

Project Name
Job #
Author

NZTA Motorway Project
4276
Kevin Jonathan

Device #
SF-S2R-1
(69cm Option)

Location Auckland
Option # A
Date 10 October 2016

Revision # RB

CALCULATIONS - Please Read Instructions First

1.0 Water Quality Design Storm Peak Runoff Flowrate (RATIONAL METHOD)

1.1 Runoff Co-efficients

Coefficient of Impervious Roof (Croof)	1.00
Coefficient of Impervious Road (Croad)	1.00
Coefficient of Pervious Area (Cper)	0.30

1.2 Catchment Areas

Area Impervious Roof (Aroof)	0 m ²
Area Impervious Road (Aroad)	53000 m ²
Area Pervious Area (Aper)	22000 m ²
Area Total Catchment (Acatch)	75000 m ²
Product of Area & Coefficients (CA)	59600 m ²

1.3 Rainfall Intensity

Water Quality Rainfall Intensity (iWQ)	10 mm/hr
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1.4 Water Quality Design Storm Peak Runoff Flowrate

Design Water Quality Treatment Flowrate (Qwq)	165.556 L/s
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2.0 StormFilter Peak Treatment Flowrate

2.1 Preliminary

Cartridge Media (Media)	ZPG
Cartridge Height (Hcart)	69 cm
Diameter Disc Orifice (d)	24.0 mm
Internal bypass weir height (Hweir)	0.79 m
Priming depth (Hprime)	0.66 m
Area of a Cartridge (Acart)	0.181 m ²

2.2 StormFilter Cartridge Peak Treatment Flowrate

StormFilter cartridge stage-discharge equation	$=0.111d^{2.06}\Delta h^{0.5}$ L/min
Design treatment flowrate per cartridge (Qcart)	1.070 L/s/cart
Number (actual) of StormFilter cartridges required	154.725 cart(s)
Number (rounded) of StormFilter cartridges required (nCART)	155 cart(s)
Design StormFilter Treatment Flowrate (QSF)	165.850 L/s

3.0 Estimate Sediment Mass Loading

3.1 StormFilter Manhole/Vault Dimensions

Length Cartridge Bay (Lbay)	9.200 m
Width Cartridge Bay (Wbay)	5.000 m
Area Cartridge Bay (Abay)	46.000 m ²
Total area of Cartridges (Acarts)	28.048 m ²
Area Lower Volume (Alow)	17.952 m ²
Volume Lower Volume (Vlow)	12387 L
Area Upper Volume (Aupp)	46.000 m ²
Volume Upper Volume (Vupp)	4600 L
Live storage volume at internal bypass (Vstor)	16987 L

3.2 Catchment Sediment Loading

Estimated TSS Concentration Impervious Roof (TSSroof)	100 kg/ha/year
Estimated TSS Concentration Impervious Road (TSSroad)	600 kg/ha/year
Estimated TSS Concentration Pervious Area (TSSper)	200 kg/ha/year
Estimated Total TSS Load (TSSload)	3620 kg/year

3.3 Treatment Efficiencies

Pre-treatment Efficiency (EFFpre)	15 %
System Efficiency (EFFsys)	75 %

3.4 Maintenance Requirements

Estimated number of cleans per annum (nCleans)	0.95
Estimated Maintenance Frequency (Mfreq)	12.632 months

4.0 Design Summary

Design Water Quality Treatment Flowrate (Qwq)	165.556 L/s
StormFilter Design WQ Treatment flowrate (QSF)	165.850 L/s
StormFilter Design flowrate at internal bypass (Qbypass)	177.645 L/s
Number of StormFilter Cartridges required (nTOTAL)	155ea x 69cm ZPG cart(s)
Treatment Flux per cartridge (FLUX)	1.0 L/s/m ²
Restrictor Disc Size (d)	24.000 mm
Maximum Hydraulic Effect (hmax)	0.930 m
Estimated Maintenance Frequency (Mfreq)	13 months

INSTRUCTIONS

1.0. Use the rational method to compute the water quality design storm peak runoff flow rate. Values with blue text require user input. Values in red text are automatically calculated. Values with black text remain constant.

1.1 Input the appropriate runoff co-efficient for each sub-catchment.

Use C=1.0 for impervious roof surfaces runoff co-efficient¹
Use C=1.0 for impervious paved surfaces runoff co-efficient¹
Use C=0.4 for pervious surfaces with clay soils runoff co-efficient & C=0.3 for all other pervious surfaces¹

1.2 Input the appropriate catchment area for each sub-catchment.

Enter impervious roof surface catchment area
Enter impervious paved surfaces catchment area
Enter pervious grassed/landscaped surfaces catchment area
Total catchment area i.e. $A_{catch} = A_{roof} + A_{road} + A_{per}$

Product of catchment areas & runoff co-efficients i.e. $CA = (Croof \times A_{roof}) + (Croad \times A_{road}) + (Cper \times A_{per})$

1.3 Input rainfall intensity

Rainfall intensity of 10mm/hr to be used for StormFilter water quality treatment within Auckland Council boundaries¹

1.4 Compute the water quality design storm peak runoff flow rate via Rational Method

i.e. $Q = f.C.I.A$

2.0. Use the stormfilter stage-discharge equation to calculate the StormFilter peak treatment flowrate.

Enter cartridge filtration media i.e. Perlite or ZPG
Enter cartridge height i.e. 69cm / 46cm / 30cm
Enter restrictor disc size, refer table below for max disc diameter

Cart Height (cm)	Actual Height (m)	Priming Depth (m)	Max Disc Diam. (mm)	Max. Design Q (L/s)	Filter Bed Area (m ²)	Flow Rate (L/s/m ²)	Bed Depth (mm)	Media Volume (m ³)	Flow Rate (L/s/m ³)
30	0.305	0.27	22.70	0.63	0.460	1.37	175	0.052	12.0
46	0.457	0.43	25.00	0.95	0.689	1.38	175	0.078	12.1
69	0.686	0.66	27.60	1.42	1.034	1.37	175	0.118	12.1

Table 1. StormFilter Cartridge Specifics [3]

Compute the Stormfilter peak treatment flowrate at internal bypass per cartridge via the StormFilter stage-discharge equation
Compute the number of actual StormFilter cartridges required i.e. $n_{CART} = QWQ / Q_{CART}$

Compute the number (rounded up to whole number) of StormFilter cartridges required
Compute the Stormfilter peak treatment flowrate at internal bypass via the StormFilter stage-discharge equation

3.0 Estimate sediment mass loading (Refer sheet '2. Mass Load Calcs' for more details)

3.1 Use tables 2 & 3 below to fill in StormFilter Dimensions based on number of cartridges as calculated in cl 2.2 above
3.2 Use table 3 below to fill in estimated TSS concentration. For roads with $\geq 25,000$ vpd, use minimum 600kg/ha/yr
3.3 Use 0% pretreatment for vaults/manholes with no forebay. Use 10-15% pretreatment for vaults/manholes with forebays. Use 50% pretreatment for upstream GPT ie EnviroPod. Use 75%-90% system efficiency

Std Manhole Dimensions	Without forebay				With forebay			
	Cart Bay Length (m)	Cart Bay Width (m)	Cart Bay Area (m ²)	Max Number Carts	Cart Bay Length (m)	Cart Bay Width (m)	Cart Bay Area (m ²)	Max Number Carts
1050	1.00	0.77	0.77	1	1.00	N/A	N/A	N/A
1200	1.00	1.03	1.03	3	1.00	0.76	0.76	2
1500	1.00	1.67	1.67	4	1.00	1.39	1.39	3
1800	1.00	2.44	2.44	7	1.00	1.83	1.83	5
2050	1.00	3.20	3.20	9	1.00	2.80	2.80	7

Table 2: Standard Stormwater360 Manhole Dimensions

Std Vault Dimensions	Without forebay				With forebay			
	Cart Bay Length (m)	Cart Bay Width (m)	Cart Bay Area (m ²)	Max Number Carts	Cart Bay Length (m)	Cart Bay Width (m)	Cart Bay Area (m ²)	Max Number Carts
3.4 L x 1.5 W x 1.8 D	2.85	1.50	4.28	11	2.30	1.80	4.14	8
4.5 L x 1.5 W x 1.8 D	3.95	1.50	5.93	17	3.40	1.50	5.10	14
4.2 L x 2.0 W x 1.8 D	3.95	1.95	7.70	23	3.40	2.10	7.14	18
5.6 L x 2.0 W x 1.8 D	5.05	1.95	9.85	31	4.50	2.10	9.45	26
5.6 L x 2.4 W x 1.8 D	5.05	2.40	12.12	39	4.50	2.10	9.45	27
6.2 L x 2.4 W x 1.8 D	5.60	2.40	13.44	44	4.50	2.40	10.80	33

Table 3: Standard Stormwater360 Vault Dimensions

Land Use	TSS (kg/ha/yr)
Road	281 - 723
Commercial	242 - 1369
Residential (low)	60 - 340
Residential (high)	97 - 547
Terraced	133 - 755
Bush	26 - 146
Grass	80 - 588
Roof	50-110 (1)
Pasture	103 - 583

