

Washington State Freight Truck Origin and Destination Study: Ferry County



EWITS Research Report Number 21-Ferry
January 1998

by

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in cooperation with

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EWITS Research Report: Background and Purpose

This is the twenty-first in a series of Research 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. A state-level Steering Committee provides overall direction pertaining to the design and implementation of the project. The Steering Committee includes Jerry Lenzi, Chair and Regional Administrator (WSDOT, Eastern Region); Richard Larson, Regional Administrator (WSDOT, South Central Region); Don Senn, Regional Administrator (WSDOT, North Central Region); Charles Howard (WSDOT, Planning Manager), and Eric Berger, Executive Director, County Road Administration Board. Pat Patterson 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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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.
4. Gillis, William R. and Kenneth L. Casavant. "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.
5. Newkirk, Jonathan, Ken Eriksen, and Kenneth L. Casavant. "Transportation Characteristics of Wheat and Barley Shipments on Haul Roads To and From Elevators in Eastern Washington." EWITS Research Report Number 5. March 1995.
6. Jessup, Eric and Kenneth L. Casavant. "A Quantitative Estimate of Eastern Washington Annual Haul Road Needs for Wheat and Barley Movement." EWITS Research Report Number 6. March 1995.
7. Gillis, William R., Emily Gruss Gillis, and Kenneth L. Casavant. "Transportation Needs of Eastern Washington Fruit, Vegetable and Hay Industries." EWITS Research Report Number 7. March 1995.
8. Casavant, Kenneth L. and William R. Gillis. "Importance of U.S. 395 Corridor For Local and Regional Commerce in South Central Washington." EWITS Research Report Number 8. April 1995.
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12. Lee, Nancy S. and Kenneth L. Casavant. "Waterborne Commerce on the Columbia-Snake." EWITS Report Number 12. October 1996.
13. Alderson, Lynn C., Kenneth L. Casavant and Eric Jessup. "Transportation Characteristics and Needs of Forest Products Industries Using Eastern Washington Highways: Part I Economic Structure of the Industry." EWITS Research Report Number 13. January 1997.
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15. Alderson, Lynn C. and Kenneth L. Casavant. "Transportation Characteristics and Needs of Forest Products Industries Using Eastern Washington Highways: Part 2 Movement of Raw Logs." EWITS Research Report Number 15. May 1997.
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17. Alderson, Lynn C. and Kenneth L. Casavant. "Transportation Characteristics and Needs of Forest Products Industries Using Eastern Washington Highways: Part 4 Commercial Shipments." EWITS Research Report Number 17. February 1997.
18. Jessup, Eric L., John Ellis, and Kenneth L. Casavant. "A GIS Commodity Flow Model for Transportation Policy Analysis: A Case Study of the Impacts of a Snake River Drawdown." EWITS Research Report Number 18. May 1997.
19. Lee, Nancy S. and Kenneth L. Casavant. "A Commodity and Origin-Destination Analysis of Rail Traffic in Washington--1990-1995. EWITS Research Report Number 19. May 1997.
20. Edwards, Richard, Eric L. Jessup, and Kenneth L. Casavant. "Eastern Washington On-Farm and Commercial Grain Storage." EWITS Research Report Number 20. January 1998.

EWITS Previous Working Paper Series Now Available

1. Lee, Nancy and Ken Casavant. "Grain Receipts at Columbia River Grain Terminals." EWITS Working Paper #1, March 1996.
2. Lenzi, Jerry, Eric Jessup, and Ken Casavant. "Prospective Estimates for Road Impacts in Eastern Washington from a Drawdown of the Lower Snake River." EWITS Working Paper #2, March 1996.
3. Ellis, John, Eric Jessup, and Ken Casavant. "Modeling Changes in Grain Transportation Flows in Response to Proposed Snake River Drawdowns: A Case Study for Eastern Washington." EWITS Working Paper #3, March, 1996.
4. Painter, Kate and Ken Casavant. "A Comparison of Canadian Versus All Truck Movements In Washington State With A Special Emphasis On Grain Truck Movements." EWITS Working Paper #4, March 1996.
5. Jessup, Eric L., John Ellis and Kenneth L. Casavant. "Estimating the Value of Rail Car Accessibility for Grain Shipments: A GIS Approach." EWITS Working Paper #5. April 1996.
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8. Jessup, Eric L. and Ken Casavant. "Economic Evaluation of Grain Shipment Alternatives: A Case Study of the Coulee City and Palouse River Railroad." EWITS Working Paper #8, March 1997.

