

Section G - Drainage Assemblies

ES54 G1 General

G1-01 General Notes

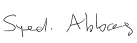
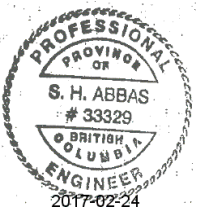
ES54 G2 Drainage Assemblies for Boxes and Vaults

G2-01 Sump with Backwater Valve

G2-02 Closed Sump

G2-03 Open Sump

ES54 G3 Drainage Systems for UD and URD Boxes and Chambers - OBSOLETE - NOW INCLUDED IN G2

REVISIONS:	DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD	DRAINAGE ASSEMBLIES TABLE OF CONTENTS		
	 S. ABBAS	 L. STEVANOVIC	 F. DENNERT				
	DISTRIBUTION STANDARDS 	ISSUED: MAR 2016 REPLACES: OCT 2001 ORIGINALLY ISSUED: MAR 1980			PAGE 1 OF 1	ES54 G0-01	R 3

General

This section covers the requirements for drainage installation in BC Hydro distribution vaults and boxes. Drains and sumps are used to keep vaults as dry as possible, to allow easy access for a remote water pump, or to prevent gases and/or rodents from entering the vaults.

The following three types of drainage sump are specified in this standard:

1. Sump with P-trap, backwater valve and 3" diameter drain pipe – used for connection to the storm water system or drain pit;
2. Empty sump closed at the bottom – used in the area underlain by impervious subsoil deposits (clay or till-like etc.), high groundwater table or no storm sewer access, and
3. Empty sump open at the bottom – used in the area underlain by high permeability subsoil deposits (clean sand, gravel etc.).

In general, vaults are drained in a storm sewer, drainage pit or other system, and the sump (Type 1) with P-trap and backwater valve is used. If a sewer connection or other drainage system is not feasible, the sump is open at the bottom (Type 3). The closed at the bottom sump (Type 2) is used in specific instances, such as installation in a high groundwater table or where there is a concentration of gasses in the ground. The Designer shall select an appropriate type, considering the conditions for each specific location such as the groundwater table, type of soil, volume of participations, existing stormwater system, etc.

Service, junction and splice boxes are not drained, in general. The boxes are fabricated with a knock-out area in the floor that is cut on site to install a sump, if needed.

Freezing of separable insulated connectors, such as elbows and junction bars, can cause separation of the electrical connection and lead to a flash-over from phase to ground. In high groundwater table locations exposed to sub-zero temperatures, the Designer shall consider alternative cable installation methods.

Other methods of drainage, or means to prevent water from entering boxes and vaults, may be used if they are approved by the BC Hydro Engineer in charge of the project.

Material

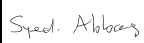
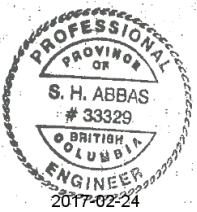
The sump shall consist of 450 mm ID concrete pipe made in accordance with CSA-A257.2.

Drain pipes shall be PVC type PSM SDR 28 sewer pipes in accordance with CSA B 182.2 or ASTM D3034, and shall have a minimum stiffness of 625 kPa. Backwater valves and P-traps with cleanout and strainers shall be installed as shown in this standard.

Installation

The vaults are provided with an opening in the floor to fit a concrete drain pipe and standard sump cover. There are two types of drainage installation: traditional "Undermount", and new "Flush Mount".

REVISIONS: R.2 - STANDARD REWRITTEN, DRAINAGE TYPES REVISED, MAR '16 SA

DESIGNED  S. ABBAS	RECOMMENDED  L. STEVANOVIĆ	ACCEPTED  F. DENNERT	ENGINEER OF RECORD 	DRAINAGE ASSEMBLIES GENERAL NOTES	
DISTRIBUTION STANDARDS 	ISSUED: MAR 2016 REPLACES: JUN 2002 ORIGINALLY ISSUED: JUL 1999	PAGE 1 OF 2		ES54 G1-01.01	R 2

The Undermount installation requires the following procedure:

1. Core a hole through the concrete sump pipe to fit the PVC drain pipe, prepare the base below the sump hole and set the concrete sump pipe into the base.
2. Stub and grout the PVC drain pipe into the concrete sump pipe.
3. Place the vault over the sump pipe and place the sump cover.

Traditional Undermount drainage is designed such that the vault sits on top of the concrete drain pipe and the keyway provided at the bottom side of the floor opening shall match the pipe splice keyway. The opening at the top side of the floor is designed such that the sump cover sits flush with the floor surface.

