R. 3- ADDED NEW FIG. C & B of M. NOV. '12 PY | R. 4- REMOVED GUY STRAIN INSULATOR IN FIG. C. JAN'18 PY

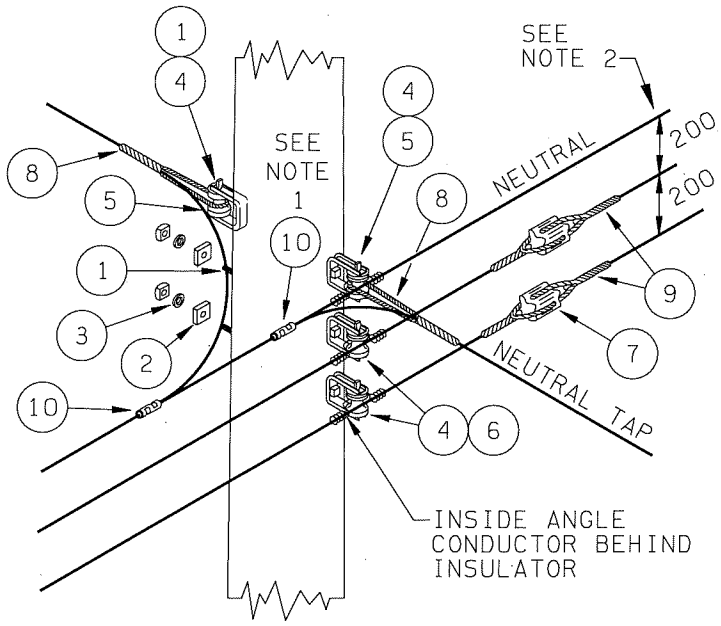

FIG. A
Secondary Tangent, Neutral Tap and Secondary Cut

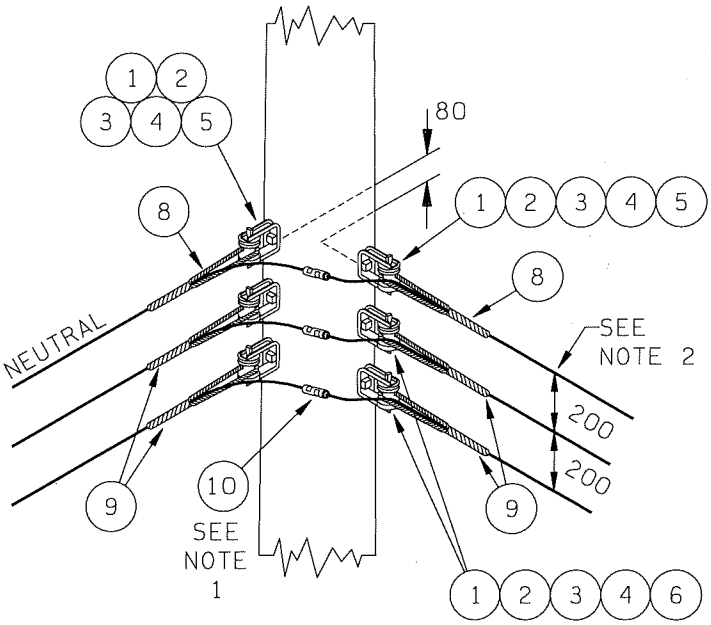

FIG. B
Secondary Heavy Angle

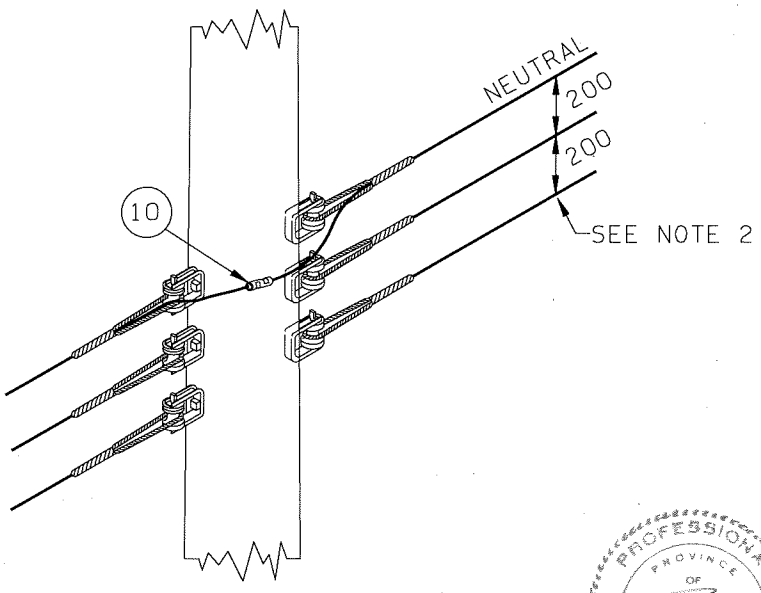

FIG. C
Secondary Dead-End

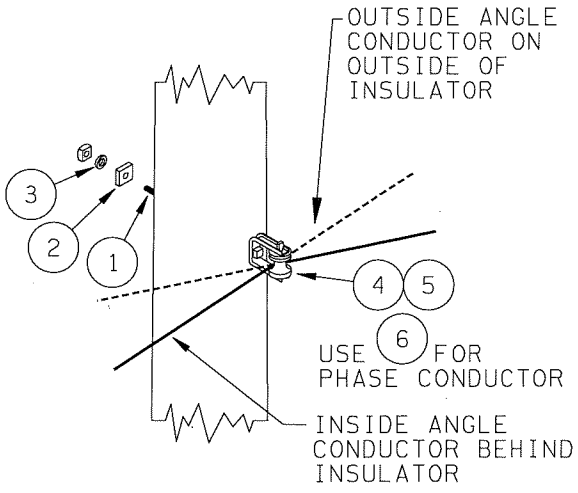

FIG. D
Small-Medium Angle Neutral

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA S. YANG

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ORIGINAL ISSUE DATE: NOVEMBER 1985

SERVICE CONNECTIONS TYPICAL SECONDARY/NEUTRAL STRUCTURES

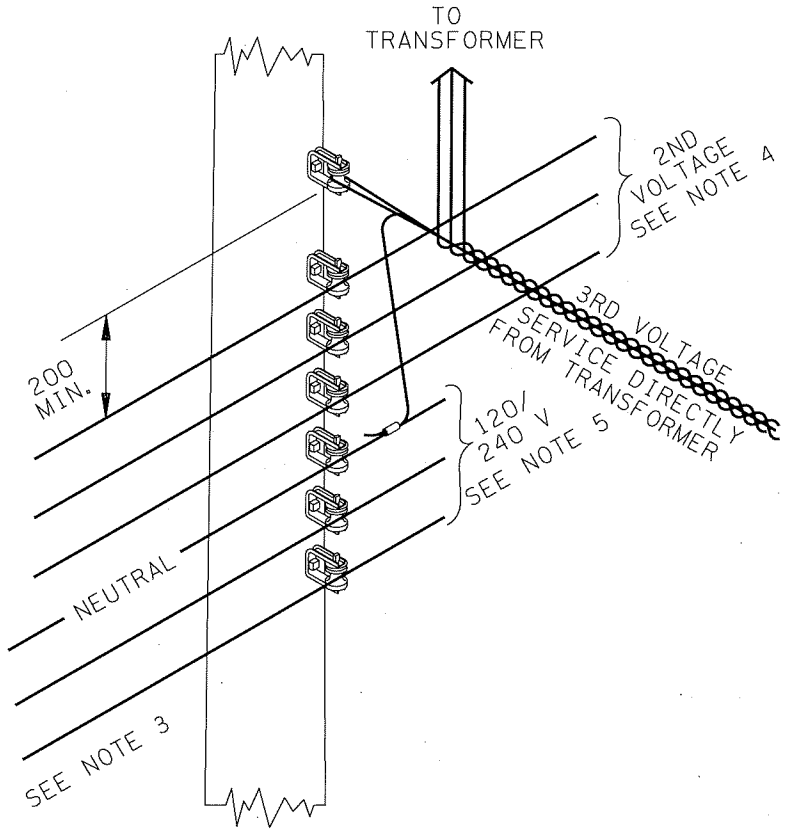
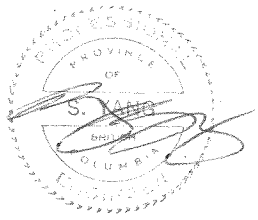


FIG. E
Two Thru-Secondaries
with 3rd Voltage Service



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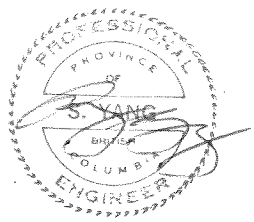
SERVICE CONNECTIONS
TYPICAL MULTIPLE SECONDARY VOLTAGE STRUCTURES

NOTES:

1. See Section F for compression connector selection.
2. Ensure 200 mm clevis spacing for 60m maximum span and 250 mm for 75 m maximum span.
3. See ES43 N2-01.01 for typical construction/material details.
4. 2nd/3rd Voltage: Split Phase 120/240 V, 3 Phase 120/208 V, or 347/600 V.
5. 120/240 V phase conductors must be below the neutral. Three phase voltages must be above the neutral, with the highest voltage at the highest level. A service taken directly from the transformer(s) per Figure E may be treated as an exception.
6. Don't mix non-standard and standard, grounded and ungrounded system.

