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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
					R 4

Scope

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

Purpose of Standards

BC Hydro objectives require standardization to:

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

Responsibility

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

Use of Stock Materials

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

Revisions to Manual

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

Mailing Addresses

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

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

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

Class of Work Specification for Construction of Underground Electrical Distribution Structures by a Customer

Revisions:

Clause No.	Description Of Revision	Date
All	Class of Work was significantly re-written and edited.	July 13, 2016
2.0	Added definitions	Oct 25, 2019
6.0	Added construction schedule	
7.0	Added Work by BC Hydro or others	
8.0	Revised to include customer build projects, added requirements for Field Review, record and final design drawings	

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

Table of Contents

1.0	General	3
2.0	Definitions	3
3.0	Standard of the Work	3
4.0	Laws, Permits and Fees.....	3
5.0	Existing Site Information	4
6.0	Construction Schedule	4
7.0	Work by BC Hydro or Others.....	4
8.0	Design, Field Review, Record Drawings	4
8.1	Design	4
8.2	Field Review.....	5
8.3	Record Drawings.....	5
8.4	Final Design	5
9.0	Removal of BC Hydro Existing Facility	5
10.0	Control of the Work	5
11.0	Work on BC Hydro Energized Facilities	5
12.0	Protection of Work, Property and Public	6
13.0	Excavation Support Shotcrete and Soil Anchors.....	6
14.0	Temporary Works.....	6
15.0	Material	7
16.0	Survey and Proving Route	8
17.0	Acceptance of the Work	8
18.0	Quality Control (QC) and Quality Assurance (QA)	8
18.1	Audit	8
19.0	Warranty.....	9
20.0	Relevant BC Hydro Publications	9

1.0 General

This Class of Work Specification describes the work requirements for the construction or installation of underground Plant by a Customer, in accordance with the Design accepted by BC Hydro.

2.0 Definitions

Capitalized terms shall have the meaning defined in the ES 54, Section W, and specified as follows:

BC Hydro: British Columbia Hydro and Power Authority, a British Columbia Crown Corporation having its head office at 333 Dunsmuir Street, Vancouver, B.C. V6B 5R3

BC Hydro Property: Any design, facilities, property, equipment, including construction equipment and small tools, replacement parts, furnishings, materials and supplies of any kind provided to the Customer by BC Hydro or by a third party at the direction of BC Hydro for the performance of the Work and whether or not incorporated into the Work.

Customer: means an entity who builds the Plant for BC Hydro use.

Customer Build Program: construction or installation of underground electrical service for residential construction as defined at the Web
<https://www.bchydro.com/powersmart/business/programs/customer-build.html>

External Service Provider (ESP): Consulting firm approved by BC Hydro to provide engineering and construction management services to the Customer under the Customer Build Program.

Site: means the location where the constructed Work is to be finally or permanently located or installed.

Work: means and includes anything and everything required to be done for the compliance with the Design approved by BC Hydro.

3.0 Standard of the Work

ES 54 Series Underground Civil Distribution Standards published by BC Hydro shall apply.

4.0 Laws, Permits and Fees

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

5.0 Existing Site Information

Type and location of existing structures and utilities shown on the BC Hydro as-built drawings are neither accurate nor complete. The Customer shall make a BC One Call request, and the relevant documents shall be made readily available on site. The Customer shall be responsible for:

- 1) Locating and exposing all buried structures and utility services.
- 2) Building around, under or over other services, and taking proper precautions against accidental damage.
- 3) Temporary works.
- 4) Maintaining specified clearances between services and structures.

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 as-built drawings is at a sole risk of the Customer.

6.0 Construction Schedule

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

7.0 Work by BC Hydro or Others

BC Hydro may perform, or retain others to perform, other work on the Site. The Customer shall permit access to the Site to other parties designated by the BC Hydro and coordinate the Work with those other parties.

8.0 Design, Field Review, Record Drawings

8.1 Design

When responsible for the Design, the Customer 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 the Design (issued for construction) and Final Design (record) drawings shall be signed and sealed by the Professional of Record.

Alternatively, 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.

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

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

8.3 Record Drawings

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

8.4 Final Design

When responsible for the Design, the Customer shall prepare the Final Design in accordance with ES54.

9.0 Removal of BC Hydro Existing Facility

The Customer shall remove, dispose and replace any existing BC Hydro facilities as necessary for The Customer to perform the Work in accordance with the Design.

10.0 Control of the Work

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

The Customer 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 Customer in carrying out any part of the Work.

11.0 Work on BC Hydro Energized Facilities

The Customer 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.

When the Work is expected to occur near existing BC Hydro facilities, the Customer shall notify BC Hydro 48 hours prior to starting of the Work. The Customer shall ensure that only BC Hydro approved persons work on energized facilities and a BC Hydro approved safety watcher is on Site to inspect the Work at the Customer's cost.

12.0 Protection of Work, Property and Public

The Customer shall protect the Work, BC Hydro, and private and public property from any damage. The Customer shall be responsible to repair any damage to BC Hydro, public or private property resulting from the Work. The repair shall be completed to a condition equal or better than what existed prior to the damage, to the most current standards, codes and laws, and shall include any betterment necessary to comply with such.