Flush Mount drainage is designed into recently developed products. The concrete drain pipe protrudes through the floor opening and the sump cover sits on top of the drain pipe. It shall be installed as follows:

1. Core a hole through the concrete sump pipe to fit the PVC drain pipe, prepare the base below the sump hole and set the concrete sump pipe into the base.
2. Stub and grout the PVC drain pipe into the concrete sump pipe.
3. Place the vault over the sump pipe to protrude the sump pipe through the hole in the floor slab.
4. Cut and grind the sump pipe as necessary to recess in the floor and provide uniform support to the sump cover.
5. Fill the gap between the pipe and the floor slab with a backer rod and non-shrink grout, Sika Pronto 11 or equivalent.
6. Place the sump cover to sit flush with the top surface of the floor slab.

The drain pipe connection to the storm system shall be constructed in accordance with the Authority Having Jurisdiction's (AHJ) requirements. The connection shall be made with a PVC saddle, installed according to the manufacturer's specifications into a neatly cored hole in the mainline pipe or storm manhole wall.

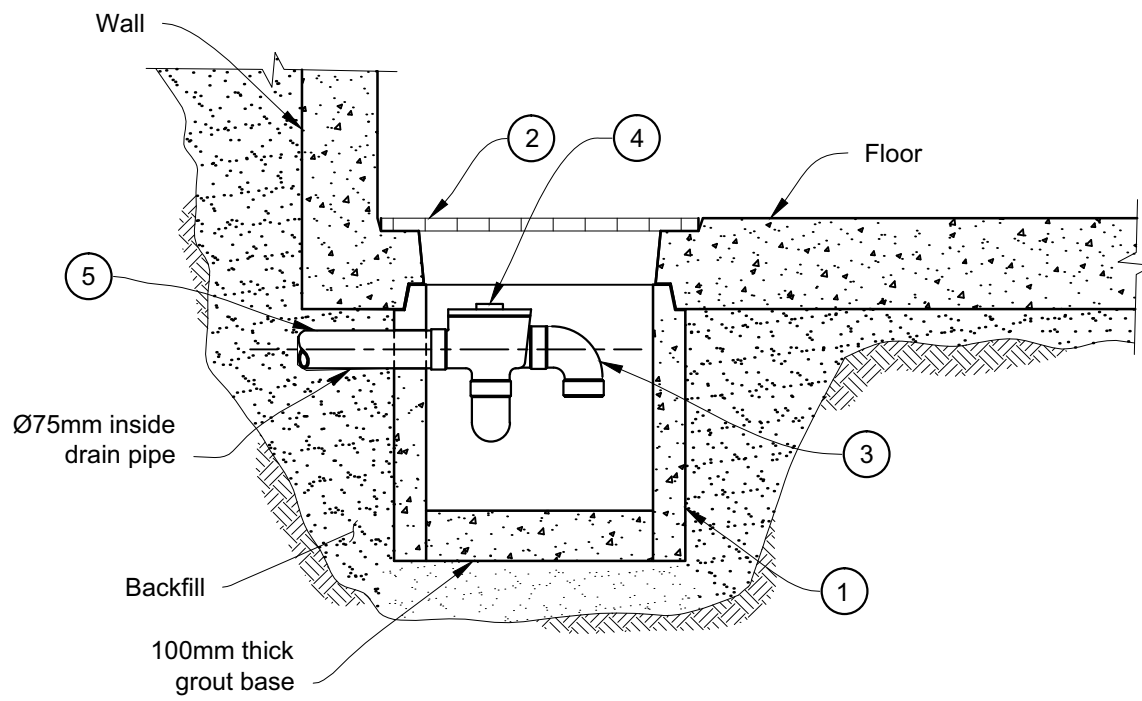
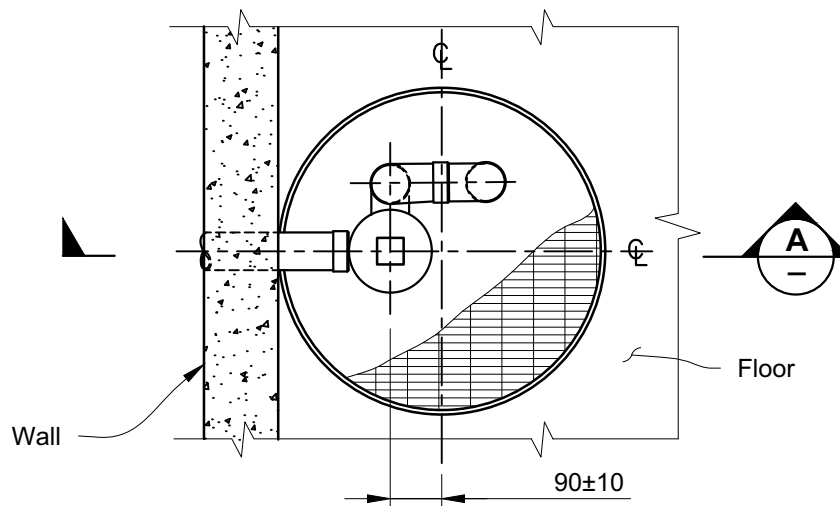
Installation Tolerances for Drain Pipe

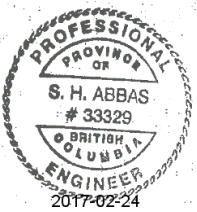
Horizontal tolerances shall be plus or minus 50 mm from the specified alignment. Vertical tolerances shall be plus or minus 10 mm from the specified grade.

