IMTC INTERNATIONAL MOBILITY & TRADE CORRIDOR PROGRAM

2022 IMTC Commercial Vehicle Operations Study

Prepared by the Whatcom Council of Governments

January 2025

In Q1 2022 the Whatcom Council of Governments (WCOG) received research funding from the U.S. Federal Highway Administration (FHWA), the B.C. Ministry of Transportation and Infrastructure (BC MoTI), Transport Canada (TC), and the Border Policy Research (BPRI) to plan and execute a commercial vehicle data collection effort based in the Cascade Gateway. Data collection in the field took place in June and July 2022.

U.S. Customs and Border Protection (US CBP) and Canada Border Services Agency (CBSA) contributed invaluable staff hours to help plan and facilitate the study's field work at their respective Cascade Gateway ports-of-entry (POE). The Whatcom Transportation Authority (WTA) assisted in providing a vanpool van for transportation of the survey crew to and from work-site locations. Project managers from WCOG and BPRI also received data and methodology guidance from the regional partner agencies that collectively make up the International Mobility and Trade Corridor Program (IMTC).

The final cost of the study was $115,336.

The IMTC

The International Mobility and Trade Corridor Program is a voluntary, binational, and regional coalition of government, business interests, and non-governmental entities established to support the improvement of safe and efficient trade and travel in the Cascade Gateway region – consisting of Western Washington State and Lower Mainland British Columbia that surrounds the western-most portion of the contiguous US-Canada international border.

The goals of the IMTC are to:

G1. Coordinate planning

G2. Improve regional, cross-border trade and transportation data

G3. Support infrastructure improvements

G4. Support coordinated implementation of U.S. and Canadian border policy

G5. Improve operations

The Cascade Gateway land border ports of entry, in red

Since 1997, U.S. and Canadian IMTC participants have together funded projects totaling over $41 million (USD) for the improvement of Cascade Gateway travel and trade.

The IMTC is managed by the Whatcom Council of Governments.

Project Scope

Cross-border vehicle studies provide regional cross-border transportation and inspection system operators with enhanced information for planning and investment decisions and support multi-agency collaboration. These studies supplement monthly vehicle count and trade data provided by federal statistics programs. The snapshots of attributes and characteristics of cross-border trade enable regional forecasting, simulation modeling, scenario analysis, operations feasibility studies, communications strategies, and more.

Planners and researchers at WCOG and BPRI, on behalf of the IMTC, have endeavored to record in-field observations of commercial vehicle movements through the Cascade Gateway at least once every 5 to 7 years since the IMTC's formation in 1997. Similar data collection efforts have occurred in 2016, 2009, and 2000.

Data and Products

The 2022 IMTC Commercial Vehicle Operations Study (CVO), as with the data studies that preceded it, updates sample datasets of border-crossing commercial vehicles, including:

- Trip origins and destinations
- Primary commodities being hauled
- Shares of empty and loaded vehicles
- Commercial vehicle classifications
- Trusted-trader program statuses
- Identification of frequent carrier companies
- Processing durations, such as inspection time and total border wait time

The data collected in the field, along with supporting traffic and trade data from federal agencies, are organized for analysis in a project database for the use of all interested partner agencies.

Design & Logistics

Data collection occurred at the six main commercial POEs in the Cascade Gateway: three northbound POEs operated by Canada Border Services Agency at (from west to east) Pacific Highway, Aldergrove, and Abbotsford-Huntingdon; and the three southbound POEs operated by US Customs and Border Protection at Pacific Highway, Lynden, and Sumas.

Field data collection was undertaken by student research assistants from Western Washington University (WWU) under the supervision of WCOG and BPRI staff. Research assistants observed commercial vehicle movements at three sequential positions along approach lanes leading to primary inspection. One position included a roadside commercial driver interview, undertaken when time and space permitted. All data was collected using custom form software on handheld smart tablets.

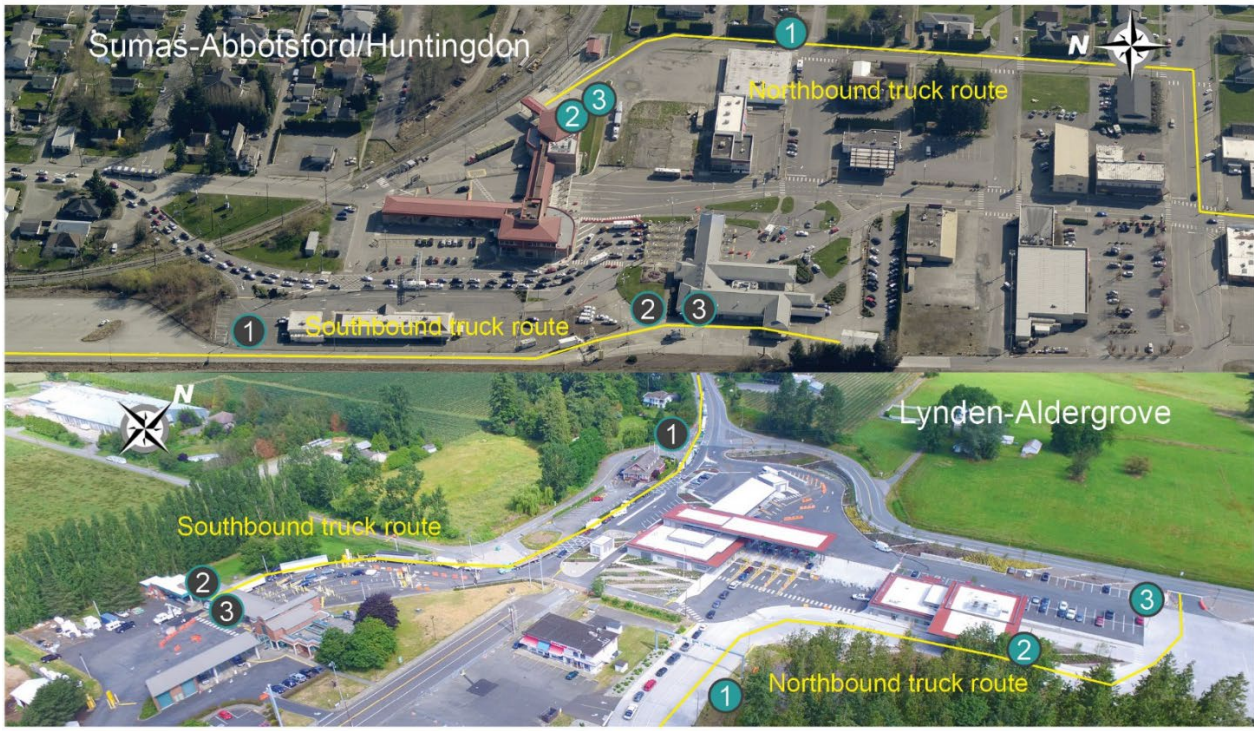
Research Assistant Positions and Associated Data Fields