Table 4: Suggested TSS loads⁴

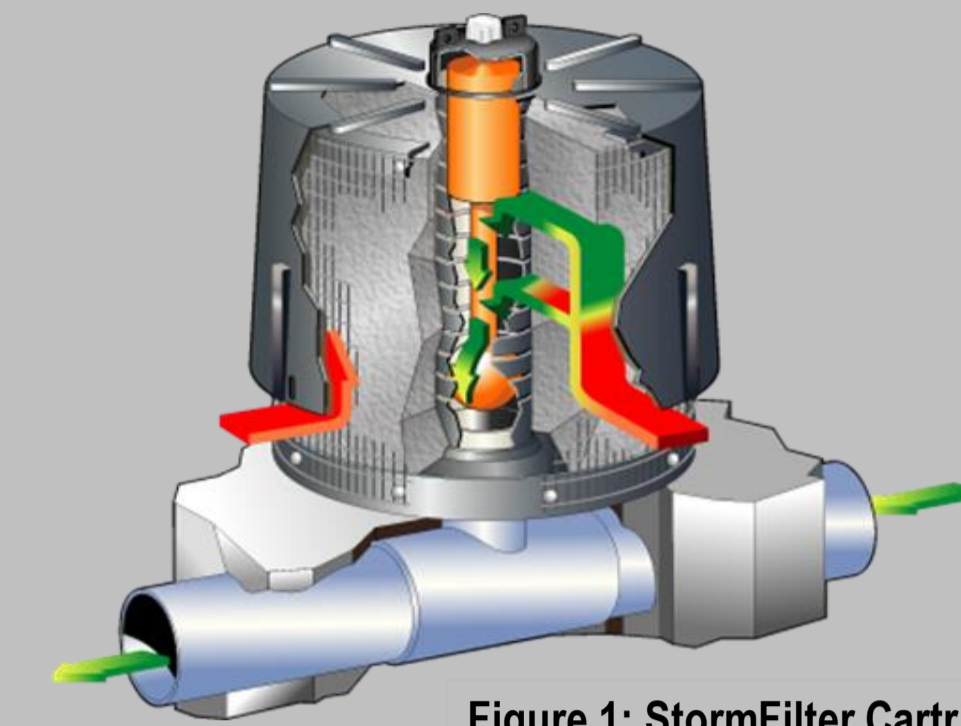


Figure 1: StormFilter Cartridge

$$Q = 0.111d^{2.06}\Delta h^{0.5}$$

[Q]=L min⁻¹; [d]=mm; [h]=m

Figure 2: StormFilter Stage Discharge Equation [2]

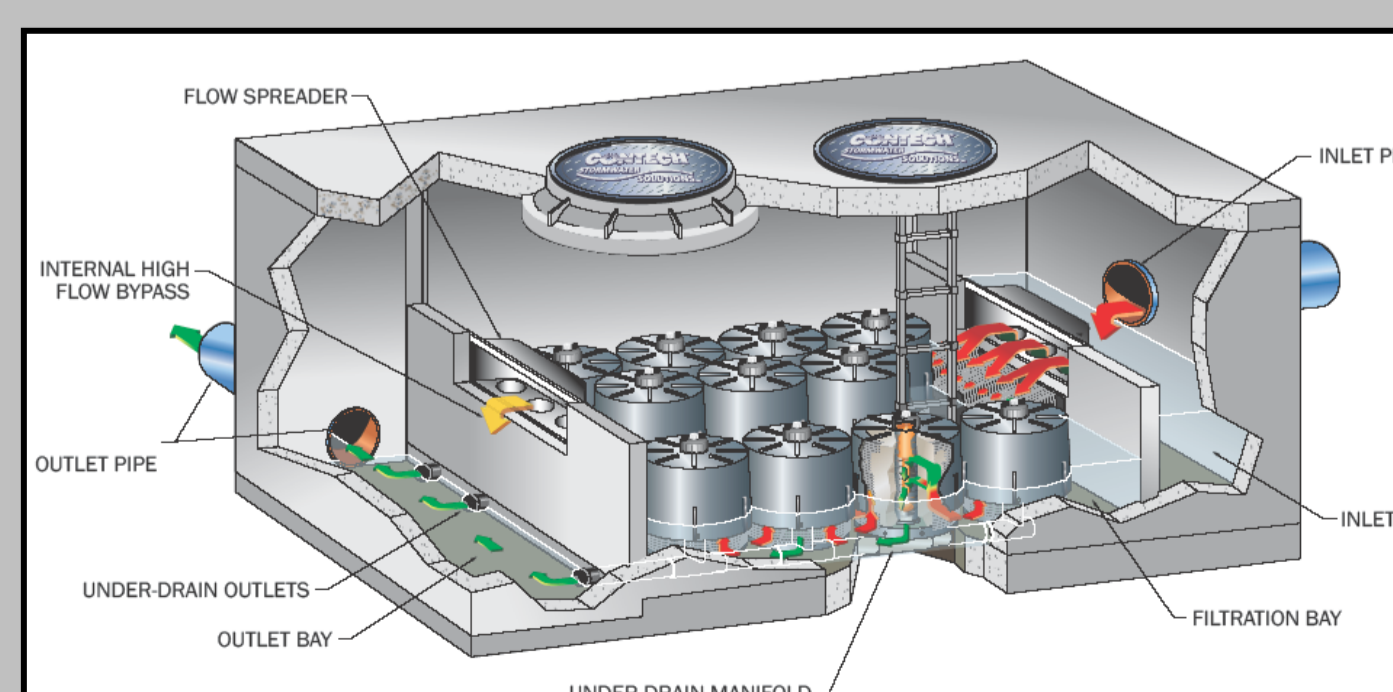


Figure 3: StormFilter Vault Cutaway

References

- Stormwater360 StormFilter: Interim Proprietary Device Evaluation, Part 1 – Air, Land and Water Plan Evaluation, Auckland Council, 24th August 2015.
- Derived from Stormwater Management Inc., Technical Publication PD-04-002.0
- Contech Stormwater Solutions, StormFilter Product Design Manual.
- Table 4-4, Technical Publication 10, 2nd Edition, May 2003, Auckland Regional Council

Project Name
Job #
Author

NZTA Motorway Project
4276
Kevin Jonathan

Device #
SF-S2R-1
(46cm Option)

Location **Auckland**
Option # **B**
Date **10 October 2016**

Revision # **RB**

CALCULATIONS - Please Read Instructions First

1.0 Water Quality Design Storm Peak Runoff Flowrate (RATIONAL METHOD)

1.1 Runoff Co-efficients

Coefficient of Impervious Roof (Croof)	1.00
Coefficient of Impervious Road (Croad)	1.00
Coefficient of Pervious Area (Cper)	0.30

1.2 Catchment Areas

Area Impervious Roof (Aroof)	0 m ²
Area Impervious Road (Aroad)	53000 m ²
Area Pervious Area (Aper)	22000 m ²
Area Total Catchment (Acatch)	75000 m ²
Product of Area & Coefficients (CA)	59600 m ²

1.3 Rainfall Intensity

Water Quality Rainfall Intensity (iWQ)	10 mm/hr
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1.4 Water Quality Design Storm Peak Runoff Flowrate

Design Water Quality Treatment Flowrate (Qwq)	165.556 L/s
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2.0 StormFilter Peak Treatment Flowrate

2.1 Preliminary

Cartridge Media (Media)	ZPG
Cartridge Height (Hcart)	46 cm
Diameter Disc Orifice (d)	21.8 mm
Internal bypass weir height (Hweir)	0.56 m
Priming depth (Hprime)	0.43 m
Area of a Cartridge (Acart)	0.181 m ²

2.2 StormFilter Cartridge Peak Treatment Flowrate

StormFilter cartridge stage-discharge equation	=0.111d ^{2.06} Δh ^{0.5} L/min
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Design treatment flowrate per cartridge (Qcart)	0.720 L/s/cart
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Number (actual) of StormFilter cartridges required	229.938 cart(s)
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Number (rounded) of StormFilter cartridges required (nCART)	230 cart(s)
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Design StormFilter Treatment Flowrate (QSF)	165.600 L/s
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3.0 Estimate Sediment Mass Loading

3.1 StormFilter Manhole/Vault Dimensions

Length Cartridge Bay (Lbay)	9.200 m
Width Cartridge Bay (Wbay)	5.000 m
Area Cartridge Bay (Abay)	46.000 m ²
Total area of Cartridges (Acarts)	41.620 m ²
Area Lower Volume (Alow)	4.380 m ²
Volume Lower Volume (Vlow)	2015 L
Area Upper Volume (Aupp)	46.000 m ²
Volume Upper Volume (Vupp)	4600 L
Live storage volume at internal bypass (Vstor)	6615 L

3.2 Catchment Sediment Loading

Estimated TSS Concentration Impervious Roof (TSSroof)	100 kg/ha/year
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Estimated TSS Concentration Impervious Road (TSSroad)	600 kg/ha/year
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Estimated TSS Concentration Pervious Area (TSSper)	200 kg/ha/year
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Estimated Total TSS Load (TSSload)	3620 kg/year
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3.3 Treatment Efficiencies

Pre-treatment Efficiency (EFFpre)	15 %
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System Efficiency (EFFsys)	75 %
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3.4 Maintenance Requirements

Estimated number of cleans per annum (nCleans)	0.96
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Estimated Maintenance Frequency (Mfreq)	12.500 months
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4.0 Design Summary

Design Water Quality Treatment Flowrate (Qwq)	165.556 L/s
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StormFilter Design WQ Treatment flowrate (QSF)	165.600 L/s
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StormFilter Design flowrate at internal bypass (Qbypass)	182.060 L/s
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Number of StormFilter Cartridges required (nTOTAL)	230ea x 46cm ZPG cart(s)
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Treatment Flux per cartridge (FLUX)	1.0 L/s/m ²
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Restrictor Disc Size (d)	21.800 mm
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Maximum Hydraulic Effect (hmax)	0.700 m
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Estimated Maintenance Frequency (Mfreq)	13 months
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INSTRUCTIONS

1.0. Use the rational method to compute the water quality design storm peak runoff flow rate. Values with blue text require user input. Values in red text are automatically calculated. Values with black text remain constant.