BILL OF MATERIAL

Item No.	Description	Catalogue ID	Quantity			
			A	B	C	D
1	Machine bolt (5/8" x length)	100-XXXX	3	6	3	1
2	Square Washer (50mm x 50mm)	420-1521	3	6	-	1
3	Lock Washer (5/8")	102-4158	3	6	3	1
4	Secondary Clevis	413-0051	4	6	6	1
5	Neutral Spool Insulator (White)	410-0500	2	2	2	1
6	Phase Spool Insulator (Brown)	410-0501	2	4	4	-
7	Strain Insulator	410-1208	2	-	-	-
8	Grip for Bare Neutral	413-054X	2	2	2	-
9	Grip for Insulated Secondary	413-05XX	4	4	4	-
10	Compression Connector	388-XXXX	2	3	1	-



REFERENCE DRAWINGS

ES43 Section F Conductors and Connectors
ES43 N1-01.02 General Secondary Ties
ES43 N1-01.01 General-Secondary Voltages/Conductors, Neutral Conductors

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SERVICE CONNECTIONS
TYPICAL SECONDARY STRUCTURES
BILL OF MATERIAL AND NOTES

R. 4- NEW T-BLOCK, PAGE 2 ADDED. NOV'12 MK
R. 3- CONNECTORS NOV. '06 FLK
R. 2- NOTES REVISED NOV'01 BF
DRAFTER: DM/JW

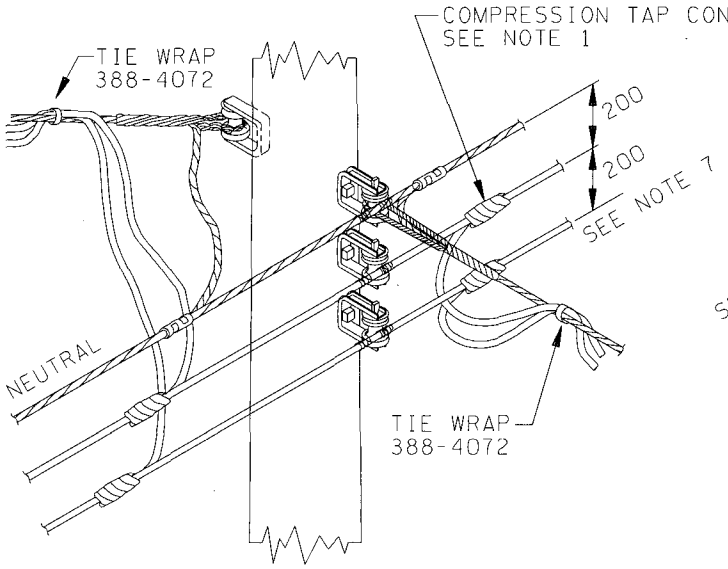

FIG. 1
Single Phase Service Connection at Pole

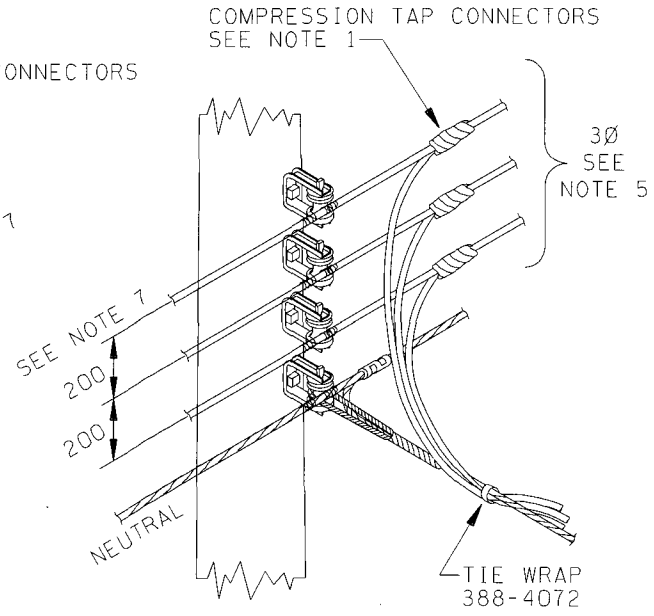

FIG. 3
Three Phase Service Connection at Pole

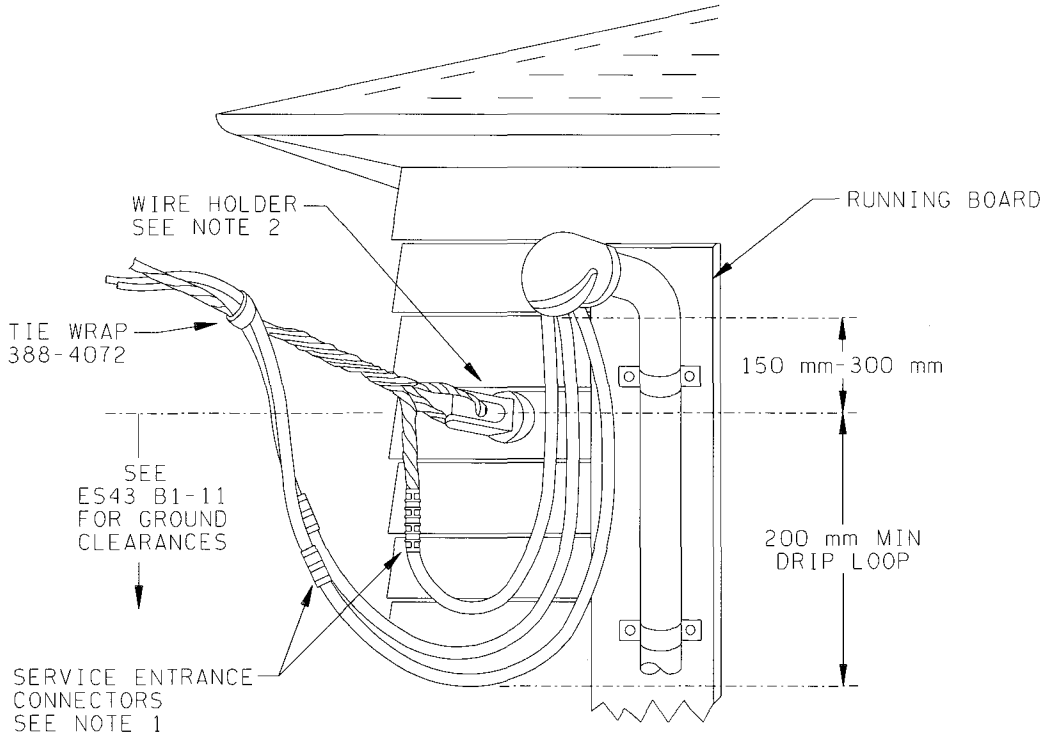

FIG. 2
Single Phase Service Connection at Entrance

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ORIGINAL ISSUE DATE: NOVEMBER 1985

SERVICE CONNECTIONS SINGLE MULTIPLEX SERVICES TAKEN FROM SECONDARY BUS

NOTES:

1. Aluminum conductors must be installed above copper. Do not install connectors at bottom of drip loops. All connections to be made in accordance with ES43 N1-01.03 and N1-01.04. See ES43 N2-05 for multiple service runs or multiple weatherheads. Stagger connectors by minimum one connector length.