Northbound

1. Standard Queue End
   - Time of queue-end arrival
2. FAST Lane Queue End
   - Time of queue-end arrival
3. Vehicle Information
   - License plate country
   - Vehicle classification
   - Carrier company name
   - Dangerous goods placard info
   - Primary inspection duration
4. Driver Interview
   - Empty/loaded cargo status
   - Origin/destination of current trip
   - Main commodity (or, if empty, what was dropped off or what will be picked up)
   - Less-than-truckload (LTL) status
   - Backhaul status
   - Trusted trader status

Southbound

1. Standard Queue End
   - Time of queue-end arrival
2. FAST Lane Queue End*
   - Time of queue-end arrival
3. Driver Interview
   - Empty/loaded cargo status
   - Origin/destination of current trip
   - Main commodity (or, if empty, what was dropped off or what will be picked up)
   - Less-than-truckload (LTL) status
   - Backhaul status
   - Trusted trader status
   - CBP fee payment type
4. Vehicle Information
   - License plate country
   - Vehicle classification
   - Carrier company name
   - Dangerous goods placard info
   - Primary inspection duration



Northbound

1. Queue End
   - Time of queue-end arrival
2. Driver Interview
   - Empty/loaded cargo status
   - Origin/destination of current trip
   - Main commodity (or, if empty, what was dropped off or what will be picked up)
   - Less-than-truckload (LTL) status
   - Backhaul status
   - Trusted trader status
3. Vehicle Information
   - License plate country
   - Vehicle classification
   - Carrier company name
   - Dangerous goods placard info
   - Primary inspection duration

Southbound

1. Queue End
   - Time of queue-end arrival
2. Driver Interview
   - Empty/loaded cargo status
   - Origin/destination of current trip
   - Main commodity (or, if empty, what was dropped off or what will be picked up)
   - Less-than-truckload (LTL) status
   - Backhaul status
   - Trusted trader status
   - CBP fee payment type
3. Vehicle Information
   - License plate country
   - Vehicle classification
   - Carrier company name
   - Dangerous goods placard info
   - Primary inspection duration

*Due to unique traffic operations conditions at the Pacific Highway southbound truck staging area, collection of data specific to commercial vehicles using the FAST-program approach lane had to be abandoned for the 2022 effort.

Schedule

Data was collected in the field from late June to mid-July 2022. Four weekdays of data capture were dedicated to each POE, from 9am to 3pm. Because of their size and close proximity, research assistants collected data at the Canadian (northbound) and U.S. (southbound) POEs at Lynden-Aldergrove and Sumas-Abbotsford/Huntingdon at the same time.

PORT-OF-ENTRY	DIRECTION	SURVEY DAYS	TIME
Pacific Highway	Northbound	M-Th, June 27-30	9:00am – 3pm
Pacific Highway	Southbound	T-F, July 5-8	
Lynden-Aldergrove	Northbound & Southbound	M-Th, July 11-14	
Sumas-Abb./Hunt.	Northbound & Southbound	M-Th, July 18-21	

Database

The primary product of this effort is a database (in Microsoft Access) consisting of both field-collected data, subsequently applied record-linkages (based on vehicle license plate numbers), categorizations (e.g., commodity codes), calculated fields (inspection times, transit times), and cleaning and standardization of place names, carrier names, and commodity descriptions.

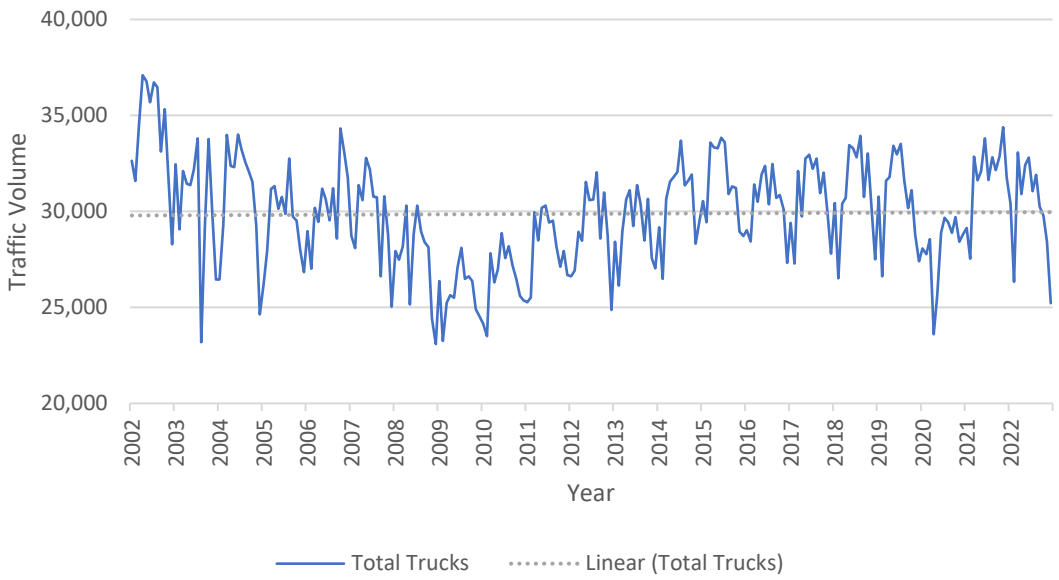
In addition to the summary data reviewed below, WCOG staff are available to assist IMTC partner agencies with custom queries of the data to provide various cross-tabulations using all of the available data elements – both for current conditions and time-series comparisons.

Data Review

The analyses in this report provide a general review of some of the main data points collected in the field. These figures and more can be replicated and expanded upon by querying the project database.

Recent Cross-Border Commercial Traffic Trends

The Cascade Gateway sees cross-border trade moving up and down the I-5 corridor from major international and intermodal trade hubs in Vancouver, BC, Seattle, WA and beyond. The Pacific Highway ports of entry serve the majority of land-based goods movements through the Cascade Gateway – its commercial vehicle volumes can serve as an indicator of overall truck-based trade trends through the region.