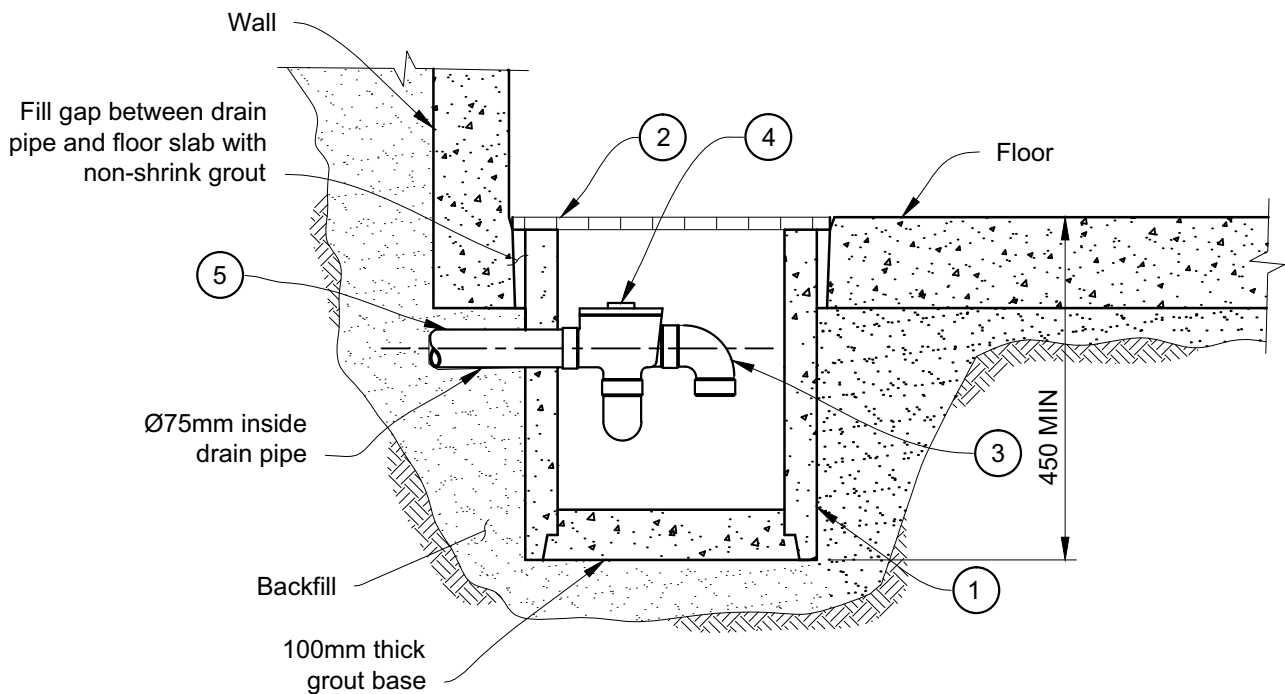
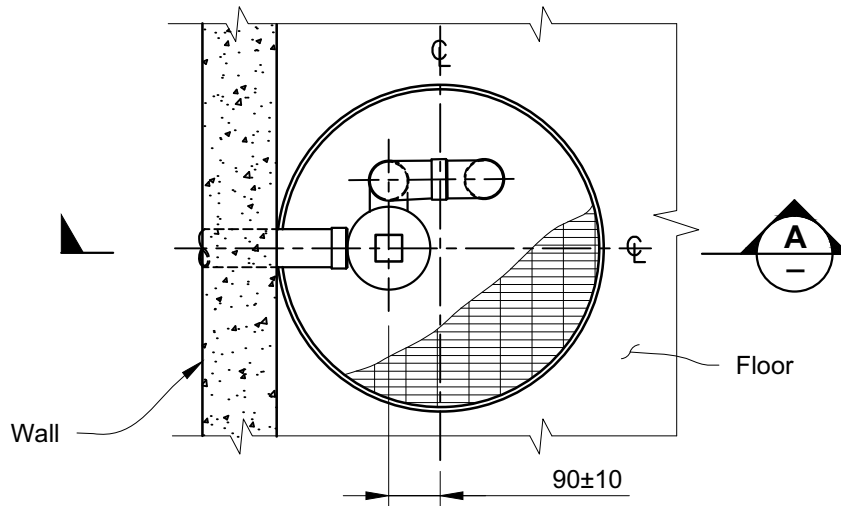
REVISIONS: R.2 - STANDARD REWRITTEN, DRAINAGE TYPES REVISED, MAR '16 SA

