Section E Switchgear Vaults and Pads

General

This section covers the installation of civil works for underground switchgear on the BC Hydro distribution system. Most of the content in these standards is based upon pre-cast structures.

Definitions

A variety of names for the equipment and installations have been used in the electrical and civil standards in the past, with little consistency. The following terminology will be used for all future applications:

Installation Types:

In-Vault—For installation and operation of switchgear inside a below ground or indoor vault. Typically the switchgear is elevated, supported by a mechanical structure or bolted to a wall, to improve cable routing. Workers access the switchgear from inside the vault.

Over-Pad—For above ground installation and operation of pad-mounted switchgear. The switchgear is installed on a pad, possibly with a small space underneath for cable pulling/routing.

Over-Vault—For above ground installation and operation of pad-mounted switchgear. The switchgear is installed on top of a manhole accessed vault that is used for cable pulling/routing (see cable vault).

Subsurface—For below ground installation of switchgear with above ground operation. The switchgear is installed below ground with a system of doors/covers at the top of the vault for above ground operation.

Pad—A civil structure for above ground direct mounting of equipment, which includes mounting and cable entrance provisions. This can be either a flat pad at surface level, or a surface level structure with a small integral below ground space for cable pulling and training.

Vault—A solidly enclosed confined space, above or below ground, designed for equipment installation and worker entry to install, maintain or inspect equipment within that space. The walls, floor or roof may have openings for ventilation, personnel access, and cable entry, and other openings required for installation and operation of equipment.

Vault Types:

Switchgear Vault—A below ground vault designed for switchgear installation and operation within the vault (see In-Vault). A switchgear vault may also have other equipment installed for secondary power, protection, and isolation purposes. This style of vault is typically accessed by manhole.

Cable Vault—A below ground vault designed for cable installation and operation. A cable vault may also have other equipment installed for secondary power, protection, and isolation purposes or above ground equipment may be installed on top (see Over-Vault). This style of vault is almost always manhole accessed and is commonly referred to as a “manhole” (a misnomer).

Indoor Vault—A vault inside a building or structure, normally customer-owned, designed for the installation of BC Hydro equipment. If such a space contains customer equipment, it is commonly referred to as an electrical room.

Subsurface Vault—A below ground solidly contained space designed for equipment installation below ground, but normal operation from outside any confined space. A system of doors/covers

at the top of the chamber allows the installed equipment to become fully accessible at surface level by opening or removing those doors/covers.

Section E Organization

The standards in Section E describe the various installation styles for switchgear, grouped into above ground, below ground, and indoor sections. A separate section for switchgear automation components is also included. Above ground installation styles include over-pad and over-vault, while below ground installation include in-vault and subsurface.

Underground switchgear in use on the BC Hydro distribution system can be categorized within two main groups: live-front and dead-front. Live front switchgear is no longer used in new construction so related standards have been obsoleted (available for maintenance or emergency replacements).

ES53 Standards are organized and grouped differently so related standards reference numbers may not directly correlate. The following table is provided.

Table 1: Civil and Electrical Standards Matrix

		Switchgear Configurations			
		Above Ground	**Below Ground**	**Indoor**	
		Pad-Mounted	**Subsurface**	**In-Vault**	
Installation Configuration	Over-Pad	See application notes			
	Over-Vault*	E4-01 (4-way) E4-03 (5-way) see ES53 E4-01			
	Subsurface Vault**		E3-01 (4-way) see ES53 E3-01 E3-02 (4 or 5-way) see ES53 E3-02		
	Switchgear Vault			E3-03 see ES53 E3-03	
	Indoor Vault				E6-01 (Single) E6-02 (Double)

* For below ground installations on private property ES54 E3-04 must also be applied
** For above ground installations on private property ES54 E4-04 must also be applied

Load Duty

The below ground vaults are typically installed in boulevards and sidewalks and are designed to the sidewalk duty. They shall not be installed within the areas designated for vehicular traffic.

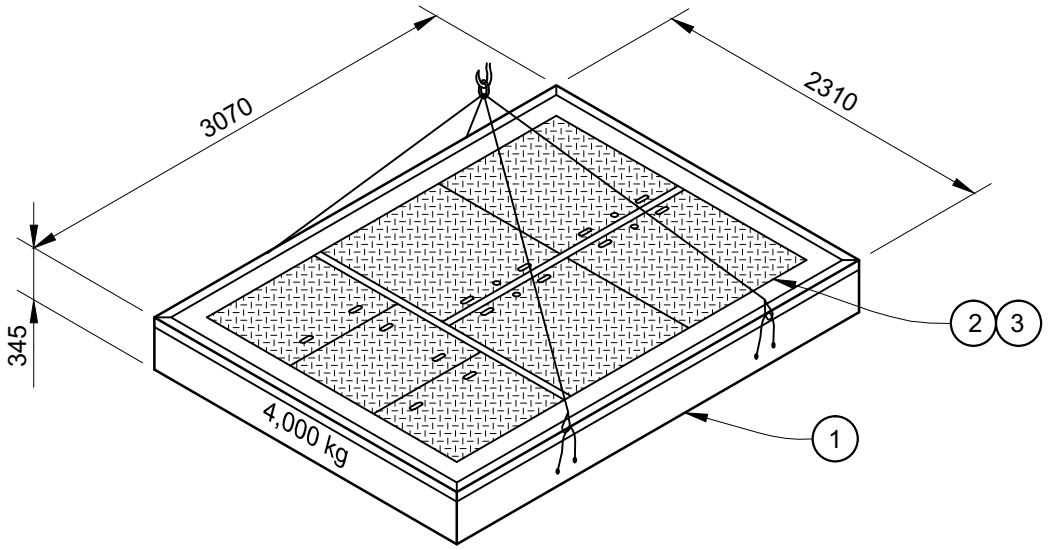
Application Notes

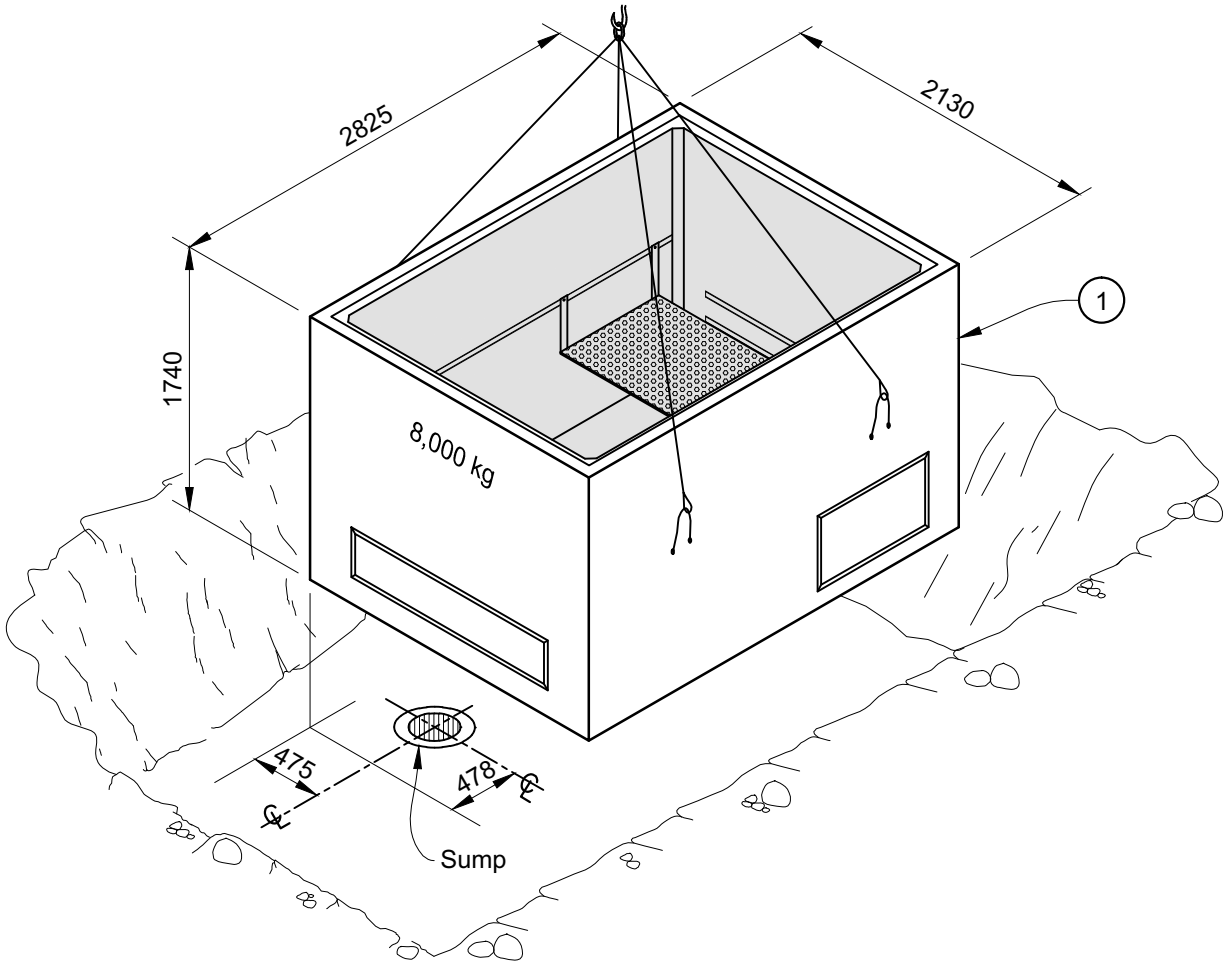
The location of the duct entrance is critical to the correct installation of high-voltage and other cables. Consult the associated ES53 standard for this information.

Above ground installation is generally preferred due to improved reliability, maintainability, and worker safety. Below ground installation is not to be applied in high water table areas that would result in long-term submersion of the switchgear.

In-vault installations are optimized for automated switchgear so applications with manual switchgear are only permitted with Regional Engineering (P.Eng.) approval.

Maintenance replacement of live-front switchgear with dead-front switchgear in an over-pad configuration is permitted in cases where upgrading the civil structures is extremely problematic (e.g., with regard to cost, complexity, customer impacts), and only with Regional Engineering (P.Eng.) approval. See Distribution Standards for guidance.





REVISIONS: R.1 - MAJOR REVISION. NEW ALUMINUM LIGHTWEIGHT LIDS AND SECURITY PUZZLE BOLTS. MAR '16 MK

DESIGNED	RECOMMENDED	ACCEPTED
M. KELVIN	L. STEVANOVIC	F. DENNERT

DISTRIBUTION STANDARDS
BC Hydro

ISSUED: MAR 2016
REPLACES: MAR 1999
ORIGINALLY ISSUED: MAR 1999

ENGINEER OF RECORD

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — M. KELVIN

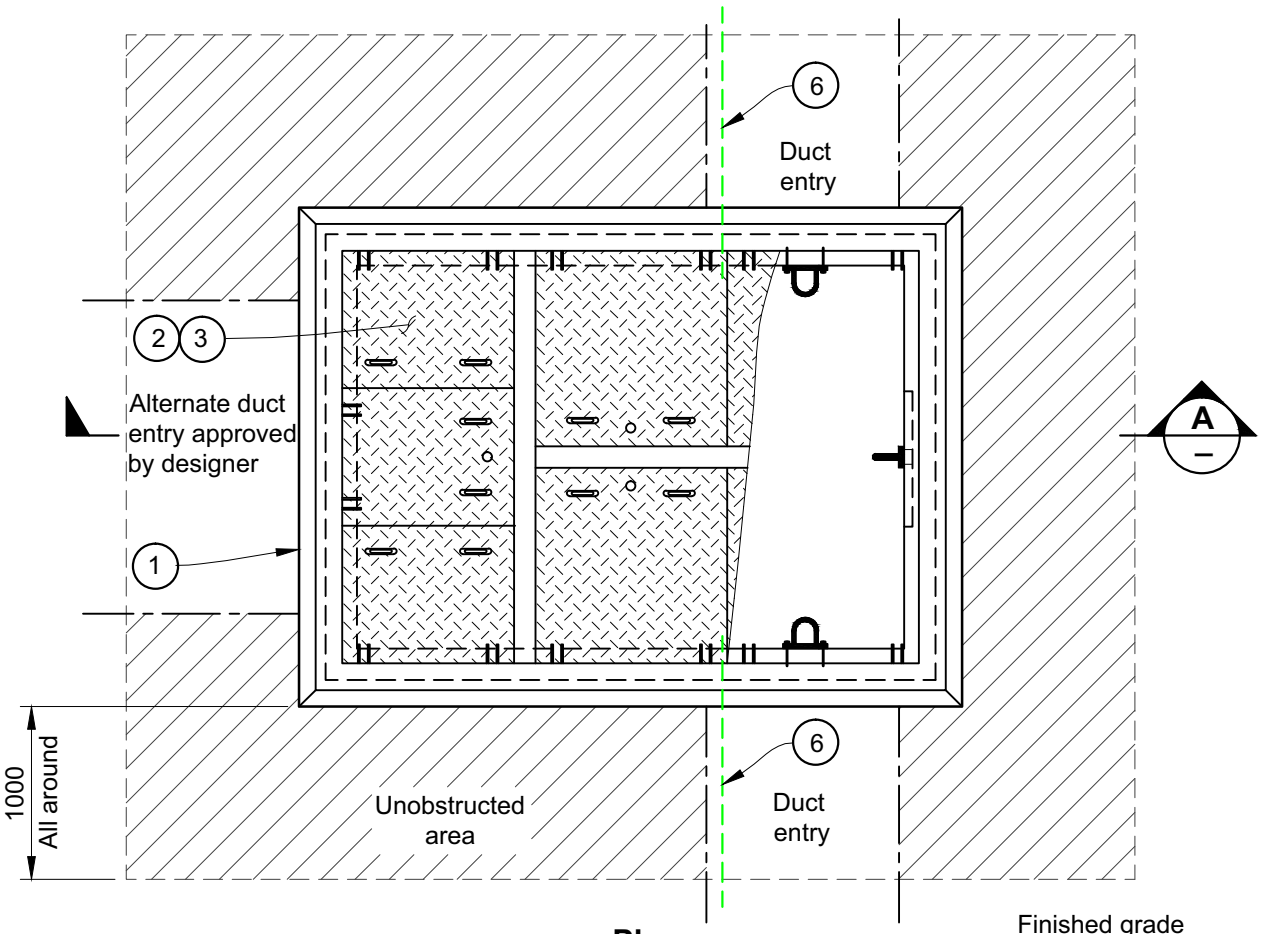
2017-02-15

BELOW GROUND SWITCHGEAR SUBSURFACE 4-WAY

PAGE 1 OF 3

ES54 E3-01.01

R 1



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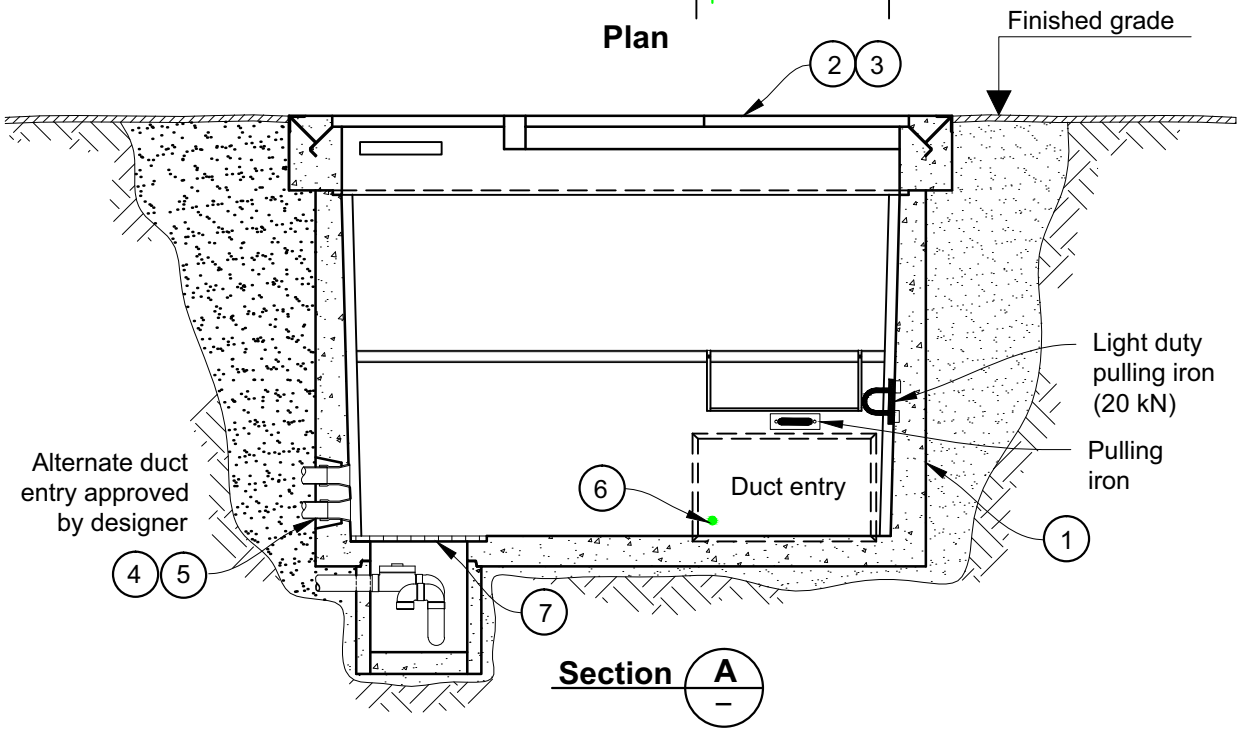


Section A –

REVISIONS: R.1 - MAJOR REVISION. NEW ALUMINUM LIGHTWEIGHT LIDS AND SECURITY PUZZLE BOLTS. MAR '16 MK

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD
M. KELVIN	L. STEVANOVIC	F. DENNERT	PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA M. KELVIN 2017-02-15

DISTRIBUTION STANDARDS
BC Hydro

ISSUED: MAR 2016
REPLACES: MAR 1999
ORIGINALLY ISSUED: MAR 1999

BELOW GROUND SWITCHGEAR SUBSURFACE 4-WAY

PAGE 2 OF 3

ES54 E3-01.02

R 1

Notes

1. Drainage shall comply with section G.
2. Duct installation shall comply with H1-06.01.
3. Grounding shall comply with R3-01.
4. Excavation and backfilling shall comply with W1-01.
5. Avoid the use of alternate duct entrances if reasonably practicable.

Bill of Material

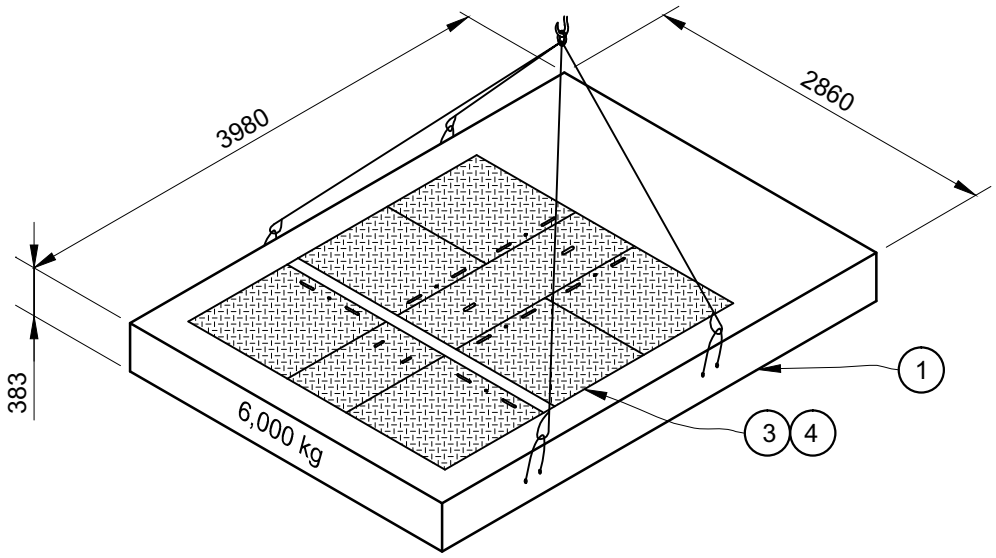
Item	Description	Catalogue ID	Quantity	Supplied By
1	Precast vault c/w frame and platform	350-8535	1	BC Hydro
2	Lid	96007598	4	BC Hydro
3	Hardware for lid	412-0042	5	BC Hydro
4	75 mm bell ends 100 mm bell ends 125 mm bell ends	401-0183 96021454 96021455	As required	Contractor Contractor BC Hydro or Contractor
5	75 mm duct plugs 100 mm duct plugs 125 mm duct plugs	401-0197 96021457 96021459	As required	Contractor Contractor BC Hydro or Contractor
6	Ground rod	420-1093	2	BC Hydro
7	Sump cover	400-0426	1	BC Hydro

