Section C Joint and Secondary Use

Scope

This section briefly summarizes the pertinent administrative and technical details for building pole structures which comply with joint use standards and B.C. regulatory requirements.

Joint Use Agreement between BC Hydro and TELUS

By an "Agreement" made in 1971 and amended and restated in 2015, all distribution poles used by both BC Hydro and TELUS shall be owned 60% by Hydro and 40% by TELUS with the exception of distribution poles used as clearance contact poles. The Agreement details the terms under which joint ownership operates. Both parties have Joint Use Administration Departments for the purpose of administering the day to day procedures and a Joint Use Coordinating Committee (JUCC) exists to review and interpret the Agreement, and approve administrative procedures. In addition, a Joint Use Technical Committee (JUTC) meets as required to address technical issues and develop joint use construction and maintenance standards.

The Agreement makes provision for each party to sublet part of its allotted pole space to a third party for a wire contact. Such contacts are covered by separate agreements made for each third party.

Line Design for Joint Use with TELUS

The Agreement with TELUS requires that the party constructing a jointly owned line has an obligation to build the line to be suitable for joint use and in conformance with the standards of both parties. The party making subsequent contact to the poles has an obligation to ensure that those standards are being followed, and that no damage or hazard is brought about by their work to the other party.

At the design stage for joint use pole lines, a local dialogue between BC Hydro and TELUS is essential to establish a mutually satisfactory design. The designer must obtain clear information on TELUS's planned requirements for clearances, span lengths, pole quadrant usage, equipment space, and the mechanical forces that pole structures must withstand to support communications plant. This information will affect the length and class of pole, the staking, and the guying and anchoring design.

Due to heavy anchoring requirements of TELUS, two separate anchors are usually needed at joint dead-end poles and sometimes at angle poles for power and telecommunications plant. Where this is the case, the party building the line is obliged to install both anchors. This procedure avoids the difficulty of installing a telecommunication anchor after the primary anchor has been installed and guyed. It also ensures that both parties agree on the anchoring requirements.

At the time of a joint pole replacement BC Hydro, TELUS and Third Party anchoring shall be replaced in accordance with Joint Use Bulletin #016.

- Various details on required joint use practices not included in this Section are to be found elsewhere in these ES43 and ES55 Standards:
- for clearances and vertical spacing on joint poles, see ES43 Section B, and ES55 Sections B and E.

- for wind loading and pole selection, see ES55 Section E.
- for guying and anchoring, see ES43 Sections E and ES55 Section E.
- for climbing space and equipment boxes on poles, see Section G.
- for grounding, see ES43 Section R and ES55 Section H.
- for duct and pilaster locations on the pole, see ES43 Section M.

BC Hydro/TELUS Redress Procedures

Since most joint poles are constructed by either BC Hydro forces or BC Hydro contractors, it is essential that all of the agreed upon design details are made known to the respective line crews and incorporated in the completed power line. If it is found that the subsequent addition of telecommunications plant to a pole has caused damage, or has created a hazardous situation and it can be documented that the line was built to accommodate TELUS's design requirements and standard installation practices, then BC Hydro may seek redress from TELUS. If satisfactory arrangements cannot be made at a local level, then the Joint Use Coordinating Committee (JUCC) should be supplied with all the facts, and asked to intercede.

Vertical Separation at the Pole between BC Hydro Neutral and Highest TELUS Messenger

Minimum safety separations at the pole are given on ES43 C2-01. Minimum in-span separations are given on ES43 C2-02.

Due to the sag incompatibility between BC Hydro wires and messenger supported communications wires, special consideration must be given to providing additional vertical separation at the pole to match wire sizes and span lengths to meet minimum CSA mid-span separations as detailed in ES43 C2-02. See ES43 C2-03 and C2-04 for typical separations at the pole for the corresponding span lengths. TELUS practice is to always mount the fibre-optic cable in the highest TELUS communications position. The wire sizes and span lengths will dictate the required additional separation at the pole.

Documentation on the Pole Plan of the required vertical separation between the BC Hydro neutral and the highest TELUS messenger is required to communicate this critical dimension to TELUS construction resources.

At the design stage, local dialogue between BC Hydro and TELUS is essential to establish a mutually satisfactory wire separation at the pole. Subsequently, each party must convey to their respective construction crews adequate wire placement information to prevent construction errors. For joint use pole lines built by BC Hydro, exactly where to place the neutral on each pole must be conveyed to the line crew. The neutral then becomes the reference point by which TELUS places its highest messenger.

During construction, it is important that both parties, BC Hydro and TELUS:

a. Accurately place conductors and messengers on the pole as per the design; and

b. Accurately sag conductors and messengers as per their respective standard stringing sag tables.

Accommodation of BC Hydro Third Party Communication Licensee on Joint Use Poles

a. A "joint use pole" is defined as a distribution pole that is jointly owned by BC Hydro and TELUS.

b. General:

A third party contact agreement and a Specific Permit of Occupation (SPO) is required before BC Hydro licensee equipment is attached to a BC Hydro or joint use distribution pole (Refer to Distribution Instructions D12-3 and D12-5).

Third Party licensees shall typically be supported by a minimum Size 6 messenger.

The addition of communication messengers, cables and equipment requires additional pole space, and additional anchoring. For existing pole lines, BC Hydro is responsible for arranging the necessary alterations to accommodate its licensee.

c. Pole Framing and Pole Class:

The vertical separation of the third party communication messenger from the BC Hydro neutral follows the same rules that would otherwise apply to TELUS (See ES43 C1-01.02). The highest TELUS messenger, in this case, is placed on the pole 400 mm (16") below the BC Hydro third party licensee's communication messenger. To accommodate new licensees on existing joint use pole lines, where ever possible, the preference is to move existing facilities up or down if necessary. If adequate space cannot be found, then a new pole may be required. Refer to DI D12-1 for the Move Down Request for moving TELUS facilities on existing poles. Vertical wire separations at the pole are given in ES43 C2-04. Contact Shared Assets if an existing third party licensee needs to be moved or relocated.

The pole class must be selected to meet the planned requirements of all parties, namely BC Hydro, TELUS and licensee(s). To accommodate new BC Hydro licensees on existing joint use pole lines, the remaining strength capacity must be assessed accordingly to determine if the pole needs to be changed out.

d. Wire Interference:

To prevent wire interference with TELUS messengers, all third party cable must be messenger supported.

e. Anchoring and Guying:

BC Hydro is responsible for providing the required anchoring and guying for the licensee and ensuring that no anchoring capacity allocated to TELUS is compromised. The anchoring requirements of new licensees on existing joint use pole lines shall be handled as follows:

i. BC Hydro/TELUS joint angle (side) anchor:

Where possible, assess spare capacity of BC Hydro/TELUS anchor. For light angles a licensee guy may not be required. Otherwise, rebuild as a single anchor or split into two anchors to attain the required holding strength.

ii..BC Hydro/TELUS joint dead end anchor:

Rebuild as a separate TELUS anchor and add a BC Hydro/licensee anchor.

iii. Separate BC Hydro and TELUS anchors at dead-end:

Assess, if possible, the spare capacity of the BC Hydro anchor. Attach licensee guy to the existing BC Hydro anchor or rebuild as required. UNDER NO CIRCUMSTANCES ATTACH LICENSEE GUY TO TELUS ANCHOR.

iv. BC Hydro shall approve all third party licensee design proposals for additions to joint use structures. All proposed anchoring or guying upgrades and additions that impact on TELUS facilities shall also be approved by TELUS. Installation will be done by BC Hydro and, if necessary, by TELUS.

f. Third Party Quadrant on Joint Use Poles:

The CSA Standard C22.3 No. 1 (Clause 4.2.4.1) requires that the risers for communications and supply (power) systems on the same pole be placed in separate quadrants. Refer to ES43 M1-10 and DI D12-5 for placement of the telecommunication and supply quadrants.

Note: The placing of communication risers and power risers on the same pole should be avoided where practicable.

g. Bonding and Grounding:

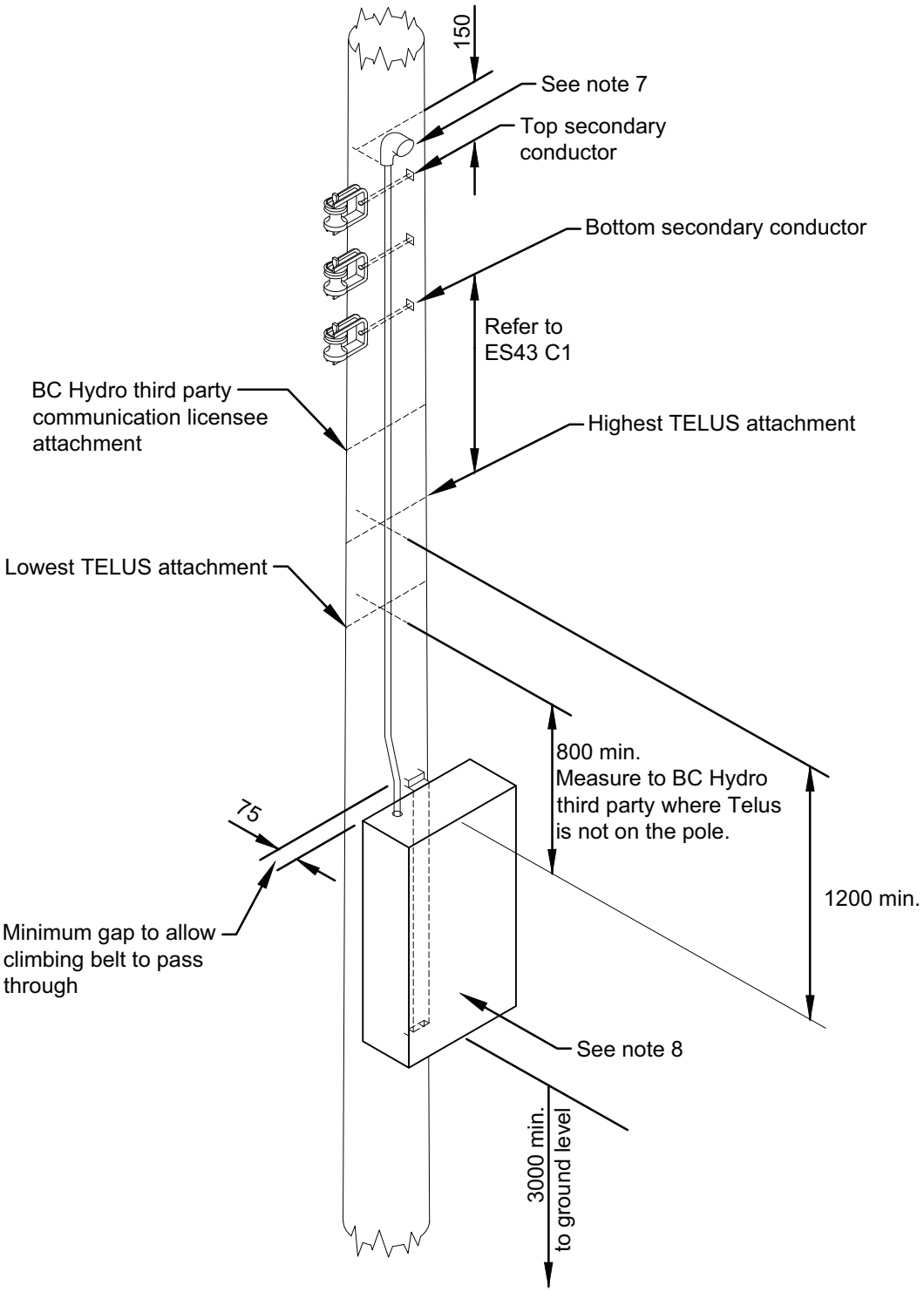
The communication licensee is responsible for providing adequate bonding, grounding, and coordinated protection of their system. As a minimum standard, the third party messenger shall be bonded to existing TELUS plant at intervals no greater than 400 metres. This will typically occur at neutral grounding locations. The coax sheath shall be bonded to its messenger at all passive devices. Coax service drops should be grounded as close as practical to the point of delivery.

h. Communication:

i. At the design stage for joint use pole lines, a local dialogue between BC Hydro and TELUS is essential to establish a mutually satisfactory design to accommodate the third party.

ii. BC Hydro and TELUS must convey to their respective construction crews adequate framing, anchoring and guying information pertaining to BC Hydro, TELUS and the third party to prevent construction errors.

iii. BC Hydro must convey to the third party explicit instructions on where to place wires and equipment on pole structures.



REVISIONS: R.0. - MOVED G1-11 TO C1-02. ADDED MIN. 1200 MM SEPERATION FROM TOP TELUS TO EQUIPMENT BOX. CLARIFIED REVIEW OF BOXES SUPPORTING TELUS LICENSEES, - APR '20 HG.

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD
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DISTRIBUTION STANDARDS BC Hydro

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JOINT AND SECONDARY USE EQUIPMENT BOXES ON POLES

PAGE 1 OF 4

ES43 C1-02.01

R 0

Application

This standard applies to the installation of third party equipment boxes (not owned by BC Hydro or TELUS) mounted below the lowest telecommunications wire. This standard does not apply to RF emitting devices.

Notes

General

1. The location and installation of third party equipment licensed to BC Hydro is subject to review and acceptance by BC Hydro. Review and acceptance of third party equipment licensed to TELUS is to be reviewed and accepted by TELUS in conformance with this standard.

Mounting

2. Communication equipment boxes shall normally be mounted on the face of the pole or on the opposite side (i.e., not on the road or field side of the pole), and on the side opposite strand mounted communication equipment. Refer to ES43 D2-04 for an illustration of the pole face.

3. On Joint Use poles, the equipment box is to be positioned to allow adequate climbing and working space as per ES43 C1-05 and G1-04.

4. Equipment boxes shall be stood off from the pole by 75 mm to allow for climbing and belting past the box. Where the box is not stood off from the pole, the design shall be approved by local agreement between BC Hydro and TELUS.

Installation on Complex Poles

5. Equipment boxes shall not be installed on the following:

III. Poles with cabinets already installed by any other company.

IV. Poles with capacitor controls, regulator controls, recloser controls, air switch operating handles, or primary revenue metering.

V. Transformer poles which are not accessible to bucket truck.

VI. Poles with underground electric or communication riser conduits.

6. Equipment boxes should not be installed on the following wherever practicable:

I. Junction poles (a pole where lines run in four or more directions).

II. Tap poles.

III. Corner poles.

REVISIONS: R.0. -.MOVED G1-11 TO C1-02. ADDED MIN. 1200 MM SEPERATION FROM TOP TELUS TO EQUIPMENT BOX. CLARIFIED REVIEW OF BOXES SUPPORTING TELUS LICENSEES, - APR '20 HG.

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JOINT AND SECONDARY USE EQUIPMENT BOXES ON POLES

Supply

7. Where electrical supply is provided to the box, the conduit must extend 150 mm above the top secondary clevis with suitable entrance fitting and conduit, per the BC Electrical Code for wet locations.

8. Foreign equipment may include a disconnecting device operable by the owner for maintenance of other equipment.

Bonding and Grounding

9. Bonding and grounding practices shall be per BC Hydro Standard ES43 Section R. Specifically:

a. Install ground electrode if not already installed at pole. Ground electrodes installed by TELUS and BC Hydro third party communication licensees at Joint Use poles shall be installed in accordance with ES43 R2-01, leaving a coil of ground wire banded to the pole below the system neutral for subsequent connection to the system neutral by BC Hydro. At every pole ground electrode location, all non-current carrying metallic communication components must be bonded to the ground wire using minimum #6 AWG insulated wire. Ground electrodes installed by TELUS may use 3/4" diameter, 10' long, galvanized steel rods as an acceptable alternative to BC Hydro ground rods (Cat. ID 420-1093).

b. All grounding conductors shall be theft deterrent grounding wire as shown in ES43 R2-01.

Size and Mass

10. Equipment boxes shall have a maximum height of 1000 mm, maximum width of 700 mm, and a maximum depth of 400 mm.

11. Equipment boxes shall have a maximum mass of 300 kg.

Identification

12. The equipment box shall be clearly marked with the owner's equipment ID#, the company name, and the emergency contact phone number.

Ground Clearance

13. Equipment boxes shall be installed with a minimum 3.0 m clearance from the bottom of the box to ground level.

14. Special mounting height provisions for FortisBC rectifier or telemetry boxes:

a. The minimum mounting height to the bottom of the box shall be 2.0 m from finished grade where safe ladder access is possible.

b. When ladder access is not possible, the minimum mounting height can be reduced to 1.5 m,

provided the following stipulations are met:

I. The pole location is at least 2.0 m away from any area used by motorized vehicles (e.g., road/driveway/ATV trail).

II. The installation location has a low or medium probability of public interaction*. For installations where the requirement for low or medium risk is not practicable and foot traffic is expected, the installation is acceptable provided the following conditions are met:

i. No sidewalk, bicycling trail, or other indication of frequent foot traffic within 2.0 m of the pole location.

ii. No reason for public congregation (e.g., schools, parks, bus stops, shopping centres) within a distance of 50 m.

iii. No foreseeable likelihood that any of the above would become true in the near future.

c. If the stipulations for mounting at 2.0 m or 1.5 m cannot be met, an alternative location shall be selected.

*Definitions of Public Interaction

High: Within boundary of city, town, or village; near sidewalk or public pathways; near schools, parks, highway pullouts, etc.

Medium: Within unincorporated communities (e.g., townships, counties), and along roadways where light foot traffic is expected.

Low: Along roadways with little to no foot traffic.

Reference Standards

ES43 C1-05	Climbing and Working Space
ES43 D2-04	Standard Framing for Wood Distribution Poles
ES43 G1-04	Climbing Space through Drop Wires, Communication and Secondary
ES43 R2-01	Ground Rods at Wood Poles and Multiple Ground Rods
ES43 R7-01	Bonding and Grounding Other Utilities Grounding Connections

REVISIONS: R.0. - MOVED G1-11 TO C1-02. ADDED MIN. 1200 MM SEPERATION FROM TOP TELUS TO EQUIPMENT BOX. CLARIFIED REVIEW OF BOXES SUPPORTING TELUS LICENSEES, - APR '20 HG.

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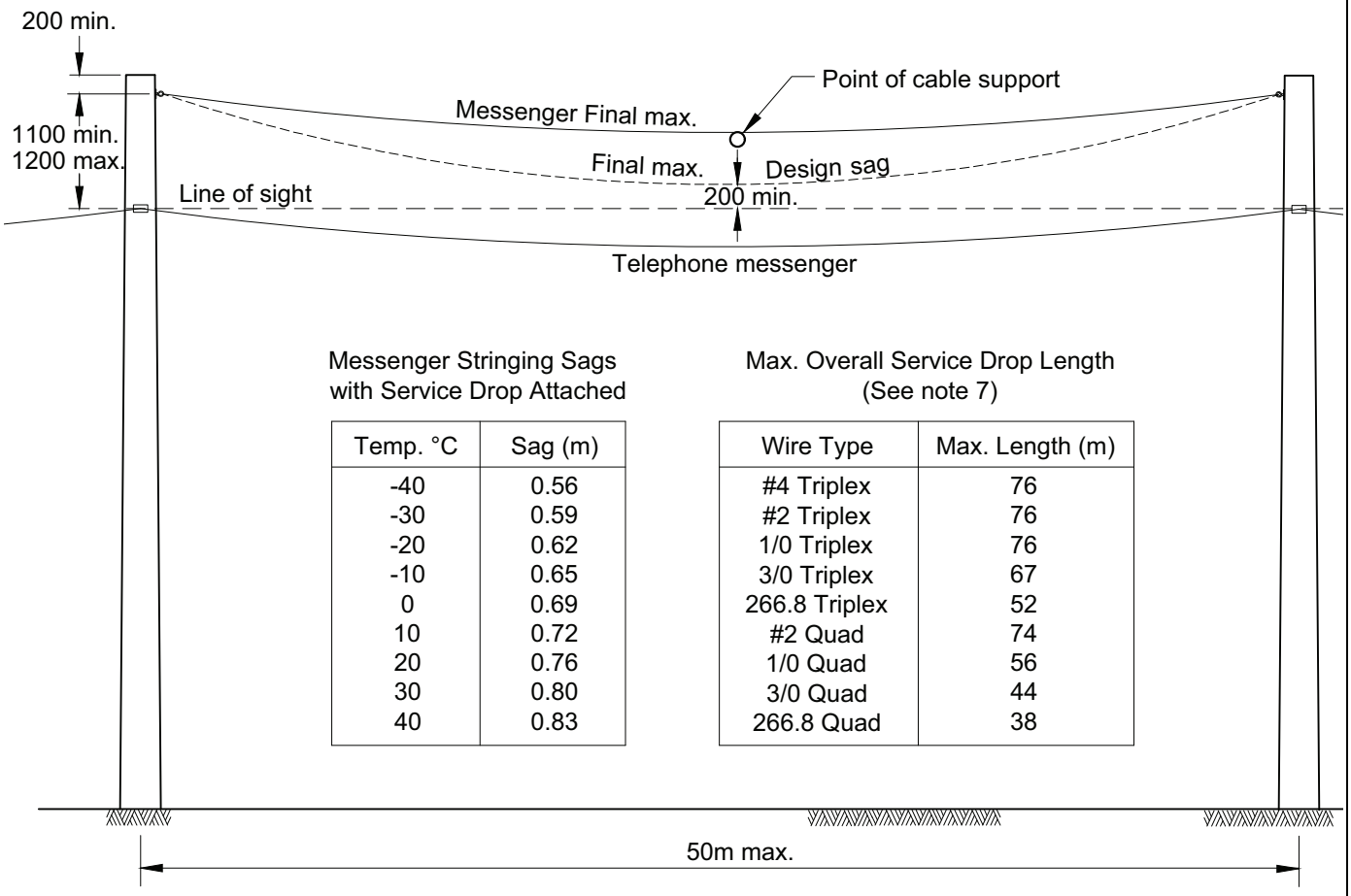
JOINT AND SECONDARY USE EQUIPMENT BOXES ON POLES



Messenger Stringing Sags with Service Drop Attached

Temp. °C	Sag (m)
-40	0.56
-30	0.59
-20	0.62
-10	0.65
0	0.69
10	0.72
20	0.76
30	0.80
40	0.83

Max. Overall Service Drop Length (See note 7)

Wire Type	Max. Length (m)
#4 Triplex	76
#2 Triplex	76
1/0 Triplex	76
3/0 Triplex	67
266.8 Triplex	52
#2 Quad	74
1/0 Quad	56
3/0 Quad	44
266.8 Quad	38

Figure 1

Service Drop Support Messenger
Configuration On Telephone Pole Line

Notes

1. This standard applies to a stand-alone single span of messenger to support a single service drop. Multiple spans in series require an engineered site-specific design.
2. This standard to be used only where avoidance alternatives are not viable.
3. Replace existing poles if necessary to provide the required messenger clearance. Pole top extensions are not acceptable for the purpose.
4. This standard may only be used on spans where a tensioned telephone messenger is present.
5. Sag messenger to correct stringing sag with service drop attached.
6. The B.C. Electrical Code requires that the bare neutral conductor be insulated from the support messenger.
7. Maximum permitted service drop length from messenger support point to attachment points on either side is 38 m.

