Major Generators of Traffic on U.S. 395 North of Spokane:

Including Freight Trucks and Passenger Vehicles Crossing the International Border

EWITS Research Report Number 4
January 1995

by

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EWITS Research Reports:
Background and Purpose

This is the fourth of a series of reports prepared from the Eastern Washington Intermodal Transportation Study (EWITS). The reports prepared as a part of this study provide information to help shape the multimodal network necessary for the efficient movement of both freight and people into the next century.

EWITS is a six-year study funded jointly by the Federal government and the Washington State Department of Transportation as a part of the Intermodal Surface Transportation Efficiency Act of 1991. Dr. Ken Casavant of Washington State University is Director of the study. The Gillis Group, a private consulting firm based in eastern Washington, provided the WSU project team with research and management assistance. A state-level Steering Committee provides overall direction pertaining to the design and implementation of the project. The Steering Committee includes Jerry Lenzi, Regional Administrator (WSDOT, Eastern Region); Richard Larson (WSDOT, South Central Region); Don Senn (WSDOT, North Central Region); Charles Howard (WSDOT, Planning Manager), and Jay Weber (Douglas County Commissioner). Linda Tompkins represents the Washington State Transportation Commission on the Steering Committee. An Advisory Committee with representation from a broad range of transportation interest groups also provides guidance to the study. The following are key goals and objectives for the Eastern Washington Intermodal Transportation Study:

- *Facilitate existing regional and state-wide transportation planning efforts.*
- *Forecast future freight and passenger transportation service needs for eastern Washington.*
- *Identify gaps in eastern Washington's current transportation infrastructure.*
- *Pinpoint transportation system improvement options critical to economic competitiveness and mobility within eastern Washington.*

For additional information about the Eastern Washington Intermodal Transportation Study or this report, please contact Ken Casavant at the following address:

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DISCLAIMER

EWITS PREVIOUS REPORTS NOW AVAILABLE

1. Gillis, William R. and Kenneth L. Casavant. "Linking Transportation System Improvements to New Business Development in Eastern Washington." EWITS Research Report Number 1. February 1994.

2. Gillis, William R. and Kenneth L. Casavant. "Lessons from Eastern Washington: State Route Mainstreets, Bypass Routes and Economic Development in Small Towns." EWITS Research Report Number 2. February 1994.

3. Gillis, William R. and Kenneth L. Casavant. "Washington State Freight Truck Origin and Destination Study: Methods, Procedures, and Data Dictionary." EWITS Research Report Number 3. December 1994.

Major Generators of Traffic on U.S. 395 North of Spokane:
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Eastern Washington Intermodal Transportation Study
Research Report Number 4

Section 1: Introduction

The segment of U.S. Highway 395 extending north of Spokane to the Canadian Border is a primary freight route utilized by communities located in Spokane, Stevens, and Ferry Counties. This highway segment is also part of the larger transportation system enabling international trade between Canada and the United States. Canadian and U.S. trade includes freight as well as tourism, business travel, and shopping.

A study of highway freight vehicle utilization of U.S. 395 north of Spokane was conducted as a supplement to the Eastern Washington Intermodal Transportation Study. The U.S. 395 study also includes an examination of passenger car flows across the international border between Canada and the United States. This report summarizes major results from the assessment of freight vehicle utilization of U.S. 395 north of Spokane and from a survey of passenger cars at the United States and Canadian borders. Specific topics include:

- Overview of the research approach.
- Daily truck volume, cargo content, and economic value of freight cargo flows on U.S. 395 north of Spokane.
- Primary origins and destinations for selected freight truck traffic.
- Truck profile including typical weight and vehicle configuration.
- Routes utilized most frequently by freight trucks traveling between major origins and destinations.
- Profile of passenger cars passing through Canadian/United States border stations north of Spokane.
- Implications for corridor planning and development.

Specific routes utilized by trucks passing through the Spokane metropolitan area are not considered in this report. A companion set of tables submitted to WSDOT Eastern Region Office provide a detailed focus on routes within Spokane utilized by trucks entering the city from points north. The assessment of Spokane truck routes presented in the following report build on the analysis of trucks moving into and through the Spokane metropolitan area on U.S. 395. An analysis of routes utilized by trucks entering the Spokane metropolitan area by SR 2 is also included in this report.

Overview of the Research Approach

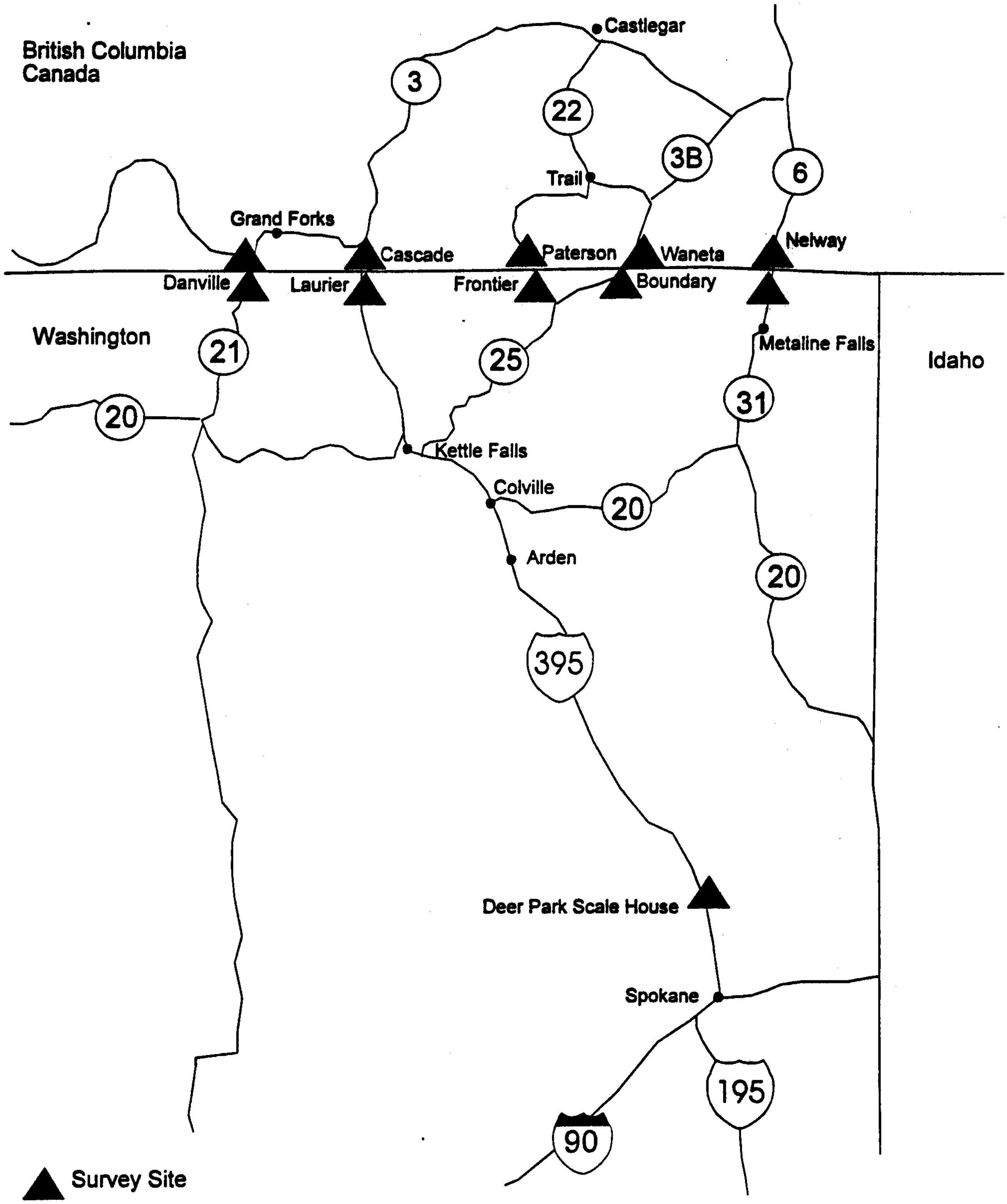
Research results presented in this report are based on personal interviews of truck drivers traveling U.S. 395 between July 1993 and May 1994. The interviews were conducted on four separate occasions at the Washington State Patrol scale house near Deer Park. Interview dates at the Deer Park scale house were selected to be representative of each of the four seasons. For some commodities, truck movements can vary substantially from season to season.

Because of the important policy interest in North American trade, a one time interview of truck drivers was conducted in July of 1993 at four U.S. and four Canadian border locations. Car drivers were also interviewed at the international border locations. Only cars are allowed to pass through the Boundary and Waneta Ports of Entry. Consequently, no truck drivers were interviewed at these sites. A summary of interview locations, dates, and the total truck count at each site are summarized by Chart 1.1 below. A map depicting the geographic location of major interview locations appears on page 3.

