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REVISIONS: UPDATED LEGAL ACKNOWLEDGEMENT FORM. FD MAR '16

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD	<p>NOTICE FROM THE EXECUTIVE VICE PRESIDENT TRANSMISSION AND DISTRIBUTION AND CUSTOMER SERVICE</p>	
J. AGNOLIN	F. DENNERT	G. REIMER			
<p>DISTRIBUTION STANDARDS</p> 		<p>ISSUED: MAR 2016 REPLACES: MAY 2004 ORIGINALLY ISSUED: NOV 1980</p>		<p>PAGE 1 OF 2</p>	<p>ES43/53/54/55/65 A1-01.01 ^R 4</p>

Scope

This manual is one of a series containing standards for construction of the BC Hydro electrical distribution plant within the service area of BC Hydro. A new distribution plant shall be designed, constructed, owned, operated, maintained and repaired to these standards.

Purpose of Standards

BC Hydro objectives require standardization to:

- a) Ensure uniform safety requirements comply with BC statutes and regulations.
- b) Provide uniform system reliability.
- c) Provide uniform operating practices.
- d) Permit economic bulk purchasing of materials.
- e) Achieve optimum life cycle cost of plant construction.
- f) Effect efficient quality assurance.

Responsibility

The Distribution Standards Department prepares these standards and verifies that specified plant and procedures will perform adequately under all normally expected conditions encountered throughout the province of British Columbia. These standards are approved by Professional Engineers. It is the responsibility of BC Hydro Managers to ensure that the standards are followed unless abnormal conditions are encountered that require variations. These variations should be kept to a minimum and their performance shall be the responsibility of the Professional of Record in charge of the project, who will record and seal the variation based on satisfactory qualifications and experience to do so. As per the latest revision of the BC Hydro Distribution Owner's Engineer Guide, these variations must be accepted by BC Hydro's Owner's Engineer.

Use of Stock Materials

The electrical distribution plant covered by these standards is built using stock materials approved by a Professional Engineer as required by law. The use of non-stock materials for special and unusual situations must be approved by Distribution Standards or the BC Hydro Engineer responsible for the project.

Revisions to Manual





These standards are revised from time to time to improve the safety, performance, workability, cost effectiveness or appearance of the plant. The existing plant built to previous standards need not be updated unless so specifically advised by BC Hydro. When maintenance or other work, such as voltage conversion or conductor change is being done, updating plant to current standards is encouraged.

