Section 8.2
FLOW SPLITTERS AND BY-PASS

September 2010

A flow splitter is an engineered structure used to divide flow into two or more directions. Its design uses specifically sized catch basins, pipes, orifices, and weirs set at specific elevations to control the direction of flow. Generally, a flow splitter will consist of a small storage area having one inlet and two outlets set at different elevations. The lower outlet is sized to convey low flows, such as the flow during a small storm or the flow at the beginning of a large storm. The higher outlet is sized to convey high flows that occur later in a larger storm. In this way, low flows can be conveyed to one area and high flows to another area. The flow splitter has one primary purpose for stormwater management, which is to break up flows from a given storm for water quantity or water quality control.

Water Quantity Control - A flow splitter can be used to split runoff volume to alleviate downstream flooding due to development or it can also be used to prevent a BMP, such as a wet pond, from overtopping and eroding due to excessive runoff during large storms. This can reduce the needed storage capacity, reducing the cost of building the BMP.

Water Quality Treatment - A flow splitter can be used to separate the first flush volume from runoff later in the storm. By doing so, it keeps the first flush volume, which can contain most of the runoff pollutants, from being diluted by later runoff. This also allows a longer treatment time within wet ponds; extended detention wet ponds, and created wetlands. These BMPs depend on plug flow and long retention times to have efficient pollutant removal. Without a flow splitter, runoff later in the storm would push the first flush out the outlet before the pollutants are removed. A basic example of a flow splitter is shown in Figure 8-2.

IMPORTANT

Flow splitters are used to divide flow into two or more parts; they do not provide any water quality treatment or quantity control. Flow splitters must be designed by someone familiar with hydraulics.

8.2.1 Design Criteria

Flow splitter design, to be effective, must be done by someone familiar with hydraulics. A badly-designed splitter can severely impede the function of the rest of the drainage system. The specific requirements for each design have to be done on a case by case basis. Only basic criteria are given below.

1. Head Loss: The flow splitter should be designed to minimize head loss by avoiding abrupt transitions in flows. Flow deflectors provide a gradual transition for flow and should be included in most designs

2. Outlets: The splitter must outlet to stable areas.

3. Construction Considerations: The functioning of a flow splitter depends on its construction as much as its design. Precise setting of elevations and grades are crucial to its performance. The splitter should be set using accurate leveling techniques by a licensed surveyor. "Eyeing-in" a splitter is not acceptable.

4. Erosion Control: Flow splitters built within drainage ditches may need additional armoring to withstand turbulent flows. The area where the flow will split should be well-protected with riprap or concrete.

5. Access: Because flow splitters involve a transition from larger pipes and channels to smaller pipes and channels, blockage is a problem. Debris that flows freely into the splitter may block the splitter's outlets. Thus, access to the splitter for routine removal of debris is a necessity.

8.2.2 Maintenance

A flow splitter should be checked regularly and after every large storm to remove debris within the splitter.