Chart 1.1--Truck Driver Interview Locations, Dates, and Total Truck Count

Interview Site	Date	Interview Hours	Total Number of Trucks
Deer Park Scale House	7/7/93	6:00 AM -- 10:00 PM	211
Deer Park Scale House	11/3/93	6:00 AM -- 10:00 PM	170
Deer Park Scale House	3/16/94	6:00 AM -- 10:00 PM	210
Deer Park Scale House	5/18/94	6:00 AM -- 10:00 PM	216
U.S./Canadian Ports of Entry			
Laurier (U.S.)	7/8/93	9:00 AM -- 7:00 PM	27
Cascade (Canadian)	7/8/93	9:00 AM -- 7:00 PM	24
Frontier (U.S.)	7/13/93	9:00 AM -- 7:00 PM	32
Paterson (Canadian)	7/13/93	9:00 AM -- 7:00 PM	33
Metaline Falls (U.S.)	7/15/93	9:00 AM -- 7:00 PM	3
Nelway (Canadian)	7/15/93	9:00 AM -- 7:00 PM	3
Danville (U.S.)	7/22/93	9:00 AM -- 7:00 PM	3
Danville (Canadian)	7/22/93	9:00 AM -- 7:00 PM	3
Boundary (U.S.)	7/14/93	9:00 AM -- 5:00 PM	cars only
Waneta (Canadian)	7/14/93	9:00 AM -- 5:00 PM	cars only

Map 1.1 *Location of the Deer Park Scale House and International Border Crossing Interview Sites*



Interviews at the Deer Park scale house were conducted for southbound vehicles only. Because the weigh station is located on the southbound side of the highway, northbound traffic could not be safely stopped for interviews. This did not, however, significantly affect the overall analysis. Southbound traffic carry major commodities and products produced in communities north of Spokane as well as commodities transported from British Columbia. According to local State Patrol officers and others knowledgeable of the area, most freight trucks traveling north on U.S. 395 are either empty returning to mills and factories north of Spokane, or are making deliveries to communities in northern Spokane, Stevens, and Ferry County. Consequently, conducting northbound interviews would generally produce redundant information on freight traffic flows. This assumption was indeed verified by interviews collected from southbound truck drivers as well as drivers passing through border ports of entry.

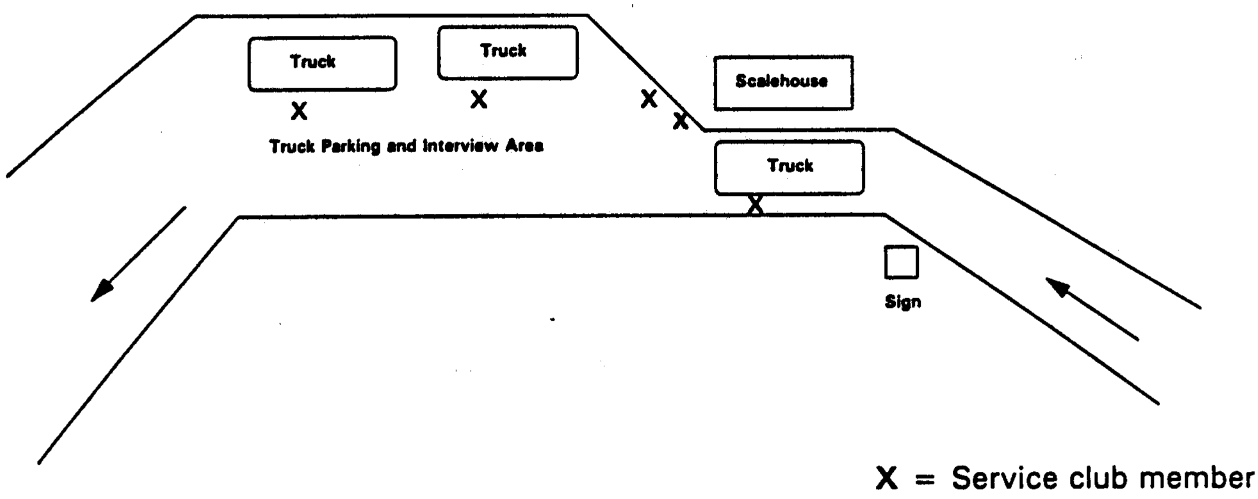
All trucks passing through the Canadian border stations between the 9:00 a.m. opening and 7:00 p.m. were interviewed. In general, truck traffic at the Canadian border locations was light with the majority of trucks passing through either Laurier or Frontier border crossings. Counts provided by the U.S. Customs Service indicate that an average of 60 trucks per day pass through Frontier. Between 40 and 50 trucks per day pass through the Laurier border crossing.

Interviews were conducted at Deer Park between 6:00 a.m. and 10:00 p.m. According to State Patrol officers familiar with the region, truck travel in the vicinity of Deer Park is very limited after 10:00 p.m. and before 6:00 a.m. Experience at the site verified this observation. Consequently, there was no need to extend the interview period to 24 hours. The interview team surveyed approximately 80% of the trucks traveling southbound on U.S. 395 over each 16-hour period.

Cooperation from the Washington State Patrol Commercial Vehicle Enforcement Office and Customs from both the United States and Canada was essential to the success of this research effort. In all cases, these organizations enthusiastically facilitated the work of the interview teams.

General interview procedures used at each site were developed through a pilot study conducted in 1992 by Washington State University at the Blaine border crossing in Whatcom County. At Deer Park, two teams of four individuals conducted the interviews. Each team worked an eight-hour shift. Interviewers worked in teams of two at Canadian border locations. The interview personnel were provided with safety equipment including a florescent orange vest and traffic cones to divert vehicles into a safe area. Training was provided in advance to ensure the interviews were conducted in a safe, efficient, and comprehensive manner.

Figure 1.1: Interview Site Set-up at the Deer Park Scale House



The diagram appearing on page 5 illustrates the logistics of the site set-up at Deer Park. Several "survey crew" signs were provided by the WSDOT Eastern Region office for use in this project. The sign placed just prior to the scale house informed drivers that an official survey was being conducted. The trucks parked on the scale allowing the weigh master to conduct enforcement activities as necessary. One team member was responsible for directing trucks to the appropriate interview location. The other three team members alternated and conducted the interviews. Each interview took about two minutes to complete.

Members of the Shadle Park Lions Club were hired and trained by the research team to conduct field interviews. The team interviewed as many of the trucks crossing the scale as possible. There were several reasons why some trucks were not interviewed. The most frequent was when more than four or five trucks crossed the scale within a two-minute time period. Only three trucks can park safely. Truck parking became even more limiting when a vehicle was stopped for an enforcement violation leaving only two spaces for interviews. Consequently some trucks were allowed to pass without an interview. In general, the team attempted to keep a systematic pattern of stopping at least every two trucks and additional trucks as could be accommodated. Cooperation from the truck drivers was excellent. Overall, 96% of the drivers who were asked, agreed to participate in an interview.

Research logistics at the international border locations were similar to those at the Deer Park scale house. However, truck traffic was relatively slow. Trucks were interviewed immediately after they completed their customs clearance at the border station.

The questionnaire utilized by the interview team is included with the report in Appendix A. From direct observation, the interviewer recorded information about each vehicle's configuration. Specific questions asked of the driver included information about the trucking company, vehicle weight, type of commodity being carried, and the origin and destination of the vehicle. The interviewer also documented the route utilized traveling from the truck's origin to its destination by highlighting the route on an attached map.

In addition to interviews of freight trucks, cars passing through the international ports of entry were also interviewed. In general, all cars passing through the international border locations north of Spokane on the assigned day were interviewed. The questionnaire utilized for passenger cars appears in Appendix B. Drivers were asked about their origin and destination as well as the purpose of their trip. Route information was also collected for passenger vehicles.

Effective data management systems help minimize both errors due to inaccurate field data collection and data entry. There are at least three potential sources of error associated with field interviews of truck or passenger car drivers. First, there are systematic problems caused by inappropriately worded questions, interview procedures, and/or site selection. Second, the drivers may provide inaccurate responses to questions. Third, interviewers may incorrectly record vehicle data or responses provided by drivers.

Potential systematic errors caused by flaws in the survey methodology were minimized through ongoing evaluation and adjustments to the interview questionnaire and site survey procedures. Improving the clarity of interview questions also helped to minimize potential errors due to drivers providing inaccurate responses. An ongoing program to provide training and supervision to community service club teams helped reduce errors associated with interviewers incorrectly recording responses provided by drivers. Despite these safeguards, field data collection errors cannot be eliminated completely.

A data integrity review was implemented for each completed questionnaire prior to entering information into the database. Each questionnaire was reviewed to ensure the answers were logically consistent. Among the most frequent errors were completed questionnaires with a total combined payload and empty vehicle weight well above the legal limit for a particular axle configuration. In these cases, the driver was generally providing the interviewer with the gross weight rather than the requested cargo weight. Another common error was an interviewer checking the box to indicate a truck was carrying cargo when other information on the survey clearly indicated the truck was empty. The data integrity review process included the development of specific decision rules to revise incorrect data utilizing other information recorded on the questionnaire. For example, trucks with a reported combined cargo and empty vehicle weight in excess of 110% of the legal limit were assumed to be gross weights. Revised payload weights were estimated as gross weight minus the reported empty vehicle weight. Empty vehicle weights were generally reported accurately.