1.1 Input the appropriate runoff co-efficient for each sub-catchment.

Use C=1.0 for impervious roof surfaces runoff co-efficient¹

Use C=1.0 for impervious paved surfaces runoff co-efficient¹

Use C=0.4 for pervious surfaces with clay soils runoff co-efficient & C=0.3 for all other pervious surfaces¹

1.2 Input the appropriate catchment area for each sub-catchment.

Enter impervious roof surface catchment area

Enter impervious paved surfaces catchment area

Enter pervious grassed/landscaped surfaces catchment area

Total catchment area i.e. Acatch = Aroof + Aroad + Aper

Product of catchment areas & runoff co-efficients i.e. CA = (Croof x Aroof) + (Croad x Aroad) + (Cper x Aper)

1.3 Input rainfall intensity

Rainfall intensity of 10mm/hr to be used for StormFilter water quality treatment within Auckland Council boundaries¹

1.4 Compute the water quality design storm peak runoff flow rate via Rational Method

i.e. Q = f.C.I.A

2.0. Use the stormfilter stage-discharge equation to calculate the StormFilter peak treatment flowrate.

Enter cartridge filtration media i.e. Perlite or ZPG

Enter cartridge height i.e. 69cm / 46cm / 30cm

Enter restrictor disc size, refer table below for max disc diameter

Cart Height (cm)	Actual Height (m)	Priming Depth (m)	Max Disc Diam. (mm)	Max. Design Q (L/s)	Filter Bed Area (m ²)	Flow Rate (L/s/m ²)	Bed Depth (mm)	Media Volume (m ³)	Flow Rate (L/s/m ³)
30	0.305	0.27	22.70	0.63	0.460	1.37	175	0.052	12.0
46	0.457	0.43	25.00	0.95	0.689	1.38	175	0.078	12.1
69	0.686	0.66	27.60	1.42	1.034	1.37	175	0.118	12.1

Table 1. StormFilter Cartridge Specifics [3]

Compute the Stormfilter peak treatment flowrate at internal bypass per cartridge via the StormFilter stage-discharge equation

Compute the number of actual StormFilter cartridges required i.e. nCART = QWQ / QCART

Compute the number (rounded up to whole number) of StormFilter cartridges required

Compute the Stormfilter peak treatment flowrate at internal bypass via the StormFilter stage-discharge equation

3.0 Estimate sediment mass loading (Refer sheet '2. Mass Load Calcs' for more details)

3.1 Use tables 2 & 3 below to fill in StormFilter Dimensions based on number of cartridges as calculated in cl 2.2 above

3.2 Use table 3 below to fill in estimated TSS concentration. For roads with ≥25,000vpd, use minimum 600kg/ha/yr

3.3 Use 0% pretreatment for vaults/manholes with no forebay. Use 10-15% pretreatment for vaults/manholes with forebays. Use 50% pretreatment for upstream GPT ie EnviroPod. Use 75%-90% system efficiency

Std Manhole Dimensions	Without forebay				With forebay			
	Cart Bay Length (m)	Cart Bay Width (m)	Cart Bay Area (m ²)	Max Number Carts	Cart Bay Length (m)	Cart Bay Width (m)	Cart Bay Area (m ²)	Max Number Carts
1050	1.00	0.77	0.77	1	1.00	N/A	N/A	N/A
1200	1.00	1.03	1.03	3	1.00	0.76	0.76	2
1500	1.00	1.67	1.67	4	1.00	1.39	1.39	3
1800	1.00	2.44	2.44	7	1.00	1.83	1.83	5
2050	1.00	3.20	3.20	9	1.00	2.80	2.80	7

Table 2: Standard Stormwater360 Manhole Dimensions

Std Vault Dimensions	Without forebay				With forebay			
	Cart Bay Length (m)	Cart Bay Width (m)	Cart Bay Area (m ²)	Max Number Carts	Cart Bay Length (m)	Cart Bay Width (m)	Cart Bay Area (m ²)	Max Number Carts
3.4 L x 1.5 W x 1.8 D	2.85	1.50	4.28	11	2.30	1.80	4.14	8
4.5 L x 1.5 W x 1.8 D	3.95	1.50	5.93	17	3.40	1.50	5.10	14
4.2 L x 2.0 W x 1.8 D	3.95	1.95	7.70	23	3.40	2.10	7.14	18
5.6 L x 2.0 W x 1.8 D	5.05	1.95	9.85	31	4.50	2.10	9.45	26
5.6 L x 2.4 W x 1.8 D	5.05	2.40	12.12	39	4.50	2.10	9.45	27
6.2 L x 2.4 W x 1.8 D	5.60	2.40	13.44	44	4.50	2.40	10.80	33

Table 3: Standard Stormwater360 Vault Dimensions

Land Use	TSS (kg/ha/yr)
Road	281 - 723
Commercial	242 - 1369
Residential (low)	60 - 340
Residential (high)	97 - 547
Terraced	133 - 755
Bush	26 - 146
Grass	80 - 588
Roof	50-110 (1)
Pasture	103 - 583

Table 4: Suggested TSS loads⁴

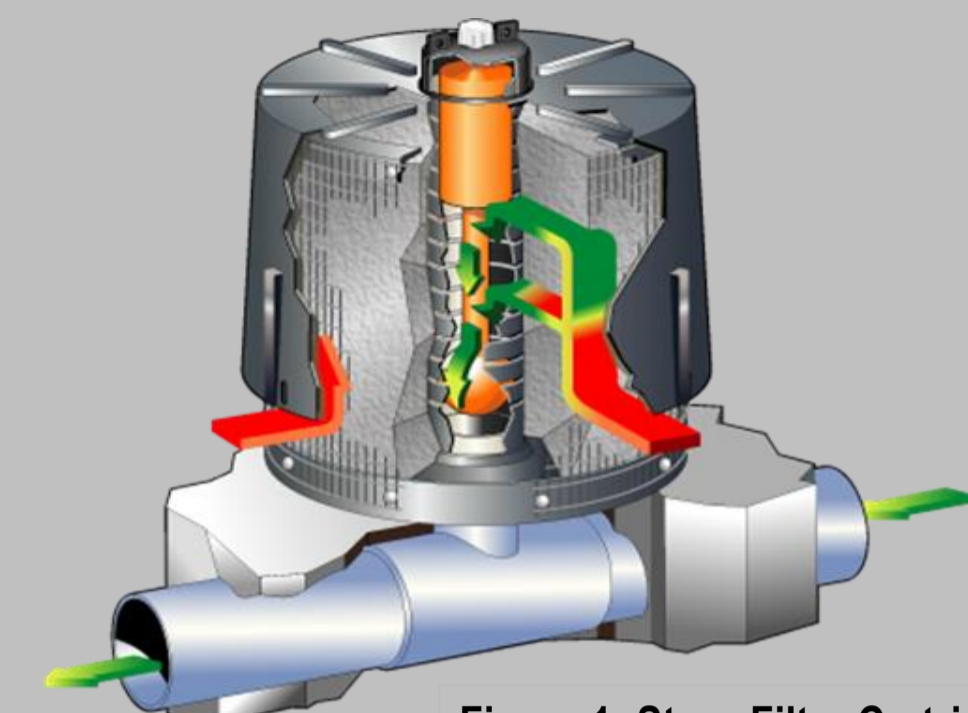


Figure 1: StormFilter Cartridge

$$Q = 0.111d^{2.06} \Delta h^{0.5}$$

[Q]=L min⁻¹; [d]=mm; [h]=m

Figure 2: StormFilter Stage Discharge Equation [2]

