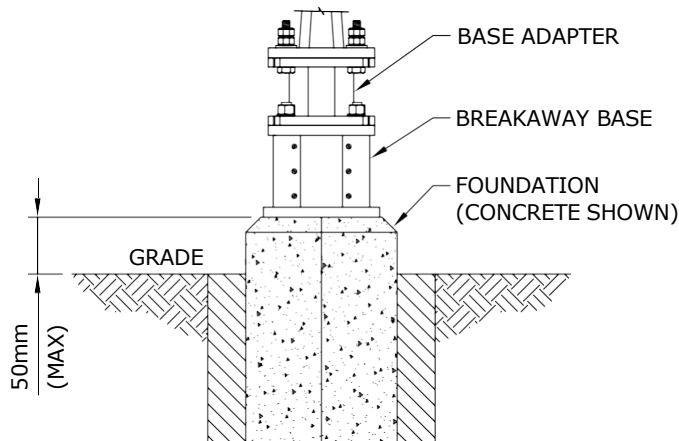
1-04431-DA-24620-0010

APPLICATIONS:

1. ANCHOR ROD TO ANCHOR ROD HOLE MISALIGNMENT.
2. FOUNDATION EXTENSION TO RAISE BURIED ANCHOR BASE OF LIGHT STANDARD TO GRADE.

RESTRICTIONS:

1. INSTALL ONLY GOOD LIGHT STANDARDS ON GOOD FOUNDATIONS AS PER CORPORATE POLICIES P348-4, "REPLACING ORNAMENTAL LIGHT STANDARDS", AND P348-5, "REPLACING OR RESETTING CONCRETE FOUNDATIONS".
2. INSTALL THE SAME TYPE OF LIGHT STANDARD AS PREVIOUS.
3. FOUR STANDARDS MOUNTED ON 179, 197, AND 206 BASES ONLY. POST TOP OR SINGLE ARM LIGHT STANDARDS OF MAXIMUM HEIGHT 10.7m (35').
4. ONLY ONE ADAPTER PLATE PER LIGHT STANDARD IS ALLOWED, DO NOT STACK.

**FOUNDATION EXTENSION WITH BREAKAWAY BASE****ANCHORAGE MISALIGNMENT WITH BREAKAWAY BASE****BREAKAWAY BASES:**

1. MAXIMUM ELEVATION OF BOTTOM OF BREAKAWAY BASE IS 50mm AS SHOWN.

ANCHORING:

1. LEVELING SHIMS ARE TO BE USED BETWEEN THE FOUNDATION AND BASE ADAPTER (WHEN REQUIRED).
2. ALL ANCHORING CONNECTIONS ARE TO BE TIGHTENED PER CD300-9, "METHOD FOR ANCHOR ROD TIGHTENING".

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 19-10-08				ANCHOR BASE ADAPTER INSTALLATION 254mm BCD TO 292mm BCD (4.7m TO 10.7m STANDARDS)	
DRAWN C.A.	CHECKED L.D.	DATE 19-10	CD 300-8		SHT 0002 OF 2
				REV 00	

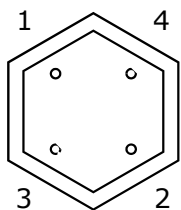
TO DEVELOP THE REQUIRED TENSION ON ANCHOR RODS, THE TURN-OF-NUT METHOD IS USED.

TURN-OF-NUT

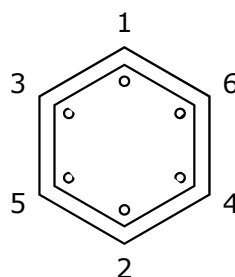
1. ENSURE ALL ANCHOR RODS AND NUTS ARE FREE OF DEBRIS AND THAT THE ANCHOR RODS ARE LUBRICATED.
2. PLACE POLE ONTO CONCRETE PILE, INSTALL WASHERS AND NUTS AND TIGHTEN UNTIL DEVELOPING A SNUG-TIGHTENED CONNECTION.

SNUG-TIGHTENED: THE TIGHTNESS THAT IS ATTAINED AFTER A FEW IMPACTS OF AN IMPACT WRENCH OR THE FULL FORCE OF A WORKER USING AN ORDINARY ONE FOOT LONG WRENCH.

3. TIGHTENING OF THE BOLTS MUST BE PERFORMED IN A MANNER THAT BRINGS THE FAYING SURFACES UP "EVENLY" AS PER THE STAR PATTERN TIGHTENING SEQUENCE.



FOUR ANCHOR BOLT PATTERN
(13.7m AND BELOW)



SIX ANCHOR BOLT PATTERN
(16.8m AND 19.8m)

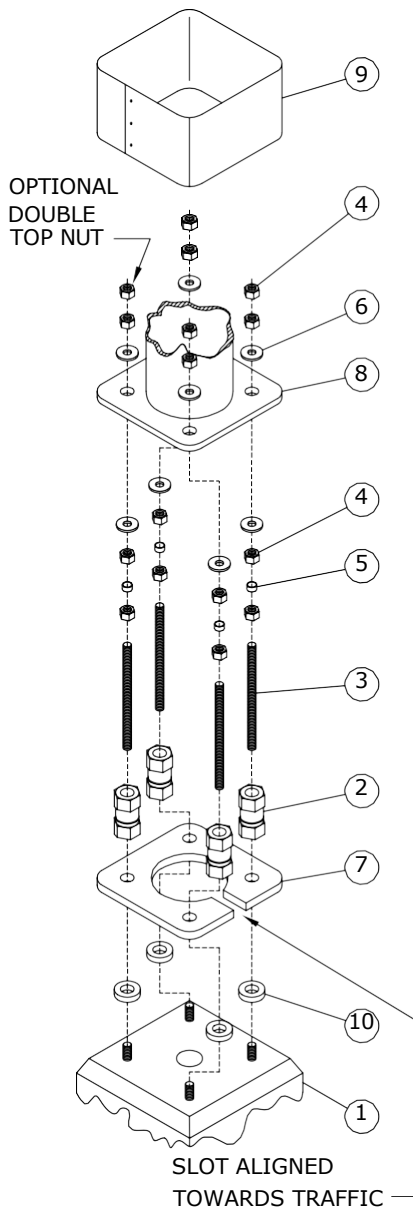
4. ENSURE THE POLE IS PLUMB AND ADD LEVELING SHIMS IF REQUIRED. SNUG-TIGHTEN THE ANCHOR BOLTS AGAIN.
5. BEVELED WASHERS ARE REQUIRED IF THE NUT CANNOT BE BROUGHT INTO FIRM CONTACT WITH THE BASE PLATE.
6. MARK THE REFERENCE LOCATION OF THE NUT AFTER SNUG-TIGHTENING THE PLUMB POLE.
7. FINAL TIGHTENING OF NUTS IS PERFORMED IN INCREMENTS AS PER THE STAR PATTERN, WITH A MINIMUM OF TWO FULL TIGHTENING CYCLES. PROPER TENSIONING IS ACHIEVED WHEN THE NUT IS ROTATED 1/3 OF A TURN BEYOND SNUG-TIGHT. THE TOLERANCE FOR THIS IS PLUS 20°.

APPROVED ORIGINAL DRAWING SEALED BY K.C. HAMILTON 10-08-13	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
			METHOD FOR ANCHOR ROD TIGHTENING	
DRAWN C.A.	CHECKED L.D.	DATE 10-08	CD 300-9	SHT 0001 OF 1
				REV 00

THE FOLLOWING INSTALLATION INSTRUCTIONS ARE APPLICABLE TO NEW OR EXISTING BREAKAWAY BASE INSTALLATIONS ON CONCRETE BASES.

PROCEDURE:

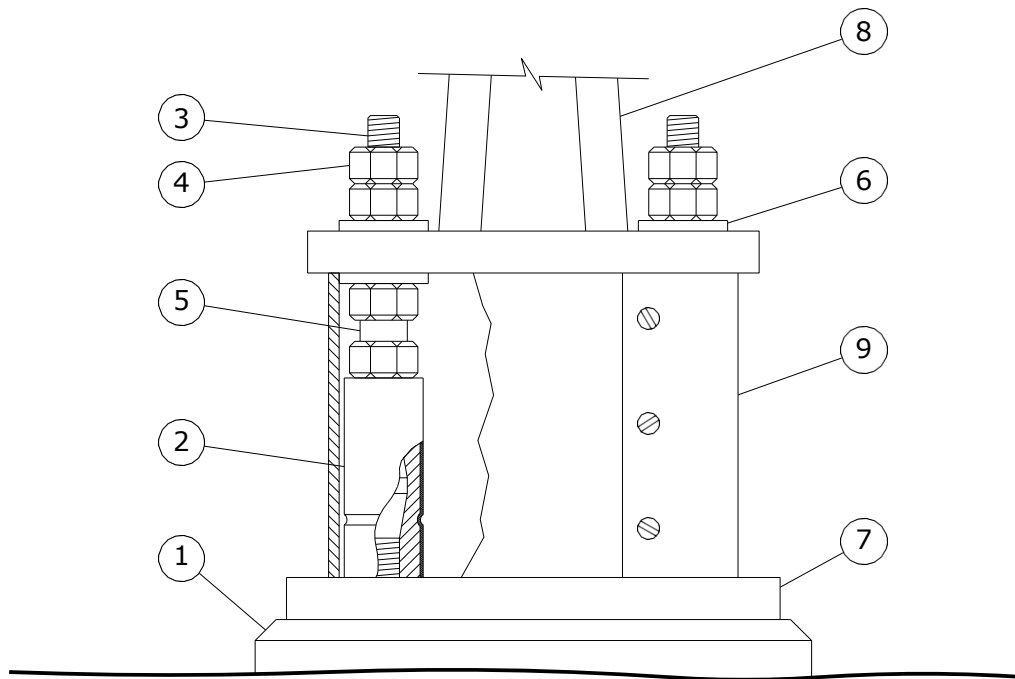
1. CLEAN THE TOP SURFACE OF THE CONCRETE BASE AND ENSURE SURFACE IS FLAT AND LEVEL WITH NO SPALLING OR OTHER SURFACE CONDITIONS THAT MAY AFFECT THE PERFORMANCE OF THE COUPLERS.
 2. THE PREFERRED MAXIMUM HEIGHT ABOVE LEVEL GRADE TO THE BASE OF THE COUPLER IS 50mm OR LESS. THIS PROVIDES THE RECOMMENDED CLEARANCE IN THE EVENT OF A COLLISION WITH THE STRUCTURE.
 3. MEASURE THE HEIGHT OF THE THREADED ANCHOR BOLTS ABOVE THE REACTION PLATE AND VERIFY THIS MEASUREMENT IS BETWEEN 1 1/4" AND 1 5/8".
 4. IF THE EXPOSED LENGTH OF THE ANCHOR BOLT IS GREATER THAN THE RECOMMENDED LENGTH, OPTIONAL SPACERS MAY BE USED (ITEM 10).
 5. IT IS RECOMMENDED THAT THE THREADED ANCHOR BOLT-COUPLER CONNECTION BE COATED WITH RUST-INHIBITING GREASE. THIS WILL FACILITATE REMOVAL OF THE COUPLER WHEN IT IS NECESSARY. A SUITABLE PRODUCT FOR THIS APPLICATION IS ARCAN 1, A WHITE, WATER RESISTANT GREASE MARKETED BY IMPERIAL OIL LTD.
 6. THREAD THE COUPLER ASSEMBLY ON EACH ANCHOR BOLT (IF THE COUPLER ASSEMBLY UPPER STUD BECOMES LOOSE AS A RESULT OF HANDLING, ENSURE THAT THE STUD IS ENGAGED AT LEAST 38mm, BUT NOT MORE THAN 44mm IN THE COUPLER BEFORE LOCKING WITH THE LOCK NUT.)
 7. SNUG UP EACH COUPLER AGAINST THE CONCRETE BASE. TIGHTEN EACH COUPLER ALTERNATELY AND INCREMENTALLY, BY MEANS OF A WRENCH OR A PIPE WRENCH ON THE BOTTOM HEX OF THE COUPLER. USE THE TURN-OF-NUT METHOD AS PER CD300-9.
- NOTE: TIGHTENING THE COUPLER ON THE TOP HEX MAY WEAKEN THE COUPLER AT THE MACHINED GROOVE AND MAKE THE COUPLER UNUSEABLE.**
8. BRING THE LEVELING NUTS (AND HENCE, THE LOWER WASHERS) INTO A LEVEL PLANE AS DESIRED MAKING CERTAIN THAT AT LEAST ONE PLASTIC SPACER REMAINS IN CONTACT WITH ITS LEVELING NUT AND ITS LOCK NUT.
 9. PLACE THE POLE BASE OVER THE PROTRUDING STUDS, AND SECURE THE POLE WITH THE UPPER WASHERS AND RETAINING NUTS.
 10. WITH THE POLE IN THE REQUIRED VERTICAL ORIENTATION, AND BEFORE FINAL TIGHTENING, ENSURE THAT ALL LEVELING NUTS, RETAINING NUTS AND UPPER AND LOWER WASHERS ARE MADE SNUG AGAINST THE POLE BASE PLATE.
 11. TIGHTEN THE RETAINING NUTS WITH THE TURN-OF-NUT METHOD AS PER CD300-9.
 12. MAKE THE NECESSARY WIRING CONNECTIONS, AND INSTALL THE PROTECTIVE SHROUD.



SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 89-04-28

APPROVED ORIGINAL DRAWING SEALED BY D.R. ORR 16-06-27		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
		16-06	4	CORRECTED TYPO, RESEALED	BREAKAWAY BASE INSTALLATION				
		10-08	3	UPDATED STANDARD, REVISED TITLE, AND ADDED SHEET 2					
		07-06	2	REVISED NOTE 4 AND ADDED NOTE 5					
DRAWN C.A.		CHECKED L.D.		DATE 16-06		CD 300-10		SHT 0001 OF 2	REV 04

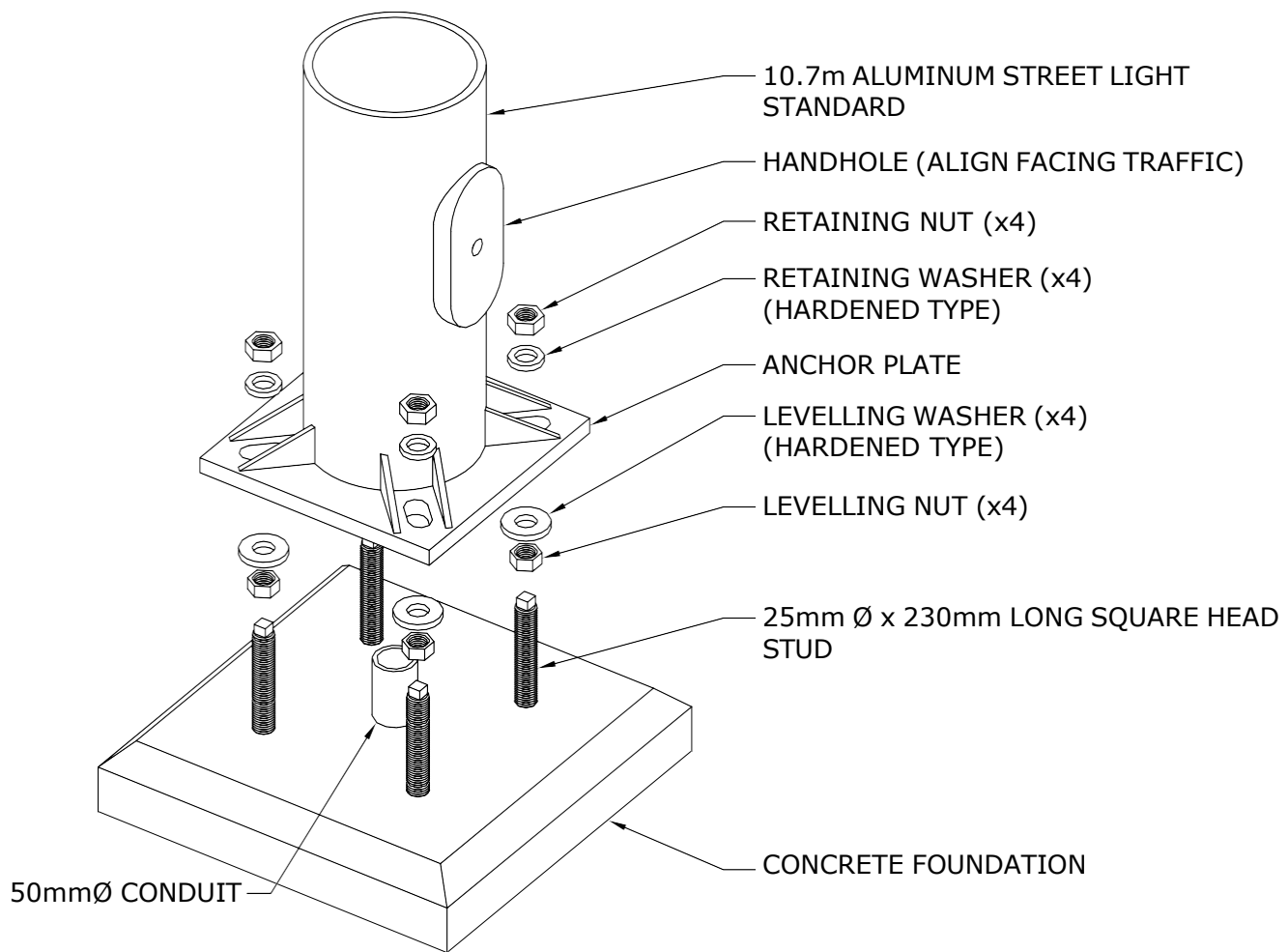
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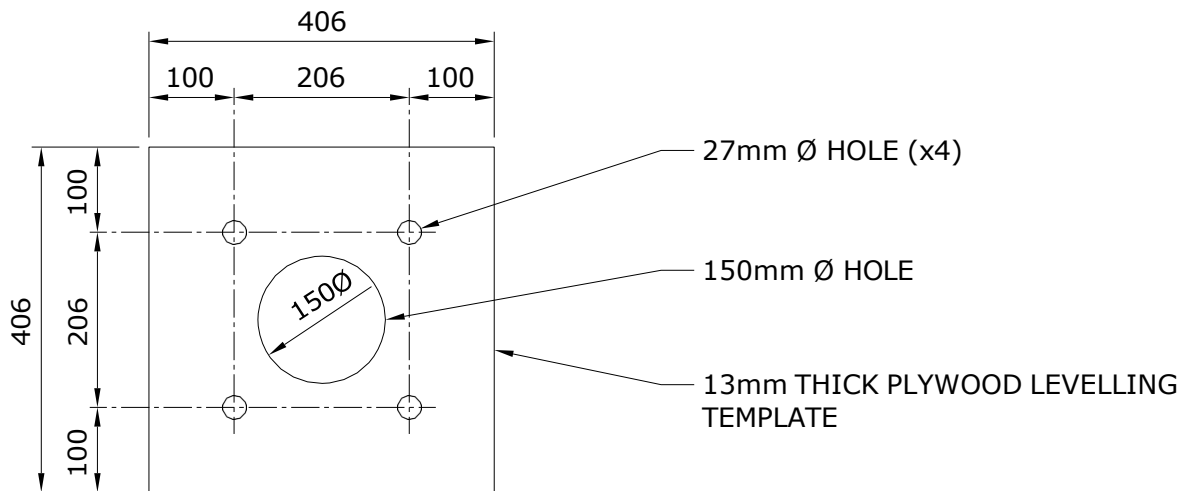
BILL OF MATERIAL		
ITEM NO.	DESCRIPTION	QUANTITY
1	CONCRETE BASE	1
2	COUPLING	4
3	1" - 8 UNC GALV. STUD	4
4	1" - 8 UNC GALV. HEAVY HEX NUT	16
5	SPACER	4
6	1" GALV. FLAT WASHER	8
7	REACTION PLATE	1
8	POLE	1
9	SHROUD ASSEMBLY	1
10	GALV. SHIM	4

APPROVED ORIGINAL DRAWING SEALED BY K.C. HAMILTON 10-08-13	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
			BREAKAWAY BASE INSTALLATION	
DRAWN C.A.	CHECKED L.D.	DATE 10-08	CD 300-10	SHT 0002 OF 2
				REV 00

1-04431-DA-24620-0004



MOUNTING DETAIL



LEVELLING TEMPLATE

APPROVED ORIGINAL DRAWING SEALED BY D.R. ORR 13-02-13		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
				INSTALLATION OF ALUMINUM STREET LIGHT STANDARDS ON BRIDGES AND DIVIDER STRIPS					
DRAWN C.A.		CHECKED L.D.		DATE 13-01		CD 300-11		SHT 0001 OF 2	REV 00

ALUMINUM STREET LIGHT STANDARD MOUNTING INSTRUCTIONS

1. ENSURE MOUNTING STUDS ARE COATED WITH WHITE LITHIUM GREASE AND ARE FREE OF DIRT AND OTHER CONTAMINANTS.
2. INSTALL LEVELLING NUTS AND WASHERS. ENSURE THEY ARE LEVEL IN ALL DIRECTIONS BY USING THE LEVELLING TEMPLATE AND A CARPENTER'S LEVEL. FAILURE TO ENSURE LEVEL MOUNTING SURFACE MAY RESULT IN A CRACKED ANCHOR BASE UPON FASTENING CONNECTION WITH AN IMPACT GUN.
3. POSITION ALUMINUM STREET LIGHT STANDARD ONTO LEVELLING WASHERS AND NUTS.
4. INSTALL RETAINING WASHERS AND NUTS TO A SNUG FIT (A FEW IMPACTS WITH IMPACT GUN).
5. SNUG TIGHTENING IS TO PROGRESS SYSTEMATICALLY AND THEN RE-TIGHTENING IN THE SAME SYSTEMATIC MANNER UNTIL THE CONNECTION IS FULLY COMPACTED.
6. TIGHTEN NUTS SYSTEMATICALLY BY 2/3 OF AN ADDITIONAL TURN. SEE CD300-9 FOR ANCHOR ROD TIGHTENING METHOD.

NOTES:

1. STUD SHOULD NOT TURN IN FERRULE WHILE TIGHTENING.
2. SQUARE HEAD STUD TO PROTRUDE APPROXIMATELY ONE NUT THICKNESS BEYOND RETAINING NUT.
3. WHERE THE REMOVAL OF THE STUDS FOR REPAIR OR REPLACEMENT IS REQUIRED, THE FERRULES AND THE STUDS SHALL BE CLEANED TO REMOVE THE OLD THREAD LOCKING COMPOUND. NEW THREAD LOCKING COMPOUND (LOCKTITE 262) SHALL BE APPLIED TO THE INSERTION LENGTH OF THE STUDS PRIOR TO TIGHTENING TO FULL DEPTH.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
ORIGINAL DRAWING SEALED BY D.R. ORR 13-02-13				INSTALLATION OF ALUMINUM STREET LIGHT STANDARDS ON BRIDGES AND DIVIDER STRIPS					
DRAWN C.A.	CHECKED L.D.	DATE 13-01	CD 300-11		<table border="1"><tr><td>SHT</td><td>REV</td></tr><tr><td>0002 of 2</td><td>00</td></tr></table>	SHT	REV	0002 of 2	00
SHT	REV								
0002 of 2	00								

STREET LIGHT POLES *			
POLE TYPE	MOUNTING HEIGHT m (ft)	MATERIAL	WEIGHT *, ** kg (±10%)
STRAIGHT SHAFT	10.7 (35)	ALUMINUM	91
DAVIT (DB)	11.3 (37)	CONCRETE	998
DAVIT (DB)	13.7 (45)	CONCRETE	1087
POST TOP (DB)	6.1 (20)	CONCRETE	544
DAVIT	7.7 (25)	STEEL	97
DAVIT	9.1 (30)	STEEL	125
DAVIT	10.7 (35)	STEEL	157
DAVIT	13.7 (45)	STEEL	219
DAVIT	16.8 (55)	STEEL	330
DAVIT	19.8 (65)	STEEL	428
POST TOP	4.7 (15)	STEEL	53
POST TOP	6.1 (20)	STEEL	68
STRAIGHT SHAFT	7.7 (25)	STEEL	90
STRAIGHT SHAFT	9.1 (30)	STEEL	113
STRAIGHT SHAFT	10.7 (35)	STEEL	172
STRAIGHT SHAFT	13.7 (45)	STEEL	220
STRAIGHT SHAFT	16.8 (55)	STEEL	388
STRAIGHT SHAFT	19.8 (65)	STEEL	557
HI-MAST	30.5 (100)	STEEL	3300

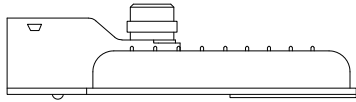
* ALL POLES ARE BASE MOUNTED EXCEPT CONCRETE.

** WEIGHTS DO NOT INCLUDE ARMS OR LUMINAIRES.

*** WEIGHTS GATHERED FROM MANUFACTURER'S DRAWING.

BASES	
TYPE	WEIGHT kg (±10%)
179	605
197	605
206	605
243	970
418	2151

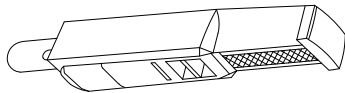
APPROVED ORIGINAL DRAWING SEALED BY D.R. ORR 16-01-14	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
			RIGGING WEIGHTS OF STREET LIGHT COMPONENTS	
	21-07	2		
	18-04	1	UPDATED TABLES	
DRAWN C.A.	CHECKED J.R.	DATE 16-01	CD 300-18	
			SHT 0001 OF 1	REV 02



LED ROADWAY LUMINAIRE

* THESE LUMINAIRES PROVIDE A VERY WIDE BEAM PATTERN (IES TYPE IV). CAREFUL CONSIDERATION OF LIGHT TRESPASS MUST BE GIVEN WHEN INSTALLING NEAR RESIDENTIAL HOUSING. IN THESE CASES, CONSIDER USING THE 500W.

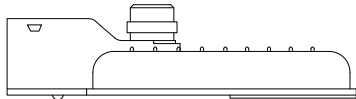
LED ROADWAY LUMINAIRES			
LUMINAIRE WATTAGE (NOMINAL)	REPLACES (HPS)	CIIC	
		GREY	BLACK
40 W LED	70 W HPS	05 15 44	05 15 71
60 W LED	100 W HPS	05 15 45	05 15 73
90 W LED	150 W HPS	05 15 47	05 15 74
150 W LED	250 W HPS	05 15 48	05 15 75
240 W LED	400 W HPS	05 15 49	05 15 76
500 W LED	1000 W HPS	06 55 67	
600 W LED *	1000 W HPS	06 55 66	



LED LANE LUMINAIRE

- LED LANE LUMINAIRES ARE AVAILABLE WITH GREY COATING ONLY.

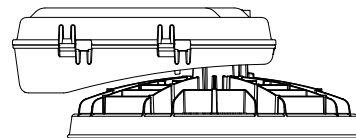
LED LANE LUMINAIRES		
LUMINAIRE WATTAGE (NOMINAL)	REPLACES (HPS)	CIIC
50 W LED	70 W HPS	05 15 50



LED DUSK-TO-DAWN LUMINAIRE

- LED DUSK-TO-DAWN LUMINAIRES ARE AVAILABLE WITH GREY COATING ONLY.

LED DUSK-TO-DAWN (AREA) LUMINAIRES		
LUMINAIRE WATTAGE (NOMINAL)	REPLACES (HPS)	CIIC
60 W LED	100 W HPS	05 15 51
90 W LED	150 W HPS	05 15 52



LED HI-MAST LUMINAIRE

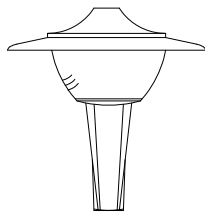
LED HI-MAST LUMINAIRES		
LUMINAIRE WATTAGE (NOMINAL)	REPLACES (HPS)	CIIC
300 W LED	400 W HPS	06 34 98

- THERE HAVE BEEN OCCASIONS WHERE A 1000W HPS LUMINAIRE WAS USED TO REPLACE A 400W HPS HI-MAST LUMINAIRE. IN THESE CASES, REPLACE THEM WITH THE 300W LED HI-MAST LUMINAIRE.
- ALL LED LUMINAIRES AUTOMATICALLY ADJUST FOR EITHER A 120V OR 240V SUPPLY.
- ALL LED LUMINAIRES COME WITH A PHOTOCELL RECEPTACLE.

SUPERCEDES ORIGINAL SEALED BY D.R. ORR ON 15-02-11

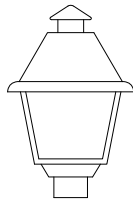
APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 24-05-07		REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS						
		24-05	3	RESEALED	STANDARD LED LUMINAIRES						
		21-07	2	ADDED 500W & 600W ROADWAY AND 300W HI-MAST LUMINAIRES							
		16-12	1	REVISED NOTES							
DRAWN C.A.		CHECKED J.R.		DATE 24-05		CD 300-24			SHT 0001 OF 2		REV 03

1-04431-DA-25620-0009



**LED POST TOP LUMINAIRE
- CONTEMPORARY**

LED POST TOP LUMINAIRES - CONTEMPORARY		
LUMINAIRE WATTAGE (NOMINAL)	CIIC	PHOTOMETRIC DISTRIBUTION
60 W LED	05 17 30	ASYMMETRICAL



**LED POST TOP LUMINAIRE
- COLONIAL**

LED POST TOP LUMINAIRES - COLONIAL		
LUMINAIRE WATTAGE (NOMINAL)	CIIC	PHOTOMETRIC DISTRIBUTION
60 W LED	05 17 28	ASYMMETRICAL
60 W LED	05 17 29	SYMMETRICAL



**LED POST TOP LUMINAIRE
- ACORN**

LED POST TOP LUMINAIRES - ACORN		
LUMINAIRE WATTAGE (NOMINAL)	CIIC	PHOTOMETRIC DISTRIBUTION
60 W LED	05 17 26	ASYMMETRICAL
60 W LED	05 17 27	SYMMETRICAL



**LED POST TOP LUMINAIRE
- OCTAGONAL LANTERN**

LED POST TOP LUMINAIRES - OCTAGONAL LANTERN		
LUMINAIRE WATTAGE (NOMINAL)	CIIC	PHOTOMETRIC DISTRIBUTION
60 W LED	05 17 32	ASYMMETRICAL
60 W LED	05 17 33	SYMMETRICAL

- LED CONTEMPORARY LUMINAIRES ARE AVAILABLE WITH GREY COATING ONLY. ALL OTHER DECORATIVE LUMINAIRES ARE BLACK.
- ALL LED LUMINAIRES AUTOMATICALLY ADJUST FOR EITHER A 120V OR 240V SUPPLY.
- ALL LED LUMINAIRES COME WITH A PHOTOCELL RECEPTACLE.
- ASYMMETRICAL STREETLIGHTS SHINE IN ONE DIRECTION WHICH IS INDICATED BY AN ARROW ON TOP OF THE STREETLIGHT HEAD.
- SYMMETRICAL STREETLIGHTS SHINE IN ALL DIRECTIONS.