Using these techniques, data recorded incorrectly on the field interview questionnaires were identified and corrected prior to data entry. The research team utilized the Conway Survey-It software package for data entry purposes. Survey-It provides a user friendly, menu driven data entry screen but only limited database capabilities. Data entered into Survey-It were then exported into Borland Paradox. Paradox is used as the primary database software for the project. Additional data integrity checks were implemented utilizing cross-tab, edit and search functions of Paradox. The refined database was utilized to develop results presented in the remainder of this report.

Section 2: Profile of Freight Trucks Traveling Southbound on U.S. 395 at the Deer Park Weigh Station

Daily Truck Volume, Cargo Content, and Economic Value

U.S. 395 is a primary economic lifeline for smaller communities located in Stevens, Pend Oreille, Ferry, and northern Spokane Counties. U.S. 395 is the primary route used by these communities to transport local products to final consumer markets and regional distribution centers. The corridor is also a primary means of shipping raw materials and consumer items to communities north of Spokane.

In recent years, the importance of U.S. 395 for North American trade has received increased focus. Key characteristics of Canadian origin trucks traveling southbound and observed at the Deer Park weigh station are highlighted in this section. A specific focus on major freight truck movements observed at border crossings within the U.S. 395 corridor area north of Spokane is provided in Section 3 of this report.

Daily truck volume as well as the content and economic value of cargo transported southbound on U.S. 395 near Deer Park is summarized by Charts 2.1 and 2.2 (following page). On average, 202 freight trucks travel southbound on U.S. 395 near Deer Park each day. Approximately two-thirds of the southbound trucks are empty. The vast majority of the empty trucks are returning to Spokane or Northern Idaho after making local deliveries to communities in Stevens, Pend Oreille, or Ferry Counties.

Each day, approximately 135 trucks originating north of Deer Park are carrying cargo to the Spokane metropolitan area and other major destinations. Wood products dominate southbound cargo shipments through the corridor. Nearly two-thirds of all southbound cargo are wood products, primarily processed lumber and wood chips. An additional 16% of southbound cargo is chemical products, primarily originating from Trail, BC. The remainder of typical daily cargo shipments include a wide range of commodities such as sand, machinery, agricultural commodities, solid waste, and general freight.

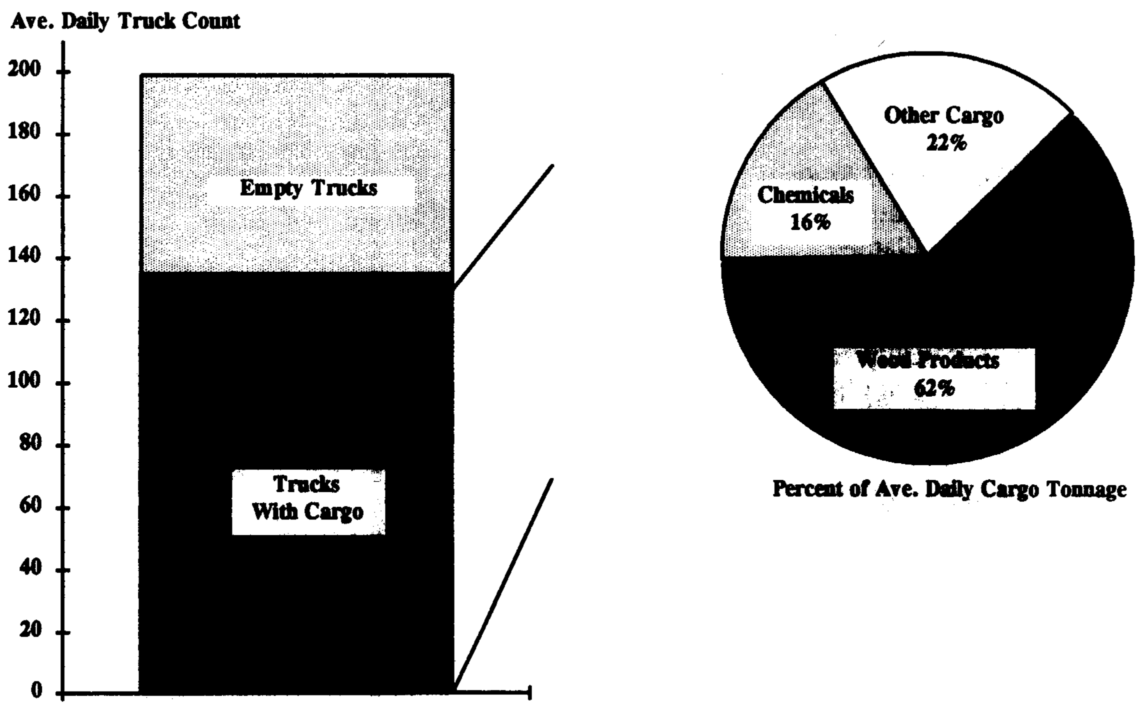
On average, 3,160 tons of cargo are transported southbound on U.S. 395 near Deer Park each day. This cargo represents an economic value to the region of $1,768,771 per day. Based on a rough annual expansion of 312 truck equivalent days per year, approximately one million tons of cargo is transported over this highway segment each year. This represents an economic value to the region of over one-half billion dollars annually.

Chart 2.1: Deer Park Southbound Scale House
Daily Truck Volume and Economic Value of Cargo

SEASON	24-HOUR TOTAL TRUCK COUNT*	24-HOUR CARGO TONNAGE	24-HOUR CARGO VALUE
Summer, 1993	211	3,397	$1,915,893
Fall, 1993	170	2,689	$1,582,977
Winter, 1993	210	3,116	$1,759,056
Spring, 1994	216	3,437	$1,817,157
Annual Daily Average	202	3,160	$1,768,771

*Truck count includes both empty and loaded trucks

Chart 2.2: Type of Cargo Transported by Trucks Passing
Through the Deer Park Southbound Scale House



The analysis of truck movements through the Deer Park weigh station included consideration of seasonal differences. In general, seasonal differences in the volume of trucks and the type of cargo carried are minimal. A slightly lower number of trucks were recorded during the Fall 1993 interview period. The difference was largely due to a smaller number of trucks carrying wood products southbound from manufacturing facilities north of Spokane. Due to slack winter construction periods, retailers and wholesalers tend to have reduced demand for wood products inventories during the late fall.

Because of the dominance of wood and chemical products for southbound cargo movements, the transportation of these commodities receives a special focus in Section 3 of this report. First, however, a brief overview of the vehicle configuration and weight of trucks traveling through the study area is provided.

Vehicle Configuration and Cargo Weight

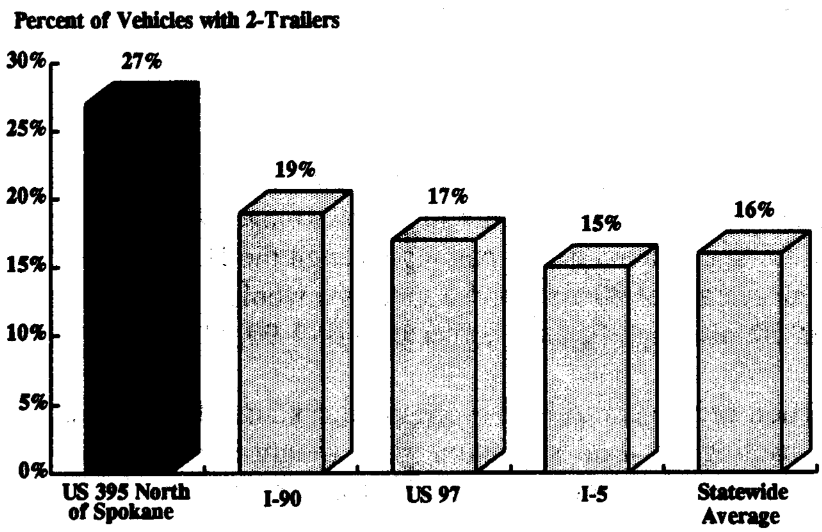
Chart 2.3: Vehicle Configuration for Trucks Passing Through the Southbound Deer Park Weigh Station

Vehicle Attribute	Ave. Number of Trucks	Percent of Total Trucks
Truck Configuration		
Straight Truck	32	16%
Truck and Trailer	28	14%
Tractor Only	2	1%
Tractor and Trailer	85	42%
Tractor w/ 2 Trailers	45	27%
Trailer/Bed Style		
Van	46	22%
Flatbed	70	35%
Hopper	18	9%
Tanker	14	7%
Chip	16	8%
Logging	8	4%
Other	30	15%
Number of Axles		
Less than 5	45	22%
5	71	35%
6	17	8%
7	34	17%
8	34	17%

A significant number of large trucks travel U.S. 395 north of Spokane. Nearly one-half of the vehicles stopped at the Deer Park scale house have more than 5 axles. Twenty-seven percent of the tractors pull two trailers.