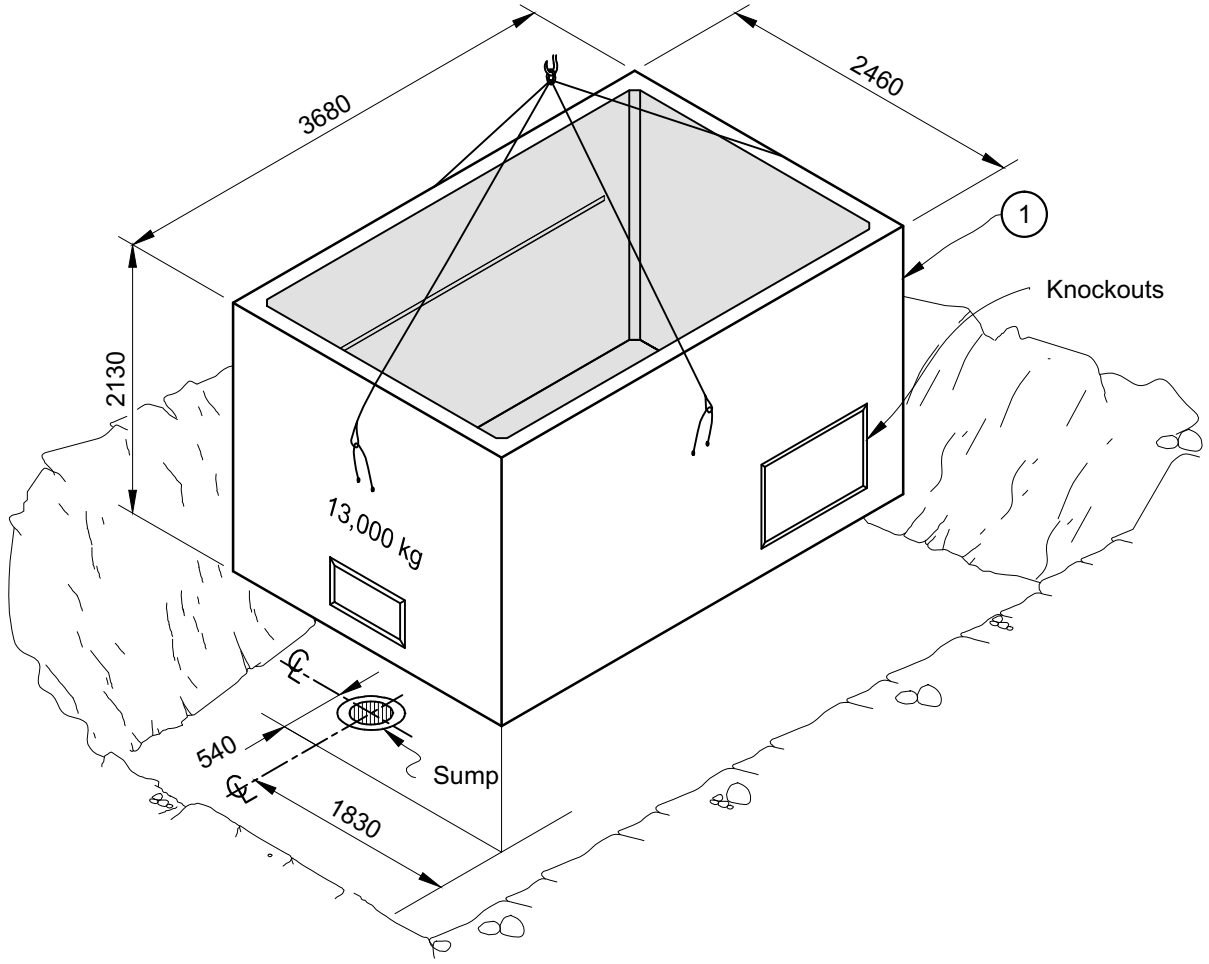
Reference Standards

ES53 E3-01	Switchgear, Below Ground, 4 Way, Subsurface
ES54 G2	Drainage Assemblies
ES54 H3-01	Duct Window
ES54 H1-06	Duct Entry Details
ES54 R3-01	Grounding in Precast Vaults with External Grounding Electrodes
ES54 W1	Excavation and Backfill

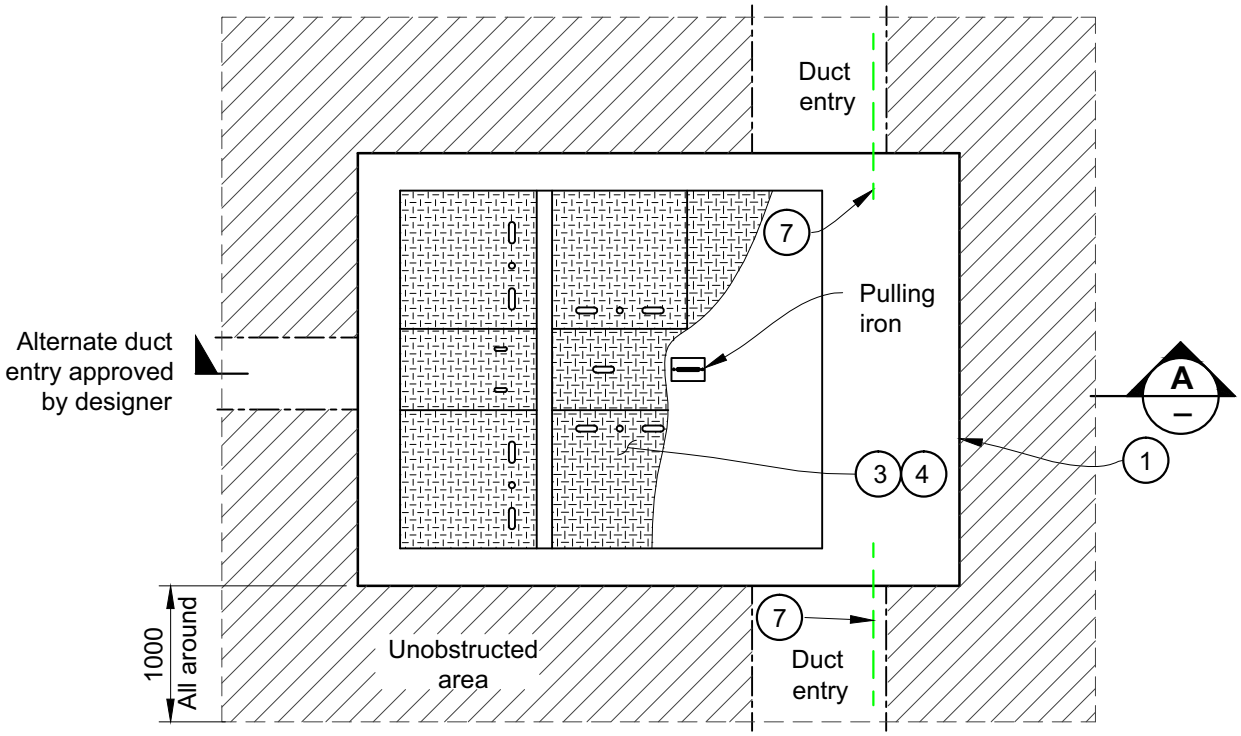
REVISIONS: R.1 - MAJOR REVISION. NEW ALUMINUM LIGHTWEIGHT LIDS AND SECURITY PUZZLE BOLTS. MAR '16 MK

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD	
M. KELVIN	L. STEVANOVIC	F. DENNERT	PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA M. KELVIN 2017-02-15	BELOW GROUND SWITCHGEAR SUBSURFACE 4-WAY
DISTRIBUTION STANDARDS BC Hydro	ISSUED: MAR 2016 REPLACES: MAR 1999 ORIGINALLY ISSUED: MAR 1999		PAGE 3 OF 3	ES54 E3-01.03 R 1





DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD	BELOW GROUND SWITCHGEAR SUBSURFACE 4-WAY AND 5-WAY	
M. KELVIN	L. STEVANOVIC	F. DENNERT	PROFESSIONAL ENGINEER M. KELVIN 2017-02-15		
REVISIONS:	DISTRIBUTION STANDARDS BC Hydro	ISSUED: MAR 2016 REPLACES: N/A ORIGINALLY ISSUED: MAR 2016		PAGE 1 OF 3	ES54 E3-02.01 R 0



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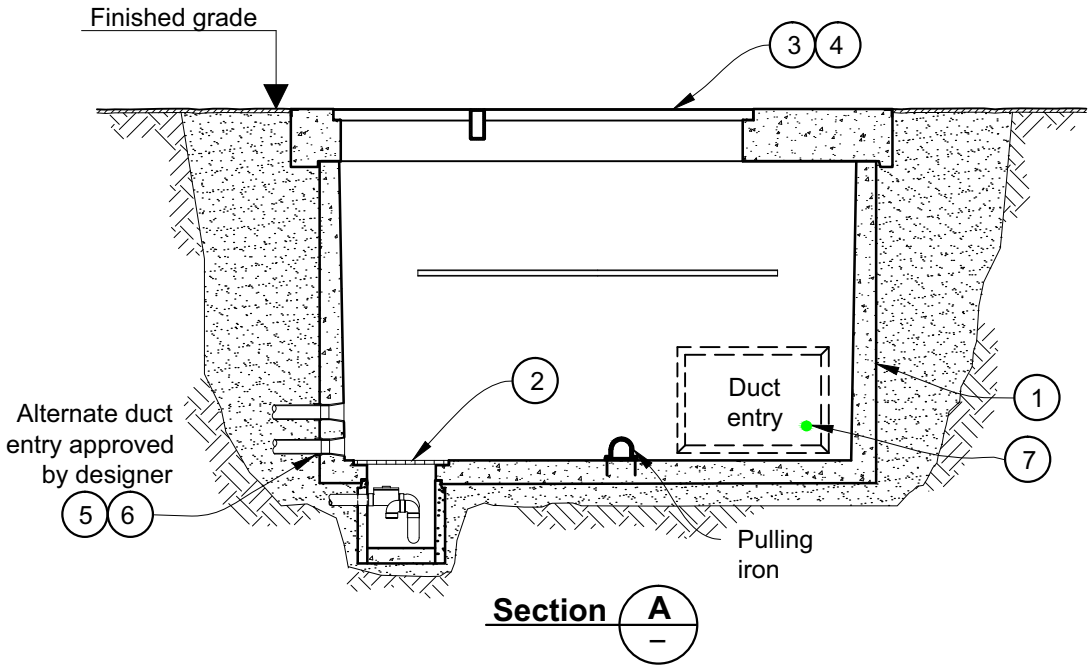


Section A –

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD	BELOW GROUND SWITCHGEAR SUBSURFACE 4-WAY AND 5-WAY	
M. KELVIN	L. STEVANOVIC	F. DENNERT	2017-02-15		
DISTRIBUTION STANDARDS BC Hydro	ISSUED: MAR 2016 REPLACES: N/A ORIGINALLY ISSUED: MAR 2016			PAGE 2 OF 3	ES54 E3-02.02 R 0

REVISIONS:

Notes

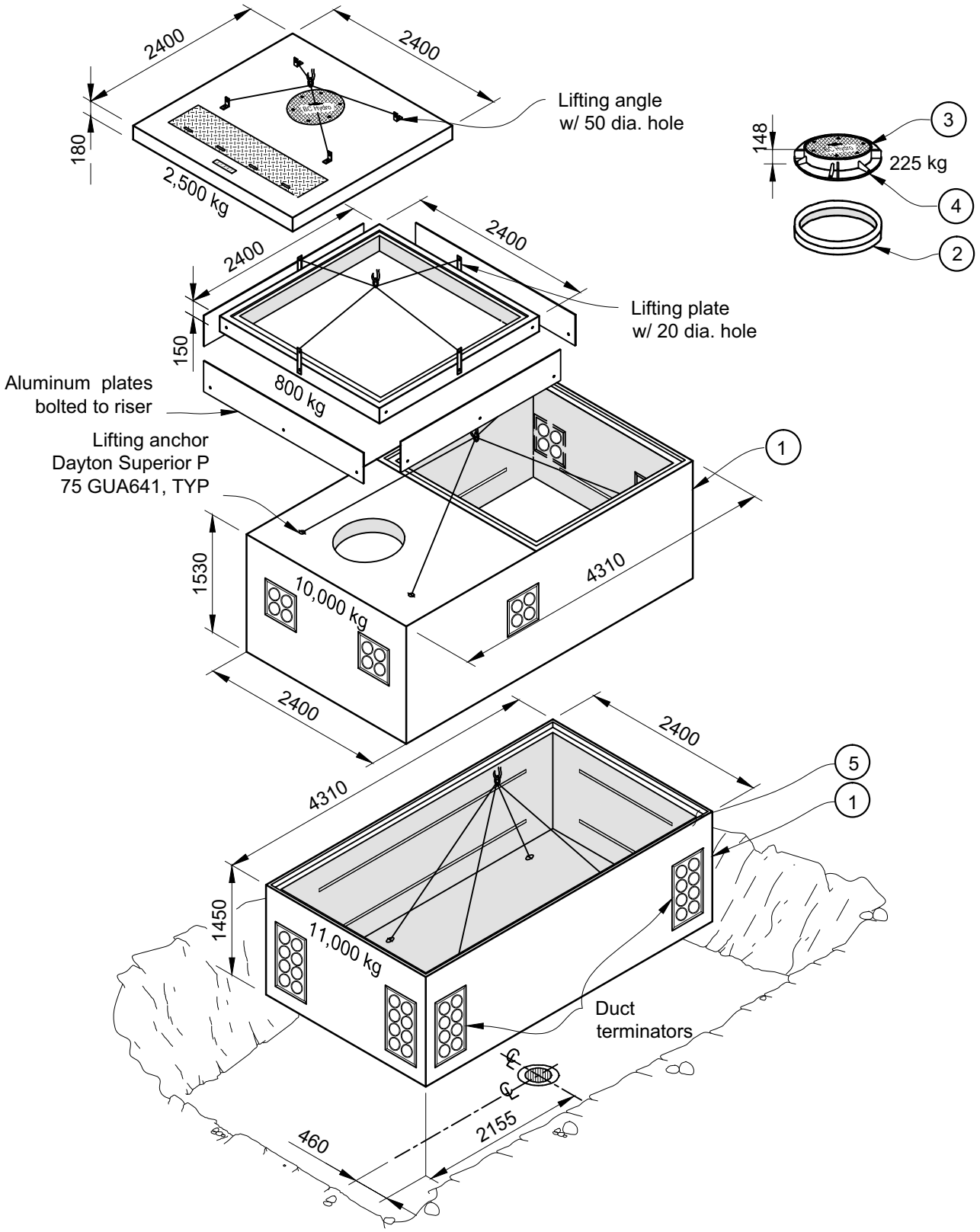
1. Drainage shall comply with section G.
2. Ducts installation shall comply with H1-06.01.
3. Grounding shall comply with R3-01.
4. Excavation and backfilling shall comply with standard W1-01.
5. Avoid the use of alternate duct entry if reasonably practicable.

Bill of Material

Item	Description	Catalogue ID	Quantity	Supplied By
1	Precast vault	96005803	1	BC Hydro
2	Sump cover	400-0426	1	BC Hydro
3	Lid	96007598	6	BC Hydro
4	Hardware for lid	412-0042	7	BC Hydro
5	75 mm bell ends 100 mm bell ends 125 mm bell ends	401-0183 96021454 96021455	As required	Contractor Contractor BC Hydro or Contractor
6	75 mm duct plugs 100 mm duct plugs 125 mm duct plugs	401-0197 96021457 96021459	As required	Contractor Contractor BC Hydro or Contractor
7	Ground rod	420-1093	2	BC Hydro

Reference Standards

ES53 E3-02	Switchgear, Below Ground, 4 and 5 Way, Subsurface
ES54 G2	Drainage Assemblies
ES54 H3-01	Duct Window
ES54 H1-06	Duct Entry Details
ES54 R3-01	Grounding in Precast Vaults with External Grounding Electrodes
ES54 W1	Excavation and Backfill



REVISIONS: R.1 - DEPTH OF BOTTOM SECTION ADJUSTED. JUN '17 MK

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD
M. KELVIN	L. STEVANOVIC	F. DENNERT	2017-06-22

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA M. KELVIN

DISTRIBUTION STANDARDS
BC Hydro

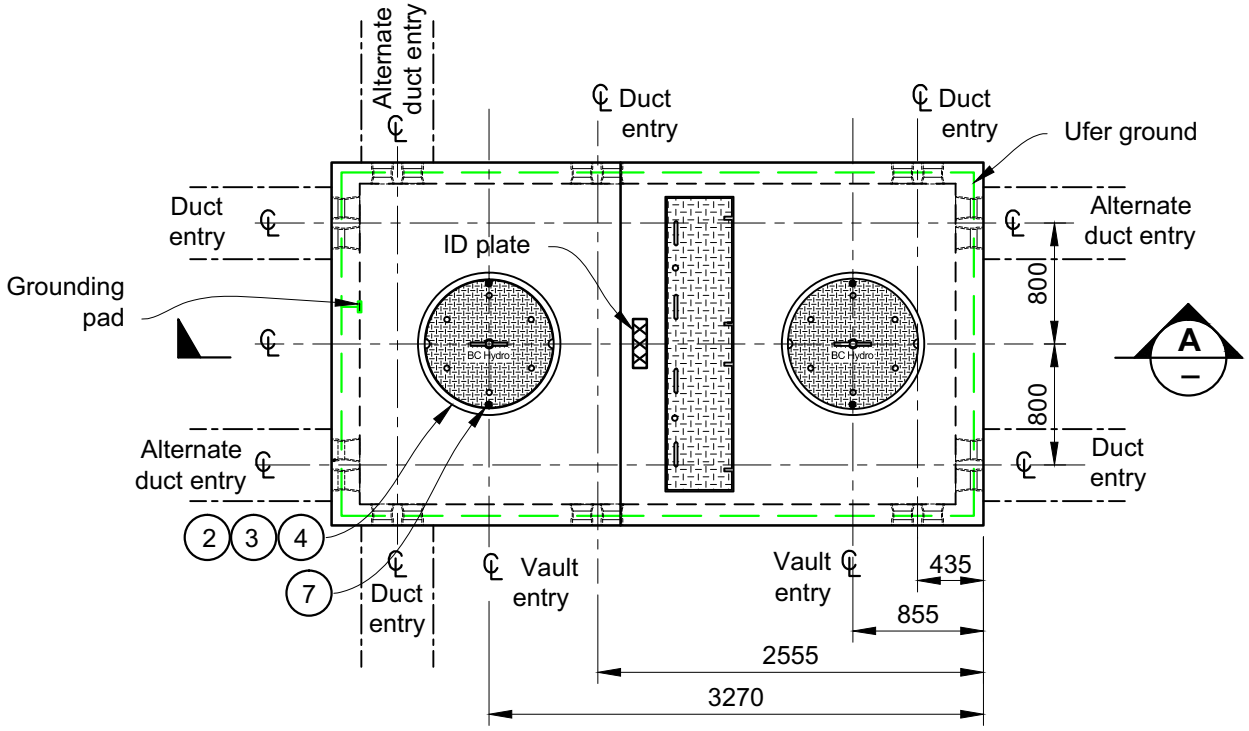
ISSUED: JUN 2017
REPLACES: MAR 2016
ORIGINALLY ISSUED: MAR 2016

BELOW GROUND SWITCHGEAR IN VAULT

PAGE 1 OF 3

ES54 E3-03.01

R 1



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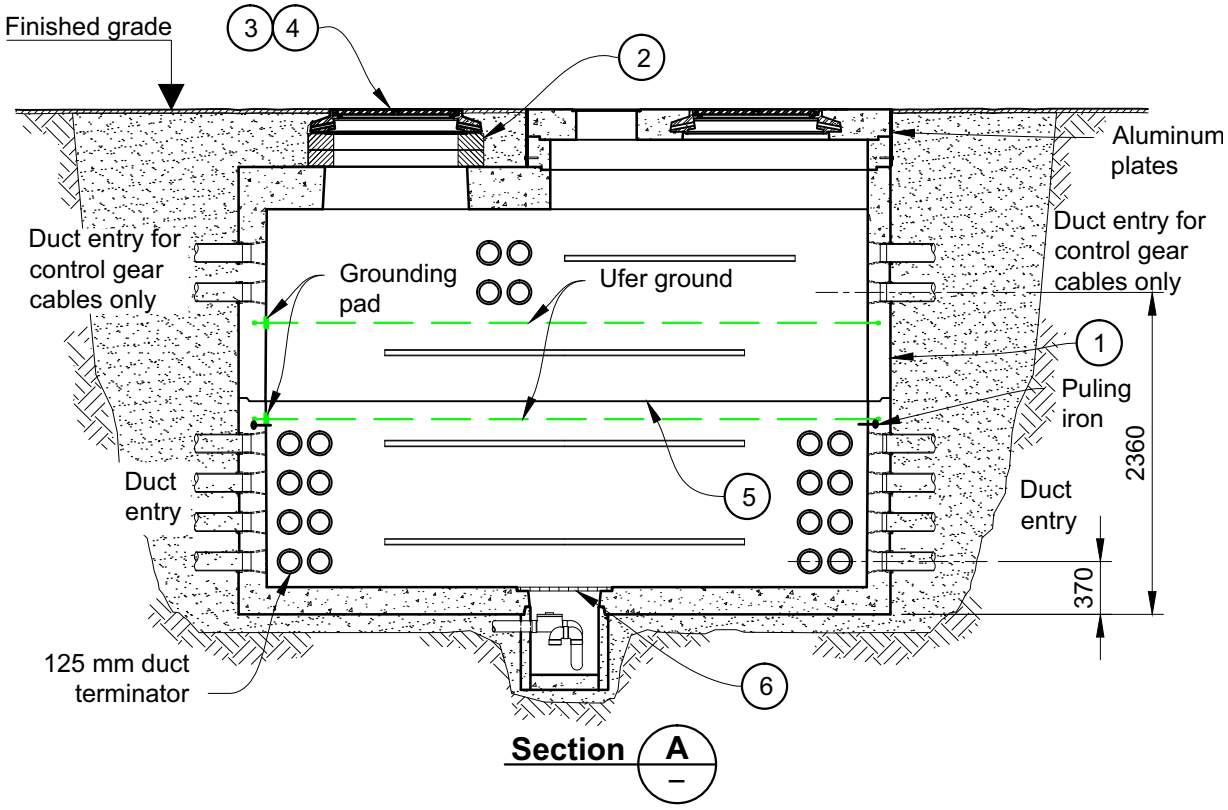


Section A – A

REVISIONS: R.1 - DEPTH OF BOTTOM SECTION ADJUSTED. JUN '17 MK

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD
M. KELVIN	L. STEVANOVIC	F. DENNERT	PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA M. KELVIN 2017-06-22

DISTRIBUTION STANDARDS
BC Hydro

ISSUED: JUN 2017
REPLACES: MAR 2016
ORIGINALLY ISSUED: MAR 2016

BELOW GROUND SWITCHGEAR IN VAULT

ES54 E3-03.02

R 1

Notes

1. Drainage shall comply with section G.
2. Duct installation shall comply with H1-06.03.
3. The vault has Ufer ground, and ground rods are not required.
4. Excavation and backfilling shall comply with W1-01.
5. In-vault application is intended for automated switchgear installation.
6. If an alternate duct entry must be used, all entries shall be through alternate duct entries.

