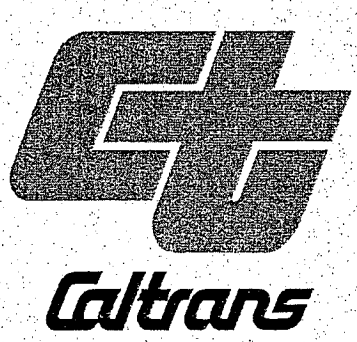

Technical Report

BMPs Suitable for Implementing the Trash Total Maximum Daily Loads

FEBRUARY 2, 2004

1 Introduction

The purpose of this report is to identify BMPs or other similar control measures that could be implemented, enhanced or refined to reduce the discharge of litter and debris in stormwater runoff from State highways in the watersheds of the Los Angeles River, and Ballona Creek and Wetlands in response to the Trash TMDLs adopted by the Los Angeles Regional Water Quality Board in September 2001. The California Department of Transportation (the Department) operates 2,197 outfalls in the Los Angeles River watershed and 435 outfalls in the Ballona Creek watershed and is developing plans to reduce their discharge of trash from these outfalls by 10 percent annually over the next five years.

The Los Angeles River watershed has a drainage area of approximately 213,400 hectares of which approximately 2,813 hectares or 1.3% consists of the Department's roadways and facilities. The Ballona Creek watershed has a drainage area of approximately 33,700 hectares of which the Department's roadways and facilities comprise approximately 436 hectares or 1.3%.

The Department has adopted an aggressive approach to characterizing the volume and composition of trash from freeways in this area, and to developing and testing of structural BMPs that specifically target trash. The Department believes that compliance with the five-year trash reduction goal may be possible by implementing the following strategy:

- Retrofit of the existing stormwater conveyance system with structural controls that specifically target trash where feasible
- Encouraging public awareness of the issues related to littering and illegal disposal of trash along the Department rights-of-way
- Continuing an aggressive program of non-structural measures such as street sweeping and debris removal along highways.
- Installation of BMPs on new projects that address a wide range of stormwater constituents (including trash)

The following sections provide information on the quantities of trash observed along highways, a description of the types and performance of structural and nonstructural BMPs that might be appropriate for reducing the discharge of trash, and a strategy that could result in the required 10 percent annual reduction.

Table 2 Annual Litter Loading Rates

Location	Weight per Area kg/ha (lb/ac)	Volume per Area L/ha (ft^3/ac)
I-105 EB between Gertrude Ave. and Atlantic Blvd.	18.5 (16.5)	143.6 (2.1)
I-105 WB between Atlantic Blvd. and Gertrude Ave.	13.1 (11.7)	106.3 (1.5)
SR-60 between Turnbull Canyon and Kwis St.	13.1 (11.7)	96.4 (1.4)
SR-60 between Garfield Ave. and Fulton Ave.	7.7 (6.9)	44.2 (0.6)
Average	**13.1 (11.7)**	**97.7 (1.4)**