A wide variety of trailer or truck-bed styles were observed at Deer Park. Flatbeds carrying lumber products were the most frequent. The 18 hopper trailers crossing the scales were primarily fertilizer products being transported from Trail, BC. Most southbound vans and tankers were returning to Spokane after deliveries to retail outlets and factories in communities to the north. Flatbed trucks carrying wood products and tankers returning from deliveries of petroleum products are among the most frequent vehicles with two trailers.

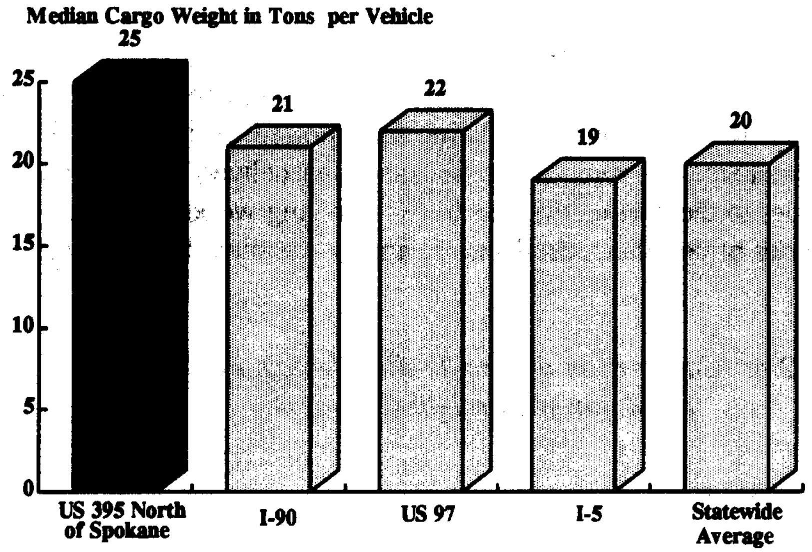
Chart 2.4: Comparison of Two-Trailer Vehicle Percentages on Major WA Freight Corridors



The segment of U.S. 395 north of Spokane is unique in its high concentration of freight vehicles with two trailers. On average, only 16% of freight vehicles traveling Washington's highways have two trailers. This compares to 27% of freight trucks with two trailers on U.S. 395 north of Spokane. Among other major Washington highway freight corridors, the proportion of two-trailer trucks is 19%, 17%, and 15% for I-90, U.S. 97, and I-5, respectively.

The relatively high proportion of two-trailer freight vehicles utilizing U.S. 395 is associated with the transportation needs of wood products businesses that dominate freight movements within the region. Because U.S. 395 is a two-lane highway utilized by a large number of passenger vehicles, the high proportion of multiple-trailer freight vehicles has special importance for future transportation policy and program improvement discussions.

Chart 2.5: Comparison of Median Cargo Weight on Major WA Freight Corridors



Freight vehicles traveling southbound on U.S. 395 north of Spokane also tend to have heavier cargo weights than is typical on other major Washington freight corridors. The median cargo weight for southbound trucks passing through the Deer Park scale house is 25 tons compared to an average of 20 tons for the state as a whole. Median cargo weights within the study area are also significantly higher than on I-90, U.S. 97, and I-5.

A significant proportion of haulers of both wood products and chemicals utilize 8-axle vehicles capable of hauling the legal maximum gross weight limit of 105,500 pounds. Cargo weights for these vehicles is typically 33 to 37 tons. Freight trucks originating from Canada, in particular, contribute heavy cargo weights on the U.S. 395 road system. For example, the median cargo weight for trucks crossing the border at Laurier during the summer of 1993 was 34 tons.

The next section of this report provides a closer examination of transportation origins and destinations for both wood products and chemical industries that are the major freight users of the U.S. 395 corridor north of Spokane.

Section 3: Major Wood and Chemical Product Movements on U.S. 395 North of Spokane

Information on major truck movements discussed in Section 2 of this report was developed from interviews conducted at the Washington State Patrol weigh station near Deer Park. Truck interviews conducted near Deer Park are also utilized in this section to profile major origins and destinations for wood and chemical products transported on U.S. 395 north of Spokane. Because of the important policy interest in North American trade, a one-day supplemental truck survey was conducted at Canadian border crossings north of Spokane. Results from this supplemental survey documented that Laurier and Frontier are the primary crossing for Canadian trucks utilizing U.S. 395. Furthermore, wood and chemical products are the primary Canadian commodities shipped to U.S. destinations over these routes. Major Canadian wood and chemical product truck shipments identified at U.S. border crossing are added to interview data obtained at the Deer Park scale house to provide a comprehensive picture of southbound wood and chemical product movements on U.S. 395 north of Spokane.

Chart 3.1: Profile of Canadian Trucks Crossing the U.S. Border North of Spokane From a One Day Survey Conducted July 1993

Major Generators	Number of Trucks*	Percent of Total Trucks at Border Crossing
Laurier (Southbound)		
Wood chips	29	64%
Lumber products	16	36%
Total Trucks at Laurier	*45*	*100%*
Frontier (Southbound)		
Wood chips for the WWP	35	56%
Fertilizer/Chemicals	21	35%
Lumber products	6	9%
Total Trucks at Frontier	*62*	*100%*

* Truck driver interviews were conducted at border crossings on a single day in July between 9:00 a.m. and 7:00 p.m. Note that "number of trucks" in Chart 3.1 represent an expansion of this 10-hour interview sample to reflect total movements across the border for a full day of operation (8:00 a.m. - 12 midnight). This expansion is based upon truck count data provided by the U.S. Customs Service.

Major Origins and Destinations of Wood Products on U.S. 395 North of Spokane

Major origins of wood products transported on U.S. 395 north of Spokane are profiled by Map 3.1 as well as Charts 3.2 and 3.3. Approximately one-half of total wood products tonnage transported on U.S. 395 north of Spokane originates in Canada. While nearly one-dozen Canadian communities were identified as origins of wood product trips by truck drivers interviewed, 80%of the Canadian cargo tonnage originated in Grand Forks and Castlegar. In general, products shipped from Castlegar, enter the U.S. via SR 25. Wood products shipped from Grand Forks tend to enter the U.S. via the Laurier border crossing.

Wood chips represent more than three-quarters of the wood products cargo tonnage originating from Canada. Most of these wood chips are destined for the Washington Water Power Electrical Co-generation Plant near Kettle Falls (see Chart 3.4) While these trips only include about 80 miles of Washington roads (U.S. 395 from Grand Forks and SR 25 from Castlegar), chip truck transportation is both steady and intensive. The median reported cargo weight for chip trucks crossing the U.S. border is 34 tons.

Dimension lumber shipments represent about 20% of total Canadian wood products tonnage transported via U.S. 395. On average, 220 tons of dimension lumber is shipped to Spokane area factories and distribution centers each day. The remainder is shipped to points east, primarily utilizing I-90.

Mills located in Kettle Falls, Colville, and Arden represent the major wood products cargo origins from northeastern Washington. On average, about 800 tons of dimension lumber and 500 tons of wood chips are shipped from Stevens County mills each day. These products are shipped year around with a somewhat smaller transportation flow during the late fall.

The majority of the wood chips crossing the scale near Deer Park originated from Arden and were destined for Lewiston, Idaho via SR 195. On average, 289 tons of dimension lumber produced in Stevens County is shipped to Spokane area destinations each day. However, the majority of dimension lumber is shipped to points east utilizing I-90.

Key destinations and transportation routes for wood products produced north of Spokane are summarized by Map 3.2. Canadian trucks transporting wood chips via SR 25 and U.S. 395 to Kettle Falls represent the largest single generator of cargo tonnage on U.S. 395 north of Spokane. Other major destinations include: Spokane; Lewiston, Idaho via SR 195; and points east via I-90. Smaller daily wood products cargo flows also occur on U.S. 395 through the Tri-Cities and to western Washington.