Bill of Material

Item	Description	Catalogue ID	Quantity	Supplied By
1	Precast vault c/w riser and collar	97000433	1	BC Hydro
2A	300 mm riser ring	97000965	1 or more	BC Hydro
2B	150 mm riser ring	97000964	1 or more	BC Hydro
3	Heavy duty cover	400-0411	2	BC Hydro
4	Heavy duty frame c/w locknut	400-0401	1	BC Hydro
5	Vault joint sealant	141-1346	As required	BC Hydro
6	Sump cover	400-0426	1	BC Hydro
7	75 mm security bolt	96005248	4	BC Hydro
8	Hardware for lid	412-0042	2	BC Hydro

Reference Standards

ES53 E3-03	Switchgear, Below Ground, 4 and 5 Way, In Vault
ES54 G2	Drainage Assemblies
ES54 H3-01	Duct Window
ES54 H1-06	Duct Entry Details
ES54 W1	Excavation and Backfill
ES54 E7-01	Automatic Switchgear Low Voltage Enclosure

REVISIONS: R.1 - DEPTH OF BOTTOM SECTION ADJUSTED. JUN '17 MK

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD
M. KELVIN	L. STEVANOVIC	F. DENNERT	PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA M. KELVIN 2017-06-22

DISTRIBUTION STANDARDS
BC Hydro

ISSUED: JUN 2017
REPLACES: MAR 2016
ORIGINALLY ISSUED: MAR 2016

BELOW GROUND SWITCHGEAR
IN VAULT

ES54 E3-03.03

R 1

Application

This standard provides installation details for the above ground switchgear 4-way over-vault.

Revision Notes

Added *Application* and *Revision Notes* sections. Updated *References*. Updated item 6, removed ground rod from item 8, and removed item 12 (pulling iron) in *Items Required* table. Removed note about pulling iron complying with ES54 H1-06. Updated note 5 for clarity. Updated Figure 1 due to a change in manufacturer to change weights, dimensions, sump location, and lifting mechanism to incorporate manufacturers' lifting clutches. Updated Figure 2 plan view to remove ground rods and reference to item 12, and Figure 2 section view to add ground plates, integral ground loop, and note to connect to Ufer. Updated Figure 3 to remove ground rods. Substantive changed content is marked by green vertical revision lines in the left margin. This standard released concurrently with Standards and Equipment Advisory Information Bulletin 2024-013 *Revised ES54 E4-01 and E4-03 Above Ground Switchgear Over-Vault 4-Way and 5-Way*.

Items Required

Item	Description	Material no.	Quantity	Supplied by
1	Vault	350-8540	1	BC Hydro
2	Vista switchgear collar	350-8536	1	BC Hydro
3	Sidewalk duty cast iron frame	400-0403	1	BC Hydro
4	Sidewalk duty cast iron cover	400-0412	1	BC Hydro
5	75 mm duct plugs 100 mm duct plugs 125 mm duct plugs	401-0197 9602-1457 9602-1459	As required As required As required	Contractor Contractor BC Hydro or contractor
6	75 mm to 125 mm duct adapter 100 mm to 125 mm duct adapter		As required	Contractor
7	Vault joint sealant	141-1346	As required	BC Hydro
8	Grounding kit 25 m counterpoise	412-0015 412-0017	1 1	BC Hydro BC Hydro
9	Sump cover	400-0426	1	BC Hydro
10	75 mm security bolt	9600-5248	2	BC Hydro
11	Bollards	400-0059	As required	BC Hydro

Designed: J. Yang, P. Eng		Professional of Record PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA J. D. YANG # 57320 2025-03-12 EGBC PERMIT 1002449	Above Ground Switchgear 4-Way Over-Vault
Checked: E. Eliasov, P. Eng			
Reviewed: L. Stevanovic, P. Eng			DISTRIBUTION STANDARDS BC Hydro
Approved: H. Giesbrecht, P. Eng		Issued: 2025-03-06 Effective: 2025-03-06	ES54 E4-01 R3

References

BC Hydro Distribution Standards

ES53 E4-01	12 kV and 25 kV Dead-Front Switchgear Above Ground 4 and 5 Way Over-Vault
ES54 section G	Drainage Assemblies
ES54 H1-06	General Trenching Details Duct Entry Details
ES54 R1-01	Grounding of Pad-Mounted Equipment in Public Corridors
ES54 U2-02	Concrete Pad Protection Bollards
ES54 W1-01	Construction Materials Excavation and Backfill

Notes

1. Drainage shall comply with ES54 section G.
2. Duct installation shall comply with ES54 H1-06.
3. Grounding shall comply with ES54 R1-01.
4. Excavation and backfill shall comply with ES54 W1-01.
5. Concrete pad protection bollards shall comply with ES54 U2-02.

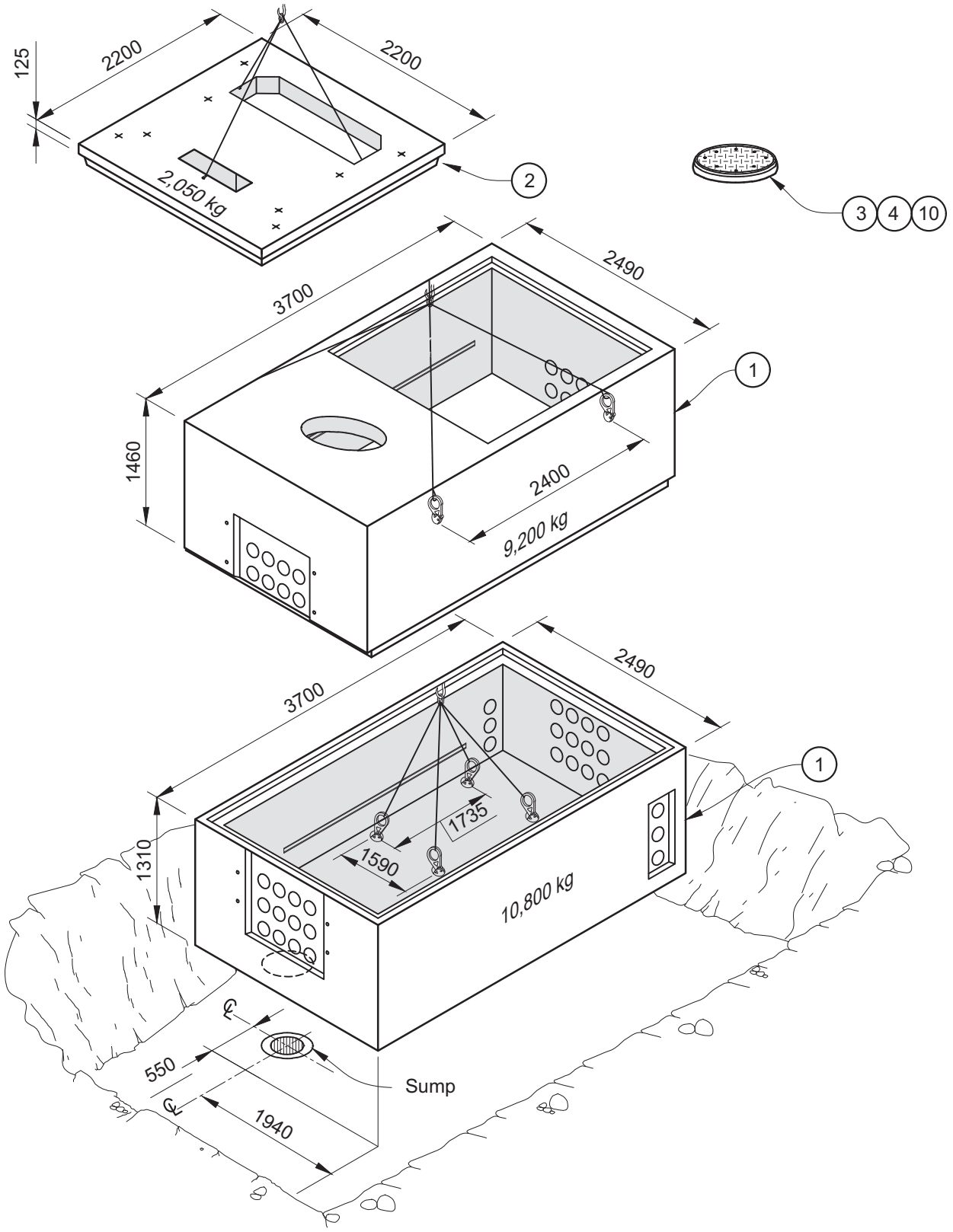


Figure 1 – 4-way over-vault precast vault installation details

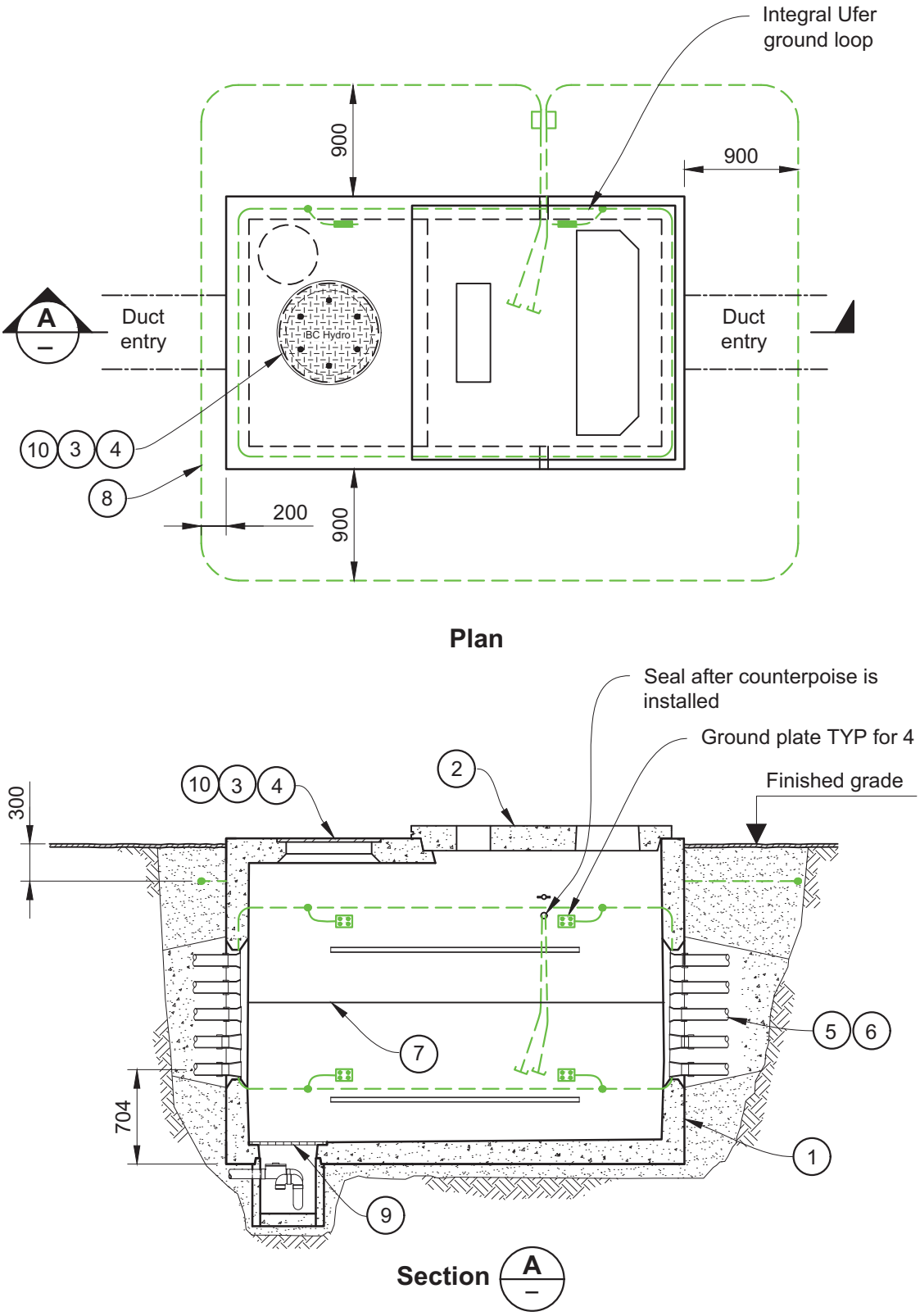


Figure 2 – 4-way over-vault plan and section view

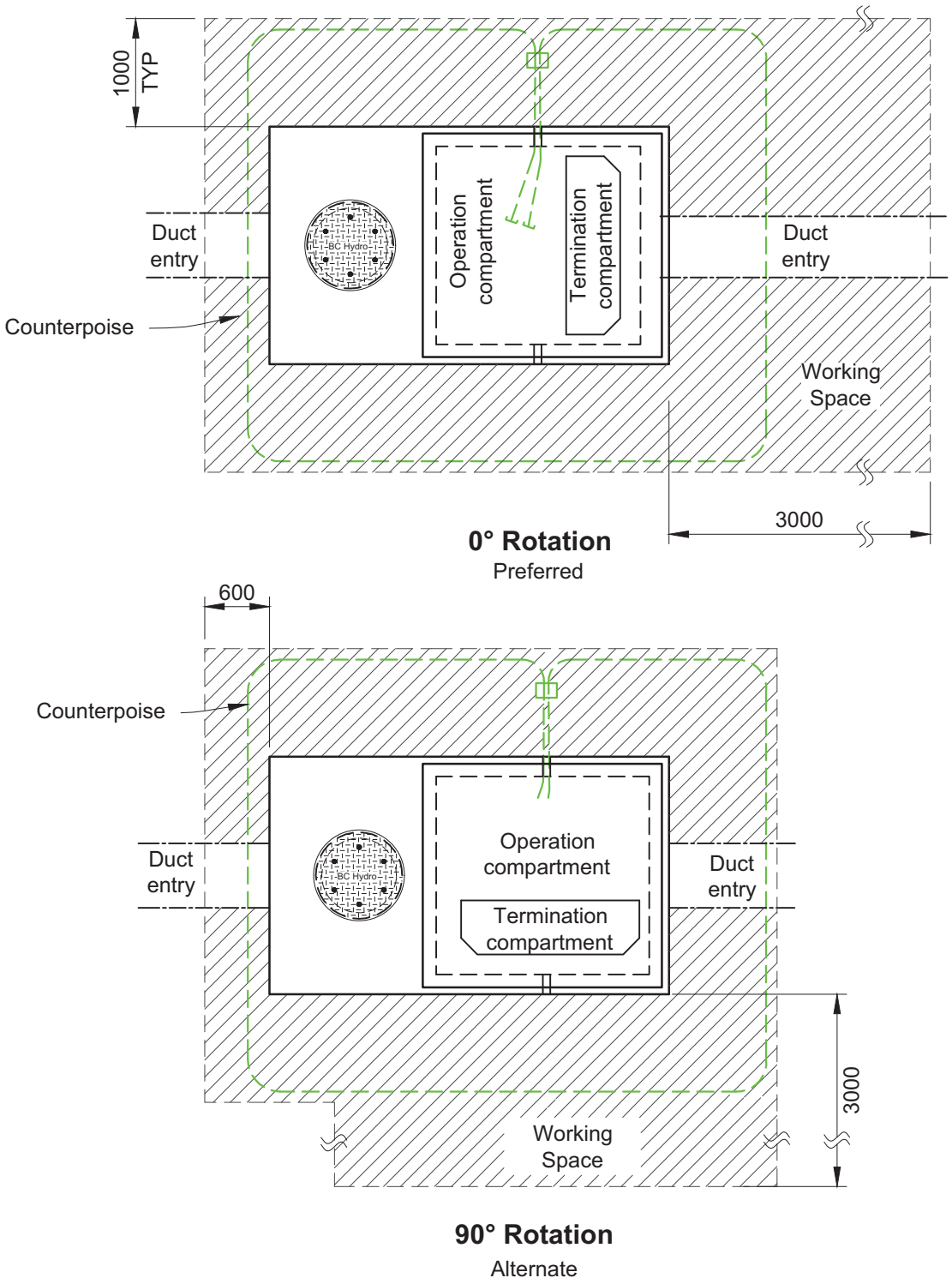


Figure 3 – 4-way over-vault orientation and clearance

Application

This standard provides installation details for the above ground switchgear 5-way over-vault.

Revision Notes

Added *Application* and *Revision Notes* sections. Updated *References*. Added contractor supplier option for 125 mm duct plug in item 5, updated item 6, removed ground rod from item 8, and removed item 12 (pulling iron) in *Items Required* table. Removed note about pulling iron complying with ES54 H1-06. Updated note 5 for clarity. Updated Figure 1 due to a change in manufacturer to change weights, dimensions, sump location, and lifting mechanism to incorporate manufacturers' lifting clutches. Updated Figure 2 plan view to remove ground rods and reference to item, and Figure 2 section view to add ground plates, integral ground loop, and note to connect to Ufer. Updated Figure 3 to remove ground rods. Substantive changed content is marked by green vertical revision lines in the left margin. This standard released concurrently with Standards and Equipment Advisory Information Bulletin 2024-013 *Revised ES54 E4-01 and E4-03 Above Ground Switchgear Over-Vault 4-Way and 5-Way*.

Items Required

Item	Description	Material no.	Quantity	Supplied by
1	Vault	350-8540	1	BC Hydro
2	Vista switchgear collar	9601-6084	1	BC Hydro
3	Medium duty cast iron frame	400-0403	1	BC Hydro
4	Medium duty cast iron cover	400-0412	1	BC Hydro
5	75 mm duct plugs 100 mm duct plugs 125 mm duct plugs	401-0197 9602-1457 9602-1459	As required As required As required	Contractor Contractor BC Hydro or contractor
6	75 mm to 125 mm duct adapter 100 mm to 125 mm duct adapter		As required	Contractor
7	Vault joint sealant	141-1346	As required	BC Hydro
8	Grounding kit 25 m counterpoise	412-0015 412-0017	1 1	BC Hydro BC Hydro
9	Sump cover	400-0426	1	BC Hydro
10	75 mm security bolt	9600-5248	2	BC Hydro
11	Bollards	400-0059	As required	BC Hydro

Designed: J. Yang, P. Eng		Professional of Record PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA J. D. YANG # 57320 2025-03-12 EGBC PERMIT 1002449	Above Ground Switchgear 5-Way Over-Vault
Checked: E. Eliasov, P. Eng			
Reviewed: L. Stevanovic, P. Eng			DISTRIBUTION STANDARDS BC Hydro
Approved: H. Giesbrecht, P. Eng		Issued: 2025-03-06 Effective: 2025-03-06	ES54 E4-03 R2

References

BC Hydro Distribution Standards

ES53 E4-01	12 kV and 25 kV Dead-Front Switchgear Above Ground, 4 and 5 Way Over-Vault
ES54 section G	Drainage Assemblies
ES54 H1-06	General Trenching Details Duct Entry Details
ES54 R1-01	Grounding of Pad-Mounted Equipment in Public Corridors
ES54 U2-02	Concrete Pad Protection Bollards
ES54 W1-01	Construction Materials Excavation and Backfill

Notes

1. Drainage shall comply with ES54 section G.
2. Duct installation shall comply with ES54 H1-06.
3. Grounding shall comply with ES54 R1-01.
4. Excavation and backfill shall comply with ES54 W1-01.
5. Concrete pad protection bollards shall comply with ES54 U2-02.