SOURCE: CTSW-RT-00-013, Caltrans 2000

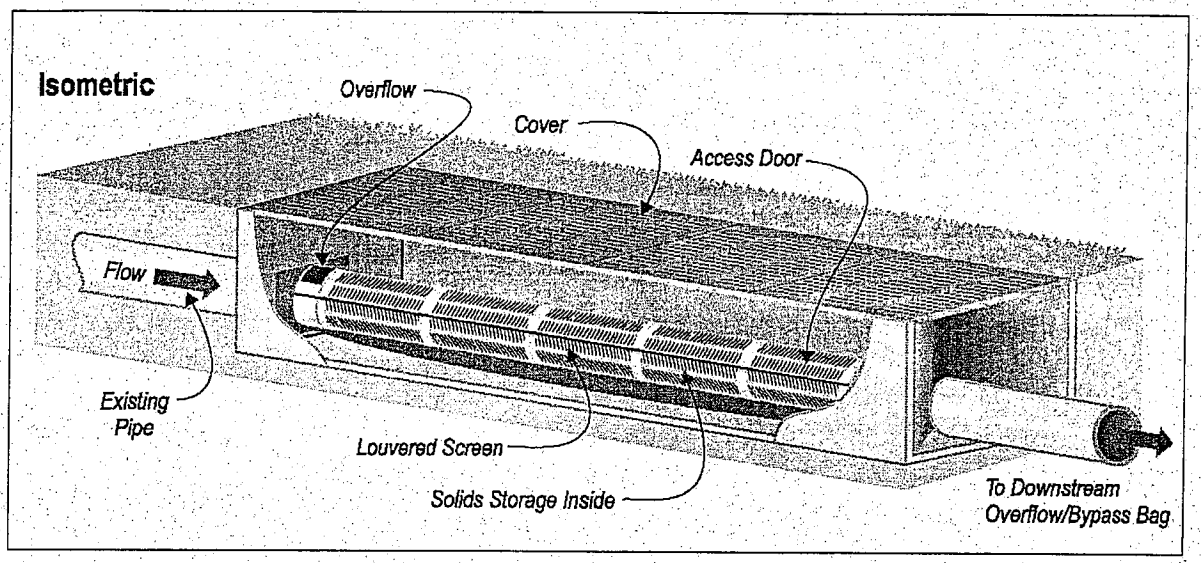

Figure 1 Schematic of Linear Radial GSRD

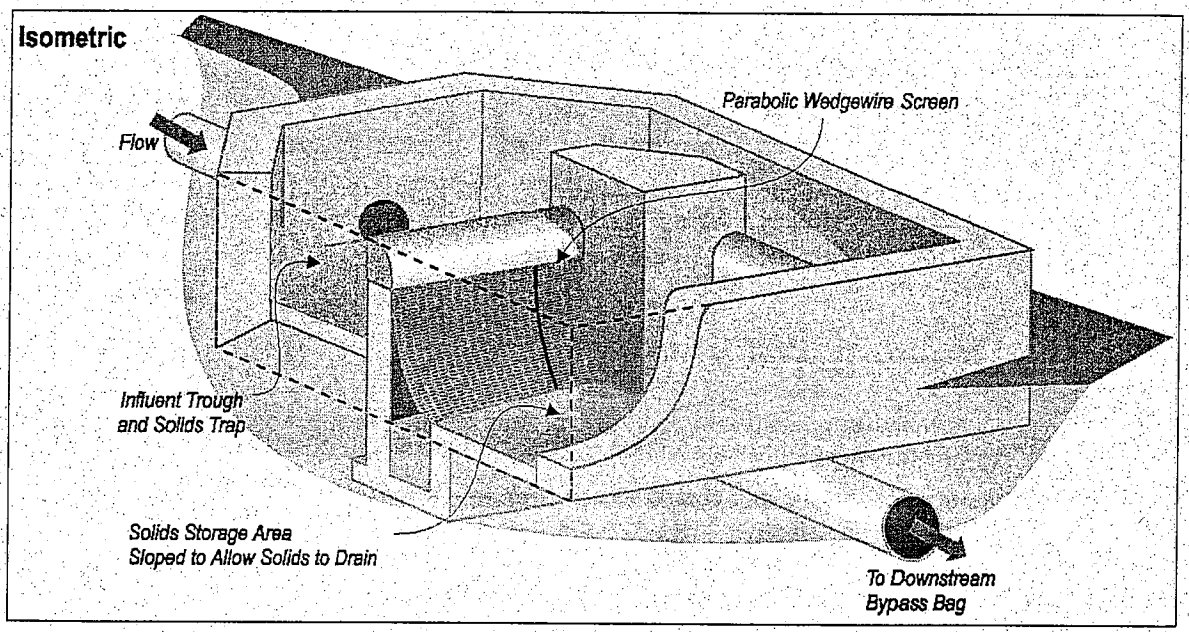

Figure 2 Schematic of Inclined Screen GSRD

3.1.1.2 Siting Criteria

GSRDs are best suited at sites that have sufficient space to safely allow construction and maintenance. Sites should have a clear unobstructed space. The linear radial GSRD requires very little head and is well suited for narrow and relatively flat areas. The inclined screen requires three feet of head is appropriate for fill sections.