Map 3.1: Major Canadian and Northeast Washington Origins of Wood Products Transported on U.S. 395 North of Spokane

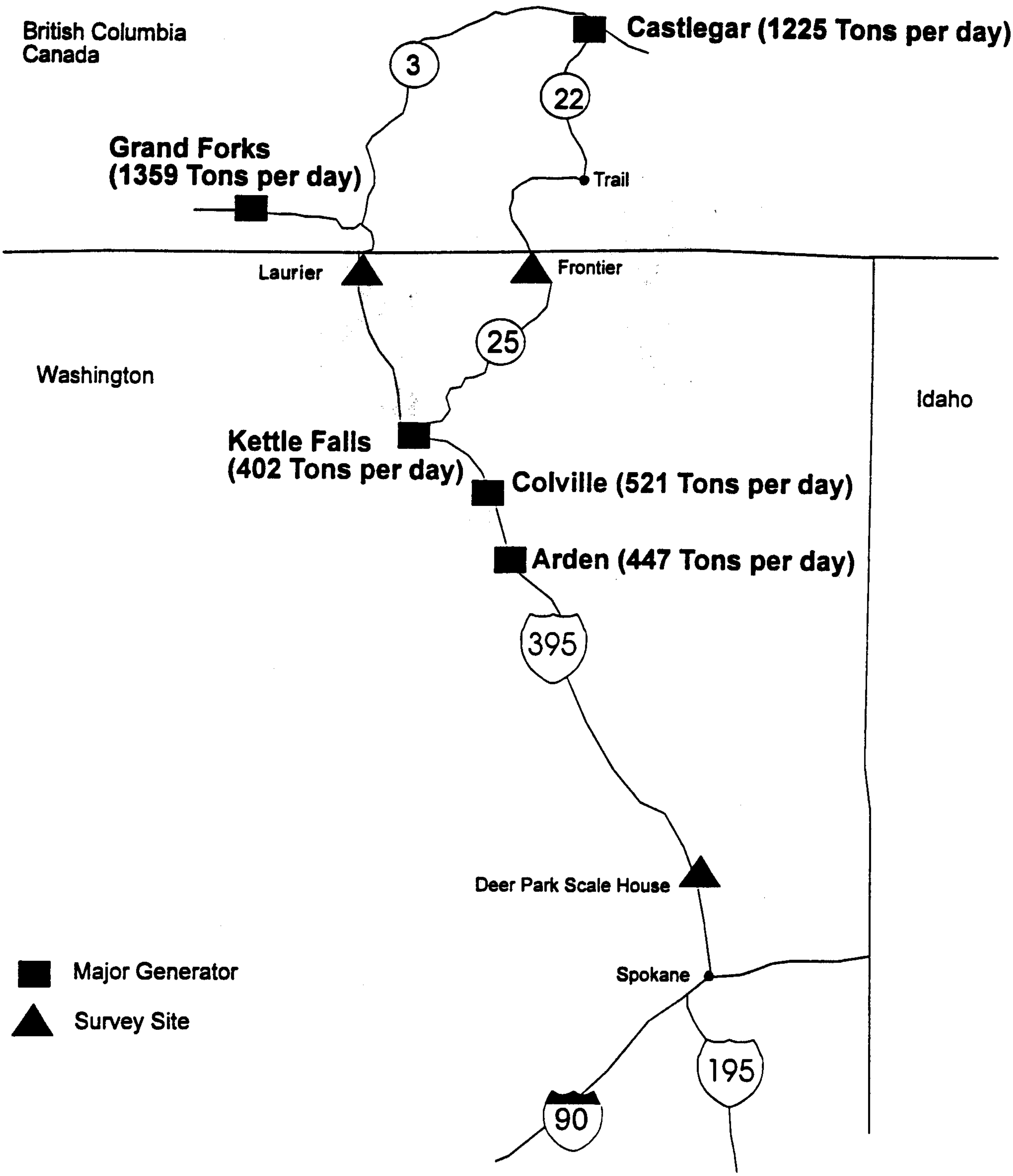


Chart 3.2: Average Daily Tonnage of Wood Products With Canadian Origins on U.S. 395 North of Spokane

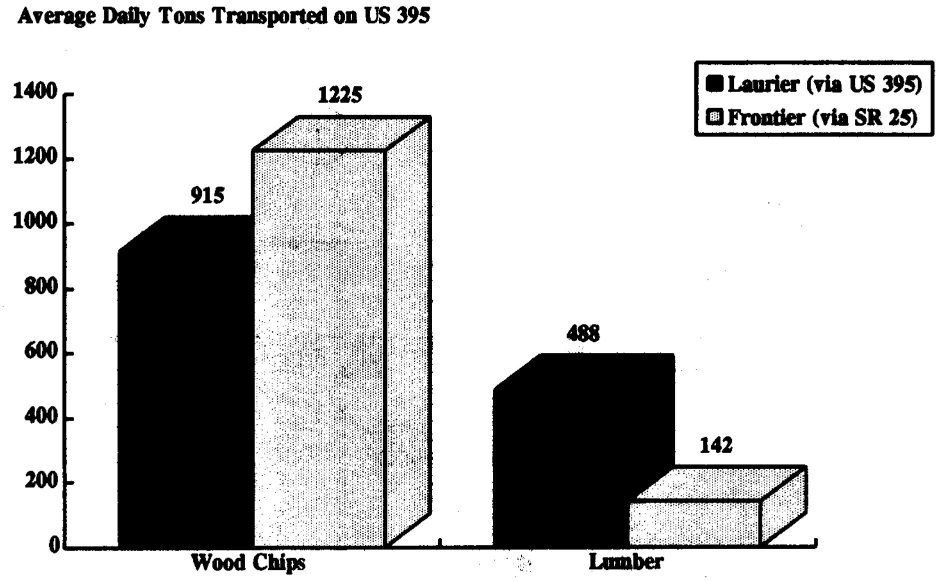


Chart 3.3: Average Daily Tonnage of Wood Products With Washington Origins on U.S. 395 North of Spokane

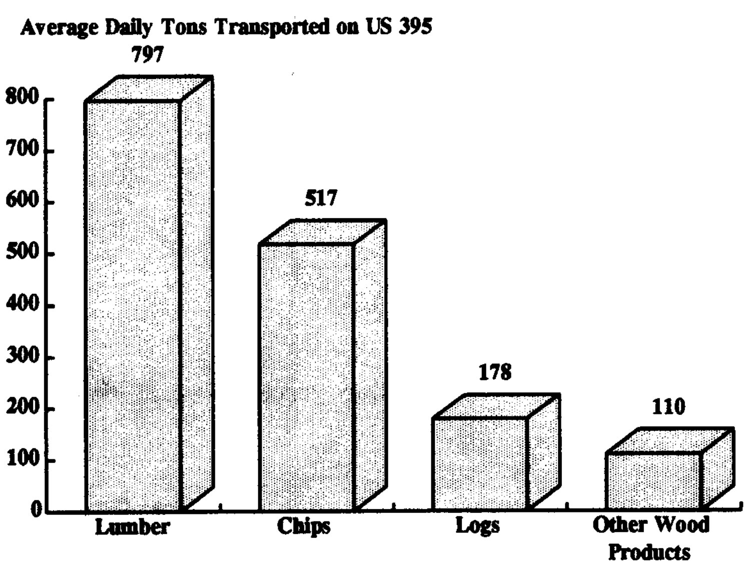


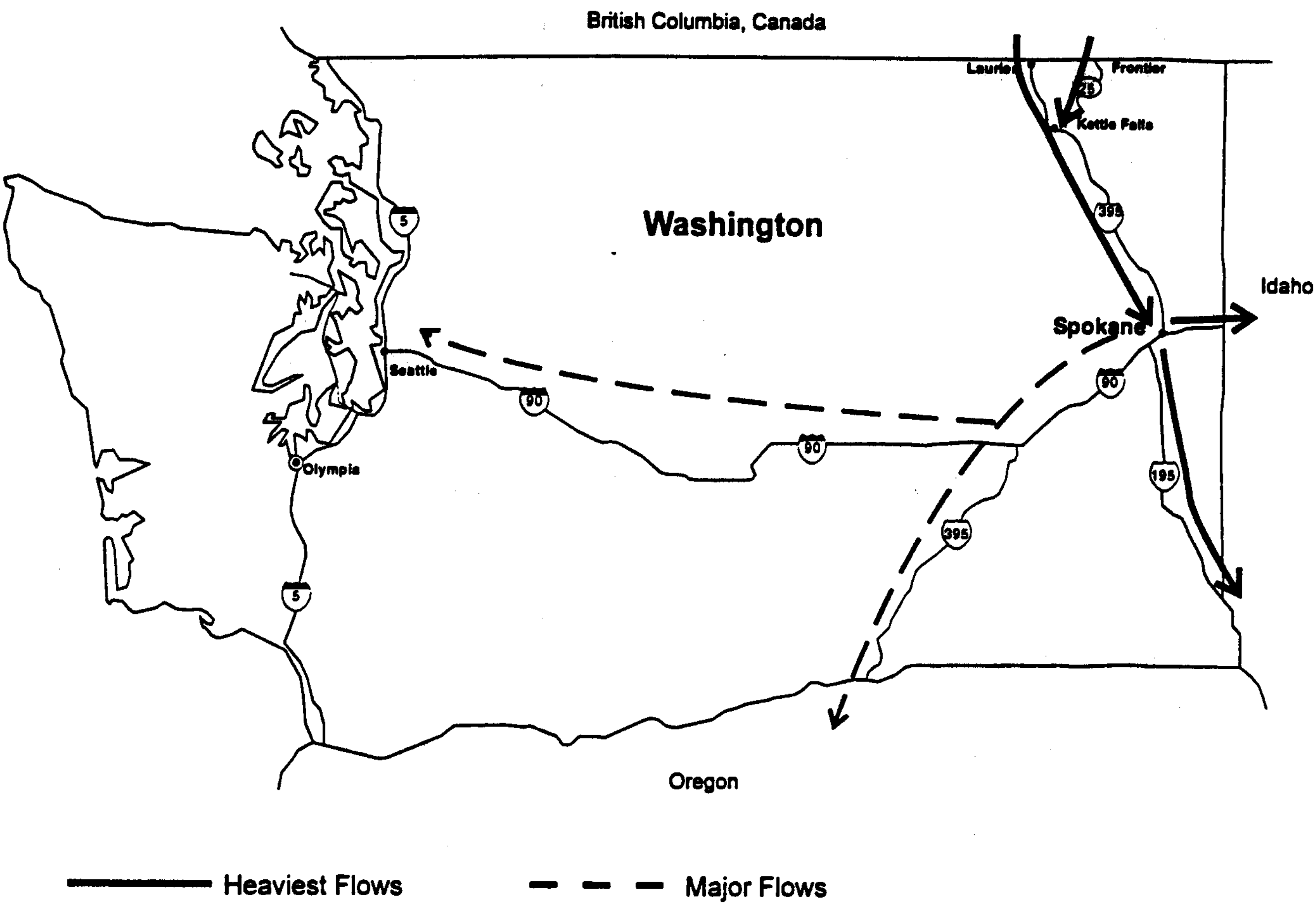
Chart 3.4: Major Destinations of Wood Products Originating From British Columbia

