

ONE 17 DESIGN One 17 SD (Structural Design) Ltd The Dyehouse Armitage Bridge Huddersfield HD4 7PD	Project STATION ROAD MELTHAM				Job Ref. 15 1033	
	Section SOAKAWAY DESIGN				Sheet no./rev. SA 1	
	Calc. by MAN	Date 12/7/2015	Chk'd by	Date	App'd by	Date

THE SURFACE WATER FROM TWO PROPOSED LARGE HOUSES WILL DRAIN TO SOAKAWAYS. THESE ARE NUMBERED SA1 TO SA4 ON DRAWING 15 1033-01.

THE AREAS DRAINED TO EACH SOAKAWAY ARE AS FOLLOWS, A PROPORTION OF THE EXTERNAL HARDSTANDING HAS BEEN INCLUDED, THE REMAINDER WILL RUN OFF TO THE GARDENS.

SA1 – 327 M² $f = 9.97 \times 10^{-4}$

SA2 – 287 M² $f = 1.93 \times 10^{-3}$

SA3 – 177 M² DITTO

SA4 – 373 M² DITTO

ARC ENVIRONMENTAL UNDERTOOK SOAKAWAY TESTING TO BRE 365 (REFER TO REPORT 15-154.01L). AVERAGE INFILTRATION RATES WERE 1.93×10^{-3} AND 9.97×10^{-4} AT POSITIONS S2 AND S3 RESPECTIVELY. AT POSITION S1 WATER WAS DISCHARGING AT A FASTER RATE THAN THE ABOVE.

FOR PURPOSES OF OUR DESIGN INFILTRATION RATES WILL BE ALLOCATED AS ABOVE.

ALL SOAKAWAYS WILL BE 800MM DEEP (FROM 2NO 400MM DEEP UNITS) WITH 95% VOID RATIO.

THE FOLLOWING CALCULATIONS CONFIRM THE SOAKAWAY PLAN SIZES –

SA1 = 2.0Mx2.0M

SA2 = 2.0Mx1.5M

SA3 = 1.5Mx1.5M

SA4 = 2.0Mx1.5M

ONE 17 DESIGN One 17 SD (Structural Design) Ltd The Dyehouse Armitage Bridge Huddersfield HD4 7PD	Project				Job Ref.	
	STATION ROAD MELTHAM				15 1033	
	Section				Sheet no./rev.	
SOAKAWAY DESIGN				SA 2		
Calc. by	Date	Chk'd by	Date	App'd by	Date	
MAN	12/7/2015					

SA 1

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.01

Design rainfall intensity

Location of catchment area; Leeds; Imp area drained to soakaway; $A = 327.0 \text{ m}^2$
 Return period; Period = 30 yr; Ratio r ; $r = 0.360$
 5-yr rtn period rainfall 60 min; M5_60min = 19.0 mm; Increase for global warming; $p_{\text{climate}} = 0 \%$

Soakaway / infiltration trench details

Soakaway type; Rectangular
 Depth of pit; $d = 784 \text{ mm}$; Width of pit; $w = 2000 \text{ mm}$
 Length of pit; $l = 2000 \text{ mm}$; Percentage free volume; $V_{\text{free}} = 95 \%$
 Soil infiltration rate; $f = 997. \times 10^{-6} \text{ m/s}$
 Wetted area of pit 50% full; $a_{s50} = 3134224 \text{ mm}^2$

Table equations

Inflow; $I = M30 \times A$; Outflow; $O = a_{s50} \times f \times D$
 Storage; $S = I - O$

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	30 year rainfall, M30 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5;	0.36;	6.8;	1.45;	9.9;	3.24;	0.94;	2.31
10;	0.51;	9.7;	1.49;	14.4;	4.71;	1.87;	2.83
15;	0.62;	11.8;	1.50;	17.7;	5.79;	2.81;	2.98
30;	0.79;	15.0;	1.53;	22.9;	7.49;	5.62;	1.87
60;	1.00;	19.0;	1.54;	29.3;	9.57;	11.25;	0.00
120;	1.22;	23.2;	1.54;	35.6;	11.65;	22.50;	0.00
240;	1.48;	28.1;	1.52;	42.8;	13.98;	45.00;	0.00
360;	1.67;	31.7;	1.51;	47.8;	15.62;	67.50;	0.00
600;	1.90;	36.1;	1.48;	53.6;	17.53;	112.49;	0.00
1440;	2.42;	46.0;	1.44;	66.2;	21.63;	269.98;	0.00

