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REVISIONS: UPDATED LEGAL ACKNOWLEDGEMENT FORM. FD MAR '16

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

- Ensure uniform safety requirements comply with BC statutes and regulations.
- Provide uniform system reliability.
- Provide uniform operating practices.
- Permit economic bulk purchasing of materials.
- Achieve optimum life cycle cost of plant construction.
- 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.

REVISIONS: UPDATED LEGAL ACKNOWLEDGEMENT FORM. FD MAR '16

DESIGNED J. AGNOLIN	RECOMMENDED  F. DENNERT	ACCEPTED  S. REIMER	ENGINEER OF RECORD  F. U. DENNERT PROFESSIONAL ENGINEER BRITISH COLUMBIA	NOTICE FROM THE EXECUTIVE VICE PRESIDENT TRANSMISSION AND DISTRIBUTION AND CUSTOMER SERVICE		
DISTRIBUTION STANDARDS BC Hydro		ISSUED: MAR 2016 REPLACES: MAY 2004 ORIGINALLY ISSUED: NOV 1980		PAGE 2 OF 2	ES43/53/54/55/65 A1-01.02	R 4

SPECIFICATIONS

Class of Work for Construction of Underground Electrical Distribution Structures by a BC Hydro Contractor

Revisions:

Clause No.	Description Of Revision	Date
All	Class of Work was significantly re-written and edited.	July 13, 2016
Table of contents	Clauses are renumbered	Oct 25, 2019
7.0	New clause: Construction Schedule	
8.0	Added requirement for environmental monitoring plan	
8.2	New clause: Field Review	
8.3	New clause: Record Drawings	

DESIGNED		RECOMMENDED		ACCEPTED	
 L. STEVANOVIC				 F. DENNERT	
Date:	Oct 25, 2019	Date:		Date:	Oct 25, 2019

SPECIFICATIONS

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1.0 General

This Class of Work Specifications forms the Appendix G of the Contract Documents for the Contract made between BC Hydro and the Contractor.

2.0 Definitions

Capitalized terms shall have the meaning defined in the ES54, Section W and Contract Documents.

3.0 Standard of the Work

ES54 Series Underground Civil Distribution Standards published by BC Hydro, in effect of the date of publication of the Request for Tenders (RFT), form a part of the Contract.

4.0 Pre-construction Meeting

Before the start of the Work, Hydro's Representative conducts the pre-construction meeting. The Contractor shall prepare the required documentation in accordance with the Contract and advise the Hydro's Representative of the pre-construction meeting's location and time.

The Contractor shall ensure that the following individuals attend the meeting:

- 1) A Contractor's Representative, Qualified Person (as described in the Workers Compensation Act and the Regulation), and
- 2) A representative for each Subcontractor.

5.0 Laws, Permits, and Fees

The Contractor is responsible to obtain all necessary permits, pay fees, and comply with all applicable laws, ordinances, rules, regulations, codes and orders of the Authority Having Jurisdiction (AHJ), which apply during the performance of the Work.

The Contractor shall notify property owners affected by the Work at least 48 hours in advance of any access restriction to the property.

The Contractor is responsible for making arrangements with the AHJ and property owners adjacent to the Site for the use of any access and storage areas the Contractor may require.

6.0 Existing Site Information

Any geotechnical or soil information for the Site is provided for the Contractor's own use, and the Contractor shall be solely responsible for the interpretation of such information and for impacts resulting from its interpretation.

The Contractor shall make a BC One Call request and the relevant documents shall be made readily available on Site. BC One Call is a non-profit corporation that identifies underground utilities in B.C. and notifies member utilities with underground facilities of planned excavations near their installations. The Contractor shall be responsible for:

- 1) Locating and exposing all buried utility services;

- 2) Building around, under or over other services, and taking proper precautions against accidental damage, and
- 3) Maintaining specified clearances between services and structures.

The type and location accuracy of existing structures and utilities shown on the BC Hydro drawings are not guaranteed. BC Hydro makes no warranty and accepts no responsibility for the accuracy and completeness of any information relevant to the existing infrastructure or existing utility information. Any use or interpretation of BC Hydro drawings is at the sole risk of the Contractor.

7.0 Construction Schedule

The Contractor shall submit the Construction Schedule to Hydro's Representative prior to the pre-construction meeting. The Construction Schedule shall include Work activities, and shall be consistent with the Design.

8.0 Design, Field Review and Record Drawings

8.1 Design by the Contractor

When responsible for the Design, the Contractor shall retain a Professional of Record (POR) for each engineering discipline and submit all related letters of assurance to BC Hydro. All engineering content including Design (issued for construction) and Final Design (record) drawings shall be signed and sealed by the Professional of Record.

