INLAND PACIFIC HUB
Transportation Study

Working Paper 3.5

Modal Issues
(Work Element 3.5)

Final

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Table of Contents

Table of Exhibits

GLOSSARY OF TERMS

Term	Definition
Bulk / Specialized Carrier	Specialized motor carriers transport specific types of goods including construction and military materials, oversize/ overweight items, and hazardous materials. Many carriers have specialized commodities in addition to more traditional truckload goods. The specialized carrier market operates according to dedicated business segments and is often terminal specific according to which materials are being transported (e.g. liquid and dry chemicals). The specialized carrier market is characterized by closed loop operation and trucks often operate with 50 percent empty miles.
Class I Railroad	The largest rail carriers in the U.S., classified by operating revenue. In 2008 Class I carriers were defined as railroads having operating revenue exceeding $401.4 million. Currently seven railroads operating in the U.S. are classified as Class I, including BNSF Railway and Union Pacific Railroad in the Western U.S.
COFC/TOFC	These acronyms mean "Container on Flat Car" and "Trailer on Flat Car" respectively. These are the two common types of intermodal freight.
Combination Truck	A power unit (truck or truck tractor) and one or more trailing units.
Container	A typical container is 40 or 48 feet long, 8 feet tall and 8 feet wide. These steel boxes are used internationally to transport freight by sea, rail and highway. Container traffic is measured in twenty-foot equivalent units (TEUs).
Container provider	For international shipments, containers are typically provided by the ocean carrier from its available empty inventory within proximity of the shipper.
Containerization	The technique of using a boxlike device in which a number of packages are stored, protected, and handled as a single unit in transit.
Deadhead	Trucking industry reference to one leg of a roundtrip that is traveled empty.
Distribution center	Warehousing facilities, where typically like commodities in containers or truck-load lots are resorted into mixed truck loads for distribution to retail outlets or customers.
Drayage Carrier	The service offered by a motor carrier for pick-up and delivery of ocean, rail or air cargo containers.
Inbound Freight Flows	The freight that originates outside a particular state or region and terminates in that state or region

Term	Definition
Inland Port	The term inland port is used in two different but related ways to mean either a port on an inland waterway or an inland site carrying out some functions of a seaport. An inland port in the wide sense, as used in common speech, is simply a port on an inland waterway such as a river, lake or canal. The term inland port is also used in a narrow sense in the field of transportation systems to mean a rather more specialized facility that has come about with the advent of the intermodal container (standardized shipping container) in international transport. Rather than goods being loaded and unloaded in such ports, shipping containers can just be transferred between ship and road vehicle or ship and train. The container may be transferred again between road and rail elsewhere and the goods are only loaded or unloaded at their point of origin or final destination.
Intermodal	Freight that travels from origin to destination on more than one mode of transportation such as a container that arrives from Asia by sea and is transferred to rail for the remainder of its journey.
Internal Flows	Freight that originates and terminates within a particular state or region.
Just-in-Time Inventory System	An inventory and inbound manufacturing strategy that smoothes material flows into assembly and manufacturing plants. The strategy seeks to minimize inventory investment by scheduling delivery of raw materials to the point where they are needed, at the precise time required.
Less Than Truckload (LTL) and Small Package Carriers	LTL carriers consolidate many smaller shipments from multiple shippers located in a common area or region, sort them at dock facilities according to common designation, and then line-haul trailers to a destination dock for delivery.
National Network (NN) Highways	The National Network of Highways includes: (1) the Interstate Highway System and (2) other designated highways, which on June 1, 1991, were part of the Federal-Aid Primary System in effect at that time. There are highways that have been certified by the states to FHWA as being capable of safely handling larger commercial motor vehicles. The total National Network system is about 200,000 miles, and a complete listing of the highways included in the NN can be found in 23 CFR Part 658, Appendix A
National Highway System (NHS)	Approximately 160,000 miles of roadway important to the nation's economy, defense, and mobility. The NHS includes Interstate, other Principal Arterials, Strategic Highway Network (STRAHNET), Major Strategic Highway Network Connectors, and Intermodal Connectors. The NHS was designated as a high priority system under the Clinton Administration.
Nonself-propelled vessels (barges)	Includes dry cargo, tank barges, and railroad car floats that operate in U.S. ports and waterways.

Term	Definition
Ocean port intermodal terminal	There are three general types of intermodal terminals serving container traffic at ports: • On-dock: a rail to ship transfer facility at the marine terminal eliminating the need to transfer containers by truck on city streets. • Near-dock: typically located within a few miles of port terminals; transfer between rail and ship requires a truck move and additional container lifts. This type of terminal has the advantage of serving multiple ocean carriers. • Inland port/satellite: Located away from the port - most advantageous if shuttle trains operate between the inland terminal and port facilities to avoid port traffic congestion.
Outbound Freight Flows	The freight that originates in particular state or region and terminates outside of that state or region.
Panamax ships	"Panamax ships" are the largest ships able to pass through the lock chambers of the Panama Canal. The current lock dimensions are 1,000 feet long and 106 feet wide. Many ocean going cargo ships are built to the Panamax limit to carry the maximum amount of cargo through the canal. Current containers ships are limited to approximately 5,000 TEU. When the larger locks currently under construction are completed in 2014, the Panama Canal will be able to handle container ships of up to approximately 13,000 TEU - this class of ships is typically referred to as "Post- Panamax" ships.
Private Carriers	Unlike "for-hire" trucking services, private carrier fleets are operated by businesses whose primary business is something other than transportation. For instance, private carrier fleets may be operated by manufacturers, distributors, retailers, or other businesses operating trucks as an internal value-added function primarily to meet their own business shipping needs. While private truck fleets primarily serve a single company, private carriers are allowed to sell unused backhaul capacity on a for-hire basis. Wal-Mart is an example of a private carrier.
Self-propelled vessels	Includes dry cargo vessels, tankers, and offshore supply vessels, tugboats, pushboats, and passenger vessels, such as excursion/sightseeing boats, combination passenger and dry cargo vessels, and ferries.
Short-ton	A unit of weight equal to 2,000 lbs..
Single-unit Truck	A large truck on a single frame with at least 2 axles and 6 tires. Excludes “other 2-axle, 4-tire vehicles” noted above.
Supply Chain	A group of physical entities such as manufacturing plants, distribution centers, conveyances, retail outlets, people and information which are linked together through processes (such as procurement or logistics) in an integrated fashion, to supply goods or services from source through consumption.

Term	Definition
TEU	Twenty-foot Equivalent Unit - the standard of measurement for intermodal containers. Early containers used for cargo were 20 feet long, 8 feet wide and 8.5 feet high. Today containers come in a variety of sizes including 40 foot, 45 and 53 foot domestic containers.
Third party logistics (3PL)	A firm that specializes in logistics services that are provided to other companies.
Through-Freight Flows (Overhead flows)	Freight traffic volumes that originate and terminate beyond the borders of a state or region, but that use transportation infrastructure of the state or region during transit.
Transload	The practice of transferring product between truck and rail transportation. In most instances, a transload facility operator, third-party logistics company, or broker facilitates transloading for both the shipper and the consignee. These companies coordinate truck and rail connections and frequently offer warehousing and other services to facilitate storage and delivery.
Transloading	The practice of transferring product between truck and rail transportation. It allows shippers and their customers to enjoy much of the cost benefits of rail transportation without having a rail siding at their door-at the least an expensive proposition, and for many companies, a physical impossibility. In most instances, a transload facility operator, third-party logistics company, or transportation broker facilitates transloading for both the shipper and the consignee. These companies coordinate truck and rail connections and frequently offer warehousing and inventory management services to facilitate storage and delivery.
Truckload Carrier	The truckload (TL) motor carrier segment generally does not operate across a regular route, but rather delivers shipments directly to a recipient and try to pick up another truckload shipment at or near the first delivery point for a "backhaul" load. TL carriers generally have little need for extensive terminal or warehousing facilities.