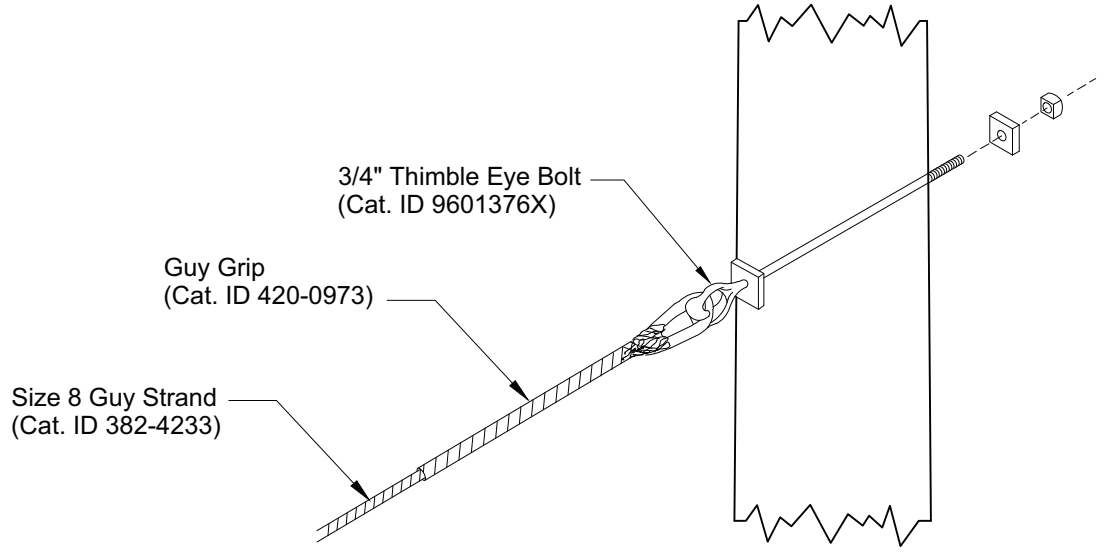


Figure 2
Span Guy Attachment

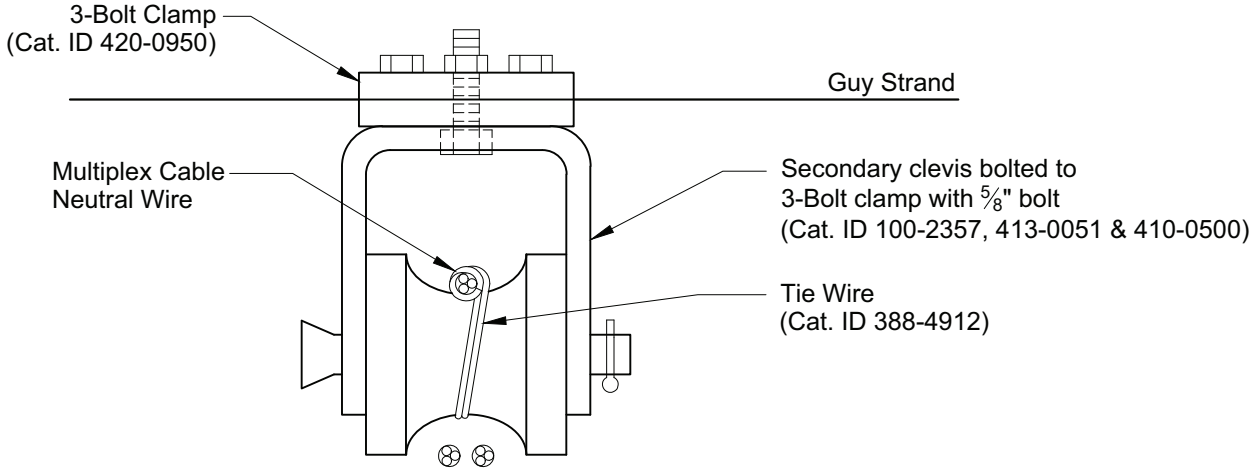


Figure 3
Cable Attachment to Messenger

Reference Standards

ES43 N1-02 Secondary Ties

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JOINT AND SECONDARY USE
MESSENGER SUPPORTED CLEARANCE CONTACT FOR MULTIPLEX CABLE SERVICE DROP

PAGE 2 OF 2

ES43 C1-04.02

R 3

REVISIONS: R3. NEW FORMAT. APR.20' KM

Application

This standard applies to the assessment of climbing and working space for attachment of equipment to Joint Use poles.

Design Notes

Joint Use poles shall be kept free of unauthorized attachments that could be hazardous and obstruct or otherwise hamper the operations of the utilities using the structures.

Climbing Space

1. Equipment shall be stood off from the pole by 75 mm to allow for climbing and belting past.

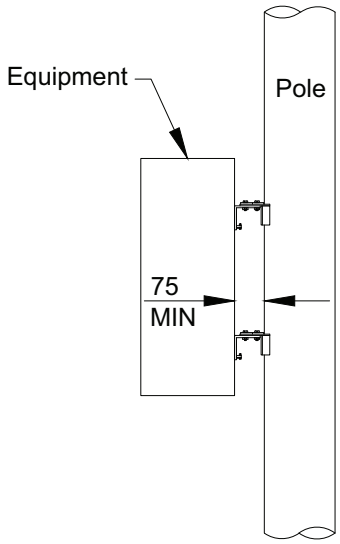

Figure 1: Required separation between pole and equipment

2. Climbing space should be free from obstructions and shall provide sufficient space, adjacent to the pole to allow safe access to wires, equipment, and other attachments above the telecommunications space.
3. The climbing space should be not less than 750 mm x 750 mm adjacent to any conductors, cables, crossarms, or other attachments and shall extend at least 1 m above and 1 m below the limiting attachments.
4. Poles not accessible by bucket truck shall have contiguous climbing space starting at the ground level and ending above the equipment mounting level to allow for installation of equipment and rescue of workers.

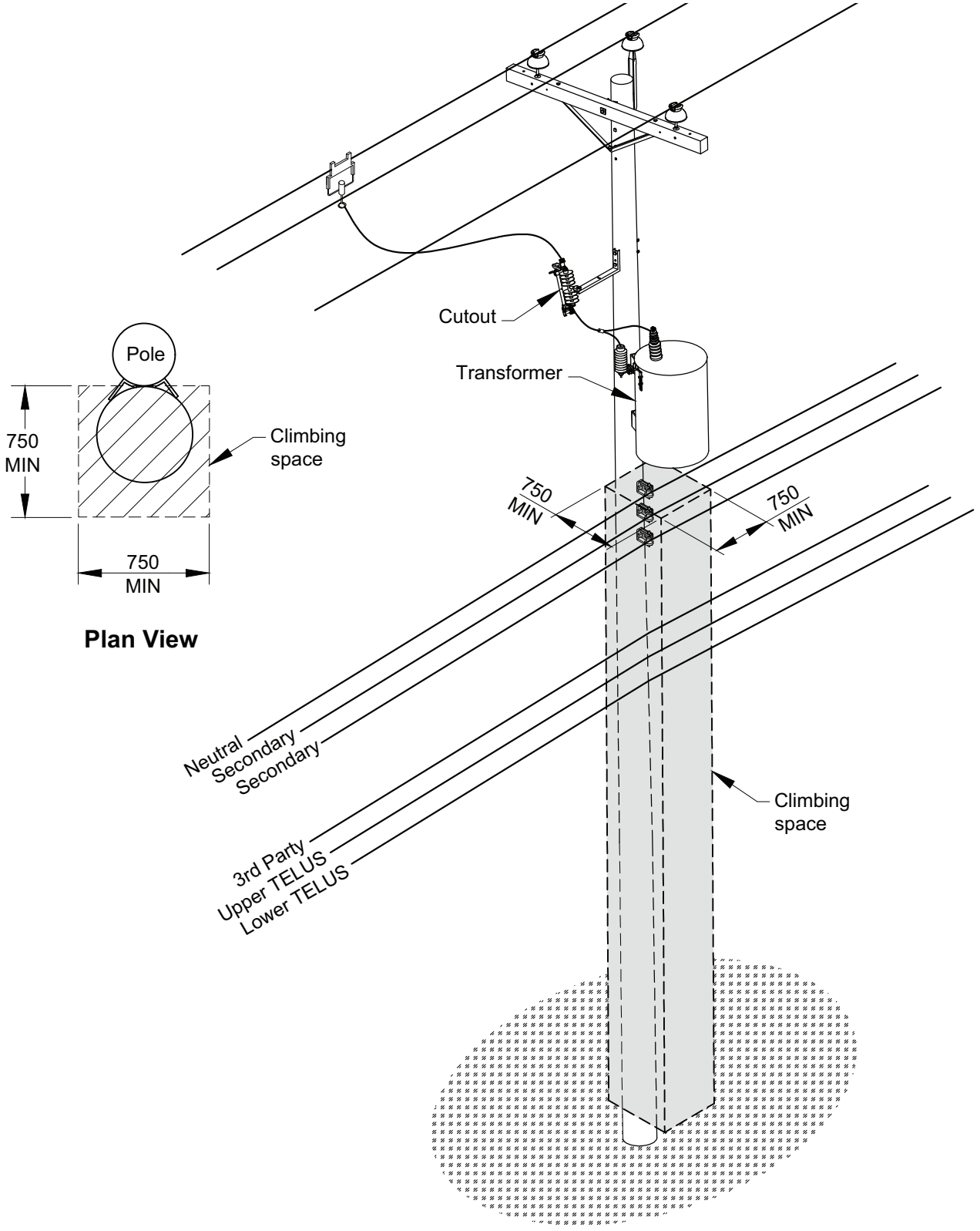

Figure 2: Climbing space for equipment poles not accessible by bucket truck

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JOINT AND SECONDARY USE CLIMBING AND WORKING SPACE

ES43 C1-05.02

R 0

Working Space

5. Working space shall be provided on the climbing face of the structure and shall have minimum horizontal dimensions of 750 mm x 750 mm. The height of the working space shall extend above the top communication position by 1000 mm and below the lowest communication position by 1300 mm.
6. Note: In cases where workers are expected to make use of ladders for climbing the structure, the working space will be near the top of the climbing space.

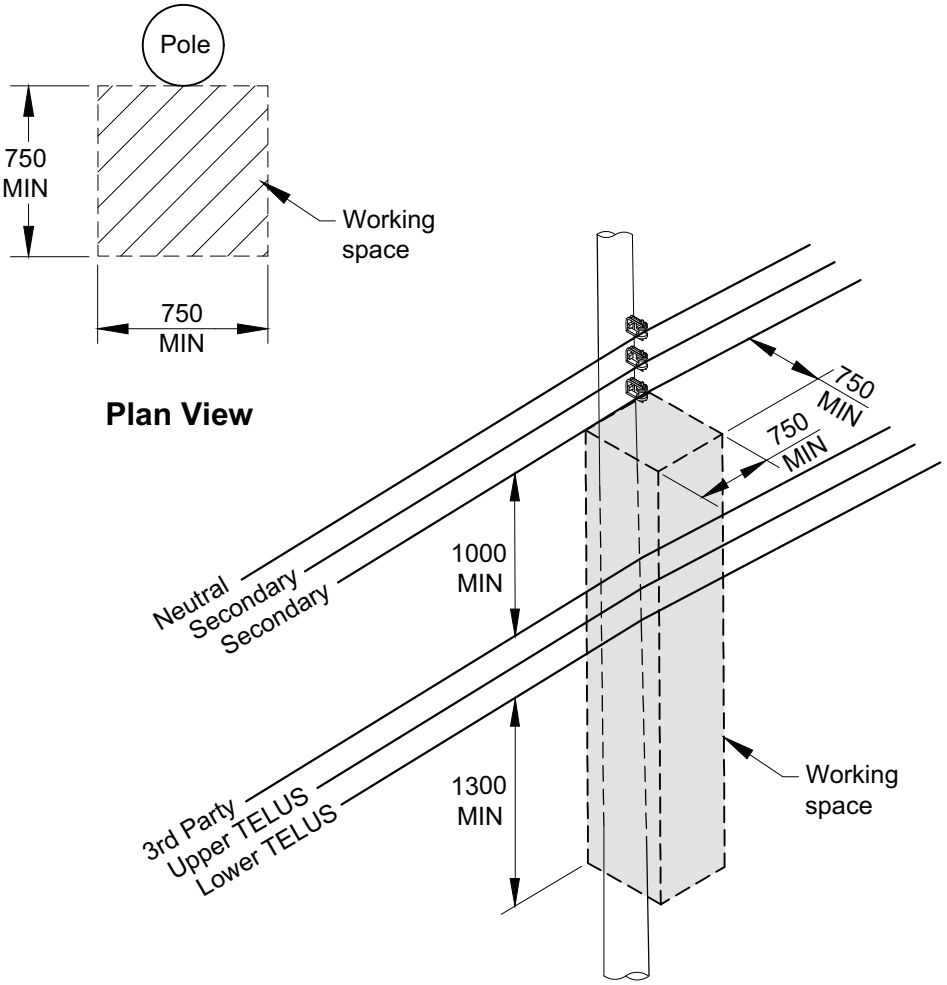

Figure 3: Working Space for Telecommunication Wire Attachments

Obstructions

7. The attachment of equipment such as wireless antennas or cabinets shall not obstruct line of sight access from a safe ground position to a cutout or switch. The cut-out or switch orientation as well as the available clear ground space around the pole must be considered. If the unobstructed operation of a cut-out or switch is uncertain, the proposed attachment shall be reviewed with BC Hydro Field Operations.

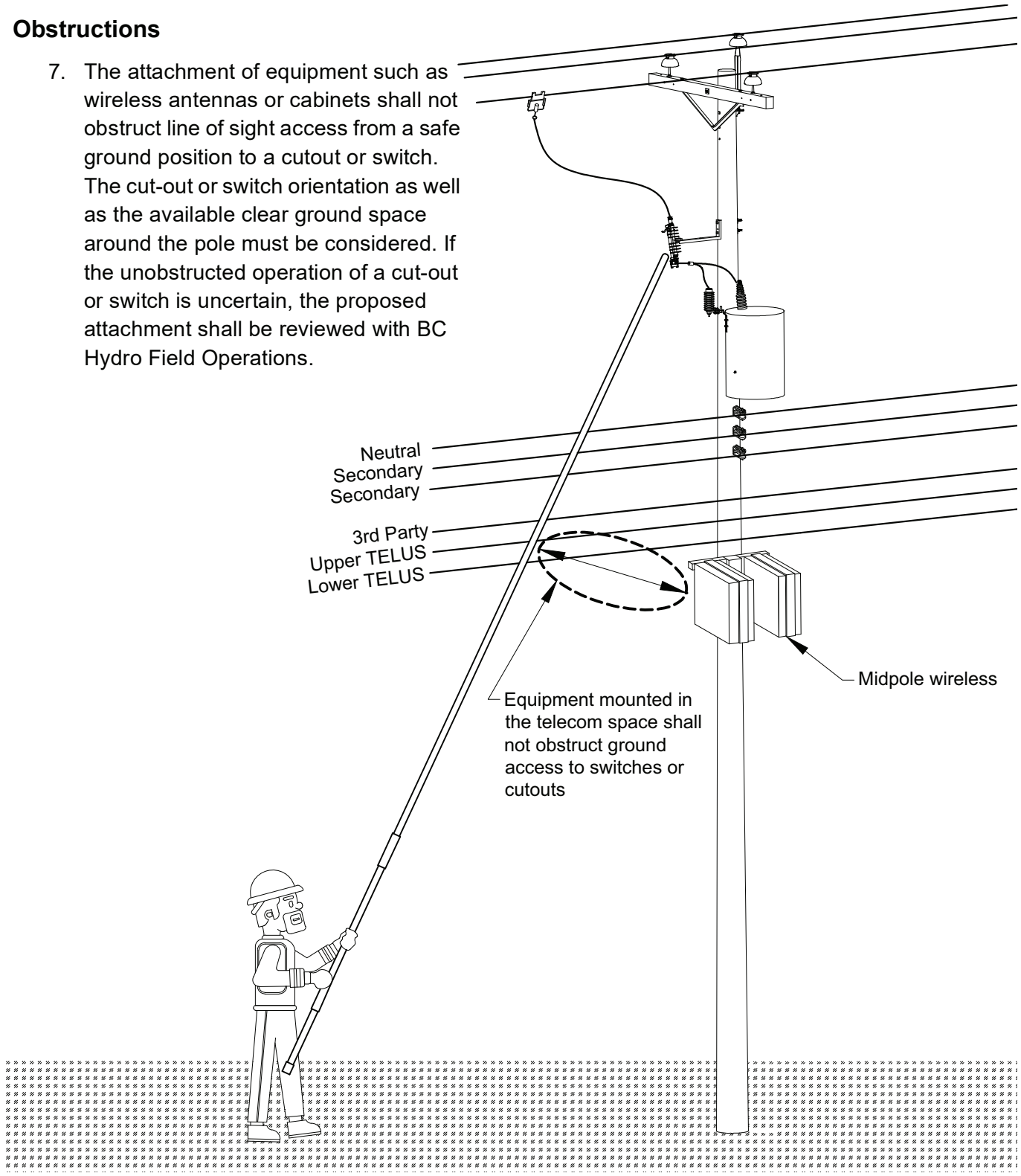

Figure 4: Unobstructed ground access to cut-outs and switches

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JOINT AND SECONDARY USE CLIMBING AND WORKING SPACE

ES43 C1-05.04

R 0

8. Attachments on the structure shall not encroach on the climbing space or working space, with the exception of
   a) pole steps at the side of the climbing space or working space on non-wooden poles
   b) crossarms along the side of the working space or climbing space
   c) tangent communication wire along the side of the working space or climbing space, provided that their vertical arrangement does not obstruct climbing of the structure;
   d) tangent open wire secondary or neutral supported secondary (duplex, triplex, quadruplex)
   e) cable covers for communication or power dips.
   f) other equipment or items that both BC Hydro and TELUS agree do not interfere with the use of climbing equipment.
9. Radiofrequency emitting devices such as radio, cellular, and WIFI antennas shall be equipped with a shut off to allow climbing and working on the pole within the minimum safe working distance of the antenna. Refer to the Work Methods documents RF Safety – BC Hydro Owned Equipment and RF Safety – Third Party Equipment.

Reference Standards

ES43 G1-04 Climbing Space Through Drop Wires Communication & Secondary

ES43 M1-01 Terminal Poles General Notes

Application

This standard describes required wire spacing below the neutral on joint use poles.

Revision Notes

Added *Application*, *Revision Notes*, and *References* sections. Added note 7. Substantive changed content is marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2025-024 *Revised ES43 C2 Joint and Secondary Use Spacing and Separation Standards*.