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Introduction

A large statewide survey of truck traffic origination, destination, and freight characteristics provided the data for in-depth county level reports of freight truck movement in Washington State. Considerable detail on road usage, truck weight, truck configuration, commodity type, and seasonal traffic variation is available in this survey. We were able to examine a rich set of characteristics for trucks whose freight was either destined for or originating from a particular county. It is important to note the survey does not capture truck movement that did not pass through one of 20 survey sites located on major routes throughout the state (see Table 1A for survey sites). For this reason, considerable intra- and intercounty traffic will not be included for some counties depending on their proximity to a survey site. Again, these truck characteristics reflect only the truck movements as reported at the statewide survey locations.

Table 1A--Survey Sites and Traffic Direction

Weigh Station	Site Number	Direction of Traffic	Road Designation
Brady West, WA	1	West	SR12
Brady East, WA	2	East	SR12
Cle Elum East, WA	3	East	I90
Cle Elum West, WA	4	West	I90
Deer Park South, WA	6	South	SR395
Douglas POE (BC Border	7	North	I5
Everett North, WA	8	North	I5
Everett South, WA	9	South	I5
Goldendale, WA	10	North/South	SR97
Kelso South, WA	11	South	I5
Othello, WA	12	All Four	SR17
Pasco, WA	13	South	SR395
Peshastin West, WA	15	West	SR2
Plymouth POE, WA	16	North	SR395
East Port Angeles Westbound, WA	17	West	SR101
Sea Tac South, WA	19	South	I5
Sea Tac North, WA	20	North	I5
East Spokane POE, WA	21	West	I90
Tokio East, WA	22	East	I90
Tokio West, WA	23	West	I90
Umatilla POE, WA	24	South	SR395
Vancouver North, WA	25	North	I5
Wallula POE, WA	26	All Four	SR12, SR395, & SR 370
Osoyoos, BC (BC Border	28	North	SR97
Oroville, WA (US Border	29	South	SR97

Information for this report was provided by an extensive study of freight truck movements on major Washington State highways conducted under the Eastern Washington Intermodal Transportation Study (EWITS). This study was the first in the United States to collect statewide freight truck origination and destination data through direct interviews of truck drivers at weigh stations. Over 300 persons conducted these personal interviews of a total of 30,000 truck drivers, providing an extensive database on freight and goods movements in Washington State.

Method of Analysis

Truck traffic characteristics at the county level were analyzed for trucks whose trips either originated or ended in a particular county. Given the survey data, there was no feasible method for analyzing truck traffic that was simply passing through the county. Detailed truck traffic characteristics for each of Washington's 39 counties by season included number of trucks with freight destined for that county per day, their payload weight and commodity type; road usage, including number of trucks per day, freight weight and commodity type; and number of trucks per day, freight weight and commodity type by city of cargo origin and destination. Truck traffic was analyzed on an annual basis for the following characteristics: county road usage, average and total truck tonnage, and number of trucks by commodity; distribution of freight weight by commodity and by road; type of commodity hauled by truck configuration; and truck carriers' home base for truck trips originating or ending in that county. Truck traffic data is likely to be more accurate in terms of relative differences by road, season, etc., than actual magnitude for any one characteristic due to the nature of the survey approach.

Presentation of Results

Detailed truck traffic characteristics are presented for Washington's 39 counties in a set of nine tables for each county. Table 1 presents information by road for truck traffic either originating or ending in that county for each season. Characteristics include total number of trucks, number of trucks with freight, average payload, and total tonnage. In addition, the percentage of loads by commodity on each road is calculated.

Tables 2 and 3 present seasonal truck traffic characteristics by city of cargo origin and city of cargo destination, respectively. For each city, the daily number of trucks, trucks with freight, their average payload weight, and total truck traffic weight are presented. Again, there is a breakdown by commodity type for each city.

Table 4 summarizes truck traffic characteristics for trucks whose trips end in that county by season. Total daily truck traffic, number of trucks with freight, average payload weight, and the total tonnage per day as well as the percentage of truckloads by commodity are presented.

Table 5 analyzes truck traffic originating or ending in that county by commodity. The number of trucks per day as well as the average and total payload by commodity is presented. In addition, truck traffic usage by road is detailed for each commodity.