Destination	**Ave. Daily Tonnage**	**Percent of Total BC Origins**
Kettle Falls (WWP Co-generation Plant)	2,140 tons per day	78%
Spokane	375 tons per day	14%
Points east via I-90	223 tons per day	8%
Total trucks from BC origins	2,738 tons per day	100%

Chart 3.5: Major Destinations of Wood Products Originating From Northeast Washington

Destination	**Ave. Daily Tonnage**	**Percent of Total WA Origins**
Spokane	289 tons per day	23%
Points South via SR 195	408 tons per day	30%
Points East via I-90	396 tons per day	29%
Points South via U.S. 395	150 tons per day	11%
Western Washington via I-90	100 tons per day	7%
Total Trucks from Northeast WA Origins	1,343 ton per day	100%

Map 3.2: Summary of Major Wood Products Cargo Flows on U.S. 395 From Origins North of Spokane



Major Origins and Destinations of Chemical Products on U.S. 395 North of Spokane

As noted in Section 2 of this report, 16% of average daily cargo tonnage passing through the Deer Park scale house are chemical products. A more detailed examination reveals that there is only one major generator of chemical products within the region. An average of 17 trucks per day carry fertilizer and related chemical products to U.S. destinations from Trail, BC utilizing U.S. 395. These trucks transport an average of 460 tons of chemical products per day (see Map 3.3).

Hopper trucks carrying fertilizer products from Trail enter the U.S. via the Frontier border crossing and utilize SR 25 to link-up with 395 near Kettle Falls. Personal interviews of truck drivers carrying fertilizer from Trail did not indicate significant utilization of Williams Lake Road as a short cut to U.S. 395.

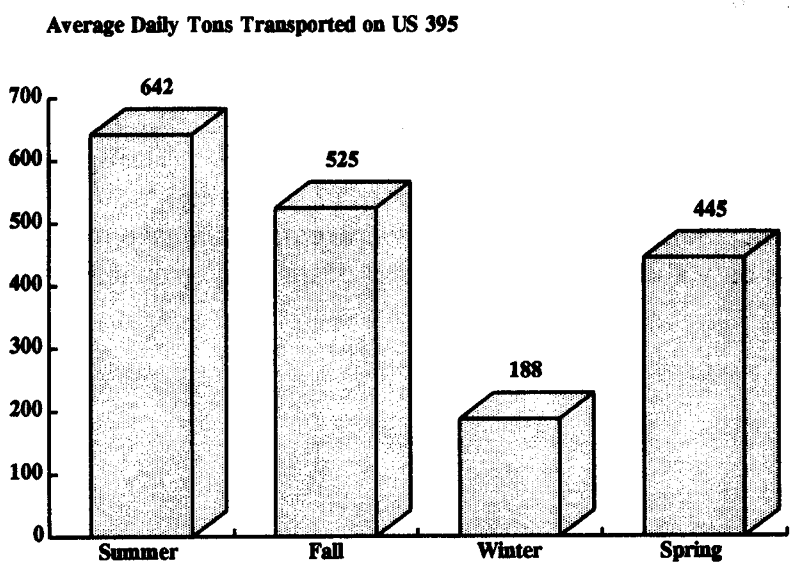
An average of 350 tons per day or approximately three-quarters of all chemical shipments from Trail are destined for distribution centers located in the Spokane area. The most frequently reported Spokane area destinations were "Trentwood" and "Interstate" Idaho. Typically, three loads of fertilizer from Trail are shipped directly to retail outlets in northern Idaho or the Columbia Basin. I-90 eastbound and SR 195 are the primary routes utilized to reach Idaho destinations. I-90 westbound from Spokane and U.S. 395 south from Ritzville are the primary routes utilized to reach retail destinations in the Columbia Basin.

The overall movement of fertilizer products from Trail, BC to U.S. destinations is significantly less during the winter season (see Chart 3.7). Transportation of fertilizer corresponds with the agricultural growing seasons. The highest tonnage is transported during the summer, fall, and spring. The average daily tonnage transported during the winter months is only about one-third the level of the peak growing season.

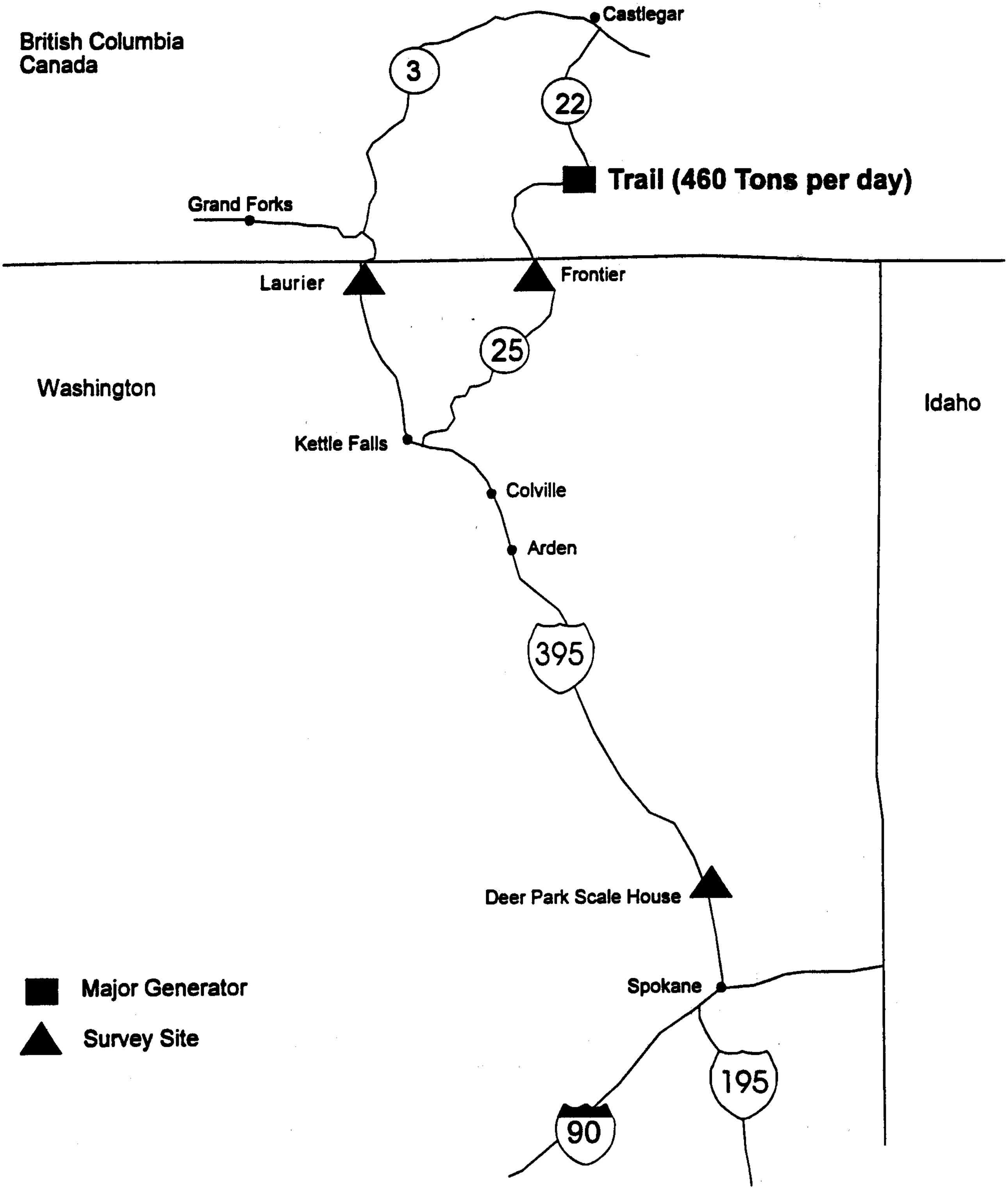
Chart 3.6: Major Destinations of Chemical Products Transported From Trail, BC on U.S. 395 North of Spokane

Destination	Ave. Daily Tonnage	Percent of Total BC Origins
Spokane Area	350 tons per day	76%
Points East via I-90	64 tons per day	14%
Columbia Basin via I-90	46 tons per day	10%
Total Chemicals from Trail, BC	460 ton per day	100%

Chart 3.7: Seasonal differences in chemical product movements from Trail, BC



Map 3.3: Trail, BC is the Primary Generator of Chemical Product Traffic on U.S. 395 North of Spokane



Section 4: Profile of Passenger Cars Crossing the U.S. and Canadian Borders North of Spokane

Freight traffic is only one element of Canadian trade with the United States. Particularly for the region north of Spokane, Canadian and U.S. trade includes tourism, shopping, and business travel. This section provides a brief overview of passenger vehicle trips across the U.S./Canadian border.