References

BC Hydro Distribution Standards

ES43 B1-03	Vertical Design Clearances of Wires and Conductors Above Ground
ES43 B1-11	Clearances Above Ground for Low-Voltage Services
ES43 C1-01	Joint and Secondary Use General Notes
ES43 C2-03	Typical Vertical Wire Separation at a Joint-Use Pole Between BC Hydro and TELUS
ES43 C2-04	Typical Vertical Wire Separation at a Joint-Use Pole for BC Hydro, TELUS, and Third-Party Communications Licensee Plant
ES55 E1-02	Pole Height
ES55 E6-02	Design Assumptions for Joint Use Poles

Other BC Hydro Documents

JUB 029	Design Assumptions for Non-Linear Analysis of Joint Use Poles

External Documents

CSA C22.3 No. 1	Overhead systems

Notes

1. Minimum vertical separation for a neutral space (safety clearance zone) is a regulatory requirement per CSA C22.3 No.1, table 23 (communications safety space). Additional safety clearance zone space may be required depending on span lengths and wire sags to avoid mid-span wire interference between BC Hydro neutral/ secondary wires and communication messengers. See ES43 C1-01, C2-03, and C2-04 for typical spacing.
2. Minimum TELUS ground clearance at the pole is mandated by the BC Hydro and TELUS joint use agreement. Minimum TELUS attachment heights are not always adequate so additional clearance must be added. Additional road clearance at the pole may be required to meet in-span clearance requirements depending on line topography, span lengths, service drop lengths, and TELUS cable sizes. See ES43 B1-03, ES43 B1-11, ES55 E1-02, and E6-02.

Designed: K. Middleton, P. Eng		Professional of Record	Wire Spacing on Joint-Use Pole Below the Neutral	
Checked: K. Middleton, P. Eng		PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA K. D. MIDDLETON # 32387 2025-03-14 Permit to Practice #1002449		
Reviewed: H. Giesbrecht, P. Eng			DISTRIBUTION STANDARDS BC Hydro	ES43 C2-01 R9
Approved: H. Giesbrecht, P. Eng		Issued: 2025-03-14 Effective: 2025-03-14		

The minimum attachment height (V) for span lengths < 50 m is:

a. 5490 mm for roads other than highways;

b. 6710 mm for highways; and

c. 8230 mm for railways.

The minimum attachment height for span lengths ≥ 50 m shall be calculated using ES43 B1-03. TELUS cable maximum final sag per ES55 E6-02 and JUB 029, or Table 1, can be used for easy reference of the minimum ground clearance for corresponding span lengths.

Table 1 – Minimum TELUS attachment height above ground at the pole

Wire or conductor location	Attachment height (V mm) per span length							
	≤ 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. See ES43 C1-01 and C2-04 for BC Hydro third-party communication licensee position on the pole.
5. Road clearances in Table 1 use a vehicle height of 4.15 m per ES43 B1-03. Add the amount by which the vehicle heights are known to exceed 4.15 m.
6. Highway clearances in Table 1 accommodate a vehicle size of 4.88 m. Add the amount by which vehicle heights are known to exceed 4.88 m.
7. Site specific calculations can determine the minimum attachment height at the pole. Ensure clearances per ES43 B1-03 and the minimum TELUS attachment height of 5490 mm are met per the joint use agreement.

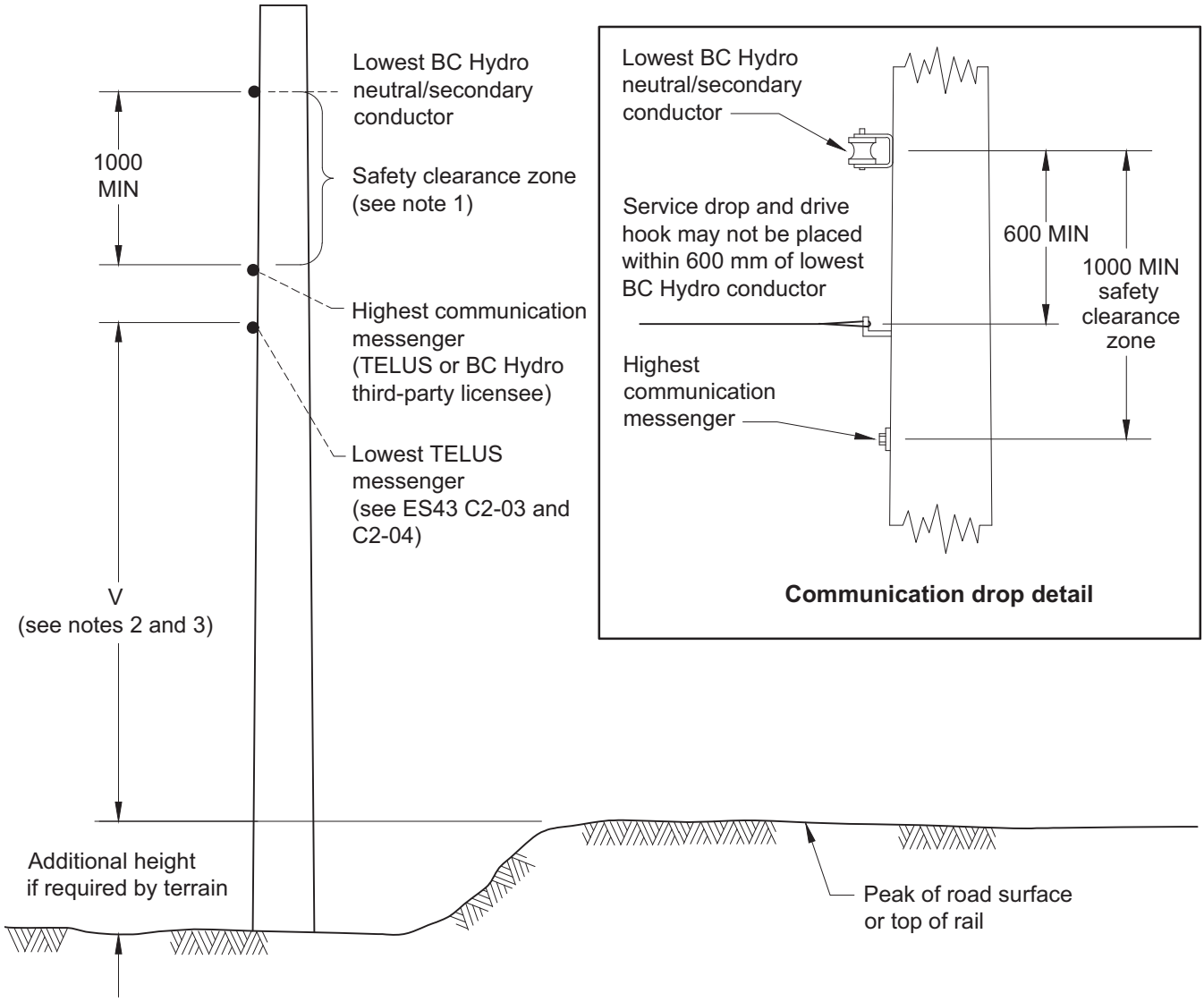
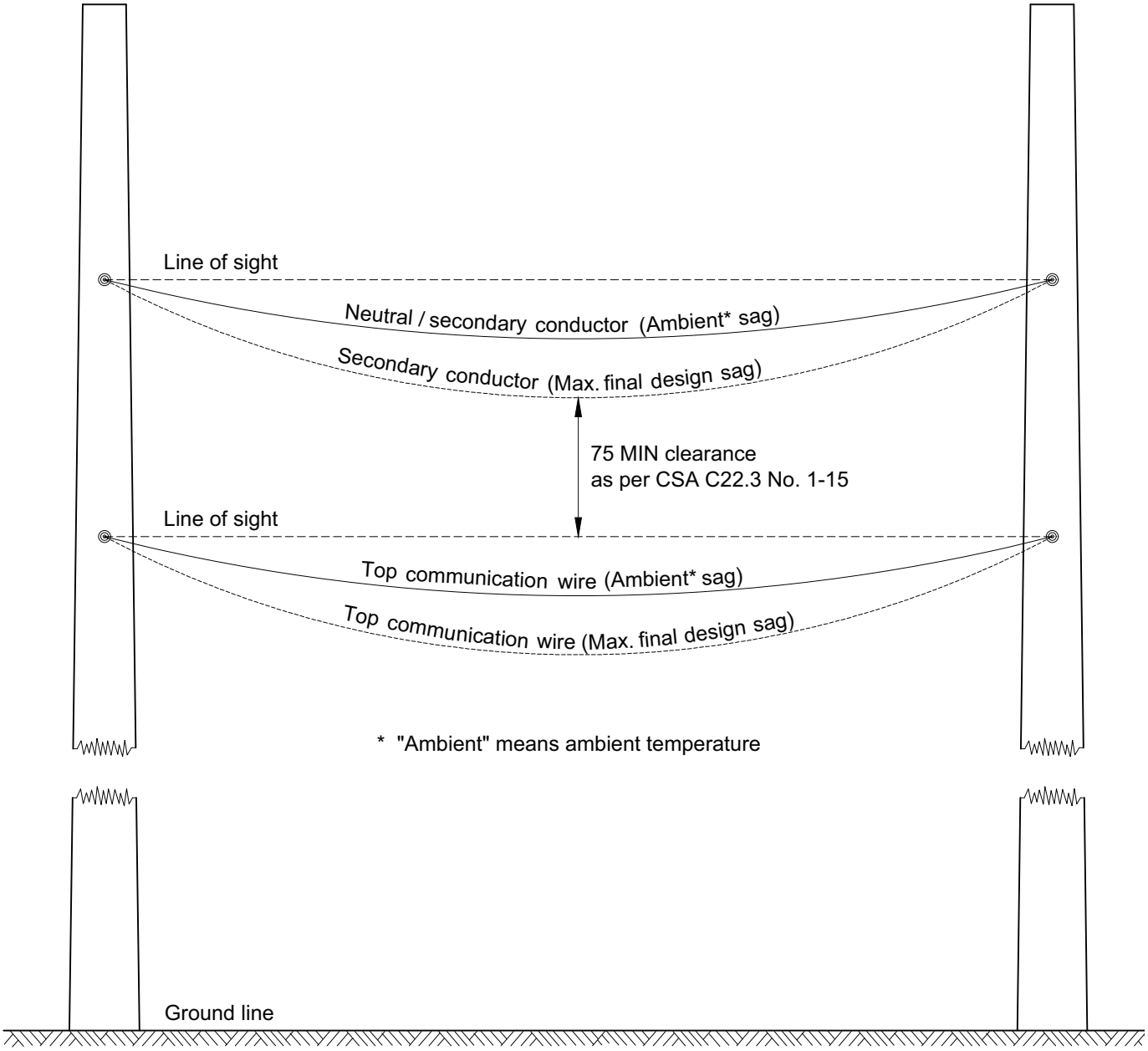


Figure 1 – Wire spacing on joint-use pole below the neutral



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	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD	SPACING AND SEPARATION IN SPAN SEPARATION BETWEEN SECONDARY/NEUTRAL CONDUCTORS AND COMMUNICATION WIRES	
K. MIDDLETON	H. GIESBRECHT	F. DENNERT	PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA K. D. MIDDLETON # 32387	PAGE 1 OF 1	ES43 C2-02 R 2
DISTRIBUTION STANDARDS BC Hydro	ISSUED: APR 2020 REPLACES:DEC 2010 ORIGINALLY ISSUED: APR 2001				

REVISIONS: R.2 - UPDATED CSA C22.3 NO.1 TO 2015 VERSION. APR' 20 KM

Typical Vertical Wire Separation at a Joint-Use Pole Between BC Hydro and TELUS

ES43 C2-03

Application

This standard describes the required vertical wire separations between BC Hydro conductors and TELUS cables on a joint-use pole with no third-party communications plant.

Revision Notes

Updated *References*. Added note 10. Substantive changed content is marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2025-024 *Revised ES43 C2 Joint and Secondary Use Spacing and Separation Standards*.

References

BC Hydro Distribution Standards

ES43 C2-02	In-Span Separation Between Secondary/Neutral Conductors and Communication Wires
ES43 C2-04	Typical Vertical Wire Separation at a Joint-Use Pole for BC Hydro, TELUS, and Third-Party Communications Licensee Plant

Notes

1. Table 1 shows vertical wire separations between BC Hydro conductors and the highest TELUS cable when there is no third-party communications licensee. Dimension A is neutral conductor to TELUS, dimension B is secondary conductor to TELUS, and dimension C is neutral conductor to secondary and secondary to secondary, as shown in Figure 1. N/A indicates there is no open-wire secondary.

Table 1 – Vertical wire separations

Span length L (m)	Dimension A (mm)	Dimension B (mm)	Dimension 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	1660	250
60 < L ≤ 75 (see note 5)	1830	N/A	N/A
75 < L ≤ 100	2340	N/A	N/A
100 < L ≤ 110	2740	N/A	N/A

2. The highest TELUS wire is located 200 mm (8") below the top of the TELUS space.
3. Only use the minimum dimension of 1430 mm where typical clearances cannot be used. Typical clearances are the preferred dimensions for both BC Hydro and TELUS.

Designed: K. Middleton, P. Eng		Professional of Record: PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, K. D. MIDDLETON # 32387, 2025-03-14, Permit to Practice #1002449	Typical Vertical Wire Separation at a Joint-Use Pole Between BC Hydro and TELUS
Checked: K. Middleton, P. Eng			
Reviewed: H. Giesbrecht, P. Eng			DISTRIBUTION STANDARDS BC Hydro / ES43 C2-03 R5
Approved: H. Giesbrecht, P. Eng		Issued: 2025-03-14 Effective: 2025-03-14	

4. Greater separation is required if 266.8 ASC WP is used for span lengths of 50 m or more. For 50 m ≤ L ≤ 60 m 266.8 ASC WP span lengths, A = 1970 mm, B= 1570 mm, and C=200 mm. The dimensions will need to be calculated for 266.8 ASC WP span lengths greater than 60 m.
5. Table 1 has two rows for span lengths 60 m < L ≤ 75 m. The first of these includes open wire secondary, the second excludes open wire secondary. The second 60 m to 75 m row can be used for existing poles, pole replacements, and situations where open wire secondary is unlikely to be required.
6. Secondary open wire conductor can only be installed on span lengths up to 75 m.
7. Dimensions for span lengths 75 m to 110 m assume a #2 ACSR or 1/0 ACSR neutral. Recalculate vertical separation and mid-span clearance if a different neutral conductor is used.
8. See ES43 C2-04 for provisions for BC Hydro third-party communications licensees.
9. Document the required vertical separation (dimension A) on the pole plan to communicate this dimension to TELUS construction resources.
10. Site specific calculations can be performed to determine vertical wire separations. Ensure mid-span clearances are met per ES43 C2-02.

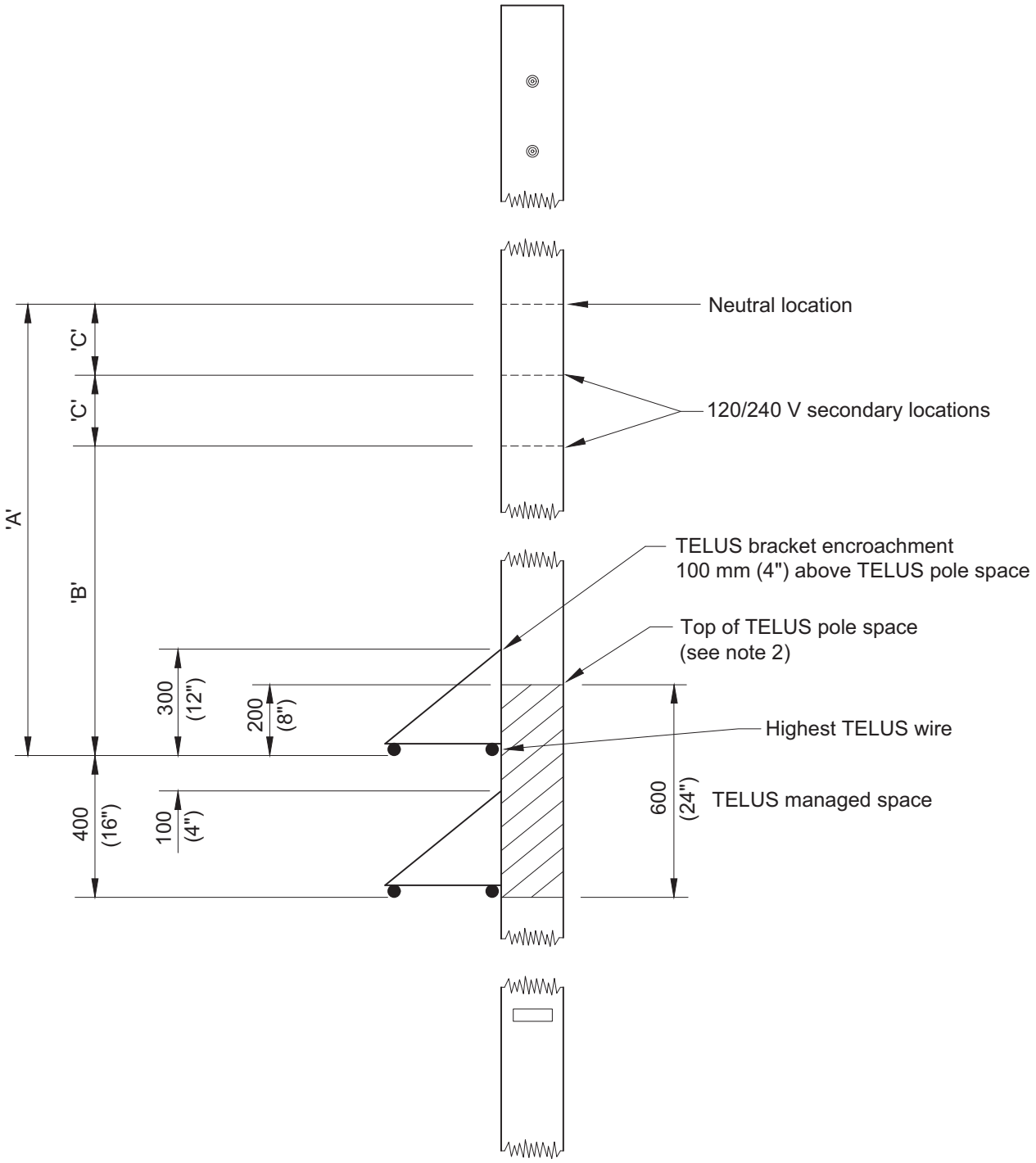


Figure 1 – Vertical wire separations on joint-use BC Hydro and TELUS pole

Typical Vertical Wire Separation at a Joint-Use Pole for BC Hydro, TELUS, and Third-Party Communications Licensee Plant ES43 C2-04

Application

This standard describes the required vertical wire separations between BC Hydro conductors, TELUS cables, and third-party communications plant on a joint-use pole.

Revision Notes

Added *Application*, *Revision Notes*, and *References* sections. Added note 9. Substantive changed content is marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2025-024 *Revised ES43 C2 Joint and Secondary Use Spacing and Separation Standards*.

References

BC Hydro Distribution Standards

ES43 C2-02 In-Span Separation Between Secondary/Neutral Conductors and Communication Wires

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. Table 1 shows typical wire separations for neutral conductor to TELUS (dimension A), secondary conductor to TELUS (dimension B), secondary conductor to third party licensee (dimension D), and secondary conductor (dimension C).

   Table 1 – Vertical wire separation per dimension between BC Hydro conductors and telecom cables (mm)

Span length L (m)	Dimension A	Dimension B	Dimension C	Dimension D
Typical L < 50	1830	1430	200	1000
50 ≤ L ≤ 60	2260	1860	200	1430
60 < L ≤ 75	2560	2060	250	1660
60 < L ≤ 75 (see note 5)	2260	N/A	N/A	1860
75 < L ≤ 100	2740	N/A	N/A	2340
100 < L ≤ 110	3140	N/A	N/A	2740
Table note: N/A (not applicable) means that there is no open wire secondary conductor. When open wire secondary is not present, dimension D is referenced from the neutral.				

4. Greater separation is required if 266.8 ASC WP is used for span lengths ≥ 50 m. For span lengths 50 m ≤ L ≤ 60 m, A = 2370 mm, B= 1970 mm, C=200 mm, D=1570 mm. Dimensions need to be calculated for span lengths > 60 m.

Designed: K. Middleton, P. Eng		Professional of Record  Permit to Practice #1002449	Typical Vertical Wire Separation at a Joint-Use Pole for BC Hydro, TELUS, and Third-Party Communications Licensee Plant
Checked: K. Middleton, P. Eng			
Reviewed: H. Giesbrecht, P. Eng			DISTRIBUTION STANDARDS BC Hydro
Approved: H. Giesbrecht, P. Eng		Issued: 2025-03-14 Effective: 2025-03-14	ES43 C2-04 R4

5. There are two table rows for span lengths 60 m < L ≤ 75 m. The first includes open wire secondary, the second 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. Dimension D is referenced from the neutral when open wire secondary is not present.
6. Dimensions for span lengths greater than 75 m to 110 m are calculated using a #2 ACSR and 1/0 ACSR neutral. Vertical separation and mid-span clearance will need to be re-calculated if a different neutral conductor is used.
7. Secondary open wire conductor can only be installed on span lengths up to 75 m.
8. Pole plan documentation for the required vertical separation (dimension A) is needed to communicate this dimension to TELUS construction resources.
9. Site specific calculations can be performed to determine vertical wire separations. Ensure mid-span clearances are met per ES43 C2-02.