INTRODUCTION

The Inland Pacific Hub (IPH) study area is comprised of nineteen counties located in eastern Washington and northern Idaho. The economic interests of this region are represented in part by the Inland Pacific Hub Advisory Board, a public-private partnership established by and consisting of representatives from both states. The Board's objective is to establish the Inland Pacific Hub study area as a multimodal global gateway to increase international commerce.

The IPH Board partnered with the Washington State Department of Transportation and the Idaho Transportation Department to study the region's capacity for economic development. The Inland Pacific Hub Transportation Study has two objectives: 1) To identify the Inland Pacific Hub study area's capacity as a globally-connected, multimodal transportation gateway; and, 2) To identify the critical infrastructure requirements needed to drive the IPH study area's future economic growth.

Report Organization and Composition of Task 3

To accomplish the objectives established by the IPH Advisory Board, Wilbur Smith Associates, in association with HNTB and Halcrow, proposed a work plan based on six tasks:

Task 1: Analyze Existing Transportation Market
Task 2: Profile Existing Multimodal Transportation Infrastructure (Tech Memo 1)
Task 3: Profile Regional Economic Assets (Tech Memo 2)
Task 4: Profile Commercial and Technology Assets (Tech Memo 3)
Task 5: Identify Public Education and Stakeholder Involvement
Task 6: Compile Final Report and Phase II Recommendations

Several tasks (2, 3 and 4) have Technical Memoranda as final task deliverables. Technical Memoranda 2 and 3 are each made up of several internal working papers that break the analysis associated with these tasks into discrete work elements, to allow study team members to work concurrently on sub-tasks.

This Working Paper

This Working Paper (3.5), *Modal Issues* examines the multimodal freight transportation systems in the IPH study area, including key gateways and intermodal connections for the purpose of identifying modal and intermodal constraints and opportunities. Border crossings are examined as an integral part of the region's transportation system. The working paper also serves as the conclusion to a series of analyses examining the regional economy, commodities, competitive factors and trade issues in four subsequent working papers:

Working Paper 3.1: Economic Base Analysis
Working Paper 3.2: Regional Freight Profile (Commodity Flow Analysis)
Working Paper 3.3: Regional Competitiveness
Working Paper 3.4: Trade Opportunities

These five working papers under Task 3 will be integrated into a comprehensive description of the IPH Study Area's Economic Assets (Technical Memorandum #2). A more in-depth examination of the study area economy, at the county level is presented in Technical Memorandum #3.

This working paper is organized as follows:

1. The Role of Freight Modes in the Global Economy
2. Stakeholder Views on IPH Modal Assets
3. Key Gateways and Corridors Serving the IPH Study Area
4. Truck Transport Issues and Opportunities
5. Rail Transport Issues and Opportunities
6. Air Cargo Issues and Opportunities
7. Water Transport Issues and Opportunities

THE ROLE OF FREIGHT MODES IN THE GLOBAL ECONOMY

The Role of Transportation Modes in the Global Economy

As discussed in associated IPH Transportation Study working papers, trade has become a significant component of the U.S. economy, and services such as transportation and warehousing have grown rapidly to support this trade economy. Freight transportation is also becoming more multimodal as many goods travel farther and sophisticated supply chain management systems seek to maximize inherent benefits offered by each mode.

This paper examines the role of freight transportation modes within the IPH study area. The paper also compares the modal roles in the IPH study area to roles the modes play in the broader national economy. The comparison is between two similar but different data sources.

- National level commodity and modal statistics are taken from the recently released, preliminarily estimates from the 2007 Commodity Flow Survey (CFS). The commodity flow survey is conducted by the Bureau of Transportation Statistic every five years. A primary goal of the CFS is to estimate shipping volumes (value, tons, and ton-miles) by commodity and mode of transportation at varying levels of geographic detail, primarily the national and state level.
- Commodity data for the IPH study area is taken from the TRANSEARCH™ dataset purchased for the study that is specific to the nineteen county IPH study area. TRANSEARCH™ data uses the CFS for recalibration every five years, but is enhanced through other data sources and is produced annually and is available at a county level of detail.

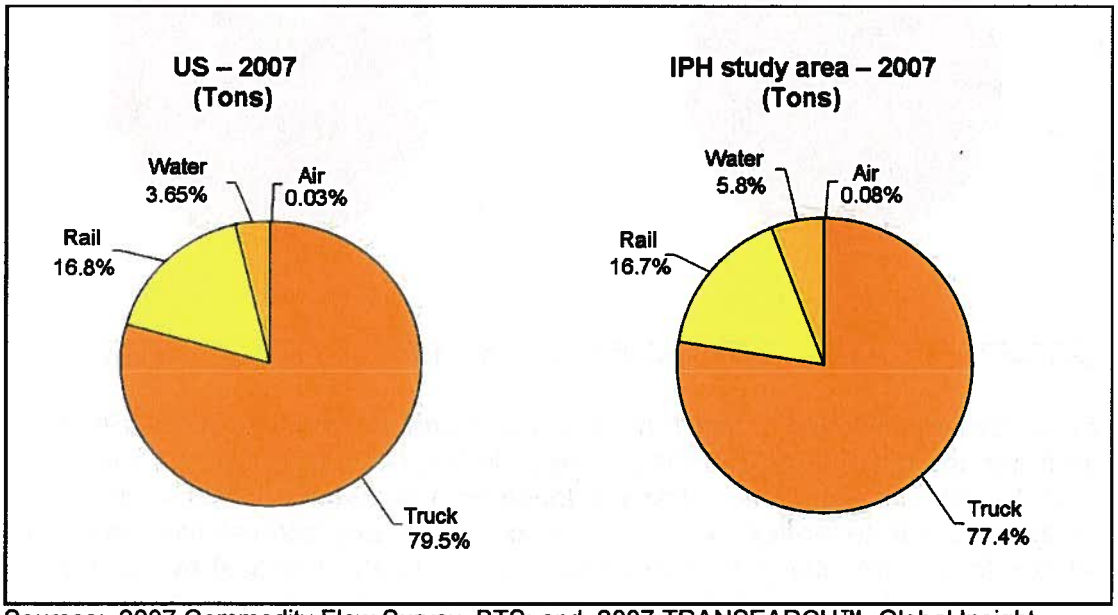
According to preliminary estimates from the 2007 CFS, more than 13 billion tons of freight, valued at $11.8 trillion was transported nearly 3.5 trillion ton-miles in the United States during 2007. Freight shipments measured in weight (tonnage), value (US dollar), and distance (in terms of ton-miles), are all on the rise, compared to 2002 totals. Tonnage was up 12 percent, value (inflation adjusted) up 13 percent, and ton-miles up 11 percent. Yet, in terms of transport mode, nearly 93 percent of the total tonnage and 81 percent of the total value of freight were shipped by means of a single transportation mode, while the remainder was shipped using two or more modes.

The "Regional Freight Profile (Commodity Flow Analysis)" Working Paper 3.2 provided a detailed commodity profile for the IPH study area including a summary of commodity movements by direction and mode in both tons and value. In this paper, modal statistics, trends, and issues are examined and analyzed from a higher policy and strategic view point. The goal is to identify

meaningful modal-based freight transportation investments within the IPH study area transportation framework. The regional freight assets serving the IPH study area are examined in terms of the changing domestic and global economic climate and the inter-related freight transportation forces.