Accumulation of trash and debris in these systems can be very rapid and greatly reduce the capacity of the devices. Consequently, GSRDs must be installed at sites with easy

The expansion of the Storm Water Public Education Program will continue with the development of the Department's overall public education strategy. The initial statewide focus, drawing on the experience with the Fresno pilot project, will also be on reducing highway litter, using the core message, "Don't Trash California."

The Department's public education plan also includes partnering with various organizations at both the state and local levels. Joint public education initiatives will be included in the strategy to maximize use of educational materials developed during the Department's Public Education Research Study. Partnering will also assist in expanding its anti-littering campaign statewide. Headquarters will coordinate partnering efforts related to the statewide "Don't Trash California" public education campaign.

The Department is currently entering other media markets with the message, "Don't Trash California" in its statewide, multimedia, bilingual (English/Spanish) campaign to educate the public on the importance of keeping pollutants out of the storm drain system. The following component options will be considered in the implementation of the statewide campaign:

- Newspaper advertisements;
- Television and radio public service announcements;
- Signage;
- Nontraditional media including bus signs, theater slides, pump toppers, and bus wraps;
- Movie Theater/Cinema Slides;
- Bus Signage;
- Mall and Airport Graphic Signage;
- Target Marketing;
- Trade Publications;
- Additional Printed Materials; and
- Audiovisuals

District 7 performed a three-phase litter generation study which included a public education program called "Please, don't tarnish the golden state." The Department, the Los Angeles Regional Water Quality Control Board and the California Highway Patrol joined forces in an anti-litter public outreach campaign. The three-phase litter generation study was conducted along the westbound I-10 offramp form Eastern Avenue to Campus Drive near downtown Los Angeles in 2000-2001. "Do Not Litter Signs" were posted in the area during the study period.

The three-phase litter generation study was designed to increase public awareness and education. During the first two parts of the study the California Highway Patrol issued a warning to anyone caught littering along the project area. In the third phase, violators were fined $1000.

3.2.2 Adopt-a-Highway Program

Individuals, organizations and businesses, under the Adopt-A-Highway program, collect a substantial amount of roadside trash every year. Adopt-A-Highway participants bag trash and leave the filled bags at the edge of the shoulder for pickup by District Maintenance personnel. Districts pick up filled bags promptly; bags are not to remain on the roadside for more than 10 days. The District continues to remove trash and debris from the median, roadway, shoulders and other areas of adopted segments that are inaccessible to adopters.

The Adopt-a-Highway program began in October 1989 in District 7. The first 2 years of the program the District issued 87 permits. As of November 2003, District 7 has issued nearly 358 permits. Each permittee picks up litter along a 2-mile segment of highway, in one or both directions. The most popular area in this program is along I-405 in Los Angeles County. Currently there are two permits issued for litter collection within the Los Angeles River and Ballona Creek Watersheds.

The exact length of highway adoption and number of cleanups per year may vary according to the project location. The frequency of cleanups required at a project location should be adequate to keep the roadside clean. A minimum of four clean ups each year, are necessary to qualify the adopter for a recognition sign(s). Districts do not perform routine trash removal in those portions of a highway segment that are the adopter's responsibility.

3.2.3 Partnering

The Department's public education plan also includes partnering with various organizations at both the state and local levels. Joint public education initiatives may be included in the strategy to maximize use of educational materials developed during the Department's Public Education Research Study. Partnering may assist the Department in expanding its anti-littering campaign statewide.