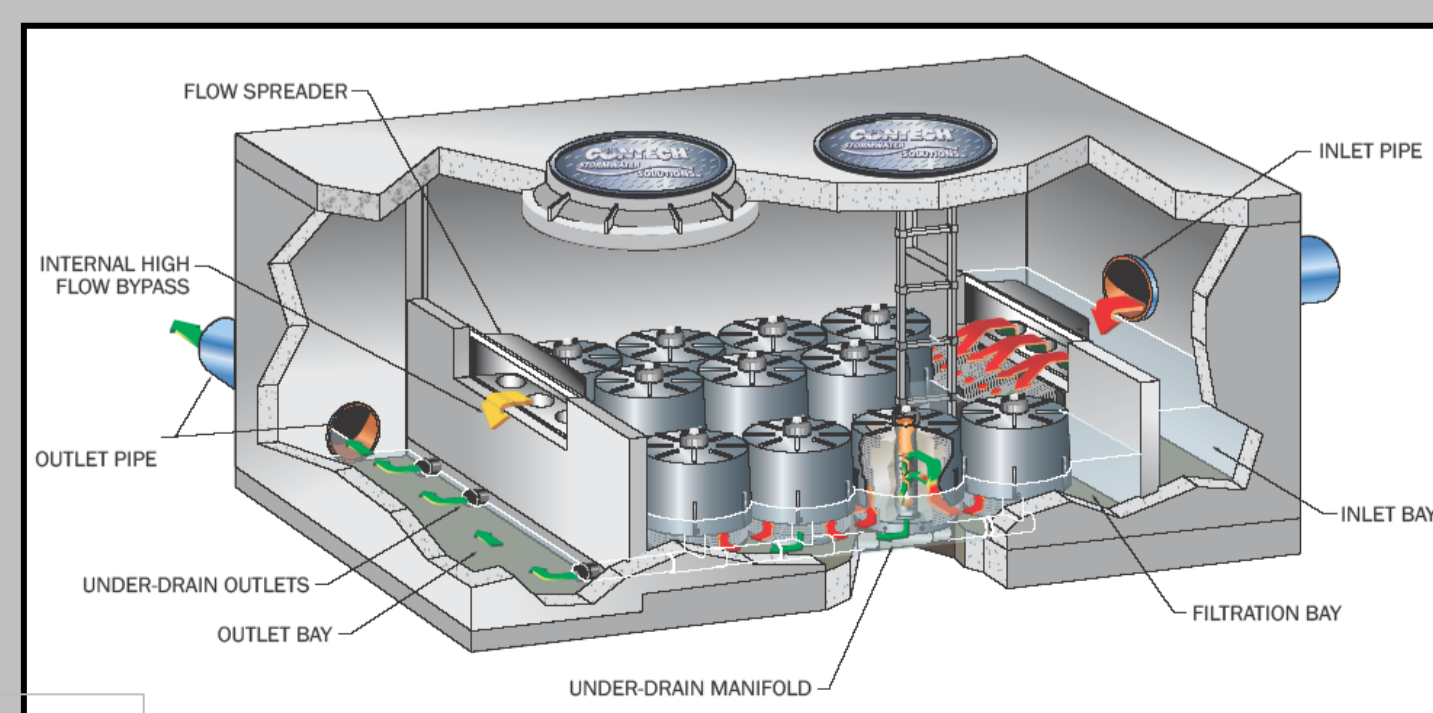


Figure 3: StormFilter Vault Cutaway

References

- Stormwater360 StormFilter: Interim Proprietary Device Evaluation, Part 1 – Air, Land and Water Plan Evaluation, Auckland Council, 24th August 2015.
- Derived from Stormwater Management Inc., Technical Publication PD-04-002.0
- Contech Stormwater Solutions, StormFilter Product Design Manual.
- Table 4-4, Technical Publication 10, 2nd Edition, May 2003, Auckland Regional Council

Project Name
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NZTA Motorway Project
4276
Kevin Jonathan

SF-PM2AH-1
(69cm Option)

Location Auckland
Option # E
Date 15 November 2016

Revision # RB

CALCULATIONS - Please Read Instructions First	
1.0 Water Quality Design Storm Peak Runoff Flowrate (RATIONAL METHOD)	
1.1 Runoff Co-efficients	
Coefficient of Impervious Roof (Croof)	1.00
Coefficient of Impervious Road (Croad)	1.00
Coefficient of Pervious Area (Cper)	0.30
1.2 Catchment Areas	
Area Impervious Roof (Aroof)	0 m ²
Area Impervious Road (Aroad)	21000 m ²
Area Pervious Area (Aper)	0 m ²
Area Total Catchment (Acatch)	21000 m ²
Product of Area & Coefficients (CA)	21000 m ²
1.3 Rainfall Intensity	
Water Quality Rainfall Intensity (iWQ)	10 mm/hr
1.4 Water Quality Design Storm Peak Runoff Flowrate	
Design Water Quality Treatment Flowrate (Qwq)	58.333 L/s
2.0 StormFilter Peak Treatment Flowrate	
2.1 Preliminary	
Cartridge Media (Media)	ZPG
Cartridge Height (Hcart)	69 cm
Diameter Disc Orifice (d)	24.0 mm
Internal bypass weir height (Hweir)	0.79 m
Priming depth (Hprime)	0.66 m
Area of a Cartridge (Acart)	0.181 m ²
2.2 StormFilter Cartridge Peak Treatment Flowrate	
StormFilter cartridge stage-discharge equation	=0.111d ^{2.06} Δh ^{0.5} L/min
Design treatment flowrate per cartridge (Qcart)	1.070 L/s/cart
Number (actual) of StormFilter cartridges required	54.517 cart(s)
Number (rounded) of StormFilter cartridges required (nCART)	55 cart(s)
Design StormFilter Treatment Flowrate (QSF)	58.850 L/s
3.0 Estimate Sediment Mass Loading	
3.1 StormFilter Manhole/Vault Dimensions	
Length Cartridge Bay (Lbay)	4.200 m
Width Cartridge Bay (Wbay)	4.800 m
Area Cartridge Bay (Abay)	20.160 m ²
Total area of Cartridges (Acarts)	9.953 m ²
Area Lower Volume (Alow)	10.207 m ²
Volume Lower Volume (Vlow)	7043 L
Area Upper Volume (Aupp)	20.160 m ²
Volume Upper Volume (Vupp)	2016 L
Live storage volume at internal bypass (Vstor)	9059 L
3.2 Catchment Sediment Loading	
Estimated TSS Concentration Impervious Roof (TSSroof)	100 kg/ha/year
Estimated TSS Concentration Impervious Road (TSSroad)	600 kg/ha/year
Estimated TSS Concentration Pervious Area (TSSper)	200 kg/ha/year
Estimated Total TSS Load (TSSload)	1260 kg/year
3.3 Treatment Efficiencies	
Pre-treatment Efficiency (EFFpre)	15 %
System Efficiency (EFFsys)	75 %
3.4 Maintenance Requirements	
Estimated number of cleans per annum (nCleans)	0.93
Estimated Maintenance Frequency (Mfreq)	12.903 months
4.0 Design Summary	
Design Water Quality Treatment Flowrate (Qwq)	58.333 L/s
StormFilter Design WQ Treatment flowrate (QSF)	58.850 L/s
StormFilter Design flowrate at internal bypass (Qbypass)	63.035 L/s
Number of StormFilter Cartridges required (nTOTAL)	55ea x 69cm ZPG cart(s)
Treatment Flux per cartridge (FLUX)	1.0 L/s/m ²
Restrictor Disc Size (d)	24.000 mm
Maximum Hydraulic Effect (hmax)	0.930 m
Estimated Maintenance Frequency (Mfreq)	13 months

INSTRUCTIONS

1.0. Use the rational method to compute the water quality design storm peak runoff flow rate. Values with blue text require user input. Values in red text are automatically calculated. Values with black text remain constant.