The table appearing below documents the number of cars traveling through each border station during the hours interviews were conducted on the assigned weekday during the month of July 1993.

Chart 4.1--Number of Cars passing through U.S. and Canadian Border Crossings

Border Station Name	Interview Hours	Total Number of Cars
Laurier (U.S. Southbound)	9:00 AM -- 7:00 PM	198
Cascade (Canada Northbound)	9:00 AM -- 7:00 PM	176
Frontier (U.S. Southbound)	9:00 AM -- 7:00 PM	109
Paterson (Canada Northbound)	9:00 AM -- 7:00 PM	144
Danville (U.S. Southbound)	9:00 AM -- 7:00 PM	258
Danville (Canada Northbound)	9:00 AM -- 7:00 PM	145
Metaline Falls (U.S. Southbound)	9:00 AM -- 7:00 PM	115
Nelway (Canada Northbound)	9:00 AM -- 7:00 PM	111
Boundary (U.S. Southbound)	9:00 AM -- 5:00 PM	124
Waneta (Canadian Northbound)	9:00 AM -- 5:00 PM	89

A significant number of passenger vehicles passed through border stations at each of the five border locations north of Spokane. Among the border stations, Laurier/Cascade and Frontier/Paterson were the most widely utilized. Approximately three-quarters of the individuals crossing at both U.S. and Canadian border stations are Canadian residents.

It should be noted that all passenger car interviews were conducted on a weekday Monday through Thursday. Weekday interview periods were selected to coordinate passenger car data collection with truck driver interviews discussed in Section 3 of this report. Customs and immigration officials at the border crossings indicate that the number of cars crossing the border is substantially higher on weekends. The traffic flow patterns described in this section reflect mid-week movements. It is probable that interviews conducted on a weekend would produce different flows to key destinations than were recorded through this survey.

The table appearing on the next page illustrates that most people crossing the international border north of Spokane on weekdays are making only short trips. At the Danville border crossing, three-quarters of the total passenger vehicle volume are only going south as far as Danville. At Frontier, 50% of the drivers indicated they were going only as far as Northport. At the other three U.S. border crossing, approximately one-third planned to stop at the first town.

Communities just south of the international border have benefited from Canadian trade. Primary reasons identified by Canadians for crossing the border are to shop, buy gas, and go to the Post Office. Among the weekday passenger vehicles traveling beyond the immediate border communities, the majority are traveling to local regional service and shopping centers in Stevens, Ferry, and Pend Oreille Counties. In particular, Colville is a frequent destination reported by drivers of passenger cars crossing the border north of Spokane.

Recent developments such as the addition of Wal-Mart in Colville and expanded casino gambling on the Spokane Indian Reservation likely provide additional incentive for Canadian residents to travel farther south than the nearby border communities. Case studies conducted for the Eastern Washington Intermodal Study in the Omak/Okanogan region indicate that the establishment of a new Wal-Mart and Tribal sponsored gaming center in those communities has been a major draw for Canadian tourists.

Approximately 20% of the passenger vehicles crossing into the United States intend to go as far south as Spokane. Among the nearly 200 cars crossing the border at Laurier, 44 reported their destination as Spokane. The majority of mid-week trips across the border to Spokane were reported to be for shopping and pleasure. Most indicated that they would be returning home the same day.

Passenger cars traveling northbound into Canada were also interviewed. Their primary origins and destinations are summarized by Chart 4.3. About three-quarters of northbound traffic across the international border is Canadian residents returning home after shopping or visiting destinations in the United States. The surveys conducted as a part of this study indicate that most of these Canadian residents live in communities relatively near the border. Among United States residents traveling to Canada, most go for recreation and a limited amount of shopping.

Chart 4.2: Primary Destinations of Southbound Passenger Vehicles Identified Through a 10-Hour Survey Conducted July 1993

Border Station/Destination	Number of Vehicles	Percent of Total Passing Through Station
Laurier		
Laurier	71	36%
Colville/Chewela	43	22%
Spokane	44	22%
Other	40	20%
Danville		
Danville	193	75%
Republic	17	7%
Curlew	15	6%
Other	33	12%
Frontier		
Northport	55	50%
Spokane	18	17%
Colville	16	15%
Other	20	18%
Metaline Falls		
Metaline Falls	33	29%
Spokane	25	22%
Northern Idaho	15	13%
Colville	8	7%
Other	34	30%
Boundary		
Boundary	45	36%
Northport	18	15%
Colville	17	14%
Deep Lake	11	9%
Spokane	10	8%
Other	23	19%

Chart 4.3: Primary Destinations of Northbound Passenger Vehicles Identified Through a 10-Hour Survey Conducted July 1993

Border Station/Destination	Number of Vehicles	Percent of Total Passing Through Station
Cascade		
Christina Lake	81	46%
Grand Forks	35	20%
Kelowna	14	8%
Other	46	26%
Danville		
Grand Forks	120	83%
Other	25	17%
Patterson		
Trail	42	29%
Rossland	41	28%
Castlegar	23	16%
Nelson	12	9%
Other	26	18%
Nelway		
Nelson	49	44%
Salmo	12	11%
Castlegar	10	9%
Other	40	36%
Waneta		
Trail	45	51%
Castlegar	10	11%
Fruitvale	7	8%
Other	27	30%

Section 5: Implications for Corridor Planning and Development

Research results presented in this report provide an overview of major freight truck transportation flows on U.S. 395 north of Spokane. The major destinations of passenger cars crossing the border between Canada and the United States were also highlighted by the preceding discussion. This final section of the report outlines several implications of the research results for corridor planning and development of U.S. 395 north of Spokane.

<u>A relatively high proportion of multiple-trailer freight vehicles on U.S. 395 north of Spokane is consistent with a priority on future highway capacity improvements to facilitate safe passenger travel through the corridor</u>.

Among major highway freight corridors within the state of Washington, U.S. 395 north of Spokane has the highest percentage of vehicles with two trailers. On average, 27% of the trucks traveling southbound on U.S. 395 have two trailers. This compares with an average of 16% of two-trailer trucks state-wide.

Slow moving multiple-trailer freight vehicles on a two-lane road have the potential to cause hazards for faster moving passenger vehicles traveling the same route. Consequently, highway capacity improvements such as additional turn-out lanes, selective widening, additional passing lanes, and four-laning of high traffic segments should be an important consideration when exploring options for future development of U.S. 395 north of Spokane.

<u>The relatively high median cargo weight combined with a climate subject to major freezes and thaws contribute to higher highway maintenance needs on U.S. 395 and connecting arteries</u>.

The median cargo weight on U.S. 395 north of Spokane is the highest in the state of Washington among major highway freight corridors. The median cargo weight on U.S. 395 is 25 tons per vehicle compared to a state-wide average of 20 tons per vehicle. On certain highway segments such as U.S. 395 from Laurier to Kettle Falls and SR 25 from Northport to Kettle Falls, the median cargo weight is even higher. While the total volume of freight vehicles on U.S. 395 is lower than other major highway freight corridors, the larger vehicles combined with the freeze-thaw cycle in northeastern Washington are demanding on the road surface.

This study has focused on the long-haul southbound freight truck movements on U.S. 395 north of Spokane. However, implicit in the heavy concentration of wood products movements documented by this study are movements of logs from the forests to local mills. These movements were not reflected in the current study because they are primarily short-haul movements on local roads. Log trucks are among the heavier vehicles traveling on the regional road system. Many of the local roads utilized by these trucks are not designed for vehicles the size of log trucks creating special demands of local and state system road maintenance.

Maintaining a rail transportation option for regional lumber mills can be an important demand-side highway management tool for U.S. 395 north of Spokane.

