RECOMMENDED PERIODIC MAINTENANCE SCHEDULE & PROCEDURES

DESIGN & MAINTENANCE OF OUR STORM WATER TRASH RACKS

Keep it Flowing!

The principal outlet for retention basins can be one of many designs. The proper operation of these structures is an important part of maintaining the overall function of the storm water system. Orifices, and weir openings are a few critical components susceptible to obstruction and damage by floating debris such as leaves, branches, and logs. One device used to ensure that the storm water outlet structure operates correctly is a trash rack. Trash racks are designed to keep debris from entering the outlet structure and causing a restriction of flow and/or complete blockage of flow.

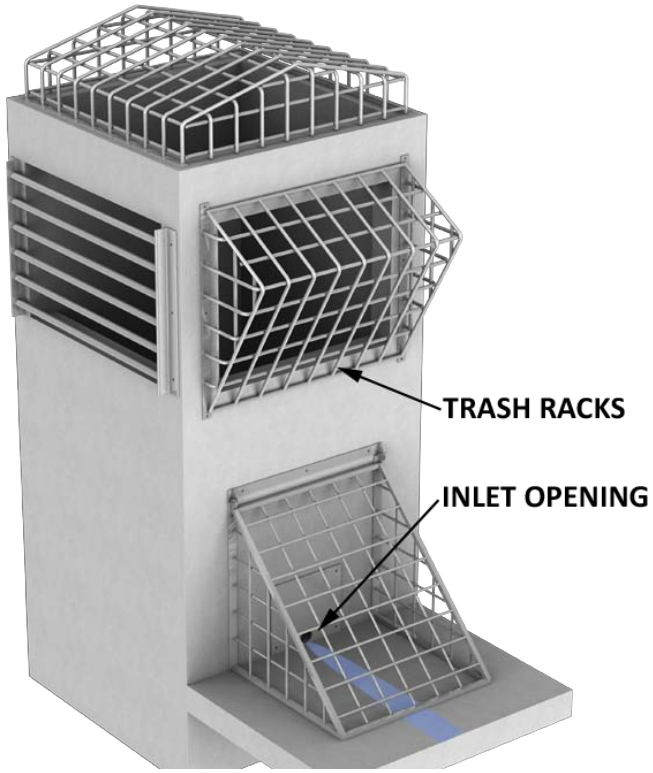
Common Problems

The main function of a trash rack is to filter the debris to prevent plugging of the small openings in the outlet structure, by catching the debris over a large surface area. Trash racks usually become plugged because the openings are too small or the head loss at the inlet causes material and sediment to settle out and accumulate. Small openings will cause debris such as twigs and leaves to accumulate on the trash rack bars. This buildup will cause progressively larger debris to accumulate against the trash rack bars. Ultimately, this will result in a complete blockage of the outlet structure inlet.

Pipe and riser spillways can also become blocked by a build-up of debris in the spillway. This type of blockage occurs when no trash rack is in place, or if the openings are too large.

In most storm water retention systems, the size of the outlet opening in the outlet structure is smaller than the size of the inlet pipes flowing into the basin. Therefore, it is incorrect to assume that debris which passes through the inlet will not obstruct the flow through the outlet. Large debris, such as logs and tree limbs, can become lodged in the transitions in the outlet structure. This could result in a complete blockage of the outlet, and cause the retention system to overfill and cause flooding and/or damage to the system. An obstructed outlet opening (orifice or weir opening for example) can be a major problem, because removal of debris from can be very difficult or impossible when the water level rises as a result of the clogging.

A partially blocked outlet opening reduces the capacity of the retention system and creates a higher than normal water level. The combination of these two factors can dramatically reduce the discharge/ storage capacity of the storm water retention system. A reduction in the discharge/storage capacity of a storm water retention basin increases the likelihood that the basin will overflow during a severe storm event. Overflowing for even a short period of time can cause damage to the embankment and/or a breech. This can result in flooding and soil erosion issues. If the basin has an emergency spillway, a blocked outlet opening will cause more frequent flows in the emergency spillway. Since emergency spillways are usually grass lined channels designed for infrequent flows of short duration, serious damage is likely to result.