Traffic volume data from the U.S. Bureau of Transportation Statistics

In the chart above, there are marked dips in commercial vehicle volumes through Pacific Highway in the past 20 years: after the recession of 2007-08 and after the start of the COVID-19 pandemic in 2020. Smaller dips indicate seasonal variation. Traffic trends overall over the past 20 years have stayed somewhat consistent, as the linear trend line indicates.

In 2022, the average monthly volume of commercial vehicles crossing southbound through Pacific Highway was 30,214. In 2016, the last time an IMTC commercial vehicle data collection effort occurred, average monthly volumes were 30,457.

Records Collected

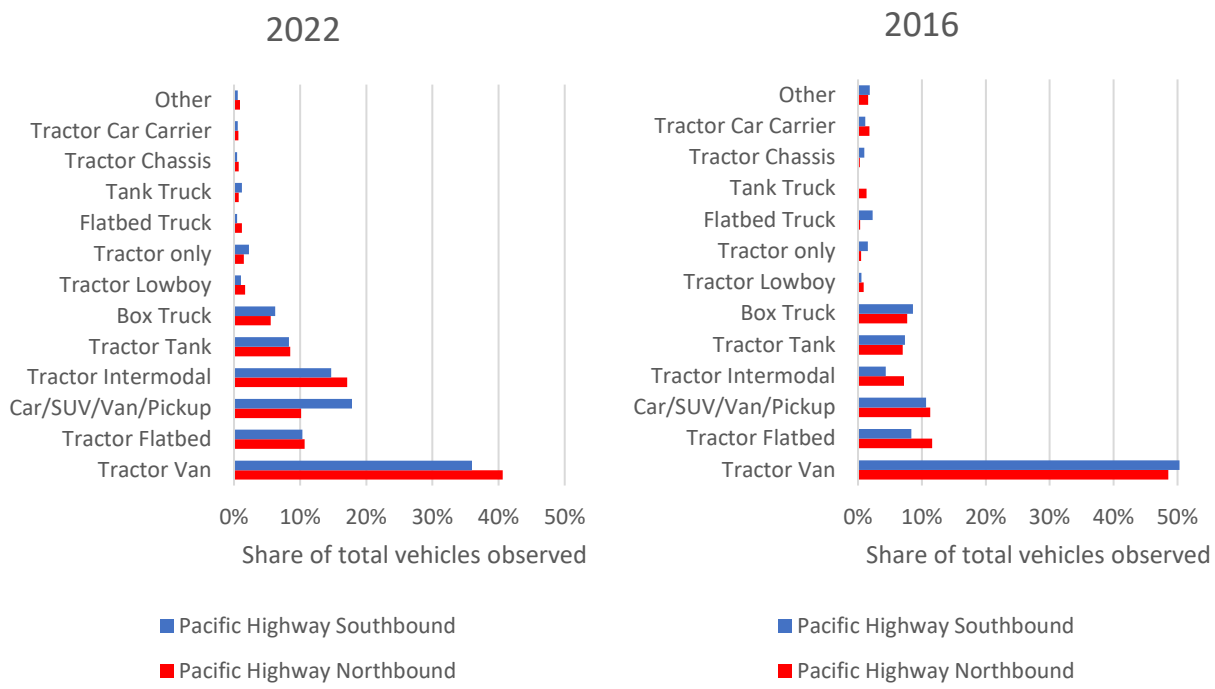
In total, 7,294 commercial vehicle movement records were collected in this effort. Because the Pacific Highway POEs' location on the primary Highway 99 – I-5 corridor and correspondingly higher truck volumes, the majority of vehicle records were collected there.

	Pacific Highway	Lynden-Aldergrove	Sumas-Abbotsford-Huntingdon	Total
Northbound	2727	360	788	
Southbound	1785	560	1074	
Total	4512	920	1862	7294

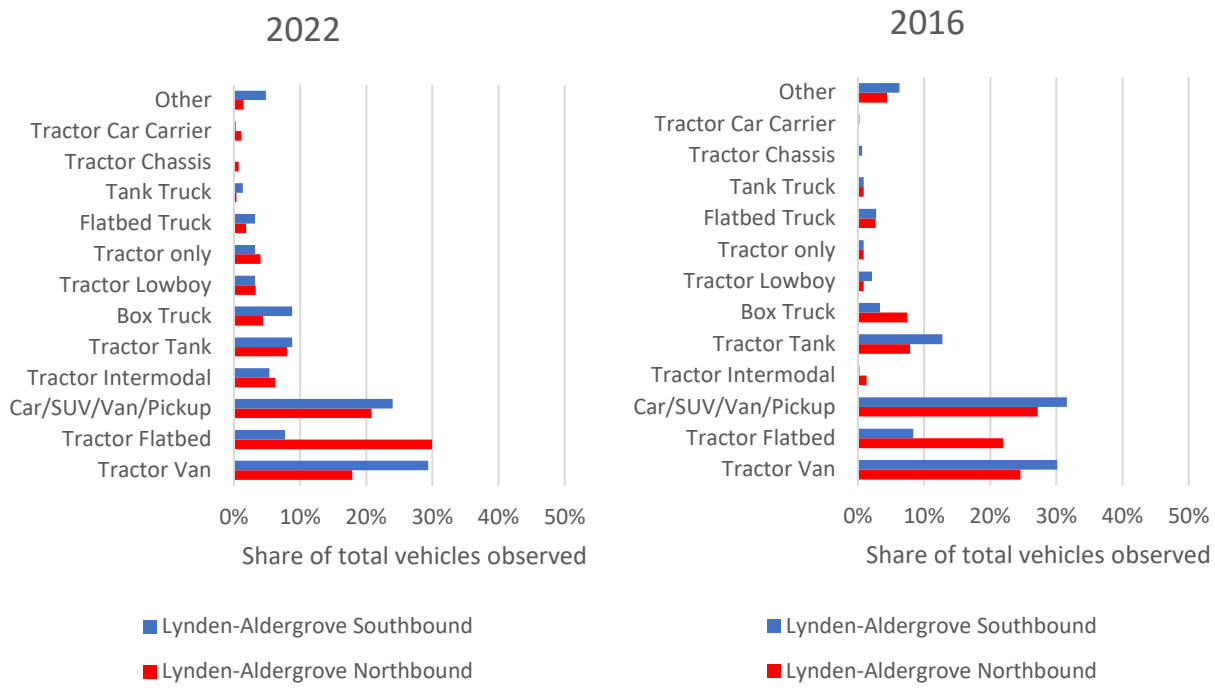
Vehicle Classification

Research assistants in the field recorded classifications of commercial vehicles using a picklist of standard vehicle types. The following charts show the share of each vehicle type observed crossing at each POE, with data from the 2022 effort compared to the data from the previous commercial vehicle study conducted in 2016.