1.1 Input the appropriate runoff co-efficient for each sub-catchment.
 Use C=1.0 for impervious roof surfaces runoff co-efficient¹
 Use C=1.0 for impervious paved surfaces runoff co-efficient¹
 Use C=0.4 for pervious surfaces with clay soils runoff co-efficient & C=0.3 for all other pervious surfaces¹

1.2 Input the appropriate catchment area for each sub-catchment.
 Enter impervious roof surface catchment area
 Enter impervious paved surfaces catchment area
 Enter pervious grassed/landscaped surfaces catchment area
 Total catchment area i.e. Acatch = Aroof + Aroad + Aper
 Product of catchment areas & runoff co-efficients i.e. CA = (Croof x Aroof) + (Croad x Aroad) + (Cper x Aper)

1.3 Input rainfall intensity
 Rainfall intensity of 10mm/hr to be used for StormFilter water quality treatment within Auckland Council boundaries¹

1.4 Compute the water quality design storm peak runoff flow rate via Rational Method
 i.e. Q = f.C.I.A

$$Q = 0.111d^{2.06} \Delta h^{0.5}$$

[Q]=L min⁻¹; [d]=mm; [h]=m

2.0. Use the stormfilter stage-discharge equation to calculate the StormFilter peak treatment flowrate.
 Enter cartridge filtration media i.e. Perlite or ZPG
 Enter cartridge height i.e. 69cm / 46cm / 30cm
 Enter restrictor disc size, refer table below for max disc diameter

Cart Height (cm)	Actual Height (m)	Priming Depth (m)	Max Disc Diam. (mm)	Max. Design Q (L/s)	Filter Bed Area (m ²)	Flow Rate (L/s/m ²)	Bed Depth (mm)	Media Volume (m ³)	Flow Rate (L/s/m ³)
30	0.305	0.27	22.70	0.63	0.460	1.37	175	0.052	12.0
46	0.457	0.43	25.00	0.95	0.689	1.38	175	0.078	12.1
69	0.686	0.66	27.60	1.42	1.034	1.37	175	0.118	12.1

Table 1. StormFilter Cartridge Specifics [3]

Compute the Stormfilter peak treatment flowrate at internal bypass per cartridge via the StormFilter stage-discharge equation
 Compute the number of actual StormFilter cartridges required i.e. nCART = QWQ / Qcart
 Compute the number (rounded up to whole number) of StormFilter cartridges required
 Compute the Stormfilter peak treatment flowrate at internal bypass via the StormFilter stage-discharge equation

3.0 Estimate sediment mass loading (Refer sheet '2. Mass Load Calcs' for more details)
 3.1 Use tables 2 & 3 below to fill in StormFilter Dimensions based on number of cartridges as calculated in cl 2.2 above
 3.2 Use table 3 below to fill in estimated TSS concentration. For roads with ≥25,000vpd, use minimum 600kg/ha/yr
 3.3 Use 0% pretreatment for vaults/manholes with no forebay. Use 10-15% pretreatment for vaults/manholes with forebays. Use 50% pretreatment for upstream GPT ie EnviroPod. Use 75%-90% system efficiency

Std Manhole Dimensions	Without forebay				With forebay			
	Cart Bay Length (m)	Cart Bay Width (m)	Cart Bay Area (m ²)	Max Number Carts	Cart Bay Length (m)	Cart Bay Width (m)	Cart Bay Area (m ²)	Max Number Carts
1050	1.00	0.77	0.77	1	1.00	N/A	N/A	N/A
1200	1.00	1.03	1.03	3	1.00	0.76	0.76	2
1500	1.00	1.67	1.67	4	1.00	1.39	1.39	3
1800	1.00	2.44	2.44	7	1.00	1.83	1.83	5
2050	1.00	3.20	3.20	9	1.00	2.80	2.80	7

Table 2: Standard Stormwater360 Manhole Dimensions

Std Vault Dimensions	Without forebay				With forebay			
	Cart Bay Length (m)	Cart Bay Width (m)	Cart Bay Area (m ²)	Max Number Carts	Cart Bay Length (m)	Cart Bay Width (m)	Cart Bay Area (m ²)	Max Number Carts
3.4 L x 1.5 W x 1.8 D	2.85	1.50	4.28	11	2.30	1.80	4.14	8
4.5 L x 1.5 W x 1.8 D	3.95	1.50	5.93	17	3.40	1.50	5.10	14
4.2 L x 2.0 W x 1.8 D	3.95	1.95	7.70	23	3.40	2.10	7.14	18
5.6 L x 2.0 W x 1.8 D	5.05	1.95	9.85	31	4.50	2.10	9.45	26
5.6 L x 2.4 W x 1.8 D	5.05	2.40	12.12	39	4.50	2.10	9.45	27
6.2 L x 2.4 W x 1.8 D	5.60	2.40	13.44	44	4.50	2.40	10.80	33

Table 3: Standard Stormwater360 Vault Dimensions

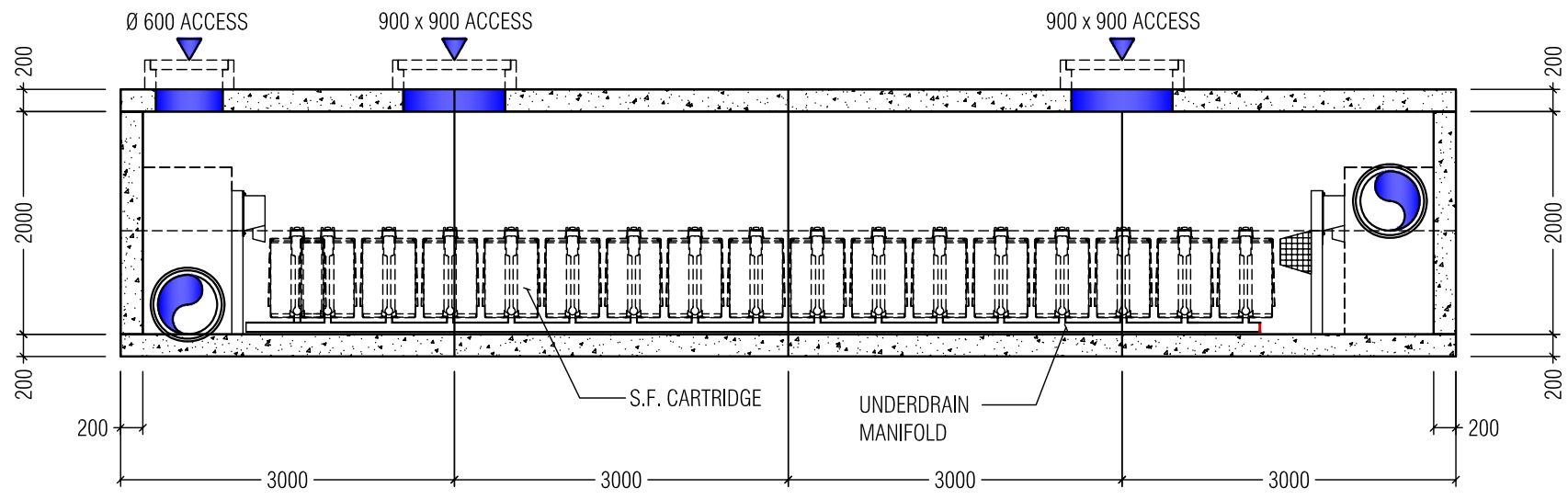
Land Use	TSS (kg/ha/yr)
Road	281 - 723
Commercial	242 - 1369
Residential (low)	60 - 340
Residential (high)	97 - 547
Terraced	133 - 755
Bush	26 - 146
Grass	80 - 588
Roof	50-110 (1)
Pasture	103 - 583

Table 4: Suggested TSS loads⁴

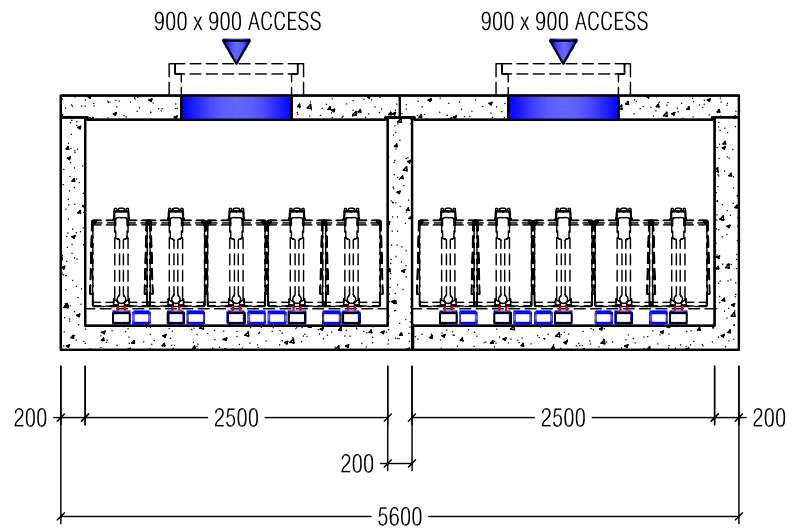
References

- Stormwater360 StormFilter: Interim Proprietary Device Evaluation, Part 1 – Air, Land and Water Plan Evaluation, Auckland Council, 24th August 2015.
- Derived from Stormwater Management Inc., Technical Publication PD-04-002.0
- Contech Stormwater Solutions, StormFilter Product Design Manual.
- Table 4-4, Technical Publication 10, 2nd Edition, May 2003, Auckland Regional Council