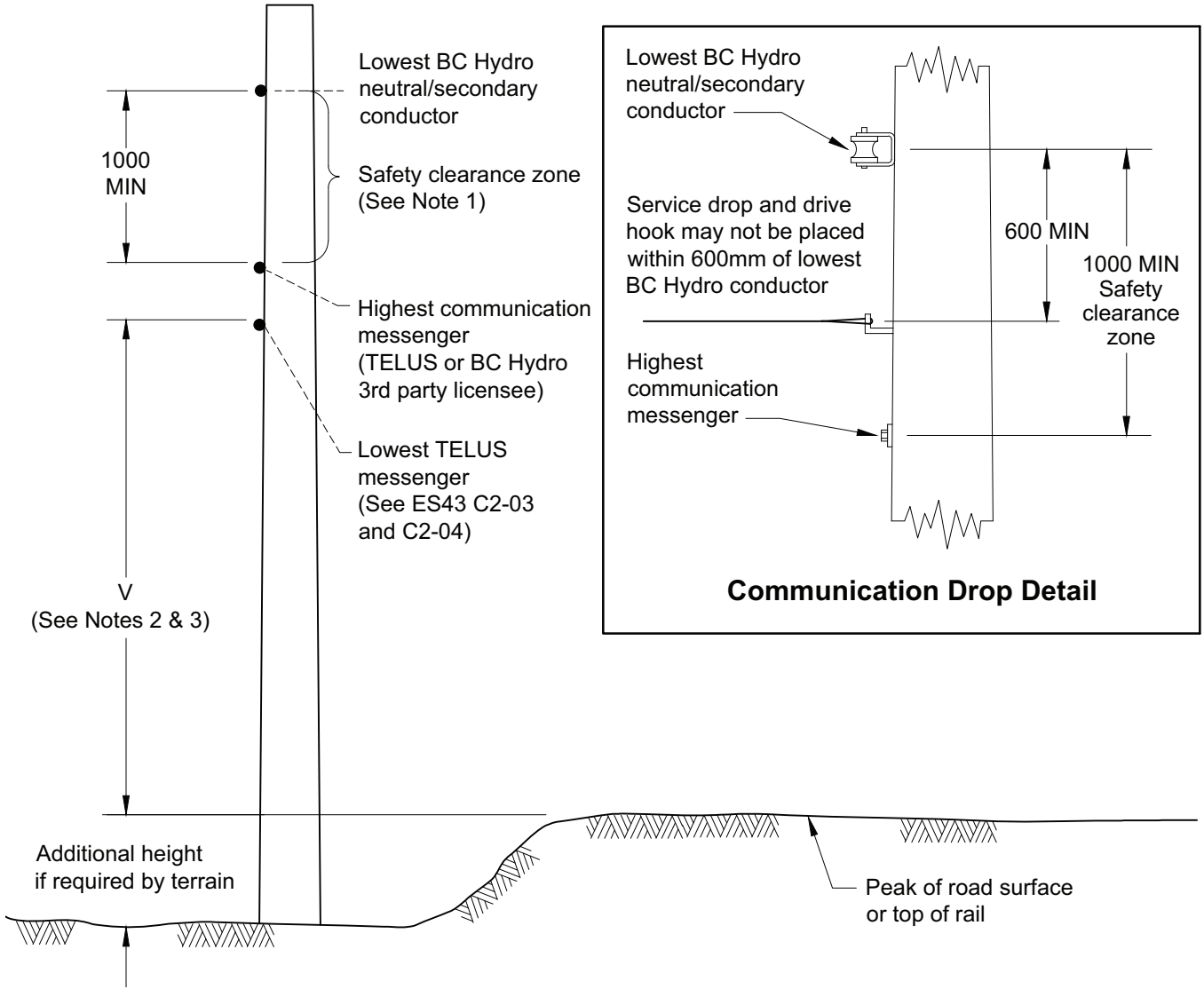
Mailing Addresses

The manual has been issued to a corporation or firm rather than to an individual. The corporation or firm is responsible for the safekeeping of the manual, and for keeping it current. Changes of address or in number of copies required must be reported promptly.

Suggestions for changes in the manual, or required changes of address may be made on the pre-addressed comment sheet included in the Manual and with each issue of revision.

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Notes

- Minimum dimension given for neutral space (safety clearance zone) is a regulatory requirement per CSA C22.3 No.1, table 23 (communications safety space).
Caution: Depending on span lengths and wire sags, additional safety clearance zone space may be required to avoid mid-span wire interference between BC Hydro neutral/secondary wires and communication messengers.
 See ES43 C1-01.02, C1-01.04, C2-03, and C2-04 for typical spacing.

REVISIONS: R.8 - TABLE WITH ATTACHMENT HEIGHTS ADDED. APR. 20 KM

DESIGNED <i>K. Middleton</i> K. MIDDLETON	RECOMMENDED <i>H. Giesbrecht</i> H. GIESBRECHT	ACCEPTED <i>F. Dennert</i> F. DENNERT	ENGINEER OF RECORD K. D. MIDDLETON # 32387 BRITISH COLUMBIA ENGINEER	SPACING AND SEPARATION WIRE SPACING ON JOINT USE POLE BELOW THE NEUTRAL	
DISTRIBUTION STANDARDS 		ISSUED: APR 2020 REPLACES: SEP 1995 ORIGINALLY ISSUED: SEP 1995		PAGE 1 OF 2	ES43 C2-01.01
				R	8

2. Minimum TELUS ground clearance at the pole is mandated by the BC Hydro/TELUS joint use agreement. **Caution:** The minimum TELUS attachment heights are not always adequate and additional clearance must be added. Depending on line topography, span lengths, service drop lengths and TELUS cable sizes, additional road clearance at the pole may be required to meet in-span clearance requirements. See ES43 B1-03 and B1-11 and ES55 E1-02 Pole Height and E6-02 Design Assumptions for Joint Use Poles.