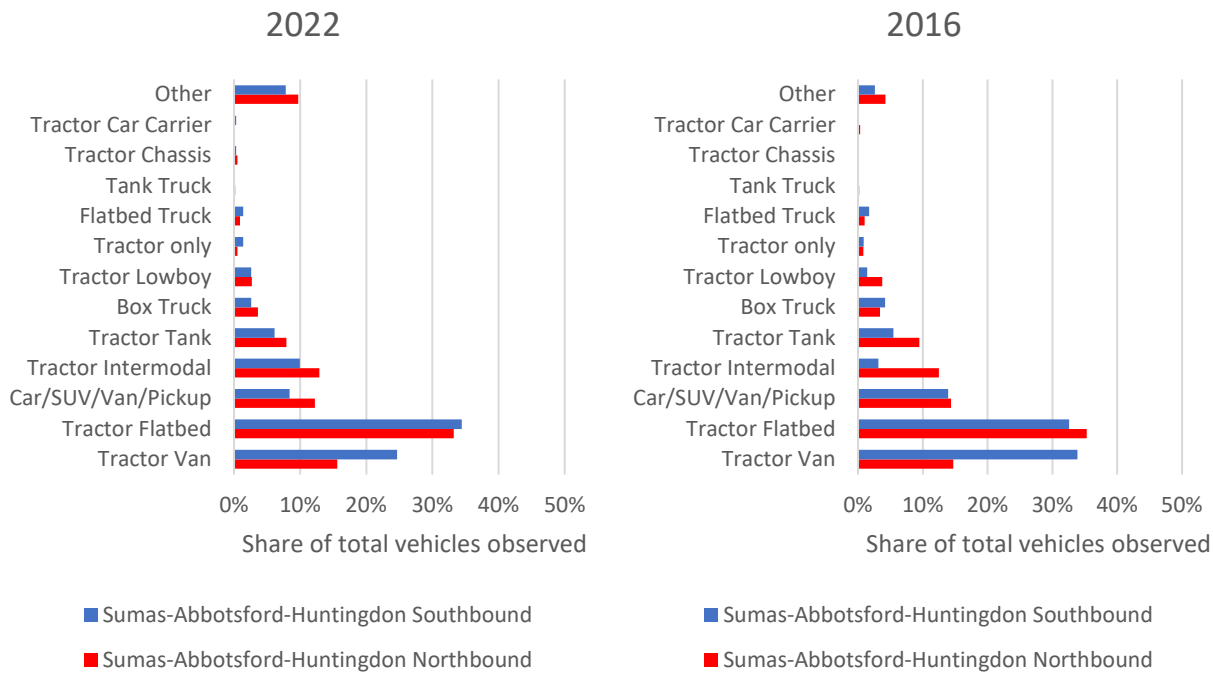
Pacific Highway



Lynden-Aldergrove



Sumas-Abbotsford/Huntingdon

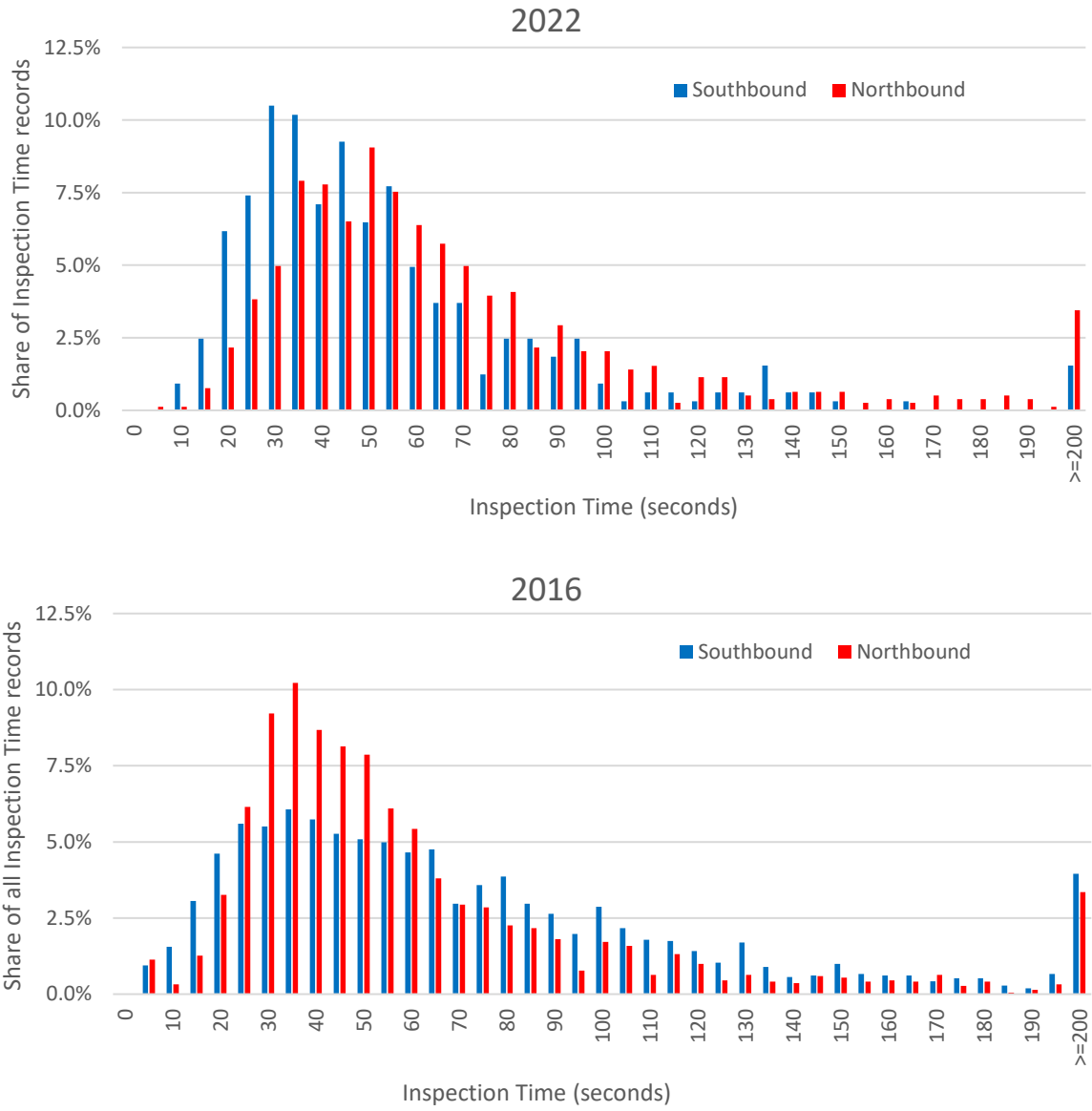


Inspection Times

To collect reasonably repeatable duration of time observations for individual commercial vehicles in primary inspection, research assistants in the field recorded a timestamp when the vehicle's wheels stopped at (indicating inspection start) and subsequently when they began to roll away from (indicating inspection complete) the primary inspection booth. The difference of these timestamps is used to estimate the duration of primary inspection for an individual commercial vehicle.