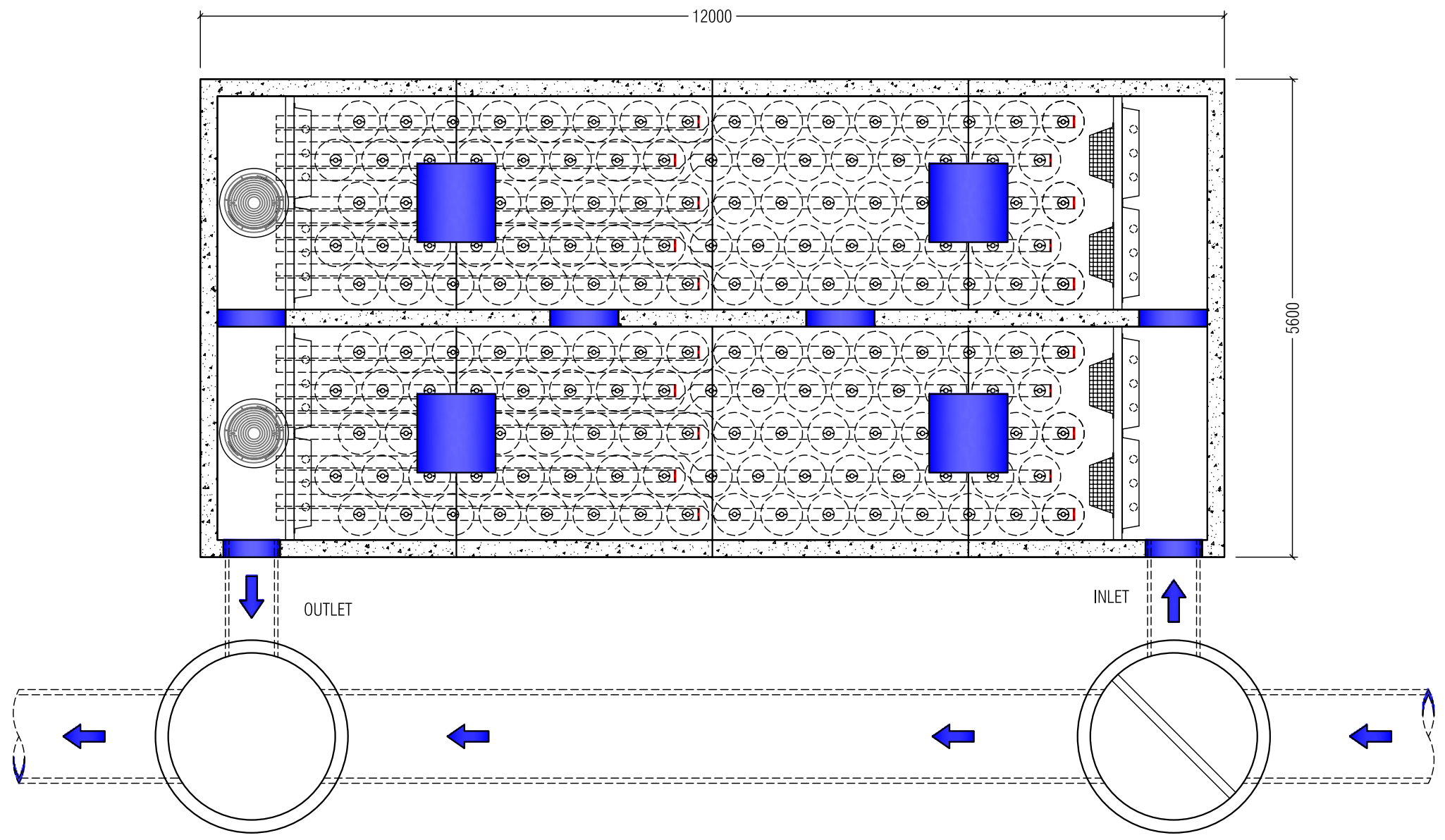
Figure 3: StormFilter Vault Cutaway



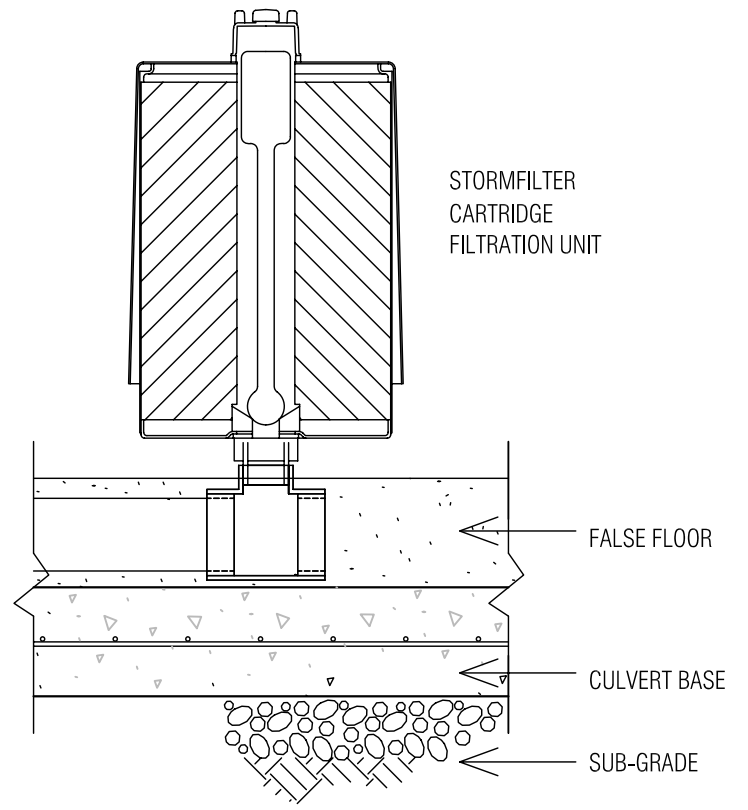
ELEVATION



SECTION



PLAN LAYOUT
(160 CARTRIDGES)

