

CHAPTER 9
WATER QUALITY INLETS

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DEFINITION

Water quality inlets (WQI) are also known as oil and grit separators. They are underground, multi-chambered tanks designed to remove sediments and to a lesser degree floatable solids.

EFFECTIVENESS

Under current designs, WQI can only store a small fraction of the two year 24-hour design storm volume. Since runoff is only briefly retained in the inlets, only moderate removal of coarse sediment, oil/grease, and debris can be expected. Even more limited removal is likely for fine-grained particulate pollutants such as silt, clay and associated trace metals and nutrients. Soluble pollutants probably pass through inlets without modification. WQI typically serve parking lots one acre or less in size, and are particularly appropriate for sites that are expected to receive a great deal of vehicular traffic or petroleum inputs (e.g., gas stations, roads, loading areas). Routine maintenance costs are high since the inlets must be cleaned out at least twice a year to remove trapped pollutants and to ensure proper inlet function.

Advantages of the WQI lie in their unobtrusiveness, compatibility with the storm drain network, easy access, and capability to pretreat runoff before it enters infiltration BMPs. Disadvantages include their limited stormwater and pollutant removal capabilities, the need for frequent clean-outs (which can not always be assured), and possible difficulties in disposing of accumulated sediments (Schueler, 1987).

The United States Environmental Protection Agency (1993) lists the following percent removals for water quality inlets:

Pollutant	TSS	TP	TN	COD	Pb	Zn	Factors
Average	35	5	20	5	15	5	Maint.
Reported Range	0 - 95	5 - 10	5 - 55	5 - 10	10 - 25	5 - 10	Sed. storage
Probable Range	10 - 25	5 - 10	5 - 10	5 - 10	10 - 25	5 - 10	
No. Values	3	1	2	1	2	1	

A number of factors inherent in the typical three-chamber design serve to limit pollutant removal.

1. The limited amount of wet storage provided by the WQI. A standard sized three-chamber WQI has about 0.12 inches of runoff per acre in the permanent pool of the first and second chambers.
2. Since WQIs serve such small areas, and have such a small capacity, runoff passes through them very quickly. The average detention time of runoff during most storms will seldom exceed an hour, and in many cases, may be measured in minutes.
3. Pollutants deposited within a chamber can only be permanently removed during cleanouts. Sediment deposited during smaller storms may be resuspended and scoured out during the next large storm (Schueler, 1987).

PLANNING CONSIDERATIONS

WQIs are to be used after exhausting other alternatives. They are typically used on small (less than an acre) watersheds. WQIs may be used prior to infiltration devices and on existing developed sites. They may be used on larger watersheds by utilizing a number of them on the drainage network. The United States Environmental Protection Agency (1993) lists the following advantages and disadvantages:

ADVANTAGES

- Captures coarse-grained sediments and some hydrocarbons
- Requires minimal land area
- Flexibility to retrofit existing small drainage areas and applicable to most urban areas
- Shows some capacity to trap trash, debris, and other floatables
- Can be adapted to all regions of the country

DISADVANTAGES

- Not feasible for drainage areas greater than one acre
- Minimal nutrient and organic matter removal
- Not effective as water quality control for intense storms
- Concern exists over the pollutant toxicity of trapped residuals
- Requires high maintenance

DESIGN CRITERIA

WQI should be a three chamber design with the first and second chambers having a combined volume equal to 400 cubic feet per contributing impervious acre. In addition, the minimum depth of the permanent pool in these chambers will be no less than 5 feet.

The inflow pipe should be constructed and sized to pass the water quality flow rate into the WQI. All additional flows should be passed through another pipe into a detention facility of sufficient capacity to meet applicable peak discharge control requirements.

When the structure length exceeds twelve feet the first two chambers are proportioned so that the

first chamber (grit) is 2/3 of the length and the second chamber (oil) is 1/3 of the length.

To facilitate cleanouts, access to each chamber should be provided by means of a separate manhole.

The walls separating the chambers must be water tight and only allow passage of stormwater through the design ports or pipes. There shall be no additional vents or passageways within the walls.