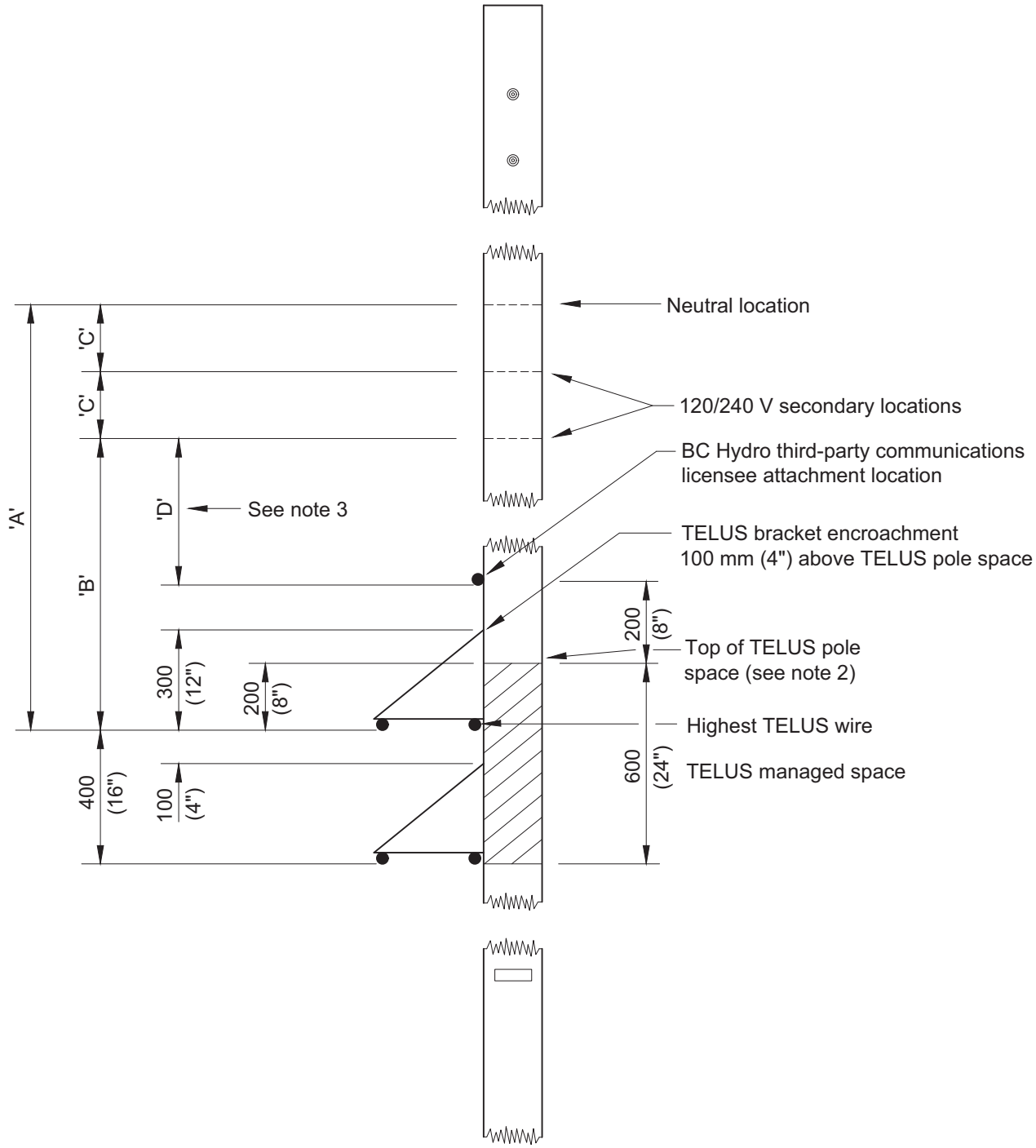


Figure 1 – Typical vertical wire separations on joint-use pole between BC Hydro, TELUS, and third-party communications licensee plant

Application

This standard applies to the installation of cellular antennas mounted on the pole top above the primary wires as well as their associated cable risers and equipment boxes.

Revision Notes

Added *Revision Notes* section. Updated *References*. Added new note 8 on field drilled holes. Removed reference to withdrawn standard from note 22. Removed manufacturer part numbers from note 33. Substantive changed content is marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2025-006 *Revised ES43 C3 Antenna Installation Standards*.

Items Required

Item	Description	Material number	Quantity
1	Duct, 3" x 20 ft, straight conduit, FRE	9700-3825	As required
2	Duct, 3" x 10 ft, straight conduit, FRE	9700-3826	As required
3	Bracket, mounting, conduit, 24"	9700-4090	1
4	Bracket, mounting, conduit strap kit, 3"	9700-4091	3
5	Machine bolt (⅝" x length)	100-XXXX	As required
6	Fetter drive screw (½" x 115 mm)	101-0309	1
7	Helical spring washer ⅝"	102-4158	As required
8	Square washer (50 mm x 50 mm)	420-1521	As required

References

BC Hydro Distribution Standards

ES43 C3-02	Antenna Installation Three-Phase Alley Arm
ES43 C3-03	Antenna Installation Three-Phase Alley Arm Single-Phase Transformer
ES43 C3-04	Antenna Installation Three-Phase Flat
ES43 C3-05	Antenna Installation Three-Phase Flat Single-Phase Transformer
ES43 C3-06	Antenna Installation Single-Phase Armless
ES43 C3-07	Antenna Installation Single-Phase Armless Single-Phase Transformer
ES43 section D	Poles

Designed: S. Sharma		Professional of Record PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA K. D. MIDDLETON # 32387 2025-03-25 Permit to Practice #1002449	Antenna Installation General Requirements
Checked: K. Middleton, P. Eng			
Reviewed: K. Middleton, P. Eng			DISTRIBUTION STANDARDS BC Hydro — ES43 C3-01 R3
Approved: H. Giesbrecht, P. Eng		Issued: 2025-03-27 Effective: 2025-03-27	

ES43 G1-04	Climbing Space Through Drop Wires Communication and Secondary
ES55 E6-02	Design Assumptions for Joint Use Poles

Other BC Hydro Documents

Work Procedure	Working Near Third-Party Radio Frequency (RF) Antennas

External Documents

CSA 22.1	Canadian Electrical Code, Part I
CSA C22.3 No. 1	Overhead systems

Notes

General

1. Pole-top wireless installation is generally not permitted on poles with:
   a. Capacitor banks;
   b. Two or more transformers;
   c. Recloser, voltage regulator, or switch;
   d. Primary dip;
   e. Primary revenue metering;
   f. Dual primary circuits; or
   g. Dead-end or angle pole with two or more BC Hydro guy wires.

   Pole-top wireless equipment installation on the above pole types may be permitted with approval of the joint use coordinating committee co-chairs.
2. Antenna installation is only permitted on poles where normal BC Hydro operation is by bucket truck access.
3. Cellular electrical equipment shall conform with CSA C22.1 for wet locations.
4. Pole-top extension assemblies or brackets used to extend pole length are not permitted.
5. Antenna and equipment box mounting brackets shall be engineered by the applicant and are subject to review and acceptance by a BC Hydro engineer.
6. Maximum 60 ft class 1 western red cedar pole is permitted.
7. Pole-top wireless installation designs shall be engineered by the applicant in accordance with ES43 C3 and CSA 22.3 No.1 and are subject to review and acceptance by a BC Hydro engineer.
8. Field drill holes at least 64 mm (2.5") apart horizontally and vertically to prevent pole quartering. See ES43 section D.

Equipment Cabinets

9. The width of equipment cabinets mounted on the pole shall not exceed 760 mm.
10. The two approved options for mounting communication equipment boxes are roadside and 90° counterclockwise to the roadside. See Figure 1.
11. The equipment box shall be clearly marked with the owner's equipment ID number, company name, and emergency contact phone number.

Communication Risers

12. Risers for communication cables running above the neutral wire shall be rigid fibreglass reinforced epoxy conduit mounted on standoff brackets.
13. Conduits and standoff brackets will normally be supplied by BC Hydro. Standoff brackets supplied by a third party shall be engineered to support the conduits using the bracket spacing shown on the applicable standard and are subject to acceptance by a BC Hydro engineer.
14. Conduits and brackets shall not interfere with the installation or removal of a BC Hydro secondary dip cable guard.
15. Conduit standoff brackets shall not be installed within the 1 m safety clearance zone below the lowest secondary or neutral conductor.
16. This standard shows a default of three conduits. This can be increased to up to six conduits at the applicant's request. The designer shall confirm the required number of conduits with the applicant.
17. Communication risers should be installed on the pole before filling with communication cables.
18. Field cut conduit based on distance between bottom of the antenna and top of the telecom equipment.

Supply

19. Electrical supply conduit shall extend 150 mm above the top secondary or neutral clevis with suitable entrance fitting and conduit per CSA C22.1 for wet locations.
20. Devices requiring electric service shall have an external service disconnect installed. The external service disconnect shall isolate all electric services.
21. Battery backup power is not permitted.

Clearances

22. Communication equipment shall be stood off from the pole 75 mm.
23. The minimum radius of clearance around the primary wires to cell equipment including cables and conduit standoff brackets shall be 760 mm.
24. Site specific review shall be completed to determine if increasing crossarm length from existing will cause aerial trespass or infringement of requirement clearances to adjacent structures.

Design Parameters for Pole Loading Analysis

25. The maximum span length for each primary framing configuration in ES43 C3-02, C3-03, C3-04, C3-05, C3-06, and C3-07 was determined using the following design assumptions.
    a. Three-phase primary wire: 336.4 ASC tulip;
    b. Single-phase primary wire: 1/0 ACSR raven;
    c. Neutral wire: 1/0 ACSR raven;
    d. Single-phase open wire secondary: 266.8 ASC WP corkwood;
    e. Third-party wire: small bundle (bundle size is defined in ES55 E6-02);
    f. Upper and lower TELUS wire (bundle size is defined in ES55 E6-02):
        i. Span length ≤ 50 m large bundle;
        ii. Span length > 50 m ≤ 70 m medium bundle; and
        iii. Span length > 50 m ≤ 110 m small bundle;

g. Pole top antennas: four objects mounted at 90° increments representing an antenna and bracket, each with a lateral wind area of 1.05 m^2, a pole side wind area of 0.65 m^2, a mass of 45 kg, and a distance of 30 cm from the pole to the centre of mass; and

h. Communication equipment cabinets: A single rectangular box with lateral wind area of 1.6 m^2, pole side wind area of 1.7 m^2, mass of 355 kg, and distance of 25 cm from the pole to the centre of mass.

Non-linear structural analysis meeting the requirements of CSA 22.3 No.1 shall be completed by a professional engineer and submitted to BC Hydro for review and acceptance if pole loading from the wires, antennas, or equipment cabinets exceeds these design assumptions.

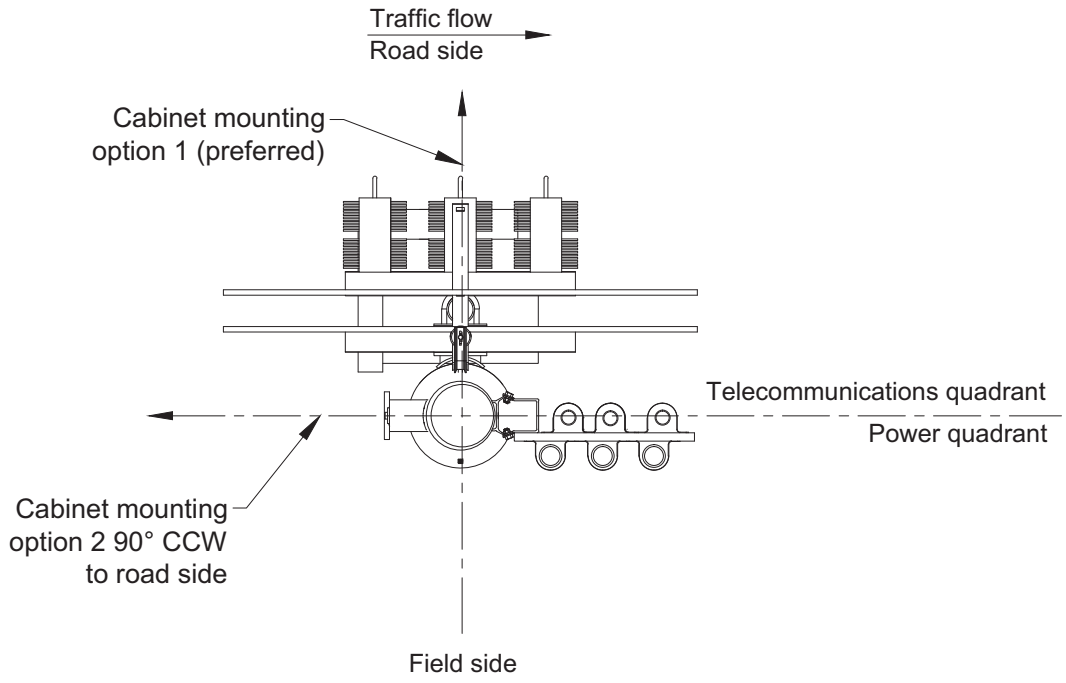


Figure 1 – Equipment location

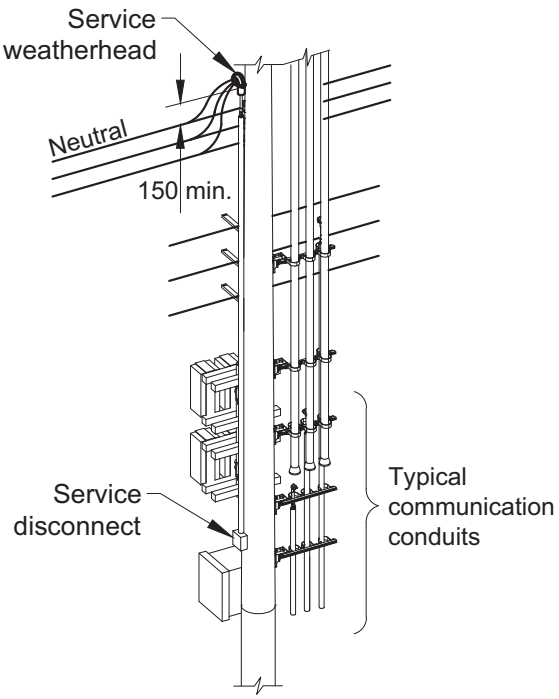


Figure 2 – Service

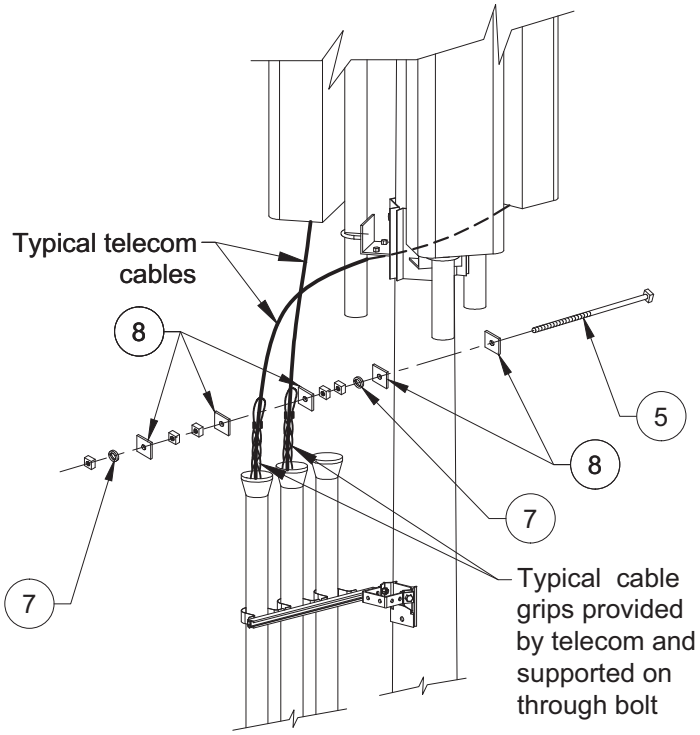


Figure 3 – Antenna cable support

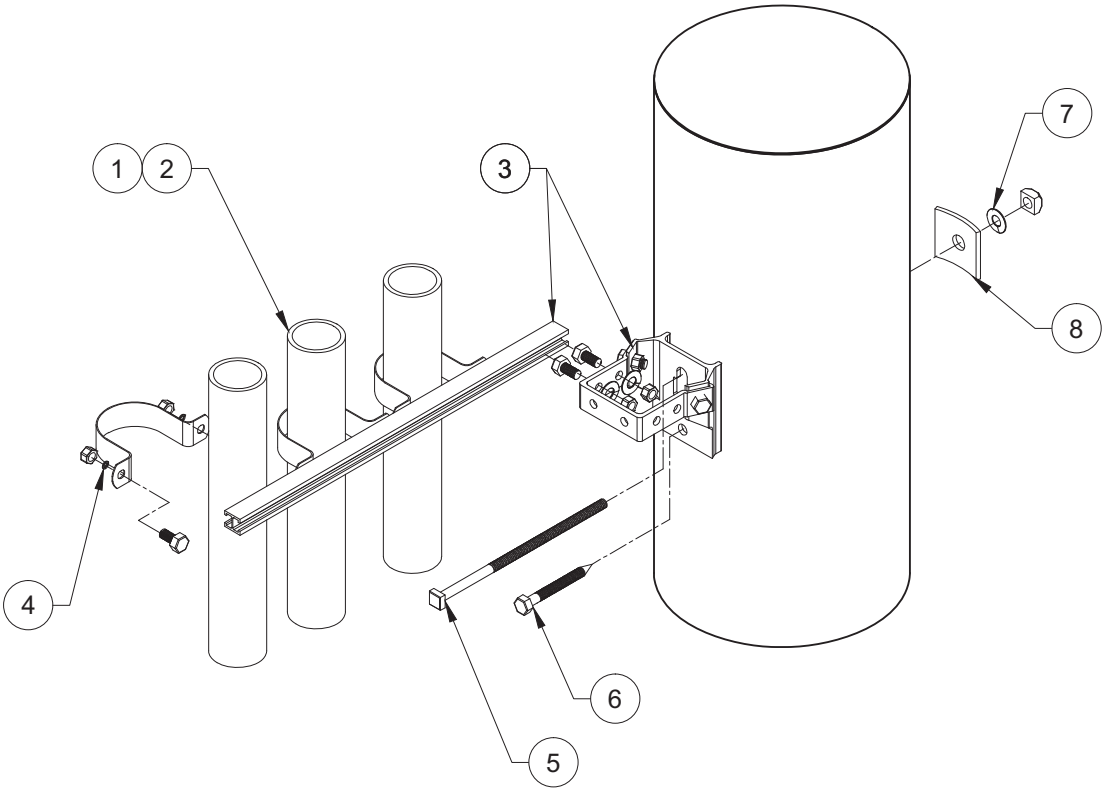


Figure 4 – 24 inch conduit mounting bracket

Construction

26. Equipment above the service weather head shall be installed and maintained by BC Hydro.
27. See work procedure *Working Near Third-Party Radio Frequency (RF) Antennas* if working near activated cellular antennas.

Field Cutting Fibreglass-Reinforced Epoxy (FRE) Conduit

28. Measure conduit to desired length and mark for cutting.
29. Cut using one of four cutting tool options:
    a. Handheld hacksaw with a fine toothed blade;
    b. Portable band saw;
    c. Chop saw with a diamond cutting blade; or
    d. Abrasive blade cutter.
30. Use 60 grit emery cloth to remove loose fibres (emery cloth included with epoxy adhesive kit).
31. Measure and mark a reference point on the conduit. Add a minimum of 3" to each end of the conduit for installing bell ends.
32. Sand the cut end with 60 grit emery cloth until the sheen is removed.

FRE Adhesive Kit Instructions

33. An epoxy adhesive kit contains two cans (black one is base adhesive, white one is hardener), stir sticks, sand paper for abrading conduit surfaces, and an instruction sheet. The adhesive kit is offered for three different ambient curing temperatures. Use the epoxy adhesive that most closely matches the expected ambient curing temperature:
    a. Material number 9700-3828 for 21°C ambient temperature;
    b. Material number 9700-3829 for 4°C ambient temperature; and
    c. Material number 9700-3830 for -7°C ambient temperature.
34. Pour one can of the two-part epoxy into the other and mix until grey. For smaller quantities mix equal parts until evenly gray. Each epoxy adhesive kit is enough for approximately 15 joints on 3" duct.
35. Measure and mark a reference point on the conduit. Add a minimum of 3" to each end of the conduit for installing bell ends.
36. Sand field cut conduit with an emery cloth until the sheen is removed. Factory ends come pre-sanded.
37. Sand the inside of the bell end.
38. Apply the two-part epoxy to the spigot end of the conduit using a metal spatula. Ensure the adhesive does not get too close to the edge of the conduit.
39. Insert the conduit section into the bell end.
40. Allow the adhesive to cure before installing on the pole. In ambient temperatures colder than the specified temperature the curing time will be longer (45 minutes). In ambient temperatures warmer than the specified temperature the curing time will be shorter (30 minutes).