The charts below show the distribution of inspection durations of all vehicles observed transiting non-FAST "standard" approach lanes, with durations grouped into 5-second buckets. Data from the 2022 and 2016 efforts are compared.

Inspection Time Distribution by Direction, All Ports and Standard lanes

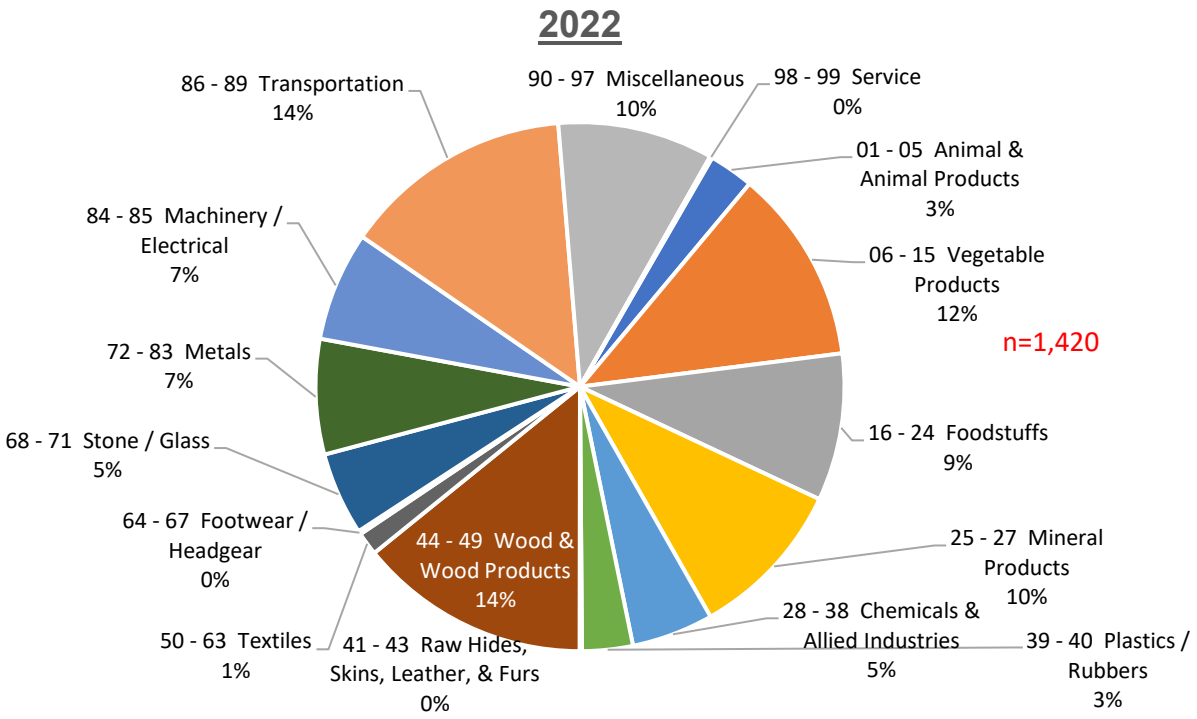


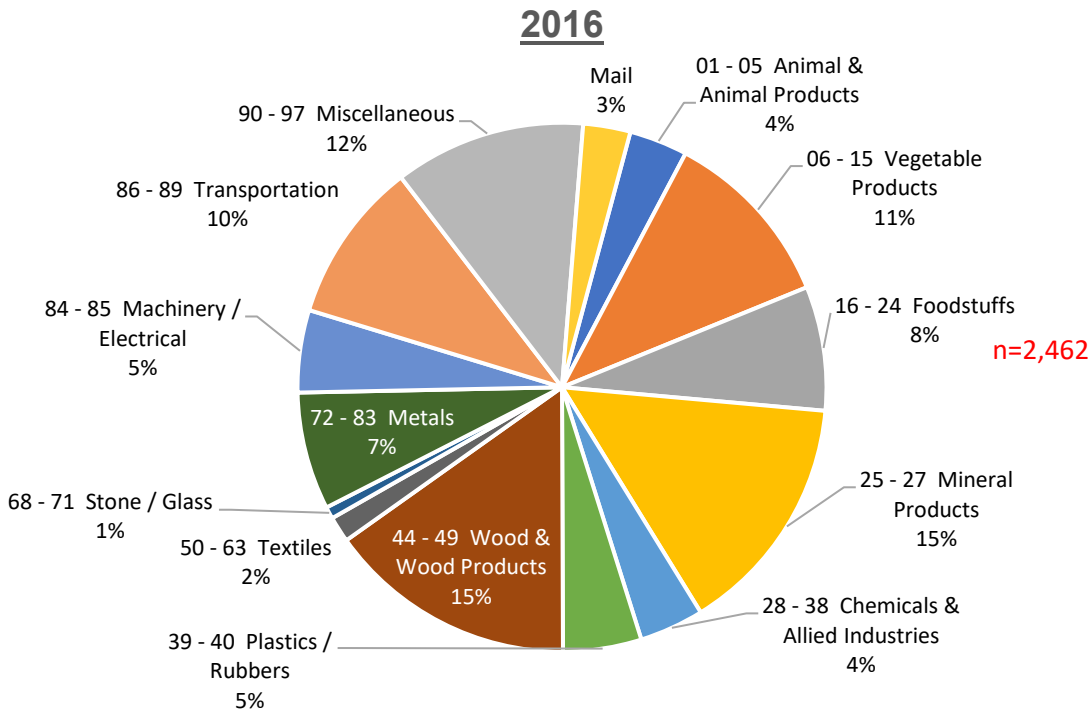
Commodities

During the driver interviews, research assistants asked what the main commodity was being hauled. For commercial vehicles that were empty at the time of the interview, drivers were asked what commodity they either had just dropped off or were about to pick up. The transcribed data was then sorted into the 99 unique Harmonized Tariff Schedule (HTS) 2-digit code classifications.