For span lengths < 50 m, the minimum attachment height is:






- V = 5490 mm Minimum for roads other than highways
- = 6710 mm Minimum for highways
- = 8230 mm Minimum for railways

For span lengths ≥ 50 m, the minimum attachment height must be calculated using ES43 B1-03, and maximum final sag of TELUS cables per ES55 E6-02 and JUB #029, or the table below can be used for easy reference of the minimum ground clearance for the corresponding span lengths.

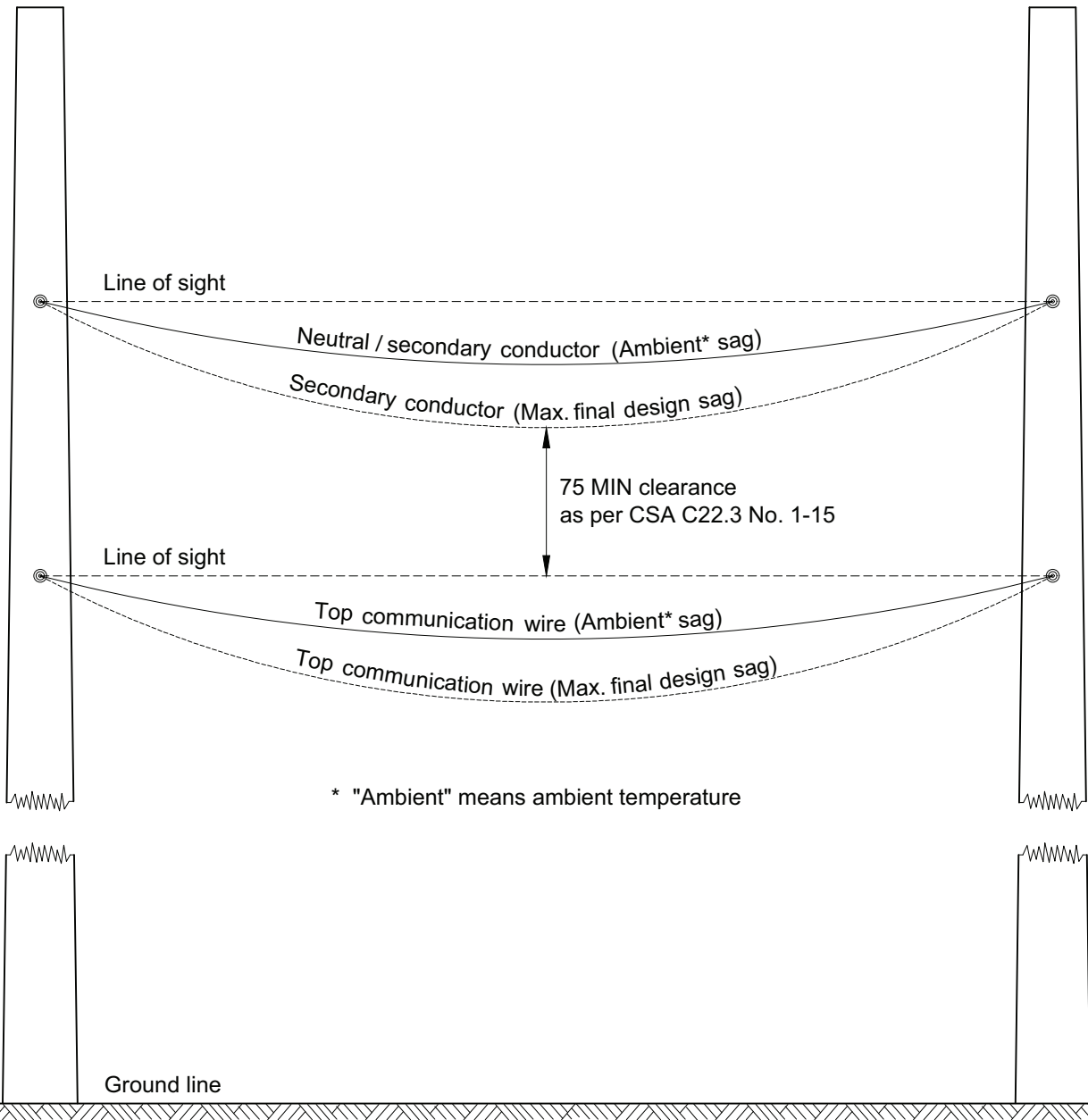
Location of Wires or Conductors	Minimum TELUS Attachment Height at the Pole Above Ground (V mm)							
	Span Lengths							
	Up to 40 m	50 m	60 m	70 m	80 m	90 m	100 m	110 m
Roads	5490	5750	5910	6300	6230	6590	6970	7370
Highways	6710	6830	6990	7380	7310	7670	8050	8450
Railways	8230	8930	9090	9480	9410	9770	10150	10550