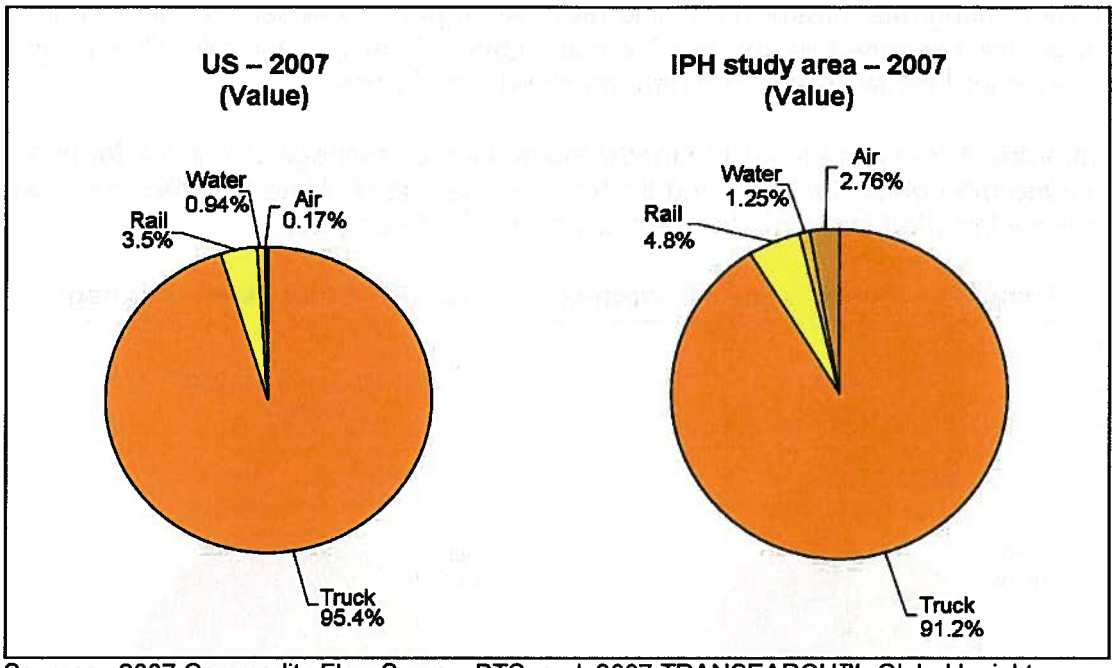
Exhibits 1 and **2** compare the modal distribution by tonnage and value for goods moved throughout the U.S. and for the IPH study area. Note the "through flows" are not included in the modal summary for the IPH study area.

Exhibit 1: Single Mode Distribution U.S. vs. IPH Study Area (Tonnage)



Sources: 2007 Commodity Flow Survey, BTS; and, 2007 TRANSEARCH™, Global Insight

Exhibit 2: IPH Study Area – Single Mode Distribution – by Value



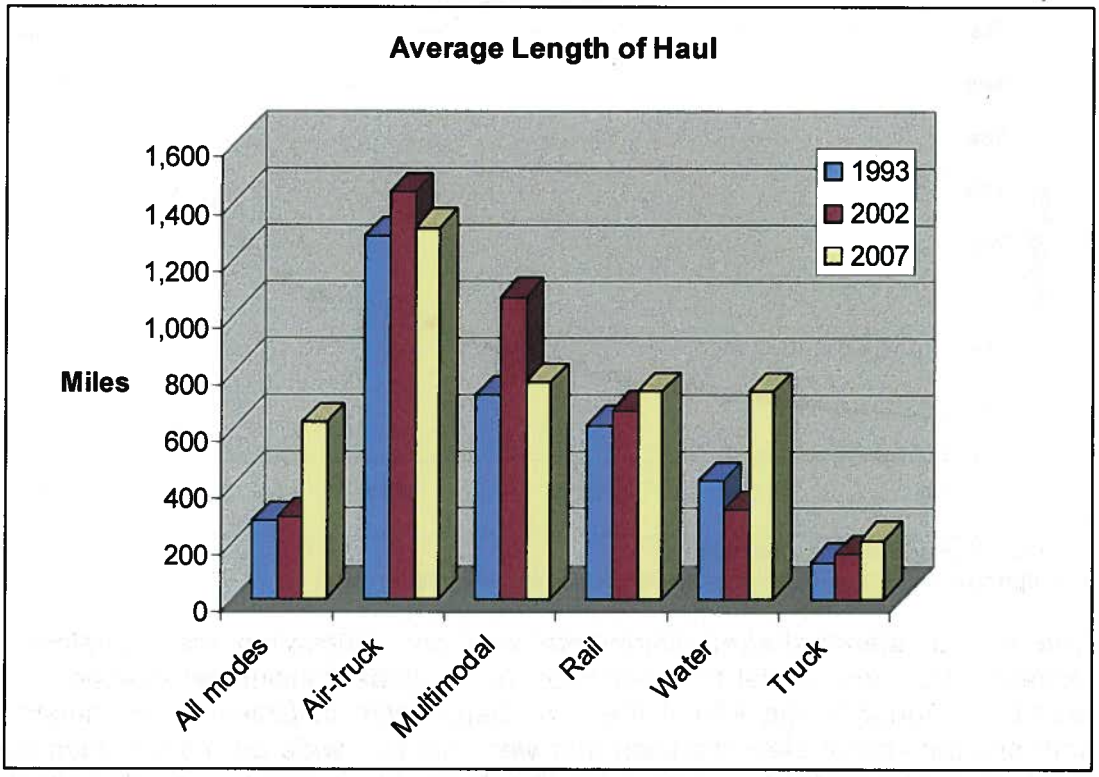
Sources: 2007 Commodity Flow Survey, BTS; and, 2007 TRANSEARCH™, Global Insight

As is shown in Exhibit 1 and Exhibit 2, the modal distribution of the IPH study area and the national as a whole are very similar. Not surprisingly trucking is the most heavily utilized mode of transportation both across the U.S. and in the IPH study area, due to its flexibility, high service quality and competitive nature. Rail shares for the IPH study area and the U.S. are nearly identical by volume and only slightly higher in the IPH study area by value. In terms of air cargo and water shipments, the IPH study area appears to utilize these modes at a far higher rate than the national average. This level of air cargo and water modes likely reflects the unique economic make-up of the IPH economy. For instance agriculture in the region is a heavy user of both modes: bulk grain shipments are carried to the coast on the Columbia/Snake River System, and perishable fruits such as cherries are flown directly to Asia from Moses Lake.

Exhibit 3 displays the trend in the average length of haul by mode from the past three CFS surveys. The overall trend is that more goods are traveling further distances. According to the 2007 CFS, the average length of haul in trucking has increased nearly 24 percent over 2002. Currently, the average truck shipment moves 206 miles. The average length of haul for rail increased nearly 10 percent during the same time frame, for an average distance of 728 miles. Interviews with rail personnel also suggest that intermodal rail service has even higher average lengths of haul; according to BNSF the average length of haul for intermodal shipments on western railroads is approximately 2,500 miles.[1]

[1] Discussion with Vann Cunninghm, BNSF Vice President of Economic Development.