Alternately, when the Design is based entirely on strict application of ES54 Distribution Standards, to the opinion of BC Hydro, the Customer may retain any individual prequalified by BC Hydro to prepare the Design. In this case, the Design will not bear the engineering seal.

If applicable, the Contractor shall submit to BC Hydro the signed and sealed Design for review and acceptance a minimum of two (2) weeks prior to commencement of the work.

8.2 Field Review

The Professional of Record (POR) shall be responsible for conducting the Field Review to confirm that the construction complies with the Design. The POR shall prepare a field review plan and submit to BC Hydro for acceptance. Any deviation from the Design shall be approved by the POR and submitted to BC Hydro for acceptance and allow a minimum of one (1) week for review.

When Field Review is conducted by BC Hydro, the Contractor shall provide the Work schedule to BC Hydro Representative to set hold points for the Field Review. The Contractor shall not pass the hold points until BC Hydro advises the Contractor in writing that the Field Review has been completed.

Field Review (as per EGBC) is not required when the Design is not prepared by a POR.

8.3 Record Drawings

The Contractor shall record all changes to the original Design. Upon completion of the construction, the Contractor shall submit record drawings with all related letters of assurance to BC Hydro.

8.4 Final Design

The Contractor shall prepare the Final Design of any portions of the Design prepared by the Contractor in accordance with the ES54.

9.0 Protection of Environment

The Contractor shall protect the environment and comply with all federal, provincial, and municipal environmental laws and regulations in the performance of the Work.

Unless specified otherwise in the Contract Documents, the Environmental Protection Plan shall include as a minimum:

- 1) A demonstration of understanding of all environmental issues involved with the project;
- 2) All tasks required for environmental approvals;
- 3) A spill contingency plan;
- 4) All equipment inspection procedures to ensure that fuel and lubricating systems are in good working condition and free of leaks;
- 5) An environmental incident reporting plan and environmental monitoring plan identifying activities during which the Environmental Monitor will be on-site;
- 6) A construction waste management plan, and
- 7) All contact names, positions and telephone numbers of individuals responsible for the elements of the plan, and the Environmental Agency contacts.

The Contractor shall be solely responsible for any direct or indirect damage to the environment that occurs as a result of a failure to comply with environmental laws and regulations.

10.0 Control of the Work

The Contractor shall have complete control of the Work and shall effectively direct and supervise the Work to ensure conformance with the Design. The Contractor shall be solely responsible for construction means, methods, techniques, sequences and procedures, and coordination of the Work. The Contractor shall maintain the work site in a tidy condition, free from the accumulation of waste, debris, and waste products.

The Contractor shall provide and maintain, at all times, competent supervisory personnel and workforce, sufficient to complete the Work, and shall disclose knowledge, skills, prior experience, and professional standing or technical or trade certification of any person appointed, employed or used by the Contractor in carrying out any part of the Work.

11.0 Work on BC Hydro Energized Facilities

The Contractor shall be solely responsible for construction safety at the Site as, and to the extent, required by applicable construction safety legislation, regulation and codes, including the Workers Compensation Act and applicable regulations, and by good construction practice. Unless otherwise specified in the Appendix H – Safety Requirements, the Contractor shall be a designated Prime Contractor as defined in the Workers Compensation Act and the Regulations.

The Prime Contractor, and its servants, agents or Subcontractors, shall at all times be knowledgeable of and comply with BC Hydro Safety Practice Regulations (SPR), Power

Systems Safety Protection (PSSP) and all other relevant regulations, standards, practices, instructions, bulletins, directives or orders issued from time to time by BC Hydro in connection with electrical safety with respect to working on BC Hydro energized facilities.

The Prime Contractor shall ensure that only BC Hydro qualified Workers work on energized facilities. The Contractor shall notify the Prime Contractor (as the case may be) and BC Hydro's Representative at least 48 hours prior to starting the Work on energized facilities. The Prime Contractor shall ensure a BC Hydro approved safety watcher is on Site for inspecting the Work at the Contractor's cost.

When excavation is expected near existing BC Hydro poles, the Contractor is responsible for notifying BC Hydro's Representative immediately. The Prime Contractor shall ensure that a BC Hydro approved line contractor will support these poles temporarily at the Contractor's cost, until the excavation is properly backfilled by the Contractor.

12.0 Protection of Work, Property, and Public

The Contractor shall take all precautions to ensure that unnecessary damage does not occur to roads, curbs, sidewalks and other street appurtenances, and shall be responsible for repair of any damage to BC Hydro, public, and private property resulting from the Work. The repair of any damage shall comply with current standards, codes and laws, and shall include any betterment necessary to comply with such codes and laws.