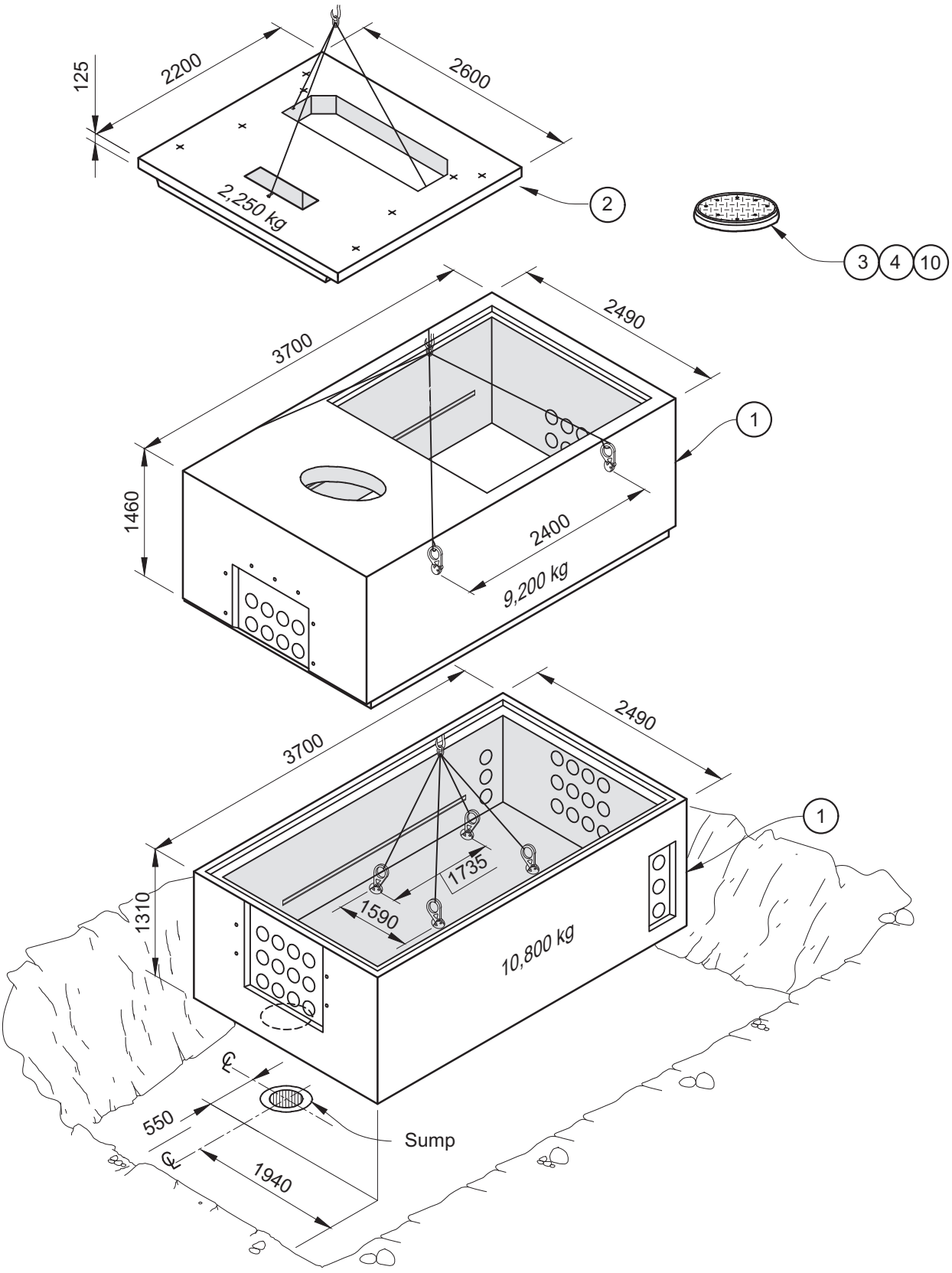


Figure 1 – 5-way over-vault precast vault installation details

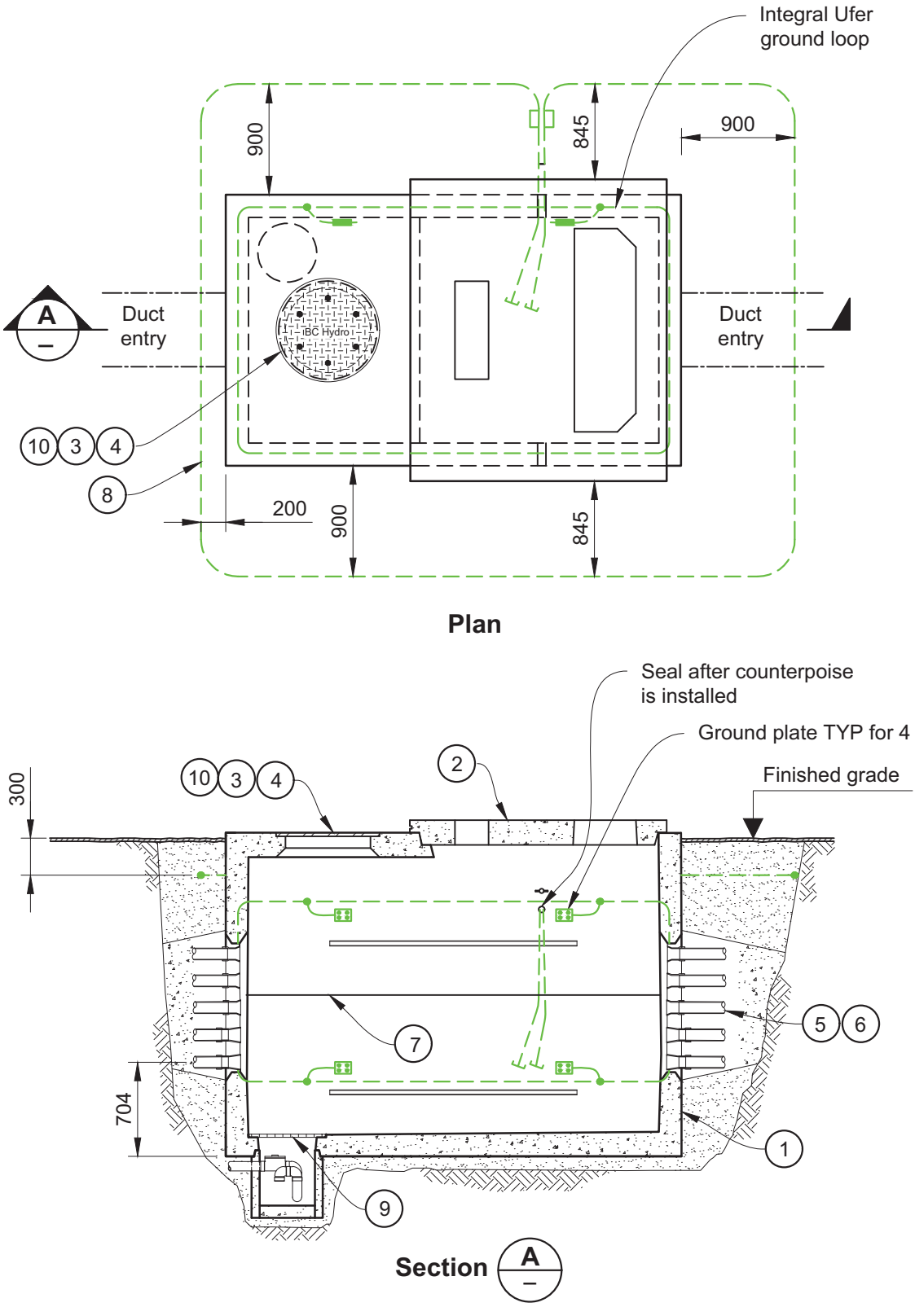
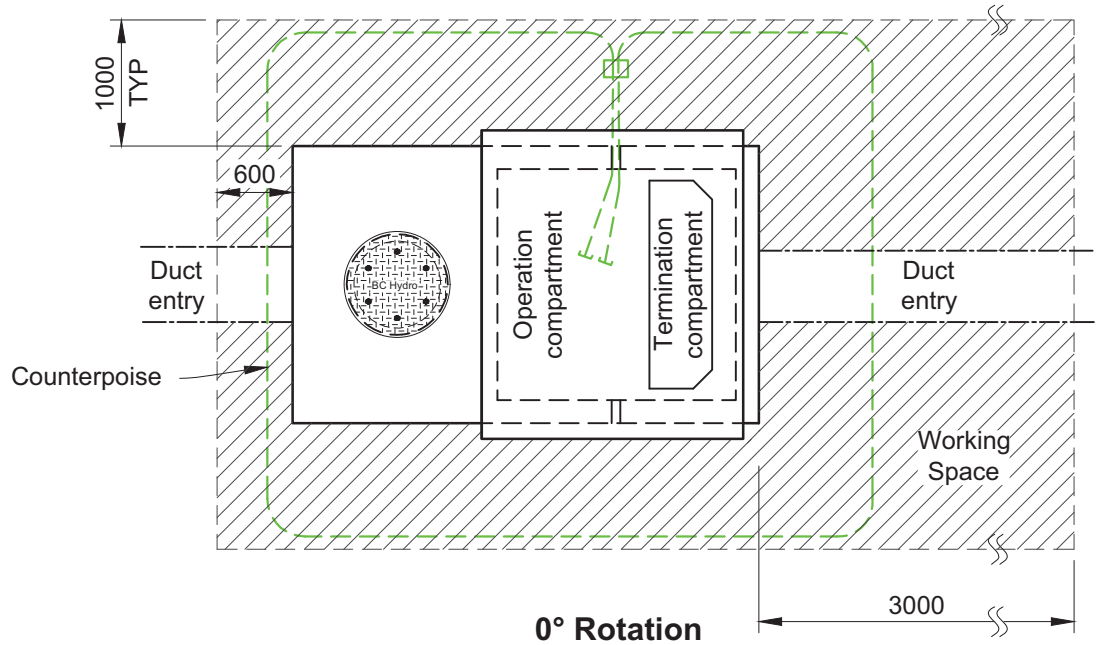
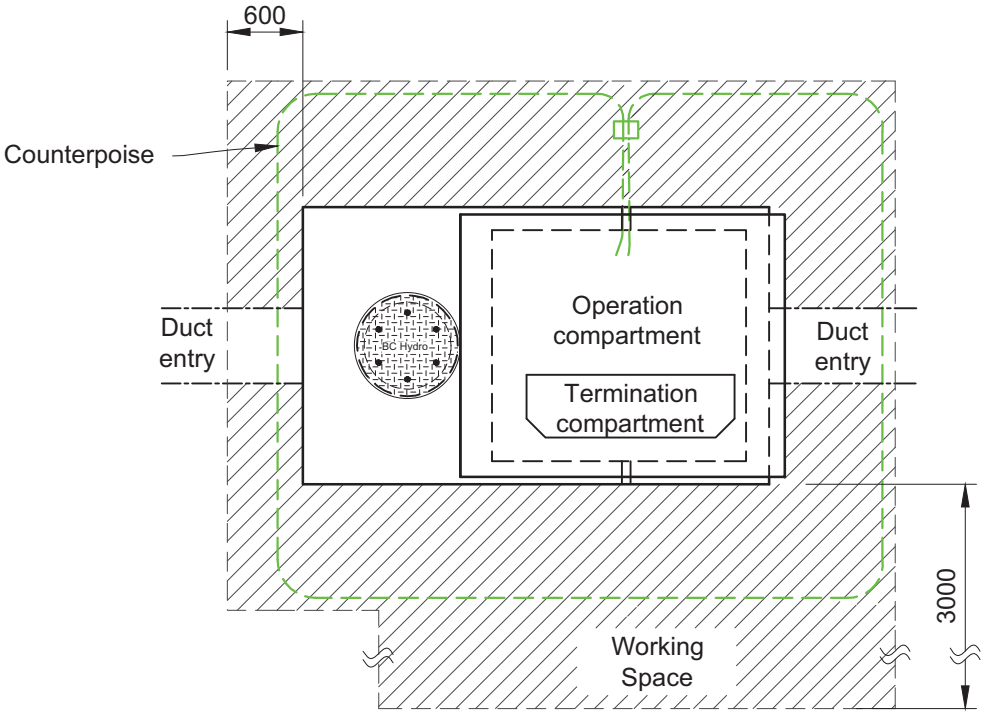


Figure 2 – 5-way over-vault plan and section view

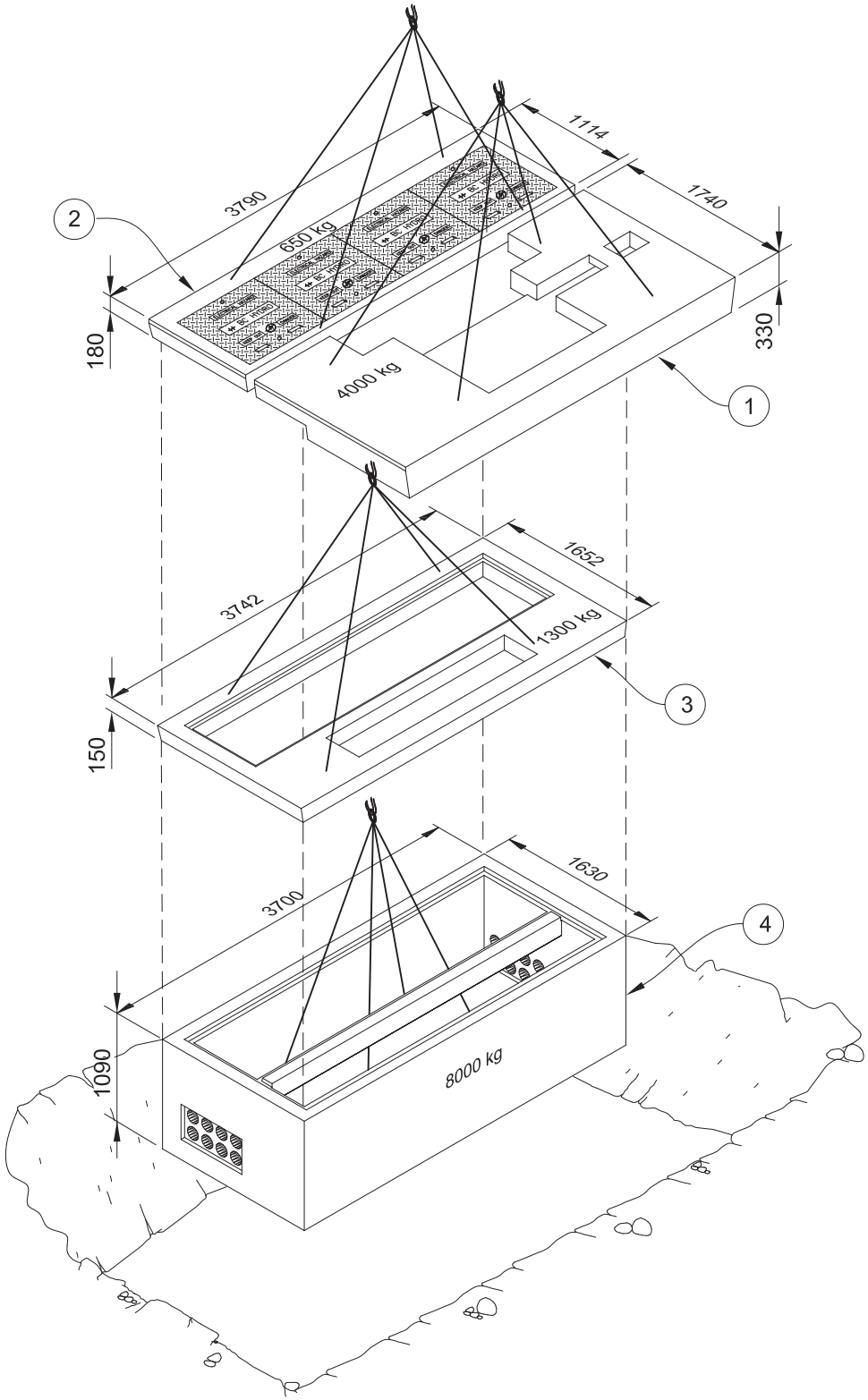


0° Rotation
Preferred



90° Rotation
Alternate

Figure 3 – 5-way over-vault orientation and clearance



REVISIONS: R1 - ROTATED LIDS 180 DEGREES IN PLAN VIEW. OCT 2021 LS

DESIGNED	RECOMMENDED	ACCEPTED
L. STEVANOVIC	G. RINGHAM	F. DENNERT

DISTRIBUTION STANDARDS
BC Hydro

ISSUED: OCT 2021
REPLACES: APR 2021
ORIGINALLY ISSUED: APR 2021

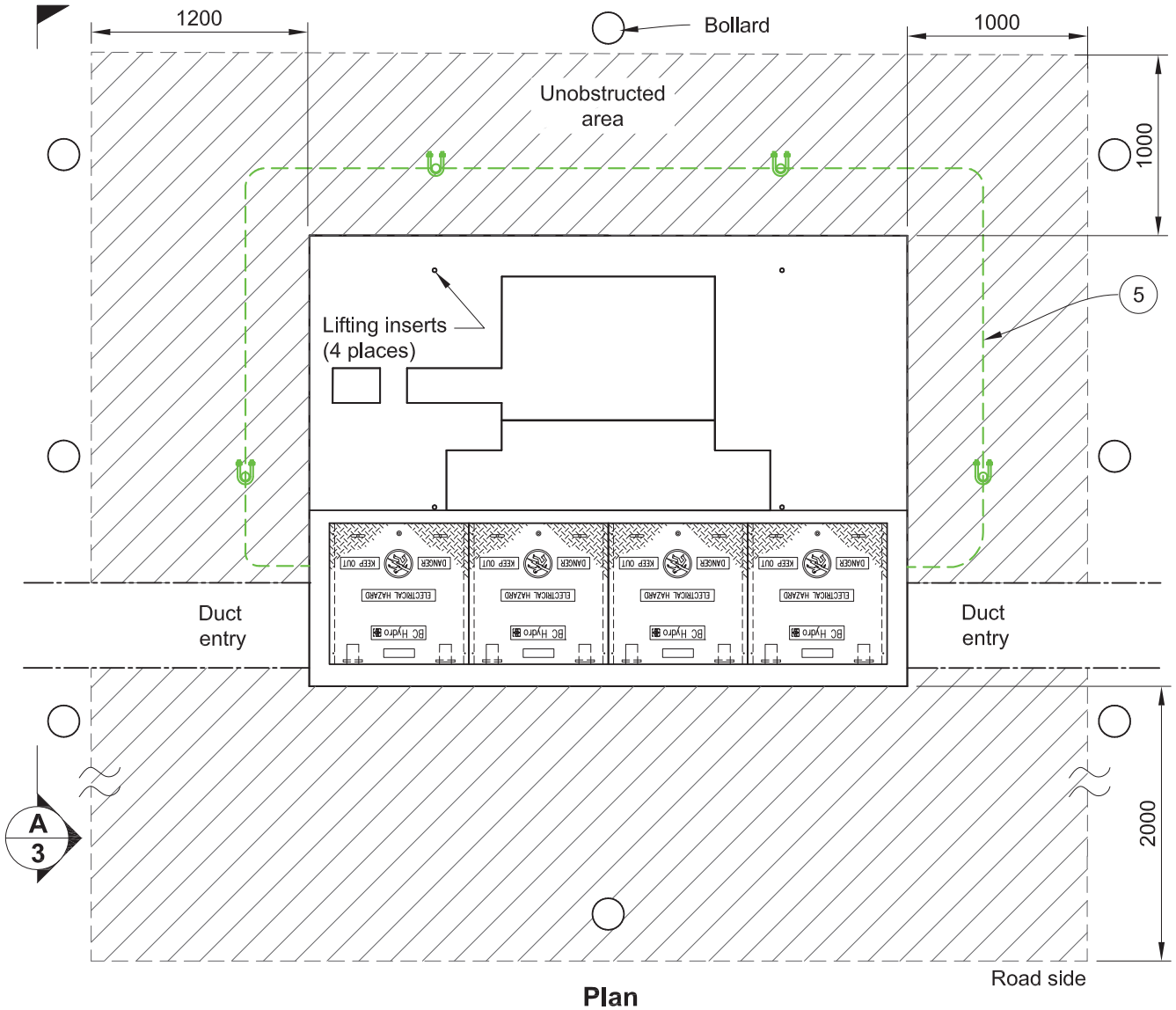
ENGINEER OF RECORD
1002449 PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA L. STEVANOVIC
Oct. 19 2021

SWITCHGEAR VAULTS AND PADS
ABOVE GROUND SWITCHGEAR
4-WAY AND 5-WAY OVER-PAD

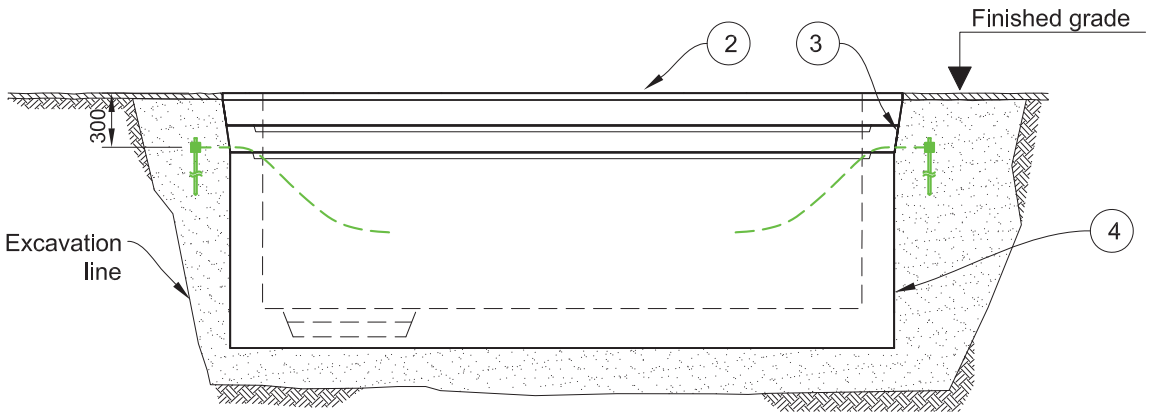
PAGE 1 OF 4

ES54 E4-05.01

R 1



Plan



Elevation

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD
L. STEVANOVIC	G. RINGHAM	F. DENNERT	1002449 PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA L. STEVANOVIC Oct. 19 2021

REVISIONS:

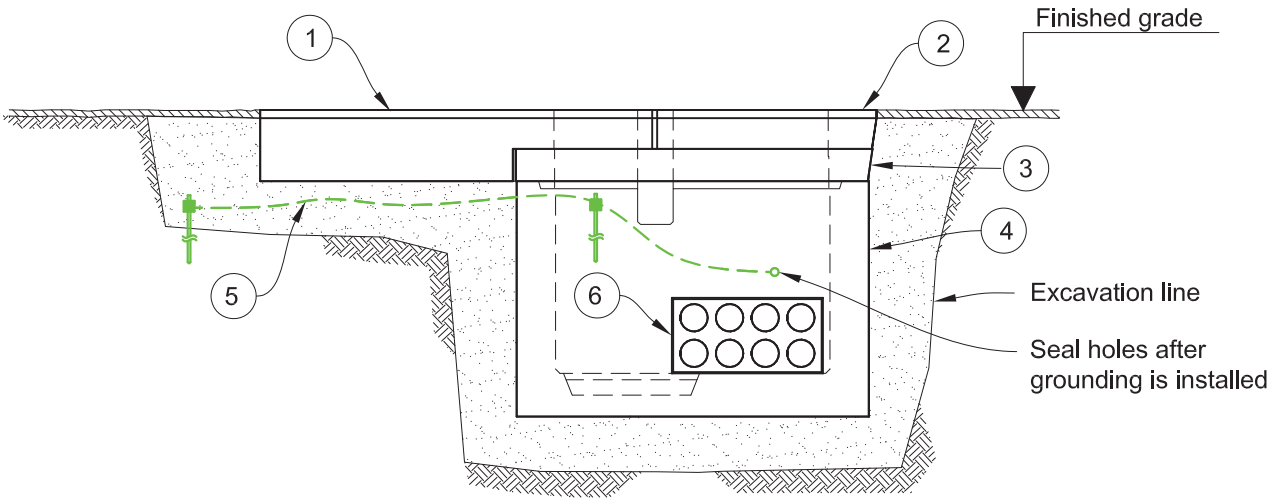
DISTRIBUTION STANDARDS
BC Hydro

ISSUED: OCT 2021
REPLACES: APR 2021
ORIGINALLY
ISSUED: APR 2021

SWITCHGEAR VAULTS AND PADS
ABOVE GROUND SWITCHGEAR
4-WAY AND 5-WAY OVER-PAD

ES54 E4-05.02

R 1



Section A 1

Notes

1. Drainage shall comply with ES54 section G.
2. Duct installation shall comply with ES54 H1-06.01. The box comes with 5” duct terminators. Smaller ducts (3” and 4”) shall be installed in suitable duct plugs and bell ends plugged and cemented in the provided terminators.
3. Counterpoise shall comply with ES54 R1.
4. The counterpoise cable shall extend approximately 600 mm inside the box on both sides, and excess coiled outside the box as per ES54 R1-01.02.
5. Excavation and backfilling shall comply with ES54 W1-01. All material shall be compacted to 95% modified proctor density in 150 mm lifts.
6. The designer shall specify protection in accordance with ES54 U2-02.