Required storage volume; $S_{\text{req}} = 2.98 \text{ m}^3$; Soakaway storage volume; $S_{\text{act}} = 2.98 \text{ m}^3$

PASS - Soakaway storage volume

Time to empty half soakaway; $t_{s50} = 7 \text{ min } 57 \text{ s}$

PASS - Soakaway discharge time less than or equal to 24 hours

ONE 17 DESIGN One 17 SD (Structural Design) Ltd The Dyehouse Armitage Bridge Huddersfield HD4 7PD	Project				Job Ref.	
	STATION ROAD MELTHAM				15 1033	
	Section				Sheet no./rev.	
SOAKAWAY DESIGN				SA 3		
Calc. by	Date	Chk'd by	Date	App'd by	Date	
MAN	12/7/2015					

SA 2

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.01

Design rainfall intensity

Location of catchment area; Leeds; Imp area drained to soakaway; $A = 287.0 \text{ m}^2$
 Return period; Period = 30 yr; Ratio r ; $r = 0.360$
 5-yr rtn period rainfall 60 min; M5_60min = 19.0 mm; Increase for global warming; $p_{\text{climate}} = 0 \%$

Soakaway / infiltration trench details

Soakaway type; Rectangular
 Depth of pit; $d = 599 \text{ mm}$; Width of pit; $w = 1500 \text{ mm}$
 Length of pit; $l = 2000 \text{ mm}$; Percentage free volume; $V_{\text{free}} = 95 \%$
 Soil infiltration rate; $f = 1.93 \times 10^{-3} \text{ m/s}$
 Wetted area of pit 50% full; $a_{s50} = 2095444 \text{ mm}^2$

Table equations

Inflow; $I = M30 \times A$; Outflow; $O = a_{s50} \times f \times D$
 Storage; $S = I - O$

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	30 year rainfall, M30 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5;	0.36;	6.8;	1.45;	9.9;	2.85;	1.21;	1.63
10;	0.51;	9.7;	1.49;	14.4;	4.13;	2.43;	1.71
15;	0.62;	11.8;	1.50;	17.7;	5.08;	3.64;	1.44
30;	0.79;	15.0;	1.53;	22.9;	6.58;	7.28;	0.00
60;	1.00;	19.0;	1.54;	29.3;	8.40;	14.56;	0.00
120;	1.22;	23.2;	1.54;	35.6;	10.22;	29.12;	0.00
240;	1.48;	28.1;	1.52;	42.8;	12.27;	58.24;	0.00
360;	1.67;	31.7;	1.51;	47.8;	13.71;	87.35;	0.00
600;	1.90;	36.1;	1.48;	53.6;	15.38;	145.59;	0.00
1440;	2.42;	46.0;	1.44;	66.2;	18.99;	349.42;	0.00

Required storage volume; $S_{\text{req}} = 1.71 \text{ m}^3$; Soakaway storage volume; $S_{\text{act}} = 1.71 \text{ m}^3$

PASS - Soakaway storage volume

Time to empty half soakaway; $t_{s50} = 3 \text{ min } 31 \text{ s}$

PASS - Soakaway discharge time less than or equal to 24 hours

ONE 17 DESIGN One 17 SD (Structural Design) Ltd The Dyehouse Armitage Bridge Huddersfield HD4 7PD	Project				Job Ref.	
	STATION ROAD MELTHAM				15 1033	
	Section				Sheet no./rev.	
SOAKAWAY DESIGN				SA 4		
Calc. by	Date	Chk'd by	Date	App'd by	Date	
MAN	12/7/2015					

SA 3

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.01

Design rainfall intensity

Location of catchment area; Leeds; Imp area drained to soakaway; $A = 177.0 \text{ m}^2$
 Return period; Period = 30 yr; Ratio r ; $r = 0.360$
 5-yr rtn period rainfall 60 min; M5_60min = 19.0 mm; Increase for global warming; $p_{\text{climate}} = 0 \%$

Soakaway / infiltration trench details

Soakaway type; Rectangular
 Depth of pit; $d = 454 \text{ mm}$; Width of pit; $w = 1500 \text{ mm}$
 Length of pit; $l = 1500 \text{ mm}$; Percentage free volume; $V_{\text{free}} = 95 \%$
 Soil infiltration rate; $f = 1.93 \times 10^{-3} \text{ m/s}$
 Wetted area of pit 50% full; $a_{s50} = 1362635 \text{ mm}^2$