2. Wire holders and other customer service entrance requirements are outlined on ES43 N1-01.03.

3. Fig. 1 shows single phase service. Three phase service connections are similar.

4. Multiplex conductors, as shown, are preferred to open wire services. Refer to ES43 N1-01.03 and N1-01.04.

5. If single phase is on same pole as three phase in Fig. 3, refer to ES43 N1-01.02.

6. See ES43 F2-25 for service stringing sags.

7. Spacing shown is for maximum 60 m span. Use 250 mm spacing for maximum 75 m span.

REFERENCE DRAWINGS

ES43 N2-01 Typical Secondary/Neutral Structures
ES43 F5-07 Service Entrance Connectors for Multiple Conductors (Single Run)
ES43 B1-11 Clearances above Ground for Low Voltage Services

DRAFTER: DM

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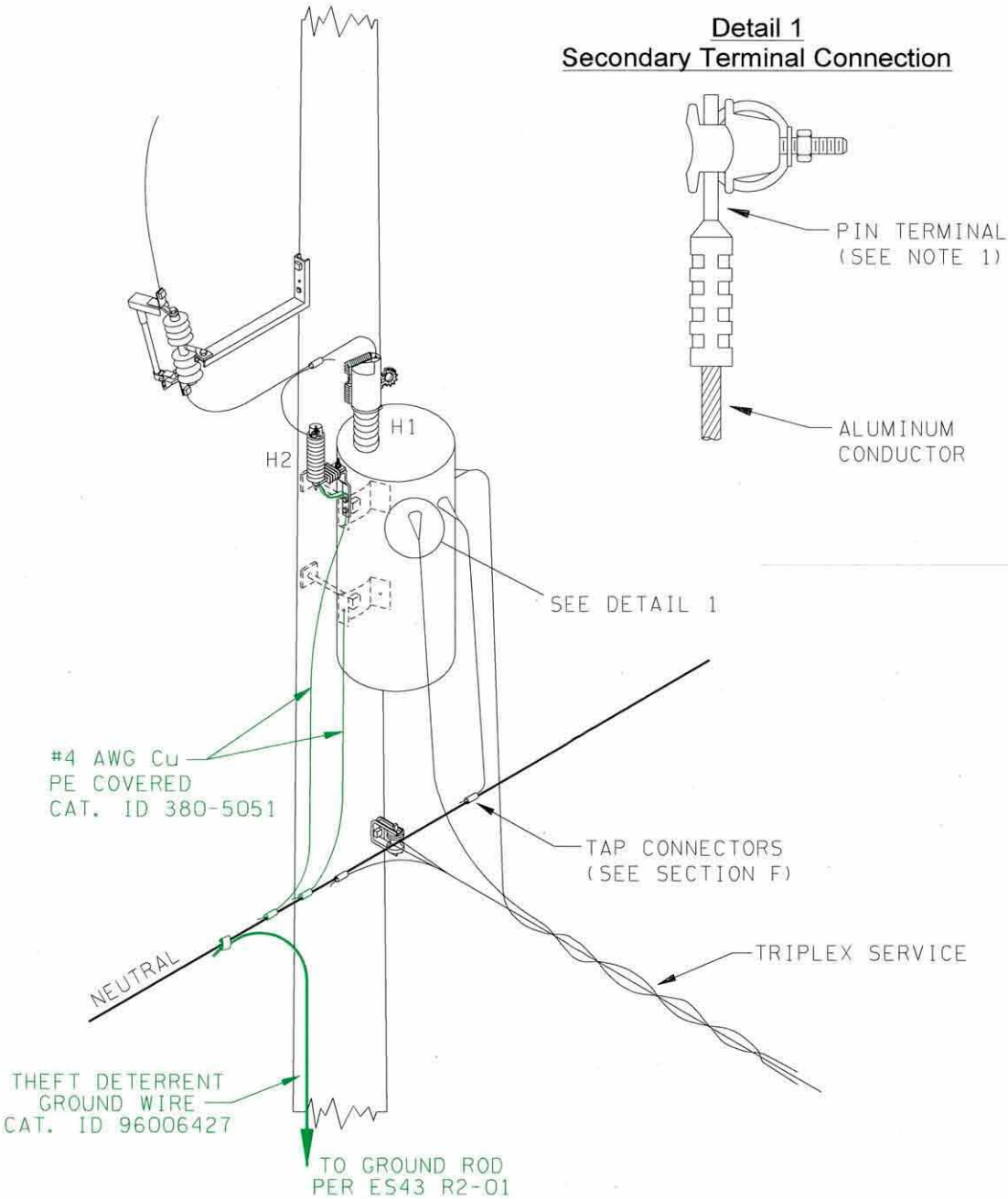
ORIGINAL ISSUE DATE: NOVEMBER 1985

SERVICE CONNECTIONS SINGLE MULTIPLEX SERVICES TAKEN FROM SECONDARY BUS



Detail 1
Secondary Terminal Connection

NOTES:

1. See ES43 F5-10 for pin terminal selection and ES43 N1-01.04 for further details.
2. If transformer has secondary spade terminals, use 2-hole copper compression lugs. See ES43 F5-10, ES43 J1-16 and ES43 N1-01.04.

REFERENCE DRAWINGS

ES43 R3-01	Grounding - Polemounted/Platform Transformers
ES43 K6-01	Fuse Selection Schedule - Overhead Transformer
ES43 J1-16	Standard Transformer Terminals
ES43 J1-08	Transformer Connection Diagram

R. 1- NOTE REFERENCE. DEC. '01 BF | R. 2- GROUNDING REVISION. NOV'12 MK

DRAFTER: DM

DESIGNER	RECOMMENDED	APPROVED
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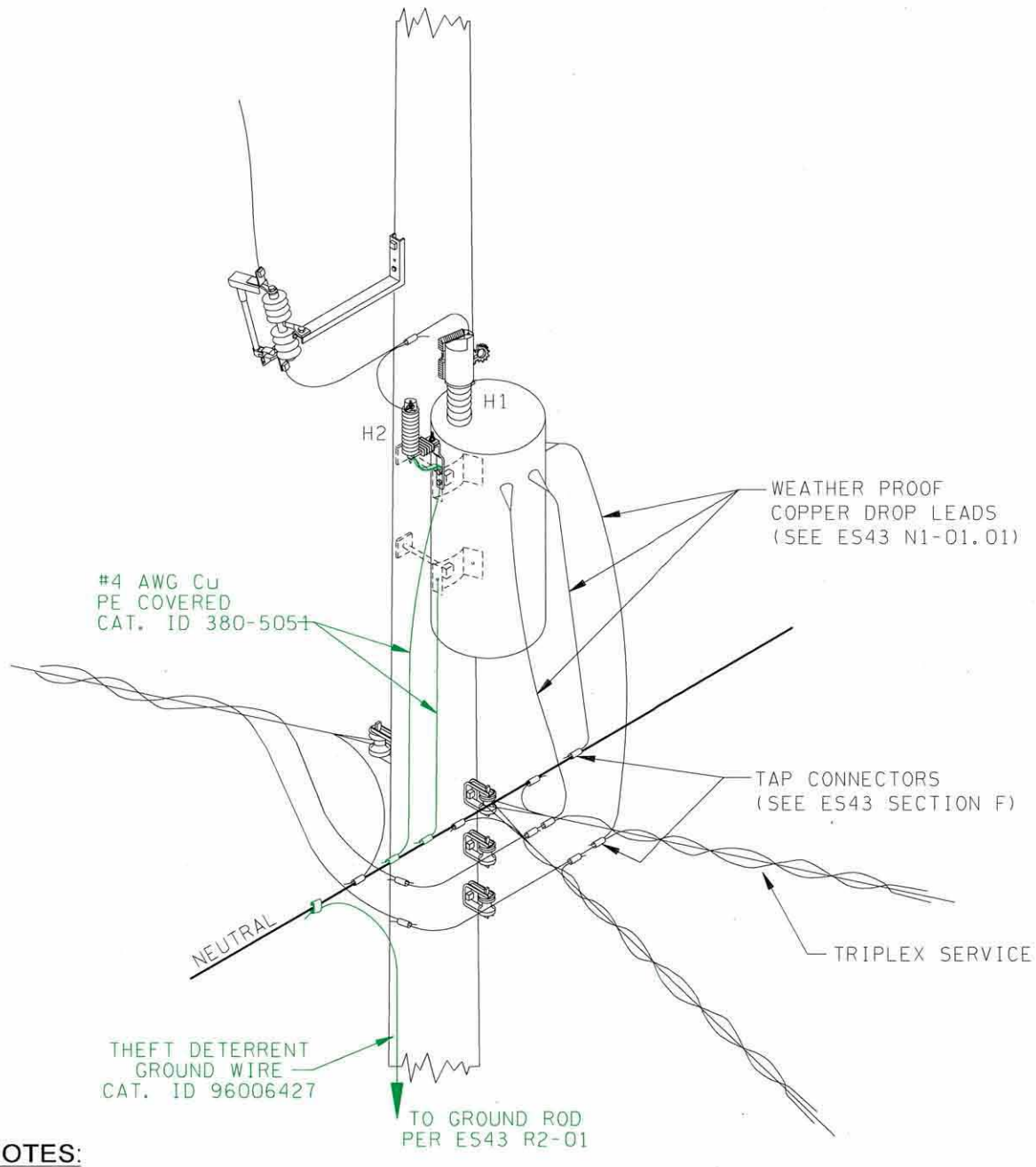
ORIGINAL ISSUE DATE: MARCH 1986

SERVICE CONNECTIONS SINGLE TRIPLEX SERVICE TAKEN DIRECT FROM TRANSFORMER



NOTES:

1. As alternate, train phase drop leads in opposite directions through spools and make all connections on riser tails.
2. If transformer has secondary spade terminals, use 2-hole copper compression lugs. See ES43 F5-10, ES43 J1-16 and ES43 N1-01.04.