3.2.4 Caltrans Trash Collection

In FY 2002-2003 District 7 forces removed 36,861 cubic yards (995,250 cubic feet) of trash from the highway. Adopt-a-Highway forces collected an additional 1,477 cubic yards (39,880 cubic feet) and District 7 forces removed 1,232 cubic yards (33,260 cubic feet) of homeless debris. The total cost was $5.16 million. Drain inlet cleaning removed 1,642 cubic yards (44,330 cubic feet) of gross solids. Other drainage structures were cleaned and 2,292 cubic yards (61,880 cubic feet) of gross solids were removed. Total cost for drain cleaning was $4.5 million.

3.2.4.1 Description

One aspect the Department examined during the Litter Management Pilot Study (Caltrans 2000) was an increase in litter pick-up frequency by Department personnel. Litter in the right-of-way was picked up manually every week at the treatment sites. At the control sites, litter was collected once a month in an attempt to match the usual Caltrans Adopt-

3.2.7 Measures Implemented at Non-Highway Facilities

3.2.7.1 Storm Drain Stenciling

The stenciling of storm drain inlets serves to educate the public about the connection between storm runoff and receiving waters, and the dangers of dumping waste, such as paintbrush residues and motor oil into inlets. The Department currently stencils storm drain inlets in maintenance stations, park and ride lots and along state routes through cities, such as Pacific Coast Hwy (SR-1) or Venice Blvd (SR-187).

3.2.7.2 Covered Trash Bins

At maintenance stations, vista points, and park and ride facilities located throughout the District trash bins are kept cover to prevent wind blown trash. The placement of trash bins at vista points and park and ride facilities encourages motorist to place trash in containers rather than discarding it onto the roadway.

5 Conclusions

The Department will utilize a multi-track approach that includes structural and non-structural BMPs to meet the required reduction in trash discharged. The following list highlights the Department's planned measures and provides estimated removal efficiencies once deployed:

- The primary method for reduction of trash discharge will likely be through the use of GSRDs and other structural BMP devices. The Department is evaluating the feasibility of retrofitting storm drain outfalls with linear radial or inclined screen GSRDs to capture trash and debris from approximately 10 percent of the Department's drainage area in the affected watersheds each year. GSRDs capture 100 percent of the trash from the retrofitted watersheds and consequently, this strategy alone could comply with the requirements of the initial 5-year implementation period; however, the significant costs of placing structural controls (current estimate $30 Million per year) and the challenges of siting these devices dictate a more comprehensive program.

  Although the goal at the end of five years is a 50% reduction, due to risks in implementation, the Department estimates that these structural BMPs will reduce the total trash discharged by **40 percent**.

- Department will continue to fund maintenance activities to reduce the amount of trash in storm water runoff. These programs are especially important in the watersheds that lack structural controls. The trash collection programs alone are currently eliminating approximately 43,500 cubic yards of trash annually in all of District 7, which includes the targeted watersheds. Of this amount, approximately 9,000 cubic yards of trash is collected within the Los Angeles River and Ballona Creek watersheds. The current street sweeping program removes from 490 to 980 cubic yards of trash annually within the two watersheds. Other measures include managing trash at District maintenance stations through covered trash containers, storm drain stenciling and staff training.

  A combination of these measures is capable of removing approximately **6 percent** of the trash and debris present in the watersheds.

- Since much of the trash observed along highways is likely deposited there by the traveling public, the Department also will continue an aggressive public education and participation program. This effort includes the adopt-a-highway program and a public education effort through installation of signs, and advertising on local radio and TV outlets. It is difficult to determine the precise effectiveness of these efforts; however, it is likely that some reduction in the discharge of trash from areas not yet retrofit with structural controls would occur.

  Based on the results of the success of the public education program in Texas, a reduction in litter of up to 50 percent can occur. As the California program is less well funded, the effectiveness is expected to be significantly less and thus the Department is assuming a **20 percent** reduction from the public education program.

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