All hardware and piping within the tank should be galvanized, corrosion resistant, or stainless steel. Pipes made of PVC are acceptable and in some applications may be preferable, however, these pipes must be constructed of schedule 40 or greater.

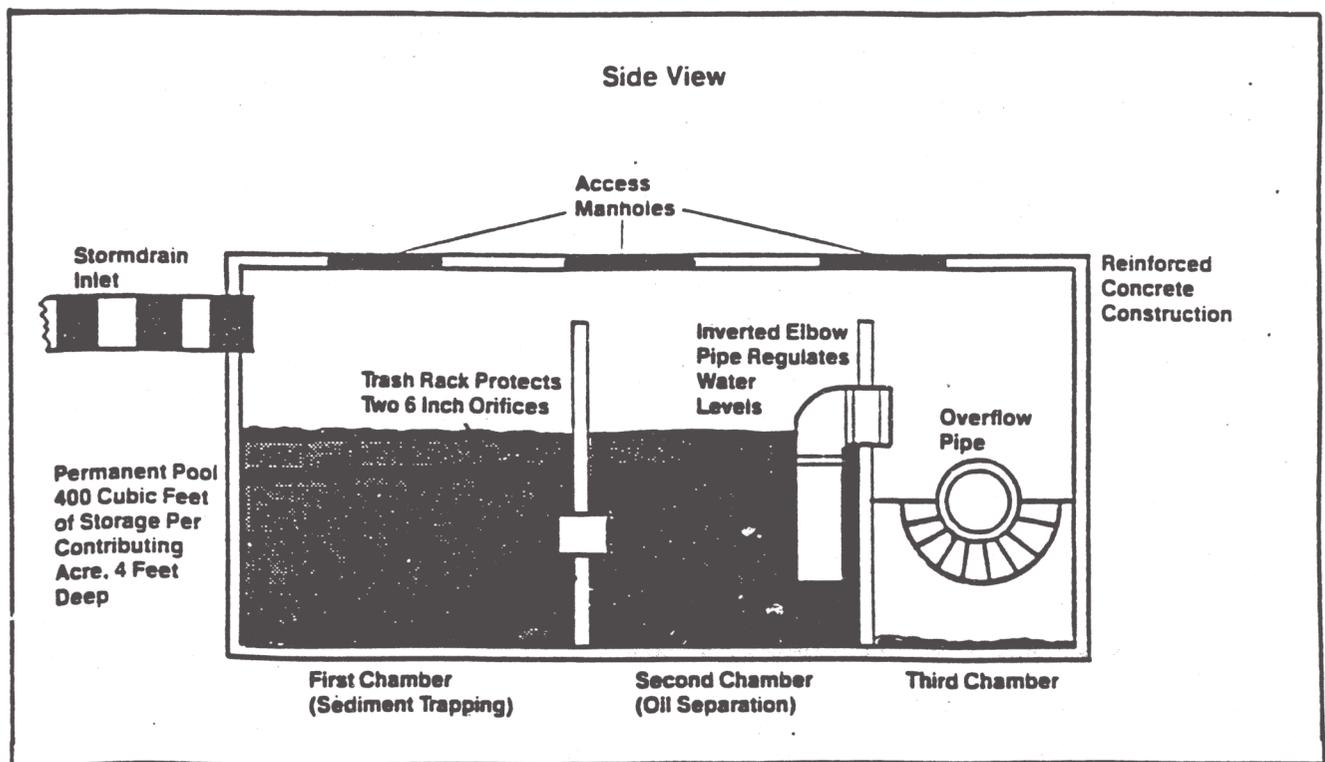
MAINTENANCE REQUIREMENTS

WQI inlets should be inspected monthly to determine depth of accumulated sediment.

Accumulated sediment should be cleaned out from inlets at least twice per year or more frequently if monthly inspections indicate a need. This can be done by vacuum pumping or siphoning of the permanent pool, and manually removing the sediments.

Accumulated deposits should be properly disposed of. Runoff in the inlet can be siphoned over to an adjacent grass filter strip, or transported to a sanitary sewer line and routed to a treatment plant.

Figure 9.1: Schematic of a Water Quality Inlet, Montgomery County, MD, Three Chamber Design, (Schueler, 1987)



REFERENCES

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