Table 6 shows distribution of payload weight by commodity for truck traffic originating or ending in that county. Five weight categories in five-ton increments are used. Table 7 presents distribution of payload weight by road for truck traffic originating or ending in that county. Weight characteristics by commodity and by road are easily identified from these two tables.

Table 8 shows truck configuration by commodity for truck traffic originating or ending in that county. The percentage of trucks with freight by configuration is presented for each commodity. Table 9 presents truckers' home base by city and the number of Washington-based carriers for truck traffic originating or ending in the county.

Overall, this county-by-county disaggregation of truck movements shows the powerful impact of particular commodity movements on certain roads and during certain seasons. Farm commodities are hauled from the field to the processor or market on a seasonal basis. Lumber harvest has considerable seasonal variation as well. Construction or closures on major roads used for these purposes will need to be planned accordingly. As different industries grow or shrink, they create specific demands on the transportation infrastructure that may need to be accommodated in future transportation planning.

These results represent a summary of truck traffic origin and destination information at the county level. This information should be useful for state and county planning with respect to traffic sources, either origin or destination, and the characteristics of this traffic. It should also be valuable for planning road maintenance and construction at the county and regional level.

Ferry County Results

The main truck routes in Ferry County are State Routes 395, 20, and 21 (SR395, SR20, and SR21) (Table 1). Truck traffic on SR395 ranges from 30 trucks per day in fall to 21 per day in summer. Common types of freight include lumber and wood products, rubber or plastic products (tires), livestock, and machinery, with considerable seasonal variation. Traffic on SR20 ranges from 25 trucks per day in summer to 10 trucks per day in spring. Freight on this route consists mainly of lumber or wood products, tires, and transportation equipment. Truck traffic for SR21 ranges from eight trucks per day in fall to two in spring. Lumber or wood products and livestock are the main freight on this route. Average payload weights are highest in summer and fall, due to the high percentage of lumber or wood products and livestock hauled during these seasons. Average weights range from 24 to 28 tons on the main routes in summer and from 25 to 27 tons on the main routes in fall.

The majority of truck traffic originating from Ferry County leaves from Republic, ranging from 22 trucks per day winter and summer to 10 trucks per day in spring. A small amount of daily truck traffic, ranging from four to seven trucks per day, also originates from the towns of Inchelium and Keller in fall and winter. Lumber or wood products make up the majority of freight leaving Ferry County. Other common types of freight categories include livestock, mail and packages from Republic, transportation equipment, and chemicals. The highest average payload weights of 29 tons occur in fall for Keller and Inchelium.

Trucks with freight destined for Ferry County are fairly small in number, ranging from 20 per day in spring to none in winter, according to the survey results (Table 3). Due to the small number of survey responses, data may not be an accurate representation of average daily truck traffic for this county. In fall, five trucks per day are destined for Republic, all carrying rubber or plastic products (tires). In spring, 20 trucks per day are headed for Barstow, half of which are carrying lumber or wood products and half of which are carrying machinery. In summer, nine trucks per day are headed to Republic, but the type of freight category is unknown. Average payload weights range from an average of 30 tons in fall to 15 tons in spring.

Total truck traffic heading for or leaving from Ferry County is fairly constant across the seasons, ranging from 34 trucks per day in spring to 31 trucks per day in winter (Table 4). Lumber or wood products are the predominant freight. Tires, livestock, machinery, and transportation equipment are also common. Average payload weights range from 17 tons in spring to 25 tons in fall and summer.

Table 5 shows road usage by type of freight for the major commodities hauled into or out of Ferry County over the entire year. SR395 is used by the majority of trucks for all commodities. Nearly two-thirds of the trucks carrying lumber or wood products also use SR20, and another 21% use SR21 as well. All trucks carrying tires use both SR395 and SR20. Trucks carrying products other than lumber or wood, tires, and machinery use SR20 half of the time and SR21 28% of the time, in addition to using SR395 about 80%

of the time. Lumber or wood products account for 58% by weight of the total truck freight for the county, even though the average payload weight of 30 tons is higher for tires.

Weight category by commodity for trucks hauling freight into or out of Ferry County is presented in Table 6. For trucks carrying lumber or wood products, one-fourth fall in the over 30 tons category, 59% are in the 20- to 25-ton weight category, and another 15% are in the 25- to 30-ton weight category. Trucks carrying tires are in the 30 tons or more weight category. All trucks carrying machinery weigh between 10 and 15 tons. Three-fourths of the trucks carrying transportation equipment have payload weights under 10 tons and the remaining one-fourth have payloads of over 30 tons.