Trash racks on a Storm Water Outlet Control Structure must be kept clean to maintain the flow of water into the inlet openings.

Trash Rack Design

A well-designed trash rack will stop large debris that could plug the outlet structure inlet opening, but still allows unrestricted passage of water and smaller debris.
The larger the inlet opening, the larger the trash rack opening should be. In the design of a trash rack, careful consideration must be given to the clear openings. The trash rack should prevent large debris from entering the opening, yet allow smaller debris (leaves, sticks, etc) to flush through the outlet structure. Too often, trash racks are designed with openings too small. One example is the specified openings for a trash rack in the State of New Jersey. According to New Jersey's Storm Water Best Practices Manual, trash rack openings are to be no greater than 1/3 of the size of the opening. In the case of a 3 inch opening, the trash rack would only have 1 inch clear-openings and would quickly clog. If small openings are required to filter debris, it is extremely important to increase the surface area of the trash rack accordingly. A larger trash rack is necessary to reduce the pressure (flow-rate) from the smaller area. Spreading out the pressure will allow turbulence from the water to unsettle debris and maintain water flow through the inlet opening.

Clogged trash racks can block water flow into the Outlet Control Structure causing flooding and damage to the system.

Recommended Maintenance Procedures

Maintenance should include periodic checks of the trash rack for damaged or broken sections and repairing as needed. Trash racks should be checked frequently before, during, and after storm events to ensure they are functioning properly and to remove accumulated debris. Extreme caution should be used when attempting to remove accumulated debris during periods of high flow.

Inspection & Maintenance

The benefits of a properly designed and maintained trash rack include the following:

1. Efficient use of the existing outlet control structure that will maintain the design discharge/storage capacity of the retention basin, and prevent flooding within the basin.
2. Prevention of costly maintenance items such as the removal of debris from the basin and/or concrete channel, repair or replacement of damaged embankments, and the repair of erosion in emergency spillway.
3. Sufficient drainage of upstream storm water inlets and piping leading into the retention basin.
4. A controlled discharge into the surrounding environment preventing flooding and soil erosion outside of the retention basin.

Small openings in trash racks clog more easily. The smaller the openings, the more frequent inspections and maintenance are required.

Schedule of Inspections

No harm can be done by over-inspection of any storm water trash rack. This brings to mind a situation quite some time ago, when some mischievous children decided to block the inlet of an Outlet Control Structure for fun. The plywood they used to block the opening was never removed and it caused massive flooding of a local neighborhood during a heavy storm. At a minimum, trash racks should be inspected:

1. Before an impending storm.

2. During a storm if it is safe.

3. After a storm.

4. Bi-Weekly

Inspection Procedures

While most of our trash racks are maintenance-free, it does not mean that they do not need periodic inspection for damage or failure. Inspections should include, but not limited to, the following:

1. Inspect all mechanical connections such as fasteners and hinges for damage or corrosion. Pull on the trash rack to ensure the fasteners are still tight.

2. Inspect all vertical and horizontal bars for damage.

3. Inspect all welds for cracking or failure.

4. Inspect grating hinges and fasteners for corrosion or failure by pulling on them. Check to make all fasteners are secure.

5. Inspect the orifice plate and the orifice (inlet opening) for blockage. If the orifice is blocked, it may be necessary to remove the trash rack protecting the opening to clear the debris.

6. Remove all debris from trash racks by hand or with a rake if necessary.

7. Remove any siltation in the channel preceding the inlet opening, as well as any debris that has potential to clog the trash racks or inlet opening.

Any damage to the trash rack, orifice plates, or gratings must be repaired immediately. Please contact our office for consultation, parts, or a replacement product if necessary.

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Remove debris from all trash racks and all inlet openings on the Outlet Control Structure by hand or with a rake as shown.

Conclusion

It is important to understand that there are many different storm water system designs. This publication explains the recommended maintenance schedule and procedures for our products. Design Engineers, and local Municipalities will better understand the behavior of their storm water systems and their own set of maintenance procedures should be implemented in addition to this publication. The preceding procedures are recommended as a minimum requirement to maintain our products, and keep your storm water system functioning smoothly.

Feel free to contact us regarding any of our products.

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