SITE EVALUATION OF SUNTREE TECHNOLOGIES, INC. GRATE INLET SKIMMER BOXES FOR DEBRIS, SEDIMENT, AND OIL & GREASE REMOVAL

Reedy Creek Improvement District
Planning & Engineering Department
Eddie Snell, Compliance Specialist

Stormwater is now recognized as the leading source of pollution to our remaining natural water bodies in the United States. Development and urbanization have removed most of the natural filtration and sediment trapping systems provided by the environment. Current development must address this need through the implementation of stormwater treatments systems in the project design. Most of these systems perform reasonably well, if properly designed, constructed, and maintained.

Retrofit of older urban areas lacking these modern stormwater systems is a continually expensive challenge. The Downtown Disney complex, formerly the Lake Buena Vista Shopping Village, has several drainage basins with 1970's stormwater systems. These older systems discharge directly into the adjacent drainage canal with no pollutant treatment. Over time the accumulation of sediments, nutrients, intensive development, and recreational/entertainment pressures are contributing to water quality degradation.

Whenever new development or redevelopment occurs, the stormwater system is brought to current code/permit requirements. In the interim, several areas are in need for rapid, effective, and economical improvement in the quality of its stormwater discharge.

Suntree Technologies Incorporated, located in Cape Canaveral, FL, manufactures stormwater grate inlet skimmer boxes. They are made of a high quality fiberglass frame, with stainless steel filter screens backed by heavy-duty aluminum grating. Each unit is custom made to accommodate various inlet sizes. A hydrocarbon absorption boom is attached to the top of the skimmer box for petroleum, oil, and grease removal.

These devices fit below the grate and catch sediment, debris, and petroleums, oils & greases. Clean-out, maintenance, and performance reporting is provided by Suntree on a scheduled basis.

Picture of Grate Inlet Skimmer Box

The Reedy Creek Improvement District (RCID) selected six (6) test sites in the Lake Buena Vista area to evaluate the performance of these units. One unit was placed in a curb inlet along Hotel Plaza Boulevard to trap landscape leaf litter, sediment, and oil & grease from a high use roadway. Three (3) units were placed in the backstage service area of the Rain Forest Cafe. Two (2) units were placed in the backstage service area of the McDonald's restaurant and Legos merchandise shop.

After several field meetings, during which Suntree took extensive measurements, photos, and other documentation of each stormwater drain, the Grate Inlet Skimmer Boxes were manufactured and delivered for installation. All units were installed without mishap approximately two weeks before the 1999 Christmas holiday season. The target time period for particle catchment was one month. Mr. Henry and Tom Happel, Suntree Technologies, visited each site several times during the month to ensure that debris would not fill the units too soon.

On January 25,2000, Suntree serviced the six units. At each site, the material captured in the skimmer boxes was removed, measured, weighed, visually identified, photographed, and recorded. Some units were slightly field modified for optimum performance. All

units **performed as** expected **removing, on average, 20 pounds of debris from each of the six sites.** The composition of debris varied considerably.

The Hotel Plaza (roadway) site was 90% leaf litter and 10% sediment. The Rain Forest Cafe sites ran in opposition as you got close to the lake. First inlet was about 50% leaf litter and cigarette butts and 50% sediment. The middle inlet was 60 % sediment and 30 % leaf litter (10% miscellaneous). The inlet closest to the lake was 95% sediment and 5% leaf litter. The two sites at the McDonalds/Legos area were similar to each other. The site closest to the lake was 95% sediment and 5% leaf litter. The site closest to the entrance gate was 98% litter sediment and 2% leaf litter.

This composition is indicative of the human activities and drainage flow patterns of that site. Backstage areas in the Walt Disney World Resort receive an artificial rain event each night during cleaning operations. This washes a continual flow over the impervious site, washing all materials into the stormwater system.

Municipalities in Brevard, Volusia and Dade counties have successfully used inlet skimmers in Florida. RCID partnered with Walt Disney Imagineering (WDI) Research and Development to coordinate some basic chemical sampling for pollutant removal efficiency determination. Mr. Craig Duxbury, WDI, provided technical support and guidance for this. An ingeniously simple device was fabricated by Suntree to allow sampling of the First Flush of water going into the units and ultimately coming out of the skimmer boxes.

Collected samples were processed and analyzed by the RCID Environmental Services Laboratory. Analysis parameter were:

Ammonia, Chemical Oxygen Demand, Fecal Coliform (MPN), Nitrite and Nitrate, Total Kjeldahl Nitrogen, Oil and Grease, Total Phosphate, Suspended Solids, and Metals.

Analysis results are presented in the following table:

ANALYSIS	LOCATION	LAB NO.	VALUE	UNITS	SAM-DATE	Pollutant Change	% Chanae
Ammonia, Salicylate	RF-IN	1646	0.38	mg/l	09-Feb-00	0.14	37%
Ammonia, Salicylate	RF-OUT	1646	0.23	mg/l	09-Feb-00		
Ammonia, Salicylate	RF-OUT-I	1646	0.25	mg/l	09-Feb-00		
Chemical Oxygen Demand	RF-IN	1646	2670	mg/l	09-Feb-00	1035	
Chemical Oxygen Demand	RF-OUT	1646	1780	mg/l	09-Feb-00		
Chemical Oxygen Demand	RF-OUT-I	1646	1490	mg/l	09-Feb-00		
Coliform, Fecal MPN	RF-IN	1646	1600	#lOO ml	09-Feb-00	-93400	
Coliform, Fecal MPN	RF-OUT	1646	160,000	#lOO ml	09-Feb-00		
Coliform, Fecal MPN	RF-OUT-I	1646	30,000	#lOO ml	09-Feb-00		
Nitrate and Nitrite	RF-IN	1646	0.06	mg/l	09-Feb-00	0.035	
Nitrate and Nitrite	RF-OUT	1646	0.04	mg/l	09-Feb-00		
Nitrate and Nitrite	RF-OUT-I	1646	0.01	mg/l	09-Feb-00		
Nitrogen, Total Kjeldahl	RF-IN	1646	24.3	mg/l	09-Feb-00	13.55	
Nitrogen, Total Kjeldahl	RF-OUT	1646	10.4	mg/l	09-Feb-00		
Nitrogen, Total Kjeldahl	RF-OUT-I	1646	11.1	mg/l	09-Feb-00		
Oil and Grease	RF-IN	1646	526	mg/l	09-Feb-00	283	

Pollutant removal efficiencies averaged about 50% for all parameters tested. The minimal removal was 37% for Ammonia and the maximum removal was 74% for Suspended Solids.

Coliform bacteria were not effectively removed by the skimmer boxes, although, they are not designed to provide water disinfection. Oil and Grease are a food source for bacteria and reduction of this pollutant should provide some effect on bacterial numbers.

Reedy Creek 24" x 24" Grate Inlet Skimmer Box

Pollutant Removal Efficiency

Grate Inlet Skimmer Box
Using Storm Boom #1 Type Absorbent