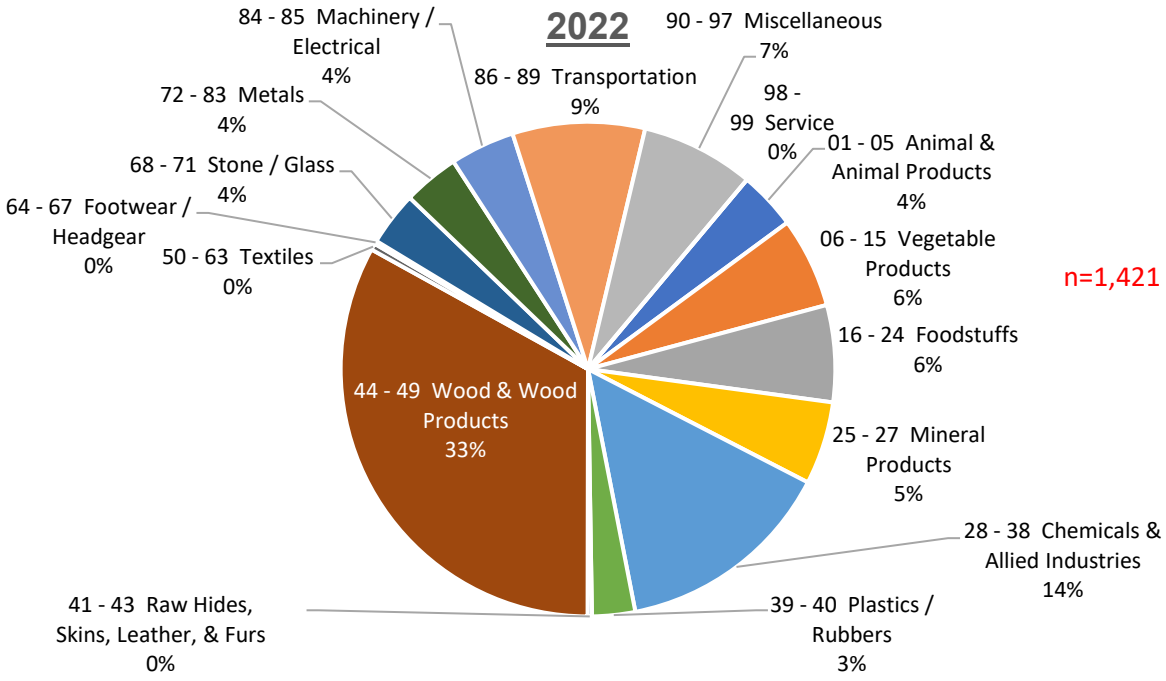
In the pie charts below, the HTS-coded commodities are grouped into the 15 unique U.S. Bureau of Transportation Statistics commodity groupings by direction of trade movement (i.e., U.S.-to-Canada or Canada-to-U.S.). Observations from all POEs visited are compared between the 2022 and 2016 data collection efforts.

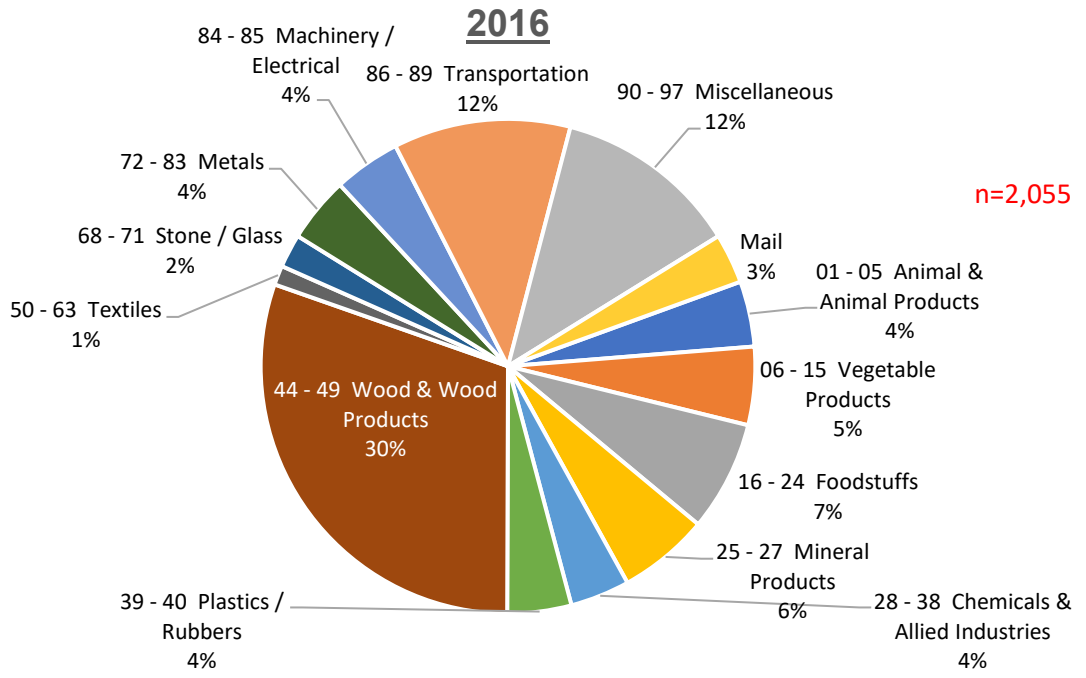
Cascade Gateway U.S.-to-Canada Truck-borne Trade by of Total Observed Cross-border Conveyances





Cascade Gateway **Canada-to-U.S.** Truck-borne Trade by of Total Observed Cross-border Conveyances