FRE Conduit Interference Joint Installation

41. Tools required are a mallet, wood block, and metal spatula.
42. Apply adhesive to the conduit straight end with a metal spatula. Do not apply adhesive too close to the edge of the conduit.

43. Insert the straight conduit interference joint end into the belled interference joint end. Simultaneously use firm pressure and a twisting motion to insert the straight interference joint conduit end into the belled interference joint end. This process will properly seat the conduits together.
44. Place a wooden block over the conduit straight end. Using a mallet, drive the straight conduit interference end into the belled interference joint end. This will firmly seat the conduits together. Do not attempt to over-seat the fitting as conduit or fitting failure may result. A properly seated joint will have a firm feel when mated together.
45. Allow adhesive to set before installing on pole.

Application

This standard provides requirements for antenna installation on a three-phase alley arm pole.

Revision Notes

Added *Application* and *Revision Notes* sections. Updated *References*. Added new notes 6 and 7. Added note references to Figure 1. Substantive changed content is marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2025-006 *Revised ES43 C3 Antenna Installation Standards*.

Items Required

Item	Description	Material number	Quantity
1	Duct, 3" x 20 ft, straight conduit, FRE	9700-3825	1 per conduit run
2	Duct, 3" x 10 ft, straight conduit, FRE	9700-3826	1 per conduit run
3	End, conduit, 3", FRE	9700-3827	2 per conduit run
4	Adhesive, epoxy, 2-part, FRE, 21°C ambient curing temperature, or 4°C ambient curing temperature, or -7°C ambient curing temperature	9700-3828 9700-3829 9700-3830	2
5	Bracket, mounting, conduit, 24"	9700-4090	4
6	Bracket, mounting, conduit strap kit, 3"	9700-4091	4 per conduit run

References

BC Hydro Distribution Standards

ES43 C2-03	Typical Vertical Wire Separation at a Joint-Use Pole Between BC Hydro and TELUS
ES43 C2-04	Typical Vertical Wire Separation at a Joint-Use Pole for BC Hydro, TELUS, and Third-Party Communications Licensee Plant
ES43 C3-01	Antenna Installation General Requirements
ES43 C3-08	Antenna Installation Grounding
ES43 D3-12	Culvert Pole Foundation in Soft Soil
ES43 G4-04	Basic Line Structures Three-Phase Tangent Alley Arm

Designed: S. Sharma		Professional of Record PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA K. D. MIDDLETON # 32387 2025-03-25 Permit to Practice #1002449	Antenna Installation Three-Phase Alley Arm
Checked: K. Middleton, P. Eng			
Reviewed: K. Middleton, P. Eng			DISTRIBUTION STANDARDS BC Hydro
Approved: H. Giesbrecht, P. Eng		Issued: 2025-03-27 Effective: 2025-03-27	ES43 C3-02 R1

Notes

1. See ES43 C3-01 for application notes, design notes, bracket and conduit details, and conduit installation instructions.
2. Use alley arm construction wherever practical to improve separation from power conductors to telecommunications plant during installation.
3. Use double alley arm per ES43 G4-04 for 266.8 ACSR and 336.4 ASC.
4. A 60 ft class 1 pole is of adequate strength for span lengths less than or equal to those in Table 1. See ES43 C3-01 for analysis assumptions.

Table 1 – Maximum span length for 60 ft class 1 pole

Maximum line angle	Maximum span length (m)		
	CSA medium B loading	CSA heavy loading	CSA severe loading
0°	75*	55	40
3°	45	30	25
5°	35	25	20
* Span length limited by maximum 75 m span length for open wire secondary.			

5. Use culvert pole foundation for installation in soft soil. See ES43 D3-12.
6. Distances can be field adjusted.
7. Based on typical 1800 mm antenna height.

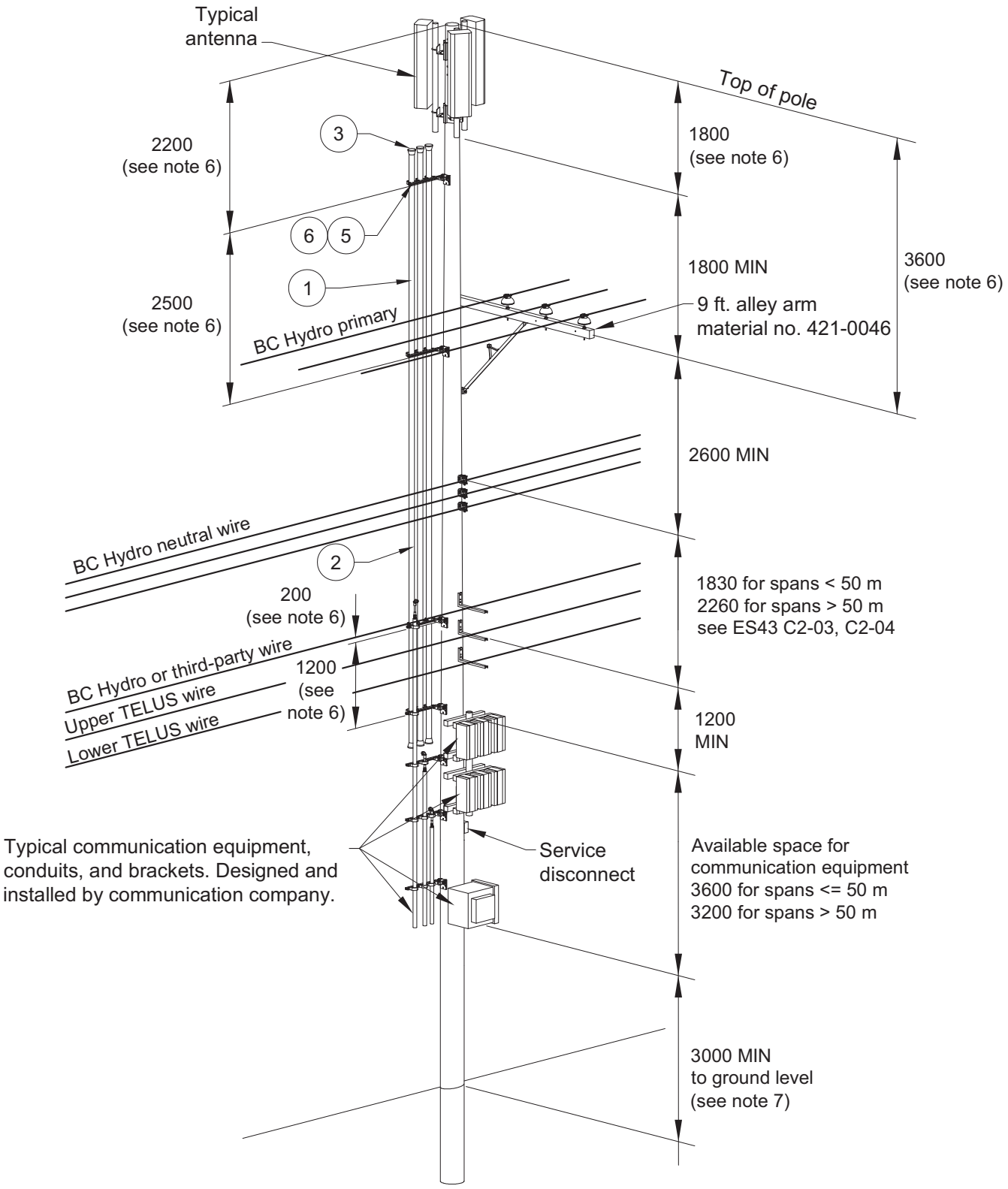


Figure 1 – Antenna installation three-phase alley arm

Antenna Installation Three-Phase Alley Arm Single-Phase Transformer

ES43 C3-03

Application

This standard provides requirements for antenna installation on a three-phase alley arm pole with a single-phase transformer.

Revision Notes

Added *Application* and *Revision Notes* sections. Updated *References*. Added new notes 8 and 9. Added note references to Figure 1 and updated several minimum vertical wire separations. Substantive changed content is marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2025-006 *Revised ES43 C3 Antenna Installation Standards*.

Items Required

Item	Description	Material number	Quantity
1	Duct, 3" x 20 ft, straight conduit, FRE	9700-3825	1 per conduit run
2	Duct, 3" x 10 ft, straight conduit, FRE	9700-3826	1 per conduit run
3	End, conduit, 3", FRE	9700-3827	2 per conduit run
4	Adhesive, epoxy, 2-part, FRE, 21°C ambient curing temperature, or 4°C ambient curing temperature, or -7°C ambient curing temperature	9700-3828 9700-3829 9700-3830	2
5	Bracket, mounting, conduit, 24"	9700-4090	4
6	Bracket, mounting, conduit strap kit, 3"	9700-4091	4 per conduit run

References

BC Hydro Distribution Standards

ES43 C2-03	Typical Vertical Wire Separation at a Joint-Use Pole Between BC Hydro and TELUS
ES43 C2-04	Typical Vertical Wire Separation at a Joint-Use Pole for BC Hydro, TELUS, and Third-Party Communications Licensee Plant
ES43 C3-01	Antenna Installation General Requirements
ES43 C3-08	Antenna Installation Grounding
ES43 D3-12	Culvert Pole Foundation in Soft Soil
ES43 G4-04	Basic Line Structures Three-Phase Tangent Alley Arm
ES43 J2-01	Single-Phase Transformer Framing Top Bushing Tangent Pole
ES43 K4-02	Typical Surge Arrestor Installations

Designed: S. Sharma		Professional of Record PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA K. D. MIDDLETON # 32387 2025-03-25 Permit to Practice #1002449	Antenna Installation Three-Phase Alley Arm Single-Phase Transformer
Checked: K. Middleton, P. Eng			
Reviewed: K. Middleton, P. Eng			DISTRIBUTION STANDARDS BC Hydro
Approved: H. Giesbrecht, P. Eng		Issued: 2025-03-27 Effective: 2025-03-27	ES43 C3-03 R1

Notes

1. See ES43 C3-01 for application notes, design notes, bracket and conduit details, and conduit installation instructions.
2. This standard only shows equipment orientation and spacing. See ES43 J2-01 for transformer connection details and materials.
3. Mount surge arrestor on cutout to maintain separation between conduit and live parts. See ES43 K4-02 for surge arrestor details.
4. Use alley arm construction wherever practical to improve separation from power conductors to telecommunications plant during installation.
5. Use double alley arm per ES43 G4-04 for 266.8 ACSR and 336.4 ASC.
6. A 60 ft class 1 pole is of adequate strength for span lengths less than or equal to those in Table 1. See ES43 C3-01 for analysis assumptions.

Table 1 – Maximum span length for 60 ft class 1 pole

Maximum line angle	Maximum span length (m)		
	CSA medium B loading	CSA heavy loading	CSA severe loading
0°	75*	50	35
3°	40	25	20
5°	30	20	15
* Span length limited by maximum 75 m span length for open wire secondary.			

7. Use culvert pole foundation for installation in soft soil. See ES43 D3-12.
8. Distances can be field adjusted.
9. Based on typical 1800 mm antenna height.

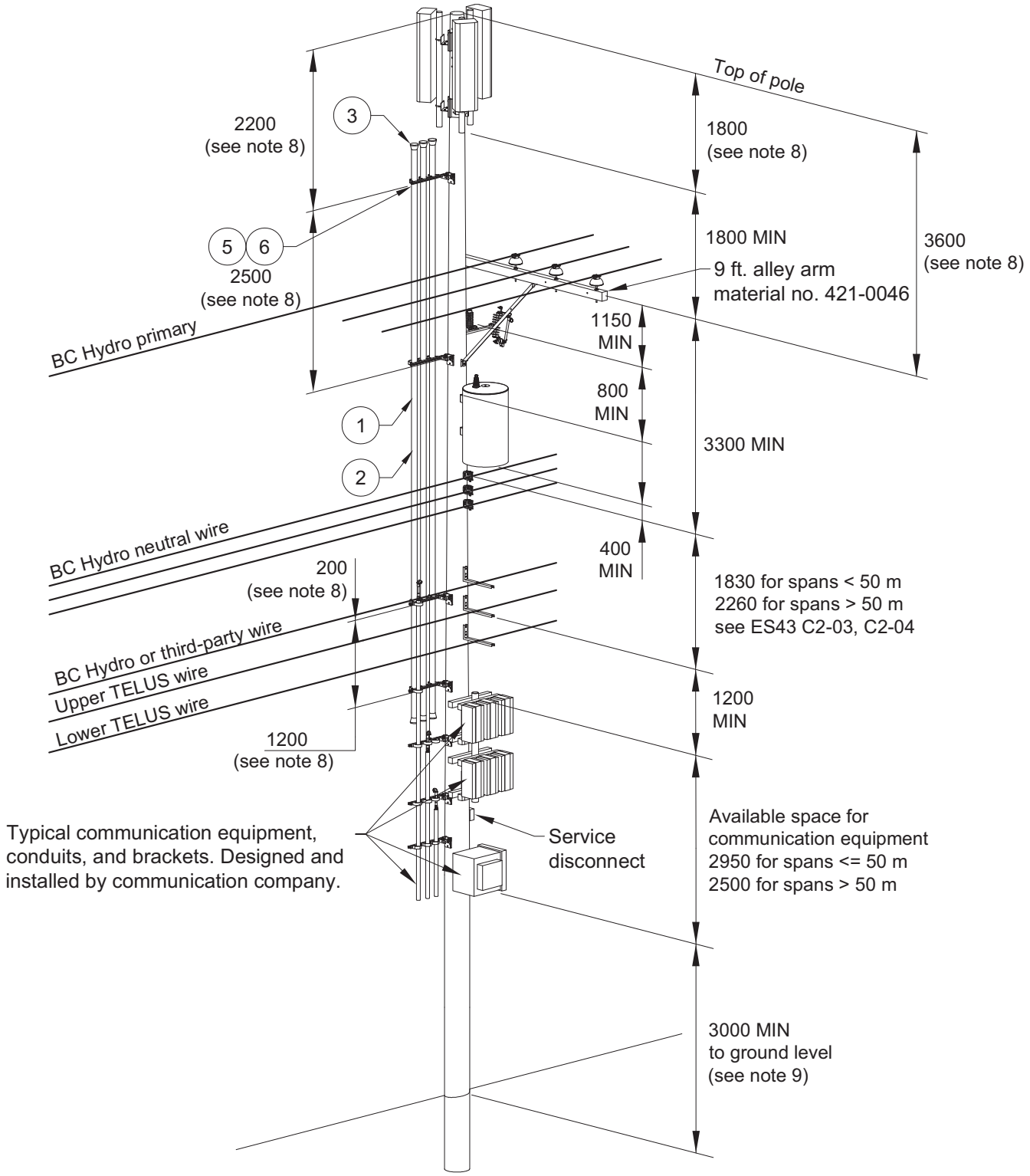


Figure 1 – Antenna installation three-phase alley arm single-phase transformer

Application

This standard provides requirements for antenna installation on a three-phase flat pole.

Revision Notes

Added *Application* and *Revision Notes* sections. Updated *References*. Added new notes 5 and 6. Added note references to Figure 1. Substantive changed content is marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2025-006 *Revised ES43 C3 Antenna Installation Standards*.

Items Required

Item	Description	Material number	Quantity
1	Duct, 3" x 20 ft, straight conduit, FRE	9700-3825	1 per conduit run
2	Duct, 3" x 10 ft, straight conduit, FRE	9700-3826	1 per conduit run
3	End, conduit, 3", FRE	9700-3827	2 per conduit run
4	Adhesive, epoxy, 2-part, FRE, 21°C ambient curing temperature, or 4°C ambient curing temperature, or -7°C ambient curing temperature	9700-3828 9700-3829 9700-3830	2
5	Bracket, mounting, conduit, 24"	9700-4090	4
6	Bracket, mounting, conduit strap kit, 3"	9700-4091	4 per conduit run

References

BC Hydro Distribution Standards

ES43 C2-03	Typical Vertical Wire Separation at a Joint-Use Pole Between BC Hydro and TELUS
ES43 C2-04	Typical Vertical Wire Separation at a Joint-Use Pole for BC Hydro, TELUS, and Third-Party Communications Licensee Plant
ES43 C3-01	Antenna Installation General Requirements
ES43 C3-08	Antenna Installation Grounding
ES43 D3-12	Culvert Pole Foundation in Soft Soil
ES43 G4-02.02	Three-Phase Tangent Flat

Designed: S. Sharma		Professional of Record PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA K. D. MIDDLETON # 32387 2025-03-25 Permit to Practice #1002449	Antenna Installation Three-Phase Flat
Checked: K. Middleton, P. Eng			
Reviewed: K. Middleton, P. Eng			DISTRIBUTION STANDARDS BC Hydro
Approved: H. Giesbrecht, P. Eng		Issued: 2025-03-27 Effective: 2025-03-27	ES43 C3-04 R1

Notes

1. See ES43 C3-01 for application notes, design notes, bracket and conduit details, and conduit installation instructions.
2. Use alley arm construction wherever practical to improve separation from power conductors to telecommunications plant during installation.
3. A 60 ft class 1 pole is of adequate strength for span lengths less than or equal to those in Table 1. See ES43 C3-01 for analysis assumptions.

Table 1 – Maximum span length for 60 ft class 1 pole

Maximum line angle	Maximum span length (m)		
	CSA medium B loading	CSA heavy loading	CSA severe loading
0°	75*	60	40
3°	45	30	20
5°	35	25	20
* Span length limited by maximum 75 m span length for open wire secondary.			

4. Use culvert pole foundation for installation in soft soil. See ES43 D3-12.
5. Distances can be field adjusted.
6. Based on typical 1800 mm antenna height.

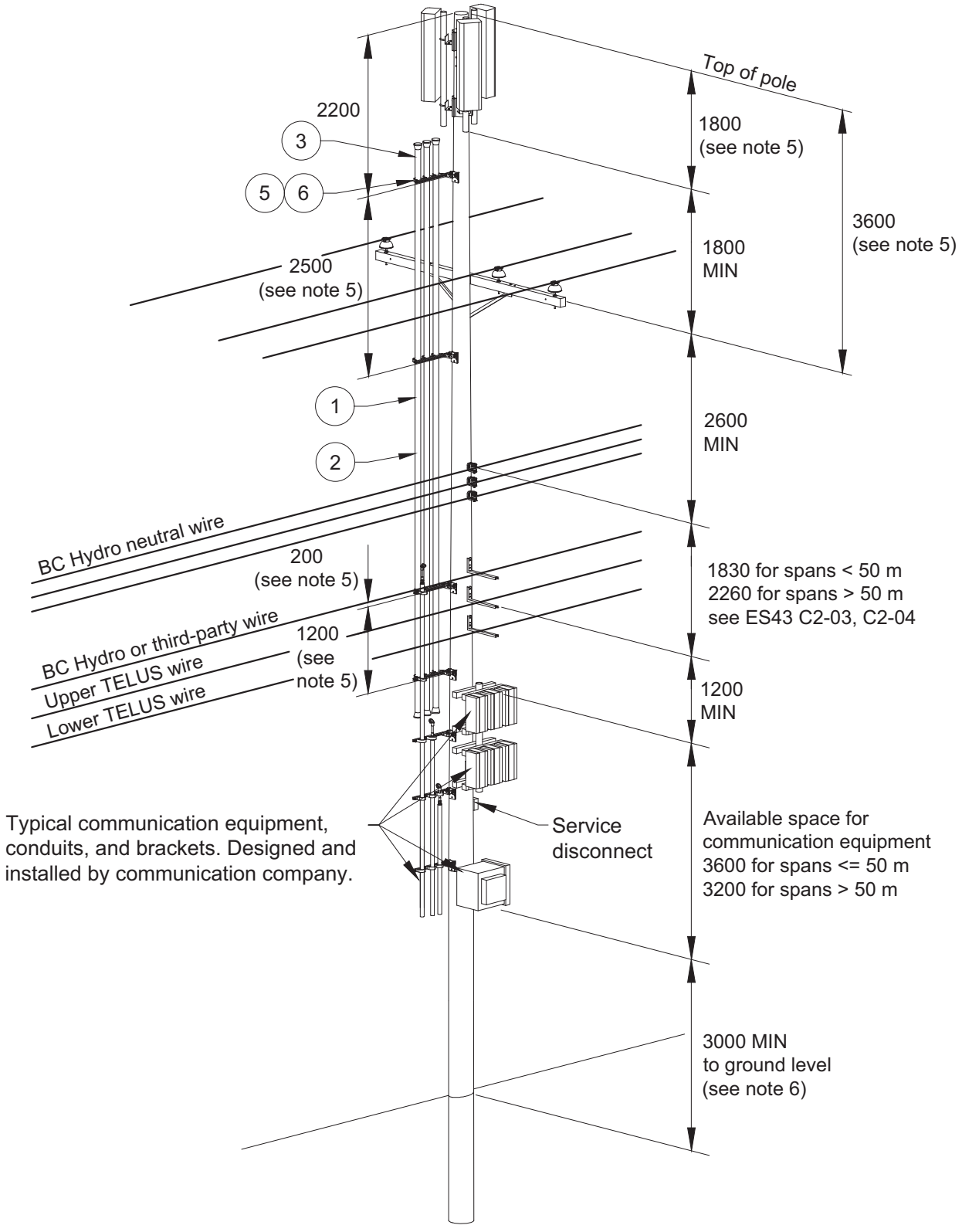


Figure 1 – Antenna installation three-phase flat

Application

This standard provides requirements for antenna installation on a three-phase flat pole with a single-phase transformer.