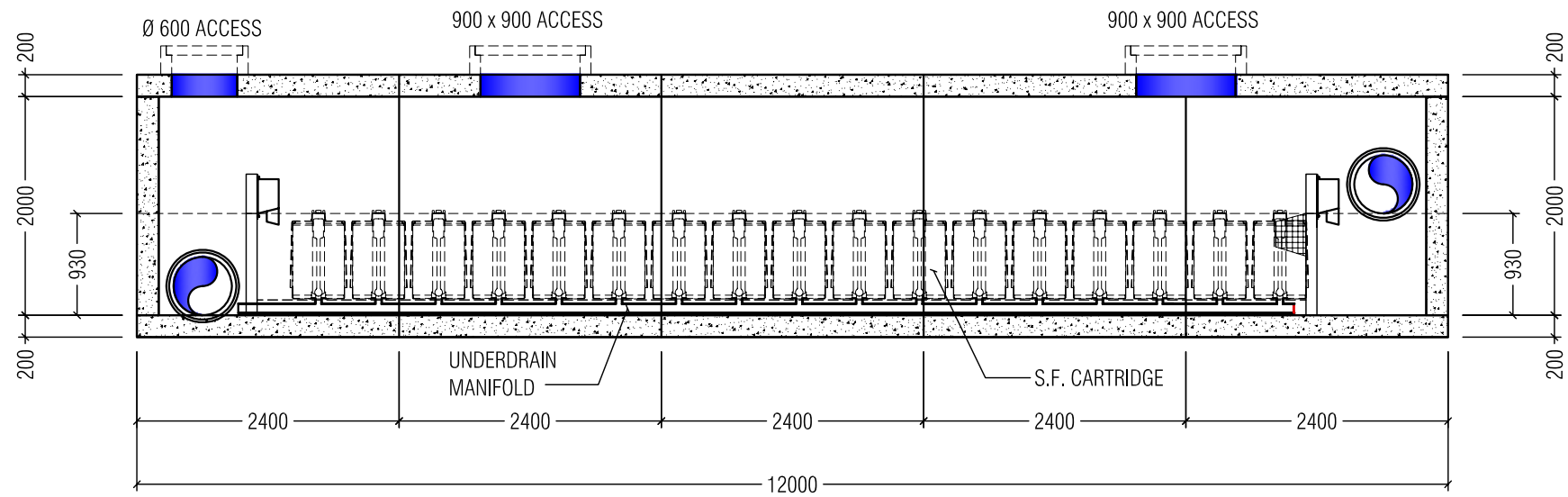


CHAMBER FALSE FLOOR

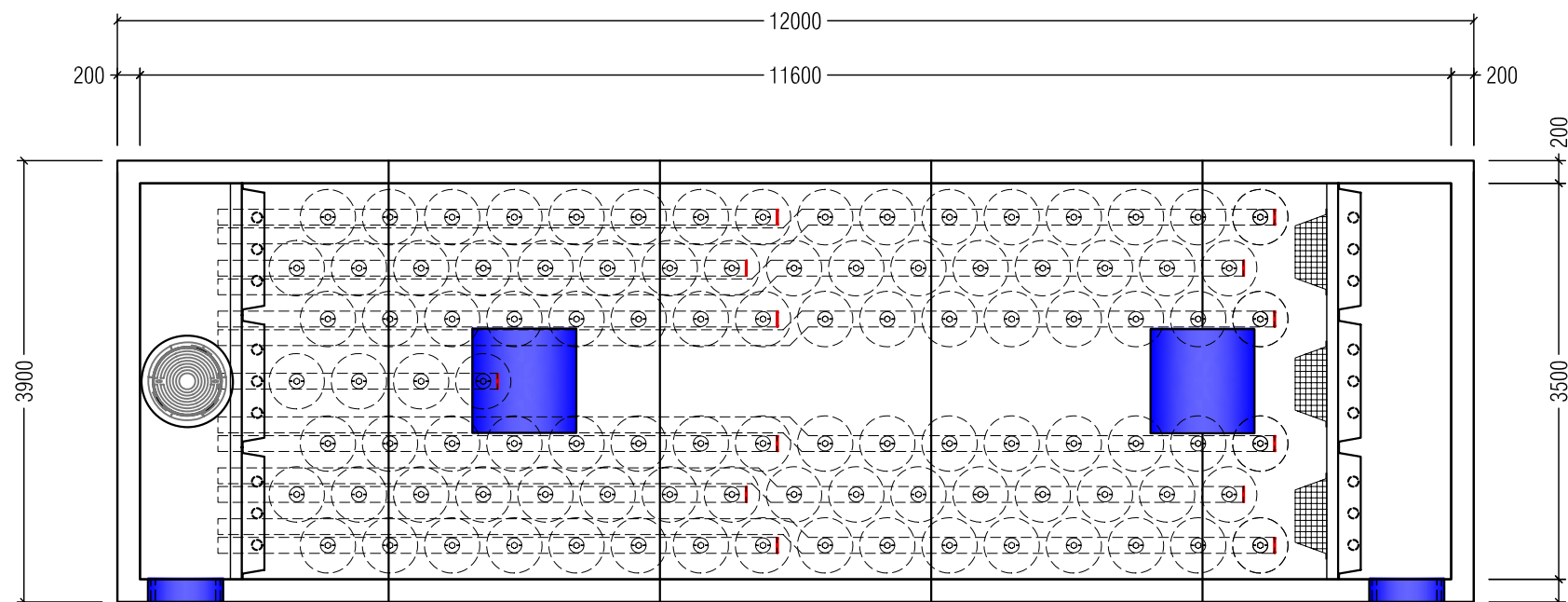
SF-S2R-1 (69cm OPTION)
155 CARTRIDGES



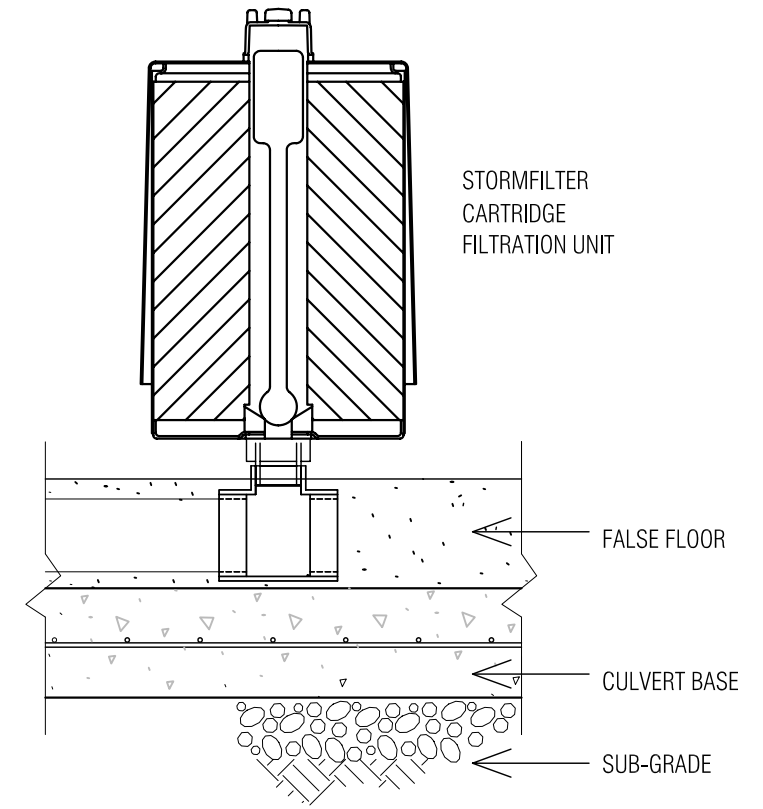
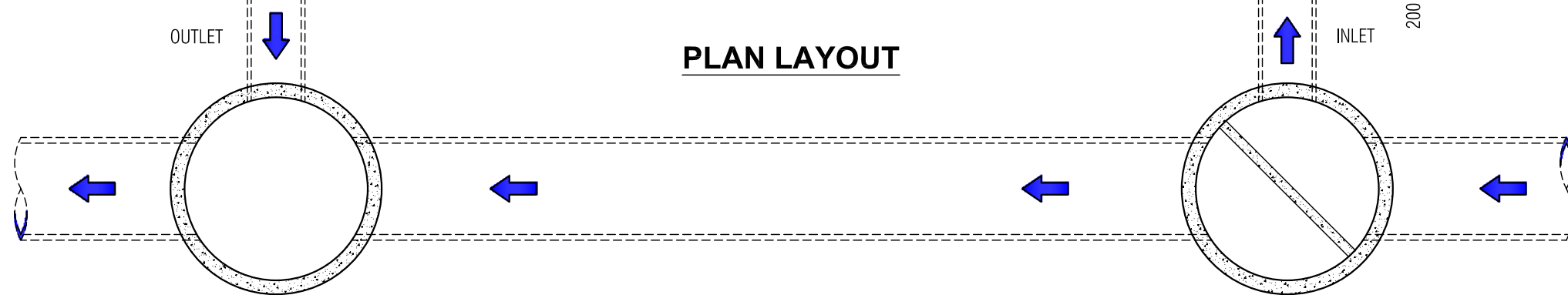
160 CART STORMFILTER SYSTEM					DRAWING
PRELIMINARY GENERAL ARRANGEMENT					1
					A
DATE: 02.02.09	SCALE: N.T.S.	FILE NAME: NSH-101-1	DRN: R.P.	CHK: J.L.	