*SUPERCEDES ORIGINAL SEALED
BY D.R. ORR ON 15-02-11*

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS			
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 24-05-07		24-05	3	ADDED ASYMMETRICAL & SYMMETRICAL NOTES, RESEALED	STANDARD LED LUMINAIRES		
		21-07	2	CORRECTED TYPO			
		16-12	1	REVISED NOTES			
DRAWN C.A.	CHECKED L.D.	DATE 24-05		CD 300-24		SHT 0002 OF 2	REV 03

TRENCH AND PLOW-IN LOCATION

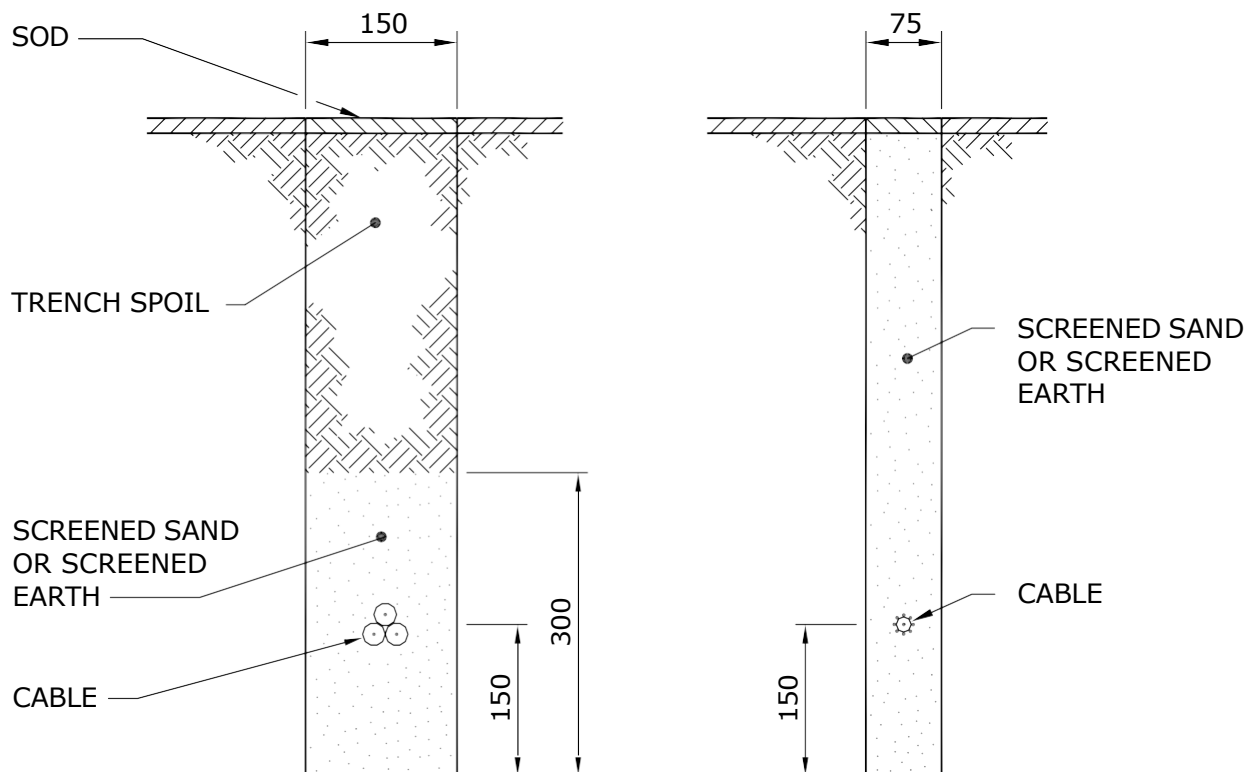
GENERALLY, THE TRENCH LOCATION WILL DICTATE THE LOCATION OF THE LIGHT STANDARDS. CONTACT SHALL BE MADE WITH THE GOVERNING MUNICIPAL AUTHORITY TO DETERMINE THEIR SET BACK REQUIREMENTS. CONTACT SHALL ALSO BE MADE WITH THE CITY OF WINNIPEG UNDERGROUND STRUCTURES OR THE INDIVIDUAL UTILITIES OUTSIDE WINNIPEG TO DETERMINE THE EXISTENCE AND EXACT LOCATION OF OTHER UTILITIES PLANT. THIS INFORMATION WILL BE INCLUDED ON THE WORK ORDER PLANS.

DEPTH OF BURIAL

THE CABLE SHALL BE BURIED BELOW THE SURFACE OF THE EARTH A MINIMUM OF 600mm IN SODDED AREAS AND 1000mm IN ROADWAYS.

TRENCH DETAILS

TYPICAL TRENCH DETAILS FOR SODDED AREAS ARE SHOWN BELOW, FOR TRENCH DETAILS UNDER ROADWAYS REFER TO DRAWING CD205-14. SEE NOTES ON SHEET 2 of 2.



NOTE: DIMENSIONS SHOWN ARE MILLIMETRES.

APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS			
	96-01	3	ROADWAY DEPTH ADDED	PLOWING AND TRENCHING DETAILS FOR UNDERGROUND STREET LIGHT CIRCUITS			
	95-09	2	BURIAL DEPTH NOTE ADDED				
	94-04	1	COMBINED WITH DWG. CD305-2				
DRAWN W.B./CAD	CHECKED		DATE 88-07	CD 305-1		SHT	REV
						0001 OF 2	03

1-04431-DA-10500-0016

NOTES:

1. FOR TYPICAL TRENCH DETAIL INSTALLATION UNDER ROADWAYS, REFER TO DRAWING CD205-14.
2. THESE ARE ALTERNATIVE TRENCH WIDTHS. A 75mm TRENCH IS PREFERABLE WHERE THE GROUND IS FIRM AND A CLEAN CUT CAN BE MADE. A 150mm TRENCH IS PREFERABLE WHERE THE GROUND IS TOO LOOSE TO MAINTAIN A FIRM TRENCH WALL.
3. THE CABLES INDICATED IN THE VIEWS CAN BE USED IN EITHER TRENCH.
4. THE 75mm TRENCH SHALL BE BACKFILLED WITH SCREENED SAND OR SCREENED EARTH.
5. THE 150mm TRENCH SHALL BE BACKFILLED WITH THE TRENCH SPOIL IF IT IS FREE FROM ROCKS OR DEBRIS. IF THE TRENCH SPOIL CONTAINS ROCKS OR DEBRIS, SCREENED SAND OR SCREENED EARTH SHALL BE INSTALLED AS SHOWN.

APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS			
				PLOWING AND TRENCHING DETAILS FOR UNDERGROUND STREET LIGHT CIRCUITS			
	96-01	2	NOTES REVISED				
	94-04	1	COMBINED WITH DWG. CD305-2				
DRAWN W.B./CAD	CHECKED		DATE 88-07	CD 305-1		SHT	REV
			0002 OF 2			02	

1. **GENERAL**

PLOWED-IN CABLES SHALL BE PULLED TO 1m ABOVE GRADE AT EACH STREET LIGHT STANDARD LOCATION. THE CABLE DEPTH SHALL BE MAINTAINED AT THE 600mm PLOW DEPTH AS CLOSE AS POSSIBLE TO THE STREET LIGHT STANDARD LOCATION BEFORE RAISING THE PLOW. THE PLOW SHALL BE RETURNED TO THE 600mm PLOW DEPTH AS CLOSE AS POSSIBLE TO THE CENTRE LINE OF THE STREET LIGHT STANDARD LOCATION.

CABLES LAID IN TRENCHES SHALL HAVE SUFFICIENT SLACK TO ALLOW FOR FUTURE MOVEMENT OR SETTLING OF THE TRENCH FLOOR. CABLES SHALL PROJECT 1m ABOVE GRADE AT EACH LOCATION.

2. **USE OF POLYETHYLENE PIPE**

2.1 WHERE CABLES ARE INSTALLED UNDER EXISTING PAVEMENT, POLYETHYLENE PIPE SHALL BE INSTALLED TO PROTECT THE CABLES IF THE HOLE IS AUGERED OR PUSHED THROUGH MATERIAL CONTAINING ROCKS, STONES, OR DEBRIS.

2.2 AT THE JUNCTION OF THE MAIN TRENCH AND THE STREET OR DRIVEWAY CROSSING, THE BOTTOM OF THE TRENCH SHALL BE BACKFILLED AND TAMPED TO THE LEVEL OF THE POLYETHYLENE PIPES TO PREVENT SHARP BENDS IN THE CABLE AND TRAPPING OF WATER IN THE PIPE.

3. **SPLICES - UNDERGROUND CABLES**

UNDERGROUND STREET LIGHT CABLES (i.e. #4 ALUMINUM CONCENTRIC NEUTRAL CABLE AND 1/0 TRIPLEXED CABLE) ARE TO BE SPLICED USING AN APPROPRIATE COMPRESSION SLEEVE (SEE DRAWING CD210-21) AND THE SPLICE IS TO BE INSULATED USING ONE OF THE FOLLOWING METHODS:

- 1) RAYCHEM RAYVOLVE SPLICE
- 2) PRE-STRETCHED INSULATING TUBING SPLICE
- 3) HEAT SHRINK INSULATING TUBING SPLICE
- 4) TAPED SPLICE

FOR COMPLETE INSTRUCTIONS REGARDING THE ABOVE SPLICES, REFER TO DRAWING CD215-12.

APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS			
				INSTALLATION OF STREET LIGHT CABLES			
	94-04	1	DWG. REFERENCE CHANGED				
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-07		CD 310-1		SHT 0001 OF 2	REV 01

4. **CABLE END CAPS**

STREET LIGHT CABLES WHICH ARE NOT GOING TO BE SPLICED OR TERMINATED IMMEDIATELY FOLLOWING INSTALLATION SHALL BE CUT SQUARE AND SEALED WITH AN END CAP. REFER TO DRAWING CD215-21 FOR DETAILS.

5. **GROUNDING OF STREET LIGHT STANDARDS**

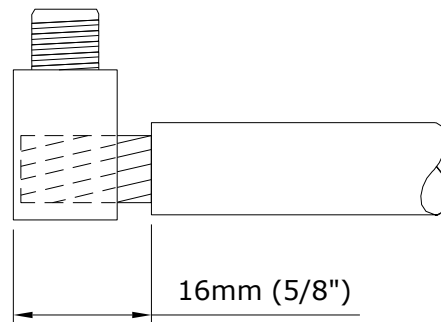
- 5.1 ALL STREET LIGHT STANDARDS SHALL BE GROUNDED BY CONNECTING THE NEUTRAL TO THE GROUND STUD INSIDE THE STANDARD. REFER TO DRAWING CD310-4 FOR DETAILS.
- 5.2 A GROUND ROD SHALL BE INSTALLED AND CONNECTED TO THE GROUND STUD AT THE LAST STANDARD ON JACKETED STREET LIGHT CIRCUITS.
- 5.3 A GROUND ROD SHALL BE INSTALLED AND CONNECTED TO THE GROUND STUD AT EVERY THIRD STANDARD AND AT THE LAST STANDARD ON C/N STREET LIGHT CIRCUITS.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 89-04-28

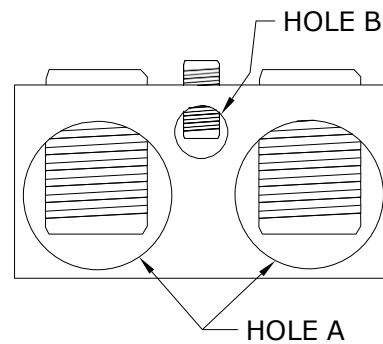
APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY P.S.C. LOEWEN 22-09-23				INSTALLATION OF STREET LIGHT CABLES	
		22-09	2		
		94-04	1		
DRAWN C.A.		CHECKED L.D.		DATE 22-09	
				CD 310-1	
				SHT 0002 OF 2	REV 02

RAYCHEM GELCAP CIIC# 04-29-36**GENERAL INSTRUCTIONS:**

1. REMOVE 16mm (5/8") OF INSULATION AND CLEAN EXPOSED ENDS.



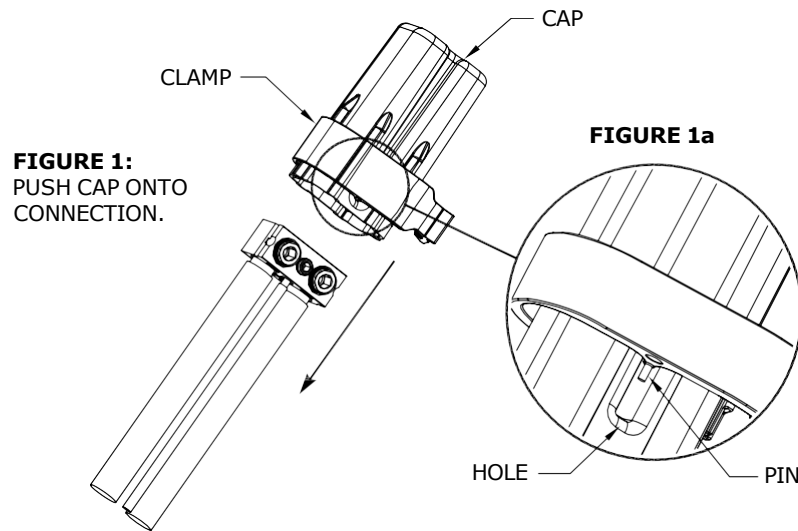
2. INSERT CONDUCTORS INTO CORRECT HOLES AND TORQUE AS SHOWN:



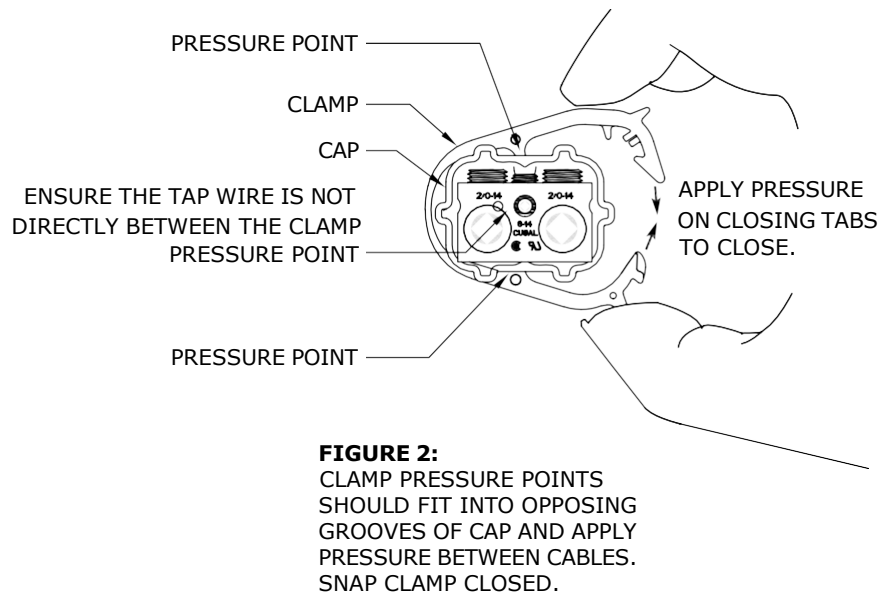
HOLE A		HOLE B	
WIRE RANGE	RECOMMENDED TORQUE VALUES	WIRE RANGE	RECOMMENDED TORQUE VALUES
#14 - 2/0 • STREET LIGHT CIRCUIT CABLES • GROUNDING CONNECTIONS • CONCENTRIC NEUTRAL • FUSE HOLDER WIRE	14 - 20 N-m (120 - 180 in-lbs)	#14 - #6 • LAMP LEADS	14 - 17 N-m (120 - 150 in-lbs)

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
			RAYCHEM GELCAP SPLICE	
DRAWN C.A.	CHECKED L.D.	DATE 17-11	CD 310-3	SHT 0001 OF 3
				REV 00

3. INSTALL CLAMP ON CAP. ENSURE THE TWO PINS ON THE BOTTOM EDGE OF THE CLAMP MATE WITH THE HOLES OF THE CAP AS SHOWN IN FIGURE 1a BELOW.

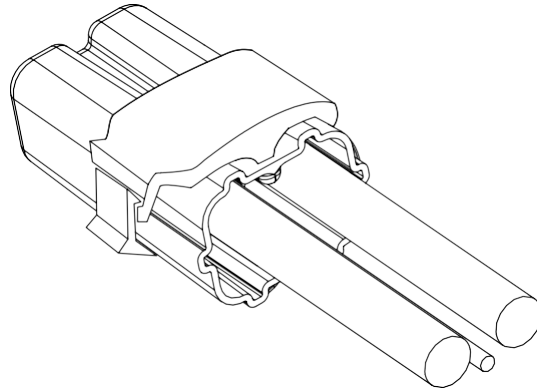


4. INSTALL CAP BY HOLDING ALL WIRES AND PUSHING THE CAP OVER THE CONNECTION ASSEMBLY UNTIL IT GOES NO FURTHER AS SHOWN IN FIGURE 1 ABOVE.
5. SNAP CLAMP CLOSED. IF NECESSARY, USE PLIERS TO SNAP CLAMP CLOSED AS SHOWN IN FIGURE 2 BELOW.

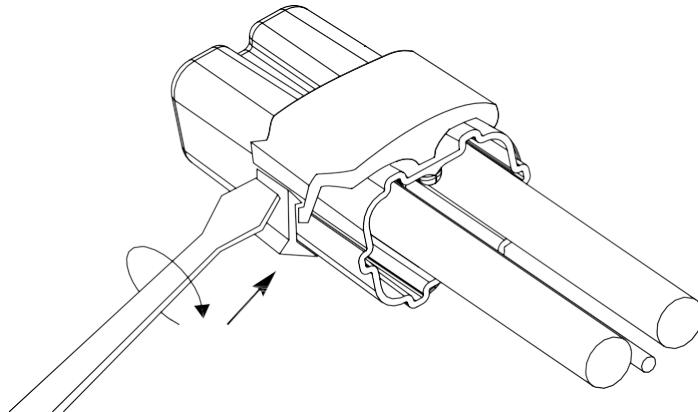


APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS				
				RAYCHEM GELCAP SPLICE				
DRAWN C.A.		CHECKED L.D.	DATE 17-11	CD 310-3			SHT 0002 OF 3	REV 00

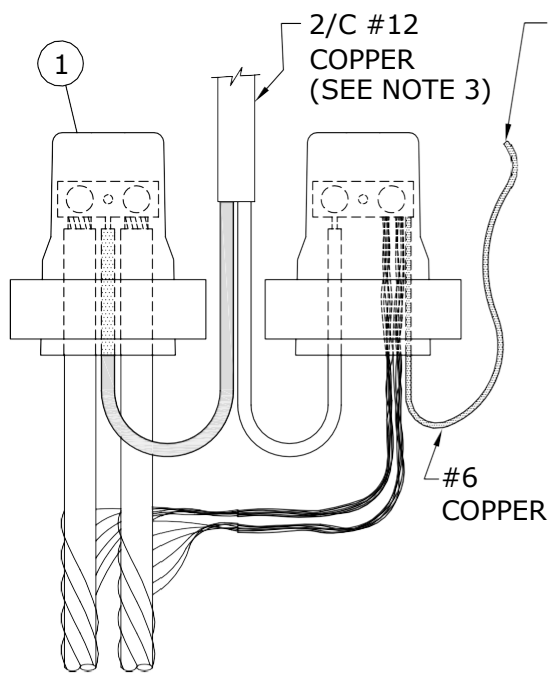
6. INSPECT THE INSTALLATION BY GENTLY PULLING ON THE CAP ENSURING IT IS LOCKED IN PLACE AND COVERS CONNECTOR AND BARE CONDUCTOR. THERE SHOULD BE NO EXPOSED METAL. ENSURE TAP CABLE IS NOT CAUGHT BETWEEN PRESSURE POINTS OF CLAMP. INSTALLATION IS COMPLETE.



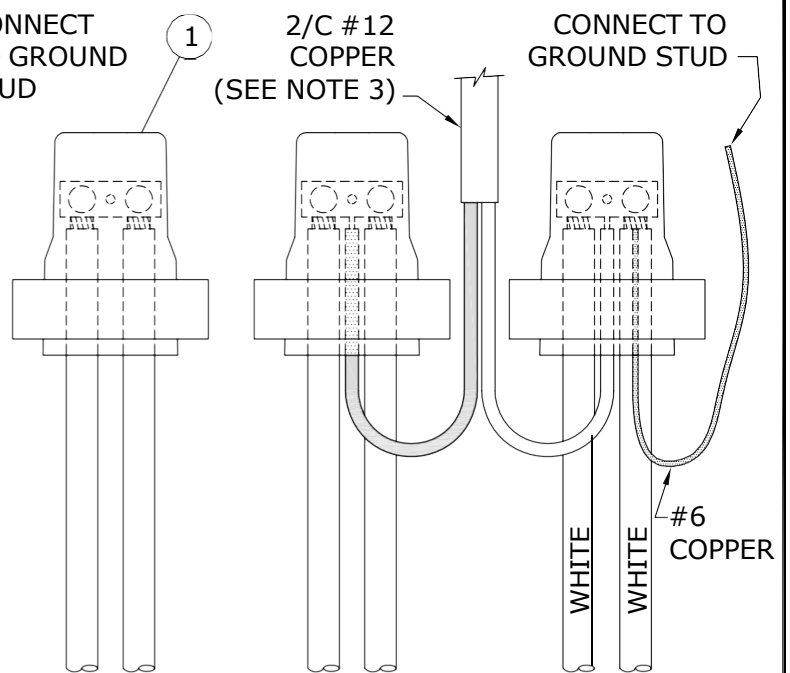
7. TO REMOVE, INSERT SCREWDRIVER BETWEEN THE CLOSING TABS AND TWIST TO OPEN THE CLAMP. REMOVE CAP SLOWLY FROM CONNECTION ALLOWING GEL TO REMAIN IN CAP.



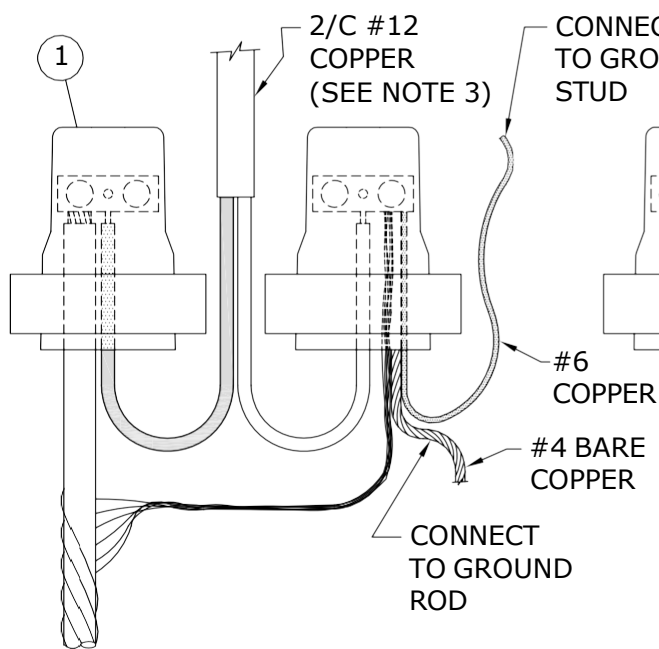
APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05				RAYCHEM GELCAP SPLICE	
DRAWN C.A.	CHECKED L.D.	DATE 17-11	CD 310-3		SHT 0003 of 3
				REV 00	



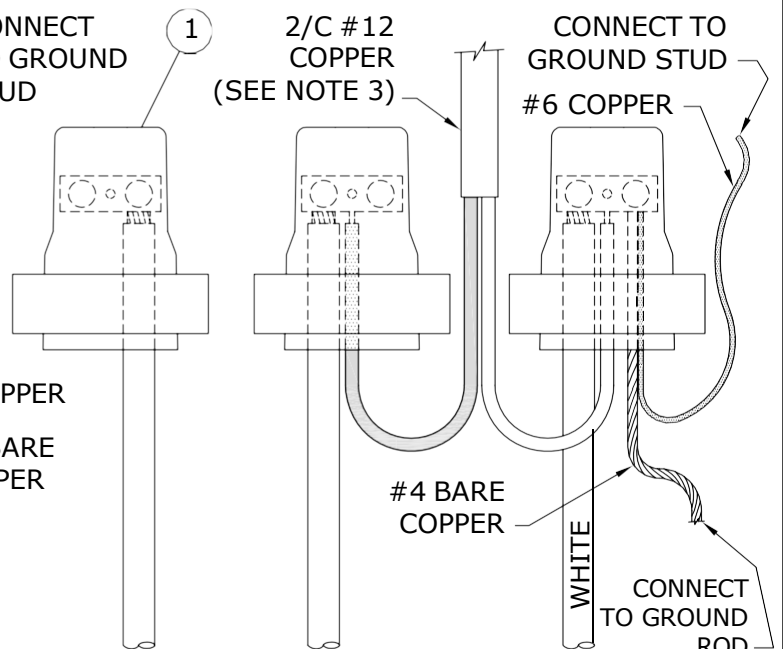
No. 4 ALUMINUM C/N CABLE
(TYPICAL FEED THROUGH)



1/0 ALUMINUM TRIPLEX CABLE
(TYPICAL FEED THROUGH)



No. 4 ALUMINUM C/N CABLE
(TYPICAL END OF CIRCUIT)

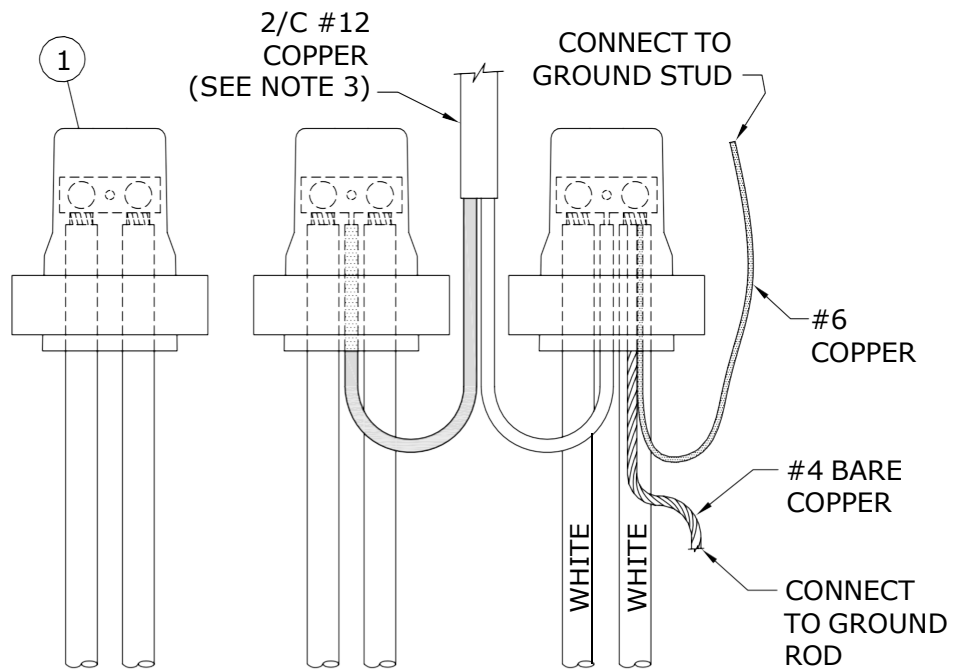


1/0 ALUMINUM TRIPLEX CABLE
(TYPICAL END OF CIRCUIT)

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 89-04-28

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
				CONNECTION DETAIL IN STREET LIGHT STANDARD					
		22-09	4					ADDED CONNECTION TO GROUND STUD FOR C/N CABLE	
		21-06	3					ADDED NOTE FOR DUAL LUMINAIRE SUPPLY	
DRAWN C.A.		CHECKED L.D./P.L.		DATE 18-04		CD 310-4		SHT 0001 OF 4	REV 04

1-04431-DA-56200-0002



1/0 ALUMINUM TRIPLEX CABLE
(TYPICAL EVERY THIRD STANDARD)

BILL OF MATERIAL			
ITEM No.	DESCRIPTION	STORES CODE No.	
		FOR USE WITH #4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX
1	GEL CAP	04-29-36 (2 REQUIRED)	04-29-36 (3 REQUIRED)

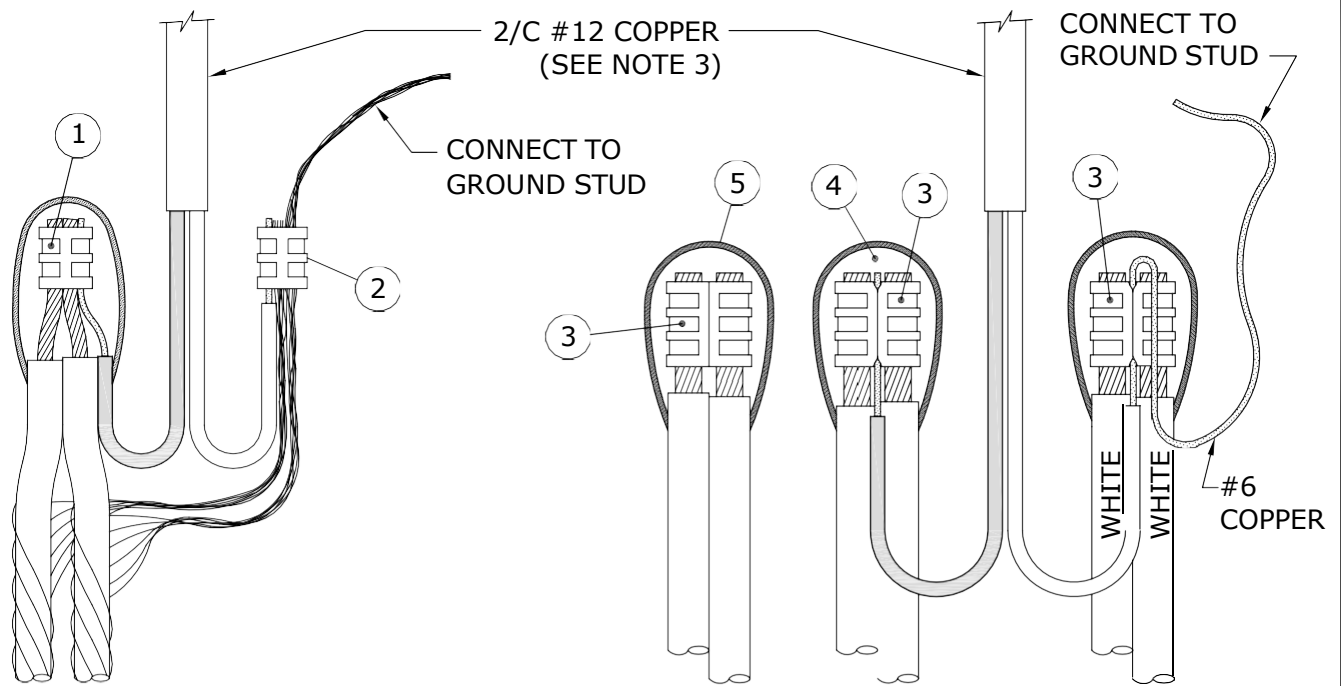
NOTES:

- 1. LEAVE SUFFICIENT SLACK ON CONDUCTORS TO ALLOW REMOVAL FROM HANDHOLE FOR MAINTENANCE.**
2. REFER TO DRAWING CD310-3 FOR GEL CAP INSTALLATION INSTRUCTIONS.
3. INSTALL PARALLEL 2/C #12 COPPER FOR DOUBLE LUMINAIRE STANDARDS. TIE TOGETHER IN HANDHOLE.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

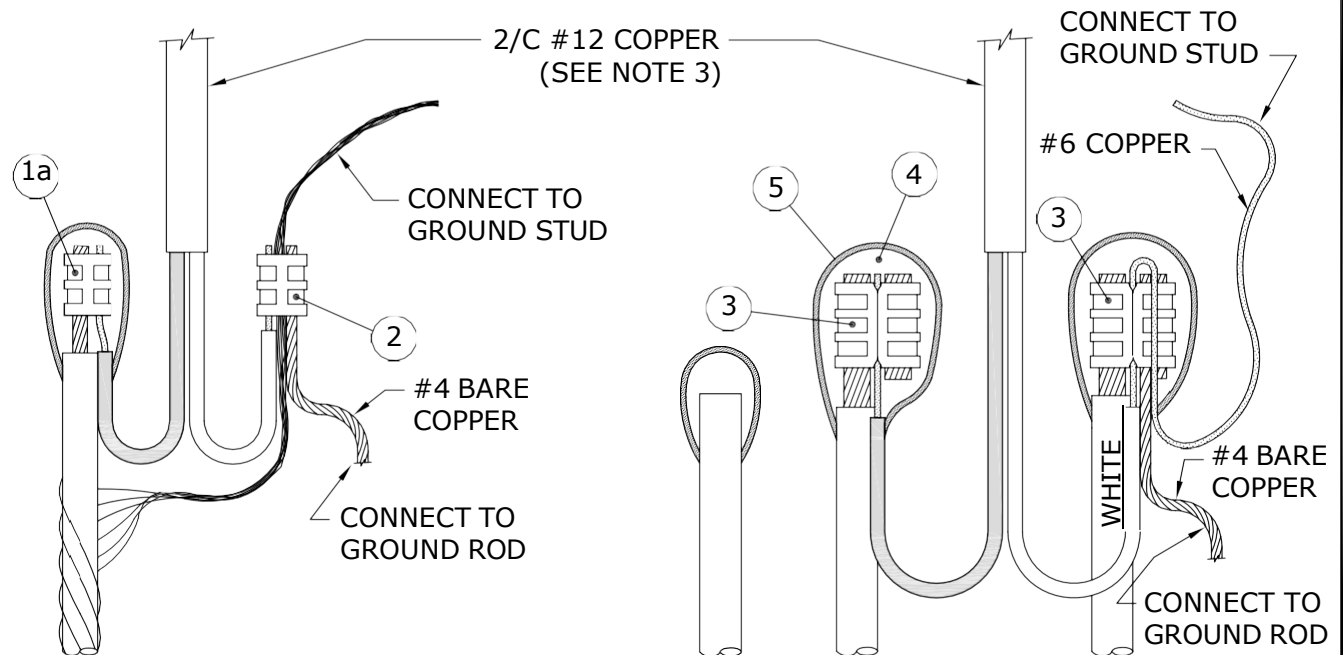
APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
		22-09	2	ADDED DETAIL FOR EVERY THIRD STREET LIGHT STANDARD	CONNECTION DETAIL IN STREET LIGHT STANDARD				
		18-04	1	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4. ADDED NEW BOM WITH GELCAP, REVISED TITLE, RESEALED					
DRAWN C.A.		CHECKED L.D./P.L.		DATE 18-04		CD 310-4		SHT 0002 OF 4	REV 02

1-04431-DA-56200-0002



**No. 4 ALUMINUM C/N CABLE
(TYPICAL FEED THROUGH)**

**1/0 ALUMINUM TRIPLEX CABLE
(TYPICAL FEED THROUGH)**

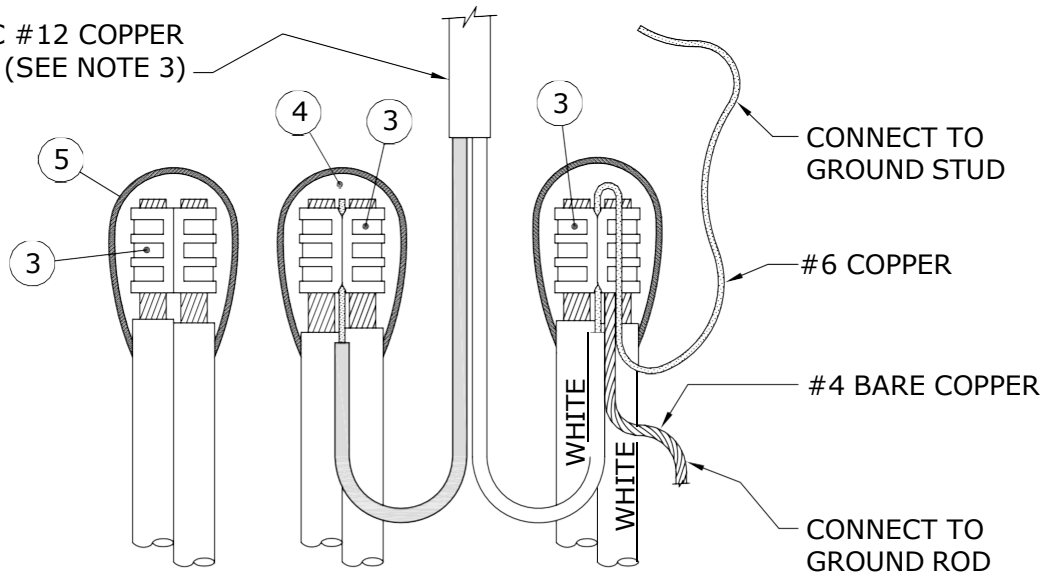


**No. 4 ALUMINUM C/N CABLE
(TYPICAL END OF CIRCUIT)**

**1/0 ALUMINUM TRIPLEX CABLE
(TYPICAL END OF CIRCUIT)**

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS			
	22-09	2	ADDED COPPER LABEL FOR #4 BARE & #6	CONNECTION DETAIL IN STREET LIGHT STANDARD			
	21-06	1	ADDED NOTE FOR DUAL LUMINAIRE SUPPLY				
	18-04	0	MOVED FROM SHEET 1				
DRAWN C.A.	CHECKED L.D./P.L.		DATE 18-04	CD 310-4		SHT 0003 OF 4	REV 02

2/C #12 COPPER
(SEE NOTE 3)



**1/0 ALUMINUM TRIPLEX CABLE
(TYPICAL EVERY THIRD STANDARD)**

BILL OF MATERIAL

ITEM No.	DESCRIPTION	STORES CODE No.		QUANTITY
		FOR USE WITH #4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX	
1	'C' TYPE AL. COMPRESSION TAP	74-41-30	---	1
1a	'H' TYPE AL. COMPRESSION TAP	74-40-10	---	1 *
2	'C' TYPE CU. COMPRESSION TAP	74-40-90	---	1
3	'H' TYPE AL. COMPRESSION TAP	---	74-40-60	3 * *
4	TAPE, SELF-AMALGAMATING EPR	78-55-23	78-55-23	1/4 ROLL
5	TAPE, COLD WEATHER VINYL	78-55-98	78-55-98	1/4 ROLL

* FOR END OF CIRCUIT WHEN USING ONLY ONE CABLE.

* * AT END OF CIRCUIT, QUANTITY MAY BE LESS THAN SHOWN.

NOTES:

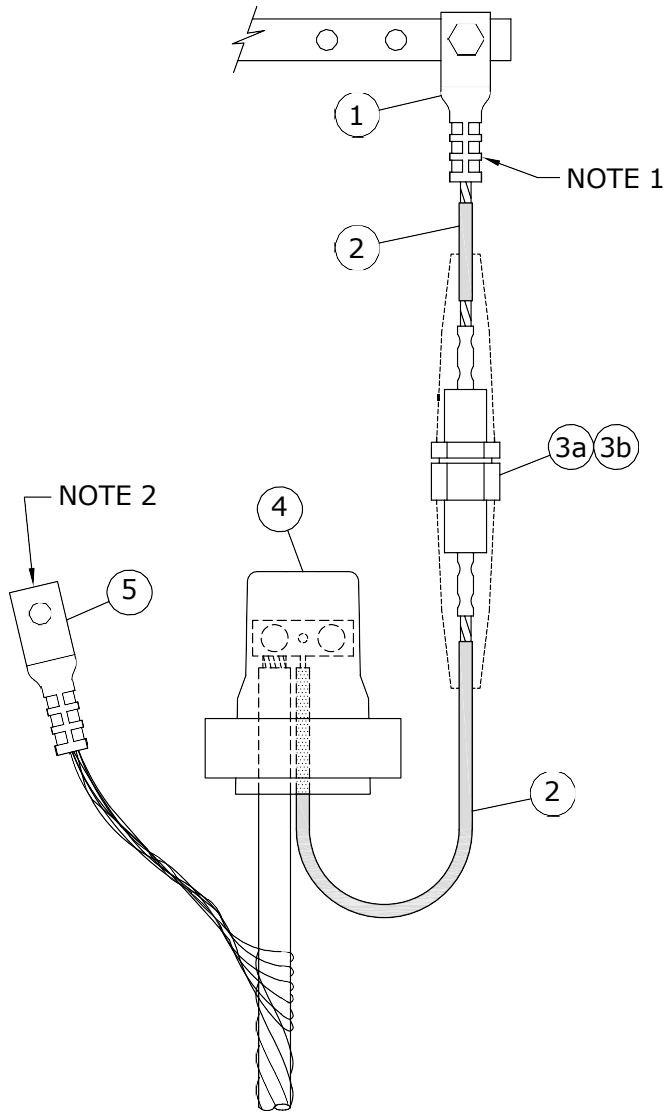
1. LEAVE SUFFICIENT SLACK ON CONDUCTORS TO ALLOW REMOVAL FROM HANDHOLE FOR MAINTENANCE.

2. FOR PROPER TAPING PROCEDURE, REFER TO DRAWING CD215-12.

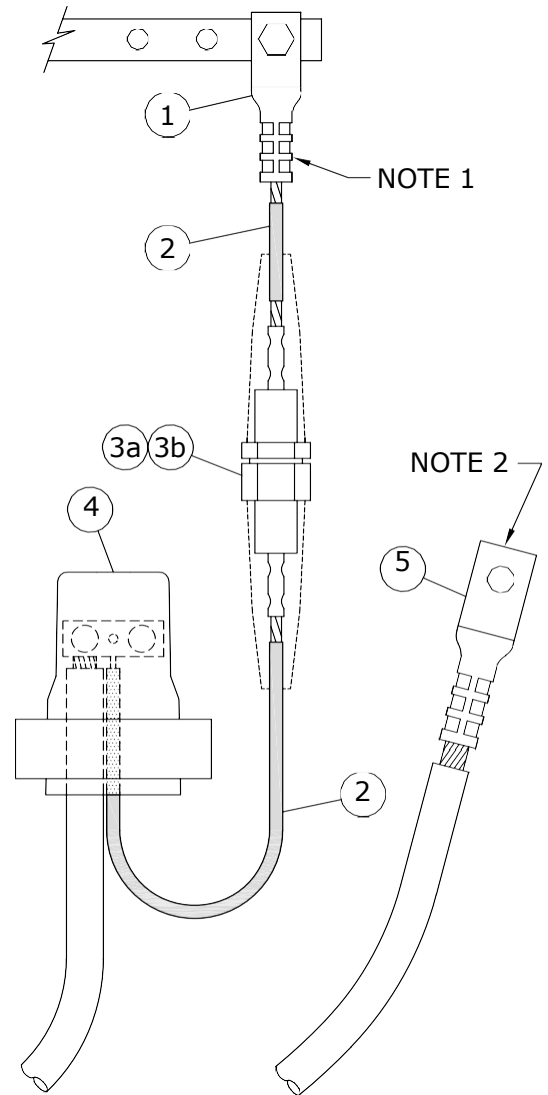
3. INSTALL PARALLEL 2/C #12 COPPER FOR DOUBLE LUMINAIRE STANDARDS. TIE TOGETHER IN HANDHOLE.

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
			CONNECTION DETAIL IN STREET LIGHT STANDARD	
	22-09	1		
	18-04	0	MOVED FROM SHEET 2	
DRAWN C.A.	CHECKED L.D./P.L.	DATE 18-04	CD 310-4	
			SHT 0004 OF 4	REV 01

1-04431-DA-56200-0002



**No. 4 ALUMINUM
C/N CABLE**



**1/0 ALUMINUM
TRIPLEX CABLE**

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 89-04-28

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
		17-11	2	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT1 TO SHT3, ADDED NEW GELCAP, DWG, RESEALED			STREET LIGHT CIRCUIT PROTECTED BY A 60A FUSE AT TRANSFORMER		
		94-04	1	CONN. REVISED DUE TO INSUL. NEUTRAL					
DRAWN C.A.		CHECKED L.D.		DATE 17-10		CD 310-8		SHT 0001 OF 4	REV 02

1-04431-DA-56200-0003

BILL OF MATERIAL

ITEM No.	DESCRIPTION	STORES CODE No.		QUANTITY *
		FOR USE WITH #4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX	
1	LUG, TERMINAL, COMPRESSION	44-66-63	44-66-63	1
2	WIRE, #6 CU., 600V, PVC	93-10-06	93-10-06	1m
3a	FUSEHOLDER, 60A C/W BOOTS	31-91-60	31-91-60	1
3b	FUSE, STREET LIGHT, 60A	31-14-60	31-14-60	1
4	GEL CAP	04-29-36	04-29-36	1
5	LUG, TERMINAL, COMPRESSION	44-66-60	44-66-65	1

* WHEN CONNECTING BOTH LEGS OF 1/0 ALUMINUM TRIPLEX, DOUBLE QUANTITY OF MATERIAL EXCEPT FOR ITEM No. 5.

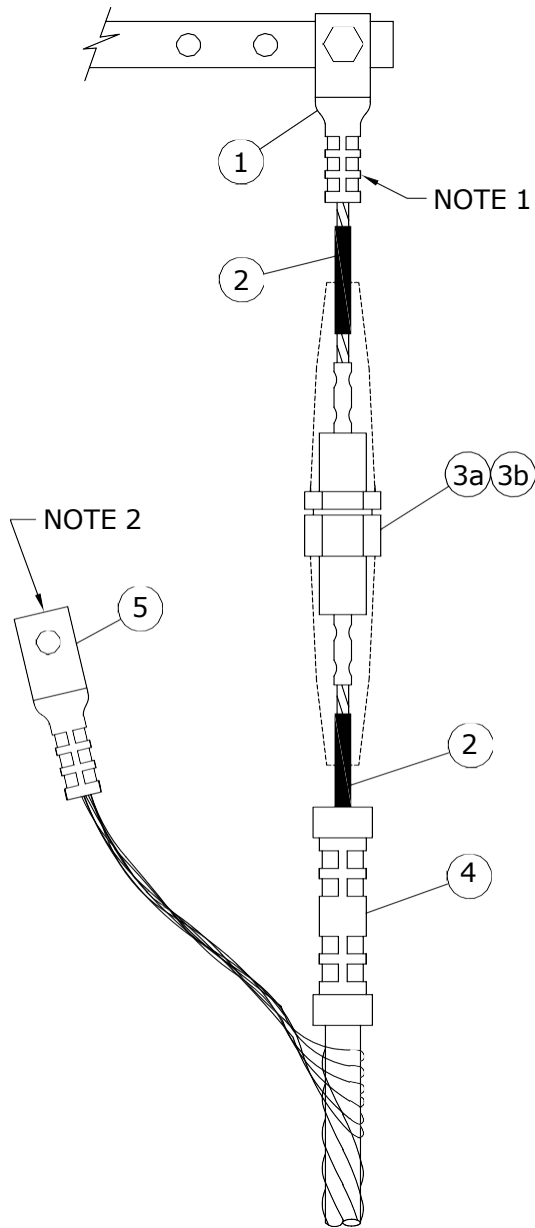
NOTES:

- FOR INFORMATION ON COMPRESSION TERMINAL LUGS, REFER TO DRAWING CD210-27.
- CONNECT TO SECONDARY GROUND BUSHING.
- REFER TO DRAWING CD310-3 FOR GEL CAP INSTALLATION INSTRUCTIONS.

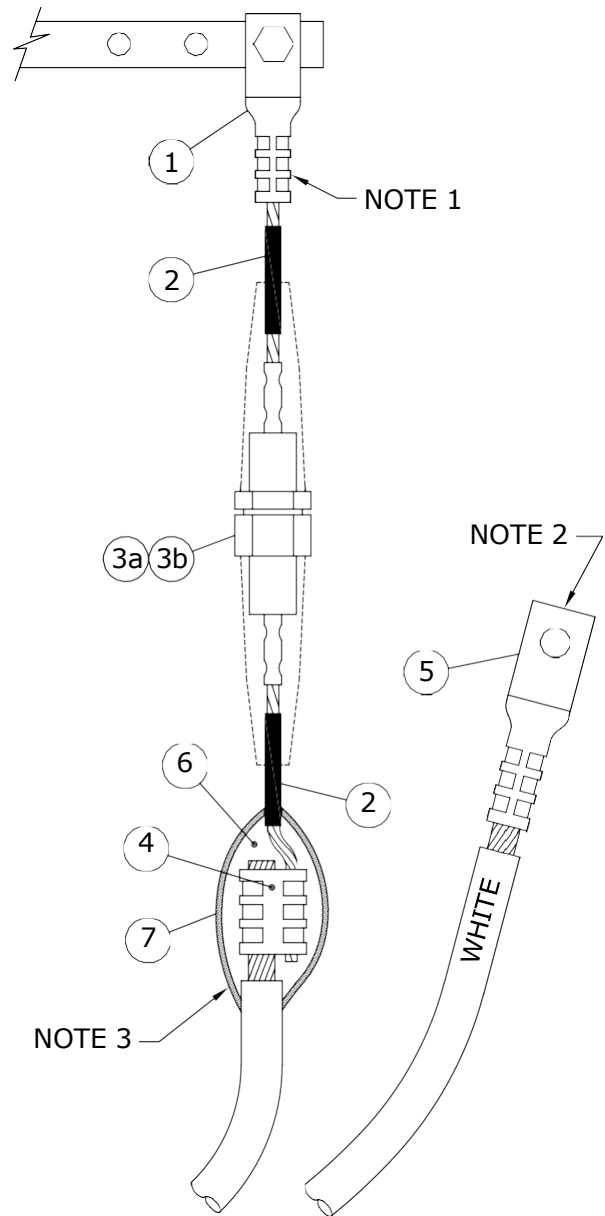
SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
				STREET LIGHT CIRCUIT PROTECTED BY A 60A FUSE AT TRANSFORMER	
		17-11	1		
		ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4, ADDED NEW BOM WITH GELCAP, RESEALED			
DRAWN C.A.	CHECKED L.D.	DATE 17-10		CD 310-8	
				SHT 0002 OF 4	REV 01

1-04431-DA-56200-0003



**No. 4 ALUMINUM
C/N CABLE**



**1/0 ALUMINUM
TRIPLEX CABLE**

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
	17-11 0 MOVED FROM SHEET 1		STREET LIGHT CIRCUIT PROTECTED BY A 60A FUSE AT TRANSFORMER	
DRAWN C.A.	CHECKED L.D.	DATE 17-10	CD 310-8	
			SHT 0003 OF 4	REV 00

BILL OF MATERIAL

ITEM No.	DESCRIPTION	STORES CODE No.		QUANTITY *
		FOR USE WITH #4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX	
1	LUG, TERMINAL, COMPRESSION	44-66-63	44-66-63	1
2	WIRE, # 6 CU., 600V, PVC	93-10-06	93-10-06	1m
3a	FUSEHOLDER, 60A C/W BOOTS	31-91-60	31-91-60	1
3b	FUSE, STREET LIGHT, 60A	31-14-60	31-14-60	1
4	INSULATED SLEEVE	74-45-50	---	1
	'H' TYPE COMPRESSION TAP	---	74-40-30	1
5	LUG, TERMINAL, COMPRESSION	44-66-60	44-66-65	1
6	TAPE, SELF-AMALGAMATING EPR	---	78-55-23	1/4 ROLL
7	TAPE, COLD WEATHER VINYL	---	78-55-98	1/4 ROLL

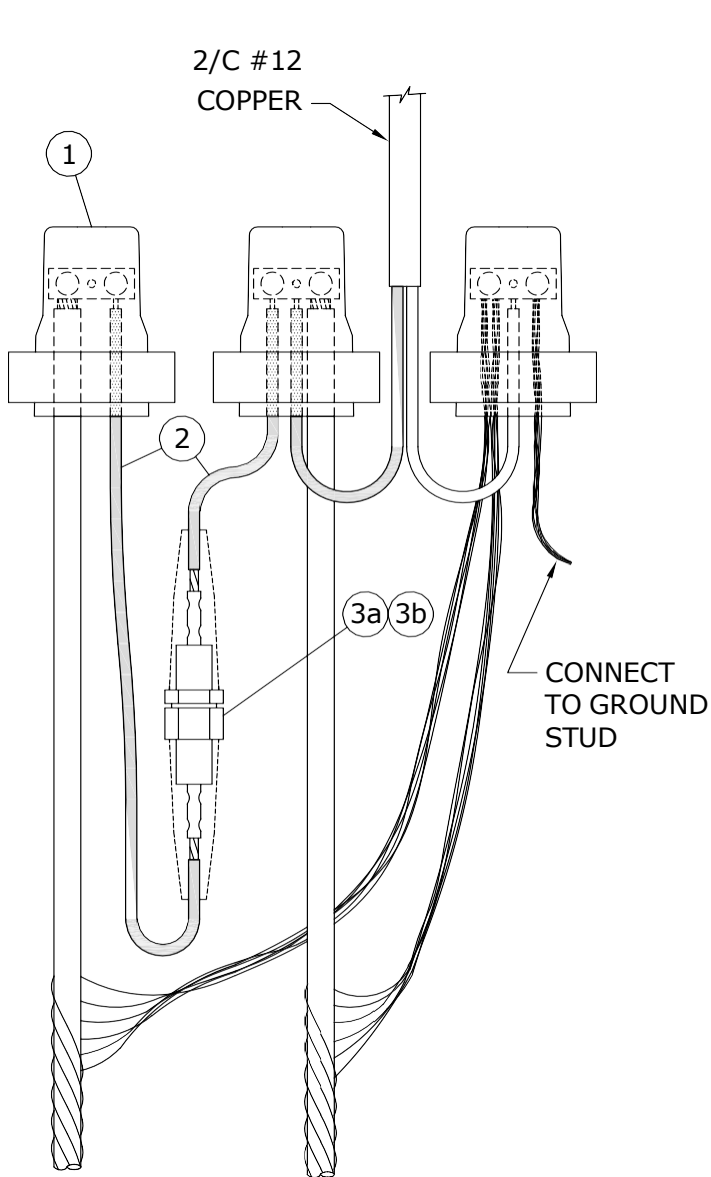
* WHEN CONNECTING BOTH LEGS OF 1/0 ALUMINUM TRIPLEX, DOUBLE QUANTITY OF MATERIAL EXCEPT FOR ITEM No. 5.

NOTES:

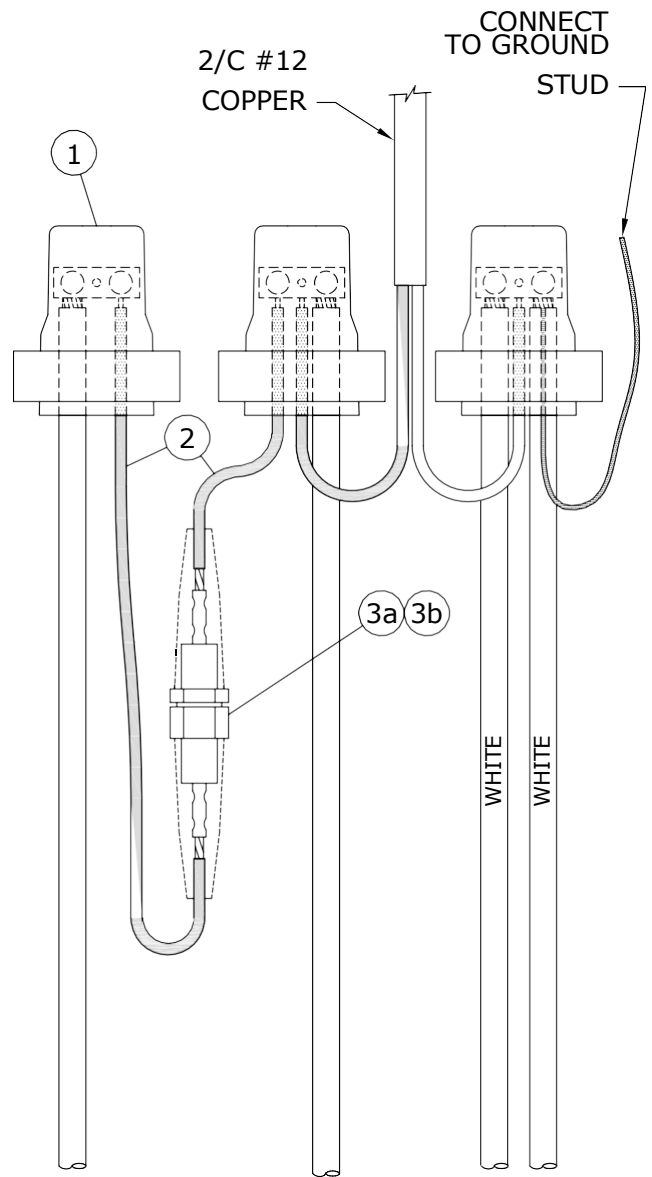
- FOR INFORMATION ON COMPRESSION TERMINAL LUGS, REFER TO DRAWING CD210-27.
- CONNECT TO SECONDARY GROUND BUSHING.
- FOR PROPER TAPING PROCEDURE, REFER TO DRAWING CD215-12.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS			
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05				STREET LIGHT CIRCUIT PROTECTED BY A 60A FUSE AT TRANSFORMER			
DRAWN C.A.		17-11	0	MOVED FROM SHEET 2		DATE 17-10	CD 310-8
		CHECKED L.D.				SHT 0004 OF 4	REV 00

1-04431-DA-56200-0003



No. 4 ALUMINUM C/N CABLE



1/0 ALUMINUM TRIPLEX CABLE

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 89-04-28

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
		17-11	2	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT1 TO SHT3, ADDED NEW GELCAP, DWG, RESEALED	STREET LIGHT CIRCUIT PROTECTED BY 30A FUSE IN STREET LIGHT STANDARD				
		94-04	1	CONN. REVISED DUE TO INSUL. NEUTRAL					
DRAWN C.A.		CHECKED L.D.		DATE 17-11		CD 310-9		SHT 0001 OF 4	REV 02

1-04431-DA-56200-0004

BILL OF MATERIAL

ITEM No.	DESCRIPTION	STORES CODE No.		QUANTITY
		FOR USE WITH #4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX	
1	GEL CAP	04-29-36	04-29-36	3
2	WIRE, # 8 CU., 600V, PVC	93-10-08	93-10-08	1m
3a	FUSEHOLDER, 15/30A C/W BOOTS	31-91-30	31-91-30	1
3b	FUSE, 30A	31-14-30	31-14-30	1

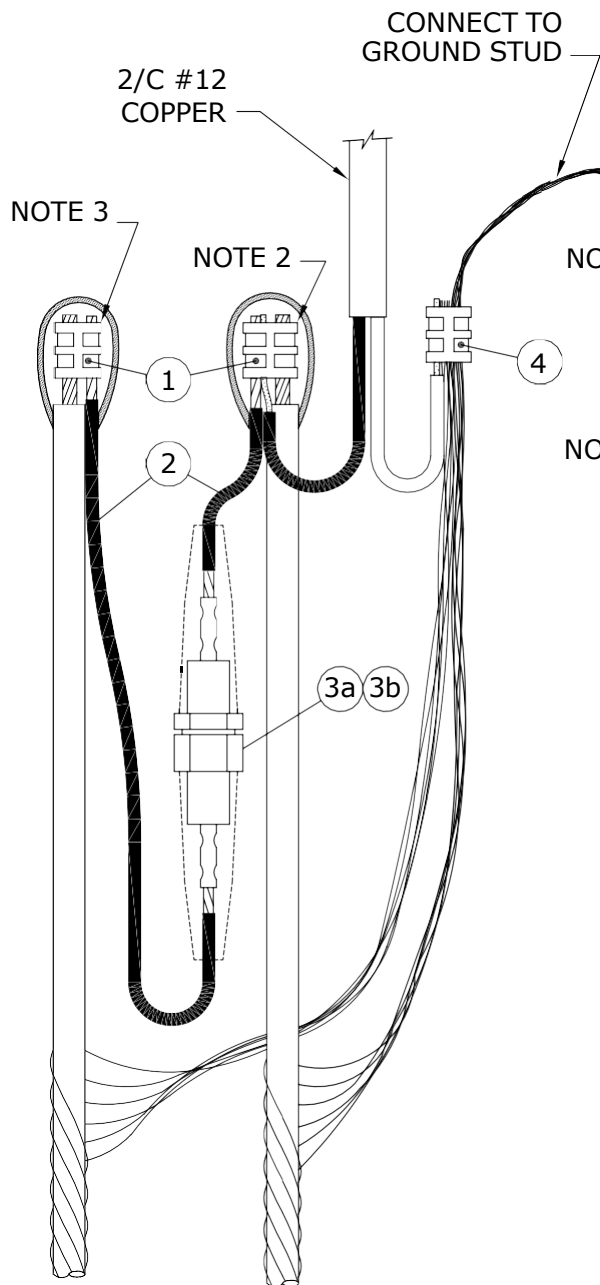
NOTES:

- 1. LEAVE SUFFICIENT SLACK ON CONDUCTORS AND FUSE HOLDER TO ALLOW REMOVAL FROM HANDHOLE FOR FUSE REPLACEMENT AND MAINTENANCE.**
2. FOR SPLICING FEED THROUGH HOT LEG, REFER TO DRAWING CD310-4.
3. FOR GEL CAP INSTALLATION INSTRUCTIONS, REFER TO DRAWING CD310-3.

