State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 12-7

January 26, 2012

Agenda Item No.: 12-1-1

WHEREAS, the Air Resources Board (ARB) has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code sections 39700 through 39705;

WHEREAS, a research proposal, number 2727-272, entitled "Development of a New Methodology to Characterize Truck Body Types along California Freeways," has been submitted by the University of California, Irvine;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 2727-272 entitled "Development of a New Methodology to Characterize Truck Body Types along California Freeways," submitted by the University of California, Irvine, for a total amount not to exceed $350,000.

NOW, THEREFORE, BE IT RESOLVED that the Air Resources Board, pursuant to the authority granted by Health and Safety Code section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 2727-272 entitled "Development of a New Methodology to Characterize Truck Body Types along California Freeways," submitted by the University of California, Irvine, for a total amount not to exceed $350,000.

BE IT FURTHER RESOLVED that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein, and as described in Attachment A, in an amount not to exceed $350,000.

I hereby certify that the above is a true and correct copy of Resolution 12-7, as adopted by the Air Resources Board.

Mary Alice Morency, Clerk of the Board

ATTACHMENT A

"Development of a New Methodology to Characterize Truck Body Types along California Freeways"

Background

On-road trucks are significant sources of criteria and greenhouse gas emissions. Currently truck activity is collected using the Vehicle Detection Station and Weigh-in Motion (WIM) sites in operation across California. These systems are unable to characterize traffic composition such as the percentage of trucks and buses, which is a critical input for emissions estimation. Recently, the University of California at Irvine, under contract to ARB, has developed a California Vehicle Activity Database to estimate highway vehicle miles traveled (VMT), average speed, heavy-duty truck VMT and heavy-duty truck weight. However, these enhancements do not provide information on truck body classification and the relationship between body size and weight characteristics that influence emissions from the truck fleet. Therefore, this study proposes to develop and implement an improved data collection methodology that will provide body type classification for trucks traveling on the California freeway system.

Objective

The main objective of this study is to develop a truck body classification model using inductive loop signature data. The second objective is to deploy a pilot program to collect inductive loop detector signature data at two WIM stations using advanced detector cards. The third objective is to evaluate the performance of the developed model by deploying these advanced detector cards at an additional eight to ten stations.

Methods

A truck body type classification model will be developed using inductive loop signature and axle configuration data. The model will be validated based on ground-truth data and rigorous statistical analysis. Two or more WIM stations will be selected and advanced detector cards will be deployed to collect wide variations of signature data. The developed model will be refined and recalibrated using additional information such as axle spacing and weight to identify the body type and improve the accuracy. Further, the research team will explore statistical techniques to back-cast truck body classifications and truck movements to previous years.

Expected Results

At the end of this project, ARB will receive a truck body type classification model based on inductive loop signature data to accurately estimate the on-road truck activity on California's freeway system.

Significance to the Board

Study results can be used to estimate the proportion of long haul and short haul trips on California's major trade corridors. This will lead to improvements in emission inventory models to predict the effectiveness of various emissions control programs. Further, the information from this study will also be used to calibrate and validate the statewide freight-forecasting model and will help inform freight models under development by metropolitan

planning organizations. Ultimately, the project will advance California's efforts for meeting the goods movement emission reduction program and AB 32 goals.

Contractor:
University of California, Irvine

Contract Period:
24 months

Principal Investigator (PI):
Stephen G. Ritchie, Ph.D.

Contract Amount:
$350,000

Basis for Indirect Cost Rate:
The State and the UC system have agreed to a ten percent indirect cost rate.

Past Experience with this Principal Investigator:
The principal investigator has conducted similar work in the past for the California Department of Transportation. He has extensively published and is a recognized expert in the field of Intelligent Transportation Systems. ARB has not previously contracted with this research team, but expects good results based on feedback from colleagues at the California Department of Transportation.

Prior Research Division Funding to University of California, Irvine:

Year	2011	2010	2009
Funding	$285,000	$274,931	$571,883

BUDGET SUMMARY

Contractor: University of California, Irvine

"Development of a New Methodology to Characterize Truck Body Types along California Freeways"

DIRECT COSTS AND BENEFITS				
1.	Labor and Employee Fringe Benefits	$	272,171	
2.	Subcontractors	$	0	
3.	Equipment	$	0	
4.	Travel and Subsistence	$	11,000	
5.	Electronic Data Processing	$	0	
6.	Reproduction/Publication	$	0	
7.	Mail and Phone	$	0	
8.	Supplies	$	39,252[1]	
9.	Analyses	$	0	
10.	Miscellaneous	$	0	
	Total Direct Costs			$322,423
INDIRECT COSTS				
1.	Overhead	$	27,577	
2.	General and Administrative Expenses	$	0	
3.	Other Indirect Costs	$	0	
4.	Fee or Profit	$	0	
	Total Indirect Costs			$ 27,577
TOTAL PROJECT COSTS				**$350,000**

1. This project will deploy 16 field-processing units to interface with detector hardware and collect inductive loop signature data. This study also requires extensive data processing and modeling; hence, two servers are needed to store inductive loop signature data and WIM data.