DESIGNED Specd. Abbabas S. ABBAS	RECOMMENDED  L. STEVANOVIC	ACCEPTED  F. DENNERT	ENGINEER OF RECORD  2017-02-24	DRAINAGE ASSEMBLIES GENERAL NOTES	
DISTRIBUTION STANDARDS 		ISSUED: MAR 2016 REPLACES: JUN 2002 ORIGINALLY ISSUED: JUL 1999		PAGE 2 OF 2	ES54 G1-01.02
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REVISIONS: R.3 - TITLE CHANGED, G2-01.02 REWRITTEN, FLUSH MOUNT INSTALLATION TYPE ADDED, MAR '16 SA



DESIGNED <i>S. Abbas</i> S. ABBAS	RECOMMENDED <i>L. Stevanovic</i> L. STEVANOVIC	ACCEPTED <i>F. Dennert</i> F. DENNERT	ENGINEER OF RECORD 	DRAINAGE ASSEMBLIES FOR BOXES AND VAULTS SUMP WITH BACKWATER VALVE	
DISTRIBUTION STANDARDS 	ISSUED: MAR 2016 REPLACES: FEB 2002 ORIGINALLY ISSUED: APR 1983	PAGE 1 OF 3		ES54 G2-01.01	R 3



Flush Mount

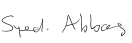
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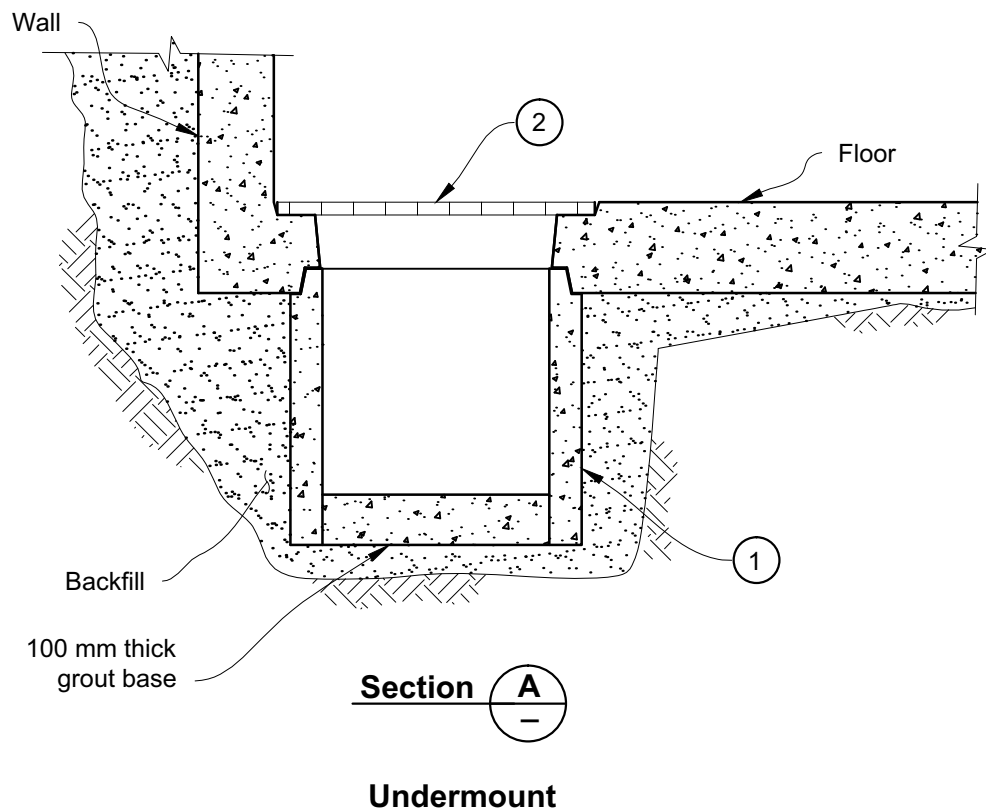
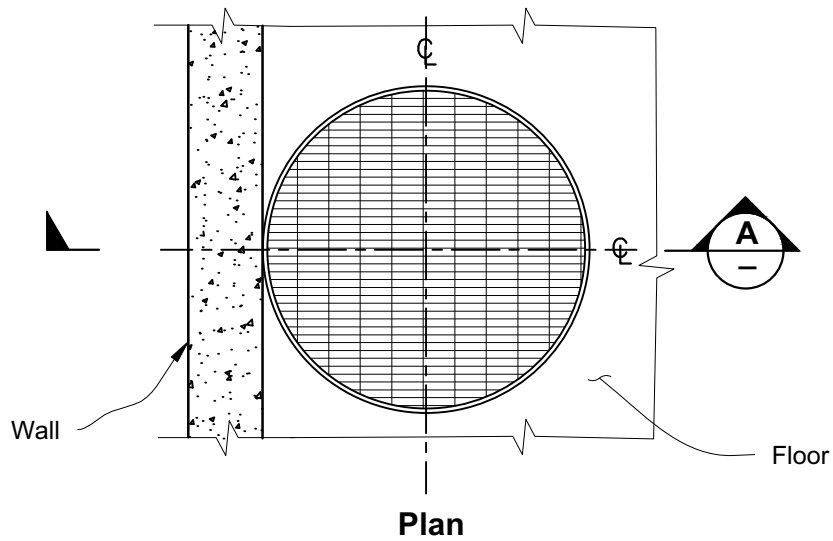
DESIGNED <i>S. Abbas</i> S. ABBAS	RECOMMENDED <i>L. Stevanovic</i> L. STEVANOVIC	ACCEPTED <i>F. Dennert</i> F. DENNERT	ENGINEER OF RECORD 	DRAINAGE ASSEMBLIES FOR BOXES AND VAULTS SUMP WITH BACKWATER VALVE	
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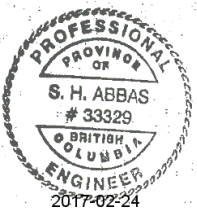
Bill of Material