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD
L. STEVANOVIC	G. RINGHAM	F. DENNERT	1002449 PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA L. STEVANOVIC Oct. 19 2021

REVISIONS:

DISTRIBUTION STANDARDS
BC Hydro

ISSUED: OCT 2021
REPLACES: APR 2021
ORIGINALLY ISSUED: APR 2021

SWITCHGEAR VAULTS AND PADS ABOVE GROUND SWITCHGEAR 4-WAY AND 5-WAY OVER-PAD

ES54 E4-05.03

R 1

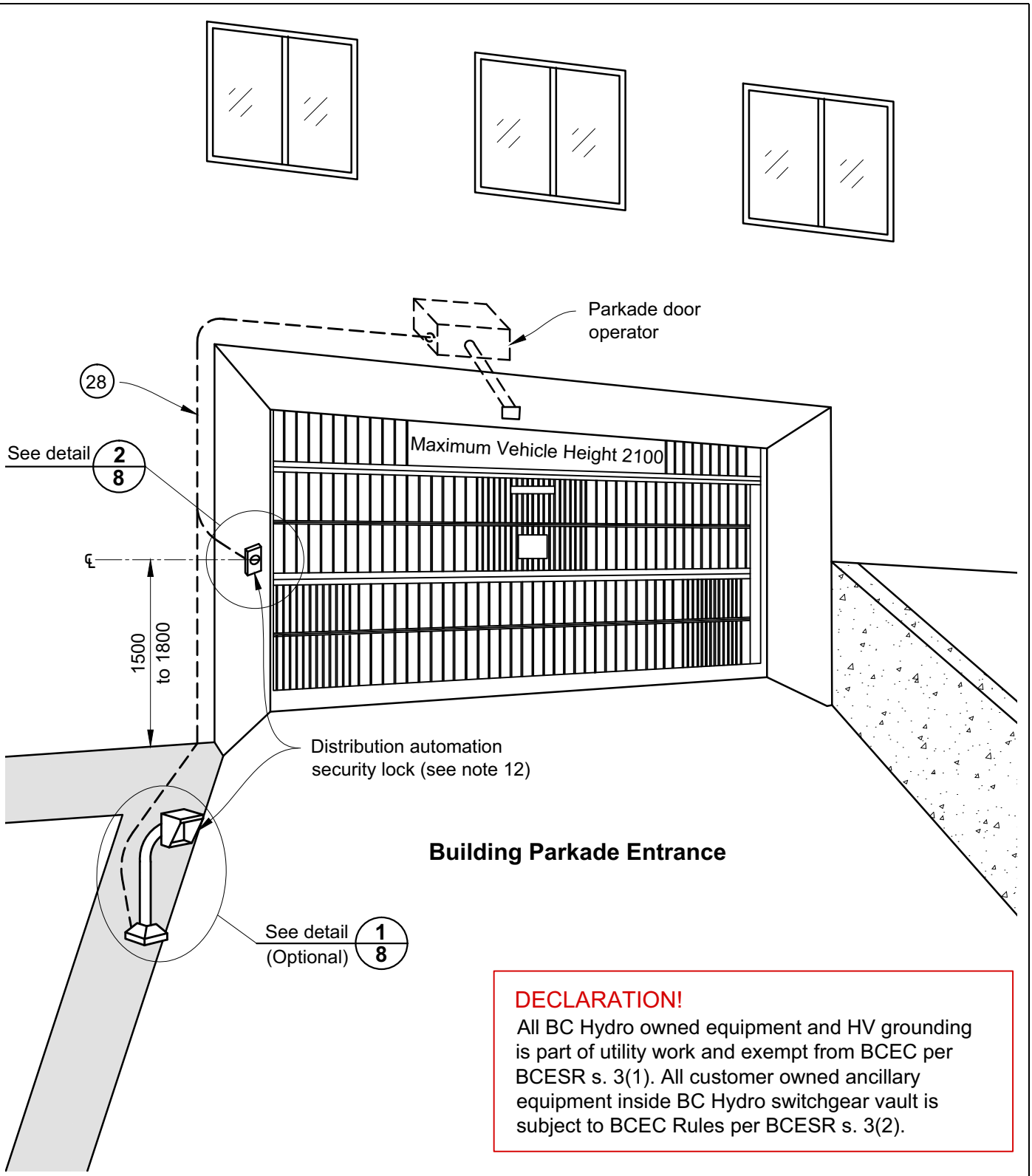
Bill of Material

Item	Description	Material Number	Quantity	Supplied By
1	Vista pad	97007031	1	BC Hydro
2	Collar with lids	97008895	1	BC Hydro
3	Riser	97007033	1	BC Hydro
4	Box	97007032	1	BC Hydro
5	Grounding kit Ground rods 18 m counterpoise	412-0015 420-1093 412-0014	2 4 1	BC Hydro
6	Sump cover	400-0426	1	BC Hydro
7	75 mm bell ends 100 mm bell ends	401-0183 96021454	As required	Contractor
8	75 mm duct plug 100 mm duct plug	401-0197 96021457	As required	Contractor
9	Bollards	400-0059	As required	BC Hydro

Reference Standards

ES53 E4-02	12 kV and 25 kV Dead-Front Switchgear Above Ground 4-Way and 5-Way Over-Pad
ES54 H1-06	General Trenching Details Duct Entry Details
ES54 R1	Grounding of Pad-Mounted Equipment
ES54 U2-02	Concrete Pad Protection Bollards
ES54 W1-01	Construction Materials Excavation and Backfill

REVISIONS: R.1 PREVIOUSLY PG-B4 - BUILDING ACCESS AND SECURITY HARDWARE ADDED. MAR '16 MK | R.2 - ROOM HEIGHT RAISED TO 3300 MM. CABLE TROUGH ADDED. CURBS DELETED. JUL '17 MK



Building Parkade Entrance

DECLARATION!

All BC Hydro owned equipment and HV grounding is part of utility work and exempt from BCEC per BCESR s. 3(1). All customer owned ancillary equipment inside BC Hydro switchgear vault is subject to BCEC Rules per BCESR s. 3(2).

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD
M. KELVIN	C. PICASSI	F. DENNERT	2017-08-11

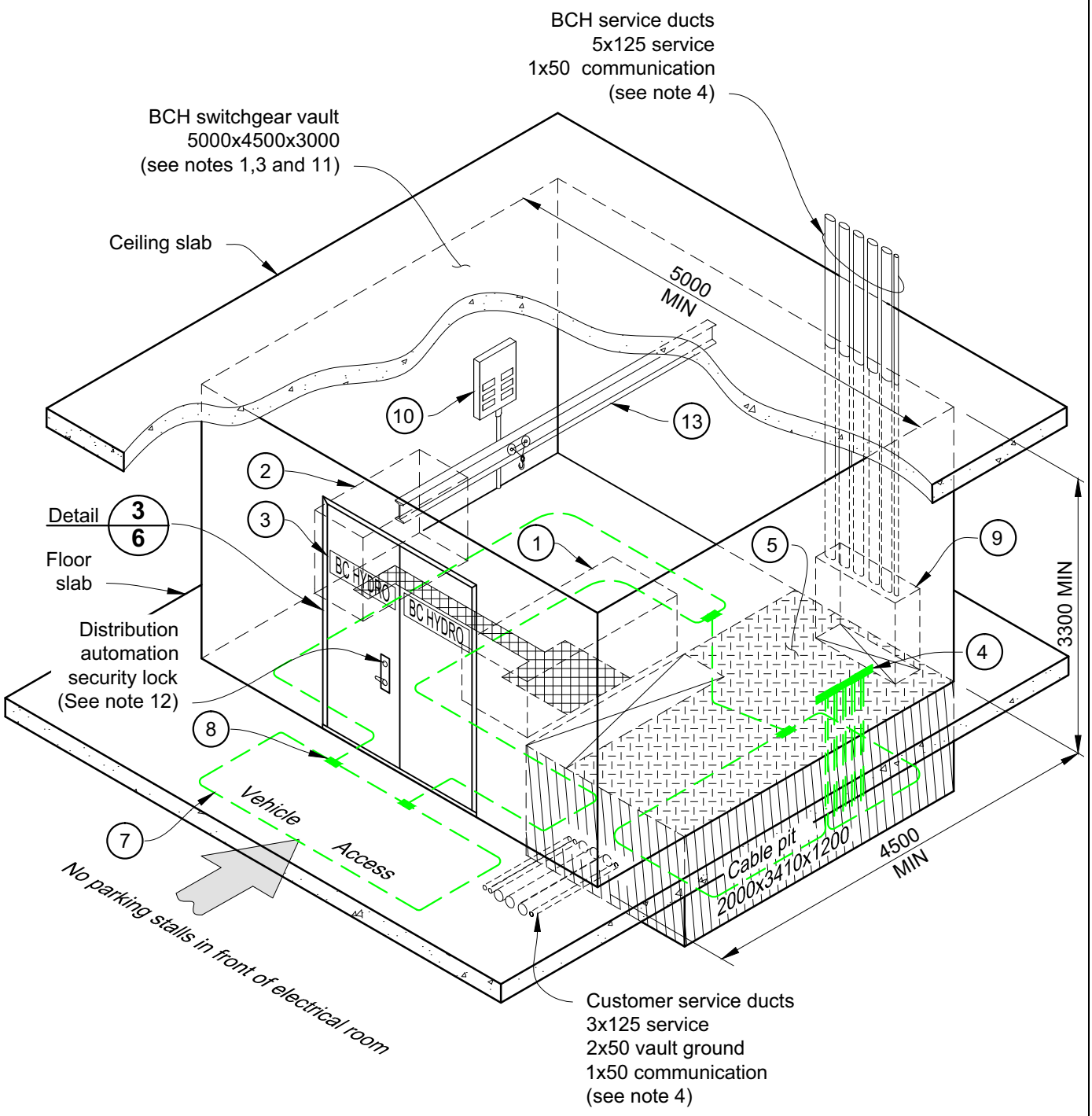
DISTRIBUTION STANDARDS
BC Hydro

ISSUED: AUG 2017
REPLACES: MAR 2016
ORIGINALLY ISSUED: AUG 2015

BC HYDRO SWITCHGEAR VAULT IN CUSTOMER-OWNED BUILDING
SINGLE RADIAL SUPPLY

ES54 E6-01.01

R 2



REVISIONS: R.1 PREVIOUSLY PG-B4 - BUILDING ACCESS AND SECURITY HARDWARE ADDED. MAR '16 MK | R.2 - ROOM HEIGHT RAISED TO 3300 MM. CABLE TROUGH ADDED. CURBS DELETED. JUL '17 MK

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD
M. KELVIN	C. PICASSI	F. DENNERT	PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA M. KELVIN 2017-08-11

DISTRIBUTION STANDARDS
BC Hydro

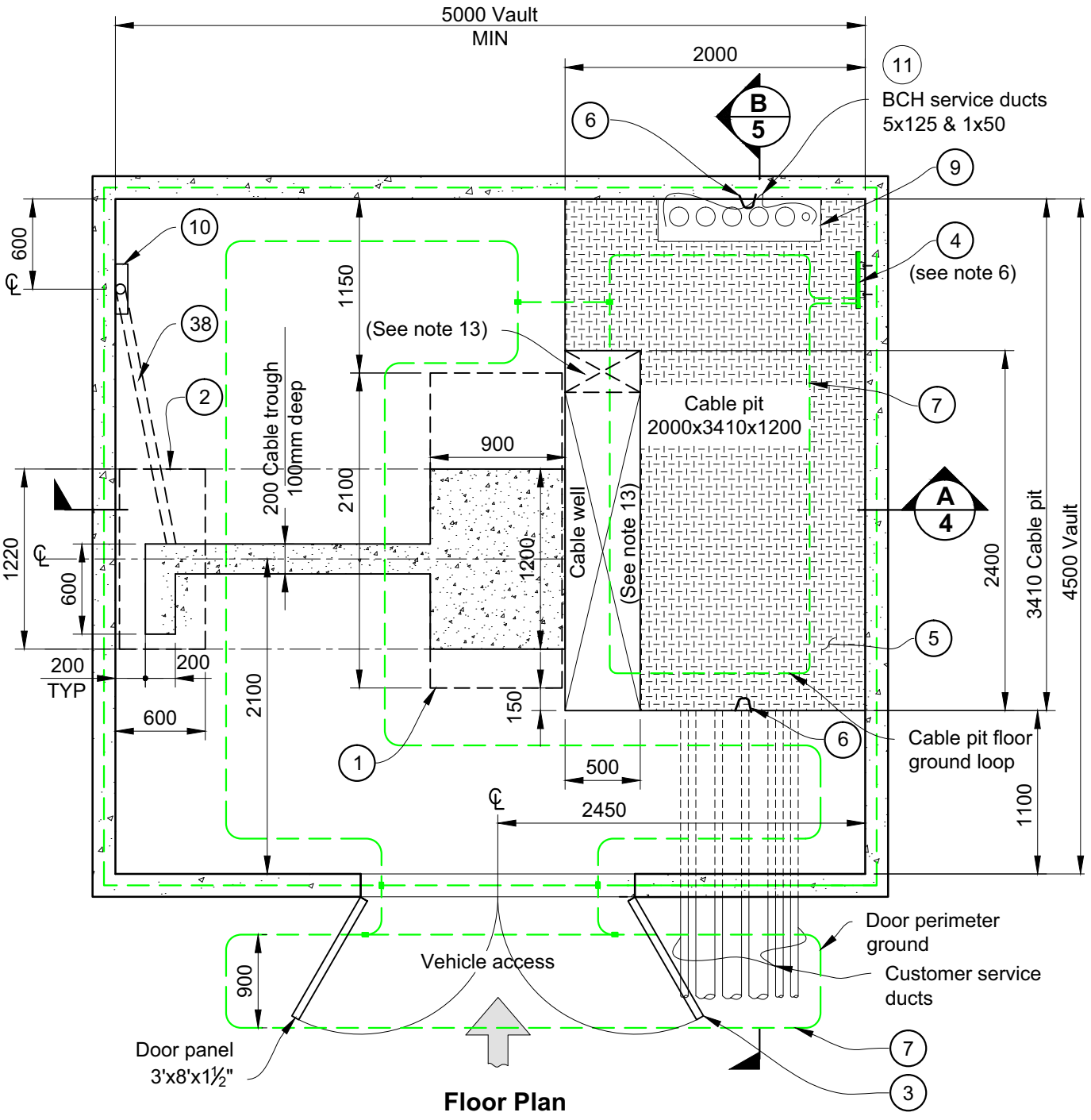
ISSUED: AUG 2017
REPLACES: MAR 2016
ORIGINALLY ISSUED: AUG 2015

BC HYDRO SWITCHGEAR VAULT IN CUSTOMER-OWNED BUILDING
SINGLE RADIAL SUPPLY

PAGE 2 OF 12

ES54 E6-01.02

R 2



Floor Plan

REVISIONS: R.1 PREVIOUSLY PG-B4 - BUILDING ACCESS AND SECURITY HARDWARE ADDED. MAR '16 MK | R.2 - ROOM HEIGHT RAISED TO 3300 MM. CABLE TROUGH ADDED. CURBS DELETED. JUL '17 MK

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD
M. KELVIN	C. PICASSI	F. DENNERT	2017-08-11

DISTRIBUTION STANDARDS
BC Hydro

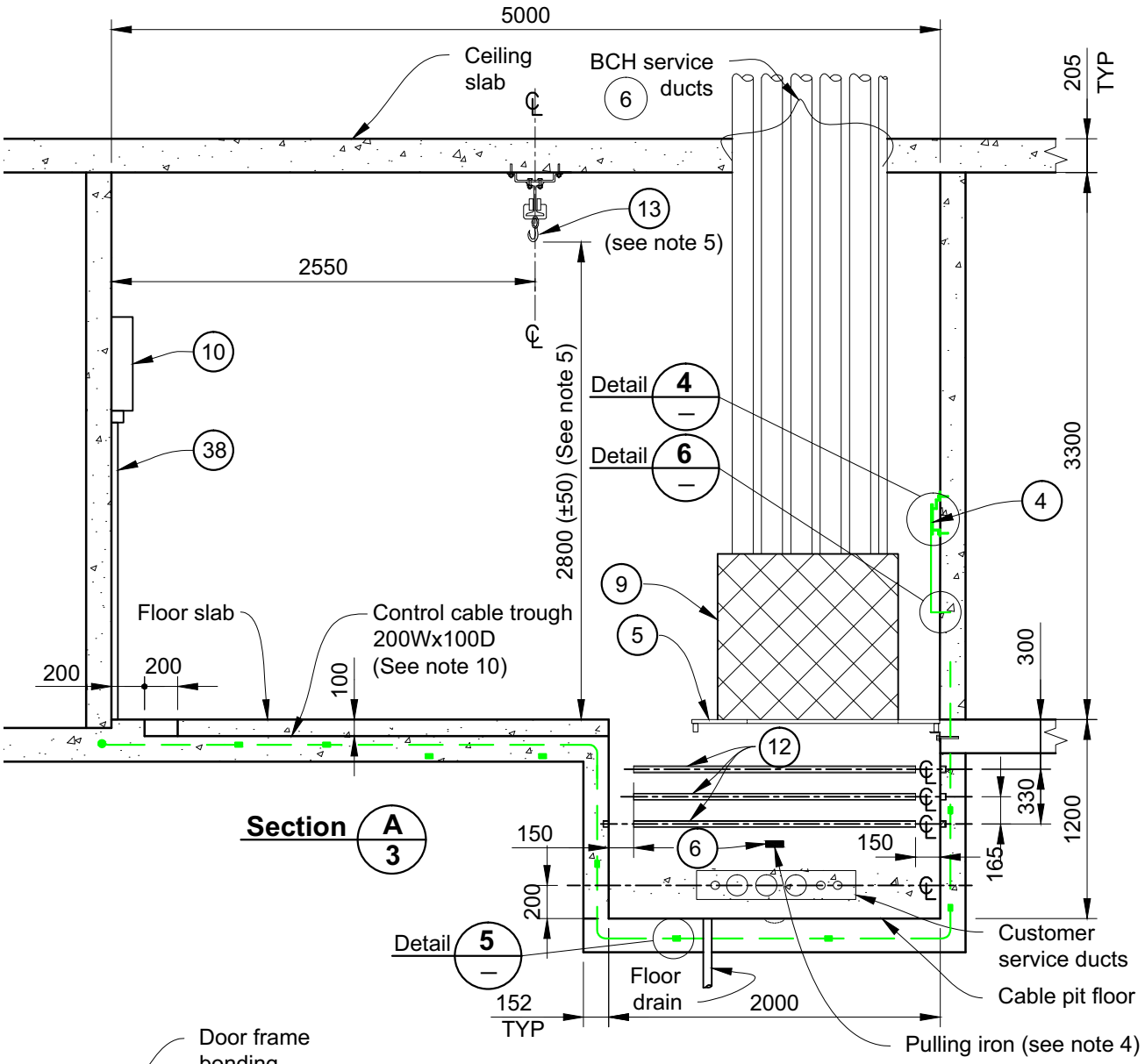
ISSUED: AUG 2017
REPLACES: MAR 2016
ORIGINALLY ISSUED: AUG 2015

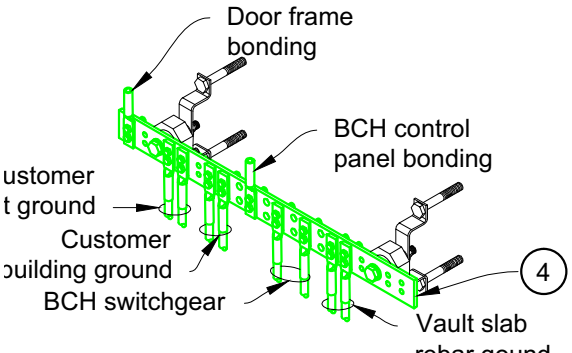
BC HYDRO SWITCHGEAR VAULT IN CUSTOMER-OWNED BUILDING
SINGLE RADIAL SUPPLY

ES54 E6-01.03

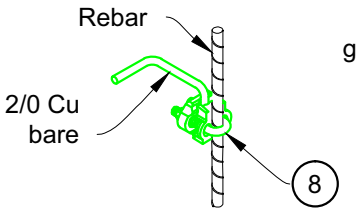
R 2

REVISIONS: R.1 PREVIOUSLY PG-B4 - BUILDING ACCESS AND SECURITY HARDWARE ADDED. MAR '16 MK | R.2 - ROOM HEIGHT RAISED TO 3300 MM. CABLE TROUGH ADDED, CURBS DELETED. JUL '17 MK

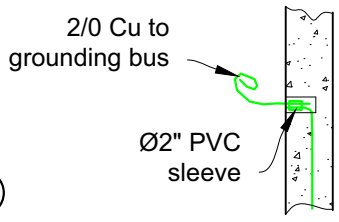




Detail 4 (see note 6)



Detail 5



Detail 6

DESIGNED	RECOMMENDED	ACCEPTED
M. KELVIN	C. PICASSI	F. DENNERT

ENGINEER OF RECORD
PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA M. KELVIN
2017-08-11