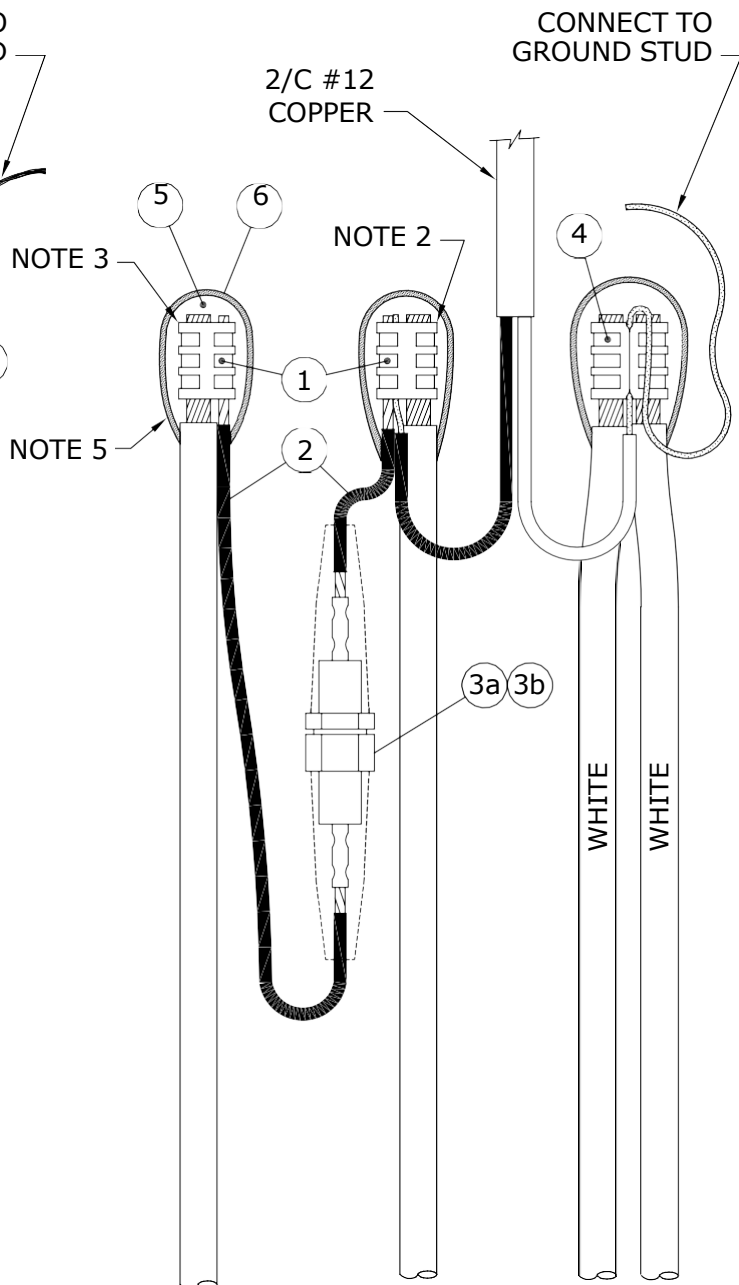
SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
				STREET LIGHT CIRCUIT PROTECTED BY 30A FUSE IN STREET LIGHT STANDARD	
		17-11	1		
		ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4, ADDED NEW BOM WITH GELCAP, RESEALED			
DRAWN C.A.	CHECKED L.D.	DATE 17-11		CD 310-9	
				SHT 0002 OF 4	REV 01

1-04431-DA-56200-0004



No. 4 ALUMINUM C/N CABLE



1/0 ALUMINUM TRIPLEX CABLE

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS			
				STREET LIGHT CIRCUIT PROTECTED BY 30A FUSE IN STREET LIGHT STANDARD			
	17-11	0	MOVED FROM SHEET 1				
DRAWN C.A.	CHECKED L.D.	DATE 17-11		CD 310-9		SHT 0003 OF 4	REV 00

BILL OF MATERIAL

ITEM No.	DESCRIPTION	STORES CODE No.		QUANTITY
		FOR USE WITH #4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX	
1	'H' TYPE COMPRESSION TAP	74-40-10	74-40-30	2
2	WIRE, # 8 CU., 600V, PVC	93-10-08	93-10-08	1m
3a	FUSEHOLDER, 15/30A C/W BOOTS	31-91-30	31-91-30	1
3b	FUSE, 30A	31-14-30	31-14-30	1
4	'C' TYPE COMPRESSION TAP	74-40-90	---	1
	'H' TYPE COMPRESSION TAP	---	74-40-60	1 *
5	TAPE, SELF-AMALGAMATING EPR	78-55-23	78-55-23	1/4 ROLL
6	TAPE, COLD WEATHER VINYL	78-55-98	78-55-98	1/4 ROLL

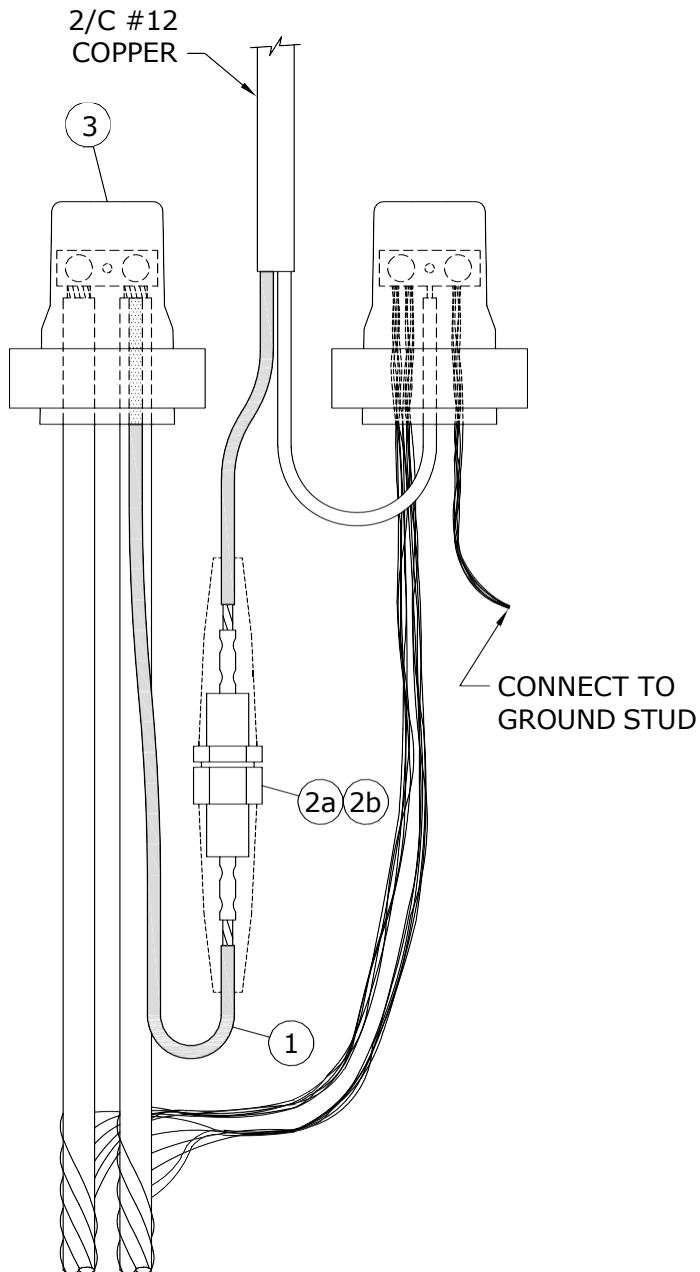
* WHEN USING 1/0 ALUMINUM TRIPLEX 1 ADDITIONAL 'H' TYPE COMPRESSION TAP (S.C.# 74 40 60) IS REQUIRED TO CONNECT SECOND (FEED THROUGH) HOT LEG.

NOTES:

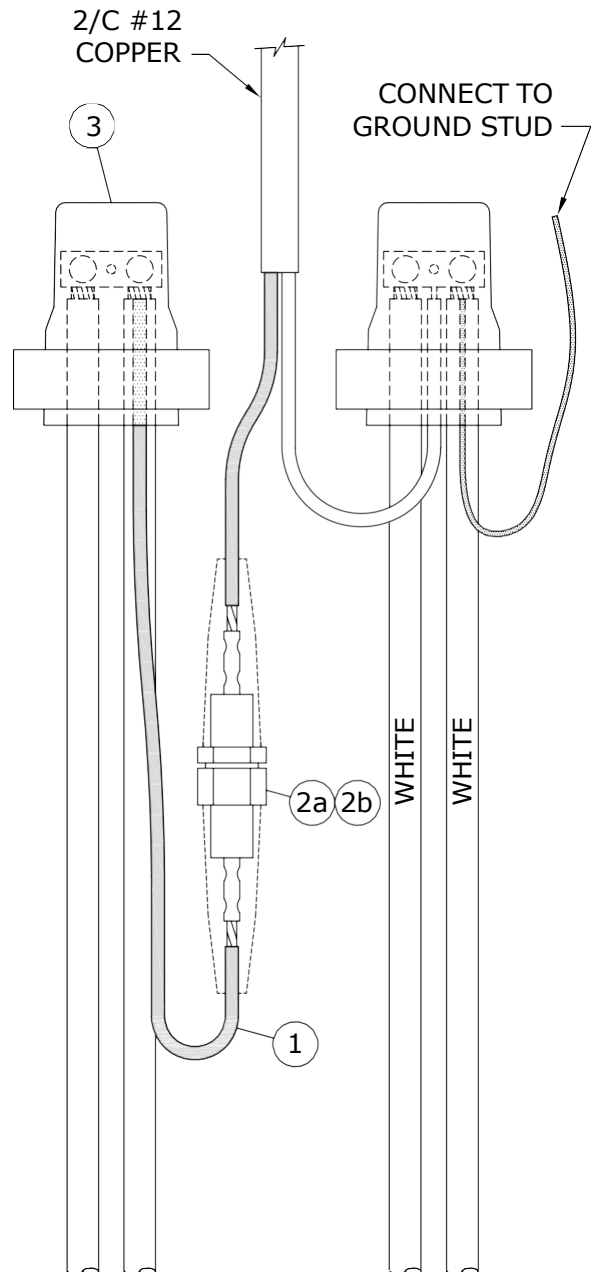
- LEAVE SUFFICIENT SLACK ON CONDUCTORS AND FUSE HOLDER TO ALLOW REMOVAL FROM HANDHOLE FOR FUSE REPLACEMENT AND MAINTENANCE.**
- INSERT #12 COPPER AND #8 COPPER IN SMALL GROOVE.
- INSERT DOUBLE THICKNESS OF #8 COPPER IN SMALL GROOVE.
- FOR SPLICING FEED THROUGH HOT LEG, REFER TO DRAWING CD310-4.
- FOR PROPER TAPING PROCEDURE, REFER TO DRAWING CD215-12.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS			
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05				STREET LIGHT CIRCUIT PROTECTED BY 30A FUSE IN STREET LIGHT STANDARD			
DRAWN C.A.		CHECKED L.D.		DATE 17-11		CD 310-9	
						SHT 0004 OF 4	REV 00

1-04431-DA-56200-0004



No. 4 ALUMINUM C/N CABLE



1/0 ALUMINUM TRIPLEX CABLE

NOTE:

RECOMMENDED FOR PROTECTING LUMINAIRES WHICH ARE TO BE MOUNTED ON STREET LIGHT POLES 16.8m AND HIGHER.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 89-04-28

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
		18-04	3	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT1 TO SHT3, ADDED NEW GELCAP, DWG, RESEALED	INDIVIDUAL LUMINAIRE PROTECTED BY 15A FUSE IN STREET LIGHT STANDARD				
		95-01	2	NOTE ADDED					
DRAWN C.A.		CHECKED L.D.		DATE 18-04		CD 310-10		SHT 0001 OF 4	REV 03

BILL OF MATERIAL

ITEM No.	DESCRIPTION	STORES CODE No.		QUANTITY
		FOR USE WITH #4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX	
1	2/C #12 COPPER	93-52-12	93-52-12	1m
2a	FUSEHOLDER, 15/30A C/W BOOTS	31-91-30	31-91-30	1
2b	FUSE, STREET LIGHT, 15A	31-14-15	31-14-15	1
3	GEL CAP	04-29-36	04-29-36	2

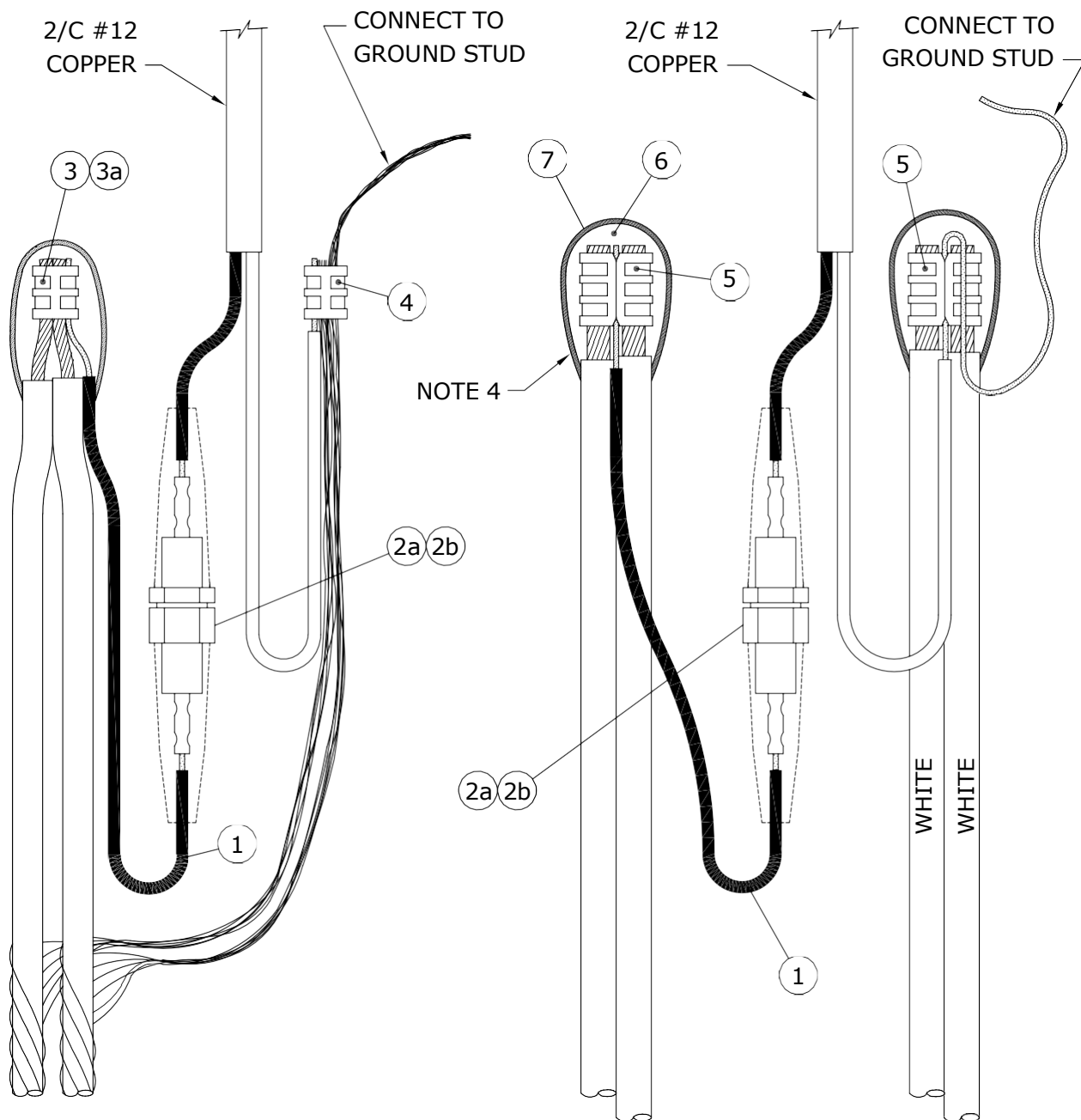
NOTES:

1. **LEAVE SUFFICIENT SLACK ON CONDUCTORS AND FUSE HOLDER TO ALLOW REMOVAL FROM HANDHOLE FOR FUSE REPLACEMENT AND MAINTENANCE.**
2. FOR SPLICING FEED THROUGH HOT LEG, REFER TO DRAWING CD310-4.
3. FOR END OF CIRCUIT, REFER TO DRAWING CD310-4.
4. FOR GEL CAP INSTALLATION INSTRUCTIONS, REFER TO DRAWING CD310-3.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
				INDIVIDUAL LUMINAIRE PROTECTED BY 15A FUSE IN STREET LIGHT STANDARD					
		18-04	1					ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4, ADDED NEW BOM WITH GELCAP, RESEALED	
DRAWN C.A.		CHECKED L.D.		DATE 18-04		CD 310-10		SHT 0002 OF 4	REV 01

1-04431-DA-56200-0005



No. 4 ALUMINUM C/N CABLE

1/0 ALUMINUM TRIPLEX CABLE

NOTE:

RECOMMENDED FOR PROTECTING LUMINAIRES WHICH ARE TO BE MOUNTED ON STREET LIGHT POLES 16.8m AND HIGHER.

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
	18-04 0		INDIVIDUAL LUMINAIRE PROTECTED BY 15A FUSE IN STREET LIGHT STANDARD	
DRAWN C.A.		CHECKED L.D.	DATE 18-04	CD 310-10
				SHT 0003 OF 4 REV 00

1-04431-DA-56200-0005

BILL OF MATERIAL

ITEM No.	DESCRIPTION	STORES CODE No.		QUANTITY
		FOR USE WITH #4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX	
1	2/C # 12 COPPER	93-52-12	93-52-12	1m
2a	FUSEHOLDER, 15/30A C/W BOOTS	31-91-30	31-91-30	1
2b	FUSE, STREET LIGHT, 15A	31-14-15	31-14-15	1
3	'C' TYPE AL. COMPRESSION TAP	74-41-30	---	1
3a	'H' TYPE AL. COMPRESSION TAP	74-40-10	---	1 *
4	'C' TYPE CU. COMPRESSION TAP	74-40-90	---	1
5	'H' TYPE AL. COMPRESSION TAP	---	74-40-60	3 **
6	TAPE, SELF-AMALGAMATING EPR	78-55-23	78-55-23	1/4 ROLL
7	TAPE, COLD WEATHER VINYL	78-55-98	78-55-98	1/4 ROLL

* FOR END OF CIRCUIT WHEN USING ONLY ONE CABLE.

** AT END OF CIRCUIT, QUANTITY MAY BE LESS THAN SHOWN.

NOTES:

- 1. LEAVE SUFFICIENT SLACK ON CONDUCTORS AND FUSE HOLDER TO ALLOW REMOVAL FROM HANDHOLE FOR FUSE REPLACEMENT AND MAINTENANCE.**
2. FOR SPLICING FEED THROUGH HOT LEG, REFER TO DRAWING CD310-4.
3. FOR END OF CIRCUIT, REFER TO DRAWING CD310-4.
4. FOR PROPER TAPING PROCEDURE, REFER TO DRAWING CD215-12.

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
				INDIVIDUAL LUMINAIRE PROTECTED BY 15A FUSE IN STREET LIGHT STANDARD	
		18-04	0	MOVED FROM SHEET 2	
DRAWN C.A.	CHECKED L.D.	DATE 18-04		CD 310-10	
				SHT 0004 OF 4	REV 00

1-04431-DA-56200-0005

SUPPLY VOLTAGES

THE SUPPLY VOLTAGE FOR STREET LIGHT CIRCUITS MAY BE PROVIDED BY POLE-MOUNTED DISTRIBUTION TRANSFORMERS OR BY PAD-MOUNTED DISTRIBUTION TRANSFORMERS.

THE MAJORITY OF ROADWAY LUMINAIRES ARE RATED FOR OPERATION ON EITHER 120 VOLT OR 240 VOLT CIRCUITS AND ARE FACTORY WIRED FOR 120 VOLT OPERATION EXCEPT FOR 400 WATT H.P.S. LUMINAIRES WHICH ARE RATED FOR 120/240 VOLT OPERATION BUT ARE FACTORY WIRED FOR 240 VOLT OPERATION.

IN CASES WHERE EXCESSIVE VOLTAGE DROP IN A STREET LIGHTING CIRCUIT IS A PROBLEM, A SUPPLY VOLTAGE OF 240/480 MAY BE USED. A SUPPLY VOLTAGE OF 240/480 CAN BE OBTAINED FROM TWO SINGLE PHASE POLE-MOUNTED DISTRIBUTION TRANSFORMERS CONNECTED AS SHOWN ON DRAWING CD315-2. IF A SINGLE PHASE PAD-MOUNTED DISTRIBUTION TRANSFORMER WITH A 240/480 VOLT SECONDARY IS REQUIRED, THE TRANSFORMER MUST BE ORDERED FROM THE MANUFACTURER (SEE DRAWING CD315-2).

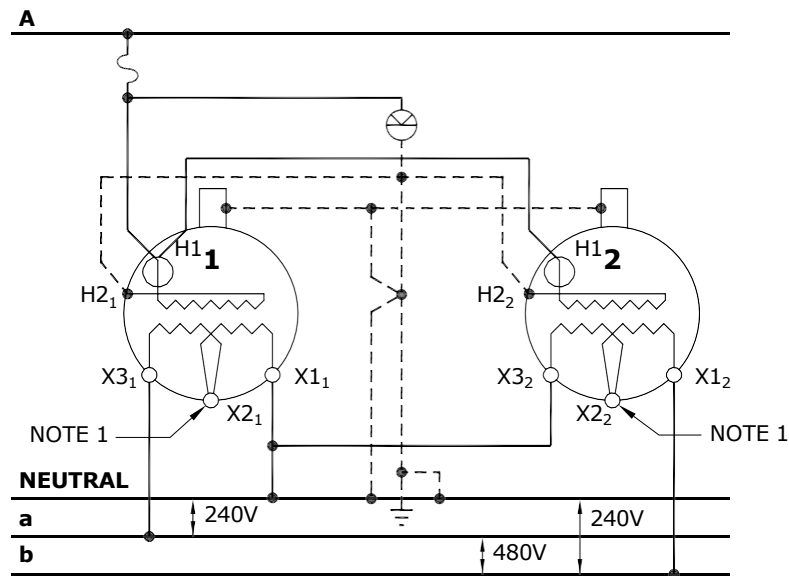
CAUTION:

PRIOR TO CONNECTING LUMINAIRES TO A 240 VOLT SUPPLY CIRCUIT IT IS IMPORTANT TO CHECK THE INTERNAL CONNECTIONS TO THE TERMINAL BLOCK TO ENSURE THAT THE UNIT IS PROPERLY CONNECTED FOR 240 VOLT OPERATION.

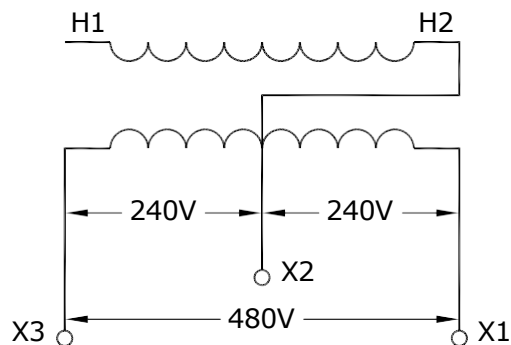
APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28				SUPPLY VOLTAGES FOR STREET LIGHT CIRCUITS					
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-08	CD 315-1		<table border="1"><tr><td>SHT</td><td>REV</td></tr><tr><td>0001 OF 1</td><td>00</td></tr></table>	SHT	REV	0001 OF 1	00
SHT	REV								
0001 OF 1	00								

NOTE:

1. X2 SECONDARY GROUNDING STRAP MUST BE REMOVED.



SECONDARY VOLTAGE 240/480V GROUNDED. TWO SINGLE-PHASE POLE-MOUNTED TRANSFORMERS WITH 120/240V SECONDARIES.



SECONDARY VOLTAGE 240/480V GROUNDED. SINGLE-PHASE PAD-MOUNTED TRANSFORMER AS SUPPLIED BY MANUFACTURER

SAFETY PRECAUTION

1. SINGLE PHASE PAD MOUNTED TRANSFORMERS WITH ABOVE SECONDARY VOLTAGES TO HAVE WARNING SIGN "**CAUTION - 240/480V SECONDARY - SEE NAMEPLATE**", STENCILLED ON THE OUTSIDE OF THE TRANSFORMER NEAR NAMEPLATE.
2. NAMEPLATES OF MODIFIED TRANSFORMERS TO BE REVISED.

PURCHASE OF 240/480 VOLT TRANSFORMER

1. INCLUDE ABOVE WARNING SIGN REQUIREMENT IN PURCHASE DESCRIPTION.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 89-04-28

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 21-06-09		REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS				
		21-06	3	ADDED NOTE 1, RESEALED	240/480 VOLT SUPPLY FOR STREET LIGHT CIRCUITS				
		13-01	2	REVISED DIAGRAM					
		90-04	1	DROPOUT DELETED					
DRAWN C.A.		CHECKED D.F./L.D.		DATE 21-06		CD 315-2		SHT 0001 OF 1	REV 03

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CONTROL METHODS

1. LUMINAIRES CONTROLLED INDIVIDUALLY BY PHOTO-ELECTRIC CELL

THE PREFERRED METHOD FOR PROVIDING ON/OFF CONTROL OF A STREET LIGHT LUMINAIRE IS TO INSTALL A PHOTO-ELECTRIC CELL ON EACH LUMINAIRE, IF LUMINAIRES ARE MOUNTED ON HIGHER POLES (IN EXCESS OF 10.7 M OR 35 FT.) WHERE IT IS DIFFICULT TO REACH THE LUMINAIRE WITH THE LOCAL DISTRICT BUCKET TRUCK, CONSIDERATION SHOULD BE GIVEN TO USING A PHOTO-ELECTRIC CONTROLLED EXTERNALLY-MOUNTED RELAY SYSTEM.

2. PHOTO-ELECTRIC CONTROLLED EXTERNALLY-MOUNTED RELAY

SEVERAL LUMINAIRES CAN BE CONTROLLED SIMULTANEOUSLY BY INSTALLING A PHOTO-ELECTRIC CONTROLLED, EXTERNALLY MOUNTED RELAY, ON A WOOD POLE (SEE CD315-11) OR ON A STEEL STREET LIGHT POLE (SEE CD315-12). SINGLE POLE (SINGLE CIRCUIT) RELAYS ARE AVAILABLE WITH EITHER A 30 AMP OR A 60 AMP RATING. A BY-PASS SWITCH MAY BE INSTALLED TO PROVIDE A MEANS OF ACTIVATING THE STREET LIGHT CIRCUIT FOR DAYLIGHT MAINTENANCE PURPOSES.

3. STREET LIGHT RELAY USING STREET LIGHT CONTROL

ACTIVATING SUCCESSIVE SECTIONS OF STREET LIGHTING CIRCUITS BY MEANS OF A SERIES OF RELAYS (KNOWN AS A CASCADE CONTROLLED SYSTEM) IS NO LONGER USED AS A CONTROL METHOD. HOWEVER, SOME CASCADE CONTROLLED RELAY SYSTEMS REMAIN IN SERVICE. THE CONNECTION DIAGRAMS FOR A CASCADE CONTROLLED RELAY SYSTEM ARE SHOWN ON DRAWING CD315-14. DOUBLE POLE (DOUBLE CIRCUIT) RELAYS ARE NO LONGER PURCHASED, THEREFORE, DOUBLE POLE RELAYS WHICH FAIL MUST BE REPLACED WITH TWO SINGLE POLE RELAYS. BOTH THE SINGLE AND DOUBLE POLE OLDER STYLE RELAYS HAVE A 5 AMP FUSE PROTECTING THE RELAY COIL.

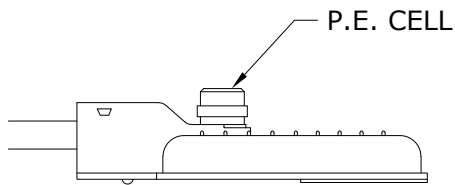
4. STREET LIGHT RELAY USING PILOT WIRE CONTROL

PILOT WIRE CONTROL SYSTEMS ARE NO LONGER USED FOR NEW CONSTRUCTION. HOWEVER, SOME PILOT WIRE CONTROL SYSTEMS REMAIN IN SERVICE. THE CONNECTION DIAGRAMS FOR PILOT WIRE CONTROL SYSTEMS ARE SHOWN ON DRAWING CD315-15. DOUBLE POLE (DOUBLE CIRCUIT) RELAYS ARE NO LONGER PURCHASED. THEREFORE, DOUBLE POLE RELAYS WHICH FAIL MUST BE REPLACED WITH TWO SINGLE POLE RELAYS.

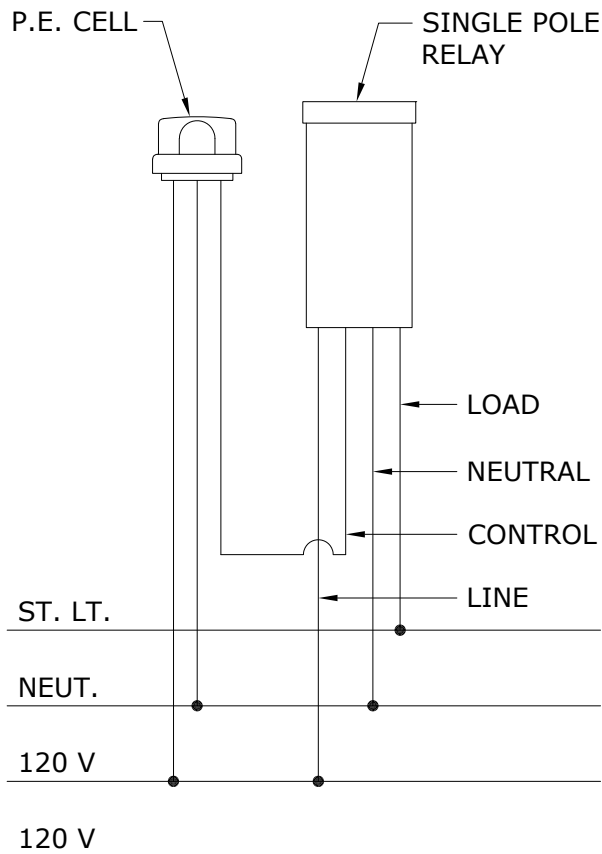
5. PHOTO-ELECTRIC CONTROLLED RELAY IN BASE OF STANDARD

COMPACT RELAYS, MOUNTED IN THE BASE OF STEEL STREET LIGHT STANDARDS ARE NO LONGER USED FOR NEW CONSTRUCTION. THE COMPACT RELAY IS ACTIVATED VIA THE PHOTO-ELECTRIC CONTROLLER ON THE LUMINAIRE. IF A COMPACT RELAY FAILS AN EXTERNALLY-MOUNTED RELAY AND PHOTO-ELECTRIC CONTROLLER SHOULD BE INSTALLED (SEE CD315-12 AND CD315-13).

