



California State University,
Sacramento (CSUS)

University of California, Davis
(UCD)

California Department of
Transportation (Caltrans)

The Impact of Annual Average Daily Traffic on Highway Runoff Pollutant Concentrations

Presented at:

ASCE *Journal of Environmental Engineering*, Nov. 2003, v. 129, Issue 11, pp. 975-990.

Authors:

Masoud Kayhanian, Center for Environmental and Water Resources Engineering,
University of California, Davis

Amardeep Singh, Caltrans/ CSUS Office of Water Programs, Sacramento

Claus Suverkropp, Larry Walker Associates, Davis

Steve Borroum, Caltrans Environmental Program, Sacramento

Michael K. Stestrom, Center for Environmental and Water Resources Engineering,
University of California, Davis

Disclaimer:

This work reflects the author's opinions and does not represent official policy or endorsement by the California Department of Transportation, the California State University, or the University of California.

Storm Water Program
CSUS Office of Water Programs
6000 J Street, Modoc Hall, Room 1001, Sacramento, CA 95819-6025

THE IMPACT OF ANNUAL AVERAGE DAILY TRAFFIC ON HIGHWAY RUNOFF POLLUTANT CONCENTRATIONS

Masoud Kayhanian, Member¹

Amardeep Singh

Claus Suverkropp

Steve Borroum, Member

ABSTRACT

The objective of this study was to evaluate correlations between annual average daily traffic (AADT) and storm water runoff pollutant concentrations generated from California Department of Transportation (Caltrans) highway sites. Analyses of data collected from the Caltrans 4-year (1997-01) highway runoff characterization program revealed that, in general, pollutant concentrations from urban highways were higher than those found from non-urban highways. For a limited number of pollutants, however, the concentrations from non-urban highways were found to be higher than the concentrations from urban highways. No direct linear correlation was found between highway runoff pollutant event mean concentrations (EMCs) and AADT. However, through multiple regression analyses, it was shown that AADT has an influence on most highway runoff constituent concentrations, in conjunction with factors associated with watershed characteristics and pollutant build-up and wash off. The other noticeable factors shown

¹**Masoud Kayhanian, Member**, (Corresponding Author) Senior Development Engineer, Center for Environmental and Water Resources Engineering, Department of Civil and Environmental Engineering, University of California, Davis, CA 95616, Phone: (916) 278-8112, Fax: (916) 278-8140, e-mail: mdkayhanian@ucdavis.edu. (corresponding author)

Amardeep Singh, Formerly with Office of Water Programs. Current address: Project Engineer, URS Corporation, 2520 Venture Oaks Drive, Suite 250, Sacramento, CA 95833, Phone: (916) 679-2244, Fax: (916) 929-7263, e-mail: Amardeep_Singh@URSCorp.com.

Claus Suverkropp, Senior Scientist, Larry Walker Associates, 509 4th Street, Davis, CA 95616, Phone: (530) 753-6400, Fax: (530) 753-7030, e-mail: clauss@lwa.com.

Steve Borroum, Member, Formerly, California Department of Transportation. Current address: Senior Project Manager, URS, 1380 Lead Hill Blvd, Suite 100, Roseville CA 95661, Phone: (916) 784-3900, Fax: (916) 784-0211, e-mail: Steve_Borroum@urscorp.com

to influence the accumulation of pollutants on highways were antecedent dry period, drainage area, maximum rain intensity, and land use.

Keywords: Annual average daily traffic (AADT), highway runoff, linear regression model, multiple regression model, and pollutants.

INTRODUCTION

The California Department of Transportation (Caltrans) is engaged in a multi-year program of research and monitoring pertaining to the environmental effects of stormwater quality from transportation facilities. Part of Caltrans storm water quality research and monitoring program involves the characterization of highway runoff (Kayhanian et al., 2001). These monitoring studies were principally undertaken (i) to comply with the statewide National Pollution Discharge Elimination System (NPDES) storm water permit requirements, (ii) to address legal requirements, (iii) to aid in developing new treatment systems, (iv) to develop runoff load models, and (v) to fill data gaps in stormwater runoff characterization for statistical analysis. The information presented in this paper is based on a 4-year highway stormwater runoff characterization study that was undertaken during the 1997-01 rainy seasons from October through April.

Caltrans monitoring data are analyzed on a regular basis to assess runoff characteristics. One question that is frequently asked is whether a correlation exists between annual average daily traffic (AADT) and the concentrations of highway runoff pollutants. The current paper addresses this issue.