Item	Description	Catalogue ID	Quantity	Supplied By
1	Concrete pipe 450 mm ID	N/A	As Required	Contractor
2	Sump cover 600 mm diameter	400-0426	1	BC Hydro
3	Elbow 90° PVC 75 mm ID	IPEX 40255	4	Contractor
4	Backwater valve with P-Trap 75 mm ID	400-0780	1	BC Hydro
5	PVC drain pipe 75 mm ID	DWV 030	As Required	Contractor

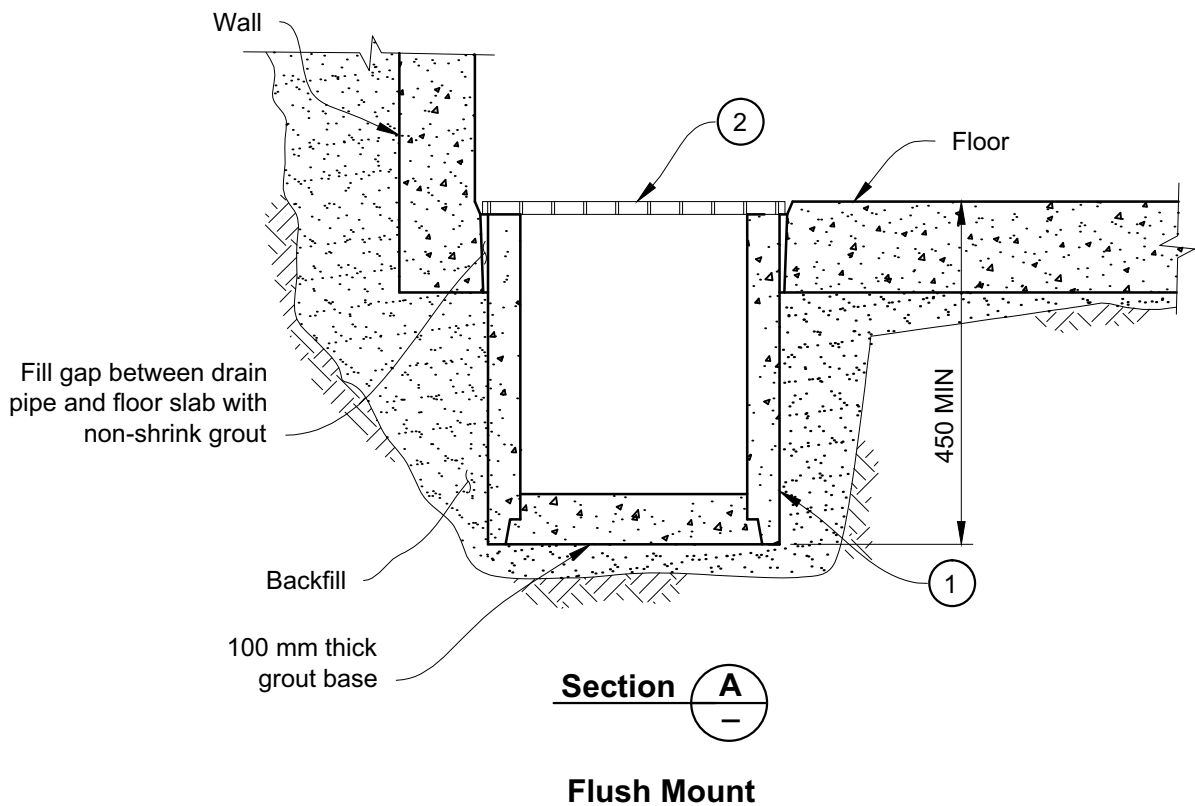
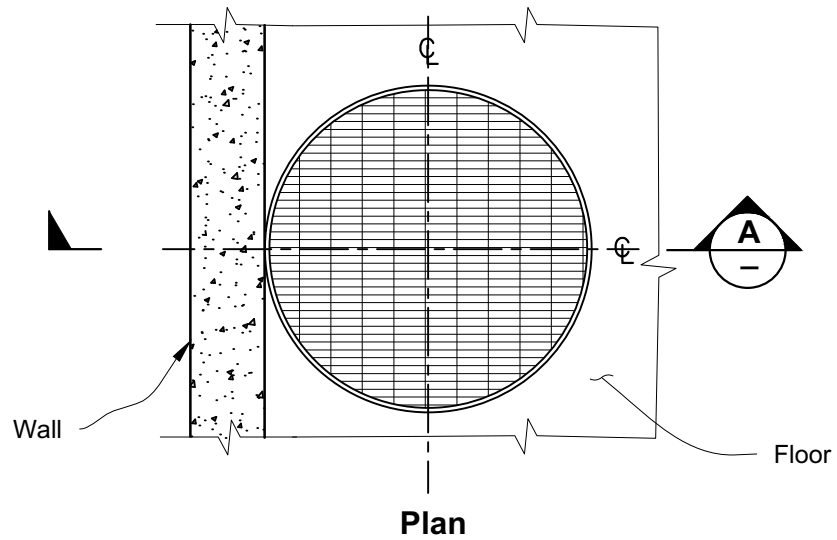
REVISIONS: R.3 - TITLE CHANGED, G2-01.02 REWRITTEN, FLUSH MOUNT INSTALLATION TYPE ADDED, MAR '16 SA

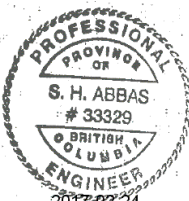