REFERENCE DRAWINGS

ES43 R3-01	Grounding - Polemounted/Platform Transformers
ES43 K6-01	Fuse Selection Schedule - Overhead Transformer
ES43 J1-16	Standard Transformer Terminals
ES43 J1-08	Transformer Connection Diagram

R. 1- NOTE REFERENCE. DEC. '01 BF | R. 2- GROUNDING REVISION. NOV'12 MK

DRAFTER: DM

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ORIGINAL ISSUE DATE: MARCH 1986

SERVICE CONNECTIONS MULTIPLE TRIPLEX SERVICE TAKEN DIRECT FROM TRANSFORMER

Service Connections Parallel Multiplex Services and Customer Masts

ES43 N2-05

Application

This standard describes service connections for parallel multiplex services and customer masts.

Revision Notes

Added *Application* and *Revision Notes* sections. Updated *References*. Removed previous notes 1 on complying with the BC Electrical Code for customer masts, 8 on service conductor sag, and 9 on triple runs. Simplified Figure 1 and added legend applicable to all figures. Added new Figures 4 and 6. Substantive changes are marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2024-043 *Revised ES43 N2-05 Service Connections Parallel Multiplex Services and Customer Masts*.

References

BC Hydro Distribution Standards

ES43 B1-11	Clearances Above Ground for Low Voltage Services
ES43 F4-01	Connectors General Notes
ES43 F5-05	Tap Connectors for Secondary Conductors (Al-to-Al and Al-to-Cu Only)
ES43 F5-07	Service Entrance Connectors for Multiplex Conductors (Single Run)
ES43 F5-09	Partial Tension Splices and Streetlight Connectors
ES43 N1-01.03	General Secondary Entrance Conductor Sizes and Configurations

Notes

1. The customer shall supply wire holders at the customer service entrance per ES43 N1-01.03.
2. Use a partial tension compression splice for neutral conductors per ES43 F5-09. Do not tape the connection.
3. Use H-type Al compression tap connectors per ES43 F5-05. Tape all phase conductor connections.
4. See ES43 B1-11 for clearance to ground.
5. Use pre-insulated service entrance splices per ES43 F5-07. Stagger connectors by a minimum of one connector length.
6. Use multiplex conductors whenever possible in preference to open wire services. See ES43 N1-01.03.

Designed: L. Chiu, P. Eng		Professional of Record 2024-10-08 PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA L. D. CHIU # 59201 PERMIT TO PRACTICE #1002449	Service Connections Parallel Multiplex Services and Customer Masts
Checked: M. Stevens, P. Eng			
Reviewed: M. Stevens, P. Eng			DISTRIBUTION STANDARDS BC Hydro
Approved: H. Giesbrecht, P. Eng		Issued: 2024-10-11 Effective: 2024-10-11	ES43 N2-05 R6