Revision Notes

Added *Application* and *Revision Notes* sections. Updated *References*. Expanded note 1 to include service connection details. Added new notes 7 and 8. Added note references and several minimum vertical wire separations to Figure 1. Substantive changed content is marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2025-006 *Revised ES43 C3 Antenna Installation Standards*.

Items Required

Item	Description	Material number	Quantity
1	Duct, 3" x 20 ft, straight conduit, FRE	9700-3825	1 per conduit run
2	Duct, 3" x 10 ft, straight conduit, FRE	9700-3826	1 per conduit run
3	End, conduit, 3", FRE	9700-3827	2 per conduit run
4	Adhesive, epoxy, 2-part, FRE, 21°C ambient curing temperature, or 4°C ambient curing temperature, or -7°C ambient curing temperature	9700-3828 9700-3829 9700-3830	2
5	Bracket, mounting, conduit, 24"	9700-4090	4
6	Bracket, mounting, conduit strap kit, 3"	9700-4091	4 per conduit run

References

BC Hydro Distribution Standards

ES43 C2-03	Typical Vertical Wire Separation at a Joint-Use Pole Between BC Hydro and TELUS
ES43 C2-04	Typical Vertical Wire Separation at a Joint-Use Pole for BC Hydro, TELUS, and Third-Party Communications Licensee Plant
ES43 C3-01	Antenna Installation General Requirements
ES43 C3-08	Antenna Installation Grounding
ES43 D3-12	Culvert Pole Foundation in Soft Soil
ES43 J2-01	Single-Phase Transformer Framing Top Bushing Tangent Pole
ES43 K4-02	Typical Surge Arrestor Installations

Designed: S. Sharma		Professional of Record PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA K. D. MIDDLETON # 32387 2025-03-25 Permit to Practice #1002449	Antenna Installation Three-Phase Flat Single-Phase Transformer
Checked: K. Middleton, P. Eng			
Reviewed: K. Middleton, P. Eng			DISTRIBUTION STANDARDS BC Hydro — ES43 C3-05 R1
Approved: H. Giesbrecht, P. Eng		Issued: 2025-03-27 Effective: 2025-03-27	

Notes

1. See ES43 C3-01 for application notes, design notes, service connection details, bracket and conduit details, and conduit installation instructions.
2. Use alley arm construction wherever practical to improve separation from power conductors to telecommunications plant during installation.
3. This standard only shows equipment orientation and spacing. See ES43 J2-01 for transformer connection details and materials.
4. Mount surge arrestor on cutout to maintain separation between conduit and live parts. See ES43 K4-02 for surge arrestor details.
5. A 60 ft class 1 pole is of adequate strength for span lengths less than or equal to those in Table 1. See ES43 C3-01 for analysis assumptions.

Table 1 – Maximum span length for 60 ft class 1 pole

Maximum line angle	Maximum span length (m)		
	CSA medium B loading	CSA heavy loading	CSA severe loading
0°	75*	55	40
3°	40	25	20
5°	30	20	15
* Span length limited by maximum 75 m span length for open wire secondary.			

6. Use culvert pole foundation for installation in soft soil. See ES43 D3-12.
7. Distances can be field adjusted.
8. Based on typical 1800 mm antenna height.

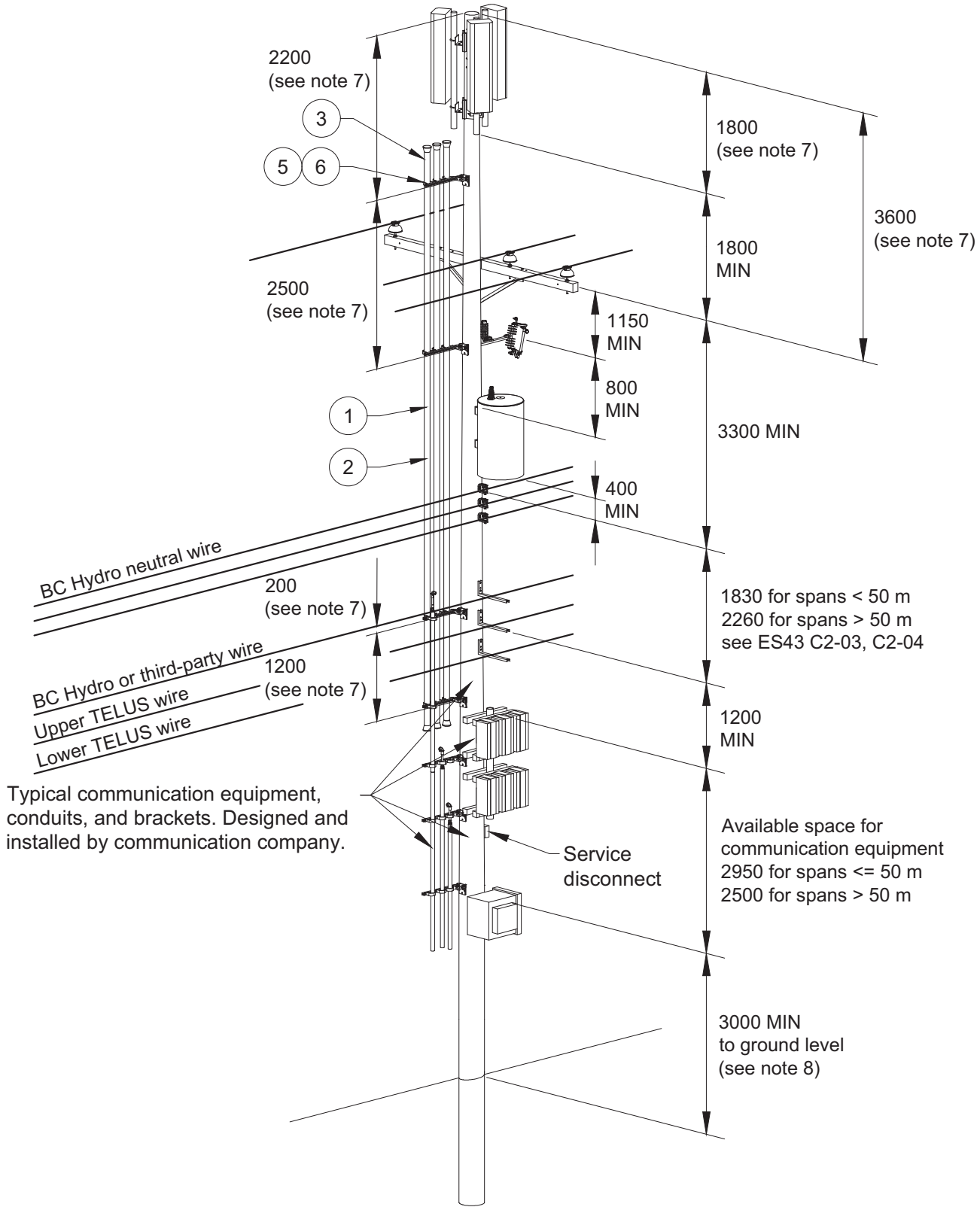


Figure 1 – Antenna installation three-phase flat single-phase transformer

Application

This standard provides requirements for antenna installation on a single-phase armless pole.

Revision Notes

Added *Application* and *Revision Notes* sections. Updated *References*. Added new notes 4 and 5. Added note references to Figure 1. Substantive changed content is marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2025-006 *Revised ES43 C3 Antenna Installation Standards*.

Items Required

Item	Description	Material number	Quantity
1	Duct, 3" x 20 ft, straight conduit, FRE	9700-3825	1 per conduit run
2	Duct, 3" x 10 ft, straight conduit, FRE	9700-3826	1 per conduit run
3	End, conduit, 3", FRE	9700-3827	2 per conduit run
4	Adhesive, epoxy, 2-part, FRE, 21°C ambient curing temperature, or 4°C ambient curing temperature, or -7°C ambient curing temperature	9700-3828 9700-3829 9700-3830	2
5	Bracket, mounting, conduit, 24"	9700-4090	4
6	Bracket, mounting, conduit strap kit, 3"	9700-4091	4 per conduit run

References

BC Hydro Distribution Standards

ES43 C2-03	Typical Vertical Wire Separation at a Joint-Use Pole Between BC Hydro and TELUS
ES43 C2-04	Typical Vertical Wire Separation at a Joint-Use Pole for BC Hydro, TELUS, and Third-Party Communications Licensee Plant
ES43 C3-01	Antenna Installation General Requirements
ES43 C3-08	Antenna Installation Grounding
ES43 D3-12	Culvert Pole Foundation in Soft Soil
ES43 G7-01	Armless Triangular Tangent Structure

Designed: S. Sharma		Professional of Record PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA K. D. MIDDLETON # 32387 2025-03-25 Permit to Practice #1002449	Antenna Installation Single-Phase Armless
Checked: K. Middleton, P. Eng			
Reviewed: K. Middleton, P. Eng			DISTRIBUTION STANDARDS BC Hydro
Approved: H. Giesbrecht, P. Eng		Issued: 2025-03-27 Effective: 2025-03-27	ES43 C3-06 R1

Notes

1. See ES43 C3-01 for application notes, design notes, bracket and conduit details, and conduit installation instructions.
2. A 60 ft class 1 pole is of adequate strength for span lengths less than or equal to those in Table 1. See ES43 C3-01 for analysis assumptions.

Table 1 – Maximum span length for 60 ft class 1 pole

Maximum line angle	Maximum span length (m)		
	CSA medium B loading	CSA heavy loading	CSA severe loading
0°	75*	75	60
3°	70	40	35
5°	45	30	30
* Span length limited by maximum 75 m span length for open wire secondary.			

3. Use culvert pole foundation for installation in soft soil. See ES43 D3-12.
4. Distances can be field adjusted.
5. Based on typical 1800 mm antenna height.

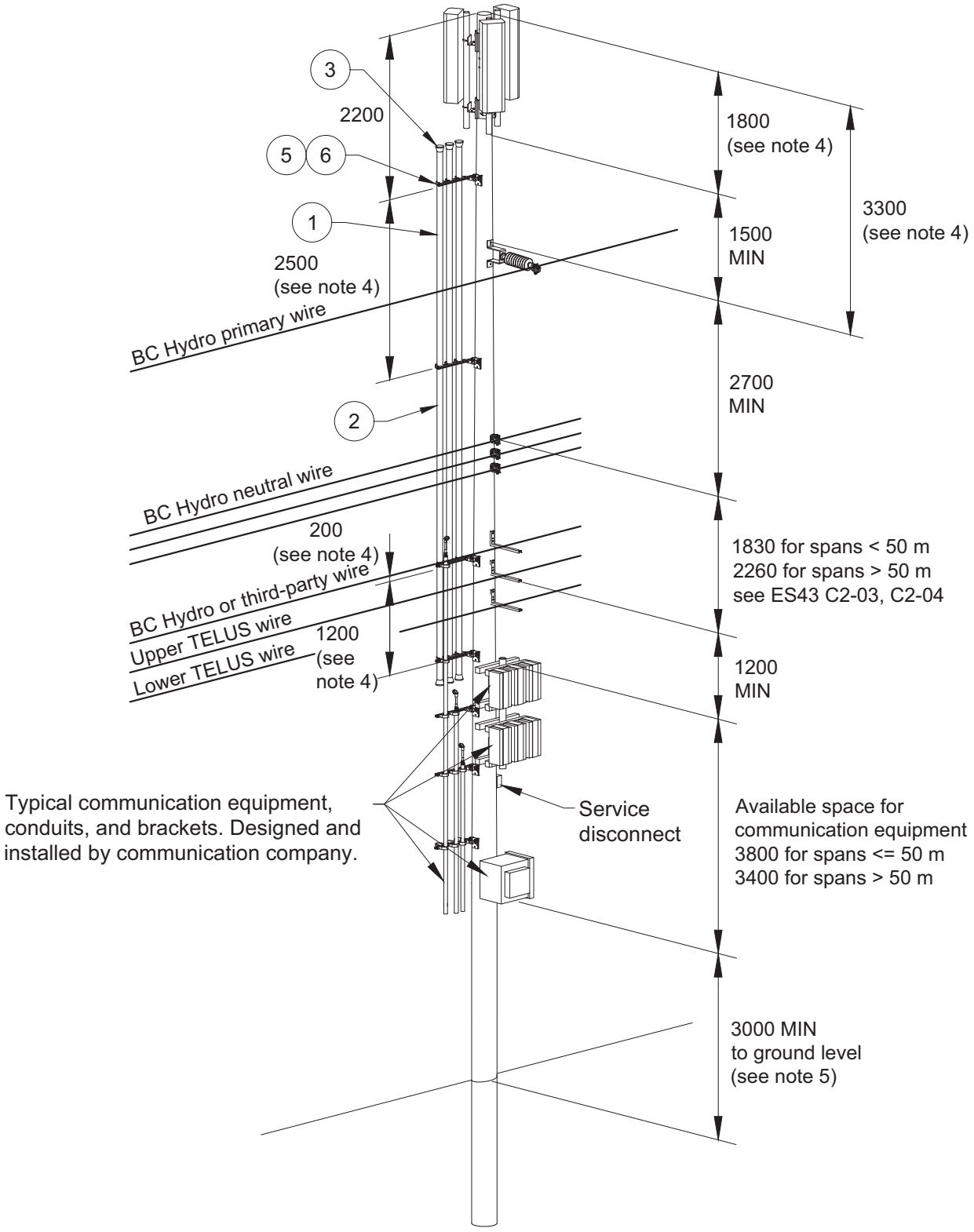


Figure 1 – Antenna installation single-phase armless

Application

This standard provides requirements for antenna installation on a single-phase armless pole with a single-phase transformer.

Revision Notes

Added *Application* and *Revision Notes* sections. Updated *References*. Added new notes 6 and 7. Added note references to Figure 1. Substantive changed content is marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2025-006 *Revised ES43 C3 Antenna Installation Standards*.

Items Required

Item	Description	Material number	Quantity
1	Duct, 3" x 20 ft, straight conduit, FRE	9700-3825	1 per conduit run
2	Duct, 3" x 10 ft, straight conduit, FRE	9700-3826	1 per conduit run
3	End, conduit, 3", FRE	9700-3827	2 per conduit run
4	Adhesive, epoxy, 2-part, FRE, 21°C ambient curing temperature, or 4°C ambient curing temperature, or -7°C ambient curing temperature	9700-3828 9700-3829 9700-3830	2
5	Bracket, mounting, conduit, 24"	9700-4090	4
6	Bracket, mounting, conduit strap kit, 3"	9700-4091	4 per conduit run

References

BC Hydro Distribution Standards

ES43 C2-03	Typical Vertical Wire Separation at a Joint-Use Pole Between BC Hydro and TELUS
ES43 C2-04	Typical Vertical Wire Separation at a Joint-Use Pole for BC Hydro, TELUS, and Third-Party Communications Licensee Plant
ES43 C3-01	Antenna Installation General Requirements
ES43 C3-08	Antenna Installation Grounding
ES43 D3-12	Culvert Pole Foundation in Soft Soil
ES43 G7-01	Armless Triangular Tangent Structure
ES43 J2-01	Single-Phase Transformer Framing Top Bushing Tangent Pole
ES43 K4-02	Typical Surge Arrestor Installations

Designed: S. Sharma		Professional of Record PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA K. D. MIDDLETON # 32387 2025-03-25 Permit to Practice #1002449	Antenna Installation Single-Phase Armless Single-Phase Transformer
Checked: K. Middleton, P. Eng			
Reviewed: K. Middleton, P. Eng			DISTRIBUTION STANDARDS BC Hydro / ES43 C3-07 R1
Approved: H. Giesbrecht, P. Eng		Issued: 2025-03-27 Effective: 2025-03-27	

Notes

1. See ES43 C3-01 for application notes, design notes, bracket and conduit details, and conduit installation instructions.
2. This standard only shows equipment orientation and spacing. See ES43 J2-01 for transformer connection details and materials.
3. Mount surge arrestor on cutout to maintain separation between conduit and live parts. See ES43 K4-02 for surge arrestor details.
4. A 60 ft class 1 pole is of adequate strength for span lengths less than or equal to those in Table 1. See ES43 C3-01 for analysis assumptions.

Table 1 – Maximum span length for 60 ft class 1 pole

Maximum line angle	Maximum span length (m)		
	CSA medium B loading	CSA heavy loading	CSA severe loading
0°	75*	75*	65
3°	75*	45	35
5°	50	35	30
* Span length limited by maximum 75 m span length for open wire secondary.			

5. Use culvert pole foundation for installation in soft soil. See ES43 D3-12.
6. Distances can be field adjusted.
7. Based on typical 1800 mm antenna height.

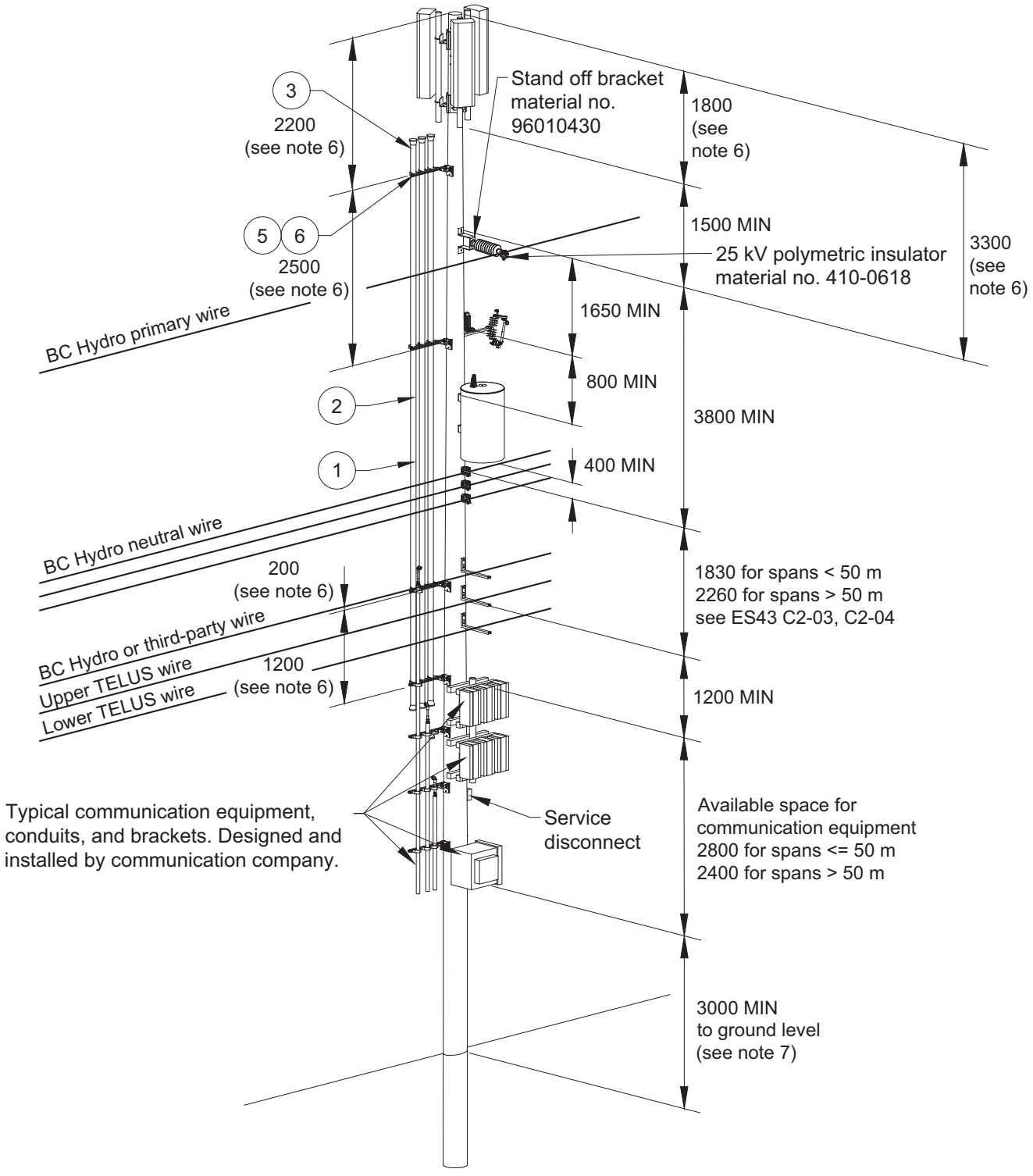


Figure 1 – Antenna installation single-phase armless single-phase transformer

Application

This standard describes requirements for grounding antenna installations.