Exhibit 3: Average Length of Haul for Select Modes



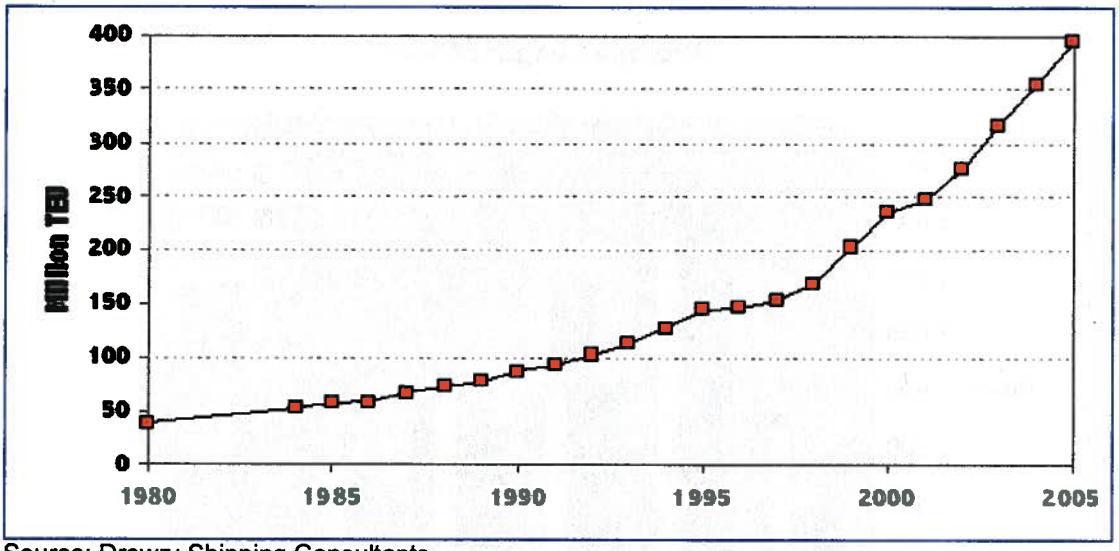
Source: USDOT, Research and Innovation Technology Administration (RITA), Bureau of Transportation Statistics (BTS). Notes: The Commodity Flow Survey (CFS) is a partnership between BTS and the U.S. Census Bureau. The Air-truck mode is defined as: *Air (includes truck and air) - Shipments that used air or a combination of truck and air.*

Containers, Intermodal Freight and Modal Productivity

The trend toward a trade-based economy has also helped shape national transportation policy toward intermodal freight transportation (i.e., the ability to smoothly transition freight shipments from one mode to another).[2] Intermodal transportation has become the center piece of U.S. transport policy since Congress passed the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991. *Containerization* is the common standard that enables intermodal freight transport. **Exhibit 4** shows that since 1980 intermodal container volumes have increased eight-fold. In 2006, railroad intermodal traffic in the U.S. exceeded 14.2 million units (containers and piggy-back trailers); containerized freight accounted for 11.8 million units. With the recession that began in 2008 container volumes dropped significantly, but long term container traffic is expected to grow.

[2] The terms intermodal and multimodal are often used interchangeably. For discussion purposes multimodal will be used to describe any transfer of freight between two or more modes not involving containerized freight. Intermodal will be used to describe containerized freight movements.

Exhibit 4: World Container Traffic (millions of TEUs)



Source: Drewry Shipping Consultants
http://people.hofstra.edu/geotrans/eng/ch3en/conc3en/ch3c5en.html

The use of standard-sized containers was one innovation that transformed domestic U.S. intermodal transportation into a global multimodal transportation standard. During World War II the U.S. Department of Defense experimented with standard-sized steel modules that were 6.3-foot wide by 6.8-foot high and 8.5-foot long capable of carrying 9,000 lbs. to speed up shipping goods between the U.S. and foreign locations. In the 1950s the Department of Defense reset the nominal specifications to 8-foot wide by 8-foot 6-inches high and in 10-foot long increments with a maximum freight weight capacity set at approximately 45,000 lbs.. Eventually, 20-foot long and 40-foot long containers became the standard length increments. The 20-foot long containers are referred to as twenty-foot equivalent units (TEU) and the 40-foot long containers are referred to as forty-foot equivalent units (FEU). Vessel size and port handling capacities are measured in TEUs. Twistlocks located at the container corners enable cranes to safely and rapidly lift containers off-of or onto container ships, rail intermodal cars and container chassis.

Source: Mi-Jack Products, Inc., product web site

These standards were adopted by the International Standards Organization (ISO) in the 1960s. By the mid-1970s size, weight and loading practices were adopted worldwide and the modern era of multimodal transportation that integrated vessel, train and truck movements commenced.

From the 1970s through the 1990s several additional container size standards were introduced to increase the cubic capacity and loading efficiency of global freight shipments. High-cube containers measuring 9-foot 6-inches high were introduced, as well as 45-foot long 8-foot high or 9-foot 6-inch high-cube containers. Refrigerated containers in 20-foot and 40-foot lengths were introduced. A more recent innovation was the introduction of tanktainers. Tanktainers are tanks that can hold gas or liquids and have a surrounding steel structure fitting the standard 20-foot or 40-foot container sizes enabling them to be stacked with standard sized containers.

Container Weight Issues

In most foreign countries the weight limitation for freight loaded into a container is in the range of 52,000 to 55,000 lbs. (lbs), as the gross vehicle weight (GVW) limit on trucks in most foreign countries is 96,000 lbs or more. The gross vehicle limit on most of the federal highway system in the U.S. is 80,000 lbs. As a result, most payloads in the U.S. max out at between 45,000 lbs. and 50,000 lbs. depending on the tare weight (empty weight) of the truck. However, many states in the western U.S. are allowed to exceed the 80,000 federal limit because state regulations allowed higher GVW weight limits at the time federal limits were first imposed. This exemption is referred to as a "grandfather" provision. Overweight containers are typically not an issue in either Washington or Idaho, as both states readily allow a GVW limit of 105,500 pounds, provided legal axle weight limits are maintained. In Idaho, a permit is required to exceed the 80,000 lb. GVW limit on Interstate and National Network Highways.

Domestic Container Sizes

Domestic long-haul highway transportation within the U.S., Canada and Mexico typically uses truck trailers that are 48-foot or 53-foot in length. In the 1980s the U.S. railroads introduced similar size, domestic containers to compete with 48-foot and 53-foot truck trailers (although the shorter, less efficient 48-foot containers are now being phased out).

Long-haul rail intermodal service is typically less expensive than truck service because one train can move 200 containers whereas 200 trucks and drivers would be needed to move 200 highway truckloads. Depending on the freight corridor, equipment availability and the seasonal intermodal costs can be from 5 percent to 15 percent less than truckload service. However, due to the time consumed for terminal in-gating, loading and off-loading containers onto the trains, and interchanging trains and drayage delivery, intermodal transit usually takes longer to complete than the more simple door to door truck delivery.

Long-haul intermodal service is also more cost effective in 53-foot domestic containers compared to 40-foot international containers because a 53-foot domestic container typically can hold about 30 percent more volume than a 40-foot international container. The constraint for international trade is that 53-foot

long domestic containers do not fit into the standard 20-foot or 40-foot slots on containerships so domestic containers cannot be loaded for export.

Although a 48-foot or 53-foot domestic container can be stacked on top of a 40-foot international container in an intermodal railcar, the railroads prefer not to mix the domestic and international containers on one railcar. To gain handling efficiencies, some railroads have designated select intermodal terminals to handle only international or domestic containers, but not both. There is a carbon impact reduction by moving 200 containers on a single train compared to moving 200 trucks pulling the same amount of freight. **Exhibit 5** shows a comparison among major service elements of the various modes in terms of their operating productivity over the past several decades. Shipping and rail elements of the intermodal freight system have significantly outpaced the other modes in productivity advances in terms of equipment and its utilization.