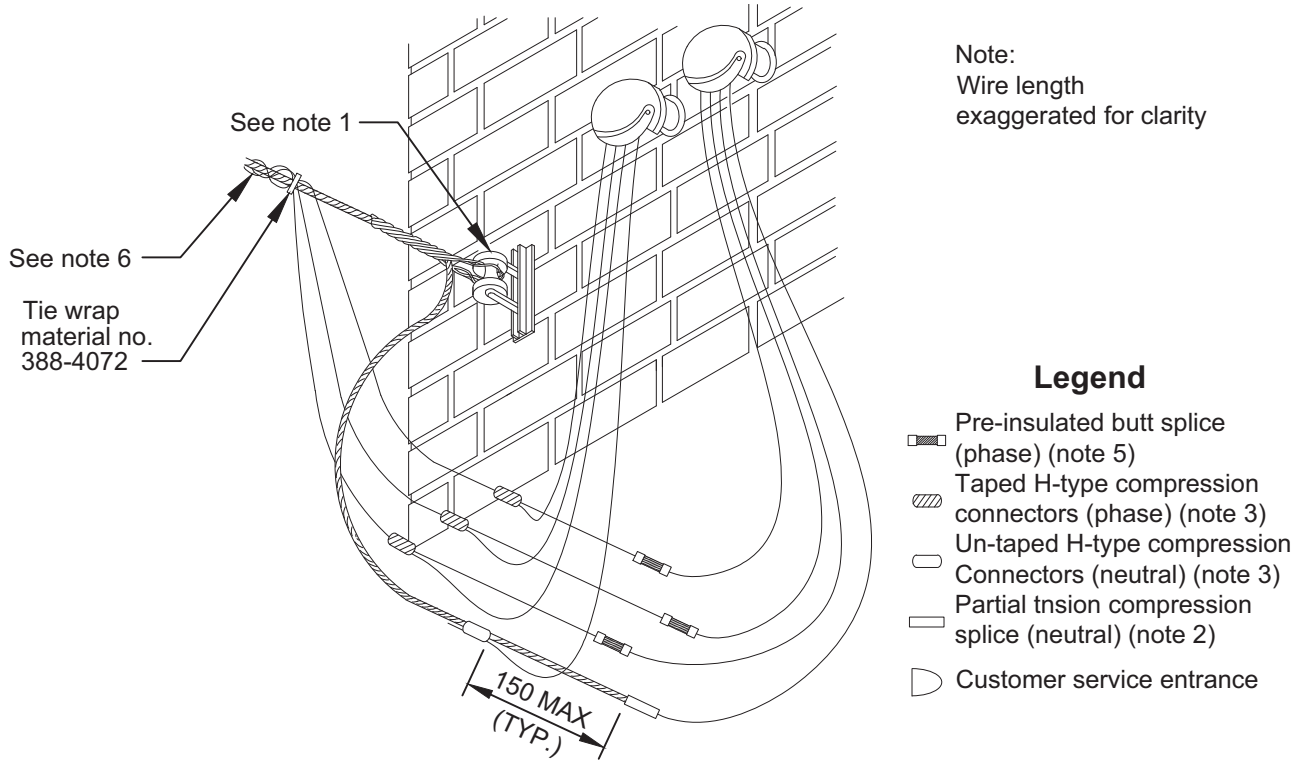

Figure 1 – Quadruplex to two mast connection

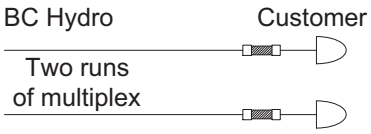

Figure 2 – Two multiplex into two masts

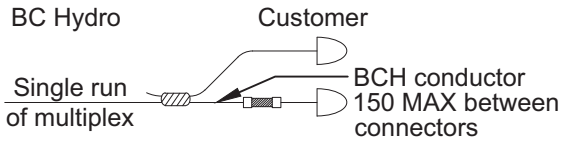

Figure 3 – Single multiplex into two masts

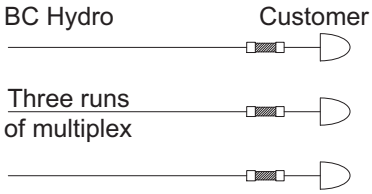

Figure 4 – Three multiplex into three masts

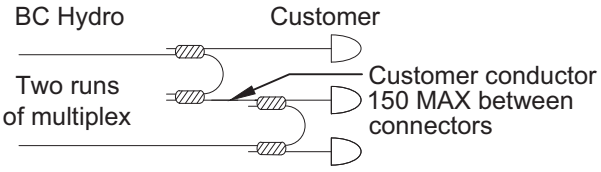

Figure 5 – Two multiplex into three masts

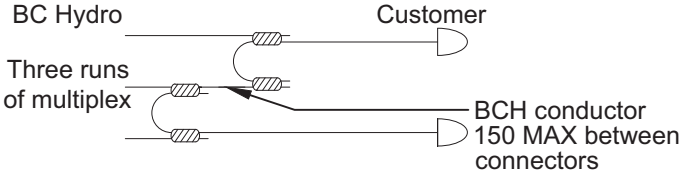

Figure 6 – Three multiplex into two masts

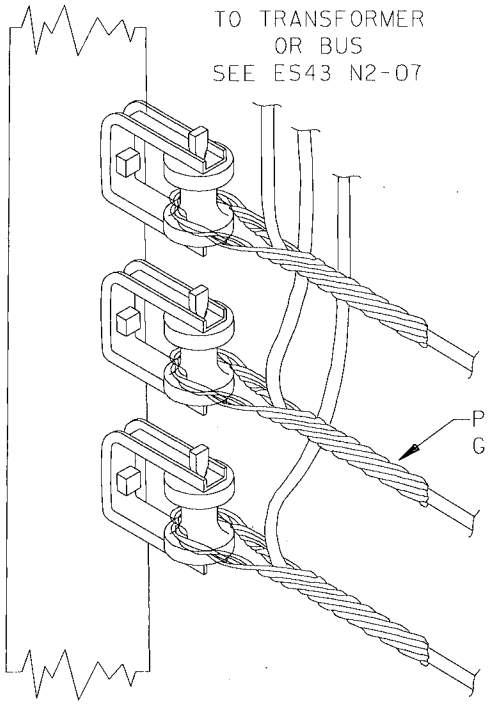

FIG. 1
Service at Pole

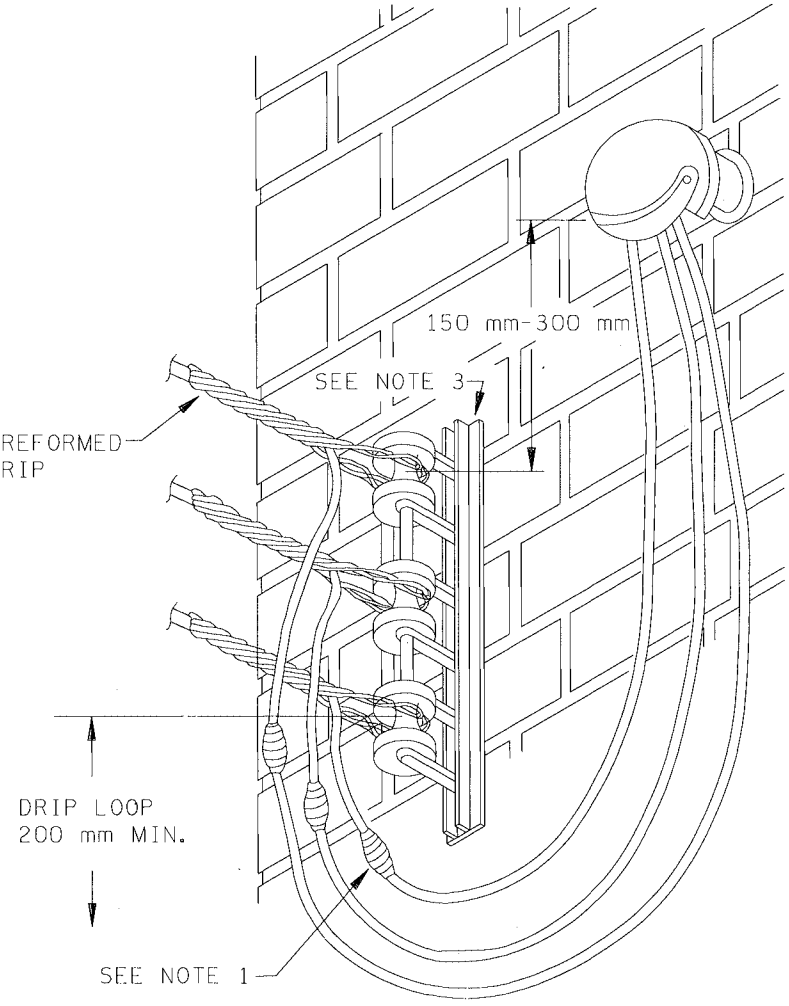

FIG. 2
Service at Entrance

REMEDIAL STDS
Not to be used for new construction.

NOTES:

1. Connectors to be installed so aluminum conductor is above copper. Do not install connectors at bottom of loops. Connectors to be installed in accordance with ES43 N1-01.03/04. See ES43 N2-05 for multiple service runs or multiple weatherheads. Stagger connectors by minimum one connector length.
2. Multiplex services are to be used, whenever possible, in preference to open wire services. Refer to ES43 N1-01.03/04.
3. Wire holder(s) at the customer service entrance are to be supplied by the customer and must meet the requirements outlined on ES43 N1-01.03.
4. Although a 3 phase three wire service is shown, the same procedure applies to all open wire services.
5. Sag service conductors in accordance with the sag chart on ES43 F2-25.

REFERENCE DRAWINGS
ES43 N2-01 Secondary/Neutral Structures
ES43 B1-11 Clearances

R.4- NOTES REVISED. NOV. '01 BF | R.5- CONNECTORS. NOV'06 FLK | R.6- T-BLOCK CHANGE. NOV'12 MK

DRAFTER: DM/JW

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ORIGINAL ISSUE DATE: FEBRUARY 1982