Revision Notes

Updated theft deterrent ground wire material number in Figure 1. Substantive changed content is marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2025-049 *Revised ES43 and ES54 Standards Using Theft Deterrent Ground Wire*.

References

BC Hydro Distribution Standards

ES43 C3-01	Antenna Installation General Requirements
ES43 R2-01	Ground Rods at Wood Poles and Multiple Ground Rods
ES43 R7-01	Other Utilities Grounding Connections

Notes

1. Cellular equipment non-current carrying metallic components and conductive cable sheaths shall be bonded to the Erico theft deterrent ground wire.
2. Unbonded hardware components shall be separated by minimum 50 mm.
3. Bonding and grounding practices shall be per ES43 section R, specifically:
   a. Install ground electrode per ES43 R2-01 if not already installed at the pole.
   b. Bonding conductors shall be minimum #4 AWG copper.
   c. Grounding conductors shall be theft deterrent grounding wire per ES43 R2-01.
   d. Ground electrodes installed by TELUS and BC Hydro third-party communication licensees at joint use poles shall be installed per ES43 R2-01, leaving a coil of ground wire banded to the pole below the system neutral for subsequent connection to the system neutral by BC Hydro. Non-current carrying metallic communication components shall be bonded to the ground wire at every pole ground electrode location. Ground electrodes installed by TELUS may use ¾" diameter 10 ft long galvanized steel rods as an acceptable alternative to BC Hydro ground rods (material number 420-1093).

Designed: C. Picassi, P. Eng		Professional of Record EGBC Permit 1001348 PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA C. C. PICASSI # 35692 2025-08-20	Antenna Installation Grounding
Checked: C. Picassi, P. Eng			
Reviewed: V. Batinovic, P. Eng			DISTRIBUTION STANDARDS BC Hydro — ES43 C3-08 R2
Approved: H. Giesbrecht, P. Eng	H. Giesbrecht	Issued: 2025-08-22 Effective: 2025-08-22	

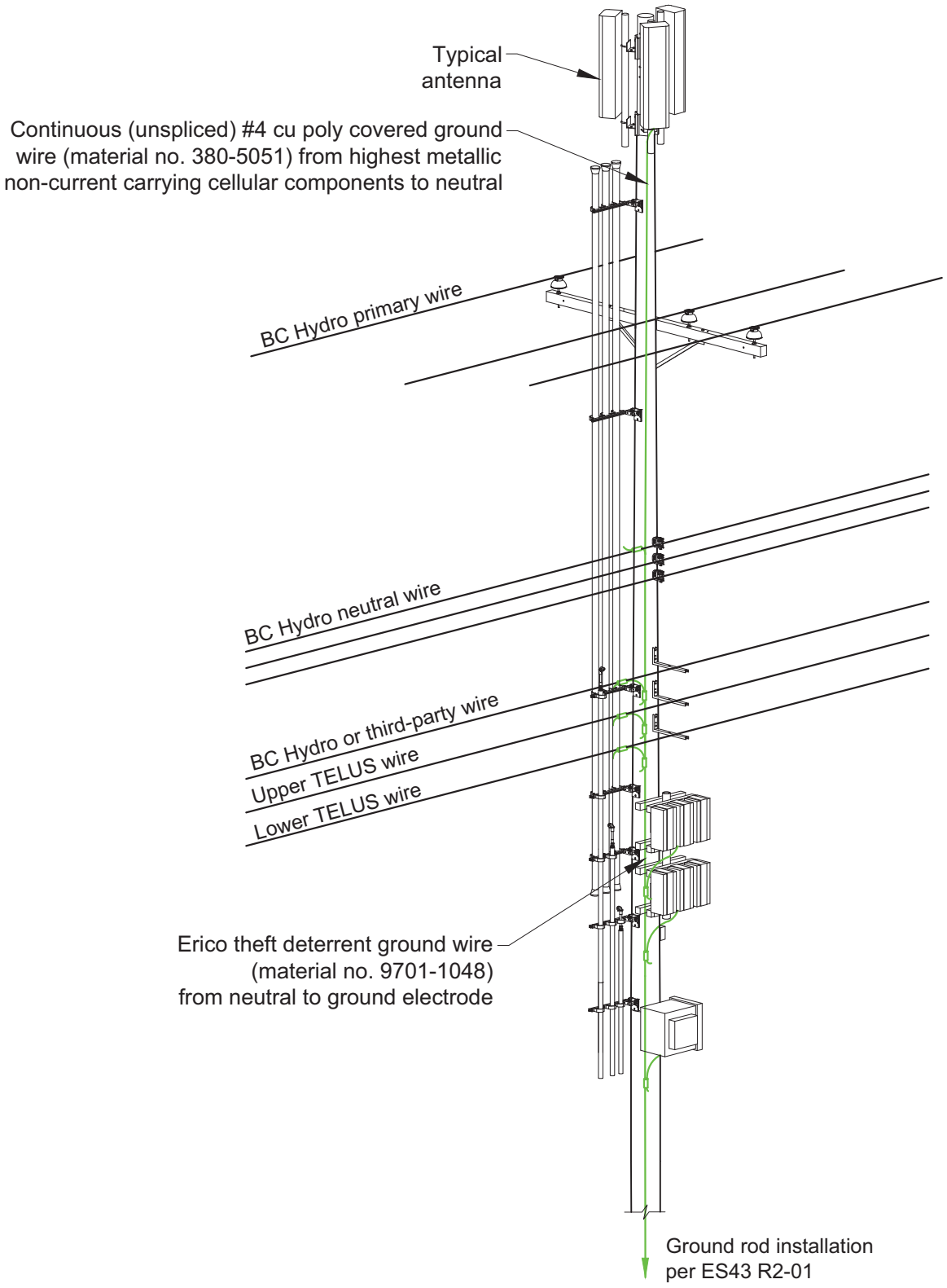


Figure 1 – Antenna installation grounding

Application

This standard applies to the installation of third-party cellular antennas within the third-party space. This standard does not apply to cellular antennas owned and installed by TELUS.

Revision Notes

Added documents to *References*. Updated note 5d quantity and material number and removed manufacturer part numbers. Substantive changes are marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2025-049 *Revised ES43 and ES54 Standards Using Theft Deterrent Ground Wire*.

References

BC Hydro Distribution Standards

ES43 C1-05	Joint and Secondary Use Climbing and Working Space
ES43 C2-04	Typical Vertical Wire Separation at a Joint-Use Pole for BC Hydro, TELUS, and Third-Party Communications Licensee Plant
ES43 G1-04	Climbing Space Through Drop Wires Communication and Secondary
ES43 R2-01	Ground Rods at Wood Poles and Multiple Ground Rods
ES43 R7-01	Other Utilities Grounding Connections
ES55 E6-02	Design Assumptions for Third-Party Licensees

Other BC Hydro Documents

DES 002	Move Down Request to TELUS for BC Hydro Equipment

Work Procedure: Working Near Third-Party Radio Frequency (RF) Antennas

External Documents

Safety Code 6	Health Canada Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz

Notes

1. General

a. Mid-pole wireless equipment shall not be installed on poles with:

i. Capacitor banks;

ii. Two or more transformers;

iii. A recloser, voltage regulator, or primary switch;

iv. Two dips / laterals;

v. Primary revenue metering;

vi. Double alley arms supporting TELUS strand;

Designed: C. Picassi, P. Eng		Professional of Record EGBC Permit 1001348 C. C. PICASSI # 35692 2025-08-20	Mid-Pole Antenna Design and Installation Requirements	
Checked: C. Picassi, P. Eng				
Reviewed: V. Batinovic, P. Eng			DISTRIBUTION STANDARDS BC Hydro	ES43 C4-01 R1
Approved: H. Giesbrecht, P. Eng	H. Giesbrecht	Issued: 2025-08-22 Effective: 2025-08-22		

vii. Radio frequency (RF) emitting equipment owned by another telecommunications company;

viii. BC Hydro smart metering infrastructure; and

ix. Transmission voltage conductors 69 kV and above.

b. Mid-pole wireless equipment should not be installed on the following due to pole congestion and climbing space limitations:

i. Junction poles (poles where lines run in four or more directions);

ii. Tap poles; and

iii. Heavy angle or corner poles.

c. See work procedure *Working Near Third-Party Radio Frequency (RF) Antennas* when working near a cellular antenna. Installations shall have a service disconnect to isolate electric service.

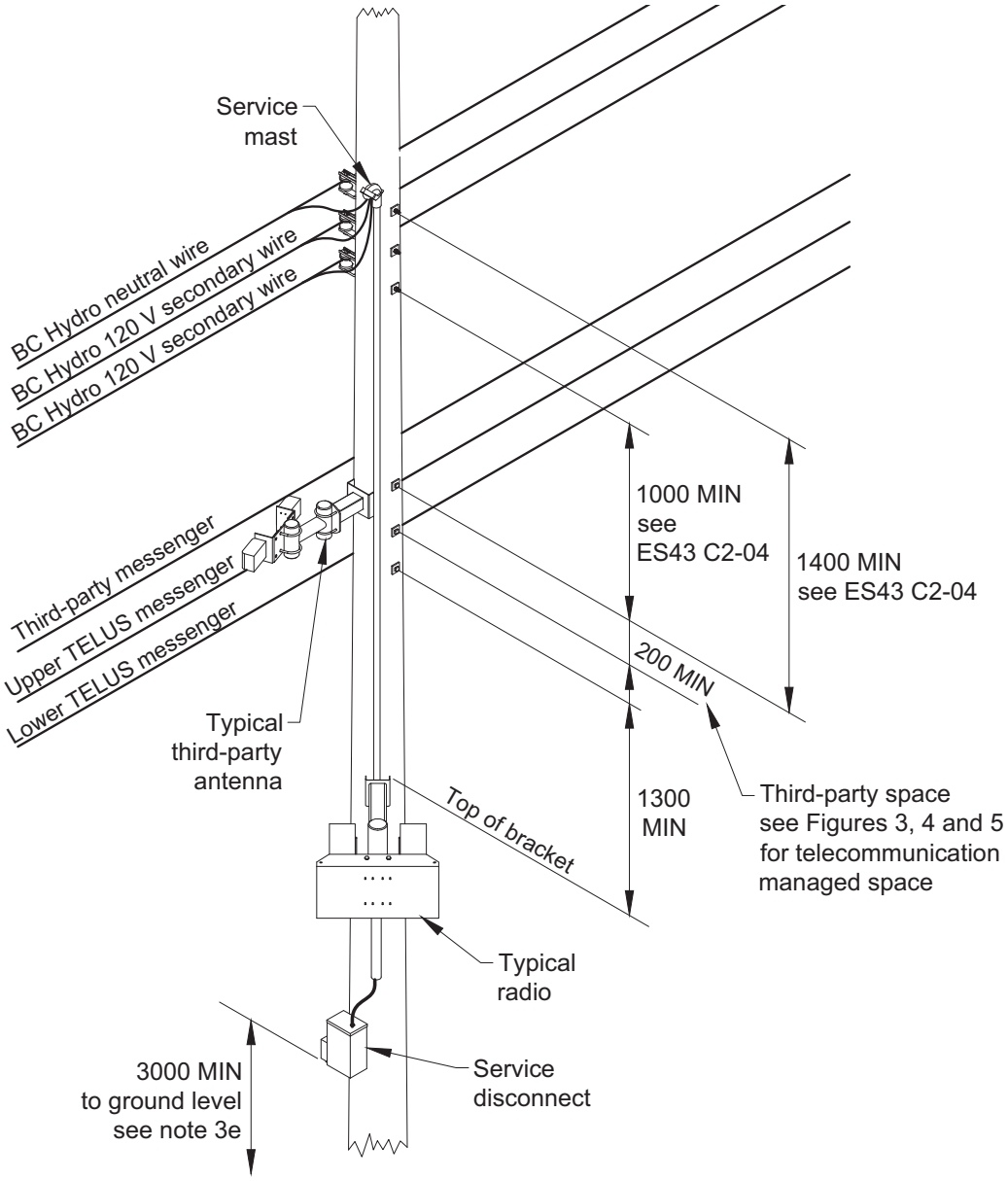


Figure 1 – Typical arrangement of mid-pole wireless equipment on a joint-use pole, view from property side

2. Equipment Design

a. The antenna and mounting bracket system shall be engineered by the applicant and are subject to review and acceptance by a BC Hydro engineer.

b. The antenna and bracket shall be engineered to meet the CSA heavy loading requirements of 12.5 mm radial ice, -20°C, and 400 Pa wind pressure.

c. The antenna bracket attachment to the pole shall include at least one ⅝" through-bolt or threaded rod. Through-bolt attachments shall be installed with a large curved washer.

d. The antenna and bracket design shall not include any sharp corners which may snag climbing equipment or present a hazardous contact surface for climbing or falling workers.

3. Equipment Installation

a. Mid-pole wireless installation equipment, including the antenna, associated radio, communications cables, and supply cables, should be installed within a single quadrant to minimize pole congestion and provide adequate climbing space. Mounting in a property-side quadrant is preferred.

b. Equipment shall not interfere with bucket access to secondary and service wires from the road side.

c. Installation on the road side is not permitted on poles with a transformer.

d. A 750 mm x 750 mm climbing space shall be maintained through the telecommunications and secondary pole space. See Figure 2 and ES43 G1-04.

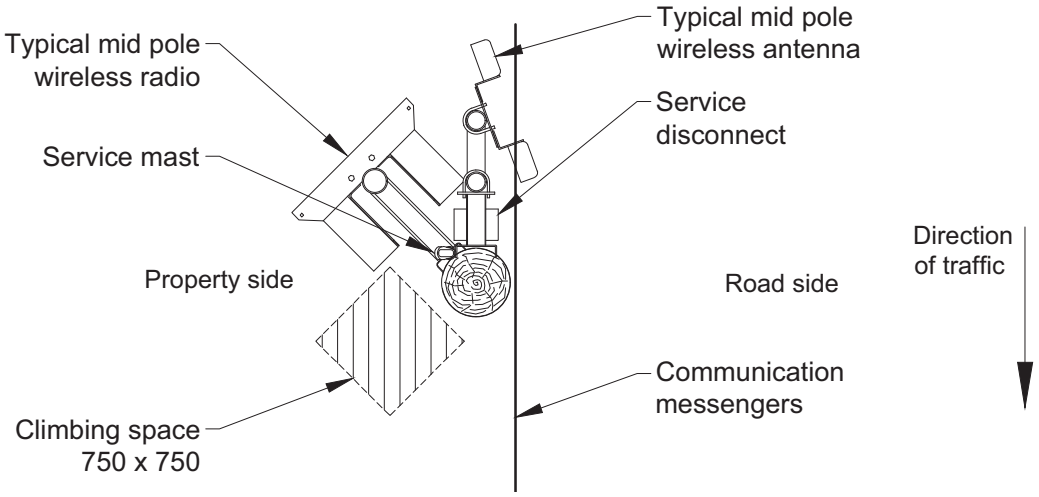


Figure 2 – Equipment location and climbing space, plan view

e. The wireless communication antenna and its associated components shall maintain a minimum separation of 3 m above ground or a distance in accordance with Safety Code 6 radiofrequency exposure guidelines, whichever is greater.

f. Communication and supply cables should be kept off the pole axis used to dead end wires to avoid conflict with current and future power and telecommunications hardware.

g. The mounting bracket and antenna shall not conflict with dips and laterals and associated cable covers, guying hardware and wires, power service drops, and telecommunication service drops.

h. Bolts installed perpendicular or parallel to one another shall maintain minimum 64 mm separation for ⅝" bolts and minimum 75 mm separation for bolts installed by TELUS to prevent pole quartering.

i. The antenna mounting bracket, antenna, and messenger shall fit within the vertical 200 mm third-party space as shown in Figure 3.

j. TELUS previously installed 10" (300 mm) extension straps that encroach into the third-party space by 100 mm. If such a 300 mm strap has been installed, existing attachments shall be moved to avoid quartering the pole. Moving third-party and TELUS attachments down 100 mm should avoid quartering poles drilled to standard. Follow DES 002 when requesting move down of TELUS attachments. Contact the Joint Use Office for more information. See Figures 3, 4, and 5.

k. The mounting bracket and antenna shall not obstruct access to TELUS pole space, messengers, or service drops.

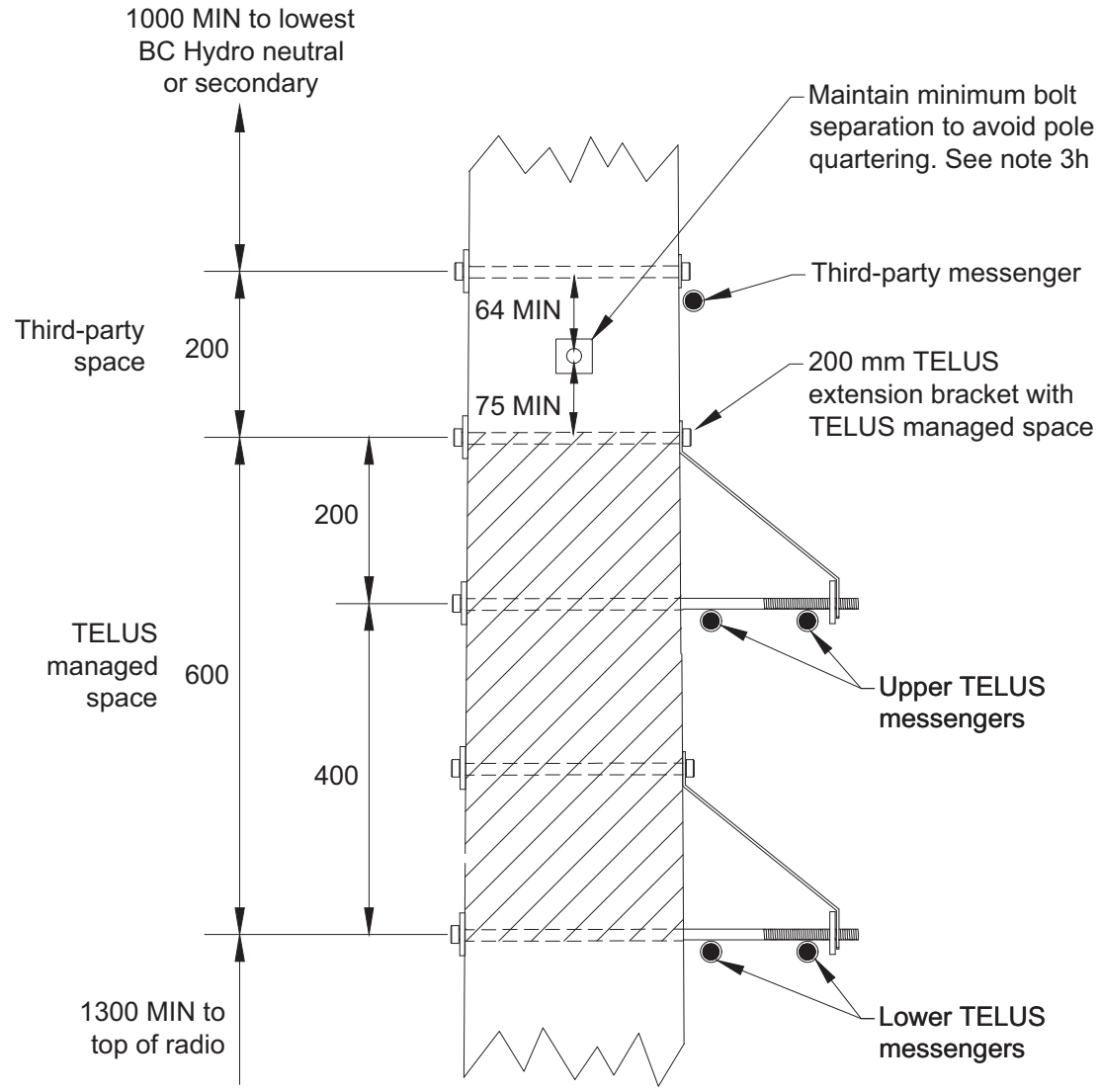


Figure 3 – No conflict between 200 mm (8") TELUS extension bracket and third-party mid-pole wireless bracket