13.0 Excavation Support Shotcrete and Soil Anchors

Soil anchors and/or shotcrete may be required to support deep excavations near BC Hydro Assets. Anchors are often extended beyond the property line into the municipal roads where BC Hydro assets are generally located. The Customer shall be responsible for submitting signed and sealed drawings and a letter report prepared by his POR confirming that the integrity of BC Hydro assets in the area will not be compromised by his operation. The excavation support design shall:

- 1) Include actual location of the BC Hydro Assets in the area including type, arrangement, dimensions, and burial depth.
- 2) Be prepared utilizing the information from the BC one call, underground utility locate, field verification by Hydrovac or hand digging and DAD plots.
- 3) Maintain a minimum of 1.0 m clear separation in all directions between BC Hydro assets and the proposed shotcrete, shoring and soil anchors.

The excavation support design shall be submitted to BC Hydro and the Authority Having Jurisdiction (AHJ) for review and acceptance a minimum of fourteen (14) days prior to the excavation.

14.0 Temporary Works

The Customer shall have the sole responsibility for the design, 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.

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

15.0 Material

All materials shall:

- 1) Be new,
- 2) Conform to the requirements of the BCH ES 54 Standards, and
- 3) Be subject to inspection and approval by the BCH prior to incorporation in the Work.

The Customer shall supply all material necessary to complete the work except materials supplied by BC Hydro. The Customer shall submit a list of suppliers of all materials incorporated in the BC Hydro Plant, to BC Hydro for acceptance 10 days prior to material ordering and construction.

Brands, species and manufacturer's names specified are approved for use in the performance of the Work. No alternative materials will be considered unless approved in advance by the BCH Representative in writing. The alternative materials should result in a product which is functionally equal or superior to that which is resulted of the specified materials.

The Customer shall provide to the BCH, material or mill certificates two weeks prior to shipping of the materials supplied by the Contractor. Such material or mill certificates shall include the material properties that demonstrate the material's compliance with the requirements of the BCH ES54 Standards. Upon request, the Customer shall submit representative samples of materials at no charge to the BCH, and notify the BCH Representative of the sources of materials supplied and obtain the right for the BCH to enter upon the premises of the material supplier or fabricator to carry out the inspection. Such notification shall be given sufficiently far in advance of materials delivery dates to enable the BCH to make inspection of the material at the source. Insufficient notice will be cause for the BCH to reject the materials without compensation.

The BCH will not be responsible for any delays to the Customer's operations where the Customer fails to give sufficiently advance notification to the BC Hydro.

The Customer shall be responsible for ensuring that all materials supplied by BC Hydro are readily available to complete the work. The Customer shall inspect all material supplied by BC Hydro for any damages and defects prior to receiving the material. By acceptance of the BC Hydro supplied material, the Customer acknowledges that such material is free from any damage and defects. All material supplied by BC Hydro remains the property of BC Hydro at all times. The Customer shall permit and provide access to BC Hydro to inspect all BC Hydro supplied material in the Customer's possession, at no cost or liability to BC Hydro.

The Customer is responsible for transporting, unloading, handling and storing of all materials supplied by BC Hydro.

The Customer shall be responsible for returning 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. All returned material will be subject to inspection and acceptance by BC Hydro.

The Customer 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.

16.0 Survey and Proving Route

The Customer 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 Customer 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 Customer shall report to BC Hydro obstacles found that may affect the duct bank alignment or locations of the structures, and shall submit revised Design to BC Hydro for acceptance.

The Customer shall be responsible for any impacts as a result of obstacles.

17.0 Acceptance of the Work

All materials and Work shall be subject to BCH Inspection. The customer shall submit a detailed Work schedule minimum two (2) weeks prior to the construction to BC Hydro to set hold points for field inspection. The Customer shall not pass the hold points until BC Hydro accepts it.

BC Hydro will report to the Contractor on materials or Work that fails to fulfil the requirements of the Contract. BCH 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

18.0 Quality Control (QC) and Quality Assurance (QA)

The Contractor shall prepare the QC and QA plan and submit to BC Hydro for acceptance a minimum of two weeks prior to commencement of any work covered by the QC/QA plan.

The Customer shall implement a Quality Control (QC) program to meet this COW 1323 and ES 54 Standard requirements. In the event that any of the Work is outside the specified quality limits, the Contractor shall propose corrective action to BC Hydro for acceptance and repair such defective or deficient work to the satisfaction of BC Hydro.

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

18.1 Audit

BC Hydro will, at its discretion, audit the Customer's QC and QA program by inspection, sampling and testing.

19.0 Warranty

The Customer warrants to BC Hydro for period of one (1) year that all work is free from any defect in material and workmanship, and for period of ten (10) years that all Design is free from errors and omissions, and shall remedy any defects upon notification to the satisfaction of BC Hydro. The warranty period starts on the date of final work acceptance.

20.0 Relevant BC Hydro Publications

- 1) BC Hydro ES 43 Series Overhead Electrical Distribution Standards;
- 2) BC Hydro ES 53 Series Underground Electrical Distribution Standards;;
- 3) BC Hydro Power Systems Safety Protection (PSSP) System Operating Order 1T-12, December 2007 (see <http://w3/pssp/pdfs/pssp.pdf>);
- 4) BC Hydro Safety Practice Regulations (SPR) Book, dated March 2011 (see <http://w3ecm/safety/ViewByDocument.do?guid={D0D98F06-AD8F-40A9-B0A7-2C243E1AA724}>);