SERVICE CONNECTIONS
COPPER OPEN WIRE SERVICE

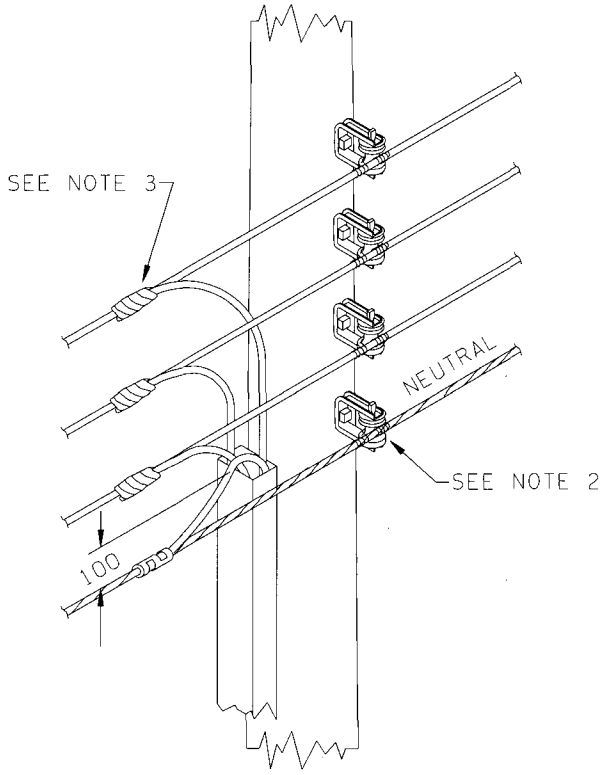

FIG. 1
3 Phase U/G Service from Secondary Bus

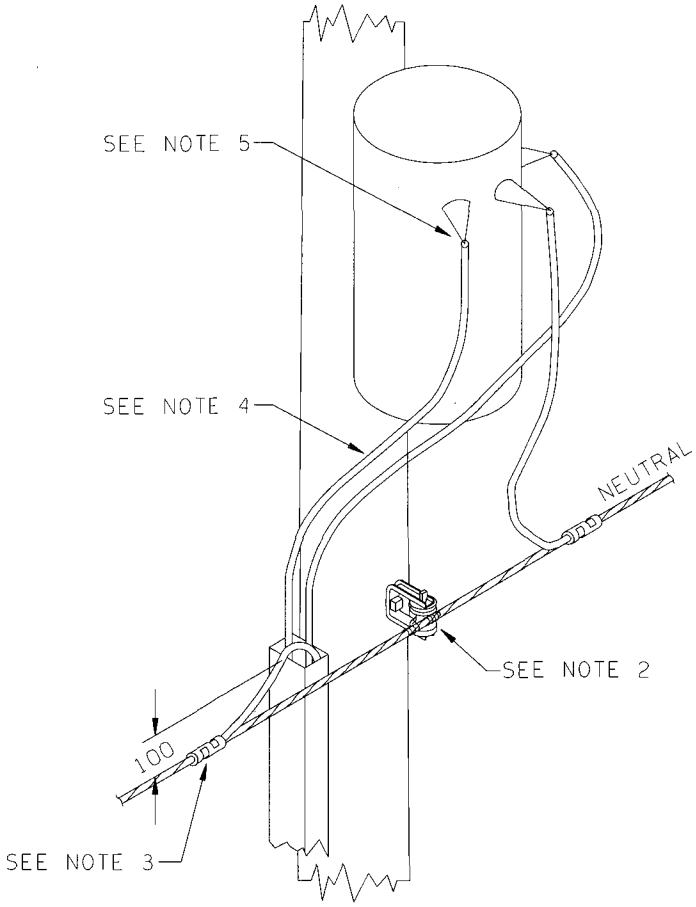

FIG. 2
1 Phase U/G Service Direct from Transformer

R. 1- GEN. REV. '92-05-08 BF | R. 2- ADDED BofM & GROUNDING. NOV'12 MK

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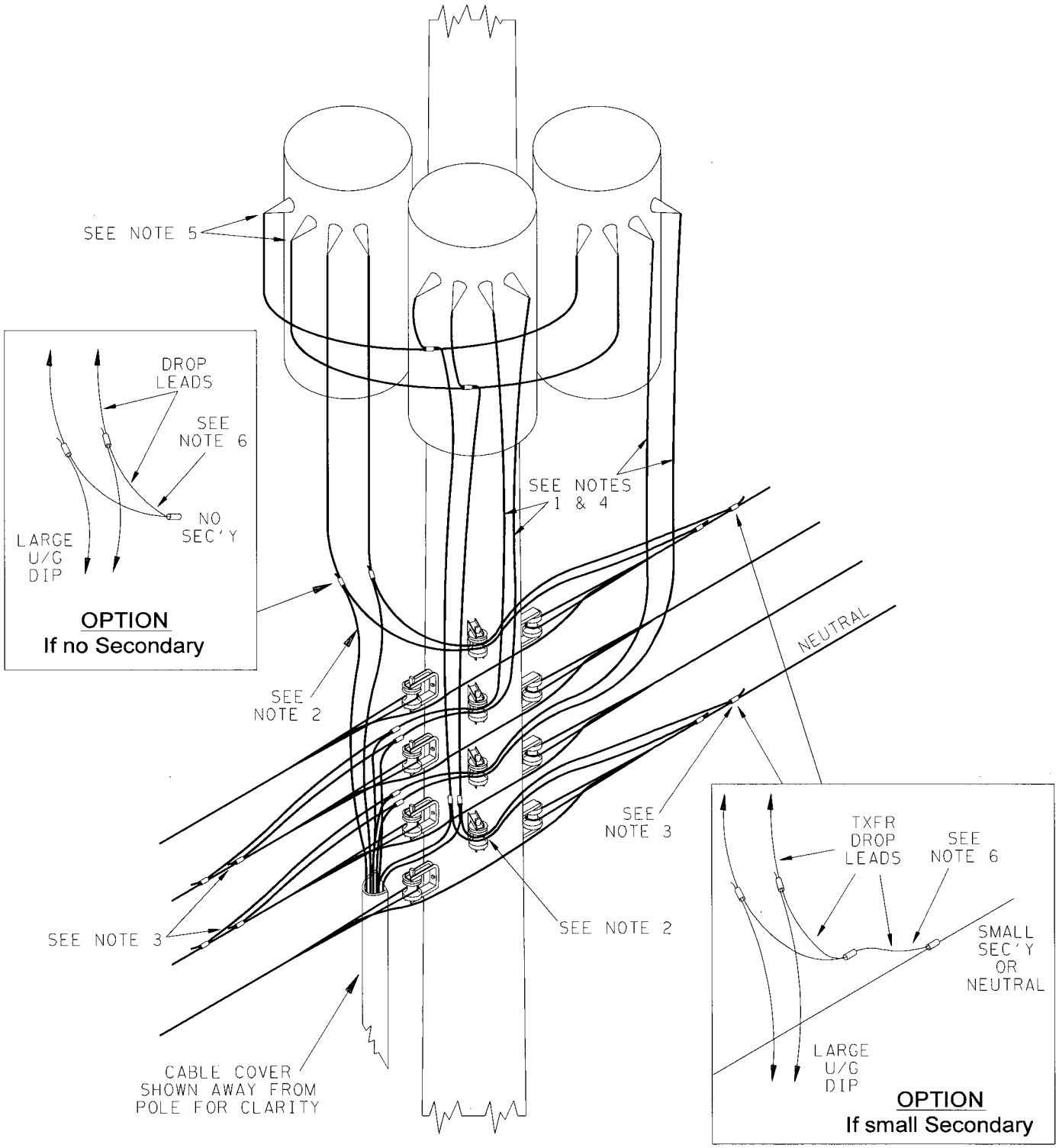
SERVICE CONNECTIONS U/G SERVICES FROM O/H SECONDARIES AND TRANSFORMERS



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SERVICE CONNECTIONS U/G SERVICES FROM O/H SECONDARIES AND TRANSFORMERS

NOTES:

1. Connection method varies with size of U/G service and size or absence of secondary conductors.
2. Conductors may be strung either on outside (as shown) or inside of insulator.
3. All phase connections are to be covered in accordance with Section F. Neutral connections are to remain bare.
4. For secondary conductor size selection, see ES43 Y1-15.
5. Refer to ES43 J1-16 for transformer connection details.
6. For no secondary or small secondary size, join parallel transformer drop leads before connection to secondary or neutral.
7. For U/G service larger than 200 A from 1/0 ACSR secondary, 400 A from 3/0 ACSR, or 600 A from 266.8 ASC, connect service directly from transformer drop leads.
8. See Sections M and S of the Underground Electrical Standards - ES53, for specific details on underground portion of service.

REFERENCE DRAWINGS

DI S10-1 to 4	Distribution Instructions
ES54 Section S	Services
ES53 Section S	Services
ES43 Y1-15	Secondary Conductor Selection Table
ES43 R3-01	Bonding and Grounding - Polemounted/Platform Transformers
ES43 K6-01	Fuse Selection Schedule - Overhead Transformer
ES43 J1-16	Standard Transformer Terminals
ES43 J1-08	Transformer Connection Diagrams

DRAFTER: DM

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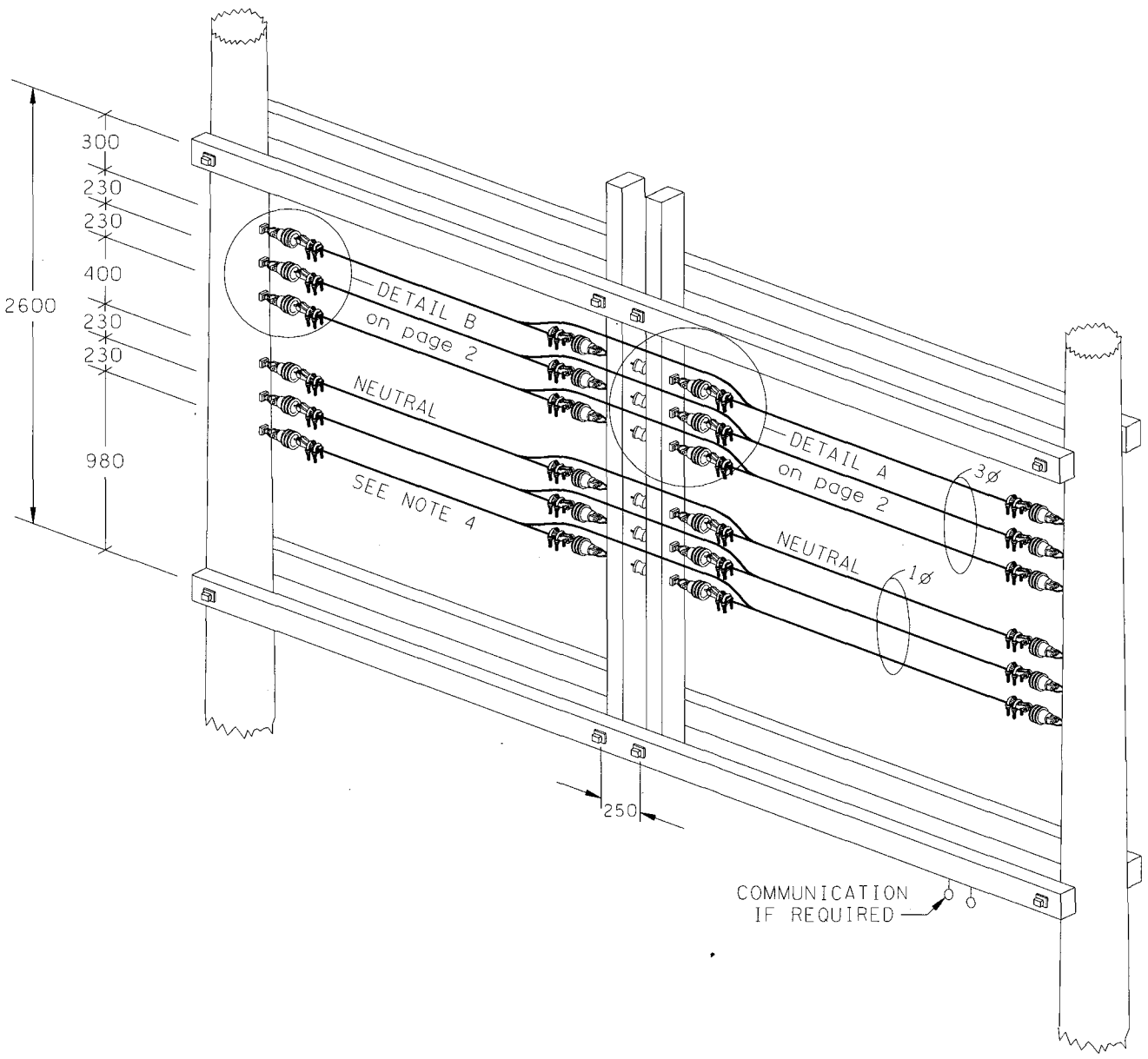
SERVICE CONNECTIONS U/G SERVICES FROM O/H SECONDARIES AND TRANSFORMERS