Table 7 shows weight category by roadway for truckloads originating or ending in Ferry County. Of the loaded trucks on SR395, 19% have payload weights of over 30 tons, and nearly half of the loads are in the 20- to 30-ton range. On SR20, over one-fourth of the payloads weigh 30 tons or more, and half fall in the 20- to 30-ton range. On SR21, truck traffic is much lower, and the majority of trucks fell in the 20- to 25-ton range. Nearly forty percent of trucks carrying loads into or out of Ferry County are tractor-trailer configurations (Table 8). Approximately 30% each are truck and trailer combinations or tractors plus two trailers. Just 9% of freight is hauled by straight trucks. Of the major freight categories, lumber or wood products are most likely to be hauled by tractors plus two trailers while machinery is more likely to be hauled by truck and trailer configurations. Tires are hauled equally by tractors plus two trailers and tractors and one trailer, while livestock is carried exclusively by a tractor and trailer.

Over the four-day survey period (one day in each season), a total of 125 trucks, loaded or empty, were either heading for or leaving Ferry County (Table 9). Of these trucks, 53% were Washington-based carriers. Spokane is home base for one-fourth of the surveyed carriers. Redding, California, is home base for another 8%, while Cedar Hills is the carrier's home base for another 7%.

Table 1--Daily Truck Traffic by Road for Each Season, Ferry County

Season/ Road	Total Trucks Per Day (No.)	Loaded Trucks Per Day (No.)	Average Payload (Tons)	Total Tonnage ¹	Commodity	
					Category	Percent
Fall: SR395	30	22	25	538	Livestock	32
					Lumber, wood	22
					Chemicals	7
					Tires	24
					Mail, packages	7
SR20	22	16	25	399	Lumber, wood	38
					Chemicals	10
					Tires	33
					Mail, packages	10
					Livestock	12
SR21	8	8	27	220	Lumber, wood	20
Winter: I90	17	10	22	227	Lumber, wood	50
					Rubber, plastic	50
SR395	30	18	17	297	Food	8
					Lumber, wood	54
					Tires	29
					Trans. equip	8
SR20	22	13	23	299	Food	12
					Lumber, wood	75
					Tires	40
					Trans. equip	12
Spring: SR21	6	4	23		Lumber, wood	100

Table 1--Daily Truck Traffic by Road for Each Season, Ferry County (cont.)

Season/ Road	Total Trucks Per Day (No.)	Loaded Trucks Per Day (No.)	Average Payload (Tons)	Total Tonnage ¹	Commodity	
					Category	Percent
Spring: SR395	22	18	15	274	Lumber, wood	21
					Furniture	7
					Machinery	59
					Trans. equip	7
					Mail, packages	7
SR20	10	7	16	117	Lumber, wood	14
					Furniture	7
					Trans. equip	13
					Mail, packages	7
SR21	2	0	0	0	Empty	100
Summer: SR395	21	16	28	455	Lumber, wood	93
					Metal products	7
SR20	25	17	26	445	Lumber, wood	87
					Metal products	7
					Machinery	6
SR21	4	4	24	100	Lumber, wood	100

¹Total tonnage may differ from the number of trucks per day multiplied by the average payload due to rounding of values for average number of loaded trucks per day and average payload.

Table 2--Daily Truck Traffic by City of Cargo Origin for Each Season, Ferry County

Season/ Town	Total Trucks Per Day (No.)	Loaded Trucks Per Day (No.)	Average Payload (Tons)	Total Tonnage ¹	Commodity	
					Category	Percent
Fall:						
Inchelium	6	3	29	90	Livestock	50
					Lumber, wood	50
Keller	7	7	29	205	Livestock	77
Republic	15	9	22	189	Lumber, wood	64
					Chemicals	18
					Mail, packages	18
Winter:						
Inchelium	4	4	23	103	Lumber, wood	100
Republic	22	13	23	299	Food	12
					Lumber, wood	48
Sherman Pass	1	1	10	14	Trans. equipment	100
Spring:						
Republic	10	9	18	155	Lumber, wood	44
					Furniture	15
					Trans. equipment	26
					Mail, packages	15
Summer:						
Republic	22	27	26	702	Lumber, wood	55
					Metal products	4
					Machinery	4

¹Total tonnage may differ from the number of trucks per day multiplied by the average payload due to rounding of values for average number of loaded trucks per day and average payload.