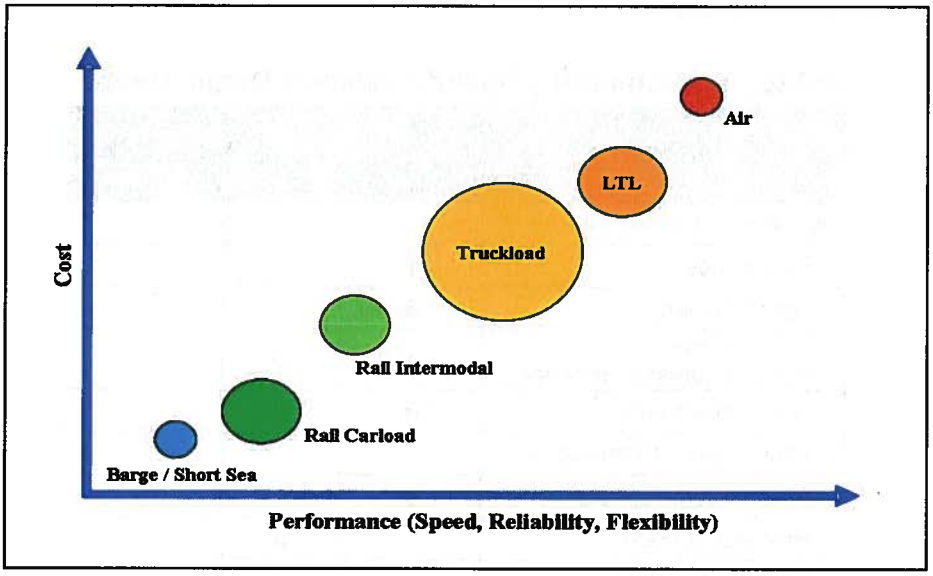
Exhibit 5: Relative Growth in Modal Operating Equipment Productivity

Modal Performance Examination

The success of intermodal freight transportation results from economic synergies gained by integrating the best attributes of each individual mode. Working together each mode performs most efficiently the task it does best. Typically, railroad line-haul costs are less than those for motor carriers, while motor carriers have greater flexibility and universal access to industrial and commercial locations. Joint services take advantage of these strengths but are much more complicated than single mode movements, due to the specialized equipment, terminals and coordination among firms. The additional cost and complexity creates important prerequisites for the success of rail intermodal such as the availability of willing firms skilled in providing intermodal services.

In order for intermodal rail services to produce a rate advantage, shipments typically must move a significant distance (500 miles or more) to allow rail line-haul economies to outweigh higher terminal and transaction costs. Other requirements usually include significant volume to operate daily trains with on-time reliability competitive with trucking. As a result, rail intermodal services are ordinarily provided only in high volume corridors between major population centers. **Exhibit 6** expands on the notion of cost and service levels associated with a variety of freight transport modes, with the bubbles representing the relative market share.

Exhibit 6: Modal Service versus Cost Continuum[3]



Speed to Market

Speed to market is one of the most important factors in supply chain design and execution and it influences modal selection by commodity type. Every supply chain differs in its need to economize on cost while at the same time arranging to consistently deliver the freight at the right time to the right destination in good condition.

Some commodities must get to the market very fast before the product's perishable life span expires. Usually, the higher the price and the fresher the product, the faster it must get to market. Fresh food must get to market while it is fresh and safe for consumption, usually only a few days. An expensive cell phone must get to market in a few weeks before the next competitive model with newer features and benefits attracts buyers' interest. A pharmaceutical must arrive in days before its potency date expires. Other commodities have wider windows for delivery because of their lower cost and more flexible consumption period.

[3] Adapted from: Lanigan, Jack Sr.; Zumerchik, John; and: Rodrigue, Jean-Paul. *Automated Transfer Management Systems to Improve Intermodal Efficiency of Rail Freight Distribution.* Undated. pg. 3

Presents for the holiday season should arrive in November or December but not in the summer. Lawn fertilizers should arrive in April or May for summer application, but if shipped in October the product would sit on the shelf all winter. Still, other commodities have a wider window of utilization and are typically lower cost bulk products such as grain, manufacturing materials such as raw lumber, wood or metal products, or products that are heavy and relatively low cost such as car batteries. Because bulkier products are in storage for longer time periods before transformation into finished products, there is less need for rush to storage facilities. They can utilize slower more cost efficient transportation. **Exhibit 7** shows several examples of the speed to market concept. The table displays the relative importance (required vs. optional) of velocity to market for a variety of industry sectors.

Exhibit 7: Commodity Speed to Market Requirements

Commodity Classification	Relative Transportation Speed		
Sample Commodities	Fast	Medium	Slow
High Priced Commodities			
Electronics	●		
High Fashion	●	○	
Just In Time Manufacturing Components	●	○	
Pharmaceuticals	●	○	
Medium Priced Commodities			
Fresh Food, Flowers	●		
Processed Food		●	
Seasonal Apparel		●	○
Consumer Goods		●	○
Lower Priced Commodities			●
Manufacturing Materials		○	●
Wood Products			●
Agricultural Products			●
Bulk Products			●
	● = Required, ○ = Optional		

Different modes of transportation have various speed capabilities to deliver freight. **Exhibit 8** shows the relative speeds for different modes. A basic comparison of transit times for the main market-to-market lane of Seattle to Chicago depicts how fast freight can move by various modes. Airfreight is the fastest while boxcar is the slowest. A plane can fly from Seattle to Chicago (approximately 2,100 miles) in just over 3 hours. After truck pick-up and delivery time is factored into the journey, a parcel can be delivered in less than 24 hours (same day service) depending on flight schedules. Team truck is the fastest surface transportation because two drivers share the non-stop driving

responsibilities and can transit the distance from Seattle to Chicago in less than 38 hours (second day service) at an average speed of 55 miles per hour. Standard single driver truck service (in which hours of service apply) limits driving time to 11 hours per day or an average of 550 miles per day, and can transit the distance in a little less than 4 days.

Exhibit 8: Relative Modal Speed

	Relative Transportation Speed		
Transportation Mode	Fast	Medium	Slow
Air Freight	●		
Truck - Team Drivers	●		
Truck - Regular		●	
Express Intermodal Unit Train		●	
Domestic Intermodal		●	
Boxcar			●
Liner Vessel Service		●	
Slow Steaming Vessel Service			●
Barge			●
● - Indicates typical speed performance of mode/service			

Intermodal rail has various service options that are basically divided into unit train service and domestic intermodal service. Unit trains are long trains that are completely loaded with containers at the origin point such as a port and are typically moved non-stop from origin to destination (stopping only for train crew changes). Domestic intermodal trains are either fully or partially loaded at the origin point and make one or several intermittent terminal stops along its scheduled journey to drop-off or pick-up additional containers. Each stop can involve several hours as intermodal cars are separated from the train or added to the train. The duration of the stop also depends on the operating hours of an individual terminal. Hours accumulated for intermittent terminal stops and operating constraints can add days to the actual journey time compared to scheduled time. For this reason, railroads design their intermodal operating schedules for long mainline transits with minimal stops in areas where only a few containers could be dropped off or picked up, raising idling and terminal costs while reducing profitability.

As discussed earlier containerization and double stack intermodal service has evolved to accommodate the trade economy of the U.S. As a result, population has become the primary driver of intermodal facility location. The IPH study area does not have a large dedicated intermodal terminal. The surrounding population base is not large enough to attract a large amount of inbound or outbound

container moves which makes stopping a train more costly per container handled.