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DISTRIBUTION STANDARDS 		ISSUED: MAR 2016 REPLACES: FEB 2002 ORIGINALLY ISSUED: APR 1983		PAGE 3 OF 3	ES54 G2-01.03
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DISTRIBUTION STANDARDS 		ISSUED: MAR 2016 REPLACES: N/A ORIGINALLY ISSUED: MAR 2016		PAGE 1 OF 3	ES54 G2-02.01 R 0

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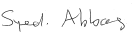
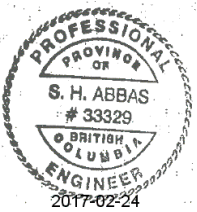


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DISTRIBUTION STANDARDS 		ISSUED: MAR 2016 REPLACES: N/A ORIGINALLY ISSUED: MAR 2016		PAGE 2 OF 3	ES54 G2-02.02 R 0

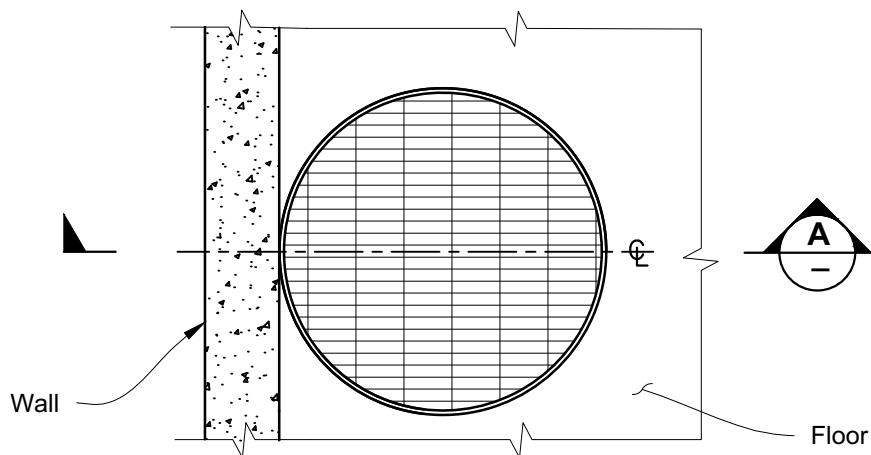
REVISIONS:

Bill of Material

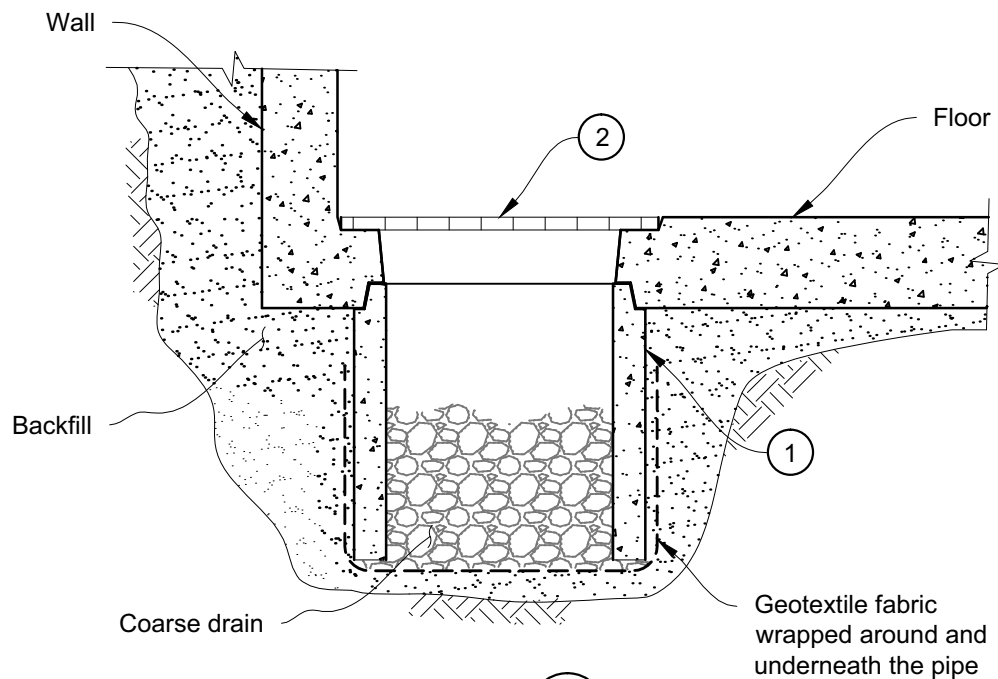
Item	Description	Catalogue ID	Quantity	Supplied By
1	Concrete pipe 450 mm diameter	N/A	As Required	Contractor
2	Sump cover 600 mm diameter	400-0426	1	BC Hydro

DESIGNED  S. ABBAS	RECOMMENDED  L. STEVANOVIC	ACCEPTED  F. DENNERT	ENGINEER OF RECORD 	DRAINAGE ASSEMBLIES FOR BOXES AND VAULTS CLOSED SUMP	
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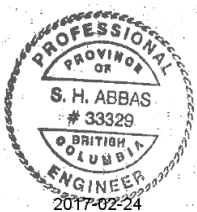
Plan