Table 3--Daily Truck Traffic by City of Cargo Destination for Each Season, Ferry County

Season/ Town	Total Trucks Per Day (No.)	Loaded Trucks Per Day (No.)	Average Payload (Tons)	Total Tonnage ¹	Commodity	
					Category	Percent
Fall: Republic	5	5	30	156	Printed materials	100
Winter: No trucks in survey.						
Spring: Barstow	20	20	15	305	Lumber, wood Machinery	48 52
Summer: Republic	9	4	24	102	Unknown	100

¹Total tonnage may differ from the number of trucks per day multiplied by the average payload due to rounding of values for average number of loaded trucks per day and average payload.

Table 4--Truck Traffic for Trips Originating or Ending in Ferry County by Season

Season	Total Trucks Per Day (No.)	Loaded Trucks Per Day (No.)	Average Payload (Tons)	Total Tonnage ¹	Commodity	
					Category	Percent
Fall:	33	24	25	604	Livestock	29
					Lumber, wood	29
					Chemicals	7
					Printed materials	22
					Mail, packages	7
Winter:	31	19	20	384	Food	8
					Lumber, wood	57
					Tires	27
					Trans. equipment	8
					Lumber, wood	47
Spring:	34	29	17	494	Machinery	37
					Trans. equipment	8
					Lumber, wood	70
Summer:	33	22	25	550	Metal products	6
					Machinery	5
					Lumber, wood	70

¹Total tonnage may differ from the number of trucks per day multiplied by the average payload due to rounding of values for average number of loaded trucks per day and average payload.

Table 5--Truck Trips by Commodity for Truck Traffic Originating or Ending in Ferry County

Commodity	Truck Trips Per Year (%)	Total Weight		Avg. Payload (Tons)	County Roads Used	
		Tons	% of Total		Road	% of Trips
Lumber, wood	35	1244	58	27	SR395	72
					SR20	64
					SR21	21
Tires	8	307	14	30	SR395	100
					SR20	100
Machinery	9	145	7	13	SR395	91
					SR20	9
Other	48	443	21	18	SR395	79
					SR20	49
					SR21	28

Table 6--Weight Category by Commodity for Truck Loads Originating or Ending in Ferry County

Weight Category (tons)	Commodity									
	Lumber, Wood		Tires		Machinery		Trans. Equipment		Other	
	No. of Loads	% of Total	No. of Loads	% of Total	No. of Loads	% of Total	No. of Loads	% of Total	No. of Loads	% of Total
<5	0	0	0	0	0	0	1	25	4	12
5 - <10	0	0	0	0	0	0	2	50	0	0
10 - <15	0	0	0	0	12	100	0	0	13	44
15 - <20	0	0	0	0	0	0	0	0	0	0
20 - <25	27	59	0	0	0	0	0	0	11	34
25 - <30	7	15	0	0	0	0	0	0	0	0
>30	12	26	10	100	0	0	1	25	4	12
Total	46	100	10	100	12	100	4	100	32	100

Table 7--Weight Category by Road for Truck Loads Originating or Ending in Ferry County

Weight Category (tons)	SR20		Road SR395		SR21	
	No.	%	No.	%	No.	%
<5	5	19	5	7	0	0
5 - <10	0	0	2	2	0	0
10 - <15	3	6	12	16	0	0
15 - <20	0	0	0	0	0	0
20 - <25	14	26	24	32	15	88
25 - <30	12	23	12	16	0	0
>=30	11	26	14	19	2	12
Total	76	100	74	100	21	100

Table 8--Truck Configuration by Type of Commodity Hauled, Ferry County (%)

Commodity	Truck Configuration				No. of Loads
	1	2	4	5	
Livestock	0	0	100	0	7
Food	100	0	0	0	1
Lumber or wood products	0	26	27	37	46
Furniture	100	0	0	0	1
Chemicals	0	0	100	0	2
Rubber or plastic products	0	0	51	49	10
Fabricated metal products	0	0	100	0	1
Machinery	0	91	9	0	12
Transportation equipment	40	0	33	27	4
Mail or packages	100	0	0	0	3
Total	9%	30%	39%	31%	87

Legend: 1 = straight truck, 2 = truck and trailer,
4 = tractor and trailer, 5 = tractor and two trailers

Table 9--Truckers' Home Base for Truck Trips Originating or Ending in Ferry County

Location	Number	Percent
By Town:		
Redding	11	8
Spokane	31	24
Cedar Hills	10	7
Other	73	51
Total	125	100
Wash. State carriers:	69	53