Carload Rail Service

Boxcar is the traditional mode of rail service. It is slower than intermodal service. A boxcar can hold the cubic capacity of three or more intermodal containers. However, many times a boxcar will reach its practical weight limitation before it exceeds its cubic capacity. This is termed weighting-out. If it reaches its cubic capacity before exceeding its weight limitation, this is termed cubing-out. Boxcars are typically loaded at a shipper's facility or at a transload center. Small locomotives shuttle the boxcars at slow speeds between the loading/unloading site and the rail yards. This is a typical role performed by short line railroads. At the rail yards the boxcars are sorted into blocks of boxcars all heading in the same general direction. This sorting area is termed a manifest yard or "hump yard". In the hump yard the shuttle locomotives push the boxcar to a highpoint, where it is uncoupled and allowed to slowly roll downhill by the force of gravity. Along the descent, the rail tracks are switched left or right to direct the boxcar to the separated group of boxcars that are all heading to a common destination. After enough boxcars bound to a common destination accumulate to an appropriate level, they are connected to a locomotive for mainline transportation. This manifesting operation consumes hours or days until enough cars are joined. This sorting occurs not only at the originating rail yard, but it can occur at intermittent terminals along the way. The manifest sorting is one of the reasons why boxcar transportation is slower than intermodal transportation. The second reason is that the manifest trains typically do not have priority access on the main rail lines.

Exhibit 9: Typical Boxcar Dimensions

General Description	50' boxcar 70 ton	50' boxcar 100 ton Hi-roof	60' boxcar 90 ton	60' boxcar 100 ton Hi-roof
Inside length	50'-7"	50'-6"	60'-9"	60'-9"
Inside width	9'-6"	9'-6"	9'-4"	9'-6"
Inside height	10'-11"	13'-0"	10'-10"	13'-0"
Door type	slide/plug	plug	plug	plug
Door width	10'-0"	10' or 12'	10'-0"	10'-6"
Door height	9'-10	12'-4	10'-2" or 10'-8"	12'-4
Exterior length	55'-5"	58'-2"	67'-11"	67'-7"
Exterior width	10'-7"	10'-8"	10'-6"	10'-8"
Cubic capacity	5,238 ft^3	6,269 ft^3	6,085 ft^3	6,646 ft^3
Freight capacity (lbs.)	158,000	200,000	186,900	204,800

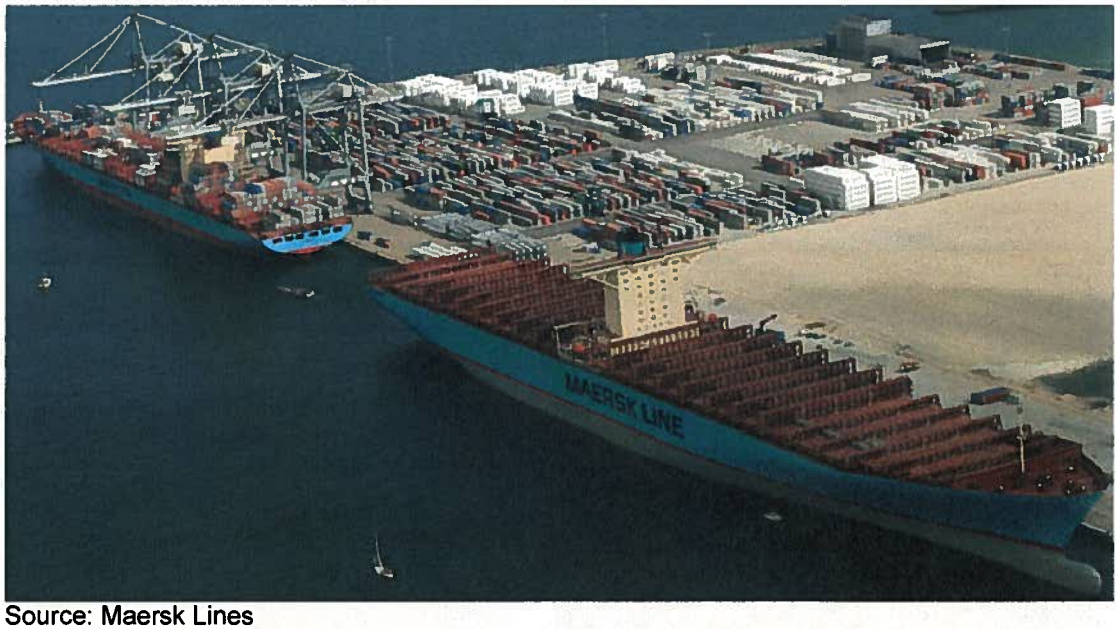
Source: CSX Railroad website

For international freight, supply chain managers must combine ocean transport of international containers with overland transport by either truck or train.

Containerships

The introduction of ocean vessels specially designed to carry the International Standards Organization (ISO) containers was a major innovation that helped to grow global multimodal transportation. In 1956 Malcolm McLean retrofitted an existing tanker vessel named "Ideal X" to exclusively carry containers between Newark, NJ and Houston, TX. It was the first containership. The Ideal X class vessels could handle 1,700 TEUs. Containerships increased in number and eventually carried trade not only between U.S. ports, but also between Asia, Europe and eventually all countries. By the late 1980s, containerships reached a configuration of approximately 5,000 TEUs. The largest vessels that can pass through the locks at either end of the Panama Canal can carry only 5,000 TEUs. Vessels that carry more than 5,000 TEUs and are too wide to pass through the Panama Canal are labeled post-Panamax vessels. Since 2000, many post-Panamax vessels have been built that are capable of carrying approximately 8,000 TEUs. After 2004, very large vessels labeled "super post-Panamax" vessels were introduced that are capable of carrying more than 8,000 TEUs **(Exhibit 10)**. Super post-Panamax vessels are designed to carry 10,000 to 12,000 TEUs. The super post-Panamax vessels ply the transit lanes between ports in Asia, Asia and Europe, and Asia and some North American ports. In 2009, several vessels capable of carrying 16,000 to 18,000 TEUs were in the design and sales cycle.

Exhibit 10: A Post-Panamax Vessel Compared to a Panamax Vessel



Source: Maersk Lines

The Panama Canal is undergoing an expansion program which will lengthen, widen and deepen the locks at the Atlantic and Pacific canal terminals to enable the super post-Panamax vessels up to 12,000 TEUs to transit the isthmus.

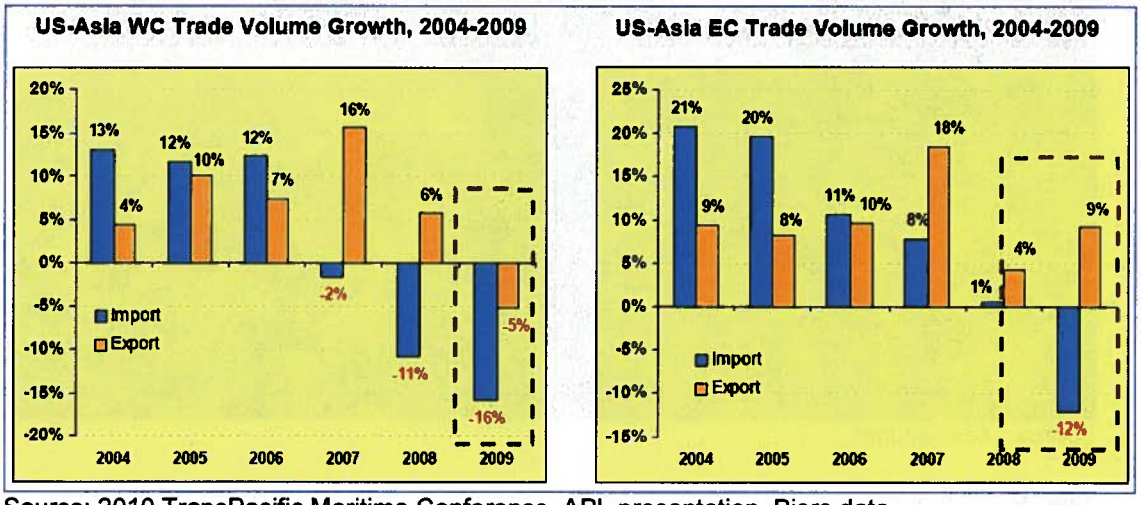
Impact of 2009 Recession on International Containerized Traffic

The 2009 recession had a severe impact on U.S.-Asian containerized freight flows. At the 2010 TransPacific Maritime Conference vessel operators explained how the recent economic slowdown had caused reductions in both imports and exports for container volumes at both the West and East Coasts in the U.S. **(Exhibit 11)**. The West Coast experienced a 16 percent import reduction and the East Coast had a 12 percent reduction. U.S. exports off of the West Coast decreased 5 percent and East Coast exports declined slightly as well. Overall world trade experienced a 9 percent decline during the recession and the decline in exports resulted in 1.2 million available empty slots on container ships, causing international vessel operators to idle portions of their fleets.