R.2- PAGE 3 ADDED. NOV'12 MK
NEW DE CLAMPS. MW

R.1- REDRAWN. MARCH'98 MB

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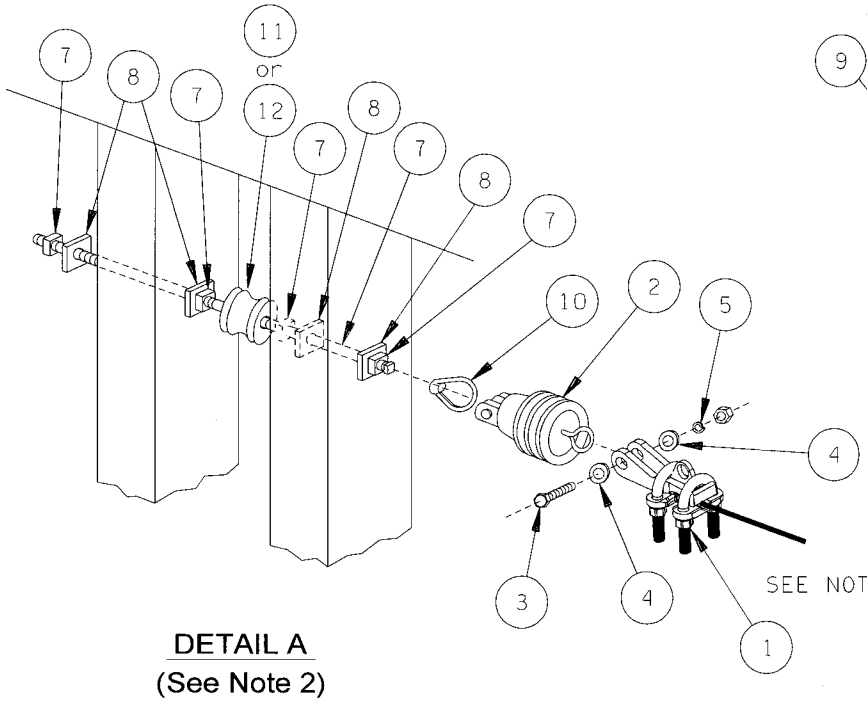
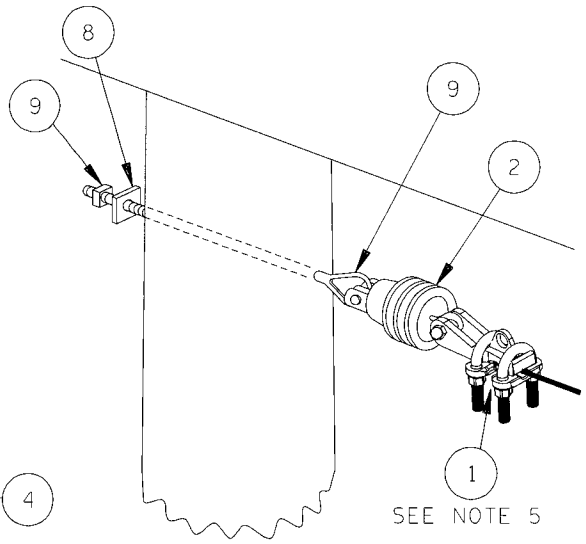
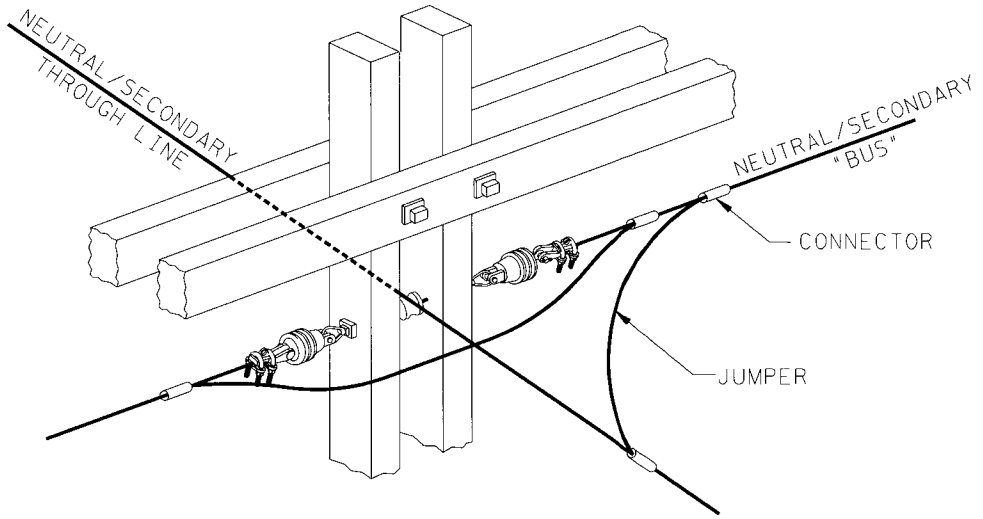
SERVICE CONNECTIONS "H" FRAME TRANSFORMER PLATFORM SECONDARY BUS



DETAIL A
(See Note 2)



DETAIL B
(See Note 2)



DETAIL C
Typical Neutral/Secondary Bus Connection
to Neutral/Secondary Line

DRAFTER: DM

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ORIGINAL ISSUE DATE: NOVEMBER 1985

SERVICE CONNECTIONS
"H" FRAME TRANSFORMER PLATFORM
SECONDARY BUS

NOTES:

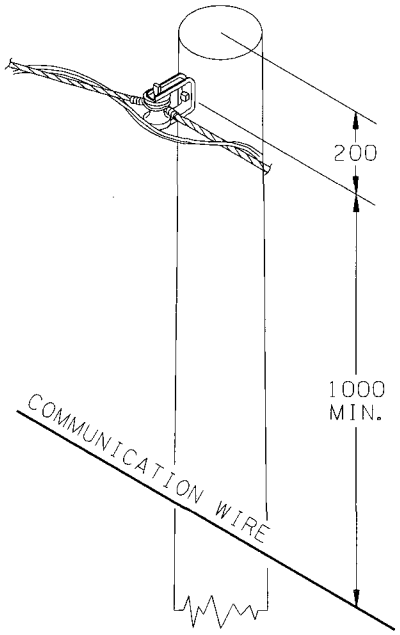
1. Page 1 shows a typical secondary bus only. Specific details will depend on actual requirements.
2. Details A and B show dead-end arrangement for 350 kcmil and 500 kcmil copper bus only.
3. For appropriate tap connectors, see Section F.
4. Refer to ES43 N1-01.01 for guide on insulated type phase and neutral conductors.
5. U-Bolt threads may have to be cut short after installation if space between the conductors is small.

BILL OF MATERIAL

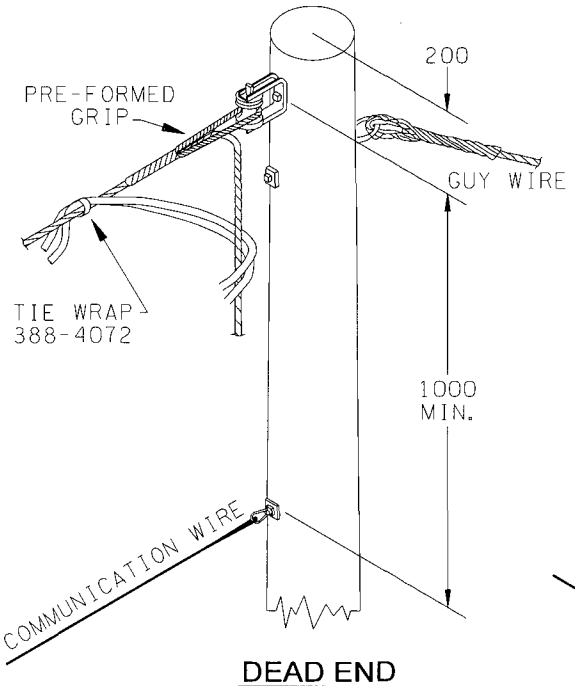
Item No.	Description	Catalogue ID	Quantity
1	Deadend Copper Clamp, 4/0 AWG - 1000 kcmil	96017333	24
2	Suspension Insulator	410-1019	24
3	Machine Bolt, Hex Head 1/2"	100-2316	24
4	Round Flat Washer 1/2"	102-3041	48
5	Helical Spring Washer 1/2"	102-4156	24
7	Double Arming Bolt (5/8" x length) c/w 4 Square Nuts	420-1310	6
8	Square Flat Washer (50 mm x 50 mm)	420-1520	36
9	Oval Eye Bolt (5/8" x length) c/w a Square Nut	420-1269	12
10	Eye Nut 5/8"	420-1400	12
11	Spool Insulator (white)	410-0500	1
12	Spool Insulator (brown)	410-0501	5