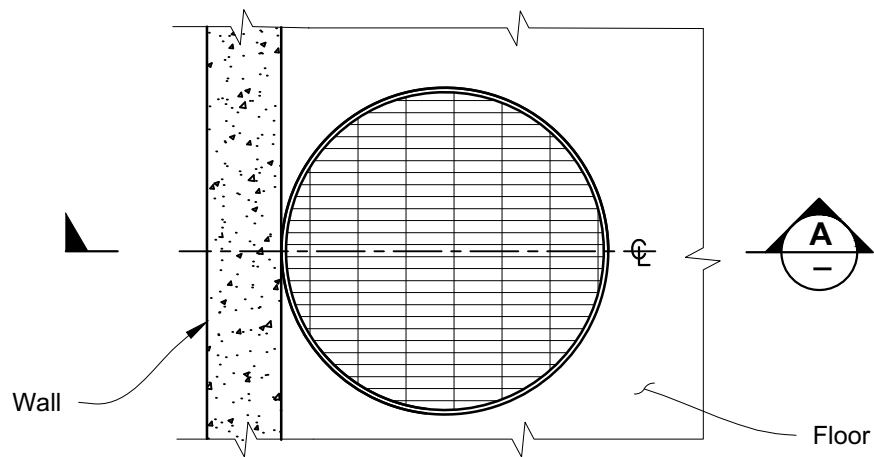


Section A

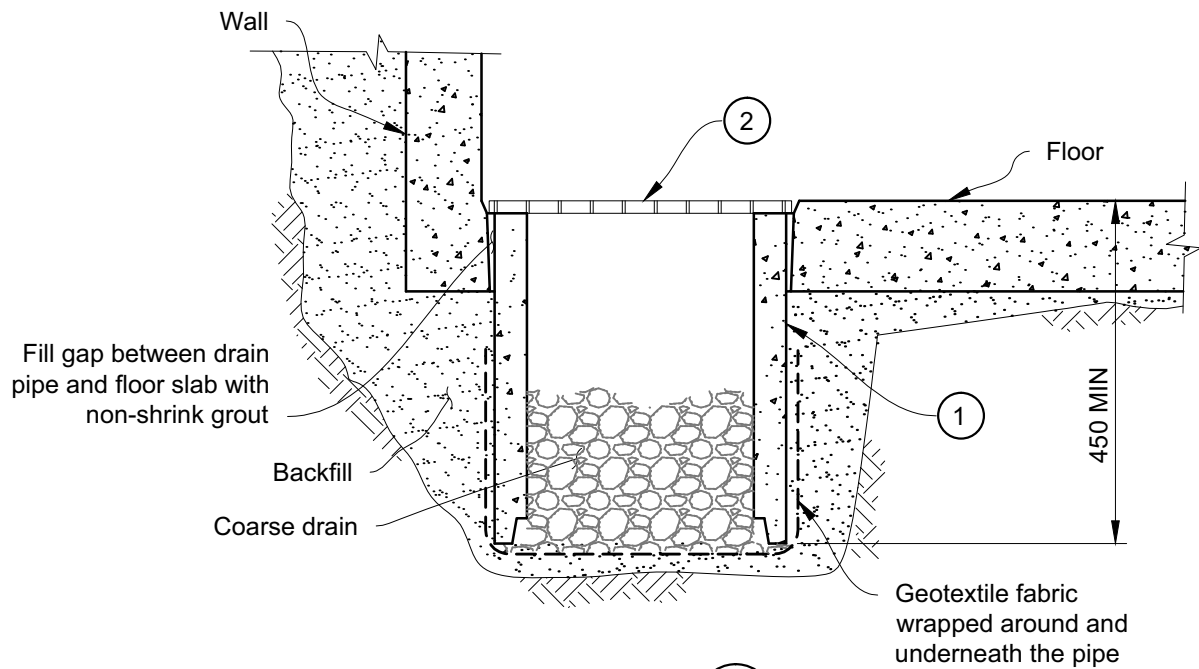
Undermount

REVISIONS: R.0 - PREVIOUSLY G3-01, TYPE D, MAR '16 SA

DESIGNED <i>S. Abbas</i> S. ABBAS	RECOMMENDED <i>L. Stevanovic</i> L. STEVANOVIC	ACCEPTED <i>F. Dennert</i> F. DENNERT	ENGINEER OF RECORD 	DRAINAGE ASSEMBLIES FOR BOXES AND VAULTS OPEN SUMP		
DISTRIBUTION STANDARDS 		ISSUED: MAR 2016 REPLACES: N/A ORIGINALLY ISSUED: MAR 2016		PAGE 1 OF 3	ES54 G2-03.01	R 0



Plan



Section A

Flush Mount

REVISIONS: R.0 - PREVIOUSLY G3-01, TYPE D, MAR '16 SA

DESIGNED <i>S. Abbas</i> S. ABBAS	RECOMMENDED <i>L. Stevanovic</i> L. STEVANOVIC	ACCEPTED <i>F. Dennert</i> F. DENNERT	ENGINEER OF RECORD 	DRAINAGE ASSEMBLIES FOR BOXES AND VAULTS OPEN SUMP		
DISTRIBUTION STANDARDS 			ISSUED: MAR 2016 REPLACES: N/A ORIGINALLY ISSUED: MAR 2016	PAGE 2 OF 3	ES54 G2-03.02	R 0

Bill of Material

Item	Description	Catalogue ID	Quantity	Supplied By
1	Concrete pipe 450 mm ID	N/A	As Required	Contractor
2	Sump cover 600 mm diameter	400-0426	1	BC Hydro
3	Geotextile fabric	-	As Required	Contractor

REVISIONS: R.0 - PREVIOUSLY G3-01, TYPE D, MAR '16 SA

DESIGNED  S. ABBAS	RECOMMENDED  L. STEVANOVIC	ACCEPTED  F. DENNERT	ENGINEER OF RECORD 	DRAINAGE ASSEMBLIES FOR BOXES AND VAULTS OPEN SUMP	
DISTRIBUTION STANDARDS 		ISSUED: MAR 2016 REPLACES: N/A ORIGINALLY ISSUED: MAR 2016		PAGE 3 OF 3	ES54 G2-03.03
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