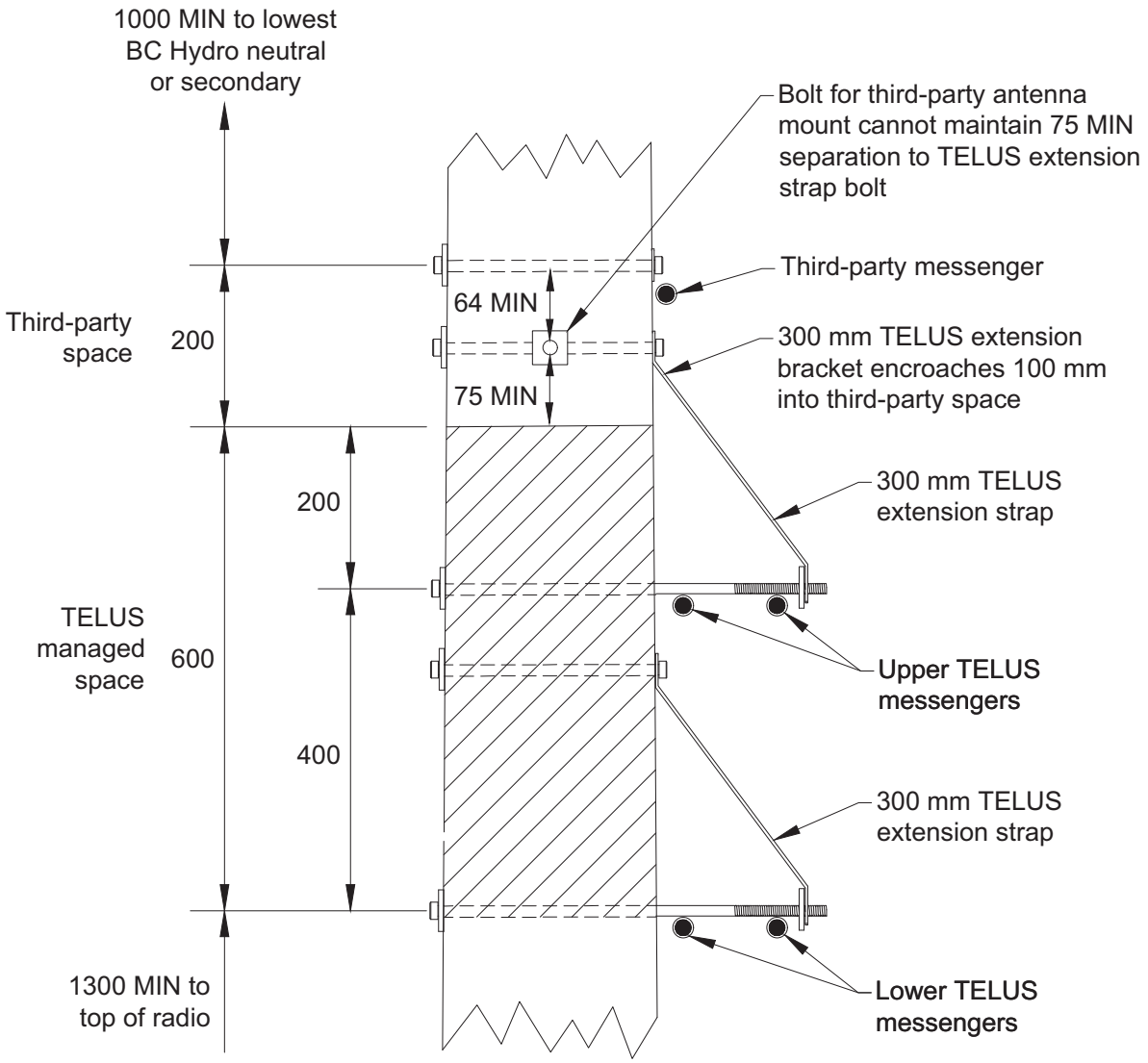


Figure 4 – Conflict between 300 mm (10") TELUS extension bracket and third-party mid-pole wireless bracket

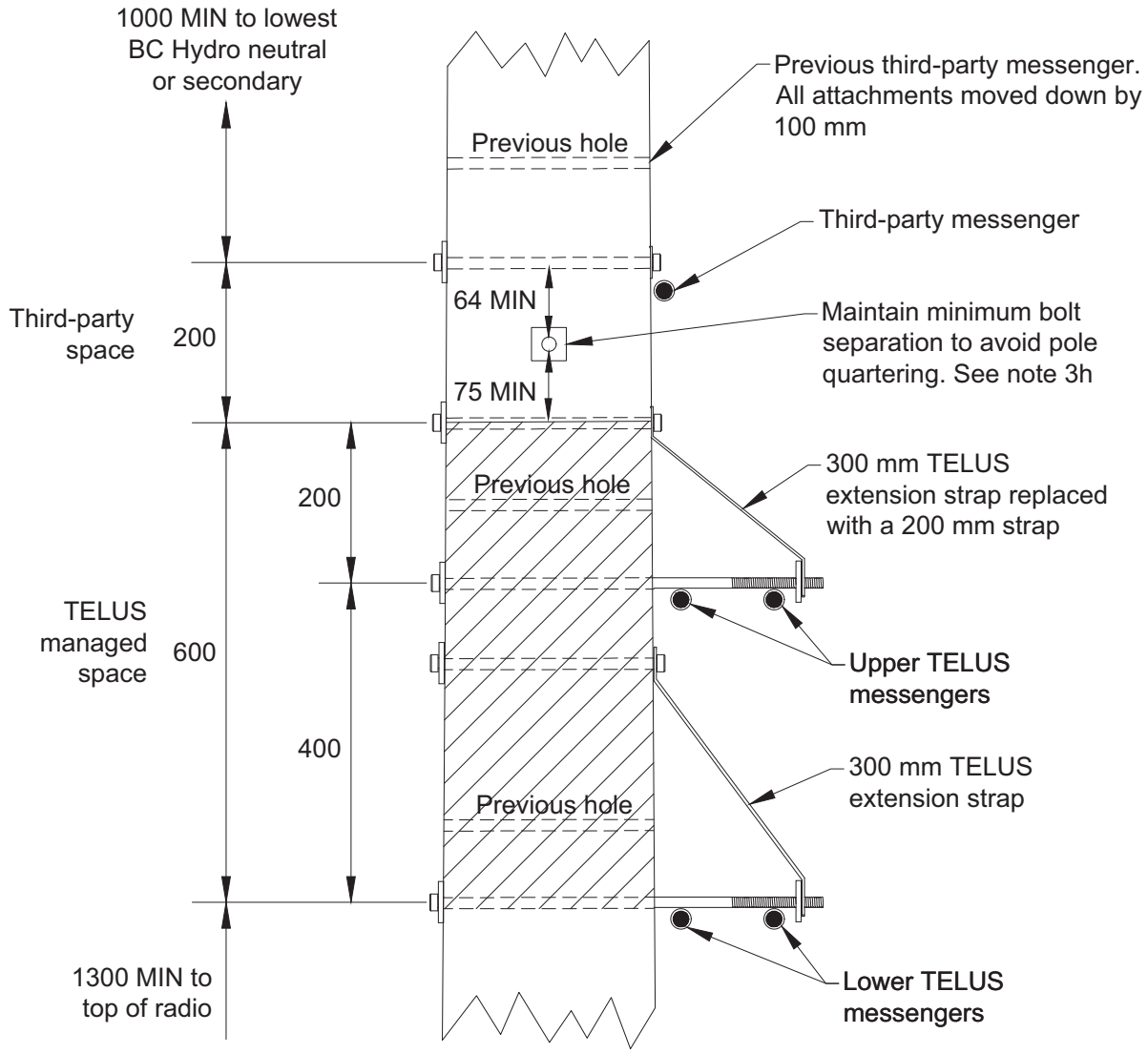


Figure 5 – Third-party and TELUS attachments moved down 100 mm to avoid conflict between 300 mm (10") TELUS extension bracket and third-party mid-pole wireless bracket

4. Supply

a. Battery backup power is not permitted.

b. Service is under flat rate metering.

c. Conduit to and from the service disconnect should be adjacent and in the same quadrant as the mid-pole wireless equipment to maintain pole climbing space and minimize pole congestion.

d. Supply cables shall be insulated for the full run length and shall be protected by a conduit. The conduit shall extend 150 mm above the top secondary or neutral clevis.

e. The supply shall have an external service disconnect installed to isolate electric service. The external service disconnect:

   i. Shall be located outside the RF safe working distance so a worker can shut off the antenna without being exposed to harmful RF radiation;

ii. Shall be mounted minimum 3000 mm above ground;

iii. Should be mounted on the pole and be visible from the road;

iv. Shall be a minimum 1300 mm below the lowest TELUS messenger attachment when mounted on the pole to provide TELUS with adequate working space; and

v. Shall be marked with the owner's equipment identification number and emergency contact phone number in a font size that is easily read from a position on the road approximately 5 m from the pole.

5. Bonding and Grounding

a. Ground electrode and wire shall be installed per ES43 R2-01, if not already installed at the pole.

b. Ground electrodes installed by third parties may use galvanized steel rods as an acceptable alternative to BC Hydro ground rods (material number 420-1093).

c. A coil of ground wire shall be banded to the pole below the system neutral for subsequent connection to the system neutral by BC Hydro at the time of service connection.

d. Grounding conductors shall be theft deterrent grounding wire as shown in ES43 R2-01:

i. 13 m coil of ground wire is BC Hydro material number 9701-1048; and

ii. 75 m coil of ground wire is BC Hydro material number 9600-6427.

e. Non-current carrying metallic communication components shall be bonded to the ground wire using minimum #6 AWG copper.

Application

This standard applies to the installation of strand-mounted antennas within the BC Hydro telecommunication space or BC Hydro third-party telecommunication space.

Revision Notes

New standard, released concurrently with Standards and Equipment Advisory Information Bulletin 2023-026 *Release of ES43 C5-01 Strand-Mounted Antennas Design and Installation*.

References

BC Hydro Distribution Standards

ES43 C1-02	Joint and Secondary Use Equipment Boxes on Poles
ES43 C1-05	Joint and Secondary Use Climbing and Working Space
ES43 C2-04	Spacing and Separation Typical Vertical Wire Separations at a Joint Use Pole for BC Hydro, Telus, and Third-Party Communications Licensee Plant
ES43 R2-01	Bonding and Grounding Ground Electrode Installations Ground Rods at Wood Poles and Multiple Ground Rods
ES43 R7-01	Bonding ang Grounding Other Utilities Grounding Connections

Other BC Hydro Documents

Work Procedure	Working Near Third-Party Radio Frequency (RF) Antennas

External Documents

CSA 22.1	Canadian Electrical Code, Part I
CSA C22.3 No. 1	Overhead systems

Notes

General

1. Strand-mounted antenna locations shall be approved by BC Hydro before installation.
2. A strand-mounted antenna shall not be installed in spans where the adjacent pole has:
   a. A platform-mounted capacitor bank, recloser, or voltage regulator;
   b. Primary revenue metering;
   c. Radiofrequency (RF) emitting equipment owned by another telecommunications company; or
   d. Less than the following minimum distance to BC Hydro smart metering infrastructure:
      i. 30 m from existing medium-power wireless equipment; and
      ii. 75 m from existing high-power wireless equipment.

Designed: H.Luk, P. Eng		Professional of Record	Strand-Mounted Antenna Design and Installation
Checked: H. Luk, P. Eng		PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA H. C. LUK Permit to Practice: 1000854	
Reviewed: M. Stevens, P. Eng			DISTRIBUTION STANDARDS BC Hydro / ES43 C5-01 R0
Approved: M. Stevens, P. Eng		Issued: 2023-07-24 Effective: 2023-07-24	

3. Only one strand-mounted antenna and associated equipment shall be allowed in each span.
4. Noise emitted from the antenna and radio shall meet local noise bylaws.

Equipment Mounting and Installation

5. Avoid installing a strand-mounted antenna on the strand if mid-span services are present.
6. A strand-mounted antenna shall not interfere with pole climbing, maintenance, and secondary wires.
7. Service to a strand-mounted antenna is under flat rate metering.

Supply

8. A strand-mounted antenna may be powered from coax cable or a 120 V secondary supply on the adjacent pole.
9. Any 120 V external communication power supply box on the pole shall be installed per ES43 C1-02.
10. Battery backup power is permitted for coax with a disconnect from RF emitting devices and is not permitted for a 120 V feed to a single small cell location.
11. A strand-mounted antenna shall have an external service disconnect installed to isolate electric service. The external service disconnect shall be:
    a. Located outside the RF safe working distance so a worker can shut off the antenna without being exposed to harmful RF radiation; and
    b. Mounted a minimum 3000 mm above ground.
12. A strand-mounted antenna powered by coax cable shall be equipped with a power disconnect switch that can be accessed and operated without special tools or the use of a key.

Identification Tags

13. The following tags shall be installed at each strand-mounted antenna site:
    a. An antenna owner ID tag with unique ID number, contact phone number, and location.

    b. Caution tags for RF emitting devices.

c. The font size shall be easily read from a position on the pole approximately 5 m from the pole.

Clearances

14. No device shall be placed within 1 m of either side of a power pole.
15. Third-party equipment shall not interfere with operation access to TELUS messengers nor extend more than 200 mm below third-party messengers.
16. Third-party cables and equipment shall be supported by a minimum size 8 messenger to prevent the wire and equipment from interfering with TELUS messengers.

Bonding and Grounding

17. Bonding and grounding practices shall comply with ES43 section R. Specifically, for 120 V supply:
    a. Ground electrode and wire shall be installed per ES43 R2-01 if not already installed at the pole. A ground electrode is required if there is a local 120 V power supply but not required if powered by coax cable.
    b. Grounding conductors shall be theft deterrent grounding wire as shown in ES43 R2-01.
    c. Conductive parts of the strand-mount antenna assembly shall be bonded together and grounded to the pole ground and shall meet CSA C22.3 No. 1 requirements.

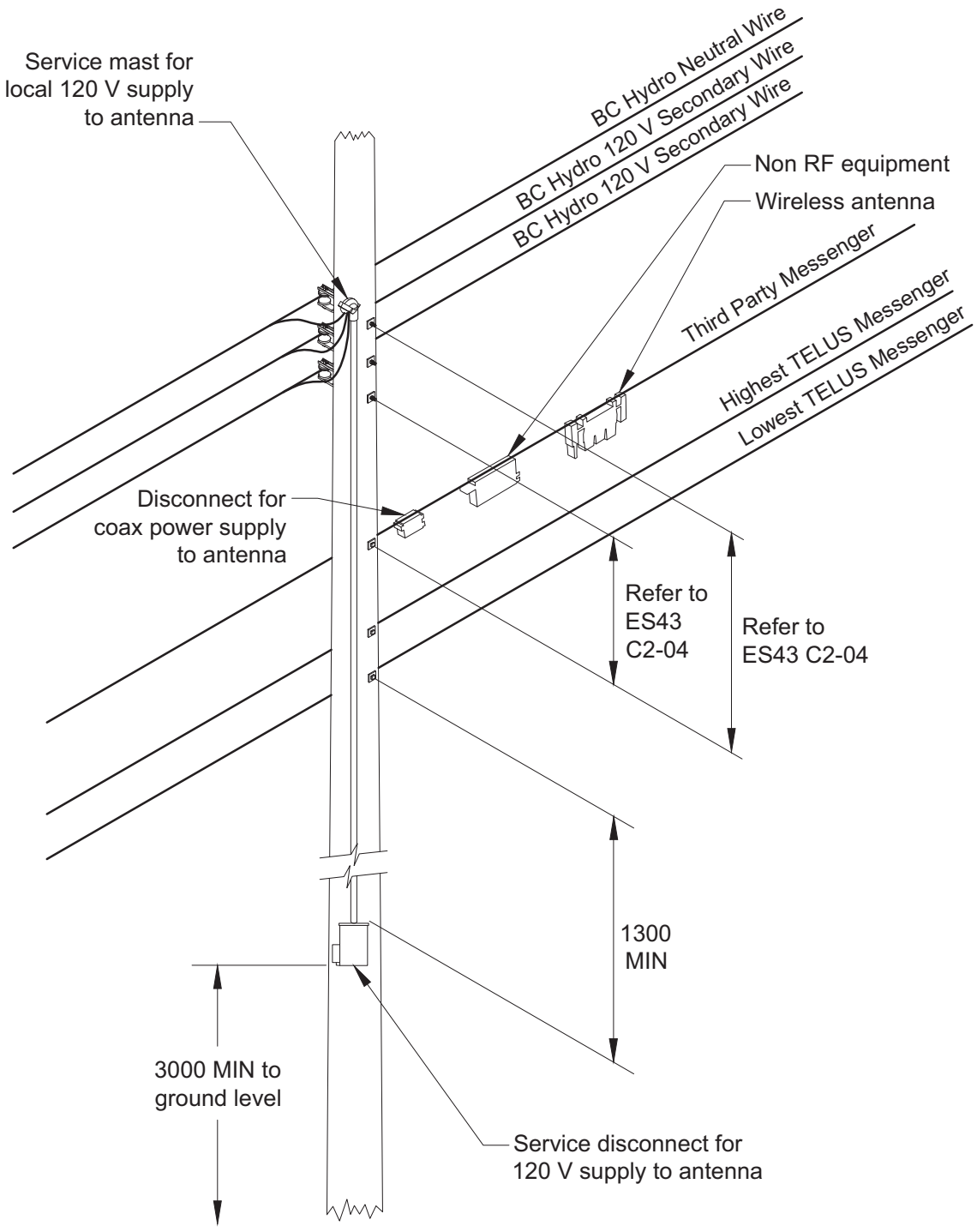


Figure 1 – Typical arrangement of strand wireless antenna with BC Hydro third-party telecommunication space (options for 120 V and coax power supply shown)

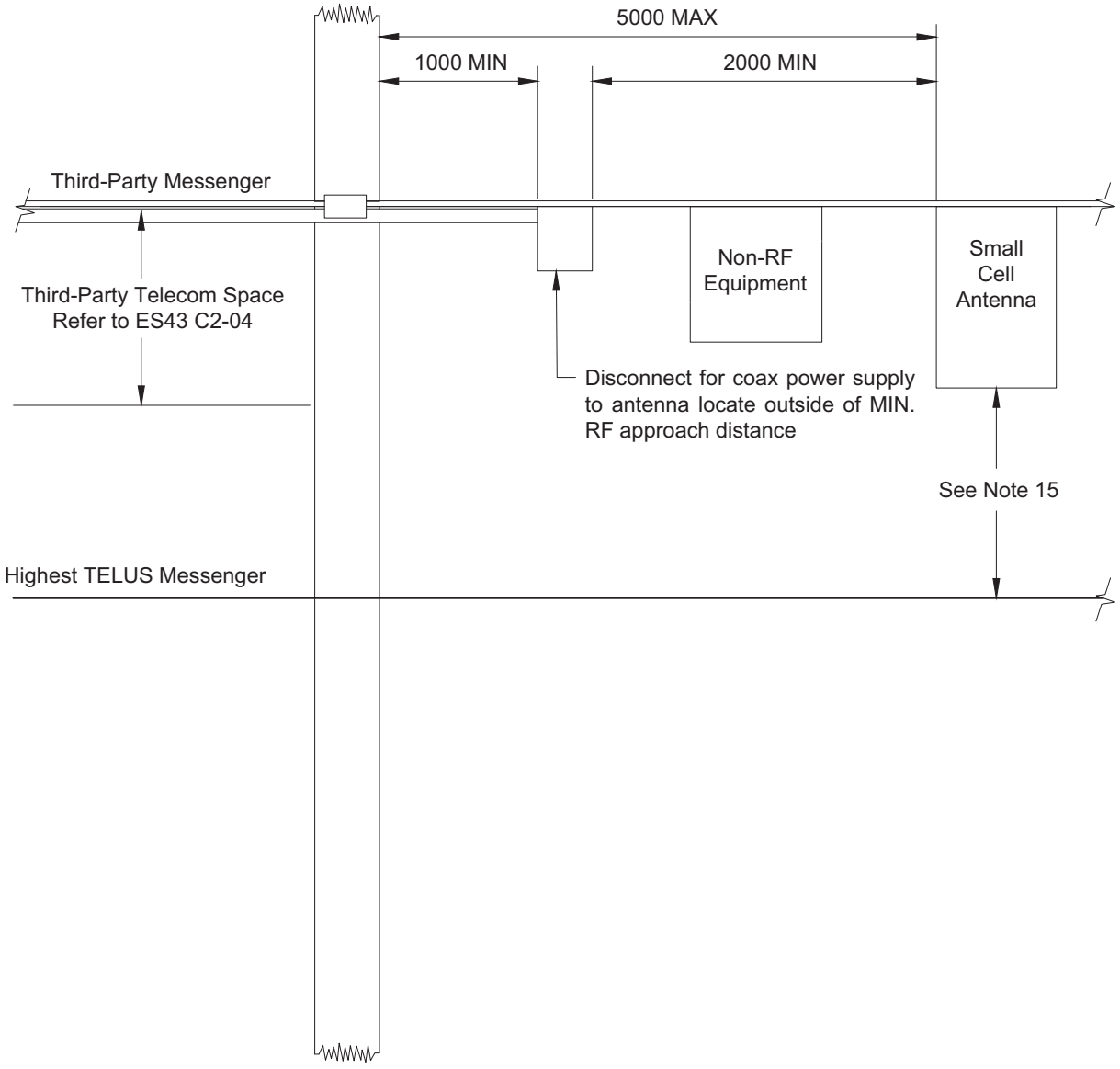


Figure 2 – Layout and clearances for strand-mounted equipment (NTS)