DISTRIBUTION STANDARDS
BC Hydro

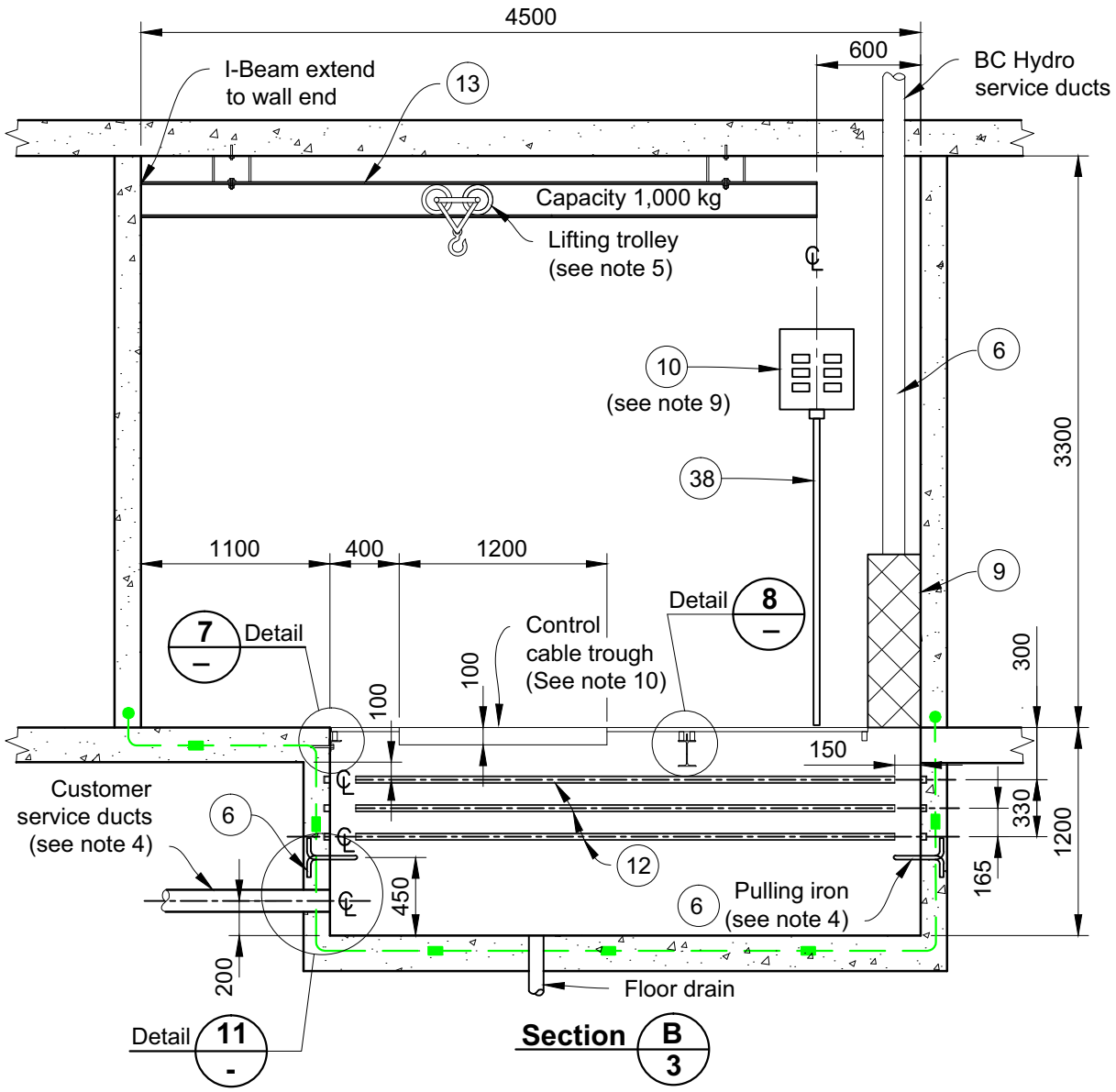
ISSUED: AUG 2017
REPLACES: MAR 2016
ORIGINALLY ISSUED: AUG 2015

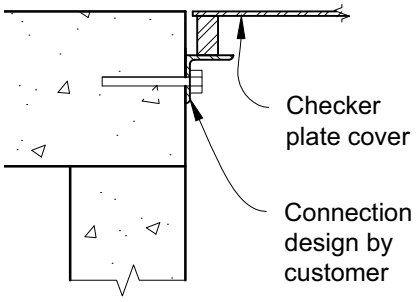
BC HYDRO SWITCHGEAR VAULT IN CUSTOMER-OWNED BUILDING SINGLE RADIAL SUPPLY

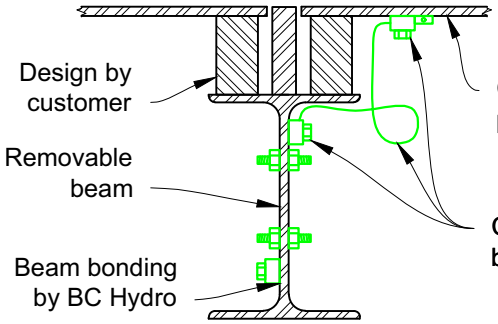
ES54 E6-01.04

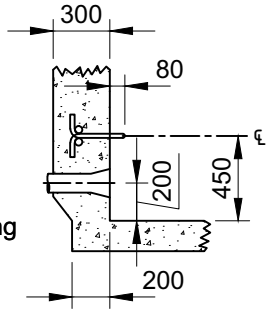
R 2

REVISIONS: R.1 PREVIOUSLY PG-B4 - BUILDING ACCESS AND SECURITY HARDWARE ADDED. MAR '16 MK | R.2 - ROOM HEIGHT RAISED TO 3300 MM. CABLE TROUGH ADDED. CURBS DELETED. JUL '17 MK









DESIGNED	RECOMMENDED	ACCEPTED
M. KELVIN	C. PICASSI	F. DENNERT

DISTRIBUTION STANDARDS
BC Hydro

ISSUED: AUG 2017
REPLACES: MAR 2016
ORIGINALLY ISSUED: AUG 2015

ENGINEER OF RECORD
PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA M. KELVIN
2017-08-11

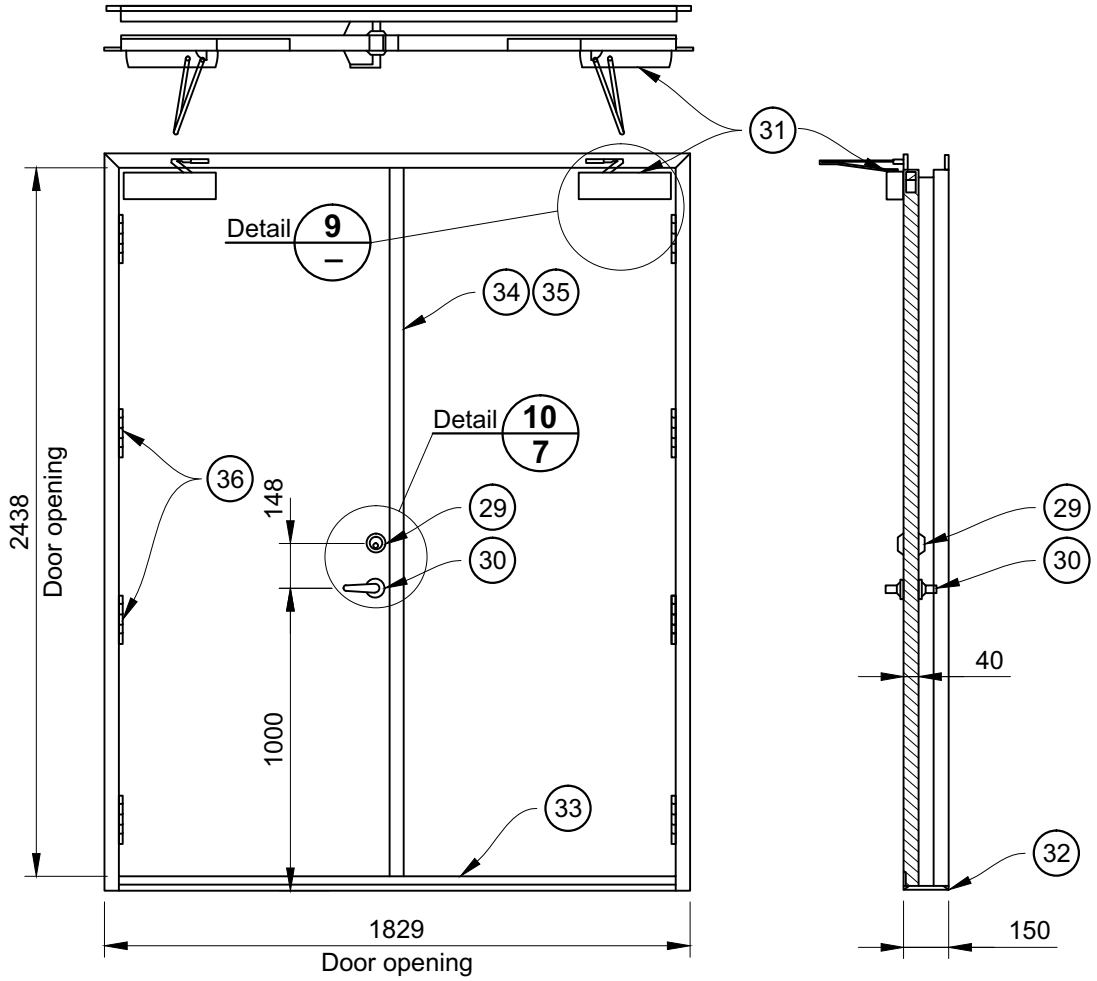
BC HYDRO SWITCHGEAR VAULT IN CUSTOMER-OWNED BUILDING
SINGLE RADIAL SUPPLY

PAGE 5 OF 12

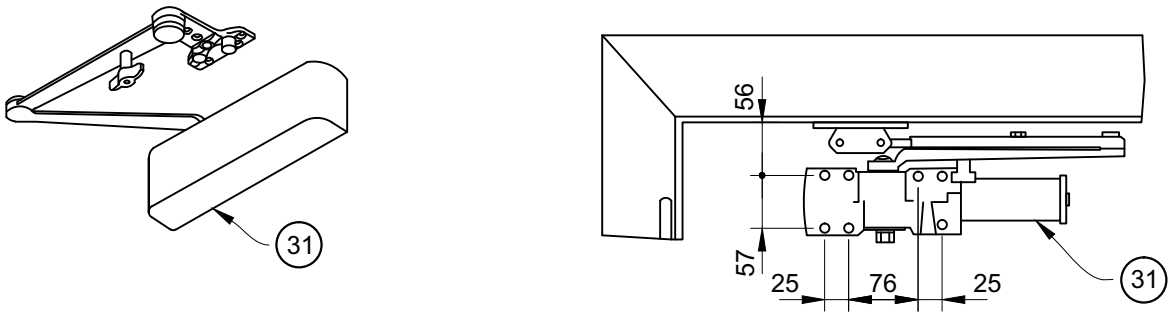
ES54 E6-01.05

R 2

REVISIONS: R.1 PREVIOUSLY PG-B4 - BUILDING ACCESS AND SECURITY HARDWARE ADDED. MAR '16 MK | R.2 - ROOM HEIGHT RAISED TO 3300 MM. CABLE TROUGH ADDED. CURBS DELETED. JUL '17 MK



Door Detail 3/2
(see note 5)



Heavy Duty Parallel Arm

Detail 9/–

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD
M. KELVIN	C. PICASSI	F. DENNERT	2017-08-11

DISTRIBUTION STANDARDS
BC Hydro

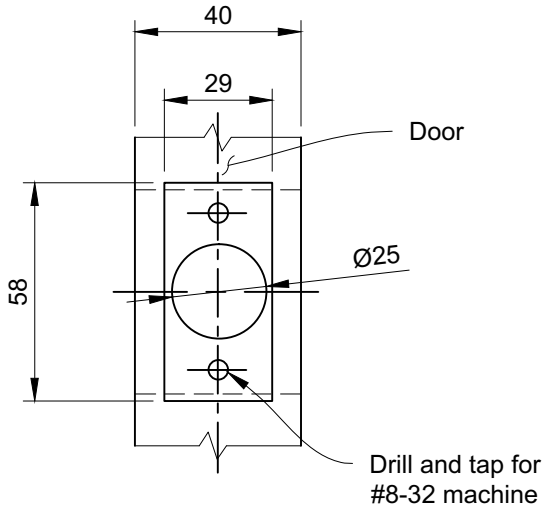
ISSUED: AUG 2017
REPLACES: MAR 2016
ORIGINALLY ISSUED: AUG 2015

BC HYDRO SWITCHGEAR VAULT IN CUSTOMER-OWNED BUILDING
SINGLE RADIAL SUPPLY

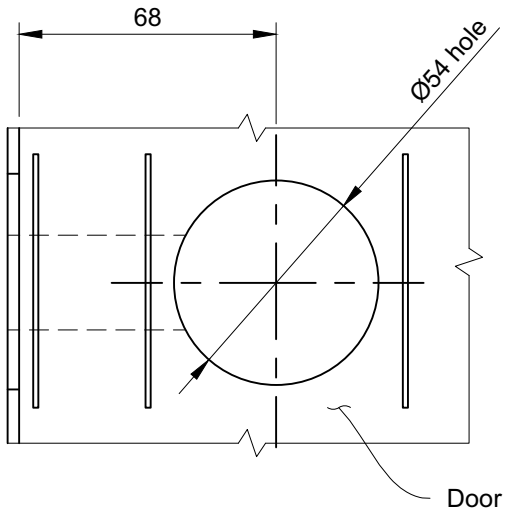
ES54 E6-01.06

R 2

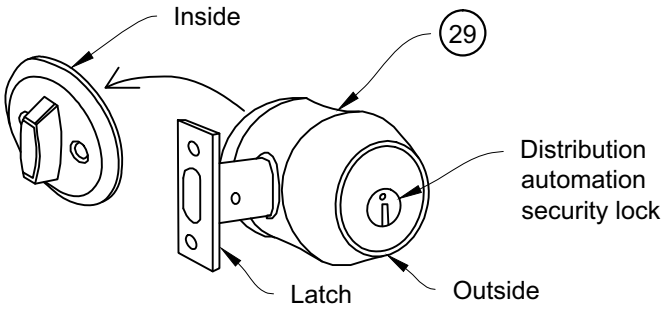
REVISIONS: R.1 PREVIOUSLY PG-B4 - BUILDING ACCESS AND SECURITY HARDWARE ADDED. MAR '16 MK | R.2 - ROOM HEIGHT RAISED TO 3300 MM. CABLE TROUGH ADDED. CURBS DELETED. JUL '17 MK



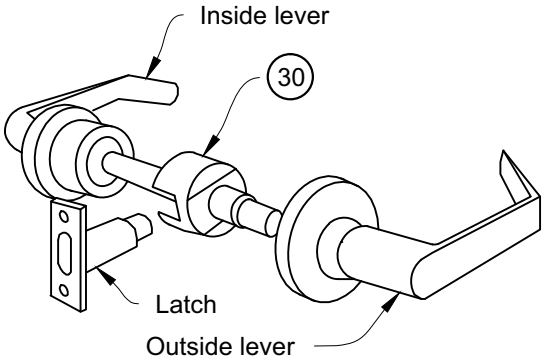
Latch



Drilling Template for Dead Bolt and Storeroom Lever



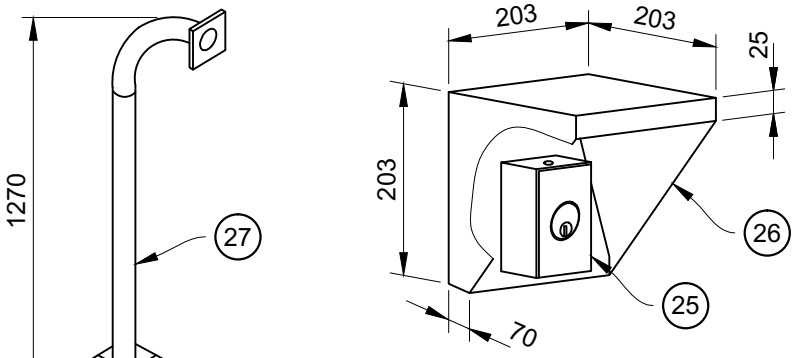
Dead Bolt



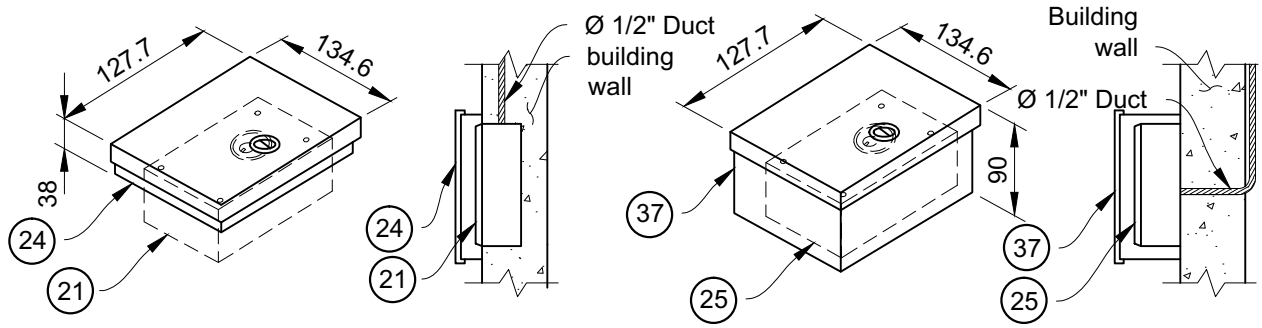
Storeroom Lever

Detail 10/6

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD	BC HYDRO SWITCHGEAR VAULT IN CUSTOMER-OWNED BUILDING SINGLE RADIAL SUPPLY	
M. KELVIN	C. PICASSI	F. DENNERT	PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA M. KELVIN 2017-08-11		
DISTRIBUTION STANDARDS BC Hydro	ISSUED: AUG 2017 REPLACES: MAR 2016 ORIGINALLY ISSUED: AUG 2015			PAGE 7 OF 12	ES54 E6-01.07 R 2



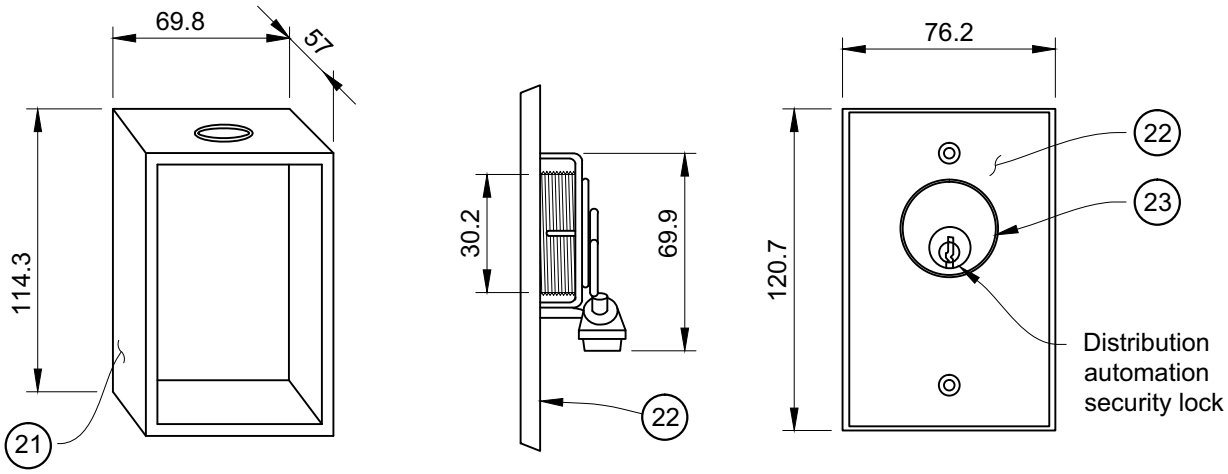
Detail 1/1 (see note 12)



Shroud Cover
(Recessed Switch)

Shroud Cover
(Surface Mounted Switch)

Detail 2/1



Keyed Switch Assembly Details

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD	BC HYDRO SWITCHGEAR VAULT IN CUSTOMER-OWNED BUILDING SINGLE RADIAL SUPPLY	
M. KELVIN	C. PICASSI	F. DENNERT	PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA M. KELVIN 2017-08-11		
DISTRIBUTION STANDARDS BC Hydro	ISSUED: AUG 2017 REPLACES: MAR 2016 ORIGINALLY ISSUED: AUG 2015			PAGE 8 OF 12	ES54 E6-01.08 R 2

Notes

1. The BC Hydro switchgear vault, 5000 W x 4500 D x 3300 H mm minimum dimensions, is intended for 4-way and 5-way switchgear to facilitate the new BC Hydro “Open Loop” configuration for designated customer primary service single radial supply. Alternatively, BC Hydro may use such vaults in areas with highly congested public corridors.
2. Switchgear vaults inside a customer building shall be located at a level not lower than one floor below ground level, namely P1. A pad-mounted switchgear option installed in an alcove or an open parkade is not acceptable to BC Hydro. For further reference and installation options, contact the BC Hydro designer for the area.
3. BC Hydro shall require a specific Right of Way (ROW) for the switchgear area and building access. The customer should prepare the ROW drawing and forward it to the BC Hydro designer. It is the customer’s responsibility to provide an as-constructed survey plan to confirm that the switchgear area is within the specific ROW area.
4. The customer shall contact the BC Hydro designer to confirm the exact number of service ducts, size of service cables, and size of the BC Hydro distribution switchgear. Service ducts located inside the building shall be concrete-encased CSA Type DB2 inside a 75 mm cover. For the exposed section of ducts inside a fire-rated vault, the ducts shall be Sched40 steel or 6 mm-thick steel cover plate, removable. The customer may propose an alternative location for the service ducts inside the cable pull pit, which may require relocating the associated pulling irons.
5. The customer shall provide easy vehicle access to the switchgear vault and a double metal door for equipment access, 2 x (3ft x 8ft) fire-rated swing-out doors. The customer shall ensure that the lifting I-beam with a lifting trolley is centred with the centre line of the access door and switchgear mounting centre line. For a high ceiling vault, the lifting trolley shall be fitted with a chain and a 3" dia. lifting ring 2800 (+/-50) mm above the floor.
6. The BC Hydro switchgear vault requires a 4" x 24" x ¼" thick Cu bus for connection to the building ground and customer vault grounding conductors, as well as the BC Hydro switchgear and control panel grounding conductors. In addition, the customer shall bond all exposed metal structures, such as doors, building columns and pull pit metal cover plates, to the ground bus, per CEC Section 36.
7. The BC Hydro switchgear vault requires a relatively large cable pull pit (2000 W x 3410 L x 1200 D) mm, to accommodate multiple cables and to facilitate the cable pulling harness. The cable pull pit shall be covered with removable steel or aluminum 6 mm (¼" thick) checker plates, less than 40 lb in weight (less than 80 lb hinged), c/w drop-down lifting handles, mechanically interlocked or bolted down to the support floor joists. The supporting floor joists and beams shall be removable, designed and installed by the customer for applicable live and dead load ratings.
8. BC Hydro requires three runs of C-channels, Unistrut P-3270, on all four walls inside the cable pull pit. These channels are used for cable clamping, grounding bus installation and support of other equipment.