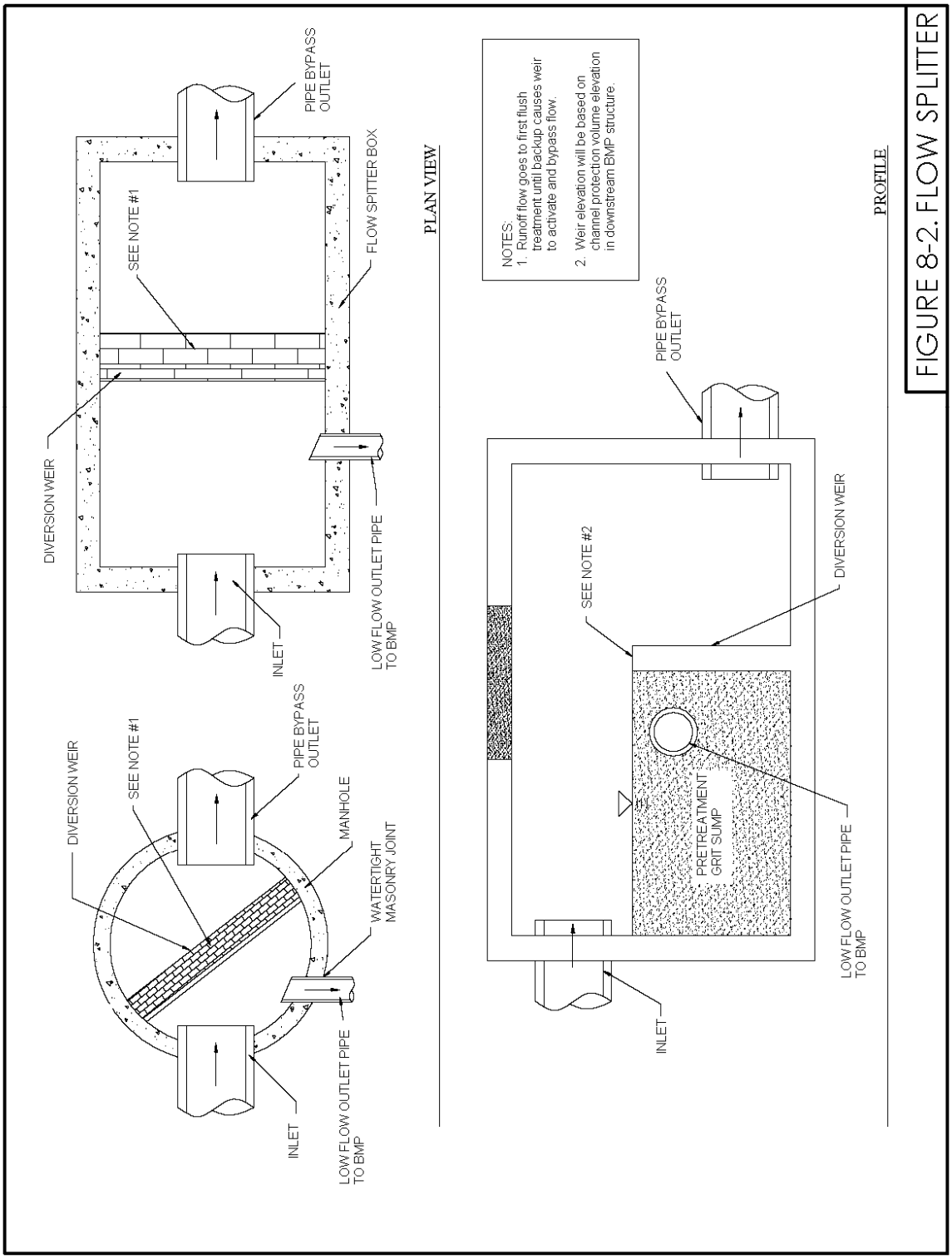
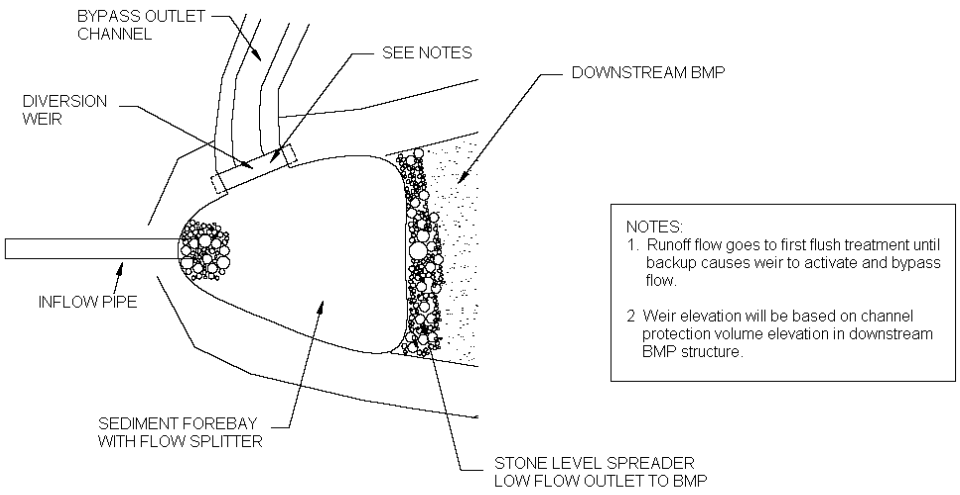
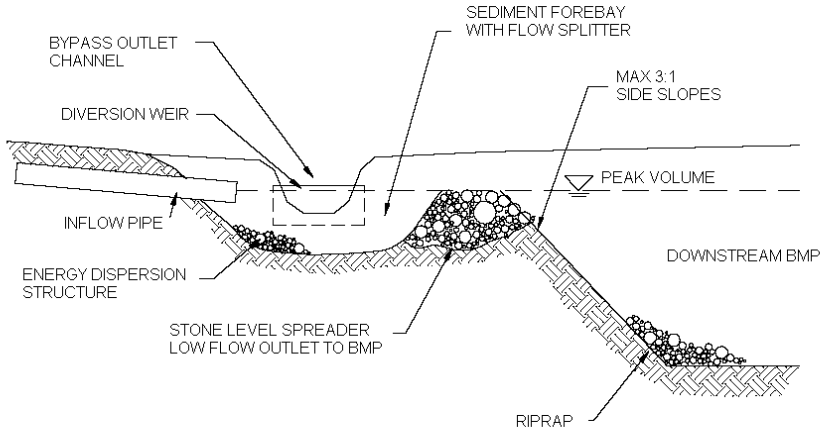


FIGURE 8-2. FLOW SPLITTER
PLAN VIEW
PROFILE
NOTES:
1. Runoff flow goes to first flush treatment until backup causes weir to activate and bypass flow.
2. Weir elevation will be based on channel protection volume elevation in downstream BMP structure.
PIPE BYPASS OUTLET
FLOW SPITTER BOX
SEE NOTE #1
DIVERSION WEIR
INLET
LOW FLOW OUTLET PIPE TO BMP
MANHOLE
WATERTIGHT MASONRY JOINT
SEE NOTE #2
PRETREATMENT GRIT SUMP



PLAN VIEW



PROFILE

FIGURE 8-3. TYPICAL SURFACE FLOW SPLITTER IN FOREBAY