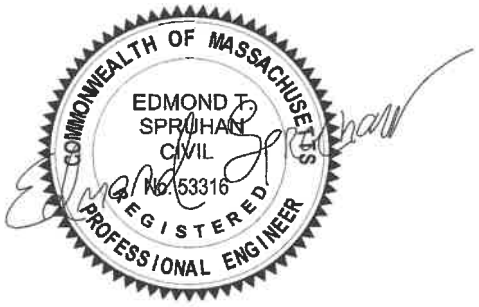
SPRUHAN ENGINEERING, P.C.

STORMWATER REPORT

31 ELM ST, WELLESLEY, MA



Prepared By: Spruhan Engineering, P.C.
February 5, 2021.; Revised April 27, 2021

5.0 Total Suspended Solids (TSS) removal calculations

At a minimum, all projects subject to a Major Stormwater Management Permit shall comply with the performance standards of the most recent version of Massachusetts Stormwater Standards and accompanying Stormwater Management Handbook (Handbook). The following design standard considering TSS removal must be addressed:

Stormwater management systems shall be designed to remove 80% of the average annual post-construction impervious area load of Total Suspended Solids (TSS). This Standard is met when:

a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained.

b. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and

c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

The 80% credit was achieved in this project using the following strategies:

- Pre-treatment: Deep sump catch basin (25% TSS removal rate) + Oil grit separator (25% TSS removal rate) = 50% TSS removal rate.

- Infiltration System: 80% TSS removal rate.

Total TSS Removal achieve is 89%. The breakdown of these calculations can be seen in Appendix C.

6.0 Total Phosphorus (TP) removal calculations

The following calculations are based on Attachment 3 to Appendix E "Methods to Calculate Phosphorus Load Reductions for Structural Stormwater Best Management Practices in the Watershed" for MA MS4 General Permit.

Phosphorus load reduction target (P_{target}) = 60%

Contributing impervious drainages area (IA) = 0.13 acres

In the following Table 6.1 the average annual distinct phosphorus load (P Load) by land category are shown. To keep calculations on the conservative side a consideration of the D soil group will be taken as 100% of the area given that it's the previous soil before filling and it has a higher P load Export rate.

Table 6.1. Average annual distinct phosphorus load (P Load) export rates for use in estimating phosphorus load reduction credits the MA MS4 Permit

Phosphorous Category by Land Use	Land Surface Cover	P Load Export Rate, lbs/acre/year	P Load Export Rate, kg/ha/yr
Low Density Residential (LDR)	Directly connected impervious	1.52	1.7
Developed Land Pervious (DevPERV)- Hydrologic Soil Group D	Pervious	0.37	0.37

BMP Load= (IA_{LDR} X $PLER_{LDR}$) + ($IA_{DevPERVD}$ X $PLER_{DevPERVD}$)

BMP Load = (0.13 acres X 1.52 lbs/acre/year) + (.33 acres X 0.37 lbs/acre/year)

BMP Load= (0.2 lbs/year) + (.12 lbs/year)

BMP Load= .32 lbs/year

The performance curve for infiltration trench, Figure 3-1 IR=0.17 in/hr is used to determine the design storage volume of the BMP (BMP Volume $_{IA\text{-}in}$) needed to treat runoff from the contributing IA and achieve a P_{target}=60%. The curve for an infiltration rate of 0.17 in/hr is chosen for being the most conservative. From the Figure 3-1 BMP Volume $_{IA\text{-}in}$ for a P_{target} = 60% is 0.43 in.

The BMP Volume is converted to cubic feet (BMP Volume $_{IA\text{-}ft^3}$) using the next equation:

BMP Volume $_{IA\text{-}ft^3}$= IA (acre) x BMP Volume $_{IA\text{-}ft^3}$ x 3,630 ft^3/acre-in