3. Minimum attachment heights are measured at the pole from the horizontal line of sight point to the road peak or top of rail.
4. For BC Hydro third party communication licensee position on the pole, refer to ES43 C1-01.04 and C2-04.
5. The clearances calculated in the table above for Roads use a vehicle height of 4.15 m as per note 2 of ES43 B1-03. Add the amount by which the vehicle heights are known to exceed 4.15 m.
6. The clearances calculated in the table above for Highways accommodate a vehicle size of 4.88 m. Add the amount by which vehicle heights are known to exceed 4.88 m.

REVISIONS: R.8 - TABLE WITH ATTACHMENT HEIGHTS ADDED. APR. 20 KM

DESIGNED  K. MIDDLETON	RECOMMENDED  H. GIESBRECHT	ACCEPTED  F. DENNERT	ENGINEER OF RECORD  K. D. MIDDLETON # 32387	SPACING AND SEPARATION WIRE SPACING ON JOINT USE POLE BELOW THE NEUTRAL	
DISTRIBUTION STANDARDS 		ISSUED: APR 2020 REPLACES: SEP 1995 ORIGINALLY ISSUED: SEP 1995		PAGE 2 OF 2	ES43 C2-01.02
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REVISIONS: R.2 - UPDATED CSA C22.3 NO.1 TO 2015 VERSION, APR '20 KM