Slow Steaming

The vessel operators responded not only with idling vessels, they also slowed the speed of vessels to reduce fuel consumption. The new approach is termed "slow steaming". Reducing average vessel speed from 23 knots down to 16 knots decreased fuel consumption by more than 50 percent. Slow steaming increased the transit times between Asia and the U.S. but this was compensated by adding two extra vessels to the trade strings to maintain the same scheduled stops in the ports (e.g., the extra vessels were in transit on the water). But the slow steaming was only utilized for vessels transiting through the Panama Canal from Asia to the U.S. East Coast because that freight is normally less time sensitive and the shippers are accustomed to longer supply chain durations. Slow steaming was not utilized for U.S. West Coast freight because shippers expect faster service through the West Coast ports coupled with fast intermodal inland rail service to the Midwest markets.

Exhibit 11: U.S.-Asia West Coast and East Coast Trade Volume



Source: 2010 TransPacific Maritime Conference, APL presentation, Piers data

Not utilizing slow steaming to the West Coast (even during a recessionary period to benefit from fuel savings) supports the concept that speed to market is

considered imperative for a portion of the freight transited from Asia to the large central markets in the U.S. Shippers have optimized their supply chains sending time sensitive freight through the West Coast gateways coupled with fast double stack intermodal unit train service and less time sensitive freight via the Panama Canal to the East Coast for truck delivery to points there. The underlying impact is that the western railroads must rapidly transit their intermodal trains from the West Coast to the central markets. **Driven by the need to improve schedule reliability and reduce the transit time of double stack intermodal unit trains, railroads have a tendency to design dedicated intermodal service schedules to run their trains through intermittent locations such as the IPH study area without stopping.** The Class I railroads often refer to double stack unit trains (110 to 120 well cars) as premium or tier one service, due to speed and cost. Second tier or third tier intermodal services like those available in Spokane are often provided by transloading containers or trailers on to flat-cars.

Transit Routes and Durations

The following maps depict the main trade routes and transit durations exports can follow between Asia and Southeast Asia from the U.S. For both inbound and outbound there are many potential combinations of Asian and U.S. ports. Examples for trade lanes depicting U.S. origins to Asian destinations were examined because they represent outbound trade, which generates jobs and income for U.S. markets. For this review of transit durations, the export origin will be Memphis because it is a major center of export activity in the U.S. with trade using the U.S. intermodal system to reach coastline ports for loading onto outbound vessels. The section explains the impacts of the Panama Canal expansion and the introduction of Prince Rupert.

Several routes to exit the U.S. were evaluated. Northern China and Singapore was one combination for the study. Rail transit durations were selected from an on-line web service: "Scheduled Distribution Services". Vessel transit duration was selected after observing several vessel operators' online schedules for averages. The study used Hanjin Shipping Company's maps and schedules. Container loading time at the ports was excluded due to numerous cut-off options for times/days, loading backlogs, and other issues which are unpredictable, but applicable to all shipments. The loading time in all ports was considered neutral for the trade routes analyzed and omitted from the total transit time. A day or two or more would actually be added to the total to account for container loading. In congested ports several days could be added.

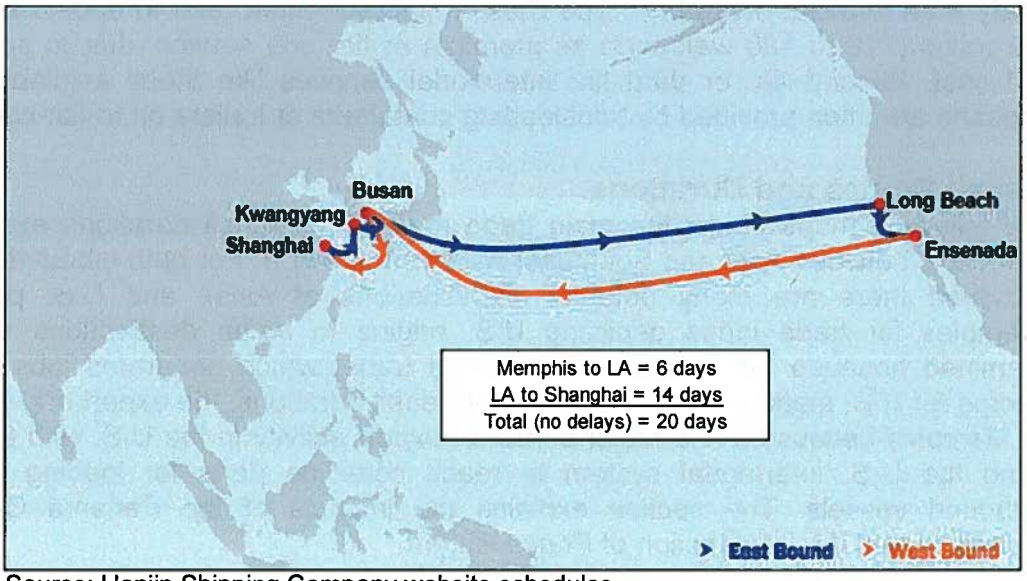
The schedules are fair estimates for best case service derived from routine ocean carrier and railroad performance but the overall duration could be slightly less or somewhat longer. There can be significant variability caused by:

- lack of truck drayage service from the consignee's location to the rail terminal
- congestion at the inland rail terminals

- lack of space for containers on the intermodal trains
- weather and congestion along the rail routes or trade lanes
- delays at the port during vessel loading

Currently the typical westbound move to Asia uses rail service from Memphis to Los Angeles where it would be loaded onto a containership **(Exhibit 12)**. This journey requires six days for intermodal service from Memphis to Los Angeles and 14 days for the vessel service from Los Angeles to Shanghai.

Exhibit 12: U.S. West Coast to Shanghai



Source: Hanjin Shipping Company website schedules

There are three recent ocean transit developments that could influence shipments between Asia and U.S. ports.