9. BC Hydro requires a reliable power supply, a 60 A 120/240 V breaker panel fed from the building essential supply powering the elevators, emergency lighting, etc. The breaker panel shall include one 30 A 120/240 V circuit for the switchgear control panel, two 15 A 120 V circuits for convenience outlets and one 15 A 120 V circuit for lighting.
10. The BC Hydro switchgear and control panel require a recessed cable trough (200 W x 100 D) mm, covered with a removable checker plate and installed between the switchgear base and control panel mounting base. The recessed cable trough widens below the switchgear and control panel, as shown on drawings.
11. The customer's certified building permit drawings shall include the BC Hydro switchgear vault designed to comply with the BC Building Code, BC Electrical Code, and local bylaws and regulations.
12. For wiring and installation details of keyed switches for the building vehicle access via the parkade, contact the BC Hydro designer, or the security access contractor, Gunnebo Canada Inc., at tel. 604-291-1725.
13. The BC Hydro switchgear and cable well dimensions shown are for a 5-way configuration. For smaller 4-way switchgear, the customer shall supply and install a removable engineered cover checker plate, 300x500 mm approximately, for a reduced size cable well.

Bill of Material

Item	Description	Catalogue ID	Quantity	Supplied By
1	BC Hydro distribution switchgear	TBD	1	BC Hydro
2	Switchgear control panel	TBD	1	BC Hydro
3	2 x (3ft x 8ft) double swing doors, hand operated, fire rated, c/w safety pins, suitable for BCH supplied deadbolt	N/A	1	Contractor
4	Ground bus 24"x4"x1/4" NEMA spacing, c/w support insulators, wall mount Burndy BBB424UD, Erico EGBA14424 or BC Hydro approved equivalent	N/A	1	Contractor
5	Checker plate floor panels, ¼" Al or steel, removable, 40 lb max, bolted on top of floor joists and removable support beams	N/A	As required	Contractor
6	Pulling iron, Slater Products Inc. hot dip galvanized Cat. No. 9119	420-0916	2	BC Hydro
7	2/0 AWG Cu bare stranded	N/A	As required	Contractor
8	2/0 Cu to ¾" rebar grounding connector Ilsco GPL-6 or T&B 54890 C-tap or equivalent	N/A	As required	Contractor
9	Cable guard, removable, steel 12 Ga, bolted to wall	N/A	1	Contractor
10	Distribution sub-panel 60 A 120/240 V 6 cct	N/A	1	Contractor
11	Rigid steel duct 125 mm dia Schedule 40	N/A	As required	Contractor
12	C-channel Unistrut P-3270	N/A	As required	Contractor
13	I-beam lifter, 1,000 kg capacity c/w lifting trolley	N/A	1	Contractor
17	Future use			
21	Single gang switch box	N/A	1	Contractor
22	Distribution Automation Key Switch, as required	N/A	1 (or more)	Gunnebo
23	Medeco 3 Logic 1⅛" mortise cylinder	N/A	1	Gunnebo
24	Shroud enclosure for Distribution Automation lock for embedded switch CUS-BCH-SMKSC-SS-1.5	N/A	1	Gunnebo
25	Surface mount Distribution Automation Key Switch	N/A	1	Gunnebo
26	Hood cover	N/A	1	Gunnebo
27	Pad-mounted goose neck	N/A	1	Gunnebo
28	½" PVC conduit c/w pull string 18 Ga	N/A	1	Contractor
29	Deadbolt Medeco MD11C60226 kGC	N/A	1	Gunnebo
30	Storeroom lever door handle	N/A	1	Gunnebo
31	Door closer	N/A	2	Gunnebo
32	Door bottom	N/A	2	Gunnebo

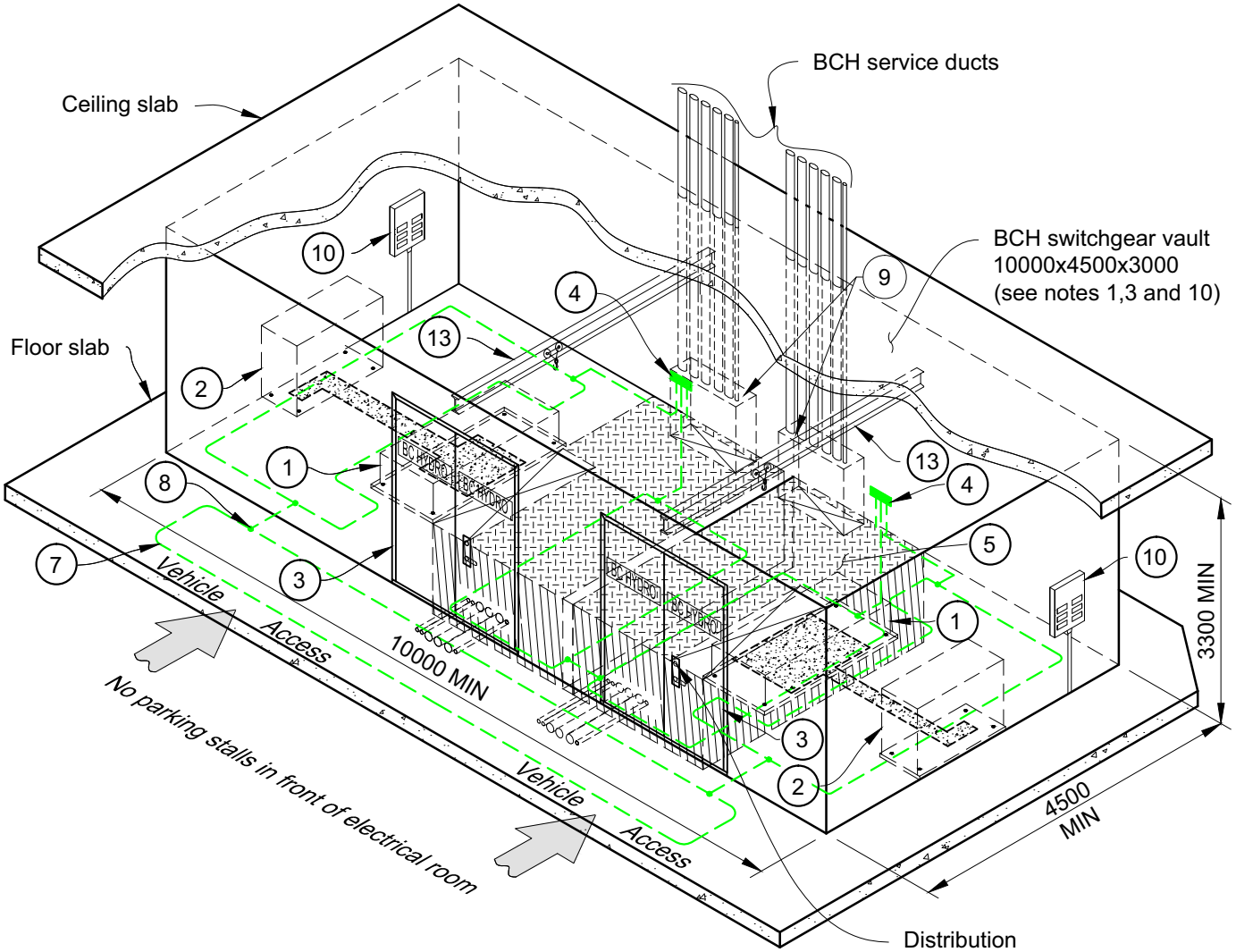
Bill of Material, contd.				
Item	**Description**	**Catalogue ID**	**Quantity**	**Supplied By**
33	Threshold ½" x 6" x 72"	N/A	1	Contractor
34	Astragal MHASH5052188	N/A	1	Contractor
35	Flush bolt set DC840C15, top and bottom	N/A	2	Contractor
36	NRP hinges MYTA2714NPR26D	N/A	8	Contractor
37	Shroud enclosure for key switch c/w ¼ turn lock for surface mount switch CUS-BCH-SMKSC-SS-3.5	N/A	1	Gunnebo
38	2"dia PVC duct	N/A	As required	Contractor

Reference Document

BC Hydro Requirements for Customer-Owned Primary Services Supplied at 4 kV to 35 kV – "Primary Guide"

Reference Standards

ES55 B2-05	BC Hydro Owned Switchgear in Customer-Owned Buildings
ES53 E4-01	12 kV and 25 kV Dead-Front Switchgear Installation, Above Ground 4 and 5 Way Over-Vault
ES54 Section R	Grounding
ES54 S3-03	Primary Services, Live Front Indoor Type Switchgear
CSA22.1	Canadian Electrical Code, Part I



DECLARATION!

All BC Hydro owned equipment and HV grounding is part of utility work and exempt from BCEC per BCESR s. 3(1). All customer owned ancillary equipment inside BC Hydro switchgear vault is subject to BCEC Rules per BCESR s. 3(2).

Note: For further details on grounding, access security, etc. refer to ES54 E6-01

REVISIONS: R.1 - ROOM HEIGHT RAISED,TO 3300 MM, CABLE TROUGH ADDED, CURBS DELETED. JUL '17 MK

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD
M. KELVIN	L. STEVANOVIC	F. DENNERT	2017-08-11

DISTRIBUTION STANDARDS
BC Hydro

ISSUED: AUG 2017
REPLACES: MAR 2016
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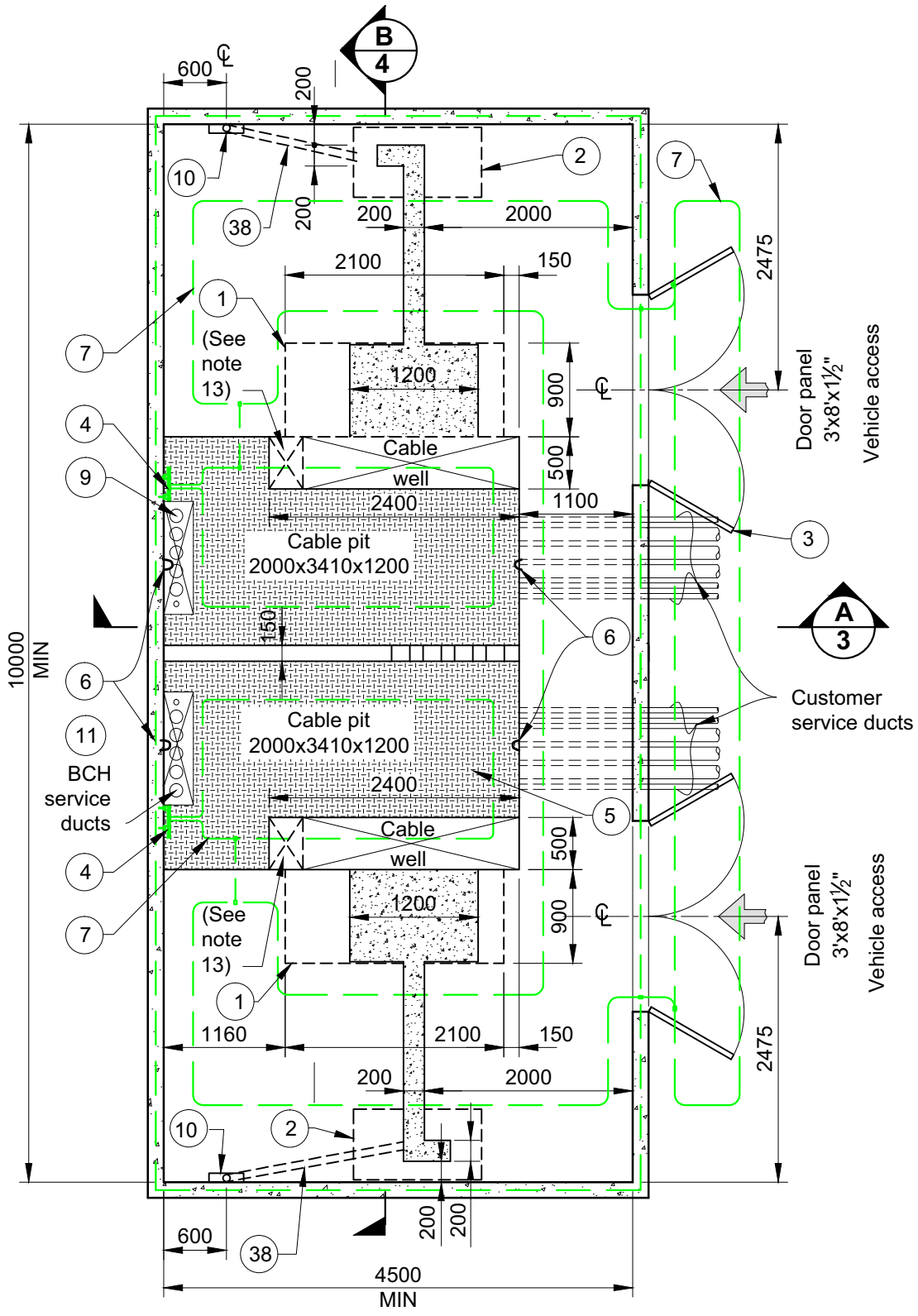
BC HYDRO SWITCHGEAR VAULT IN CUSTOMER-OWNED BUILDING DUAL SUPPLY

PAGE 1 OF 7

ES54 E6-02.01

R 1



Plan

REVISIONS: R.1 - ROOM HEIGHT RAISED,TO 3300 MM, CABLE TROUGH ADDED, CURBS DELETED. JUL '17 MK

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD
M. KELVIN	L. STEVANOVIC	F. DENNERT	2017-08-11

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — M. KELVIN

DISTRIBUTION STANDARDS
BC Hydro

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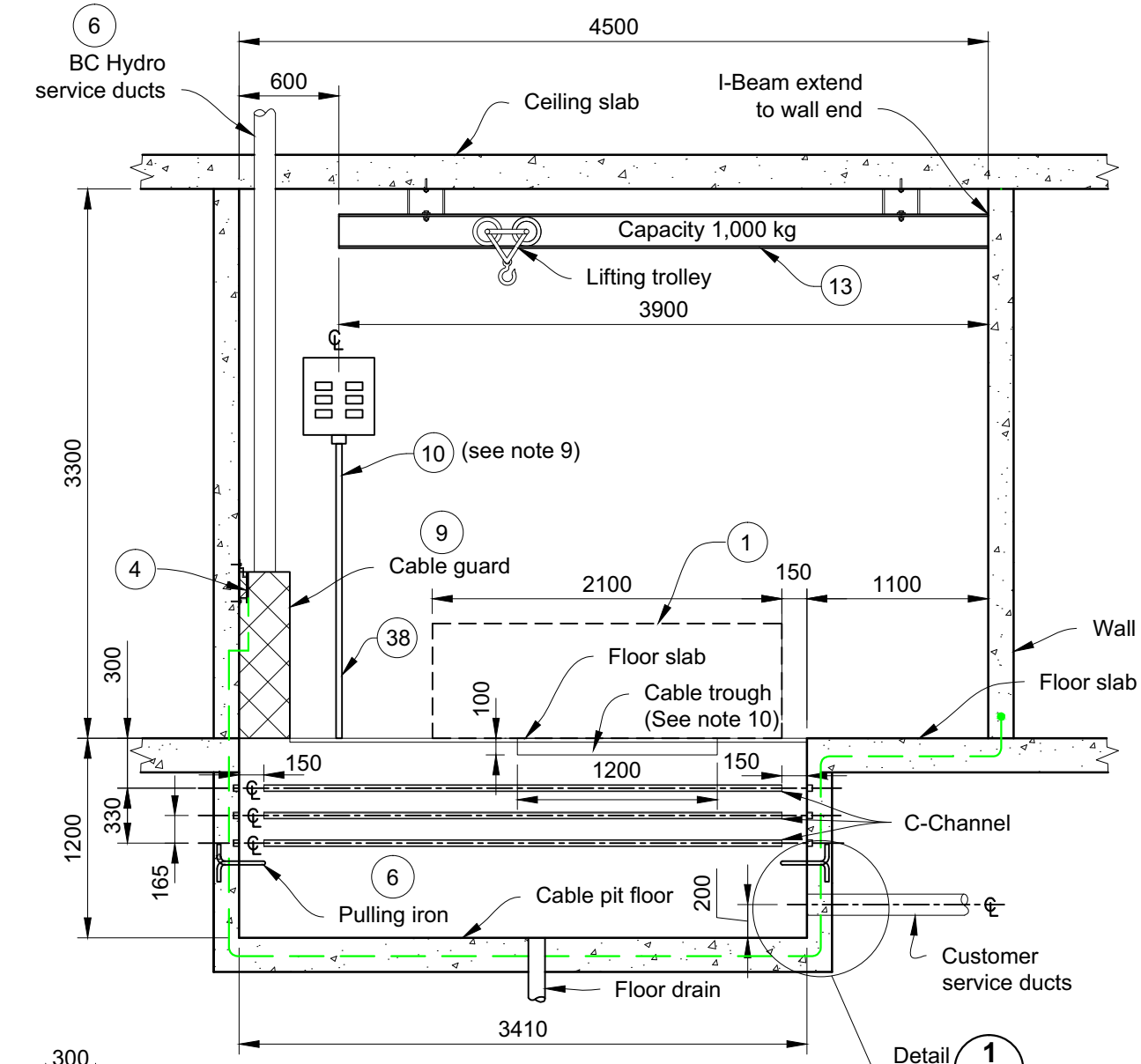
BC HYDRO SWITCHGEAR VAULT IN CUSTOMER-OWNED BUILDING
DUAL SUPPLY

ES54 E6-02.02

R 1



REVISIONS: R.1 - ROOM HEIGHT RAISED,TO 3300 MM, CABLE TROUGH ADDED, CURBS DELETED. JUL '17 MK

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M. KELVIN	L. STEVANOVIC	F. DENNERT	2017-08-11

DISTRIBUTION STANDARDS
BC Hydro

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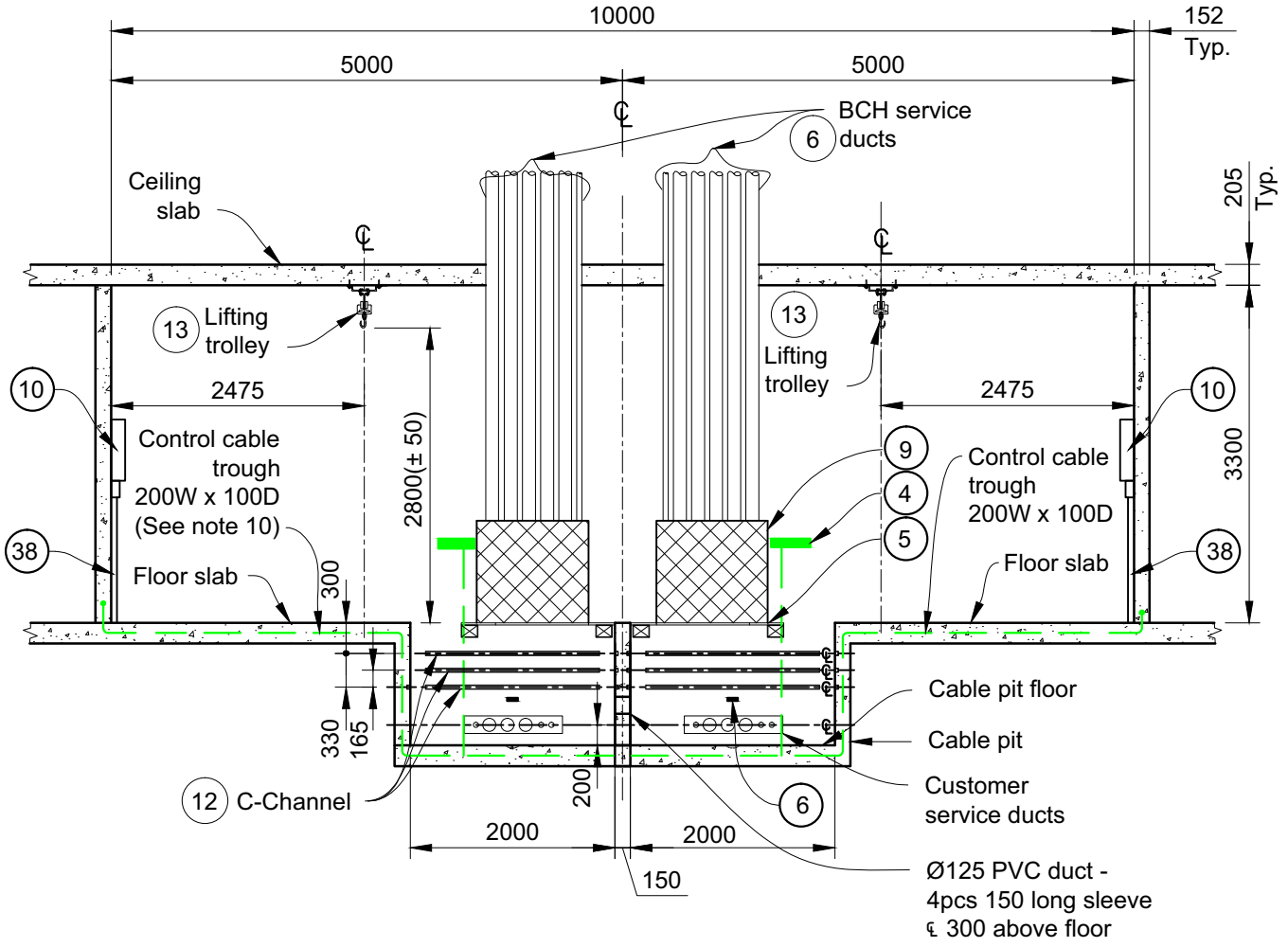
BC HYDRO SWITCHGEAR VAULT IN CUSTOMER-OWNED BUILDING DUAL SUPPLY

ES54 E6-02.03

R 1



Section B / 2

REVISIONS: R.1 - ROOM HEIGHT RAISED,TO 3300 MM, CABLE TROUGH ADDED, CURBS DELETED. JUL '17 MK

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD
M. KELVIN	L. STEVANOVIC	F. DENNERT	PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA M. KELVIN 2017-08-11

DISTRIBUTION STANDARDS
BC Hydro

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BC HYDRO SWITCHGEAR VAULT IN CUSTOMER-OWNED BUILDING
DUAL SUPPLY

PAGE 4 OF 7

ES54 E6-02.04

R 1

Notes

1. This standard presents BC Hydro specific requirements for a large customer primary supply service, which requires dual supply using BC Hydro owned switchgear per ES54 E6-01. Design details, vault dimensions, general requirements and Bill of Materials remain the same as listed in ES54 E6-01 standards.