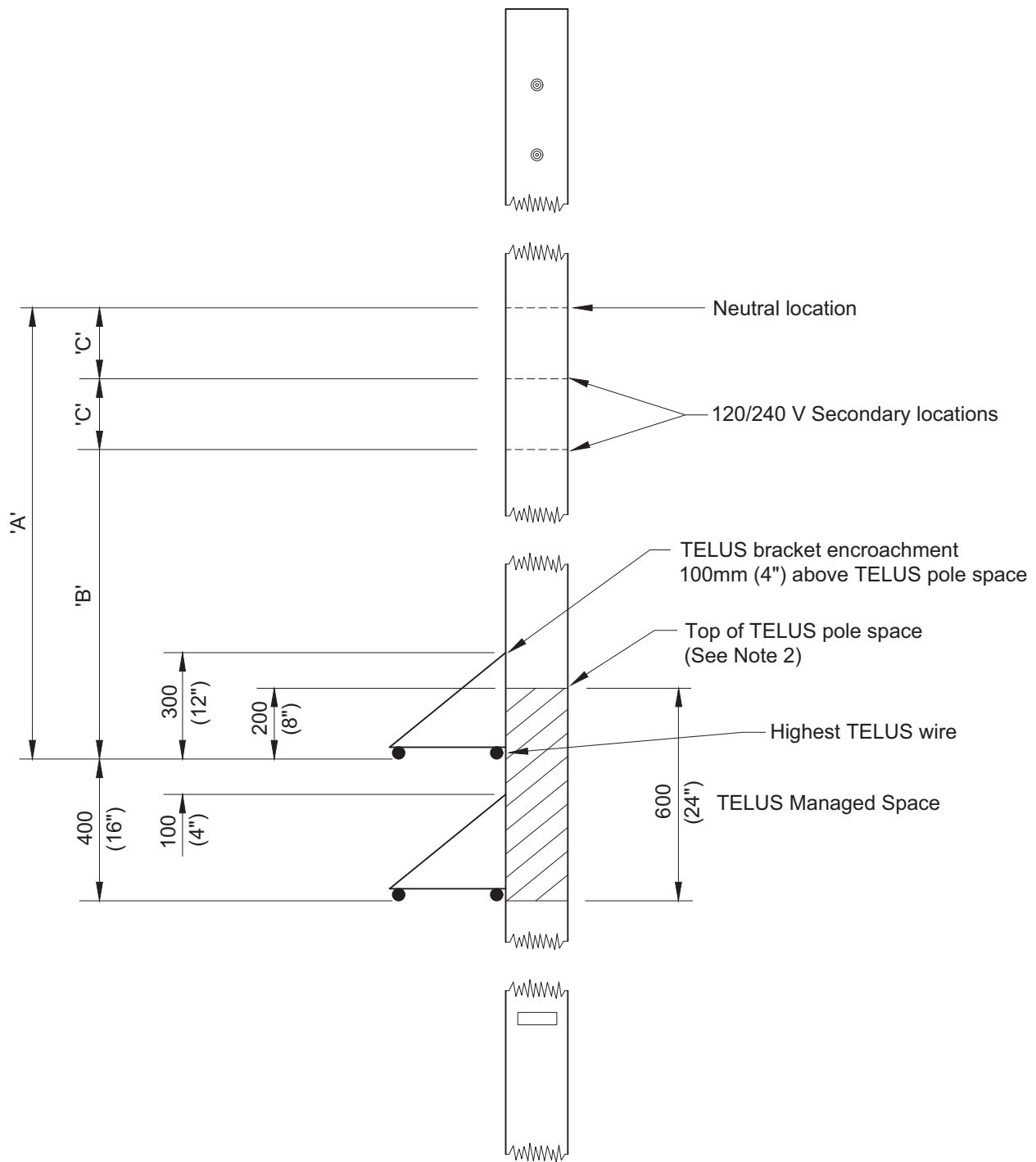
* "Ambient" means ambient temperature

Notes

1. For spans up to 75 m, the 75 mm minimum separation to the line of sight applies to neutral and secondary conductors.
2. For spans over 75 m, the neutral may sag below the line of sight, but not closer than 300 mm to the communications wire under the maximum final design sags.

DESIGNED <i>K. Middleton</i> K. MIDDLETON	RECOMMENDED <i>H. Giesbrecht</i> H. GIESBRECHT	ACCEPTED <i>F. Dennert</i> F. DENNERT	ENGINEER OF RECORD  K. D. MIDDLETON # 32387 BRITISH COLUMBIA ENGINEER	SPACING AND SEPARATION IN SPAN SEPARATION BETWEEN SECONDARY/NEUTRAL CONDUCTORS AND COMMUNICATION WIRES	
DISTRIBUTION STANDARDS 		ISSUED: APR 2020 REPLACES: DEC 2010 ORIGINALLY ISSUED: APR 2001		PAGE 1 OF 1	ES43 C2-02
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REVISIONS: R.3 - CLARIFICATION TO NOTE 4 FOR 266.8 ASC WP ON SPAN LENGTHS. SEP' 20 KM



DESIGNED <i>K. Middleton</i> K. MIDDLETON	RECOMMENDED <i>H. Giesbrecht</i> H. GIESBRECHT	ACCEPTED <i>F. Dennert</i> F. DENNERT
DISTRIBUTION STANDARDS 		ISSUED: SEP 2020 REPLACES: APR 2020 ORIGINALLY ISSUED: APR 2001

ENGINEER OF RECORD

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32387
BRITISH COLUMBIA
ENGINEER

SPACING AND SEPARATION TYPICAL VERTICAL WIRE SEPARATION AT A JOINT USE POLE BETWEEN BC HYDRO AND TELUS	
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Notes



1. Typical wire separations for neutral conductor to TELUS (A), secondary conductor to TELUS (B), and secondary conductor (C) are provided Table 1: (with no third party communications licensee).