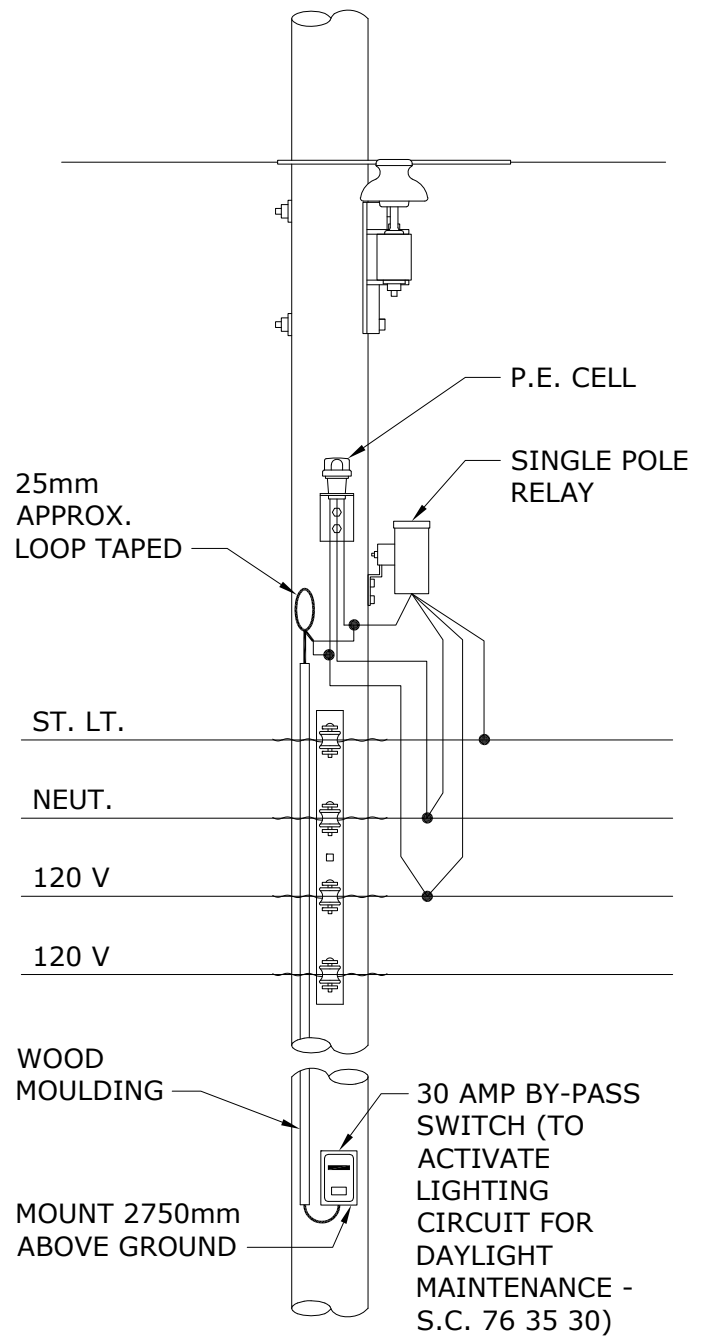
APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28				CONTROL METHODS FOR STREET LIGHT CONTROLS		
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-08	CD 315-10		SHT 0001 OF 1	REV 00



INDIVIDUALLY CONTROLLED LUMINAIRE



SINGLE POLE (SINGLE CIRCUIT) RELAY CONNECTIONS



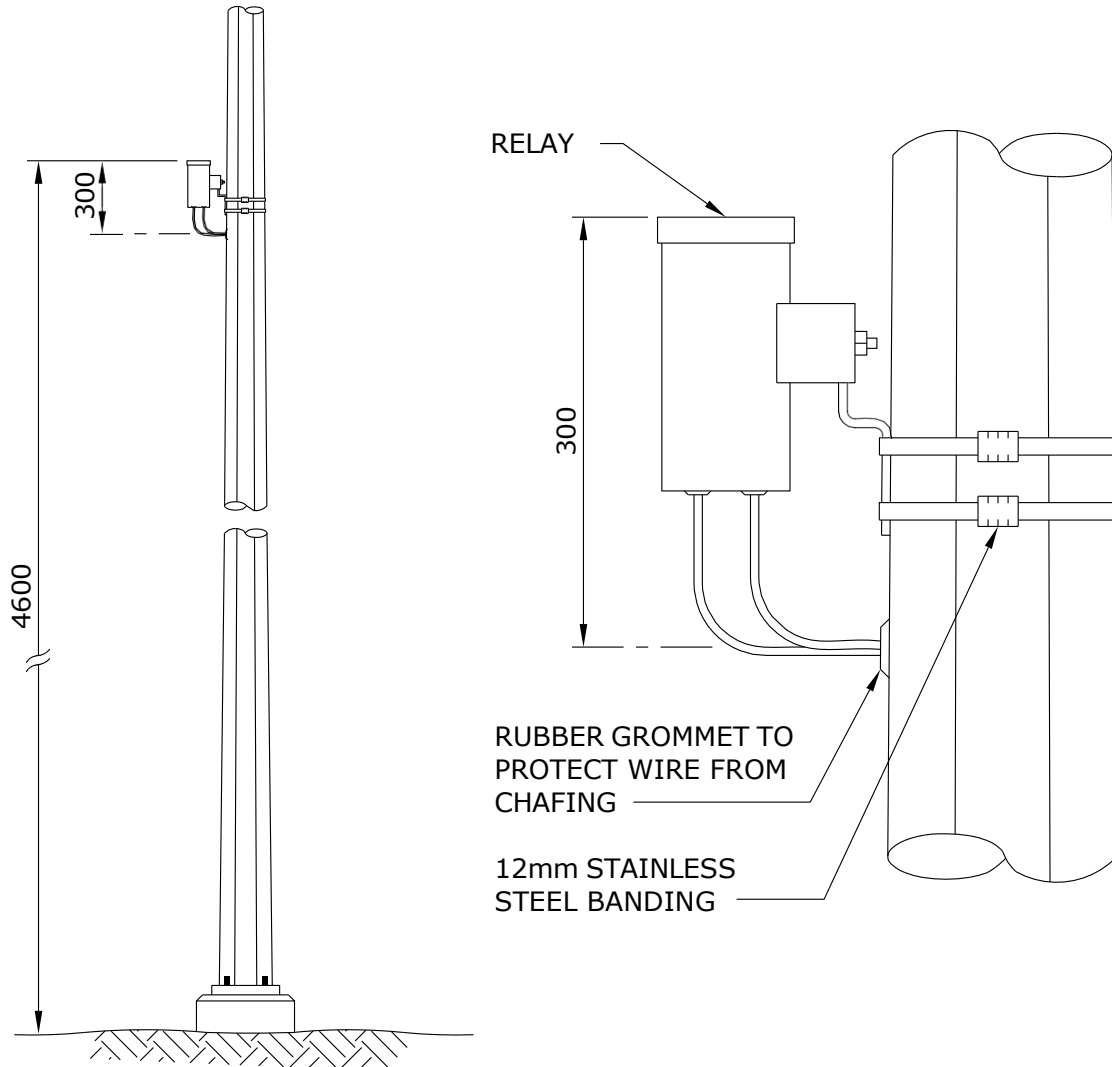
SINGLE POLE (SINGLE CIRCUIT) RELAY C/W BY-PASS SWITCH

NOTE:
P.E. CELL MUST BE MOUNTED SO
THAT CELL WINDOW FACES NORTH.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 89-04-28

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 24-04-26		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
				PHOTO-ELECTRIC CELL, RELAY AND BY-PASS SWITCH CONNECTION DIAGRAM					
24-04	1	UPDATED CROSSARM & LUMINAIRE, RESEALED							
DRAWN C.A.		CHECKED K.S.		DATE 24-04		CD 315-11		SHT 0001 OF 1	REV 01

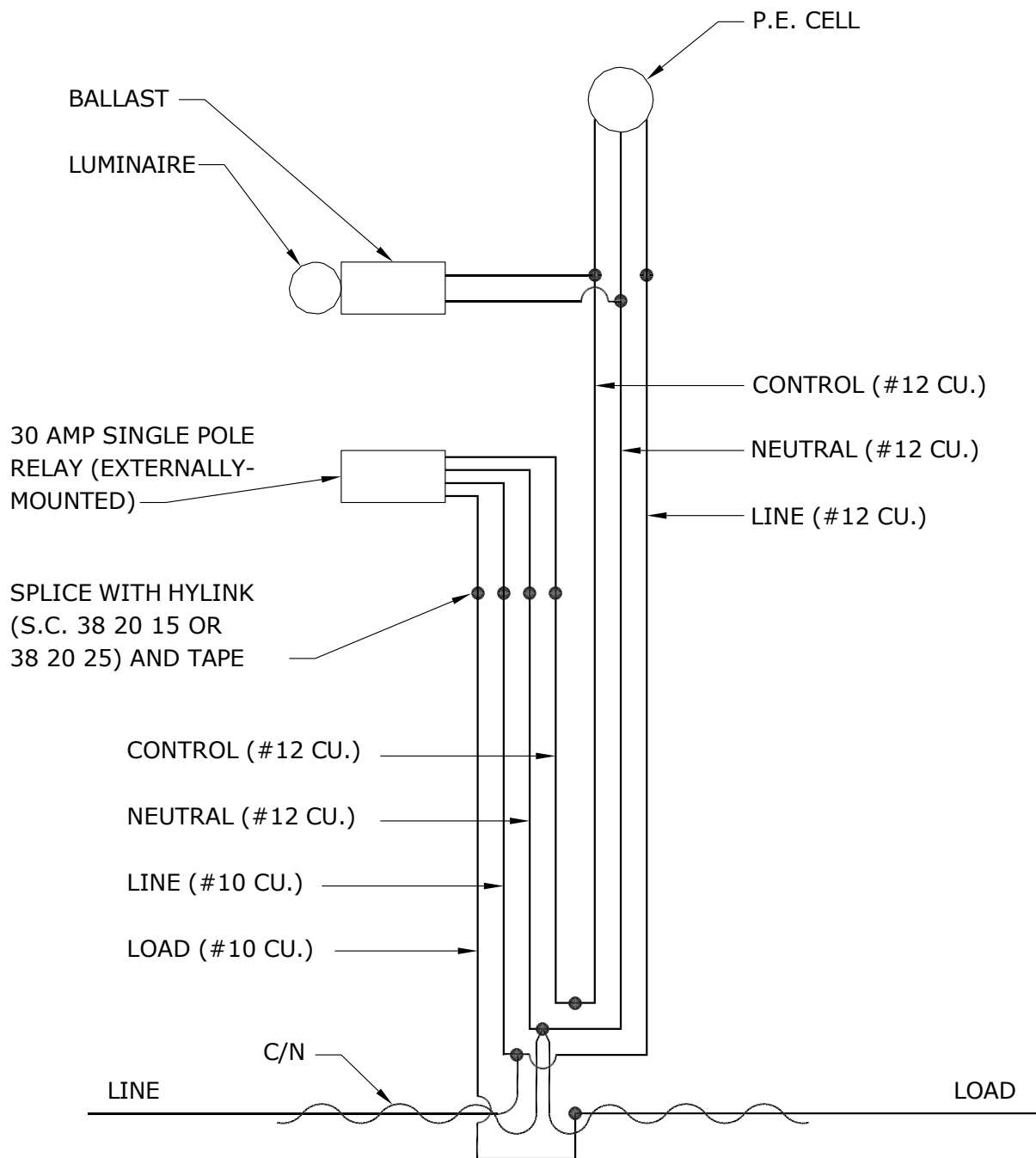
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NOTES:

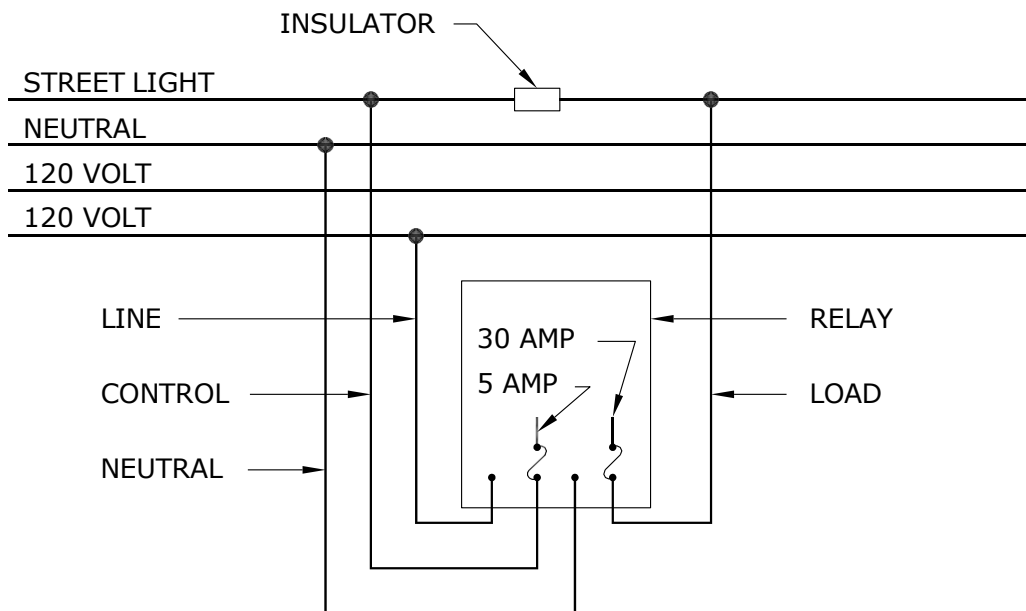
1. DRILL 25mm HOLE AT A POINT 4.3m ABOVE FINISHED GRADE.
2. INSTALL RUBBER GROMMET IN HOLE.
3. BAND RELAY TO POLE USING 12mm STAINLESS STEEL BANDING MATERIAL SO THAT THE TOP OF THE RELAY IS 300mm ABOVE THE CENTRE OF THE HOLE.
4. CONNECT RELAY LEADS TO 4.3m LENGTHS OF EQUAL SIZED CONDUCTOR AND PUSH SPLICES INSIDE POLE.
5. TAPE EXPOSED RELAY LEADS INTO A BUNDLE.
6. DIMENSIONS SHOWN ARE MILLIMETRES.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28				INSTALLATION OF EXTERNALLY-MOUNTED RELAY	
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-09	CD 315-12		SHT 0001 OF 1
					REV 00

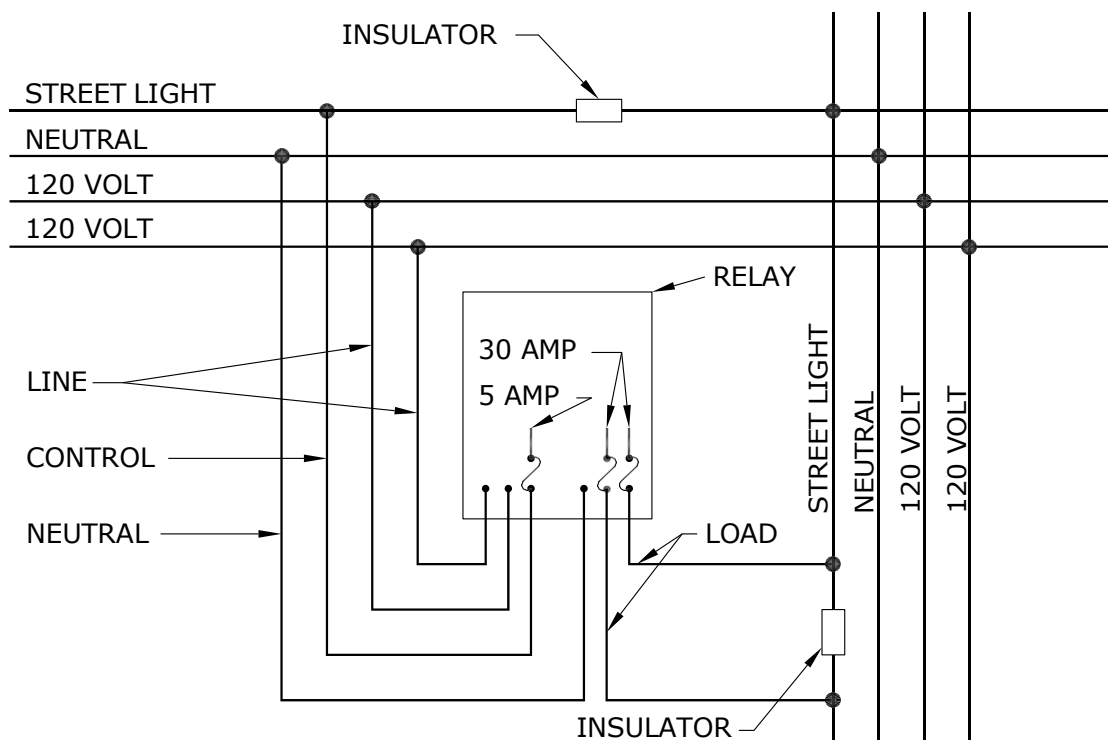


APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28	REVISIONS 94-03 1 MAXIMUM RELAY SIZE			MANITOBA HYDRO DISTRIBUTION STANDARDS CONNECTION SCHEMATIC FOR EXTERNALLY-MOUNTED RELAY		
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-09		CD 315-13		SHT REV 0001 OF 1 01

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SINGLE POLE (SINGLE CIRCUIT) RELAY

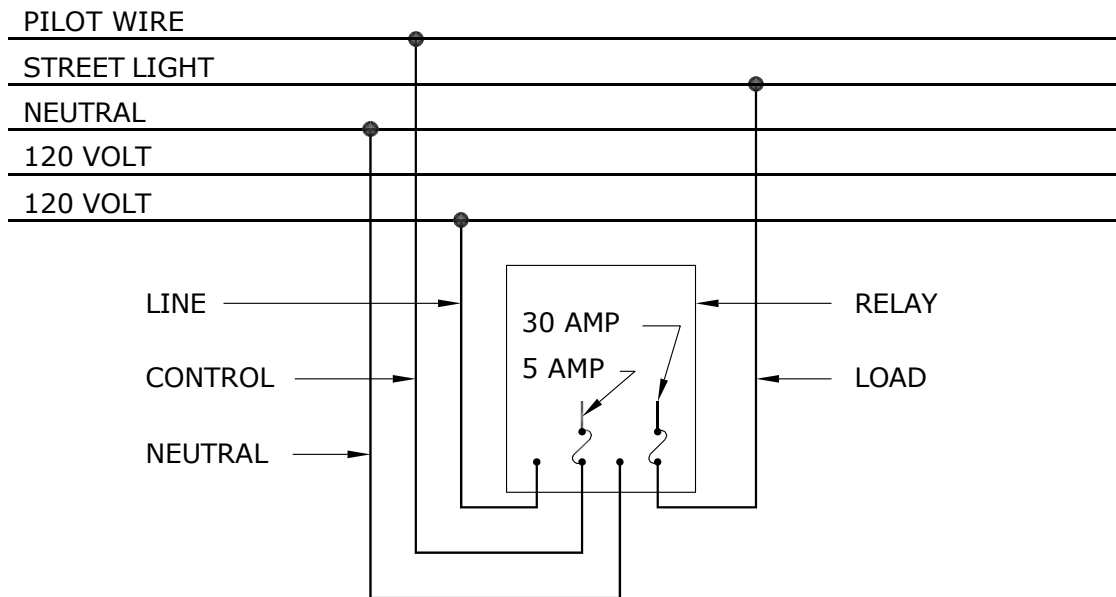


DOUBLE POLE (DOUBLE CIRCUIT) RELAY

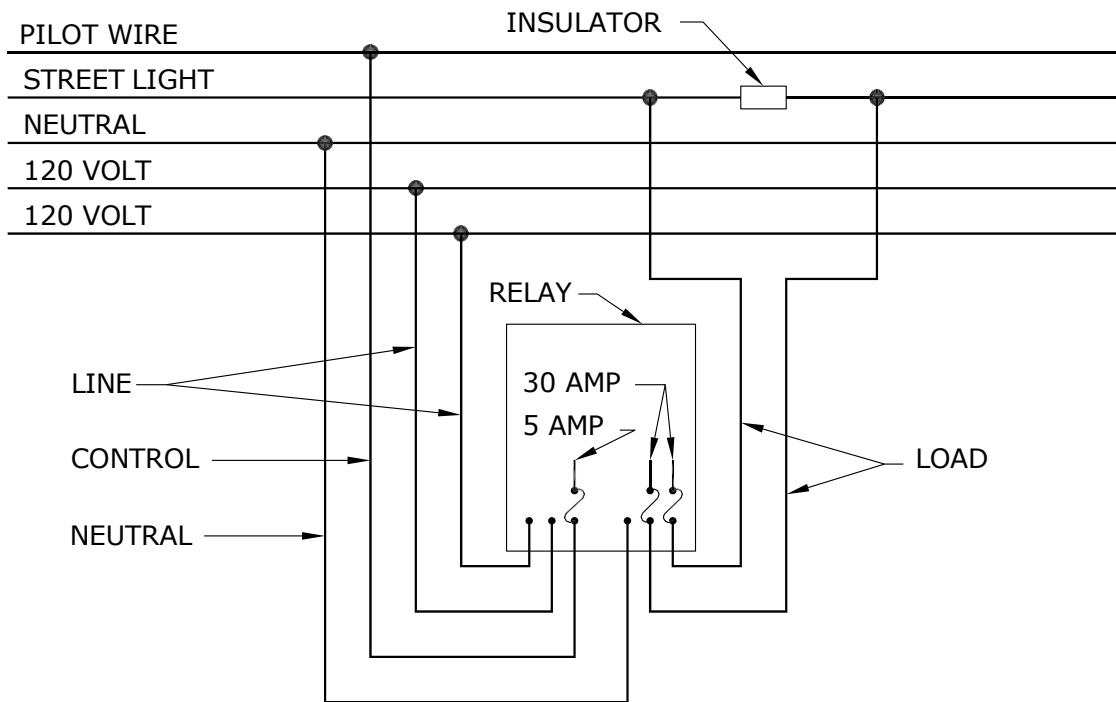
NOTE:

CASCADE SYSTEM NOT USED FOR NEW CONSTRUCTION.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28				STREET LIGHT RELAY CONNECTIONS USING STREET LIGHT CONTROL (CASCADE SYSTEM)	
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-09	CD 315-14		SHT 0001 OF 1
					REV 00



SINGLE POLE (SINGLE CIRCUIT) RELAY

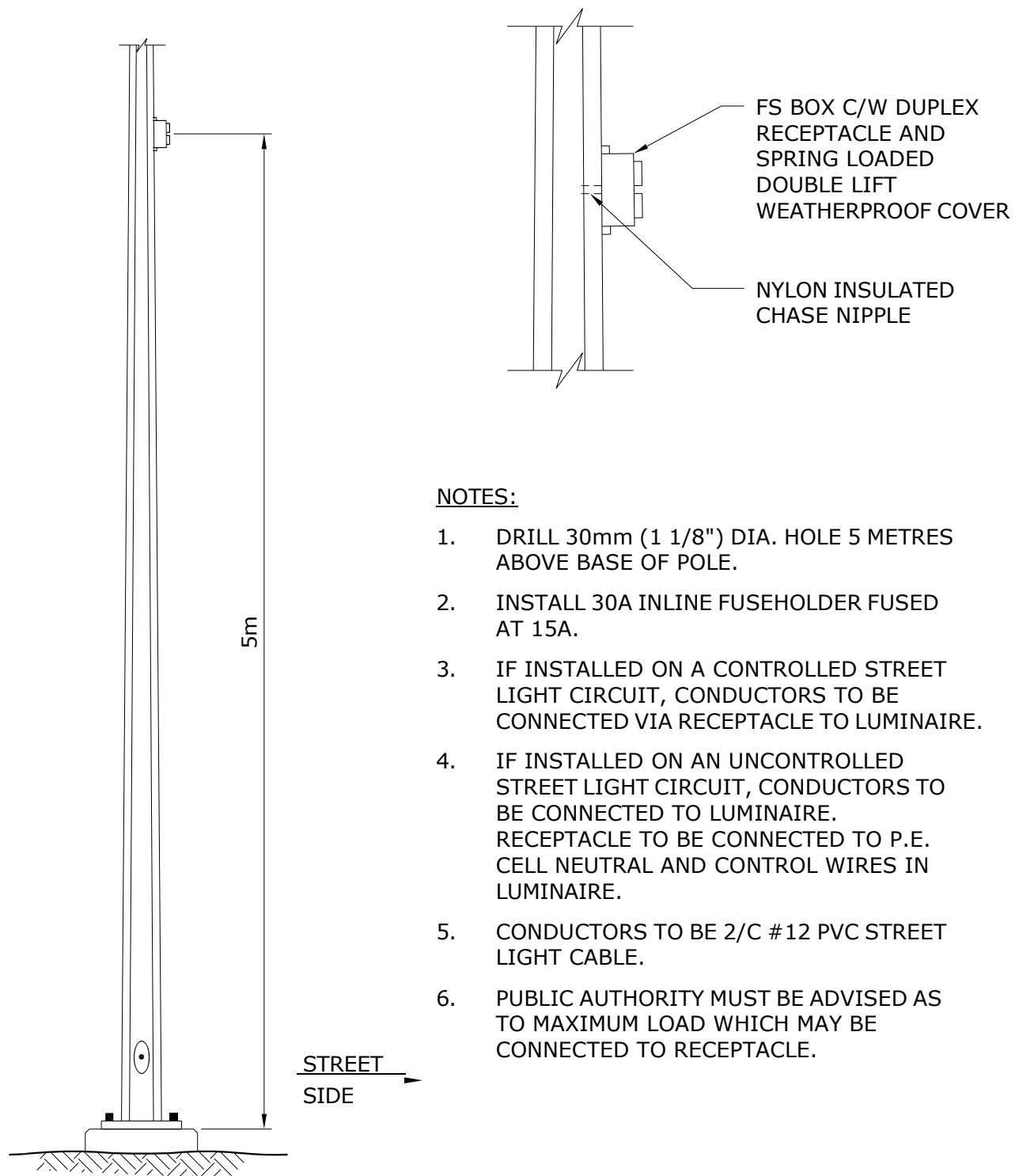


DOUBLE POLE (DOUBLE CIRCUIT) RELAY

NOTE:

PILOT WIRE SYSTEMS NOT USED FOR NEW CONSTRUCTION.

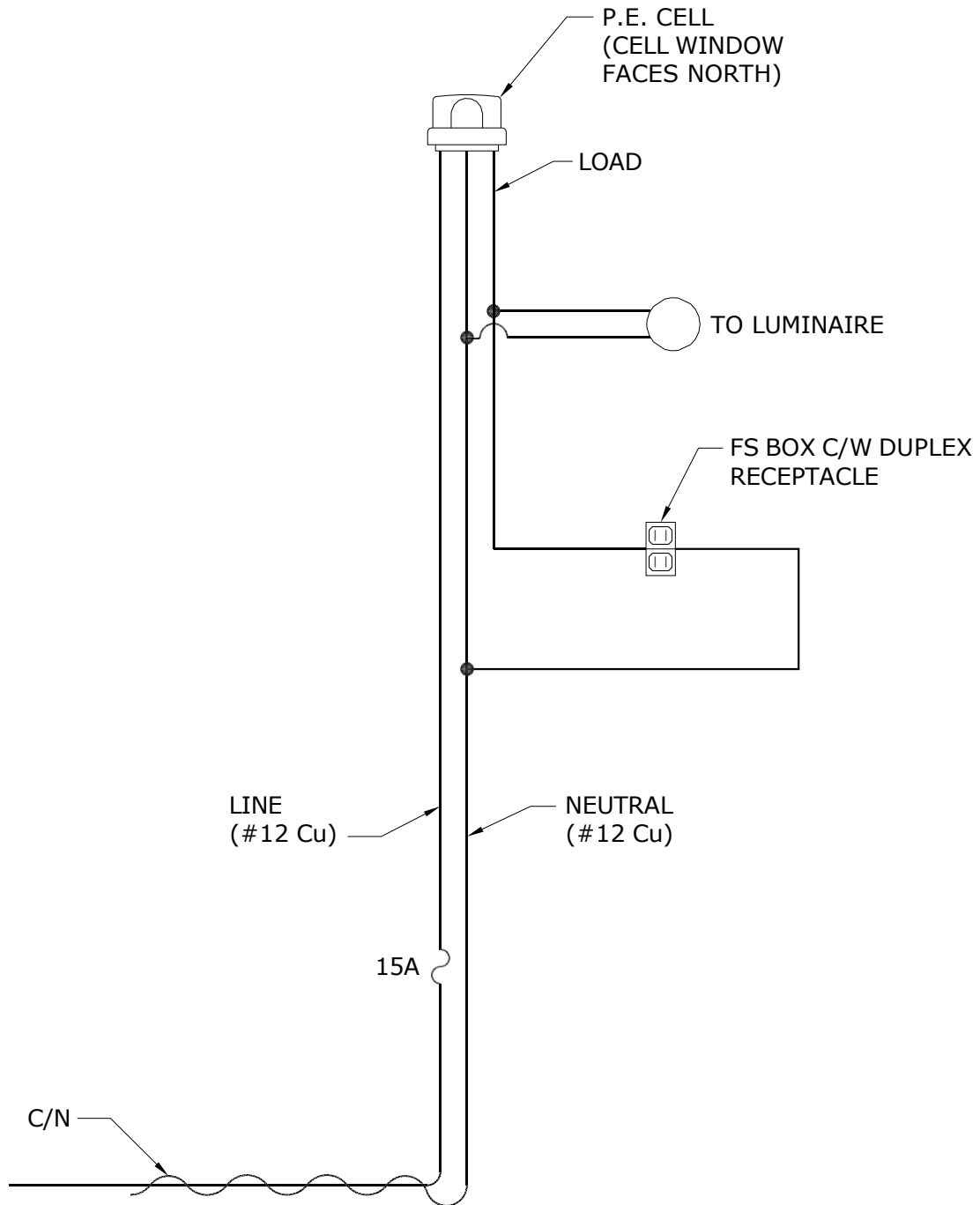
APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28				STREET LIGHT RELAY CONNECTIONS USING PILOT WIRE	
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-09	CD 315-15		SHT 0001 of 1
					REV 00



NOTES:

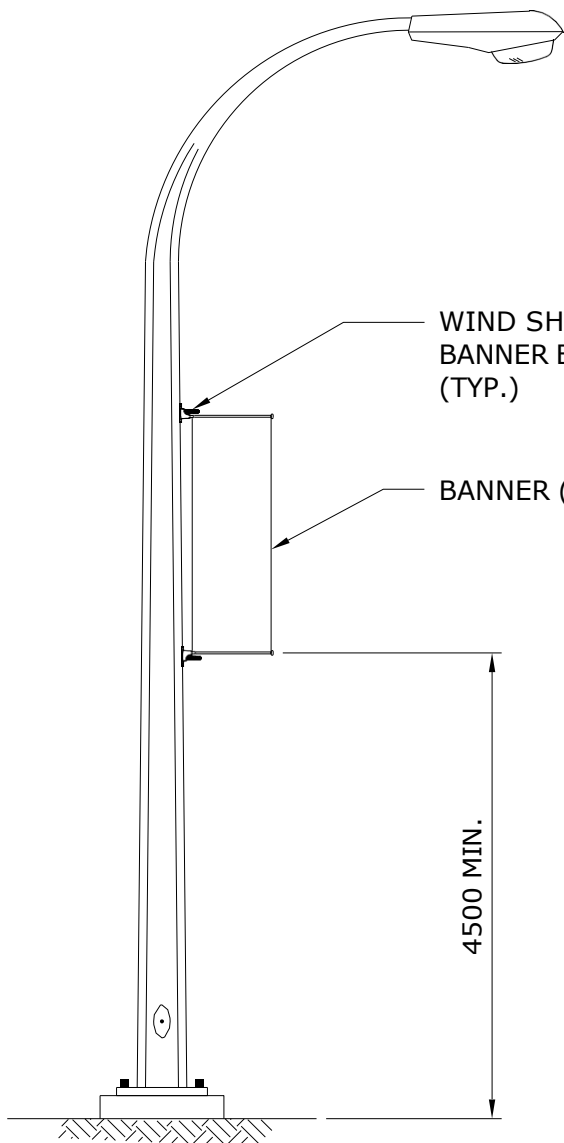
1. DRILL 30mm (1 1/8") DIA. HOLE 5 METRES ABOVE BASE OF POLE.
2. INSTALL 30A INLINE FUSEHOLDER FUSED AT 15A.
3. IF INSTALLED ON A CONTROLLED STREET LIGHT CIRCUIT, CONDUCTORS TO BE CONNECTED VIA RECEPTACLE TO LUMINAIRE.
4. IF INSTALLED ON AN UNCONTROLLED STREET LIGHT CIRCUIT, CONDUCTORS TO BE CONNECTED TO LUMINAIRE. RECEPTACLE TO BE CONNECTED TO P.E. CELL NEUTRAL AND CONTROL WIRES IN LUMINAIRE.
5. CONDUCTORS TO BE 2/C #12 PVC STREET LIGHT CABLE.
6. PUBLIC AUTHORITY MUST BE ADVISED AS TO MAXIMUM LOAD WHICH MAY BE CONNECTED TO RECEPTACLE.

APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS		
				DECORATIVE LIGHTING RECEPTACLE INSTALLED ON STEEL POLE		
	13-01	1	ADDED SHEET 2			
DRAWN W.B./CAD	CHECKED L.D./D.O.	DATE 88-09	CD 315-24		SHT 0001 OF 2	REV 01

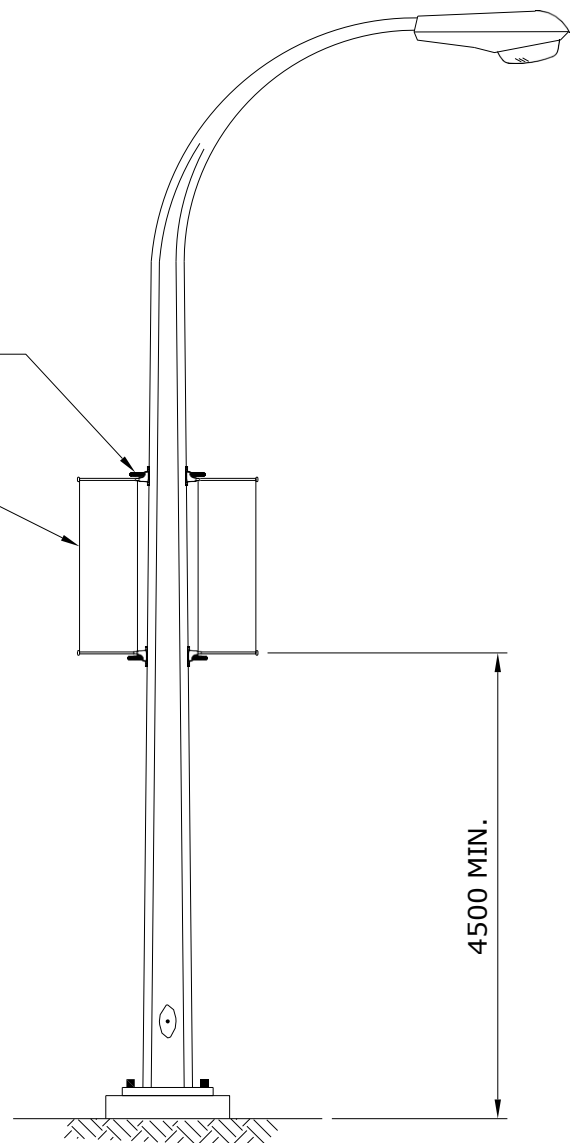


TYPICAL CONNECTION DIAGRAM

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY D.R. ORR 13-02-12				DECORATIVE LIGHTING RECEPTACLE INSTALLED ON STEEL POLE	
DRAWN C.A.	CHECKED L.D.	DATE 13-01	CD 315-24		SHT 0002 OF 2
					REV 00



SINGLE BANNER INSTALLATION
(762mm X 2286mm MAXIMUM
DIMENSION)



DOUBLE BANNER INSTALLATION
(559mm X 1676mm MAXIMUM
DIMENSION)

NOTE: DIMENSIONS SHOWN ARE IN MILLIMETRES.

APPROVED ORIGINAL DRAWING SEALED BY K.C. HAMILTON 07-06-29		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
				BANNER INSTALLATION DETAILS					
13-01	1	REVISED TITLE							
DRAWN C.A.		CHECKED L.D./D.O.		DATE 07-06		CD 315-25		SHT 0001 OF 3	REV 01

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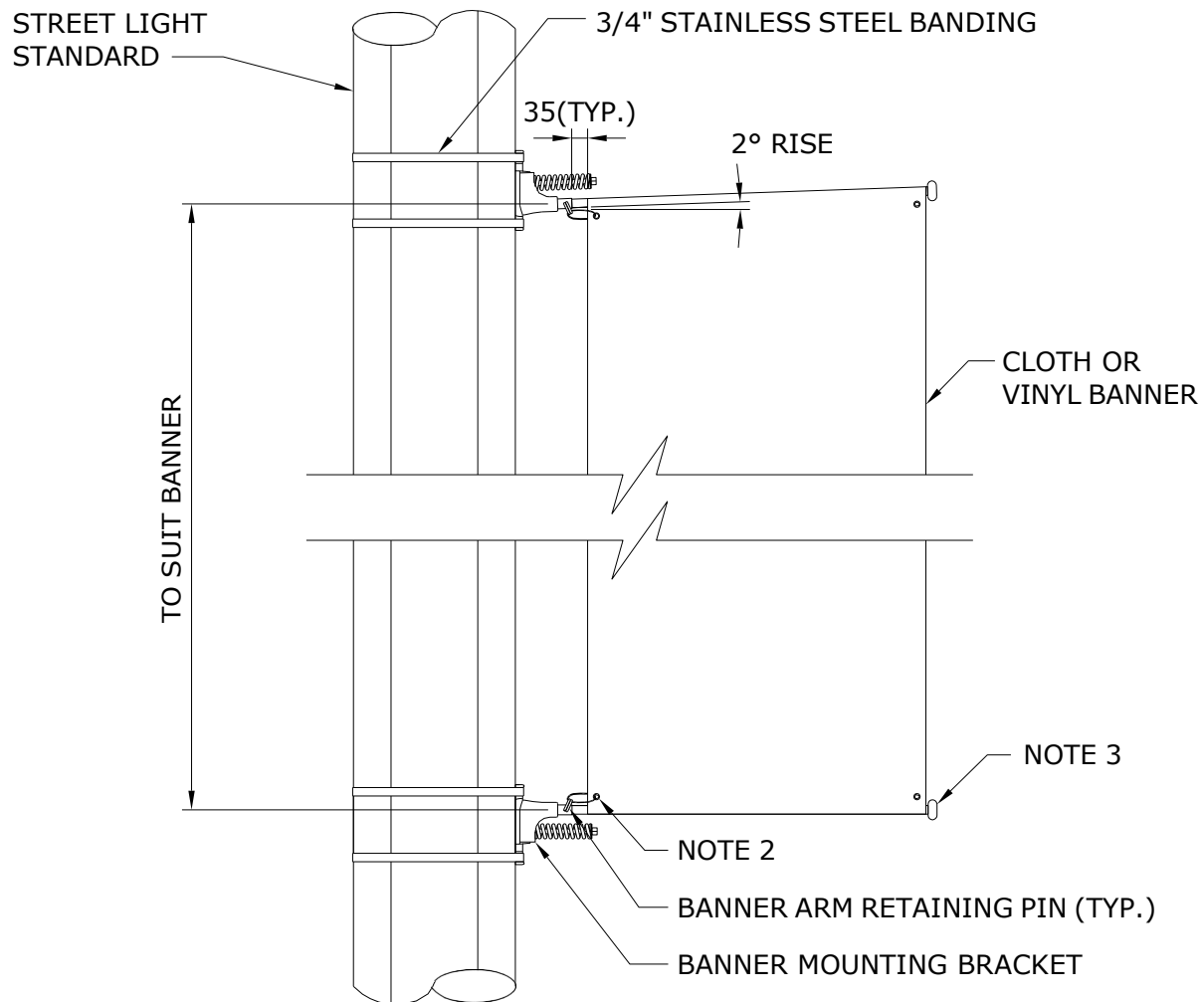
BANNER CRITERIA:

1. BANNER INSTALLATION TO CONSIST UP TO A MAXIMUM SIZE OF EITHER ONE 762mm x 2286mm (30"x90") CLOTH BANNER, OR TWO 559mm x 1676mm (22"x66") CLOTH BANNERS.
2. BANNERS CAN BE ORIENTED EITHER 90° OR 180° FROM EACH OTHER AROUND CIRCUMFERENCE OF STANDARD FOR DOUBLE BANNER INSTALLATIONS.
3. BANNER INSTALLATION SHALL NOT IMPEDE WIND SHEDDING CHARACTERISTICS OF BANNER MOUNTING BRACKET.
4. APPROVAL OF STANDARDS FOR BANNER MOUNTING TO BE BASED UPON:
 - a. A SATISFACTORY ASSESSMENT OF THE STANDARDS STRUCTURAL INTEGRITY AND IT'S FOUNDATION PER CORPORATE POLICY P348-4, "MAINTAINING OUTDOOR LIGHTING - ORNAMENTAL LIGHT STANDARDS REPLACEMENT GUIDE", AND P348-5, "MAINTAINING OUTDOOR LIGHTING - REPLACING OR RESETTING CONCRETE FOUNDATIONS".
 - b. TIGHTENING OR REPLACING ANY LOOSE OR MISSING ANCHOR NUTS OR BOLTS.
 - c. AN UNIMPEDED DRIVER'S VIEW OF TRAFFIC SIGNALS OR TRAFFIC CONTROL SIGNAGE.
 - d. NOT EXCEEDING THE STANDARD'S MAXIMUM ALLOWABLE SIGNAGE SURFACE AREA WHERE STANDARD HAS EXISTING SIGNAGE, SEE NOTE 5.
5. IF BANNER(S) ARE TO BE INSTALLED ON STANDARDS WITH EXISTING SIGNAGE, THE MAXIMUM ALLOWABLE BANNER SIZE (SURFACE AREA) MOUNTED WITH WIND-SHEDDING BRACKETS CAN BE CALCULATED WITH THE FOLLOWING FORMULA:

$$\text{MAXIMUM SURFACE AREA} = 1.75 \times \left(1 - \frac{\text{SURFACE AREA OF SIGNAGE (m}^2\text{)}}{\text{OF BANNER(S) (m}^2\text{)}} \right)^*$$

* DIVIDE BY 2 FOR DOUBLE BANNER INSTALLATION.

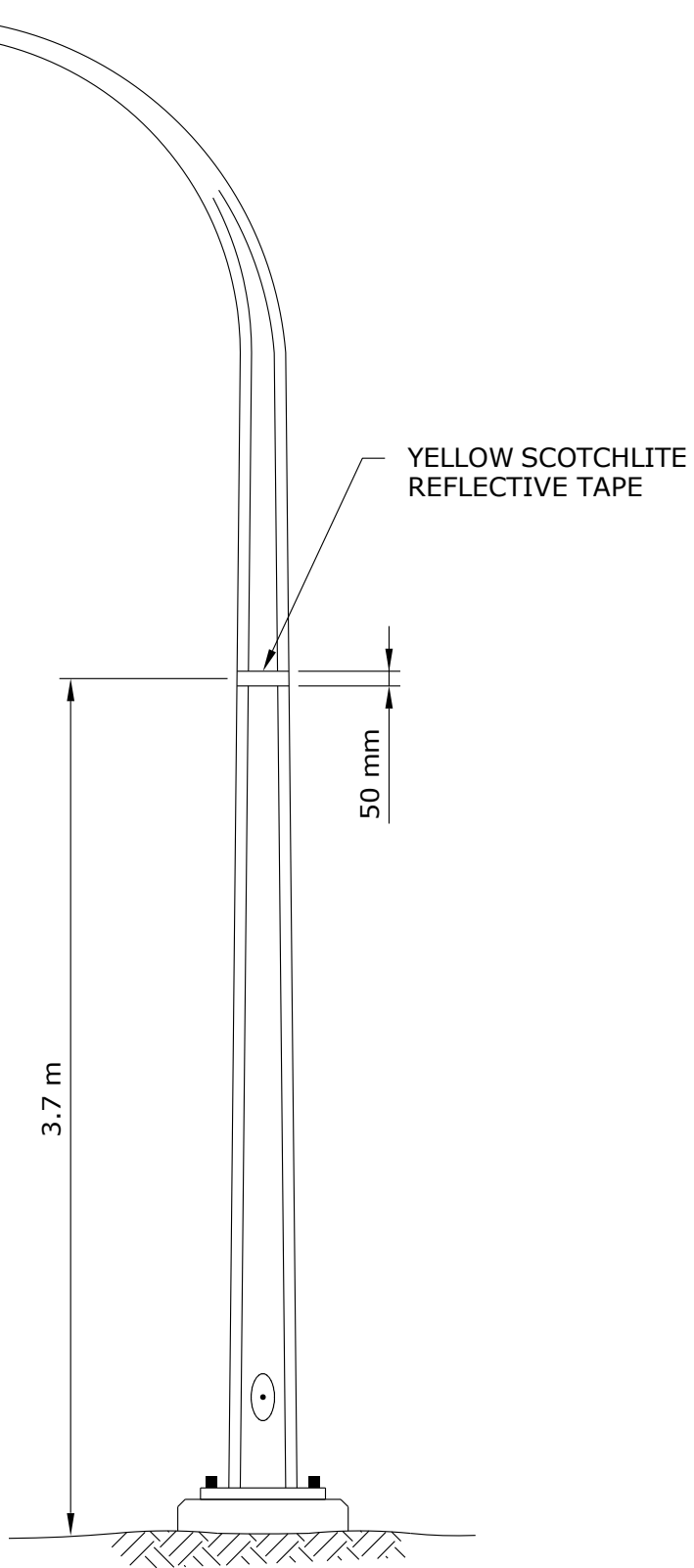
APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY K.C. HAMILTON 07-06-29				BANNER INSTALLATION DETAILS	
		13-01	1	REVISED TITLE	
DRAWN C.A.	CHECKED L.D./D.O.	DATE 07-06		CD 315-25	
				SHT 0002 OF 3	REV 01



NOTES:

1. CUSTOMER TO COMPLETE AN APPLICATION FOR USE OF MANITOBA HYDRO UTILITY POLES (EFORM #H1900) AND HAVE FORM APPROVED PRIOR TO INSTALLATION OF BANNERS AND ASSOCIATED EQUIPMENT.
2. BANNER TO HAVE REINFORCED HOLES. SECURE BANNER TO BRACKET WITH U.V. RESISTANT TY-RAPS (2 LOCATIONS PER BANNER). LOOP TY-RAP THROUGH REINFORCED HOLE AND EYELET OF BANNER ARM RETAINING PIN.
3. 3/4"Ø FIBREGLASS ROD. CUT TO SUIT BANNER.
4. BANNER MOUNTING BRACKET AND ARM TO BE WIND SHEDDING TYPE.
5. INSTALL BANNER MOUNTING BRACKETS SO BANNER IS TAUT ACROSS LENGTH OF BANNER ROD.
6. DIMENSIONS SHOWN ARE MILLIMETRES.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY K.C. HAMILTON 07-06-29				BANNER INSTALLATION DETAILS	
		13-01	1	REVISED TITLE	
DRAWN C.A.	CHECKED L.D./D.O.	DATE 07-06		CD 315-25	
				SHT 0003 OF 3	REV 01



APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
			IDENTIFICATION OF FIRST STREET LIGHT STANDARD CONNECTION TO CIRCUIT		
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-09	CD 315-35	SHT 0001 OF 1	REV 00

1-04431-DA-65620-0014

PART 2: SAFE EXCAVATION AND SAFETY WATCH GUIDELINES

Safe Excavation & Safety Watch Guidelines



For your **SAFETY**

ClickBefore
YouDigMB.com®

 **Manitoba
Hydro**

Or call 1-800-940-3447

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IMPORTANT: No excavation shall take place prior to receiving Manitoba Hydro's "Electric and/or Natural Gas Facilities Locate form".

Manitoba Hydro only locates facilities that it owns and has no knowledge of or responsibility for privately owned facilities. Electric conductors or gas pipes installed past the meter are owned privately by the property owner, and at times are installed below ground before entering the building. Outbuildings that are heated or have electric power, wells, septic systems, pumps, pools and hot tubs are examples where privately owned buried facilities may exist.

This booklet has been prepared by Manitoba Hydro for Manitoba Hydro staff, contractors and homeowners involved with excavation and is available at hydro.mb.ca. Information on excavation and safety watch is included to inform excavators about basic requirements for excavation in the vicinity of buried electric power lines and gas pipelines. Unless otherwise indicated, gas pipelines and underground power cables will be called "lines".

RELEASE OF NATURAL GAS

In the event of any damage to a natural gas pipeline (regardless of whether it is steel, plastic or aluminum) or to its protective pipe coating or tracer wire, however minor, call Manitoba Hydro immediately 204-480-5900 or 1-888-624-9376. In most cases there is no charge for minor repairs.

In case of damage causing a release of natural gas:

- Call 911 and Manitoba Hydro immediately.
- Clear people from the vicinity and prevent people from approaching the area of the leak.
- Shut off all vehicles and equipment. Remove or extinguish all sources of ignition. **DO NOT** smoke or allow open flame in the presence of natural gas.
- If a gas line has been punctured, do not remove the tool or equipment that punctured the line. This could result in a larger gas leak and pose a greater hazard.
- **DO NOT** attempt to backfill over a leaking natural gas line or attempt to stop the leak; it is safest to allow the gas to vent into the atmosphere.

Each ground disturbance is unique and this guide's purpose is to help you determine whether you must obtain a facilities locate, how to obtain it and proper excavation guidelines which must be followed when excavating around Manitoba Hydro facilities.

- Once the lines are marked, you will be provided with a Manitoba Hydro “Electric and/or Natural Gas Facilities Locate form” with specific instructions. You must obtain this form prior to excavation.
- If work has not started within 14 calendar days of receiving the locate from Manitoba Hydro, you must contact ClickBeforeYouDigMB.com to have the lines re-marked and receive an updated Facilities Locate form.
- Contractors must ensure that everyone on the worksite is aware of the presence of all gas and electric facilities and ensure that the Facilities Locate form is kept at the excavation site until the excavation and backfill are complete.
- The location markings must be tracked, maintained and kept visible during the excavation process.

In addition to contacting ClickBeforeYouDigMB.com be sure to contact any other underground services that may be in the area.

This guideline applies to all excavation types within the vicinity of Manitoba Hydro electrical conductors and natural gas pipelines only. When Manitoba Hydro fibre optic cables are identified within the work area, Manitoba Hydro personnel will identify on the Manitoba Hydro “Electric and/or Natural Gas Facilities Locate form”. The contractor must contact Manitoba Hydro’s Communications Department for further instructions prior to excavating.

The first step to a safe excavation starts with contacting ClickBeforeYouDigMB.com to arrange for the underground utility lines to be located. Manitoba Hydro will notify you within three business days the date which personnel will arrive to locate Manitoba Hydro’s plant for the work area that’s been identified.

WHY YOU SHOULD PLAN AHEAD

When you contact ClickBeforeYouDigMB.com prior to excavating, we can identify buried lines so you can dig safely. This prevents injury or death, costly repairs, equipment damage, service outages, and environmental pollution.

It is YOUR responsibility to contact all owners of buried underground services.

PLANNING LARGE PROJECTS

Determining the location of existing Manitoba Hydro Underground Structures within the work area should be one of the first priorities of any work. Knowing the location of all utilities infrastructure allows the third party to plan work proactively, mitigating the need for costly design changes or delays during construction.

Gas

Manitoba Hydro requests that project information for all activities involving ground disturbance be submitted for review. Instructions for submitting construction drawings and project information are available on our [natural gas project review application web page](#). Plans submitted on this web page will be reviewed by Manitoba Hydro at no cost and a letter providing details of any work restrictions, specific requirements or costs will be provided to the contractor. Submitted construction drawings must include details of the proposed work, as well as all existing gas and electrical lines in the project area.

Electric

Contact Manitoba Hydro in Winnipeg at 204-480-5900 or outside Winnipeg at 1-888-MBHYDRO (1-888-624-9376).

You will be referred to the local Customer Service Centre for further instruction.

REGULATIONS

There are several federal and provincial agencies overseeing the operation of and around natural gas pipelines and electric cables. The following regulations and safe practice guides specify requirements for both the contractor and the utility:

Provincial

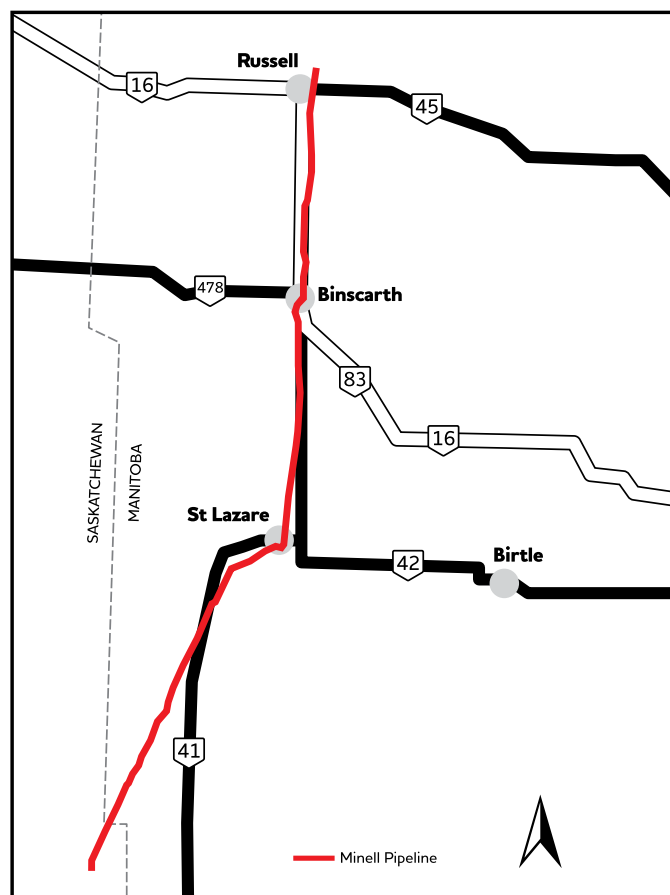
- Manitoba Gas Pipeline Act, Regulation 140/92 – Provides the legal definition of an excavation and outlines Excavator and Utility responsibilities.
- Manitoba Workplace Safety and Health Act and Regulation M.R. 217/2006 - Part 26, Excavations and Tunnels – Describes legal responsibilities in regards to excavating safely.
- Guideline for Excavation Work, Manitoba Workplace Safety & Health Division.

Federal

- Canadian Energy Regulator Pipeline Onshore Pipeline Regulations SOR/99-294
- Canadian Energy Regulator Pipeline Damage Prevention Regulations: Authorizations, SOR/2016-124;
- Canadian Energy Regulator Pipeline Damage Prevention Regulations: Obligations of Pipeline Companies, SOR/2016-133
- Canadian Energy Regulator – Pipeline Damage Prevention; Ground Disturbance, Construction and Vehicle Crossings (Guideline)
- Canadian Energy Regulator – Landowner Guide
- CSA Z247 Damage Prevention Standard.

MINELL PIPELINE

The Minell pipeline starts near Moosomin, SK, travels 4 km to the Saskatchewan–Manitoba border, and continues up to Russell, MB. Federally regulated, it has a 30-metre prescribed area outside of the right-of-way (ROW) that restricts some activities. This specific area starts from the pipeline's center and expands 30 metres on each side.



You must receive consent from Manitoba Hydro before you start any construction or excavation work on or around the Minell pipeline (for example, installing field drainage, stump removal).

Please visit our [natural gas project review application web page](#) if you are conducting any excavation work around the Minell pipeline.

DEFINITIONS

Daylighting – A term used to describe the uncovering and exposing of underground utilities to daylight without the use of mechanical excavation.

Excavation – includes digging, boring, pushing, ploughing, trenching, grading, post installation and breaking and displacement of soil or other material below the existing level of the ground that will disturb more than the top 150 mm (6 inches) of the ground.

High Pressure Gas Line – A natural gas line that operates in excess of 700 KPa (100psi).

Hydro-vac/Air-vac – A truck or trailer used for excavation that injects pressurized water/air from an onboard reservoir tank into the ground through a handheld wand. As the soil cover is liquefied/ granulated, the resulting byproduct is simultaneously extracted by a powerful vacuum and stored in an onboard tank for disposal.

Large Diameter Pipeline – A natural gas pipeline that is 168.3 mm (6 inches) in diameter or larger, regardless of operating pressure.

Safety Watcher – A person designated by Manitoba Hydro to ensure that workers are not put at risk as a result of special hazards on the work site.

Sonde – A transmitter behind the bore head which registers angle, rotation, direction and temperature data.

Tolerance Zone – The space in which a line or facility is located, and in which special care is to be taken.

White Lining – Designating the route and/or work area of the excavation using white paint, stakes and/or flags to outline the work area prior to the locator arriving on the site.

EXCAVATOR PRE-MARKING

Pre-marking your proposed work site allows excavators to accurately communicate to Manitoba Hydro's facility locators where the excavation is to occur. This can be accomplished electronically through [ClickBeforeYouDigMB.com](https://www.clickbeforeyoudig.com) along with incorporating "white lining" into the process.

- Prior to excavating; contact [ClickBeforeYouDigMB.com](https://www.clickbeforeyoudig.com) to submit electronically a detailed excavation area utilizing the mapping and drawing features provided; along with the option of including additional attachments or,
- Call 1-800-940-3447 to communicate where the excavation is to occur and pre-mark the excavation area by "white lining".

In either scenario you will be issued a reference number from [ClickBeforeYouDigMB.com](https://www.clickbeforeyoudig.com) which will be followed by an email from Manitoba Hydro identifying the date we will be on site.

IMPORTANT: *When a project is too large for or not conducive to pre-marking, additional information may be requested by Manitoba Hydro to ensure the excavation area is captured. Face-to-face meetings between Manitoba Hydro's facility locator and the excavators may also be arranged at the proposed work site.*

White Line

The excavator designates the route and/or area of the excavation using white paint, stakes and/or flags to outline the work area prior to the locator arriving on the site.

When using stakes or flags to mark the excavation work area; do not drive them into the ground deeper than 150 mm. Any activity which disturbs more than 150 mm must have the facilities located.

IMPORTANT: *Manitoba Hydro will not provide locates outside the excavation area identified through the [ClickBeforeYouDigMB.com](https://www.clickbeforeyoudig.com) process. Please be detailed in your submissions to minimize any delays.*

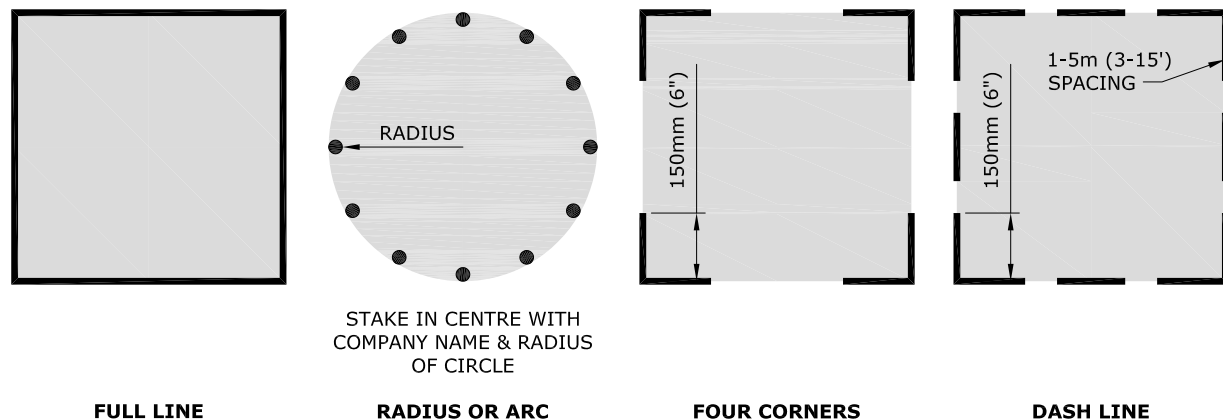
Guidelines for Excavation Marking

The following marking illustrations are examples of how excavators may choose to mark their area of proposed excavation. The use of white marking products (e.g. paint, flags, stakes, or a combination of these) may be used to identify the excavation site.

Mark in white paint the proposed area of excavation through the use of a continuous line, dots marking the radius or arcs, dashes marking the four corners of the project, or dashes outlining the excavation project. The recommended size of each dash is approximately

150–300 mm in length and 20 mm in width with interval spacing approximately 1–5 metres apart. The maximum separation of excavation marks is to be reduced to a length that can be reasonably seen by the operator's locators when the terrain or excavation site conditions warrant it. Dots of approximately 20 mm diameter are typically used to define arcs or radii and may be placed at closer intervals in lieu of dashes.

SINGLE POINT EXCAVATION MARKINGS



If an excavation is contained within a 5 metre maximum radius then it can be marked with a single white stake at the centre of the excavation. The stake must clearly state the company identifier and the radius of the excavation in black lettering. This information must be conveyed to Manitoba Hydro.

IMPORTANT: *In winter, please mark in black paint when snow conditions warrant.*

After the Area is Pre-Marked

On the appointed date, the locator will identify the Manitoba Hydro facilities that are located in the designated work area and provide an “Electric and/or Natural Gas Facilities Locate form” electronically (email) or on site if requested. Please note: customer must be on site if requesting paper copy of locate form.

A detailed map identifying Manitoba Hydro’s owned plant and the excavation area is also a part of every Manitoba Hydro “Electric and/or Natural Gas Facilities Locate form”. The map attached to the information package must match the paint/flag/stake markings presented on site including the excavation area. If there are any deviations between the map provided and the excavation area / markings on site, Manitoba Hydro must be contacted for further direction prior to excavating.

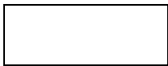
When the locator has completed locating the facilities, clear direction will be provided within Manitoba Hydro’s “Electric and/or Natural Gas Facilities Locate form” on how to address any conflicts there may be within the excavation area. The “Electric and/or Natural Gas Facilities Locate form” must also be on site and available at all times until the project has been complete (including backfill) as per:

- The Manitoba Gas Pipeline Act, Regulation 140/92
- Workplace Safety and Health Act, regulations M.R.217/2006, part 26.6
- Canadian Energy Regulator Onshore Pipeline Regulations SOR/99-294

If an excavation takes place without a current locate form on site, the locate is considered “not valid”. Excavating prior to a locate being available will result in consequences which may include fines and/or sanctions by Manitoba Workplace Safety and Health and Manitoba Hydro.