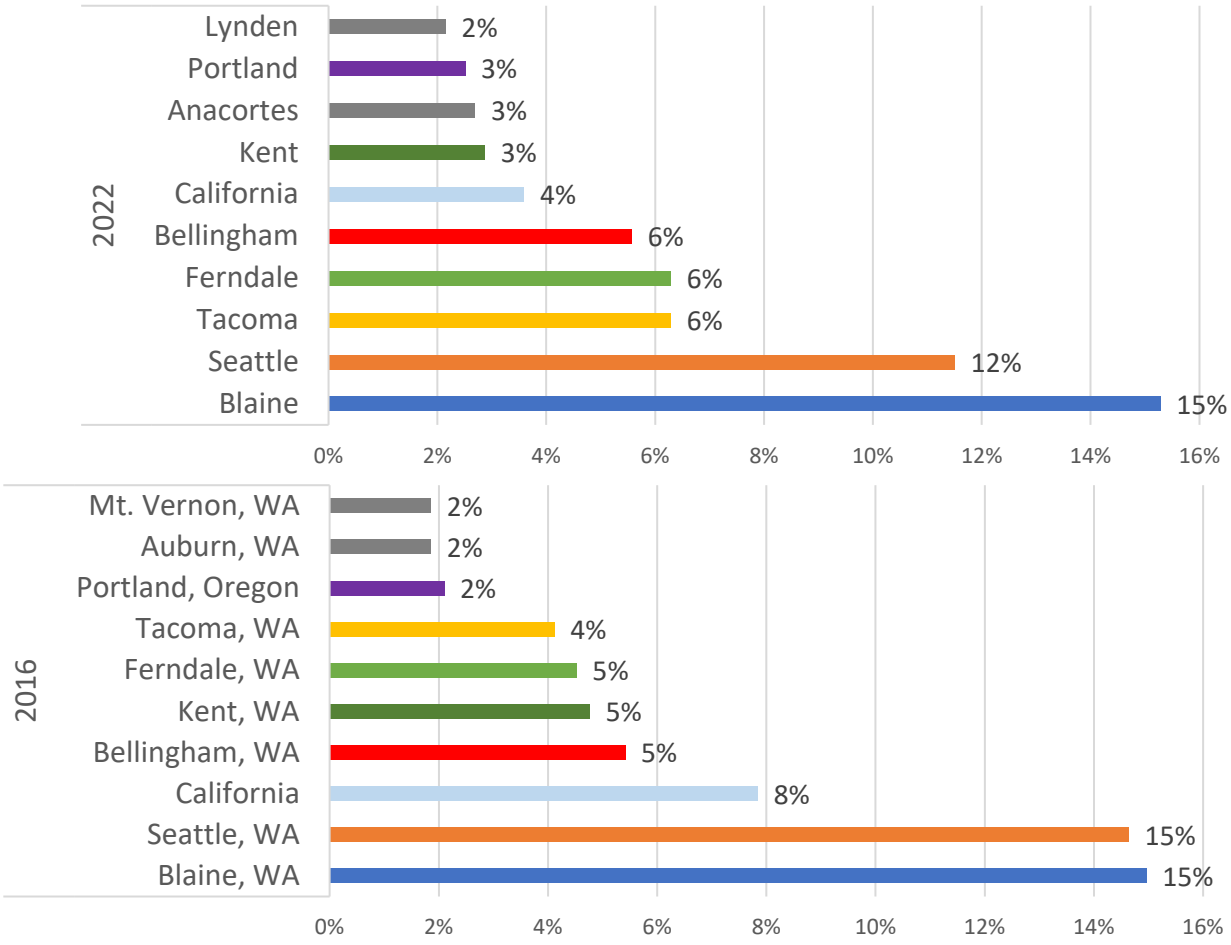


Location of Commodities Destined for Cross-Border Conveyance

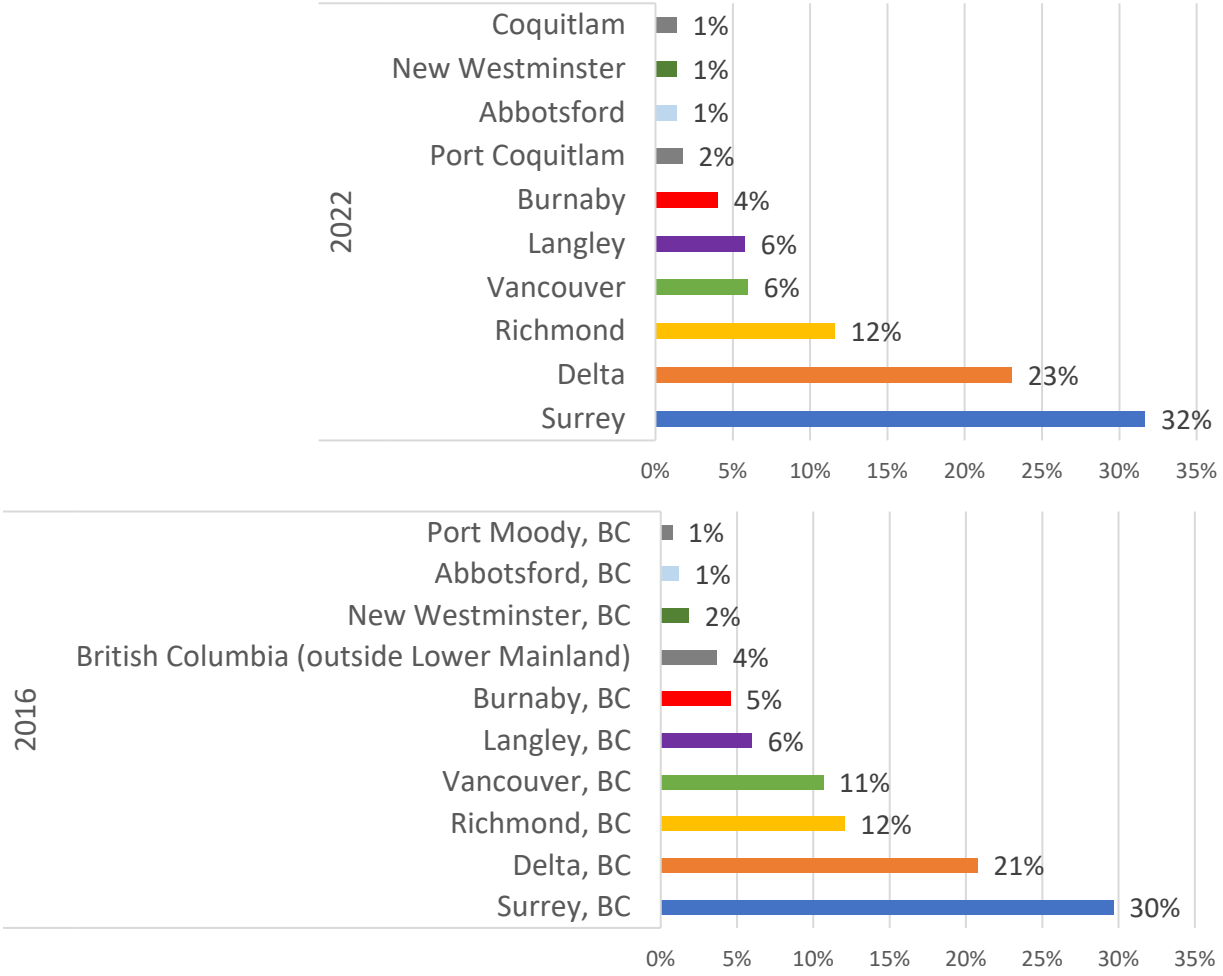
Based on whether the commercial vehicle was empty or loaded and where the driver said they were picking up or dropping off their goods, it can be inferred where goods are originating from (or rather, where their last location was before transiting the border).