The data presented in this report documents that a significant share of wood products shipments are currently being transported outside the state of Washington by truck. Particularly for long-haul shipments, rail is often a competitive mode of transport for bulky commodities such as lumber. Maintaining and, to the extent possible, enhancing rail service along the U.S. 395 corridor is an important option available to enhance the capacity of the existing highway system by reducing the demand for highway freight transportation through the region.

National events such as NAFTA, changes in the business cycle, and timber supply offerings from national forests are likely to major drivers of future freight transportation volumes on U.S. 395 north of Spokane.

The future volume of freight traffic on U.S. 395 north of Spokane will be heavily impacted by events beyond the control of the local region. For example, a major national economic downturn can quickly change the fortunes of lumber mills that are the primary generators of freight traffic on U.S. 395. Similarly, a major reduction in the availability of local timber supplies may lead to reduced production and volume shipped from the area. The impact of NAFTA on regional freight movements is yet undetermined. This study has documented that a substantial volume of wood and chemical products is currently shipped from Canada through border locations north of Spokane to United States customers. This study found almost no American products shipped to Canada through international border crossings north of Spokane.

Whether or not the current trade patterns will continue in the long-run remains uncertain. Numerous factors including relative value of the two nations' currencies and political changes will impact future trade patterns. Trends reported in this study should be understood as a snap-shot of current freight transportation movements resulting from present economic and political circumstances. The importance of national events in determining regional freight volumes necessitates future corridor development be accomplished in an environment of uncertainty.

The regional transportation system provides important support to local retail trade between the United States and Canada.

Interviews of passenger cars at United States and Canadian border locations north of Spokane document a substantial retail shopping trade between border communities in the two countries. The largest volume of trade is from residents of Canadian communities living close to the international border. These Canadian residents cross over to nearby U.S. border communities for groceries, gas, and postal service. A significant number also travel farther south to Colville and Spokane for shopping needs.

At the time border surveys were conducted in July of 1993, the majority of the shopping was from Canadian residents traveling to the United States. The incentive for Canadians to shop in United States communities continues to be reduced by changing currency values. At some point, changing currency values may result in a reversed trend with economic incentives for American residents to shop in Canada. Regardless of the direction of traffic flow, the regional highway system is critical to efficient and safe travel of shoppers crossing the international border.

Appendix A--Truck Driver Interview Questionnaire

For Office Use Only
Survey__________
QCA__________
Input ☐

Washington State Department of Transportation and
Washington State University
Truck Traffic Survey, Winter 1994

Please Remember - your Club is depending on YOU for the Quality Control Award!

✓ *Write neatly!* ✓ *Do not abbreviate!* ✓ *Complete all required questions!*

Thank You!

CONFIDENTIAL

1) Station Location: **Deer Park**

2) Initials of Interviewer: __________________

3) Interview shift:

1. Day Shift 6:00 a.m. - 2:00 p.m.
2. Evening Shift 2:00 p.m. - 10:00 p.m.

4) Time of interview: _______ AM _______ PM

5) Is this truck a part of the "official sample"? 1) ☐ Yes 2) ☐ No

6) Truck Configuration

[Check only one truck configuration]

[see Quality Control Notes for definitions]

1 ☐ Straight truck
2 ☐ Truck and trailer
3 ☐ Tractor only
4 ☐ Tractor and trailer
5 ☐ Tractor with two trailers
6 ☐ Other (specify)______________

7) Trailer Style

[If appropriate, check more than one trailer style]

[see Quality Control Notes for definitions]

1. ☐ Van (without temperature control)
2. ☐ Van with temperature control
3. ☐ Flatbed
4. ☐ Car carrier
5. ☐ Hopper or belly dump
6. ☐ Stake and rack
7. ☐ Concrete mixer
8. ☐ Tanker
9. ☐ Float or low boy
10. ☐ Dump
11. ☐ Container
12. ☐ Wood Chip
13. ☐ Animal Carrier
14. ☐ Logging
15. ☐ Belt
16. ☐ Other (specify)______________

8) Total number of axles on the ground: ______________

9) Is a hazardous material placard displayed? 1) ☐ Yes ID# ____________ 2) ☐ No

[Please ask the following questions] **CONFIDENTIAL**

10) Trucking company name: ______________________________

11) Trucking company home base: City ______________ State/Province ______________

12) What is the <u>unloaded</u> weight of this vehicle? __________ lbs.

13) Is this vehicle carrying cargo or is it empty? ☐ carrying cargo ***[Ask Q14-21]*** ☐ empty ***[Ask Q22-27]***

14) What is the major commodity on board: ______________________________
DO NOT ABBREVIATE

15) How much does the <u>cargo</u> you are carrying today weigh? ________ lbs.

*Complete only the **<u>one</u>** column that applies to **<u>this</u>** trip.*

Trucks CARRYING cargo:

Where did you pick-up this cargo?

16) City: ______________________

17) State/Province: ______________________

18) Facility: ***[see Quality Control Notes]***

1) ☐ trucking yard
2) ☐ railroad yard
3) ☐ river or ocean port
4) ☐ airport
5) ☐ factory, processing plant, or sawmill
6) ☐ warehouse/distribution center or post office
7) ☐ farm or forest
8) ☐ retail store or gas station
9) ☐ job or construction site
10) ☐ other______________

What is the destination of your cargo?

19) City: ______________________

20) State/Province: ______________________

21) Facility: ***[see Quality Control Notes]***

1) ☐ trucking yard
2) ☐ railroad yard
3) ☐ river or ocean port
4) ☐ airport
5) ☐ factory, processing plant, or sawmill
6) ☐ warehouse/distribution center or post office
7) ☐ farm or forest
8) ☐ retail store or gas station
9) ☐ job or construction site
10) ☐ other______________

Trucks WITHOUT cargo:

Where did this trip without cargo originate?

22) City: ______________________

23) State/Province: ______________________

24) Facility: ***[see Quality Control Notes]***

1) ☐ trucking yard
2) ☐ railroad yard
3) ☐ river or ocean port
4) ☐ airport
5) ☐ factory, processing plant, or sawmill
6) ☐ warehouse/distribution center or post office
7) ☐ farm or forest
8) ☐ retail store or gas station
9) ☐ job or construction site
10) ☐ other______________

What is your current destination?

25) City: ______________________

26) State/Province: ______________________

27) Facility: ***[see Quality Control Notes]***

1) ☐ trucking yard
2) ☐ railroad yard
3) ☐ river or ocean port
4) ☐ airport
5) ☐ factory, processing plant, or sawmill
6) ☐ warehouse/distribution center or post office
7) ☐ farm or forest
8) ☐ retail store or gas station
9) ☐ job or construction site
10) ☐ other______________

28) What Washington highways were used to travel between the two locations identified above?

______________________________ *(Remember to also highlight the attached map.)*

29) ***Including this trip***, how many times has this truck traveled the above route in the past 7 days?
________ Times ☐ Don't know

Appendix B--Car Driver Interview Questionnaire

CONFIDENTIAL

WSU/WSDOT Canadian Border *Southbound* Passenger Car Interview Form

1. Location: **Oroville Southbound** 2. Interviewer:____________________

3. Time of interview:____________a.m. ____________p.m.

4. Is this vehicle a part of the official sample? ___ yes __ no

5. Type of vehicle: 1) ☐ car 2) ☐ car with trailer 3) ☐ RV 4) ☐ light truck

6. Number of passengers:__________________

7. Where do you live? City/State/Province:________________________________

Questions for U.S. Residents

8. Where in Canada did this trip begin today?
City/Province:_______________________

9. Why were you in Canada?
   1) ☐ Recreation
   2) ☐ Work/business
   3) ☐ Shop
   4) ☐ Eat
   5) ☐ Visit friends/family
   6) ☐ Delivery
   7) ☐ Pick-up
   8) ☐ Other:__________________________

10. What is your primary destination today?
City/State:__________________________

11. Why are you traveling to this destination?
   1) ☐ Return home
   2) ☐ Recreation
   3) ☐ Work/business
   4) ☐ Shop
   5) ☐ Eat
   6) ☐ Buy gas
   7) ☐ Visit friends/family
   8) ☐ Delivery
   9) ☐ Pick-up
   10) ☐ Other:_________________________

12. What Washington highways will you use from this border station to your destination today? *(highlight on the attached map)*

13. How many times do you typically travel through this station in a month?__________

Questions for Canadian Residents

14. Where in Canada did this trip begin today?
City/Province:_______________________

15. What is your primary destination today?
City/State:__________________________

16. Why are you traveling to this destination?
   1) ☐ Recreation
   2) ☐ Work/business
   3) ☐ Shop
   4) ☐ Eat
   5) ☐ Buy gas
   6) ☐ Visit friends/family
   7) ☐ Delivery
   8) ☐ Pick-up
   9) ☐ Other:__________________________

17. What Washington highways will you use from this border station to your destination today? *(highlight on the attached map)*

18. Approximately how many times do you typically travel to this destination in a month?
____