APWA UNIFORM COLOUR CODE

Underground utility marking



WHITE – Proposed Excavation



PINK – Temporary Survey Markings



RED – Electric Power Lines, Cables, Conduit and Lighting Cables



YELLOW – Gas, Oil, Petroleum, or Gaseous Materials



ORANGE – Communication, Alarm or Signal Lines, Cables or Conduit



BLUE – Potable Water



PURPLE – Reclaimed Water, Irrigation and Slurry Lines



GREEN – Sewer and Drain Lines

GUIDELINES FOR EXCAVATION NEAR ELECTRICAL AND NATURAL GAS LINES

Hand Digging to Expose Lines

Mechanical excavation cannot be used within 1 metre of an electrical or gas line until the line has been physically exposed by hand. Hand exposing means exposing a buried facility, whose location has been marked by Manitoba Hydro, using non-powered tools such as a Spade or shovel (**hand augers are not acceptable**). An alternative to exposing cables by hand digging is to use a Hydro-vac/Air-vac system capable of exposing Manitoba Hydro facilities without damage.

There are several things to remember when hand exposing:

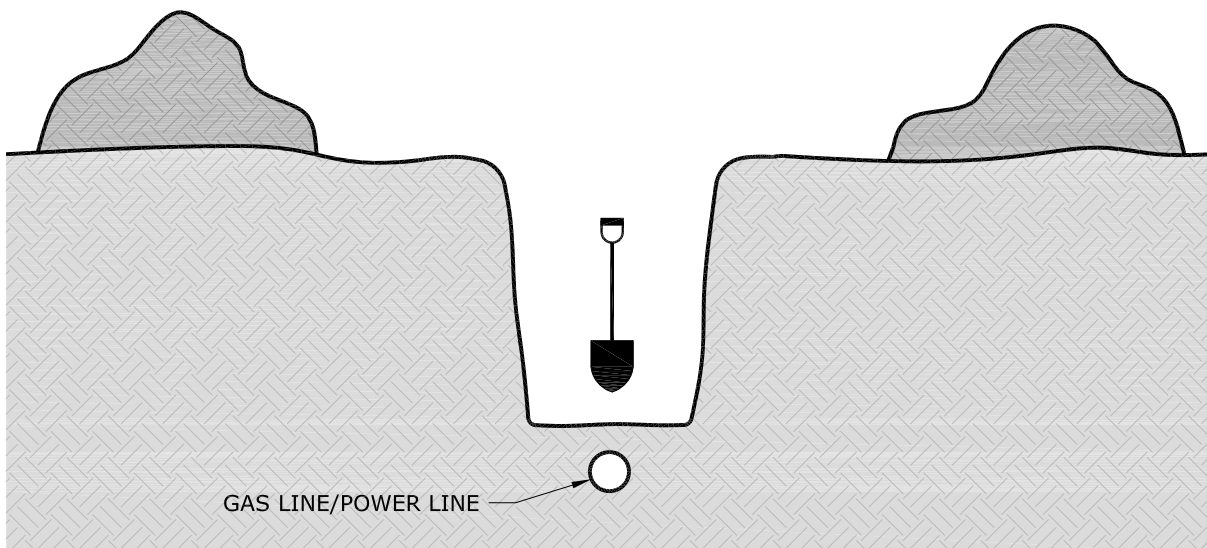
- No one should ever jump on or use their entire body weight on a shovel when digging.
- Use a prying (rather than striking) motion to loosen hard dirt.
- Never probe for the facility using a sharp pointed tool such as a pickaxe or pointed bar.
- Dig on an angle if possible, such that any contact with the facility is a glancing blow rather than a direct hit.

Once the line is visible, mechanical excavation equipment can be used in accordance with the guidelines for mechanical excavation.

IMPORTANT: *Fittings such as active or abandoned service tees may be present on gas pipelines that protrude from the pressurized gas mains. Abandoned gas and electrical lines may also be in the general area of facility markings requiring care when excavating and crossing utilities.*

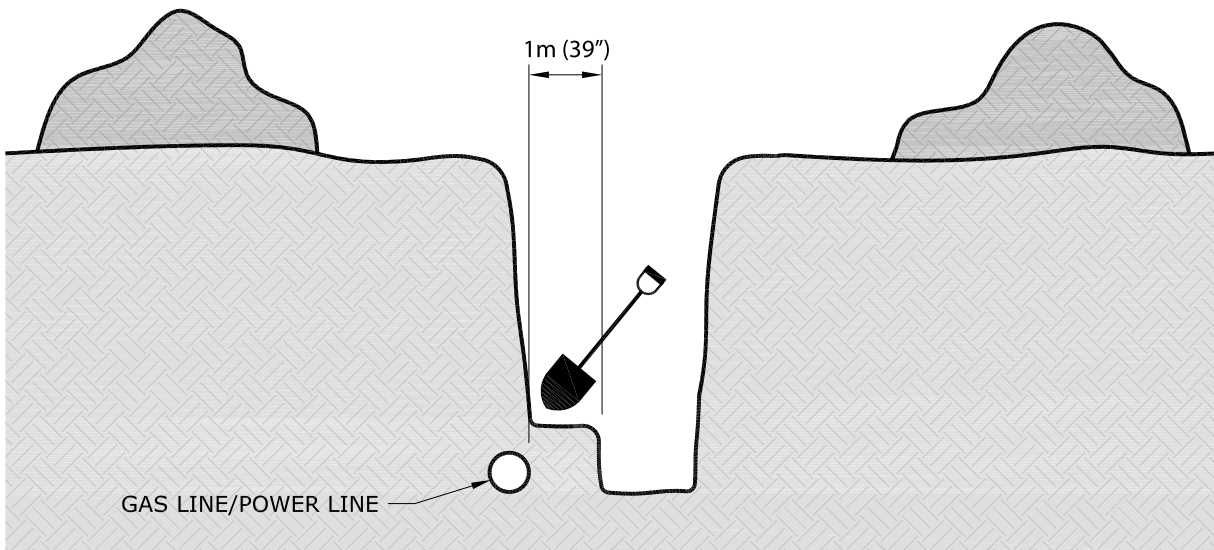
Some acceptable excavation methods:

a) Dig Vertically



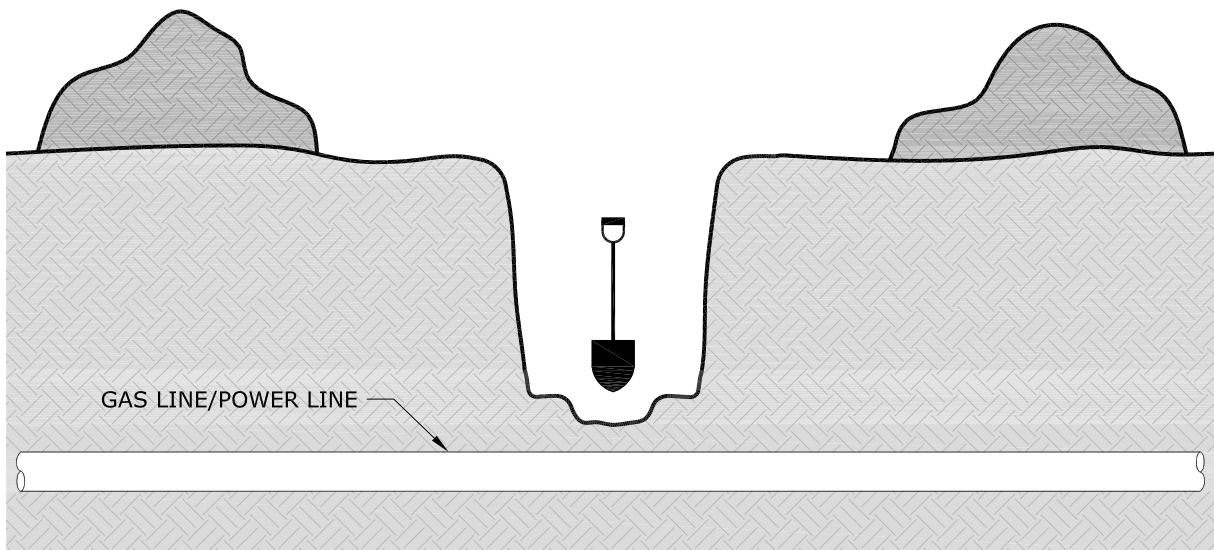
Dig a hole with a shovel directly above the line location until the line is exposed. Take care not to damage the line or coating. Mechanical excavation equipment **MUST NOT** be used to widen or deepen the hole before exposing the line.

b) Dig Laterally



Dig a trench or bell hole 1 metre from the line location, parallel to the line, then hand dig laterally to expose the line.

c) Dig Trench Full Width of the Excavation



Dig a trench by hand across the full width of the excavation (perpendicular to or “across from” the line). If the line is not uncovered, mechanically excavate to one half the depth of the trench. Repeat this process until the line is exposed.

Hydro-vac (Water Pressure/Vacuum System)

Only oscillating head type nozzles are to be used for the water wand. When excavating within 1 metre of a marked line, the maximum setting of 38°C (100°F) water temperature and 10,342 Kpa pressure (1,500 psi) must not be exceeded. The end of the vacuum tube shall be neoprene or equivalent. To expose the buried line; a sweeping motion should be used, perpendicular to the locate markings, until the line has been sighted.b) Dig **Laterally**.

Dig a trench or bell hole 1 metre (39 inches) from the line location, parallel to the line, then hand dig laterally to expose the line.

Air-vac (Air Pressure/Vacuum System)

When excavating within one meter of underground cables or pipe a fiberglass air lance with an Air-Tec nozzle is required. The maximum allowable pressure for an air-vac system is 220 psi while ensuring the 'wand' maintains a minimum distance of 2 inches from any electrical or gas lines. The end of the vacuum tube shall be neoprene or equivalent. To expose the buried line; a sweeping motion should be used, perpendicular to the locate markings, until the line has been sighted.

IMPORTANT: *After sighting, the line shall not be contacted by high pressure spray (air/water) or vacuum to avoid damage to wraps and coatings.*

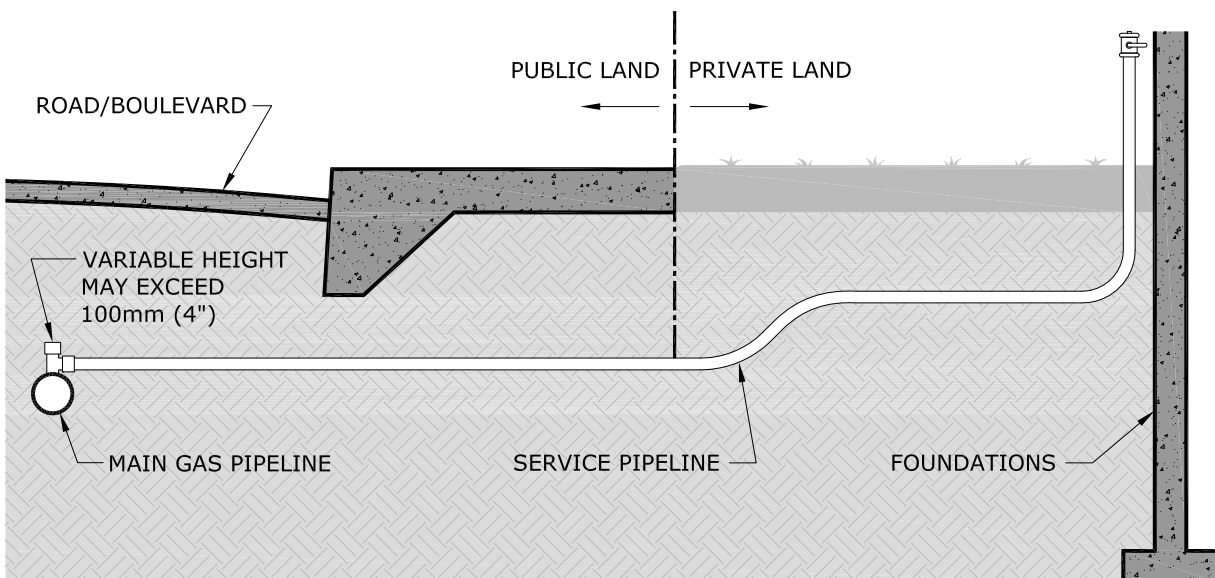
General Approach

- When the line is not visible, mechanical excavation shall not be used within 1 metre of an electrical or gas line.
- When the line is visible, mechanical excavation can be used no closer than 450 mm to natural gas lines and 600 mm to electrical lines.
- When soil conditions permit, a smooth edge bucket is preferred when excavating near gas and electrical lines.
- An observer (excavator staff) located near the line must maintain communication and control of the operator at all times by the use of hand signals and verbal communication. The observer is responsible for maintaining the minimum distance from the pipe.

If at any point the observer or operator is unclear of the location or orientation of the line, no digging shall occur until this is confirmed and agreed upon by all on the worksite.

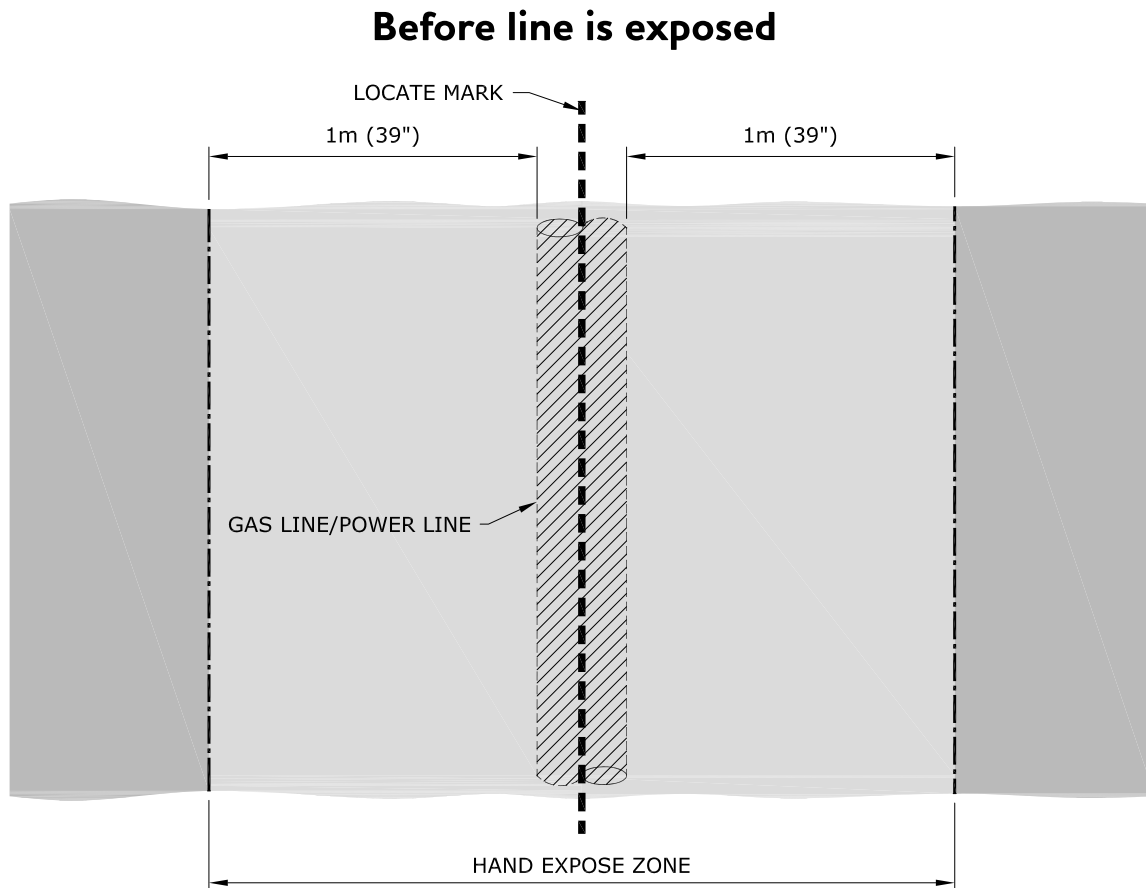
Typical Gas Service Installation

(Example only, does not represent all installations)



IMPORTANT: Gas pipelines are generally yellow in color; however, there are instances of other colors being used such as black, blue, orange, tan and green as an example. Caution when verifying must be observed and all pipes and cables excavated must be considered “operational” until verified by a Manitoba Hydro representative.

Daylighting to Expose Line



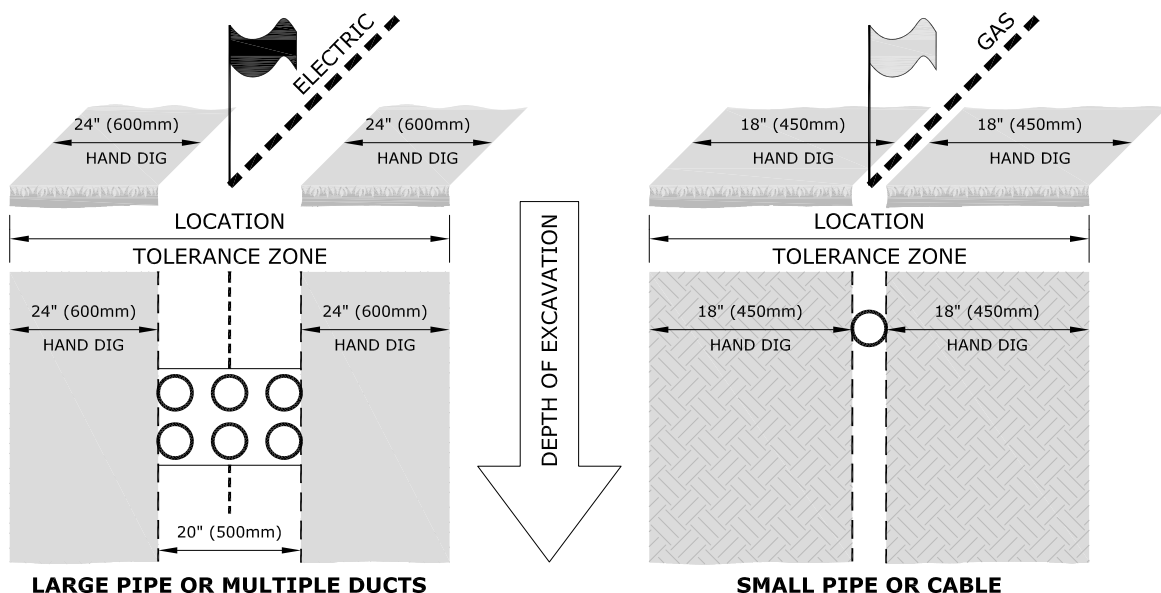
Crossing Lines

- When crossing a line, the line is to be exposed for the width of the excavation.
- After the line is daylighted, and provided there is space for excavator access, it is recommended that excavation near the line be performed parallel to the line.

Working Parallel to Lines

- When working parallel to a line it is not necessary to expose the full length of the line to reduce the acceptable mechanical excavation separation. A series of daylight holes along the line is acceptable. The distance between daylight holes will be a maximum of 10 metres or as required to define the location of the line. Daylight holes must be large enough to expose the full width of the line or lines.
- After daylighting and previewing of the line, marks shall be placed a minimum of 450 mm from the outside of the line at each daylight hole for gas and 600 mm for electrical lines. This tolerance zone should be marked along the entire length of the work area to ensure that the operator maintains proper alignment with the line. With the line daylighted and the tolerance zone marked, it is acceptable to use mechanical excavation on the outside of the marked line of the tolerance zone.
- If at any point the line becomes obscured, it shall be re-marked immediately. The observer is responsible for maintaining the minimum distance from the pipe by confirming the machine's distance and alignment with the line. The operator will orient his machine parallel to the line so their bucket remains more than 450 mm away for gas and 600 mm away for electric lines. They must preview the work prior to entering their machine and prior to any trenching.

Once line is exposed



Hard Surface Removal

- Mechanical equipment can be used to remove the asphalt or concrete road/sidewalk surface and should only be used to the depth of that surface.
- Avoid starting the pavement break directly over the marked facility.
- Start a few feet away from the marks and attempt to “peel off” the pavement or break it into small chunks for removal.

Utility Relocation

The line shall not be moved or relocated. No operation or work shall be done that would put stress on the line.

Inspect for Damage

Electric Power Lines

- Visually inspect the line and if you suspect a power cable has been damaged, contact Manitoba Hydro to inspect the cable. Do not contact the cable as it may be energized.

Gas Pipelines

- Thoroughly clean (with water only) and inspect the exposed gas line for damage to the pipe, plastic pipe covering, wrapping or tracer wire (used on plastic pipe). If damage is found, notify Manitoba Hydro. They will repair minor damage to the pipe coating or tracer wire at no charge.

Report Contact or Damage

Any contact with or damage to any gas line or underground cable must be reported immediately to Manitoba Hydro.

Backfilling

To prevent settling or stress, the contractor is required to place clean fill under the power or gas line and compact the fill. The backfill material must be free of rocks, sharp objects or other material that could damage the line.

If the backfill material is frozen, it should be free of large frozen lumps of soil. The backfill material must be gradually placed, not dumped, on the line. Alternatively, the line may be hand padded with 300 mm of screened sand or soft fill before backfilling.

If mechanical protection is required, or if the backfill contains rocks, the cable or pipeline must be enclosed in a minimum 150 mm envelope of screened sand.

Access

Manitoba Hydro utility personnel shall have access to the excavation to inspect the underground line at any time during construction.

Project Closeout

When the excavation project has been completed all flags and stakes used to mark gas and electric lines shall be removed from the site.

SAFETY WATCH

Safety Watch is a program where an employee qualified by Manitoba Hydro observes the excavation work in progress and determines actions to be taken by the contractor to prevent injury, property damage or damage to Manitoba Hydro facilities.

Safety Watch personnel work with the excavator to check that:

- the excavation is done safely;
- rules and procedures related to the excavation are followed;
- the plant is located accurately;
- all documentation is accurate and complete;
- Hydro-vac/Air-vac guidelines are followed.

Safety Watch personnel shall be recognized as an authority on site with the ability to shut the job down.

When is a Safety Watch required?

Any excavation within 1 to 3 metres of a cable or pipeline may require a Safety Watch and will be clearly identified if required on the first page of Manitoba Hydro's "Electric and/or Natural Gas Facilities Locate form". The decision to provide a Safety Watch is based on the proposed excavation, type of cable or pipeline, and the proximity of the excavation to the cable or pipeline.

Why is a Safety Watch done?

Safety Watch services are provided to ensure the safety of customers and their contractors when working in close proximity to either energized electrical or pressurized gas lines. In addition, this protects the integrity of the utility lines, minimizing the chance of an outage or future issues with the utility.

NOTE: Typically, Safety Watch personnel are not provided for low voltage conductors (under 750 volts) or distribution pressure gas mains and services under 168.3 mm diameter. Manitoba Hydro staff may assess other situations outside the noted Safety Watch guidelines depending on congestion of utilities in the area, essential service feeds (Hospitals) or other conditions that are deemed warranted.

Who pays for a Safety Watch?

Generally, Safety Watch service is provided at no cost to the homeowner for minor projects. For larger projects, the contractor may be charged at a cost shared rate. Please contact Manitoba Hydro at 1-888-624-9376 for further information.

How to Schedule a Safety Watch?

When an underground line is located in response to a ClickBeforeYouDigMB.com request, the Manitoba Hydro employee will indicate whether a Safety Watch is required on Manitoba Hydro's "Electric and/or Natural Gas Facilities Locate form". A phone number is provided on the form for the excavator to call to schedule with Manitoba Hydro a Safety Watch appointment.

IMPORTANT: Manitoba Hydro requires a minimum of three business days' notice for scheduling a Safety Watch. This timeline may be extended depending on utility type and location.

DIRECTIONAL BORING – CONTRACTOR GUIDELINES

Prior to all ground disturbance activity, the excavator must first obtain a Manitoba Hydro's "Electric and/or Natural Gas Facilities Locate form" by contacting:

ClickBeforeYouDigMB.com

When boring within the tolerance zone of a high pressure or large diameter gas pipeline or any critical distribution gas pipeline or electrical conductor, as identified by Manitoba Hydro's Facilities Locate personnel, qualified natural gas or electric Safety Watch personnel are required.

The distance measured to Manitoba Hydro electrical conductor or gas pipeline must always be measured from the outside diameter or wall of the Manitoba Hydro facility to the outside diameter of the back reamer. The same measuring methodology must be used when paralleling Manitoba Hydro facilities.

Electrical Conductors and Gas Pipelines

Prior to directional boring across Manitoba Hydro gas and electrical lines, the buried depth and / or the location of the utility must be confirmed. Acceptable practice to verify utility line depth is to:

- Expose the line by hand digging, or
- Expose the line by Hydro-vac/Air-vac excavation; or
- Locate on the side wall of a trench that has been excavated 1 metre on either side of the surface locates; or
- Use reference measurements that are known to be accurate, for example: electrical duct lines.

Observation Hole Required When Crossing Any Manitoba Hydro Facility

The accuracy of the drill head location and depth must be visually verified 1 metre prior to crossing Manitoba Hydro facilities by use of an observation or discovery hole (as detailed on page 23 & 24). Acceptable practices for excavating an observation/discovery hole shall follow Hydro-Vac, Air-Vac or hand digging practices (described on page 12, 13 & 14).

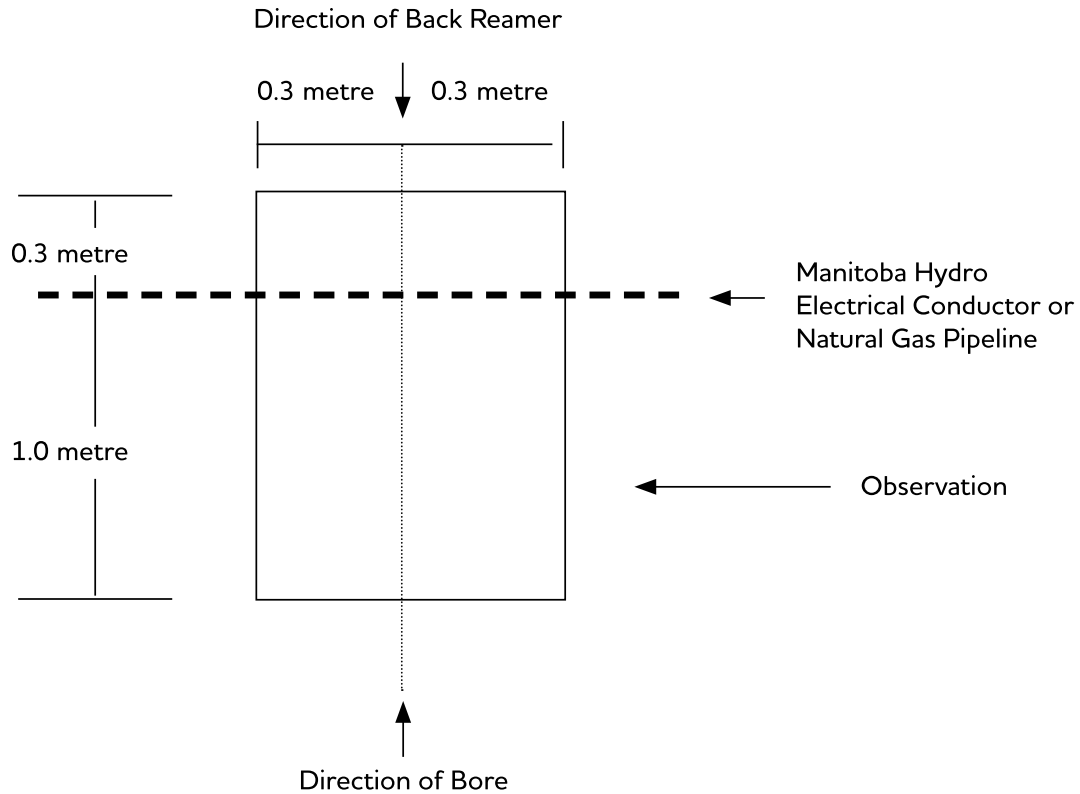
When boring head and/or back reamers path is crossing above a natural gas pipeline or electrical conductor the boring head and/or back reamer must be visually observed crossing the facility.

When the boring head and/or back reamer's path is crossing below a gas pipeline or electrical conductor an observer must verify that the bore head and/or reamer does not enter the observation/safety watcher hole within 1 metre of the line. If the boring head or back reamer path is set to cross within 1 meter below the gas pipeline or electrical conductor, the observation hole must increase in depth to 1 meter; ensuring equipment does not encroach on the tolerance zone.

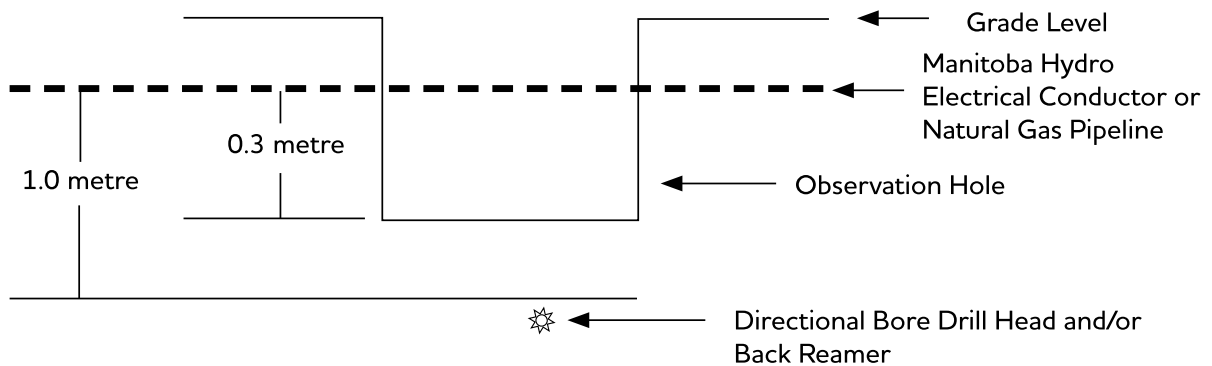
The minimum dimensions of the observation/discovery hole **MUST BE:**

- 1 metre in front of the gas pipeline or electrical conductor on the near side of the bore path;
- 300 mm on the far side of the bore path;
- 300 mm on each side of the bore path;
- 300 mm below natural gas pipeline or electrical conductor.