Span Length (L) (m)	Dimensions for Vertical Separations Between BC Hydro Conductors and Highest TELUS Cable		
	A (mm)	B (mm)	C (mm)
Minimum L < 50	1430 (1830)	1030 (1430)	200
Typical L < 50	1830	1430	200
50 ≤ L ≤ 60	1830	1430	200
60 < L ≤ 75	2160	2000	250
60 < L ≤ 75	1830	N/A	N/A
75 < L ≤ 100	2340	N/A	N/A
100 < L ≤ 110	2740	N/A	N/A

N/A – not applicable. With reference to the table above, N/A means that there is no open wire secondary conductor.






2. Highest TELUS wire is located 200 mm (8") below the top of the TELUS space.
3. Minimum dimension of 1430 mm is only to be used where typical clearances cannot be used. Typical clearances are the preferred dimensions for both BC Hydro and TELUS.
4. If 266.8 ASC WP is to be used for span lengths greater than or equal to 50 m, a greater separation will be required. For span length $50 \text{ m} \leq L \leq 60 \text{ m}$, A = 1970 mm, B= 1570 mm, C=200 mm. For span lengths > 60 m, the dimensions will need to be calculated.
5. For span lengths $60 \text{ m} < L \leq 75 \text{ m}$, there are two rows in the table below; one row includes open wire secondary, and the second row excludes open wire secondary that can be used for existing poles and pole replacements, or situations where it is unlikely open wire secondary will be required.
6. Secondary open wire conductor can only be installed up to 75 m span lengths.
7. For span lengths greater than 75 m to 110 m, the dimensions are calculated using a #2 ACSR and 1/0 ACSR neutral. If there is a different neutral conductor used, the vertical separation and mid-span clearance will need to be re-calculated.