ELEVATION

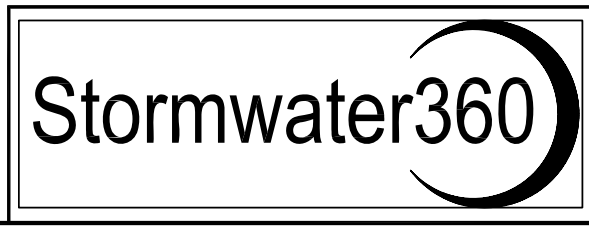


PLAN LAYOUT

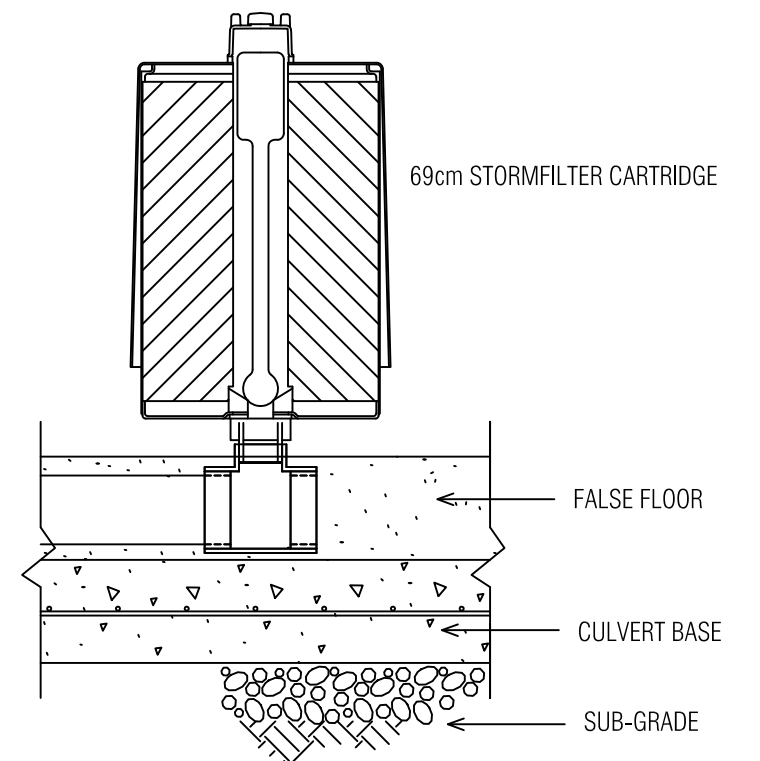
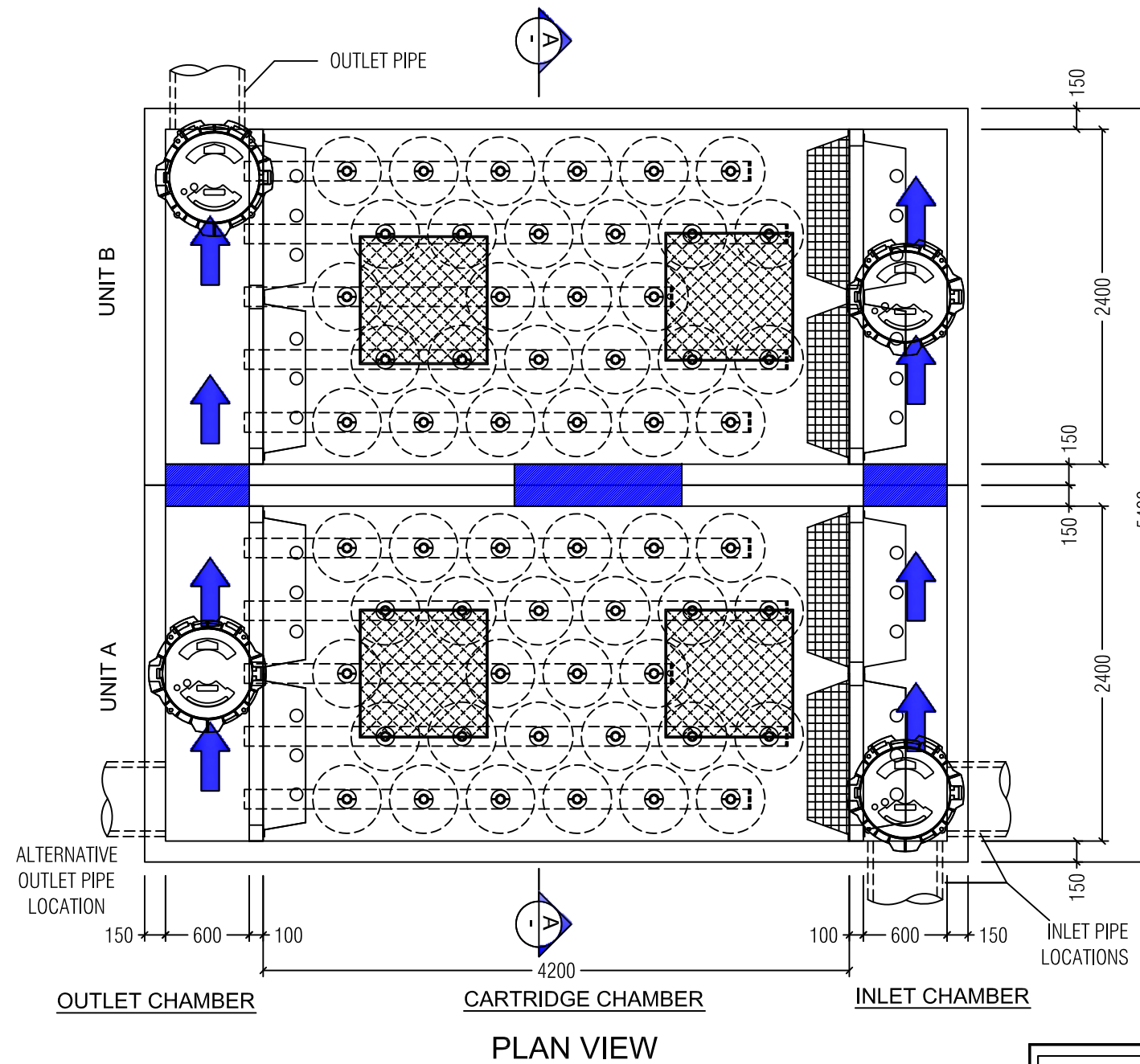
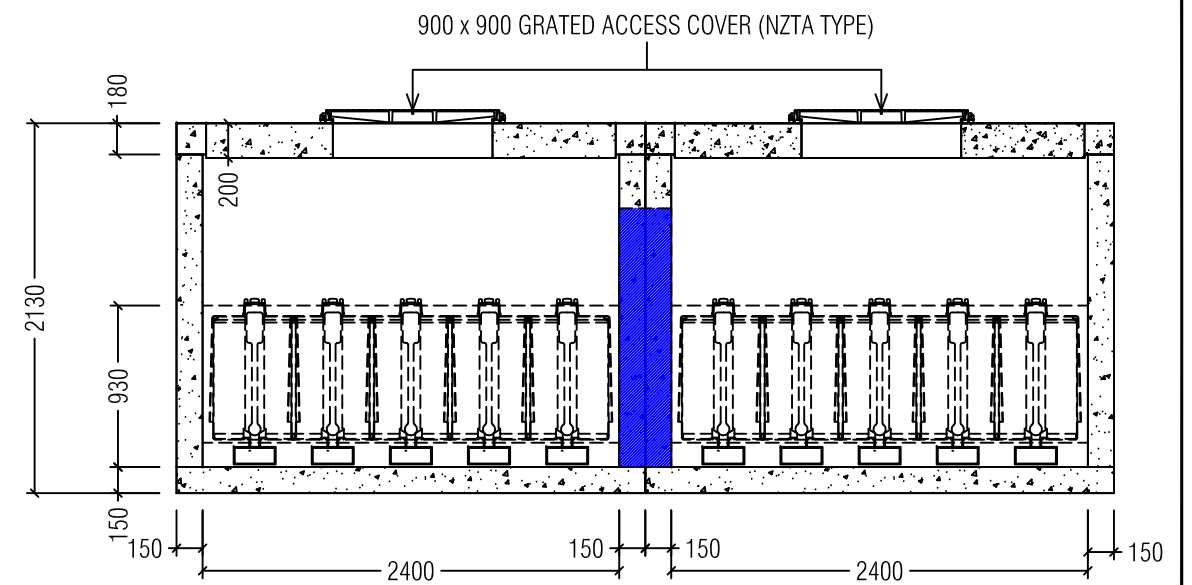
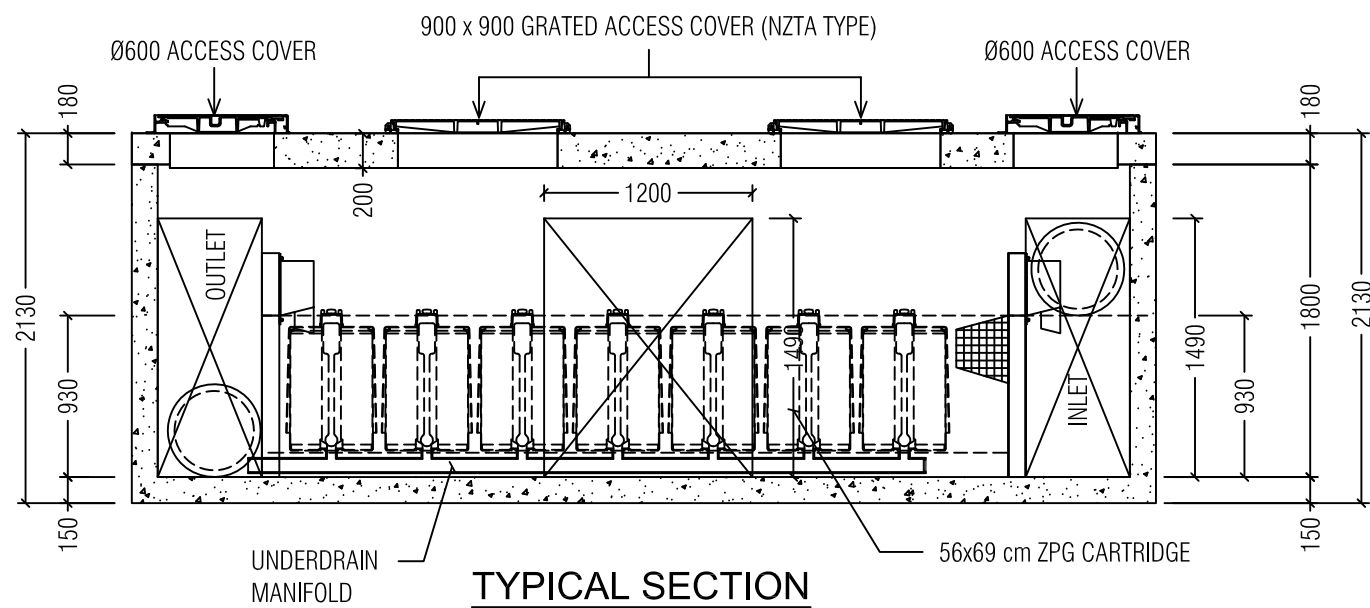


CHAMBER FALSE FLOOR

SF-S2R-1 (46cm OPTION)
230 CARTRIDGES



100 CART STORMFILTER SYSTEM				DRAWING
GENERIC DESIGN				1
DATE: 28.05.10				A
FILE NAME:	CTG-100C-01	DRN: R.P.	CHK: N.V.	



NOTE

UNIT A & B TO BE BOLTED TOGETHER ONSITE BY OTHERS
 SIZE AND CLASS OF PIPE OR SQUARE KNOCKOUT
 SIZE TO BE SPECIFIED ON DRAWING BY CLIENT.
 ACCESS RISERS AND CONVERTER SLABS TO FINISHED
 GROUND LEVEL ARE TO BE FORMED ON SITE BY
 CONTRACTOR IF REQUIRED.
 CONCRETE CONSTRUCTION TO NZS 3109
 MASS OF PIT (UNIT A) = 23.2 TONNES
 MASS OF LID (UNIT A) = 8.2 TONNES

Stormwater360
 0800 STORMWATER

SF-PM2AH-1 (69cm OPTION)
56 CARTRIDGES

DRAWING
1
A

DATE: 16.01.15

FILE NAME: NZ-SF69-56C-VF-564818

DRN: K.J.

CHK: T.B.