2. Dual supply switchgear vaults inside a customer building shall be located at a level not lower than one floor below ground level, namely P1. A pad-mounted switchgear option installed in an alcove or an open parkade is not acceptable to BC Hydro. For specific requirements for building access via overhead door, refer to ES54 E6-01 standards.

3. BC Hydro shall require a specific Right of Way (ROW) for the switchgear area and building access. The customer should prepare the ROW drawing and forward it to the BC Hydro designer. It is the customer's responsibility to provide an as-constructed survey plan to confirm that the switchgear area is within the specific ROW area.

4. The customer shall contact the BC Hydro designer to confirm the exact number of service ducts for each switchgear, size of service cables, and size of BC Hydro switchgear. Service ducts located inside the building shall be concrete-encased CSA Type DB2 inside a 75 mm cover. For the exposed section of ducts inside a fire-rated vault, the ducts shall be Sched40 steel or 6 mm-thick steel cover plate, removable. The customer may propose an alternative location for the service ducts inside each cable pull pit, which may require relocating the associated pulling irons.

5. The customer shall provide easy vehicle access to the switchgear vault and two separate sets of double metal doors for equipment access, 2 x (3ft x 8ft) fire-rated swing-out doors. The customer shall ensure that the lifting I-beam with a lifting trolley is centred with the centre line of each access door and the switchgear mounting centre line. For a high ceiling vault, the lifting trolley shall be fitted with a chain and a 3" dia. lifting ring at elevation 2800 (+/-50) mm above the floor.

6. Each BC Hydro switchgear vault requires a 4" x 24" x ¼" thick Cu bus for connection to the building ground and customer vault grounding conductors, as well as the BC Hydro switchgear and control panel grounding conductors. In addition, the customer shall bond all exposed metal structures, such as doors, building columns and pull pit metal cover plates, to the corresponding ground bus, per CEC Section 36.

7. Both switchgear units require a separate cable pull pit (2000 W x 3410 L x 1200 D) mm with a minimum 150 mm (6" thick) concrete curb wall as a safety barrier in the event that one supply is shut off. Each cable pull pit shall be covered with removable steel or aluminum 6 mm (¼" thick) checker plates, less than 40 lb in weight (less than 80 lb hinged), c/w drop-down lifting handles, mechanically interlocked or bolted down to the floor joists. The supporting floor joists and beams shall be removable, designed and installed by the customer for applicable live and dead load ratings.

8. BC Hydro requires three runs of C-channels, Unistrut P-3270, on all four walls inside both cable pull pits. These channels are used for cable clamping, grounding bus installation and support of other equipment.

9. BC Hydro requires two separate power supply 60 A 120/240 V breaker panels fed from the building essential supply powering the elevators, emergency lighting, etc. Each breaker panel shall include one 30 A 120/240 V circuit for the switchgear control panel, two 15 A 120 V circuits for convenience outlets and one 15 A 120 V circuit for lighting.
10. The BC Hydro switchgear and control panels require a recessed cable trough (200 W x 100 D) mm, covered with a removable checker plate and installed between the switchgear base and control panel mounting base. The recessed cable trough widens below the switchgear and control panel as shown on the drawings.
11. The customer's certified building permit drawings shall include the BC Hydro switchgear vault designed to comply with the BC Building Code, BC Electrical Code, and local bylaws and regulations. Accordingly, the dual supply switchgear vault shall display a large warning sign "Power supplied from Two Separate Sources."
12. For wiring and installation details of keyed switches for the building vehicle access via the parkade, contact the BC Hydro designer, or the security access contractor, Gunnebo Canada Inc., at tel. 604-291-1725.
13. The BC Hydro switchgear and cable well dimensions shown are for a 5-way configuration. For smaller 4-way switchgear, the customer shall supply and install a removable engineered cover checker plate, 300x500 mm approximately, for a reduced size cable well.

Bill of Material

Item	Description	Catalogue ID	Quantity	Supplied By
1	BC Hydro distribution switchgear	TBD	1	BC Hydro
2	Switchgear control panel	TBD	1	BC Hydro
3	2 x (3ft x 8ft) double swing doors, hand operated, fire rated, c/w safety pins, suitable for BCH supplied deadbolt	N/A	1	Contractor
4	Ground bus 24"x4"x1/4" NEMA spacing, c/w support insulators, wall mount Burndy BBB424UD, Erico EGBA14424 or BC Hydro approved equivalent	N/A	1	Contractor
5	Checker plate floor panels, ¼" Al or steel, removable, 40 lb max, bolted on top of floor joists and removable support beams	N/A	As required	Contractor
6	Pulling iron, Slater Products Inc. hot dip galvanized Cat. No. 9119	420-0916	2	BC Hydro
7	2/0 AWG Cu bare stranded	N/A	As required	Contractor
8	2/0 Cu to ¾" rebar grounding connector Ilsco GPL-6 or T&B 54890 C-tap or equivalent	N/A	As required	Contractor
9	Cable guard, removable, steel 12 Ga, bolted to wall	N/A	1	Contractor

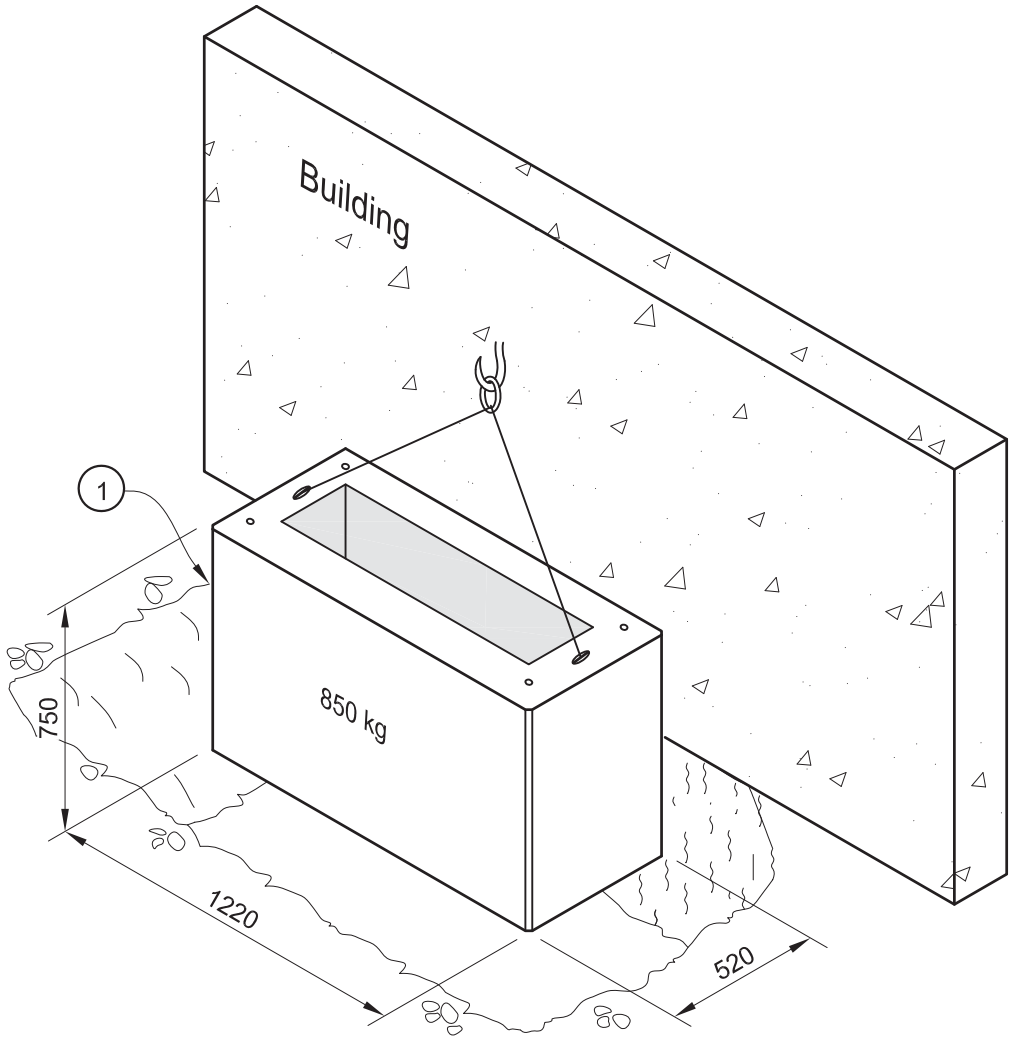
Bill of Material, contd.				
Item	**Description**	**Catalogue ID**	**Quantity**	**Supplied By**
10	Distribution sub-panel 60 A 120/240 V 6 cct	N/A	1	Contractor
11	Rigid steel duct 125 mm dia. Schedule 40	N/A	As required	Contractor
12	C-channel Unistrut P-3270	N/A	As required	Contractor
13	I-beam lifter, 1,000 kg capacity c/w lifting trolley	N/A	1	Contractor
17	Future use			
21	Single gang switch box	N/A	1	Contractor
22	Distribution Automation Key Switch, as required	N/A	1 (or more)	Gunnebo
23	Medeco 3 Logic 1⅛" mortise cylinder	N/A	1	Gunnebo
24	Shroud enclosure for Distribution Automation lock for embedded switch CUS-BCH-SMKSC-SS-1.5	N/A	1	Gunnebo
25	Surface mount Distribution Automation Key switch	N/A	1	Gunnebo
26	Hood cover	N/A	1	Gunnebo
27	Pad-mounted goose neck	N/A	1	Gunnebo
28	½" PVC conduit c/w pull string 18 Ga	N/A	1	Contractor
29	Deadbolt Medeco MD11C60226 kGC	N/A	1	Gunnebo
30	Storeroom lever door handle	N/A	1	Gunnebo
31	Door closer	N/A	2	Gunnebo
32	Door bottom	N/A	2	Gunnebo
33	Threshold ½" x 6" x 72"	N/A	1	Contractor
34	Astragal MHASH5052188	N/A	1	Contractor
35	Flush bolt set DC840C15, top and bottom	N/A	2	Contractor
36	NRP hinges MYTA2714NPR26D	N/A	8	Contractor
37	Shroud enclosure for key switch c/w ¼ turn lock for surface mount switch CUS-BCH-SMKSC-SS-3.5	N/A	1	Gunnebo
38	2"dia PVC duct	N/A	As required	Contractor

Reference Document

BC Hydro Requirements for Customer-Owned Primary Services Supplied at 4 kV to 35 kV – "Primary Guide".

Reference Standards

ES55 B2-05	BC Hydro Owned Switchgear in Customer-Owned Buildings
ES54 E6-01	BC Hydro Owned Switchgear Vault in Customer-Owned Buildings Single Radial Supply
ES53 E4-01	12 kV and 25 kV Dead Front Switchgear Installation, Above Ground 4 and 5 Way Over-Vault
ES54 Section R	Grounding
ES54 S3-03	Primary Services, Live Front Indoor Type Switchgear
CSA22.1	Canadian Electrical Code, Part I



REVISIONS: R. 1 - CAT. ID FOR ITEM 9 UPDATED IN BILL OF MATERIALS. APR '19 GR

DESIGNED	RECOMMENDED	ACCEPTED
G. RINGHAM	C. CROWSON	F. DENNERT

DISTRIBUTION STANDARDS
BC Hydro

ISSUED: APR 2019
REPLACES:MAR 2016
ORIGINALLY ISSUED: MAR 2016

ENGINEER OF RECORD

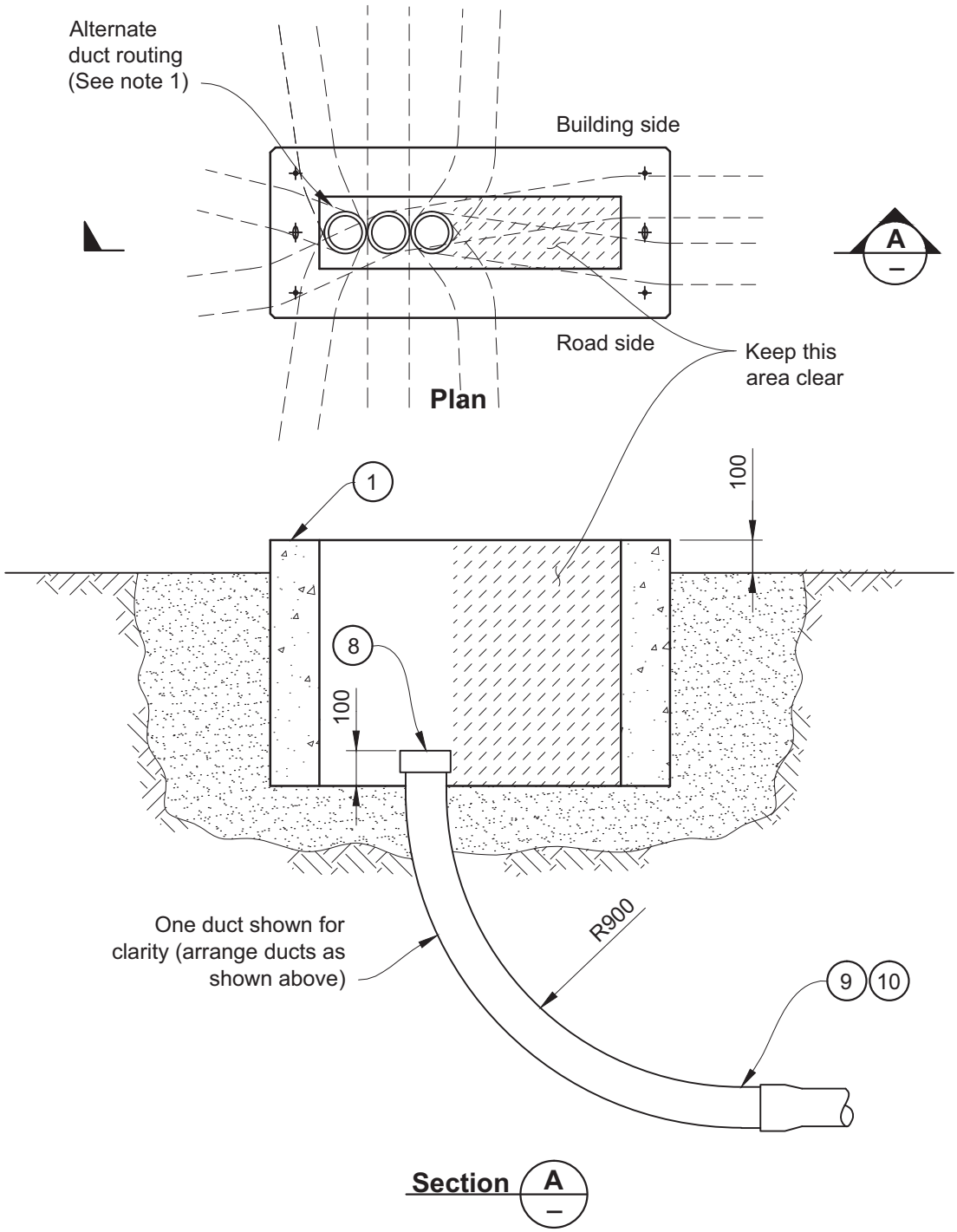
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
C. E. CROWSON
45713

2019-04-26

AUTOMATED SWITCHGEAR
LOW VOLTAGE ENCLOSURE
NON-TRAFFIC INSTALLATION

ES54 E7-01.01

R 1



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DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD
G. RINGHAM	C. CROWSON	F. DENNERT	PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA C.E. CROWSON #45713 2019-04-26

DISTRIBUTION STANDARDS
BC Hydro

ISSUED: APR 2019
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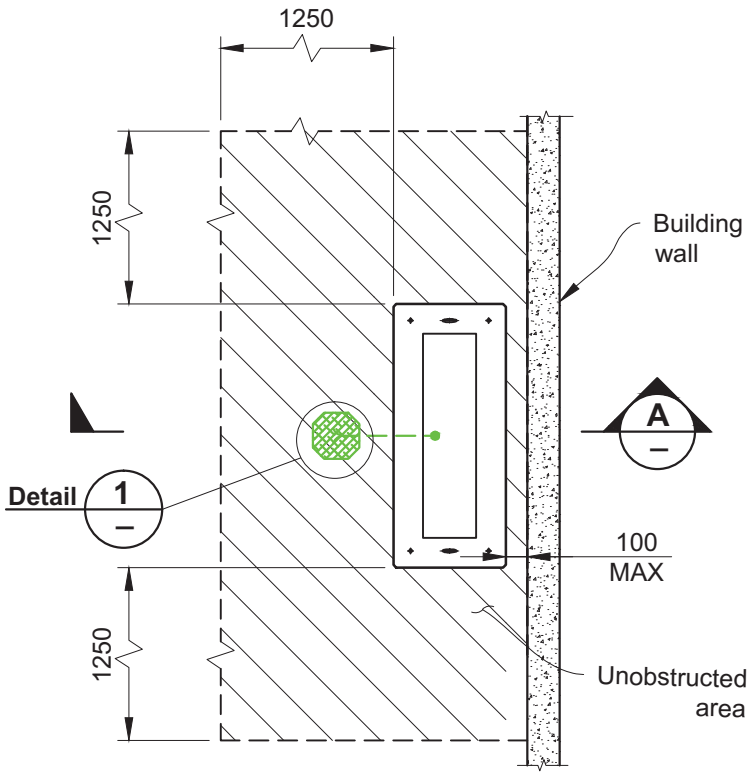
ORIGINALLY ISSUED:
MAR 2016

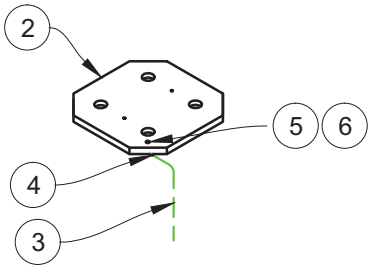
AUTOMATED SWITCHGEAR LOW VOLTAGE ENCLOSURE NON-TRAFFIC INSTALLATION

ES54 E7-01.02

R 1

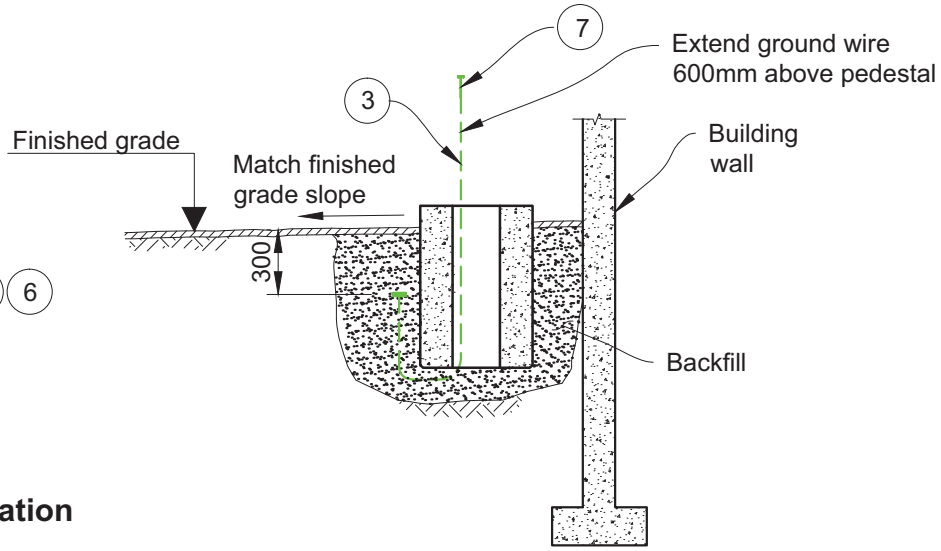


Plan



Ground Plate Installation

Detail 1



Section A

REVISIONS: R. 1 - CAT. ID FOR ITEM 9 UPDATED IN BILL OF MATERIALS. APR '19 GR

DESIGNED	RECOMMENDED	ACCEPTED
G. RINGHAM	C. CROWSON	F. DENNERT

ENGINEER OF RECORD

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA C. E. CROWSON # 45713

2019-04-26

DISTRIBUTION STANDARDS
BC Hydro

ISSUED: APR 2019
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AUTOMATED SWITCHGEAR LOW VOLTAGE ENCLOSURE NON-TRAFFIC INSTALLATION

ES54 E7-01.03

R 1

Notes

1. Arrange ducts to enter the left side of the pedestal opening.
2. Excavation and backfilling shall comply with standard W1-01.
3. Install all bollards outside of unobstructed area to allow equipment access.

Bill of Material

Item	Description	Catalogue ID	Quantity	Supplied By
1	Controlgear pedestal	96019917	1	BC Hydro
2	Ground plate	420-1080	2	BC Hydro
3	#4 AWG conductor	380-0171	4 m	BC Hydro
4	Split stud connector	388-2103	As required	BC Hydro
5	⅜" nut, hexagonal, galvanized	102-0122	As required	BC Hydro
6	⅜" washer, spring, galvanized	102-4154	As required	BC Hydro
7	Cap, heat shrink, 1.2" x 3"	394-0605	1/2	Contractor
8	125 mm duct caps	96021452	3	Contractor
9	125 mm duct, 90° elbow	97006119	3	Contractor
10	PVC cement	141-1044	As required	Contractor

Reference Standards

ES54 H1-03	Duct Entries at Pads
ES54 W1	Excavation and Backfill
ES54 U2-02	Above Ground Plant Protection

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