

Practical Performance of the Simplified Fiber Filtration for CSO Control

Takemasa CHIKUSA^{1,*}, Mikako TAKENAKA¹⁾

¹⁾Daiki Ataka Engineering Co., Ltd.

Ninety Bldg, 5-3-28 Nishikujo, Konohana-ku, Osaka, 554-0012, Japan

*Corresponding author, e-mail: takemasa.chikusa@atk-dk.co.jp

Introduction

We had started to study CSO control technology using a fiber filtration in order to achieve the target¹⁾ set force by Japan Institute of Wastewater Engineering Technology in 2005. The targeted performance was as follows:

Items	Removal ratio
SS & BOD5	More than 60% of inlet loading
Debris	More than 99% of inlet loading

Other requirements on CSO control technologies were small footprint installation and lower construction and maintenance costs. On those requirements, we had applied new technology of the Simplified Fiber Filtration (SFF), and after the field test, we installed the first SFF CSO control facility in SWTP in Nichinan City, Miyazaki.

Outline of the SFF CSO control facilities;

A schematic diagram of the SFF is shown in Figure 1.

Our concepts of CSO filtration are as follows;

- 1) Filter media should not be washed during CSO coming in. It means backwash procedure during raining can be avoided and backwash wastewater can be treated after raining when CSO never comes anymore.
- 2) The most of buoyance debris and sand in CSO should be separated by floatation and sedimentation to prevent clogging of filter media.
- 3) Maximum filtration head loss should be less than 5 kPa. In case it gets over 5 kPa. CSO should go through the facilities smoothly without any special operation.
- 4) Filter media made of synthetic fiber should have large SS caption capacity and be washable easily by aeration for periodical use.
- 5) The two sections should be vacant while not in used in order to avoid decomposition of holding water in the basin.

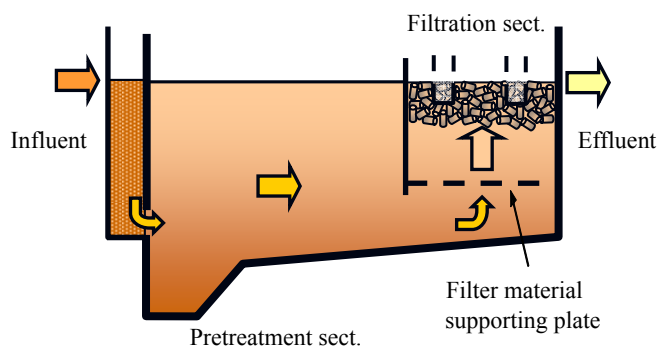


Figure 1 A schematic diagram of the SFF

The first SFF facility was installed with modification of the existing primary settling tank, whose dimension was 8m width 28m length 3.5m depth, to the SFF basin. A proportion of

two sections for sedimentation and filtration in the basin were set at almost 1:1.

The design conditions of the facility were as follows;

- 1) Designed maximum CSO flow rate: 37,300m³/day (1,554 m³/h) by pumping up
- 2) The height of filter media: 0.5m
- 3) Filtration velocity: 500 m/day
- 4) BOD removal ratio: More than 53% of inlet loading

Practical performance

During one and a half years operation after the commissioning, there were about 70 times of CSO incoming and we had executed six times precision surveys on the SFF performance. Among the surveys, the rainfall duration at the every event had been varied between 3 to 23 hours.

Detailed results are shown below.

- 1) BOD removal performance
The total BOD removal ratio was 65-83 % of inlet loading.
- 2) SS removal performance
The total SS removal ratio was 72-91% of inlet loading

Table 1 The SFF performance

Date	Rainfall Duration [min]	CSO incoming hours [min]	Amount of CSO [m ³]	BOD removal ratio [%]	SS removal ratio [%]*
Mar. 15, 2010	230	230	5,190	74.9	80.4
Apr. 15, 2010	1,216	679	9,756	82.8	90.4
July 3, 2010	1,392	1,019	22,175	77.9	72.2
Oct. 24, 2010	1,134	895	17,464	79.7	84.7
May 23, 2011	598	408	7,555	77.4	88.9
Aug. 03, 2011	152	152	3,110	80.5	86.4

*) Removal ratio based on water analysis during 6 hours after CSO incoming

Filter media supporting plate and filter media screen, those are made by special designed fine mesh plate, had been free from any clogging in practical operation. It means the pretreatment consisting of floatation and sedimentation has worked very effectively in the SFF CSO control technology.

Conclusion

We confirmed our SFF CSO control technology was acceptable in practical application and we hope it will contribute to reduction of the water bodies pollution caused by CSO in the world.

Durability and stability of filter media against a long term usage will be followed up.

Reference

- 1) Shimazu R. et al. (2008). Study on the simplified fiber filtration for CSO control, 11th International Conference on Urban Drainage, Edinburgh, Scotland, UK