The charts below show the top locations of where goods were last picked up before transiting the Pacific Highway POEs. Data from 2022 and 2016 are compared.

Top U.S. Locations of where Cross-Border Goods were picked up, Pacific Highway POE



Top **Canadian** Locations of where Cross-Border Goods were picked up, Pacific Highway POE

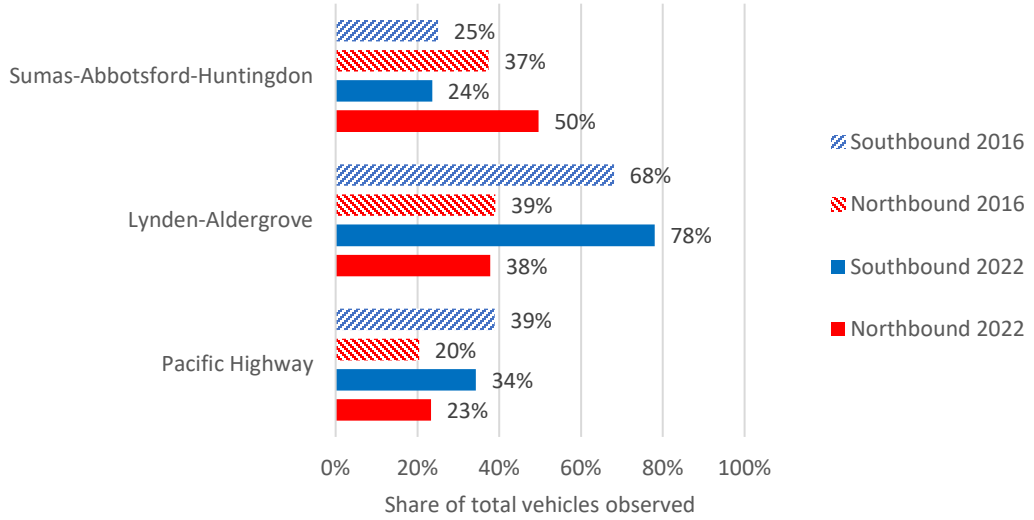


Empty Status

The first question asked in the driver interview is whether the vehicle is carrying goods or is empty. These data are collected in every IMTC commercial study and are important considerations in the development of strategies to make primary inspection queuing and processing more efficient for all commercial vehicles crossing the border.

The chart below shows the percent of vehicles at each commercial POE that are empty, comparing data from 2022 with data from 2016.

Percentage of Commercial Vehicles Observed to be Empty (by POE and Direction)



Project Impacts beyond 2022

The 2022 Commercial Vehicle Operations study has been used by WCOG and partner agencies in numerous planning efforts since data collection was wrapped up in summer 2022.

The Cascade Gateway Advanced Border Information System (ABIS)

Having defensible historic data on wait-times benefits federal, state, and local agencies in their short- and long-term planning and operations. The 2022 IMTC CVO methodology for observing and collecting wait-times for commercial vehicles (using in-field research assistants and multiple data collection positions) was a result of aging loop detector-based technology that no longer accurately calculates these measures in an automated way. Wait-times collected from this study are a good baseline from which to conduct further analyses, however these studies are infrequent (happening once every 5 to 7 years), require in-field staffing, and the resulting datasets are only samples. These realities have contributed to the need for an improved automated wait-time system that collects and archives vehicle movements accurately and perpetually.

In 2023 the Whatcom Council of Governments was awarded $458,000 in grant funding from the U.S. Department of Transportation's Strengthening Mobility and Revolutionizing Transportation (SMART) Grants Program to evaluate technologies to replace and improve aging wait-time systems (for both

passenger and commercial vehicles) at the Cascade Gateway system of border crossings. Considerations and research from the CVO was used by both WCOG staff and consultants in this evaluation. In December 2024, the project was awarded funding for implementation.

Pacific Highway Southbound Staging Area Assessments

The 2022 CVO reconvened IMTC partner agency dialogue on the ongoing compliance issues seen in the southbound truck staging area at the Pacific Highway border crossing. In 2012 the staging area, where commercial vehicles queue on approach to US CBP primary inspection, was redesigned with an automated, signalized, multi-row system meant to more efficiently organize waiting vehicles, especially with respect to separating out and prioritizing FAST-program compliant trucks from the rest of the queue. However in recent years driver compliance with the automated system has greatly diminished, resulting in inefficient use of the staging area lanes, backups on BC Hwy 15, vehicles jumping their position in the queue, and overall driver confusion and aggression that has led to safety concerns.

In 2023, a subgroup of the IMTC was established to assess issues with the system, communicate operational needs, and consider alternatives. IMTC commercial vehicle studies have been used in previous simulation modeling efforts where adjustments and redesigns of the staging area are tested in a data-driven approach. The data from the 2022 CVO will be critical for the inputs of future simulation modeling efforts with respect to this ongoing issue.

FOR MORE INFORMATION

Please direct any questions or comments regarding the 2022 IMTC Commercial Vehicle Operations Study to the following project managers:

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