REVISIONS: R.3 - CLARIFICATION TO NOTE 4 FOR 266.8 ASC WP ON SPAN LENGTHS. SEP' 20 KM

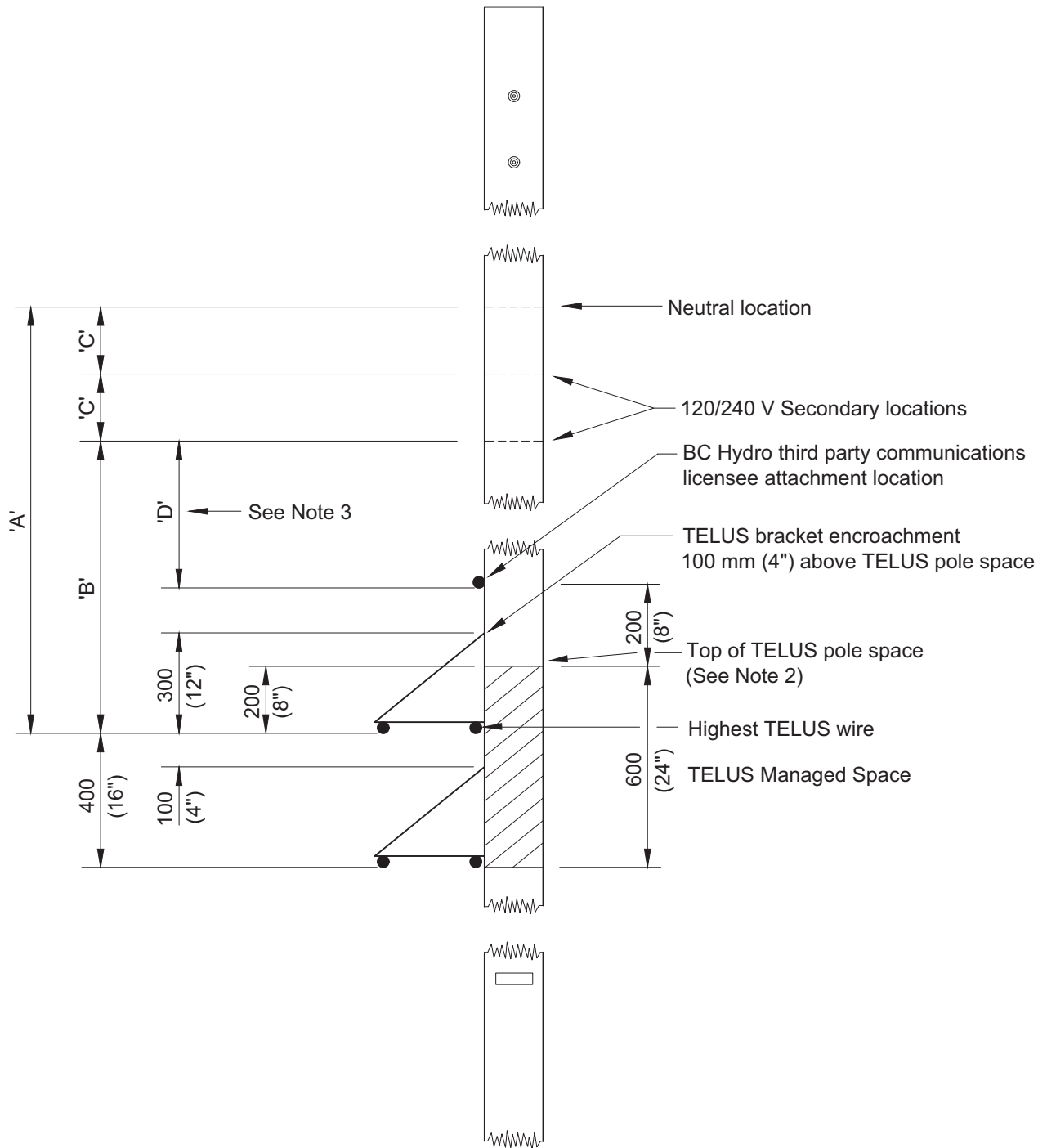
DESIGNED <i>K. Middleton</i> K. MIDDLETON	RECOMMENDED <i>H. Giesbrecht</i> H. GIESBRECHT	ACCEPTED <i>F. Dennert</i> F. DENNERT	ENGINEER OF RECORD  K. D. MIDDLETON # 32387 BRITISH COLUMBIA ENGINEER	SPACING AND SEPARATION TYPICAL VERTICAL WIRE SEPARATION AT A JOINT USE POLE BETWEEN BC HYDRO AND TELUS	
DISTRIBUTION STANDARDS 		ISSUED: SEP 2020 REPLACES: APR 2020 ORIGINALLY ISSUED: APR 2001		PAGE 2 OF 3	ES43 C2-03.02
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8. For provisions of BC Hydro third party communications licensee, see ES43 C2-04.
9. Documentation on the Pole Plan of the required vertical separation (Dimension A) is required to communicate this critical dimension to TELUS construction resources.

REVISIONS: R.3 - CLARIFICATION TO NOTE 4 FOR 266.8 ASC WP ON SPAN LENGTHS. SEP' 20 KM

DESIGNED  K. MIDDLETON	RECOMMENDED  H. GIESBRECHT	ACCEPTED  F. DENNERT	ENGINEER OF RECORD  K. D. MIDDLETON # 32387 BRITISH COLUMBIA ENGINEER	<p>SPACING AND SEPARATION TYPICAL VERTICAL WIRE SEPARATION AT A JOINT USE POLE BETWEEN BC HYDRO AND TELUS</p>	
DISTRIBUTION STANDARDS 		ISSUED: SEP 2020 REPLACES: APR 2020 ORIGINALLY ISSUED: APR 2001	PAGE 3 OF 3	<p>ES43 C2-03</p>	R 3

