

# DRISI

CALTRANS DIVISION OF RESEARCH,  
INNOVATION AND SYSTEM INFORMATION

TRANSFORMING IDEAS INTO SOLUTIONS

# Research

# Notes

Planning, Policy  
&  
Programming

MAY 2024

Project Title:  
Validation of Freight Volume  
Modeling on Major Highway Links

Task Number: 3457

Start Date: July 1, 2023

Completion Date: June 30, 2024

Task Manager:  
Frank Law  
Project Manager  
frank.law@dot.ca.gov

## Validation of Freight Volume Modeling on Major Highway Links

Develop a method for generating freight (truck) volumes

### WHAT IS THE NEED?

One of the most challenging problems in urban transportation planning is the lack of fine grain data on freight movements.

### WHAT ARE WE DOING?

The research seeks to develop a method for generating freight (truck) volume and origin-destination estimations at the traffic analysis zone level from streamed data so that estimations can be constantly updated.

The experiments focus on state highways in the vicinity of the ports of Los Angeles and Long Beach, so it's relevant to both ship to truck freight distribution (Livability and Economy) as well as maintenance of pavement that is heavily travelled by trucks (System Performance). The methods include developing Closed-Circuit Television (CCTV) camera video analytics, freight simulation tool and freight volume estimation algorithms.

The approach for this research is comprised of five tasks below:

Task 1: Freight sensing dataset

Task 2: CCTV modeling and validation

Task 3: Freight modeling

Task 4: Freight simulation tool and validation

Task 5: Final report, modeling tool packages and demonstrations



DRISI provides solutions and  
knowledge that improves  
California's transportation system

## WHAT IS OUR GOAL?

The research seeks to develop a new method for generating freight (truck) volume and origin-destination estimations at the traffic analysis zone level from streamed data so that estimations can be constantly updated. As a result, this method could provide fine grain data on freight movements for urban transportation planning and freight planning. In addition, this research would develop simulation tools and dashboards to allow to test freight volume estimation under varying scenarios.

## WHAT IS THE BENEFIT?

The method developed by this research could enhance Caltrans freight modeling effort. In addition, it has the potential of providing fine grain data on freight movements for transportation planning and freight planning. Also, the simulation tool developed by this research should be accessible to Caltrans and provide support for envisioned planning use cases.

## WHAT IS THE PROGRESS TO DATE?

The research task was executed on June 27, 2023. Project kickoff meeting was held on August 10.

- We have stored the raw data (2TB District 7 CCTV cameras, 67GB WIM data, and 37.2 MB of UCI TAMS data) collected as part of Deliverable 1A and made it accessible to the project researchers.
- We have created a curated dataset subsetting the raw data within the ROI.
- We have started to label CCTV images in the ROI dataset as part of Deliverable 2A.
- We started to scope the requirements for building models of CCTV labeled images to inform Deliverable 2B.
- We have developed and published predictive freight volume estimation algorithms as part of Deliverable 3A.
- We have examined the ROI dataset to understand how to apply the volume estimation algorithms on real world data for Deliverable 3B.

The following tasks are planned for the next quarter:

Deliverables 2A and 2B:

- Finish CCTV image labeling-Train models to detect trucks on labeled ROI dataset-Output truck detection metrics from detected trucks in ROI dataset-Perform feasibility analysis on truck detection and counting using CCTV cameras deployed in ROI

-Deliverables 3A and 3B:

- Apply truck volume estimation on ROI sensor data-Perform feasibility analysis of truck volume estimation in ROI

-Deliverables 4A (Final report) and 4B (Data packages):

- Submit the final report-Submit data and schema
- Enter data and schema into Dryad