Table equations

Inflow; $I = M30 \times A$; Outflow; $O = a_{s50} \times f \times D$
 Storage; $S = I - O$

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	30 year rainfall, M30 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5;	0.36;	6.8;	1.45;	9.9;	1.76;	0.79;	0.97
10;	0.51;	9.7;	1.49;	14.4;	2.55;	1.58;	0.97
15;	0.62;	11.8;	1.50;	17.7;	3.13;	2.37;	0.77
30;	0.79;	15.0;	1.53;	22.9;	4.06;	4.73;	0.00
60;	1.00;	19.0;	1.54;	29.3;	5.18;	9.47;	0.00
120;	1.22;	23.2;	1.54;	35.6;	6.31;	18.94;	0.00
240;	1.48;	28.1;	1.52;	42.8;	7.57;	37.87;	0.00
360;	1.67;	31.7;	1.51;	47.8;	8.45;	56.81;	0.00
600;	1.90;	36.1;	1.48;	53.6;	9.49;	94.68;	0.00
1440;	2.42;	46.0;	1.44;	66.2;	11.71;	227.22;	0.00

Required storage volume; $S_{\text{req}} = 0.97 \text{ m}^3$; Soakaway storage volume; $S_{\text{act}} = 0.97 \text{ m}^3$

PASS - Soakaway storage volume

Time to empty half soakaway; $t_{s50} = 3 \text{ min } 5 \text{ s}$

PASS - Soakaway discharge time less than or equal to 24 hours

ONE 17 DESIGN One 17 SD (Structural Design) Ltd The Dyehouse Armitage Bridge Huddersfield HD4 7PD	Project STATION ROAD MELTHAM				Job Ref. 15 1033	
	Section SOAKAWAY DESIGN				Sheet no./rev. SA 5	
	Calc. by MAN	Date 12/7/2015	Chk'd by	Date	App'd by	Date

SA 4

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.01

Design rainfall intensity

Location of catchment area; Leeds; Imp area drained to soakaway; $A = 373.0 \text{ m}^2$
Return period; Period = **30 yr**; Ratio r ; $r = \mathbf{0.360}$
5-yr rtn period rainfall 60 min; $M5_{60\text{min}} = \mathbf{19.0 \text{ mm}}$; Increase for global warming; $p_{\text{climate}} = \mathbf{0 \%}$

Soakaway / infiltration trench details

Soakaway type; Rectangular
Depth of pit; $d = \mathbf{778 \text{ mm}}$; Width of pit; $w = \mathbf{2000 \text{ mm}}$
Length of pit; $l = \mathbf{1500 \text{ mm}}$; Percentage free volume; $V_{\text{free}} = \mathbf{95 \%}$
Soil infiltration rate; $f = \mathbf{1.93 \times 10^{-3} \text{ m/s}}$
Wetted area of pit 50% full; $a_{s50} = \mathbf{2723347 \text{ mm}^2}$

Table equations

Inflow; $I = M30 \times A$; Outflow; $O = a_{s50} \times f \times D$
Storage; $S = I - O$

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	30 year rainfall, M30 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5;	0.36;	6.8;	1.45;	9.9;	3.70;	1.58;	2.12
10;	0.51;	9.7;	1.49;	14.4;	5.37;	3.15;	2.22
15;	0.62;	11.8;	1.50;	17.7;	6.60;	4.73;	1.87
30;	0.79;	15.0;	1.53;	22.9;	8.55;	9.46;	0.00
60;	1.00;	19.0;	1.54;	29.3;	10.91;	18.92;	0.00
120;	1.22;	23.2;	1.54;	35.6;	13.29;	37.84;	0.00
240;	1.48;	28.1;	1.52;	42.8;	15.95;	75.69;	0.00
360;	1.67;	31.7;	1.51;	47.8;	17.82;	113.53;	0.00
600;	1.90;	36.1;	1.48;	53.6;	19.99;	189.22;	0.00
1440;	2.42;	46.0;	1.44;	66.2;	24.68;	454.12;	0.00

Required storage volume; $S_{\text{req}} = \mathbf{2.22 \text{ m}^3}$; Soakaway storage volume; $S_{\text{act}} = \mathbf{2.22 \text{ m}^3}$

PASS - Soakaway storage volume

Time to empty half soakaway; $t_{s50} = \mathbf{3 \text{ min } 31 \text{ s}}$

PASS - Soakaway discharge time less than or equal to 24 hours