The Contractor shall protect adjacent paving, utilities, or other affected structures, and prevent any sloughing of material on the sides of the excavation. The use of equipment with cleated or flanged tracks or wheels shall not be permitted, unless street surfaces are protected at all times with mats or heavy planks from these wheels or tracks. Driving trucks or other equipment over curbs or sidewalks, without adequate protection, is strictly prohibited.

13.0 Traffic Control

The Contractor is responsible for safe and suitable traffic control, meeting the requirements of the Ministry of Transportation and Infrastructure's "Traffic Control Manual for Work on Roadways" and requirements imposed by the AHJ. The Contractor shall pay any charges made by a third party for traffic control, guards, signalmen, police patrol, maintenance or repair, or any other charges properly made in connection with these operations.

The Contractor shall provide a notice to the AHJ, police, fire departments, emergency services and all owners or occupants of properties where access is affected by a roadway and/or sidewalk closure, a minimum of 48 hours in advance of the closure. Affected property owners shall be notified at least 48 hours in advance before excavating a driveway or entities.

Excavations shall be backfilled and compacted by the end of the current working day. Road plates may be used only in urban areas where the posted speed limit is less than 60 km/h.

13.1 Removal of Parked Vehicles

The Contractor shall be responsible for the installation and maintenance of "*No Parking – Unauthorized Cars will be Towed Away at Owner's Expense*" signs as required to complete each day's Work. If vehicles are found in violation and are obstructing the Work, the Contractor may, after making all reasonable efforts to contact the owner of the parked vehicles, have the vehicle moved. In the interest of public relations, the vehicle shall be moved to a visible, safe

location within 100 metres of the original location. The Contractor shall take care not to damage the vehicle during displacement.

The Contractor shall remove or cover "No Parking" signs when not required within 12 hours, or as required by the AHJ. The erection of signs and removal of vehicles shall be at the Contractor's sole expense, without any cost or liability to BC Hydro.

14.0 Temporary Works

The Contractor shall have the sole responsibility for the design, supply, erection, operation, maintenance and removal of temporary works and other temporary facilities, and the design and execution of construction methods required in their use, in compliance with WorkSafeBC requirements.

The Contractor shall retain the Professional of Record (POR) to design the temporary works including excavation supports and for undermining of any structure, or an excavation that may cause instability of any structure. The construction procedure shall include detailed excavation and backfill construction sequences, and design of temporary supports, and shall be submitted to BC Hydro and the AHJ for acceptance a minimum of 14 days before the excavation. The POR shall inspect the construction and ensure that the construction complies with the procedure.

Where ES54 Standards include design of temporary works or specifies a method of construction in whole or in part, the Contractor shall not be held responsible for that part of the design or the specified method of construction. However, the Contractor shall be responsible for the execution of such design or specified method of construction.

15.0 Pavement Removal

Pneumatic spades shall not be used unless the Contractor demonstrates to the satisfaction of Hydro's Representative that the saw-cut method is not feasible. The pneumatic spade holes shall be spaced close enough in the pavement to prevent any oversize cuts or excess breakage of pavement.

The distance from a pavement cut to the edge of the trench shall be at least 150 mm, or sufficient to ensure the pavement will not be undermined by the excavation. During the removal or replacement of any existing curb, gutter or sidewalk, the edges of the Work shall be saw-cut in order to provide a clean and even joint.

16.0 Maintenance of Backfill

As part of the Work, the Contractor shall maintain the backfilled excavation at no cost or liability to BC Hydro, until all reasonable post-construction soil settlement has occurred, except for on paved streets where the Contractor shall maintain the backfilled trenches and temporary surfaces for 45 calendar days after completion of backfill or for the warranty period after the Contract completion date, whichever occurs last. The "completion" will be done on a section-by-section basis, and the 45-day period will not commence until BC Hydro's Representative's written acceptance has been obtained that the backfill of a particular section is completed.

17.0 Contractor's Personnel

The Contractor shall provide and maintain, at all times, competent workforce, sufficient to complete the Work, and shall disclose knowledge, skills, prior experience, and professional standing or technical or trade certification of any person appointed, employed or used by the Contractor in carrying out any part of the Work.