REFERENCE DRAWINGS

ES43 N1-01.01 Secondary Voltages and Conductors, Neutral Conductor Sizes
ES43 G5-01 to 10 Platform Structures

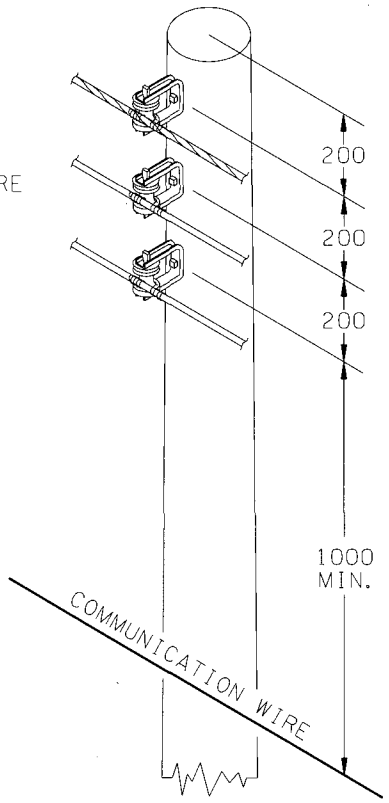


TANGENT

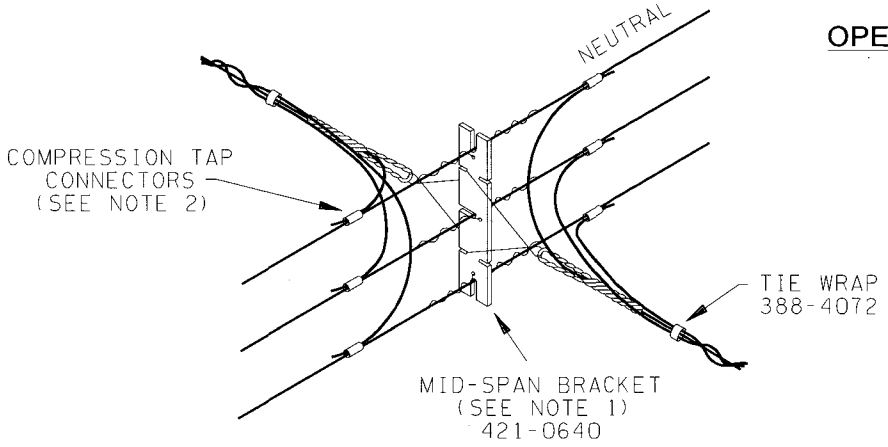


DEAD END

MULTIPLEX SERVICE



TANGENT
OPEN WIRE SERVICE



MID SPAN TAP

NOTES:

1. Whenever possible, balance the side pull by installing opposing services as shown. Maximum service conductor size: #1/0 AL. triplex.
2. Connectors are to be installed in accordance with the requirements of ES43 N1-01.02 and Section F.

ES43 B1-11 Clearances above Ground for Low Voltage Services

REFERENCE DRAWINGS

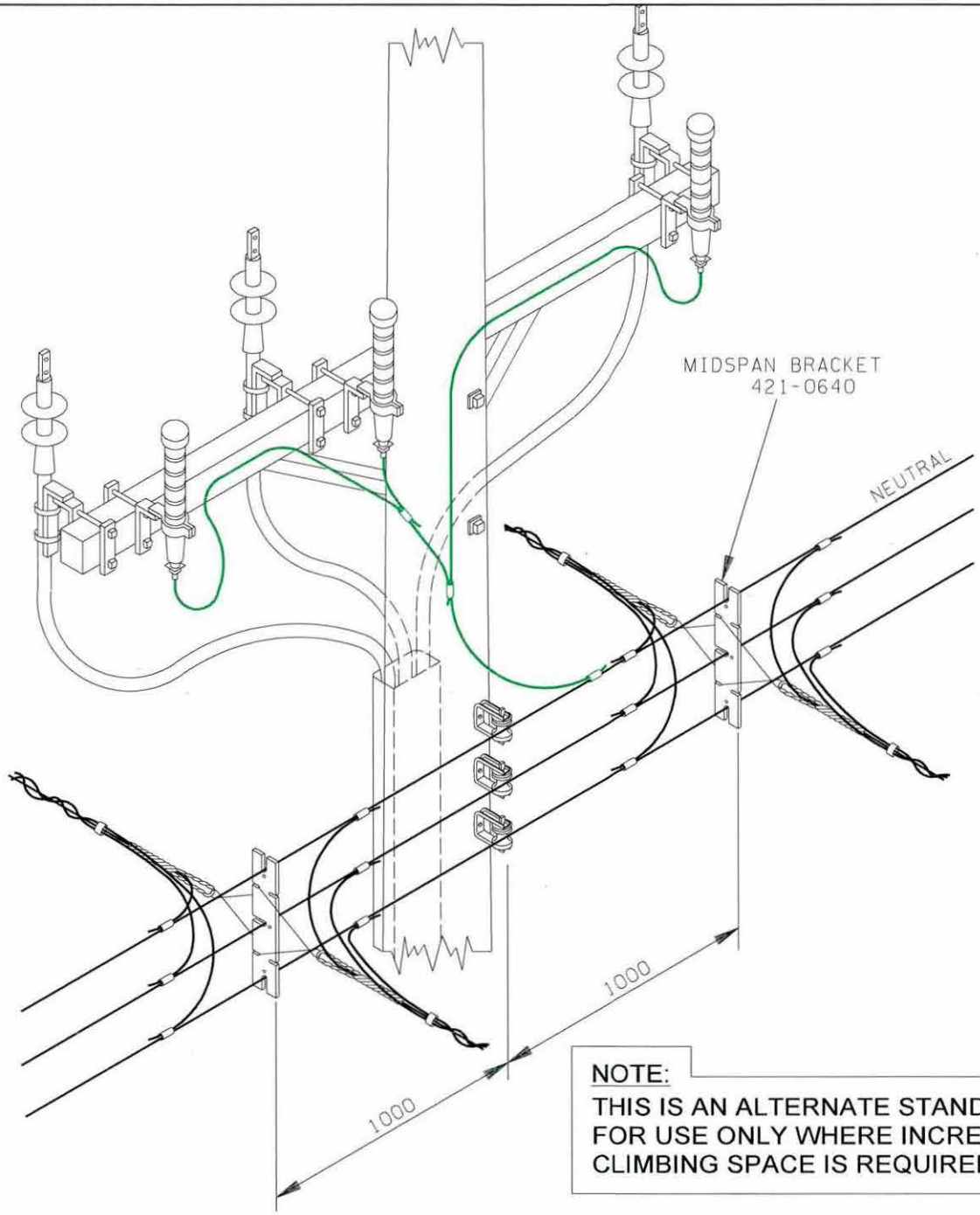
R. 2- EXTENSION BRACKETS DELETED. DEC. '01 FLK | R. 3- TITLE BLOCK CHANGE. NOV'12 MK

DRAFTER: DM/JW

DESIGNER	RECOMMENDED	APPROVED
M. KELVIN	C. PICASSI	F. DENNERT

ORIGINAL ISSUE DATE: NOVEMBER 1985

SERVICE CONNECTIONS SERVICE POLE ATTACHMENT AND MID SPAN TAP



NOTE:
THIS IS AN ALTERNATE STANDARD. FOR USE ONLY WHERE INCREASED CLIMBING SPACE IS REQUIRED.

NOTES:

1. Refer to Section M for termination of feeder or UD/URD cables.
2. Place midspan bracket on side of pole which avoids aerial trespass.
3. Whenever possible, balance the sidepull by installing opposing services as shown.
4. Services larger than 1/0 AL triplex should remain connected from pole.

REFERENCE DRAWINGS

ES43 R3-06 Surge Arrester Grounding
ES43 B1-11 Clearances above Ground for Low Voltage Services

R.1- TITLE BLOCK, JAN'11 MK

DRAFTER: DM

DESIGNER	RECOMMENDED	APPROVED
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SERVICE CONNECTIONS TERMINAL POLE FEEDER OR UD/URD OR MID SPAN SERVICE TAPS

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