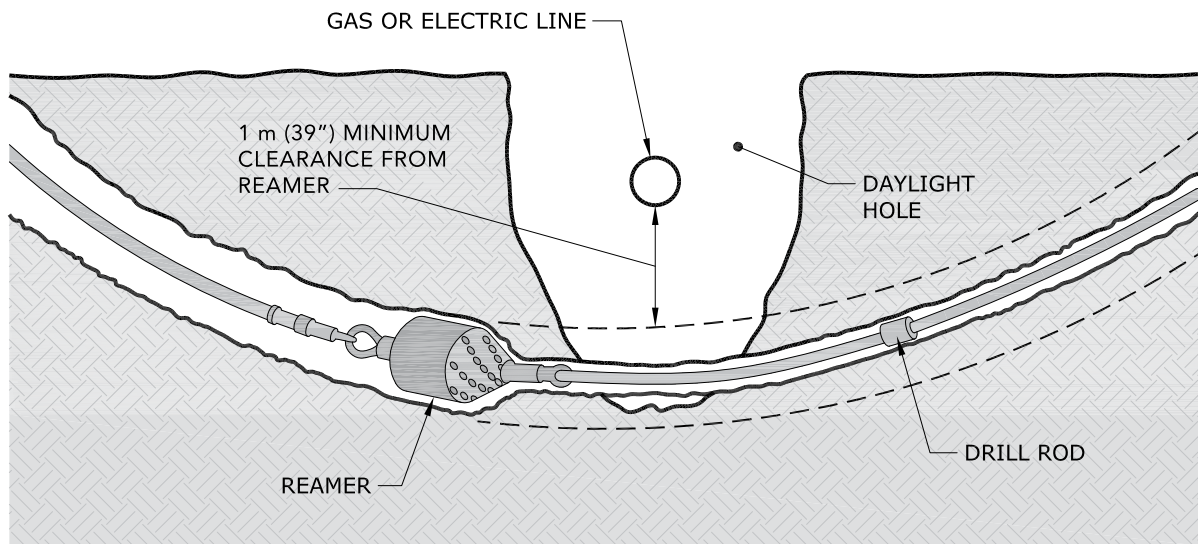
Observation Hole – Plan View



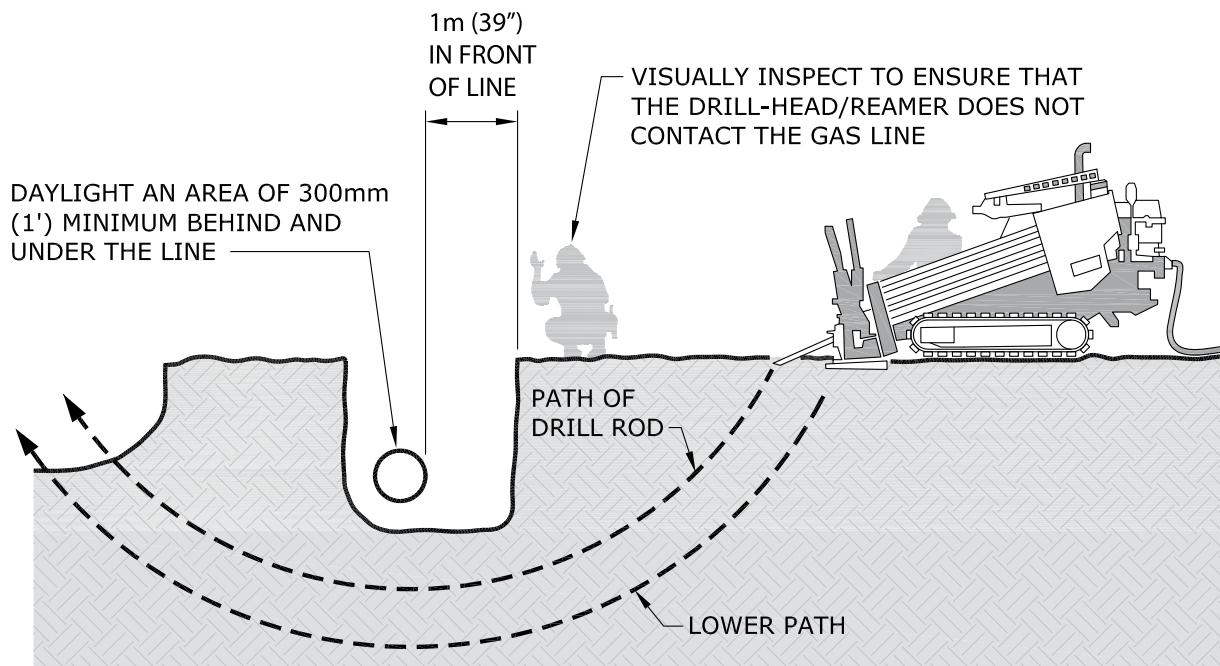
Observation Hole – Profile View



Direction Boring/Reamer 1 meter or Less below Manitoba Hydro Facilities



Direction Boring/Reamer greater than 1 meter below Manitoba Hydro Facilities



Drilling Parallel to Manitoba Hydro Facilities

There must be 1 metre of separation between the outside diameter of the back reamer assembly and the outside diameter of any Manitoba Hydro electrical conductors or natural gas pipelines.

IMPORTANT: *When drilling within 1 metre horizontally, the drill must be kept at a depth either deeper or shallower than the existing electrical conductor or natural gas pipeline to maintain 1 metre separation when measured diagonally.*

If 1 metre horizontal separation cannot be maintained between the boring head (sonde) position readings and the utility locate markings, the location of the lines shall be verified by hand exposing (or Hydro-vac/Air-vac) to determine location of Manitoba Hydro's facilities. The bore head (sonde) must also be verified through daylighting ensuring path does not encroach on tolerance zone.

- The frequency of the exposures depends on the consistency of the alignment of the existing facility.
- Manitoba Hydro facility must be exposed once for each lot, or a minimum of once every 15 metres, whichever is the shorter distance, to confirm alignment.
- Where there is an alignment change indicated by the facility locate marks, the Manitoba Hydro facility shall be visually confirmed at each alignment deviation.

IMPORTANT: *Working parallel to lines guidelines (page 16) must be followed ensuring no mechanical equipment (boring head/back reamer) enters the tolerance zone and daylight holes are large enough to expose the full width of the line or lines.*

UNPLANNED CONTACT WITH ELECTRIC OR NATURAL GAS LINES

This guideline applies to people who come in contact with or simply expose a buried utility line while excavating.

Anyone who comes in contact with buried utility lines should contact the utility owner immediately. Although there may be no apparent external damage, the impact of striking a line can cause internal structural damage that can only be determined and repaired by qualified utility personnel. Generally Manitoba Hydro does not charge for this inspection and coating repair; however, gas pipeline must be fully accessible for Manitoba Hydro personnel to repair.

Abrasions

Even if contact does not cause the utility line to stop working, a nick or cut to the outer, protective sheath of the utility line can allow ground water, laden with salts and other caustic substances, to corrode the line. Abrasions may compromise the sidewall strength of a plastic, steel or aluminum gas line.

Aerial

Cables suspended along utility poles can easily be damaged if struck by a vehicle or a mechanical implement like a hydraulic lift. Cable clamps and other attachments can be pulled apart and component housings may hide damage to the electronic equipment inside.

Stop Work

If any equipment is snared in the utility lines, it should be left in place. Trying to extract, flex or manipulate the line can compound the damage. Operations at the site shall stop immediately. Operators should stay in the equipment unless it is not safe (as in the case of a fire) and all others should be kept clear of the equipment as it may have become energized. If you must leave the equipment, jump clear with both feet together so you are not in contact with the equipment and the ground at the same time. Continue to hop or shuffle with your feet close together until you are a safe distance away.

Call It In

The person involved in the incident must call Manitoba Hydro immediately and report the location of the hit. (In Winnipeg at 204-480-5900 or outside of Winnipeg at 1-888-624-9376.) The exact address, or street intersection, along with what type of contact occurred, will help the utility respond in an appropriate manner.

Notes

[illegible]

**ClickBefore
YouDigMB.com[®]**

Or call 1-800-940-3447

In addition to contacting
ClickBeforeYouDigMB.com
be sure to contact other
underground services in the area.

For more information visit
hydro.mb.ca

PART 3: GELCAP KIT

[My Cart](#) | [My Part Lists](#) | [Sign In/Register](#)[English](#) (Change)

What can we help you find?

[Submit](#)[Products](#) [Industries](#) [Resources](#) [About TE](#) [My Account](#) [Innovation](#) [Support Center](#)**GELCAP-SL-2/0-3HOLE(B10) Product Details**[Share](#)[Print](#)[Email](#)**GELCAP-SL-2/0-3HOLE
(B10)**

TE Internal Number: F40658-000



Active

Power Cable Splices, Repair Sleeves and End Seals

Always EU RoHS/ELV Compliant (Statement of Compliance)

Product Highlights:

- Cable Splice
- Splice Type = Stub Splice
- Splice Style = Cap
- GelCap-SL Series
- Motor Connections Application, Street Lights Application

[View all Features](#)**Quick Links**

- [Pricing & Availability](#)
- [Search for Tooling](#)
- [Product Feature Selector](#)
- [Contact Us About This Product](#)

[Add to My Part List](#)[Request Sample](#)[Find Similar Products](#)[Buy Product](#)**Documentation & Additional Information****Product Drawings:**

- None Available

Catalog Pages/Data Sheets:

- None Available

Product Specifications:

- None Available

Application Specifications:

- None Available

Instruction Sheets:

- None Available

CAD Files:

- None Available

Additional Information:

- [Product Line Information](#)

Related Products:

- [Tooling](#)

Product Features (Please use the Product Drawing for all design activity)**Product Type Features:**

- Product Type = Cable Splice
- Splice Type = Stub Splice
- Splice Style = Cap
- Series = GelCap-SL
- Cable Type = Polymeric
- Retention Type = Clamp
- Armored Cable = No
- Jacketed Cable = With

Mechanical Attachment:

- Installation Type = Cold Applied

Configuration Features:

- Conductor (Wire) Size = #14 - 2/0
- Cable Shielding = Without

Industry Standards:

- [RoHS/ELV Compliance](#) = RoHS compliant, ELV compliant
- [Lead Free Solder Processes](#) = Not relevant for lead free process
- RoHS/ELV Compliance History = Always was RoHS compliant

Printer/Label Features:

- Voltage Rating (kV) = 0.6

Operation/Application:

- Application = Motor Connections, Street Lights

Other:

- Brand = Raychem
- Comment = Clear cap to allow visual inspection.; Port B - power port to light - #14-6 AWG; Kits include connectors

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PART 4: ELECTRICAL AND NATURAL GAS FACILITIES LOCATE



ELECTRIC AND/OR NATURAL GAS FACILITIES LOCATE

DEMANDE DE LOCALISATION DE CONDUITES

D'ÉLECTRICITÉ ET DE GAZ NATUREL

In case of Emergency, call /
En cas d'urgence, composez le
480-5900 or / ou
1-888 MB HYDRO (1-888-624-9376)
outside / à l'extérieur de Winnipeg



Address or location of work / Adresse ou site des travaux				Notice given by / Avis signifié par									
Name of contact on site / Nom de la personne-ressource sur le site			Contact tel. no. / Tél. de la personne-ressource		Company name (if applicable) / Nom de l'entreprise (s'il y a lieu)		Company tel. no. / N° de tél. de l'entreprise						
Description of work / Description des travaux													
Map no. / N° de carte		MIT Application #		Asbuilt no. / N° de plan définitif		DATE REQUIRED / DATE DEMANDÉE		yyyy mm dd / a. m. j.		TIME REQUIRED / HEURE DEMANDÉE		hh mm / h min. ☐ A.M. ☐ P.M.	

High pressure / Haute pression	Gas main / Conduite principale de gaz	Service line / Ligne de desserte	Size / Taille	High voltage > 750 V / Haute tension > 750 V	Secondary / Secondaire	Overhead line / Ligne aérienne	Under-ground cable / Câble souterrain	Address or location of work / Adresse ou site des travaux

Excavation constitutes a danger to the electrical cables and natural gas mains indicated below. / Les travaux d'excavation comportent des risques pour les câbles électriques et les conduites de gaz naturel indiqués ci-dessous.

Only the following utilities have been marked / Les services suivants sont les seuls à avoir été marqués :

- ☐ **Electrical / Électrique :** RED markings, flags or marked stakes indicate power utility cables. / Les marques, les drapeaux ou les piquets **ROUGES** indiquent la présence de câbles électriques.
- ☐ **Natural Gas / Gaz naturel :** YELLOW markings, flags or marked stakes indicate natural gas lines. / Les marques, les drapeaux ou les piquets **JAUNES** indiquent la présence de conduites de gaz naturel.

Sketch is for illustration purposes only. It is not to scale or in reference to property lines. Refer to actual stakes or markings for location(s). / Le croquis n'est qu'une illustration. Il n'est pas à l'échelle et il ne représente pas les limites des propriétés. Pour connaître l'emplacement exact, consulter les marques ou les piquets eux-mêmes.

Location or sketch / Emplacement ou croquis														
☐ See attached / Voir document ci-joint														

☐ **SAFETY WATCH REQUIRED / EXIGENCE DE SURVEILLANCE DE SÉCURITÉ :**

- ☐ Electricity / Électricité
- ☐ Natural Gas / Gaz naturel

Notify the Utility at least **2 business days in advance** of excavation to request a Safety Watch / Avertir l'entreprise **2 jours ouvrables avant les travaux** d'excavation pour demander une surveillance de sécurité.

- ☐ Work area is within three metres of overhead line. / La zone de travail est à moins de 3 mètres de distance d'une ligne aérienne.
- ☐ Excavation area is within three metres but at least one metre away from power cable or gas line location. / La zone d'excavation est à moins de 3 mètres et à plus d'un mètre d'un câble électrique ou d'une conduite de gaz.
- ☐ Hand dig within one metre of all markings/staking. / Creusez manuellement à moins d'un mètre des marques et des piquets.
- ☐ Contact the Utility for further instructions before working/digging. / Communiquez avec le service public avant de commencer à travailler ou à creuser pour obtenir des instructions additionnelles.

Utility contact name / Personne-ressource (entreprise)	Tel. no. / N° de tél.
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Prepared by (print name) / Fait par (nom en caractères d'imprimerie)		Employee signature / Signature de l'employé(e)		DATE ADVICE GIVEN / DATE DES CONSEILS		yyyy mm dd / a. m. j.	
Received and conditions noted by (print name) / Reçu et conditions acceptées par (nom en caractères d'imprimerie)				Signature / Signature			

The recipient (**must be 18 years of age or older**) acknowledges receipt of the advice herein; and accepts and agrees to the Terms and Conditions as set out on the reverse. / Le récipiendaire, **qui doit être âgé de 18 ans ou plus**, reconnaît avoir reçu les conseils indiqués dans la présente et accepte les conditions générales indiquées au verso.

DISTRIBUTION / DISTRIBUTION : ORIGINAL / ORIGINAL – Office / Bureau **COPY / COPIE :** Customer / Abonné

TERMS AND CONDITIONS:

Wherever used herein, Utility refers to Manitoba Hydro and any employees or agents of the Utility.

You, by signing the front of this Electric and/or Natural Gas Facilities Locate, acknowledge that you are the owner, or an authorized agent for the owner of the location(s) of the excavation ("You") and You agree as follows:

1. The Utility shall not be liable for any claims, damages, costs, liability, damage to property, or injury or death arising from, or caused by the work or excavation, or failure to abide by the location advice or any other terms or conditions provided herein;
2. You agree to indemnify the Utility, its successors and assigns, from and against all causes of action, claims, damages, costs, liability, demands, damage to property, and injury or death which may be alleged, claimed or brought against the Utility by You, your heirs, successors, assigns, employees, contractors, invitees, or by any other third party, in respect or arising out of the work or excavation, or failure to abide by the location advice or any other terms or conditions provided herein;
3. You are responsible to provide supervision and safety watching services in respect of any work or excavation, unless it is otherwise indicated herein that the Utility shall provide same, in which case You are responsible to arrange for same with the Utility as outlined herein;
4. You shall immediately upon demand reimburse the Utility for any losses, claims, costs, or damages to the facilities of the Utility caused by or arising out of the work or excavation, or failure to abide by the location advice or any other terms or conditions provided herein.

INSTRUCTIONS:

Do not excavate (including digging, boring, pushing, ploughing, or trenching the ground) without first hand digging to expose lines at a number of locations sufficient to determine their exact position and depth. If any location appears not to coincide with the markings or stakes, contact the Utility for confirmation of the location. If exposed by the excavation, cable or pipe must be inspected by the Utility for damage or safety hazards.

Do not attempt to locate lines by probing the ground with any pointed tool or object.

Stakes and markings are provided only for the work area specified by you. If work has not started within 14 days after the locate is completed by the Utility, you must again notify the Utility to re-mark the work area and provide an updated Electric and/or Natural Gas Facilities Locate form. Notify the Utility of any changes in the nature of work or work area at least two business days before beginning excavation. This form must be kept at the work area until all work has been completed. Any changes in the work or work area that was originally specified by you may require additional staking. Work should not proceed until you have received a new Electric and/or Natural Gas Facilities Locate and all facilities are located and marked.

During the course of the work on any excavation, the excavator shall maintain, and keep in a visible condition, any markings placed there by the Utility. Do not proceed if the stakes or marks have become obliterated or are displaced. From the start of the excavation and until work and backfilling is completed, you must take every precaution to ensure that no damage will result to the lines, their coatings, protective wrapping or cathodic protection devices and no stress will be applied to the lines.

Do not move lines or other installations, dangerous conditions may result at this or other locations.

Safety Watch and High Pressure excavations (as indicated on the front of this form) must be supervised by the Utility.

CAUTION:

Notify the Utility of any damage, or gas and power line disturbances immediately at 480-5900 or 1 888 MB HYDRO (1-888-624-9376) outside Winnipeg.

If natural gas leaks, you must do the following:

- **Notify all persons in any premises that may be affected**
- **Keep traffic and pedestrians out of the area; and**
- **Do not backfill any damaged facilities until the damage has been inspected by the Utility and the Utility has authorized the backfill.**

Leaking natural gas must be allowed to dissipate into the air.

BACKFILLING PRECAUTIONS:

When backfilling, ensure that the cables or pipes will remain in their original position during settlement by thoroughly tamping the backfill under them; and keeping them supported.

Manitoba Hydro only locates facilities that it owns and has no knowledge of or responsibility for locating facilities owned by others.

These instructions are provided as an on-site reference. All excavations must adhere to the current Department of Labour Workplace Safety and Health Regulations and Manitoba Gas Pipe Line Excavations Regulations of the *Gas Pipe Line Act*. Copies of these acts can be obtained from the Utility or the Queen's Printer.

CONDITIONS GÉNÉRALES

Dans les présentes, chaque fois que le terme « Entreprise » est utilisé, il fait référence à Manitoba Hydro, ainsi qu'à tout employé ou agent de l'Entreprise.

En signant au recto le présent formulaire de demande de localisation des conduites d'électricité et de gaz naturel, vous reconnaissez que vous êtes le propriétaire de l'emplacement (des emplacements) de l'excavation ou un agent autorisé de ce dernier (« vous ») et vous convenez de ce qui suit :

1. *L'Entreprise ne doit pas être tenue responsable de toute réclamation ou responsabilité, ou de tous dommages-intérêts, coûts ou dommages causés à la propriété, ou de toute blessure ou tout décès découlant de l'excavation ou causés par cette dernière, ou par tout défaut de respecter les conseils relatifs aux excavations ou toute condition de la présente demande.*
2. *Vous acceptez de garantir l'Entreprise, ses successeurs et ayants droit, contre toute cause d'action, réclamation, responsabilité ou obligation, ou contre tous dommages-intérêts, coûts ou dommages causés à la propriété, ou contre toute blessure ou tout décès qui peuvent être présumés, réclamés ou déposés contre l'Entreprise par vous-même, vos héritiers, successeurs, ayants droit, employés, entrepreneurs ou invités, ou par toute tierce partie, relativement aux travaux ou à l'excavation ou à tout défaut de respecter les conseils relatifs aux excavations ou toute condition de la présente demande.*
3. *Il vous incombe de fournir une supervision et des services de surveillance de sécurité en rapport avec vos travaux ou votre excavation, sauf s'il est indiqué ailleurs dans la présente demande que l'Entreprise est responsable de fournir une telle supervision et de tels services de surveillance. Dans un tel cas, vous êtes responsable de prendre les dispositions appropriées avec l'Entreprise pour assurer une telle supervision et de tels services de surveillance.*
4. *Sur demande, vous devez rembourser immédiatement à l'Entreprise toutes les pertes ou sommes réclamées, ou tous les coûts, dommages-intérêts ou dommages causés aux installations de l'Entreprise qui découlent des travaux ou de l'excavation ou qui sont causés par ces derniers ou par tout défaut de respecter les conseils relatifs aux excavations ou toute condition de la présente demande.*

INSTRUCTIONS

N'entrez jamais dans les travaux d'excavation, y compris le creusage ou le forage de trous, l'entassement ou le labourage du sol, ou le creusage d'une tranchée, sans tout d'abord creuser manuellement pour exposer les conduites à suffisamment d'endroits pour établir leur position et leur profondeur exactes. Si un emplacement ne semble pas coïncider avec les marques ou les piquets, communiquez avec l'Entreprise pour confirmer l'emplacement. Toute ligne ou conduite exposée par les travaux d'excavation doit être inspectée par l'Entreprise afin de vérifier si elle présente des dommages ou des risques pour la sécurité.

N'essayez jamais de localiser des conduites en sondant le sol à l'aide d'un objet ou d'un outil pointu.

Les piquets et les marques ne sont fournis que pour la zone des travaux que vous délimitez. Si les travaux ne sont pas entrepris dans les quatorze jours qui suivent la localisation effectuée par l'Entreprise, vous devez communiquer avec l'Entreprise pour faire poser à nouveau des piquets et soumettre un formulaire de localisation de lignes électriques et de conduites de gaz naturel mis à jour. Vous devez signaler à l'Entreprise toute modification apportée à la nature ou à la zone des travaux au moins deux jours ouvrables avant d'entreprendre l'excavation. Ce formulaire doit demeurer sur le site des travaux jusqu'à ce qu'ils soient terminés. Toute modification apportée à la nature ou à la zone des travaux originalement délimitée peut exiger un piquetage additionnel. Les travaux ne devraient pas être entrepris avant que vous ne receviez un nouveau formulaire de demande de localisation de conduites d'électricité et de gaz naturel et que toutes les installations ne soient localisées et marquées.

Les piquets et les marques doivent demeurer visibles et en bon état. N'entrez pas dans les travaux si les piquets ou les marques ont disparu ou ont été déplacés. Du début de l'excavation jusqu'à son parachèvement, y compris le remblayage, vous devez prendre toutes les précautions nécessaires pour veiller à ce que les lignes, leur revêtement, leur enveloppe protectrice et les dispositifs de protection cathodique ne soient pas endommagés et à ce qu'aucune contrainte ne s'applique aux lignes.

Ne déplacez pas les lignes ou les autres installations, car cela peut créer des conditions dangereuses à cet emplacement ou à d'autres emplacements.

Toute excavation qui exige une surveillance de sécurité ou porte sur des conduites haute pression (voir le recto du présent formulaire) doit être supervisée par l'Entreprise.

ATTENTION

Vous devez signaler immédiatement à l'Entreprise tous les dommages ou toute perturbation des conduites en composant le 480-5900 ou le 1 888 MB HYDRO (1 888 624-9376) (à l'extérieur de Winnipeg).

En cas de fuite de gaz naturel, vous devez adopter les mesures suivantes :

- **Avertissez toutes les personnes qui sont dans les locaux qui peuvent être visés.**
- **Éloignez les piétons et la circulation automobile de la zone.**
- **Ne remblayez jamais des installations endommagées avant que l'Entreprise n'inspecte les dommages et n'autorise le remblayage.**

Le gaz naturel qui fuit doit avoir la possibilité de se dissiper dans l'air ambiant.

PRÉCAUTIONS RELATIVES AU REMBLAYAGE

Pendant le remblayage, vous devez veiller à ce que les conduites demeurent dans leur position originale pendant le tassement du sol en pilonnant soigneusement le matériau de remblayage sous eux et en les supportant adéquatement.

Manitoba Hydro n'effectue que la localisation des installations qu'elle possède. Elle n'a aucune connaissance des installations que possèdent les autres services publics et n'assume aucune responsabilité pour la localisation de ces installations.

Les présentes instructions sont offertes à titre de référence sur place. Toute excavation doit se conformer au Règlement sur les excavations effectuées à proximité des conduites de gaz de la Loi sur les gazoducs, ainsi qu'aux règlements pertinents sur la sécurité et l'hygiène au travail du ministère du Travail. Vous pouvez vous procurer des exemplaires des documents en vous adressant à l'Entreprise ou aux Publications officielles du gouvernement provincial.

PART 5: SAMPLE JOB PLAN

1. EMERGENCY RESPONSE PLAN

Identify exact location for emergency response:

Emergency phone numbers:

Dispatch - Daytime - Local CSC

911

After hours - Electric 204-360-2006 Radio #031

204-360-HELP (4357)

- Gas 204-360-2009 Radio #030

SCC: 204-474-3369, 204-474-3007, 204-474-3327

Blowing Gas - Wpg. 204-480-5900

VHF: 040

Blowing Gas - Rural 1-888-624-9376

Spill Response no./FSO: Jeff Breakey - 204-871-2003

How will you execute a rescue?

INSTRUCTION: Prepare, discuss and review the job plan with the crew daily and whenever a change is introduced to the job.

2.	CURRENT DATE	yyyy mm dd	Project name	Work Order no.	Description		
	CSC and Radio Channel	Line or feeder	Blocked ☐ Yes ☐ No	Upstream protective device	Blocking received from	Time	Phone no.

3. HAZARD IDENTIFICATION LIST

1. Mechanical 1.1 Equipment failure 1.2 Lifting with a boom 1.3 Max work loads 1.4 Vehicle stability 1.5 Moving parts/Sharp objects 1.6 Tension loads/Springs	2. Electricity 2.1 Live contact HV 2.2 Live contact LV 2.3 Induction/backfeed HV 2.4 Induction/backfeed LV 2.5 Static charge 2.6 Step potential 2.7 ARC Flash potential 2.8 Clothing ignition hazard/ FRC required 2.9 Lockout/Tagout	3. Gravity 3.1 Falling from a height 3.2 Falling objects 3.3 Falling structures 3.4 Rigging failure 3.5 Working over water	4. Applicable 4.1 Vehicular 4.2 Kenetic 4.3 Thermal 4.4 Chemical 4.5 Confined Space 4.6 Excavations 4.7 Vehicle or pedestrian traffic 4.8 Underground Utilities 4.9 Other, specify: 4.9.1 _____
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Hand contact:	Incident energy -	ARC flash boundary -	ARC Flash PPE Level -
Hot stick Work:	Incident energy -	ARC flash boundary -	ARC Flash PPE Level -

[illegible]

REVIEWED BY	DATE yyyy mm dd

People	Procedures	Hardware/Equipment	Environment	Workers Affect on Environment
☐ Qualification of personnel ☐ Other work groups/contractors ☐ Effective Communication ☐ Worker fatigue ☐ Pedestrian control ☐ General public ☐ Traffic control ☐ Safety watcher	☐ Limits of approach ☐ De-energize/Isolation of apparatus ☐ Safety hold off/Blocking required ☐ Switching orders ☐ Adequate cover-up ☐ Grounding apparatus and vehicles ☐ Work permit/Clearance to work ☐ Permit checklists (soft dig, confined space, etc.) ☐ Review rescue procedures ☐ Spiking/Stethoscoping ☐ Cut Hazards/Cut Resistant Gloves	☐ Inspection of equipment ☐ Inspection of tools & PPE ☐ Inspection of vehicles ☐ Condition of structures ☐ Safe loads for rigging ☐ Adequate cover-up ☐ Specialized tools - calibrated/tested & up-to-date	☐ Environment checklist ☐ Underground locates ☐ Weather conditions ☐ Soil conditions/Shoring ☐ Lighting conditions ☐ Adjacent structures/Vegetation ☐ Housekeeping ☐ Emergency plan/procedure ☐ Open excavations/Trench ☐ Distractions and Interruptions	☐ Cause erosion ☐ Release/spills (liquids/gases/solids) ☐ Waste disposal liquids/solids) ☐ Noise ☐ Fire ☐ Species at risk (plant and animal) ☐ Disturbing waterways/drainage/wetlands/burial grounds ☐ Wildlife Habitat ☐ Bio Security
WHAT ARE THE CHANGES?			HOW WILL THIS AFFECT YOUR WORK?	

☐ Stop When Unsure / Know When to Stop Stop when unclear on task / outcomes	☐ Procedure Use and Adherence Verify correct / accurate procedure	☐ Self Check STAR Stop / Think / Act / Review
☐ Questioning Attitude Identify confusion / doubt / uncertainty	☐ Effective Communication Send message / paraphrase back / acknowledge	

Designated person in charge (Print Name):		Crew cell no.:		Designated person in charge (Signature):		Date:	yyyy mm dd
Print Full Names and classification of crew members:							
yyyy mm dd	Initial/Sign off for Tailboard Discussion						

Be aware of **all** work crews in the area.

Multi-crew job coordinator

Cell
phone:

WHAT OTHER CREWS ARE ON SITE	PERSON IN CHARGE	HOW WILL THEIR JOB AFFECT YOURS

WORKSITE VISITOR SIGN OFF	DATE yyyy mm dd	WORKSITE VISITOR SIGN OFF	DATE yyyy mm dd

PART 6: NETWORK COMMISSIONING REPORT

FIELD INSTRUCTIONS: Preferred Best Practice

1. Construction Foreman to contact Customer Service Center Supervisor upon completion of project.
2. Customer Service Center Supervisor to provide a delegate that will review project details with Construction Foreman in the field.
3. Delegate to identify deficiencies and record on report. If project is accepted as complete proceed to Step 5.
4. Construction to complete deficiencies and review with delegate.
5. Once project deemed acceptable delegate to sign under "Accepted as complete by Customer Service Center Representative"
6. One copy of report to be attached to working file.
7. One copy of report to be forwarded to Customer Service Center Supervisor with close out package.
8. Construction Manager to sign under "Accepted as Complete by Construction Manager" and file with final close out package.

Network number		Description			
Foreman name (line)		Foreman name (pole)		Foreman name (underground)	
IN-SERVICE DATE	yyyy mm dd	Plan attached ☐ Yes ☐ No		Built as estimated ☐ Yes ☐ No	
Field Supervisor responsible for work					
GENERAL COMMENTS					
Prepared by (Construction Coordinator/Foreman) : Network Authenticated Signature				yyyy mm dd	

Network number

WORK CATEGORIES	APPLICABLE		STATE ALL DEFICIENCIES OR DISCREPANCIES	CORRECTIONS COMPLETED	
	Yes	No		Department	yyyy mm dd
Poles					
Primary System					
Secondary System					
Transformer					
Equipment Data					
Street Lights					
Connect/ Disconnects					
Regulator					
Capacitors					
URD Secondary					
URD Primary					
Terminals					
Materials Location/Condition					
Site Condition					
Sub Transmission System					
Transmission System					
Station System					
GPS Locations Synchronized					

SIGN OFFS (Network Authenticated Signatures):			
Deficiencies identified by (Customer Service Center Representative)	yyyy mm dd	Corrections completed by	yyyy mm dd
WORK COMPLETION			
I hereby accept the Construction and Workmanship of this Order and Consider it to be Complete.			
Accepted as complete by (Customer Service Center Representative)	yyyy mm dd	Accepted as complete by (Construction Manager)	yyyy mm dd