17.1 Materials

The Contractor completes the following:

1. Supplies all materials required to complete the Work, except the materials supplied by BC Hydro;
2. Ensures that all materials supplied by BC Hydro are readily available to complete the work. Inspects all material supplied by BC Hydro for any damages and defects before receiving the material. By acceptance of BC Hydro supplied materials, the Contractor acknowledges that such materials are free from any damage and defects;
3. Transports, unloads, handles and stores of BC Hydro supplied materials;
4. Returns all excess new materials supplied by BC Hydro to the appropriate BC Hydro stores, in good order, within 72 hours of completion of the Work. The Hydro's Representative inspects and accepts all returned material, and
5. Removes and disposes any abandoned and unsuitable excavated materials at the Contractor's disposal Site.

The Contractor shall not alter, modify or misuse any materials supplied by BC Hydro and shall be responsible for replacement or repair of any damaged BC Hydro supplied materials. The repair design shall be submitted to BC Hydro for acceptance. If BC Hydro considers that the damage may affect the structural integrity of the material, the proposed repair design shall be signed by a Professional Engineer.

18.0 Survey and Proving Route

The Contractor is responsible for all survey and staking required for the completion of all Work, as shown in the design.

Prior to surface cutting and excavation, the Contractor shall mark duct-bank alignment and locations of structures on the Site as shown in the design, and prove the location of any existing utility by digging hydro-vacuum excavation test holes, or using another equivalent method. The Contractor shall report to Hydro's Representative any obstacles found that may affect the duct-bank alignment or locations of the structures, and shall not proceed with the excavation until receiving a notice to proceed.

In the event of the Contractor's failure to report any obstacle that the Contractor should reasonably have been aware of, the Contractor shall be responsible for all costs and time spent to recover any impacts resulted from such failure.

19.0 Bases for Payment

19.1 Excavation

Price for excavation in the Schedule of Prices shall include all temporary works (i.e., over excavation to allow room for shoring and back slopes), and hauling and disposal of any excavated material at the Contractor's disposal Site.

If the Schedule of Prices includes any Optional Work for rock or other excavation, then the Contractor shall be entitled only for payment of calculated quantities of such excavation encountered within the Limits of Excavation and depth as shown on the drawings. Any excavation outside the Limits of Excavation or below the depth of excavation shown on the Drawings (to allow room for shoring, back slopes, or caused by sloughing trench sides) shall be considered temporary works and shall not be paid separately.

19.2 Duct-bank Length

Duct-bank length shall be a horizontal distance measured face to face between duct entrance walls or terminal posts.

20.0 Acceptance of the Work

The Work shall not be accepted as complete until the Hydro's Representative gives final acceptance. Acceptance of any materials or Work during the execution of the Contract and before the final acceptance shall not preclude later rejection of the same materials or Work before the acceptance of the complete Work.

Hydro's Representative will report to the Contractor on materials and Work that fails to fulfil the requirements of the contract. The Contractor shall propose corrective action to Hydro's Representative. BC Hydro costs for re-inspection and re-testing for repaired and replaced work items that originally did not meet contract requirements shall be at the Contractor's expense.

The work will not be accepted as complete until final acceptance has been given by BC Hydro. Previous acceptance of any materials or work shall not preclude it from rejection prior to acceptance of the complete Work.

20.1 Quality Control

Contractor shall be responsible for all Quality Control (QC) during the performance of the Work. QC Work shall include monitoring, inspecting and testing methods, materials, workmanship, processes, and products of all aspects of the Work, including design, construction, and management, whether provided by the Contractor, a Subcontractor or a supplier as necessary to ensure conformance with the Contract.

When a Subcontractor performs QC on the portion of the Work performed by that Subcontractor, the responsibility for the QC remains with the Contractor, and the Contractor shall also perform Quality Assurance (QA) on the Work performed by the Subcontractor.

Testing laboratories shall be Canadian Council of Independent Laboratories (CCIL) certified for the type of testing being carried out.

20.2 Quality Assurance

BC Hydro shall implement a Quality Assurance (QA) program by inspecting and reviewing the Contractor's QC program, and by sampling and testing at its discretion. Any QA activities shall not relieve the Contractor of responsibility to perform its QC program.

21.0 Relevant BC Hydro Publications

- 1) BC Hydro ES43 Series Overhead Electrical Distribution Standards;
- 2) BC Hydro ES53 Series Underground Electrical Distribution Standards;
- 3) BC Hydro ES54 Series Underground Civil Distribution Standards;
- 4) BC Hydro Power System Safety Protection (PSSP) System Operating Order 1T-12, December 2007 (see <http://w3/pssp/pdfs/pssp.pdf>), and
- 5) BC Hydro Safety Practice Regulations (SPR) Book, dated Nov 2014 (see http://hw/news/keeping_current/Pages/sprb1014.aspx)