REVISIONS: R3 - CLARIFICATION ON DIMENSION D WHEN NO OPEN WIRE SECONDARY IS PRESENT, AND CLARIFICATION TO NOTE 4 FOR 266.8 WP ON SPAN LENGTHS. SEP'20 KM



DESIGNED <i>K. Middleton</i> K. MIDDLETON	RECOMMENDED <i>H. Giesbrecht</i> H. GIESBRECHT	ACCEPTED <i>F. Dennert</i> F. DENNERT	ENGINEER OF RECORD  K. D. MIDDLETON # 32387 BRITISH COLUMBIA ENGINEER	SPACING AND SEPARATION TYPICAL VERTICAL WIRE SEPARATIONS AT A JOINT USE POLE FOR BC HYDRO, TELUS AND THIRD PARTY COMMUNICATIONS LICENSEE PLANT	
DISTRIBUTION STANDARDS 		ISSUED: SEP 2020 REPLACES: APR 2020 ORIGINALLY ISSUED: APR 2001		PAGE 1 OF 3	ES43 C2-04.01
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REVISIONS: R3 - CLARIFICATION ON DIMENSION D WHEN NO OPEN WIRE SECONDARY IS PRESENT, AND CLARIFICATION TO NOTE 4 FOR 266.8 WP ON SPAN LENGTHS. SEP 20 KM



Notes

1. Highest TELUS wire is located 200 mm (8") below the top of TELUS space.
2. Highest TELUS wire is located 400 mm (16") below third party communications wire.
3. Typical wire separations for neutral conductor to TELUS (A), secondary conductor to TELUS (B), secondary conductor to third party licensee (D), and secondary conductor (C) are provided in the following tables.

Span Length (L) (m)	Dimensions for Vertical Separations Between BC Hydro Conductors and Telecommunication Cables			
	A (mm)	B (mm)	C (mm)	D (mm)
L < 50	1830	1430	200	1000
50 ≤ L ≤ 60	2260	1860	200	1430
60 < L ≤ 75	2560	2060	250	1660
60 < L ≤ 75	2260	N/A	N/A	1860
75 < L ≤ 100	2740	N/A	N/A	2340
100 < L ≤ 110	3140	N/A	N/A	2740






N/A – not applicable. With reference to the table above, N/A means that there is no open wire secondary conductor. When open wire secondary is not present, dimension D is referenced from the neutral.

4. If 266.8 ASC WP is to be used for span lengths greater than or equal to 50 m, a greater separation will be required. For span length 50 m ≤ L ≤ 60 m, A = 2370 mm, B= 1970 mm, C=200 mm, D=1570 mm. For span lengths > 60 m, the dimensions will need to be calculated.
5. For span lengths 60 m < L ≤ 75 m, there are two rows in the table below; one row includes open wire secondary, and the second row excludes open wire secondary that can be used for existing poles and pole replacements, or situations where it is unlikely open wire secondary will be required. When open wire secondary is not present, dimension D is referenced from the neutral.
6. For span lengths greater than 75 m to 110 m, the dimensions are calculated using a #2 ACSR and 1/0 ACSR neutral. If there is a different neutral conductor used, the vertical separation and mid-span clearance will need to be re-calculated.

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DISTRIBUTION STANDARDS 		ISSUED: SEP 2020 REPLACES: APR 2020 ORIGINALLY ISSUED: APR 2001		PAGE 2 OF 3	ES43 C2-04.02
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REVISIONS: R3 - CLARIFICATION ON DIMENSION D WHEN NO OPEN WIRE SECONDARY IS PRESENT, AND CLARIFICATION TO NOTE 4 FOR 266.8 WP ON SPAN LENGTHS. SEP'20 KM

7. Secondary open wire conductor can only be installed up to 75 m span lengths.
8. Documentation on the Pole Plan of the required vertical separation (Dimension A) is required to communicate this critical dimension to TELUS construction resources.

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DISTRIBUTION STANDARDS 		ISSUED: SEP 2020 REPLACES: APR 2020 ORIGINALLY ISSUED: APR 2001		PAGE 3 OF 3	ES43 C2-04	R 3