BMP Volume $_{IA\text{-}ft^3}$= 0.13 acre x 0.43 in x 3,630 ft^3/acre-in

BMP Volume $_{IA\text{-}ft^3}$= **202.9 ft^3.**

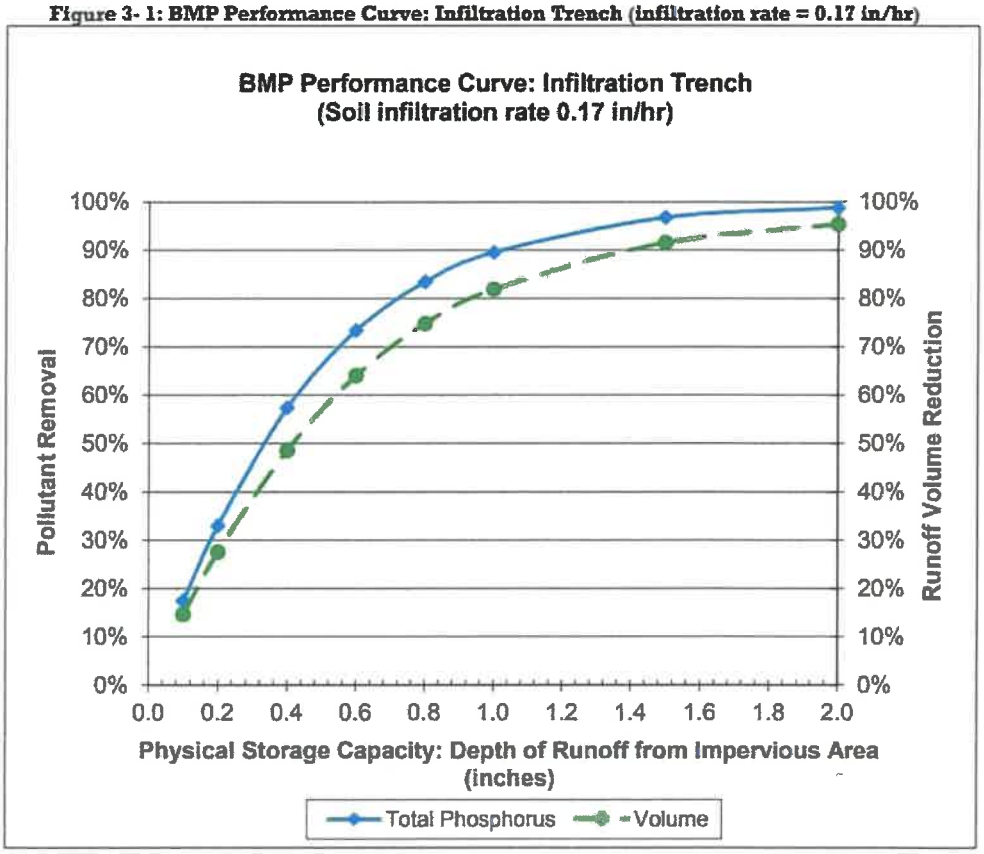
BMP-Reduction $_{lbs\text{-}P}$= BMP Load x (P_{target} /100)

BMP-Reduction $_{lbs\text{-}P}$= .32 lbs/year x (60/100)

BMP-Reduction $_{lbs\text{-}P}$**= .19 lbs/yr**

The volume of the proposed infiltration practice, 749 ft^3, exceeds the BMP Volume $_{IA\text{-}ft^3}$ needed, 202.9 ft^3 and is sufficient to achieve the P target of 60%.

Figure 3- 1: BMP Performance Curve: Infiltration Trench (infiltration rate = 0.17 in/hr)



APENDIX C – TSS REMOVAL CALCULATIONS

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Full treatment train

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	0.05	1.00	0.05	0.95
Deep Sump and Hooded Catch Basin	0.25	0.95	0.24	0.71
Oil Grit Separator	0.25	0.71	0.18	0.53
Infiltration Trench	0.80	0.53	0.43	0.11
	0.00	0.11	0.00	0.11

Total TSS Removal = 89%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 31 Elm St, Wellesley, MA
Prepared By: GP
Date: 4-19-2021

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Pre-treatment

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	0.05	1.00	0.05	0.95
Deep Sump and Hooded Catch Basin	0.25	0.95	0.24	0.71
Oil Grit Separator	0.25	0.71	0.18	0.53
	0.00	0.53	0.00	0.53
	0.00	0.53	0.00	0.53

Total TSS Removal = 47%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 31 Elm St, Wellesley, MA
Prepared By: GP
Date: 4-19-2021

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Treatment

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Infiltration Trench	0.80	1.00	0.80	0.20
	0.00	0.20	0.00	0.20
	0.00	0.20	0.00	0.20
	0.00	0.20	0.00	0.20
	0.00	0.20	0.00	0.20

Total TSS Removal = 80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 31 Elm St, Wellesley, MA
Prepared By: GP
Date: 4-19-2021

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1