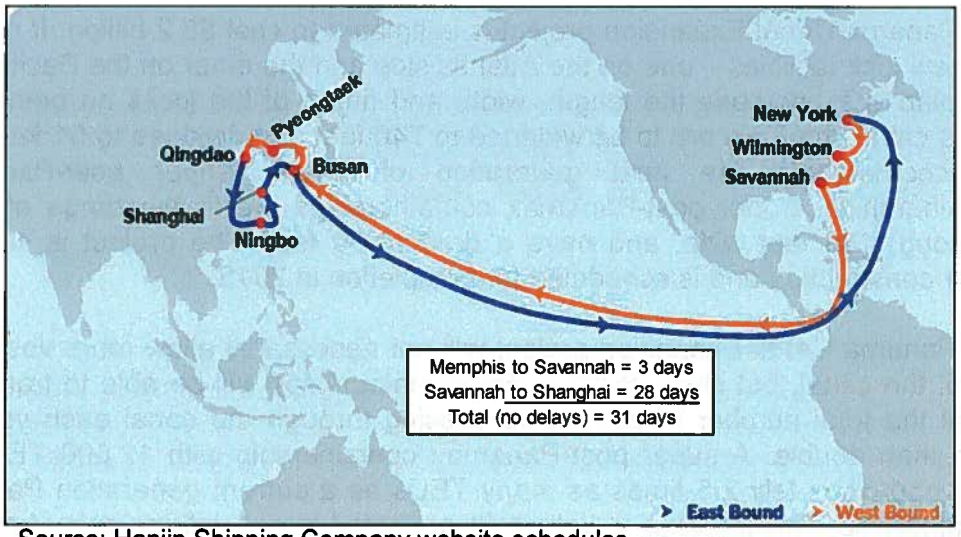
Labor issues at the San Pedro Bay Ports in 2004-2005 and driver slowdowns at Oakland and Stockton, CA in 2008 prompted shippers and consignees to search for alternatives for their international trade flows. Shippers adopted a "four corners strategy" to diversify the risk of importing the majority of freight through the San Pedro Bay Ports. This strategy uses port access in the Pacific Northwest, the Atlantic East Coast and the Gulf of Mexico to compliment flows through San Pedro Bay Ports. A key example is Wal-Mart. As of 2009, Wal-Mart has diverted 85 percent of its Asian inbound freight away from the San Pedro Bay Ports to Pacific Northwest, East Coast and Gulf Port. Wal-Mart has built over two million square feet of warehouse distribution space in Houston, TX. Other large importers have followed Wal-Mart's lead and have considered using the Panama Canal or the Suez Canal to bypass the San Pedro Bay Ports. Many have built warehouses clustered around the alternative ports along the east coast to receive their freight via all-water vessel service and avoid the west coast ports and possible inland rail delays.

Containers typically must exit the country through the same port of entry to maintain a balanced equipment flow on trains and vessels. The Panama Canal Expansion, the Suez Canal Express and the Port of Prince Rupert/CN intermodal service will increase the number of containers arriving in the U.S. Midwest, Northeast, Southeast and Mid-South via ports other than Los Angeles/Long Beach.

The net effect of the increased inbound container flows via Panama, Suez and Prince Rupert is that fewer containers will be railed between Los Angeles/Long Beach and the Pacific Northwest ports to the Asian markets. A negative impact will be fewer ISO containers available for exports for transit through the Los Angeles/Long Beach ports possibly driving up container cost. Another impact will be the increased number of empty containers for export in the Southeast and Mid-South that must exit the U.S. via Southeastern or Gulf ports, or Prince Rupert. This could possibly drive down the cost of international transportation through those ports.

A major alternative to the West Coast to Asia trade route is to use one of the U.S. East Coast ports with transit through the Panama Canal to Asia **(Exhibit 13)**. This route typically requires containers to be shipped overland to Savannah or other East Coast port. Truck transit from Memphis to the East Coast ports can be accomplished in a day or two or three maximum. The vessel transit duration to Shanghai through the Panama Canal requires 28 days. Total transit duration would be in the range of 31 days, which is 10 days longer than service through Los Angeles but it would avoid the risk of delays for long-haul rail transit and congested port activities in San Pedro Bay Ports.

Exhibit 13: U.S. East Coast to Shanghai via Panama Canal



Source: Hanjin Shipping Company website schedules

Panama Canal Expansion

In 2001, the Panamanian Government commissioned a strategic assessment designed to keep the Panama Canal competitively positioned to capture increased international trade and maintain its long-term sustainability as a trade route between Asia and the U.S. east coast ports. A major reason that all-water containerized service between the U.S. east coast and Asia had not increased in prior decades was that the Panama Canal vessel transit capacity is limited to approximately 40 vessels per day in each direction (14,000 vessels per year). Canal Water Time (CWT), the duration it takes for the Atlantic-Pacific transit, averages from 15 to 30 hours – including wait time at the locks.
In 2006, the canal transit distribution by vessel type was:

- Containerships represented 35 percent of the vessels that transited the Canal
- Dry bulk ships represented 20 percent
- Vehicle carrier vessels represented 10 percent
- The remaining 35 percent was spread among liquid bulk, reefer, cruise ship, general cargo and miscellaneous (naval and research vessels, fishing vessels, barges, etc.)

Currently containerships that transit through the Panama Canal are classified as "Panamax". Their size limitations are 965 feet in length, 106 feet in width, and have a draft limitation of 40 feet. Panamax containerships carry approximately 4,500 to 5,000 TEUs. Most freight shipped internationally is transported in FEUs. FEUs typically number in the range of 70 to 80 percent of containers on a containership. Of the eastbound containerships that transit the canal, approximately 50 percent of containerized freight was destined for the U.S. ports.

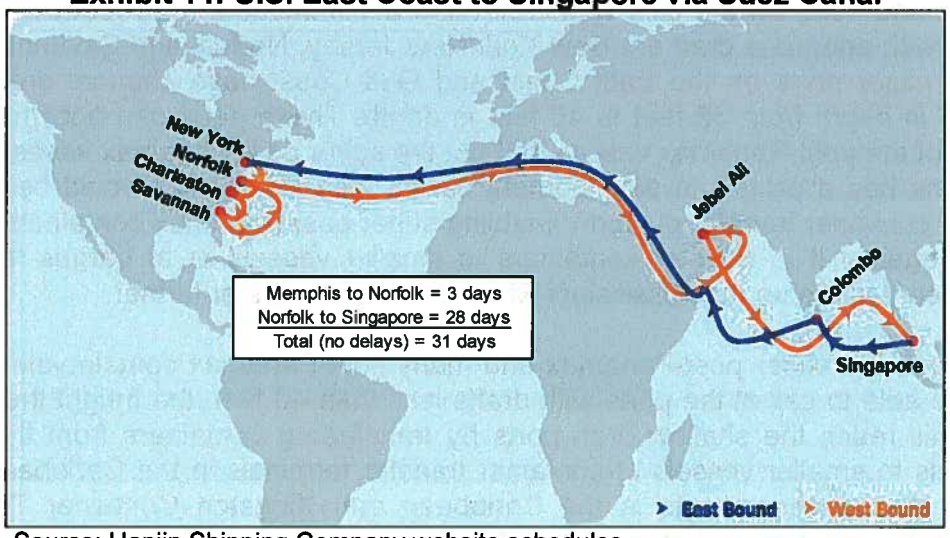
The Panama Canal Expansion project is estimated to cost $5.2 billion. It calls for two new lock facilities – one on the Atlantic side and the other on the Pacific side. The plan is to increase the length, width and depth of the locks on both sides. Inland canal channels are to be widened to 740 feet and dredged to 51 feet deep to accommodate the next generation of larger "super post-Panamax" containerships. Super post-Panamax containerships are in the range of 1,200 feet long, 160 feet wide, and have a draft of 50 feet. The project is currently under construction and is scheduled for completion in 2015.

The Panama Canal Expansion project will not necessarily allow more vessels to transit the canal, but since much larger containerships will be able to transit the Canal the total number of containers passing through the canal each year will more than double. A super post-Panamax containership with 12,000 TEUs will carry approximately 2.5 times as many TEUs as a current generation Panamax containership. This increase in volume is projected to pull volume away from San Pedro Bay and other west coast ports.

All-water Suez Canal Service

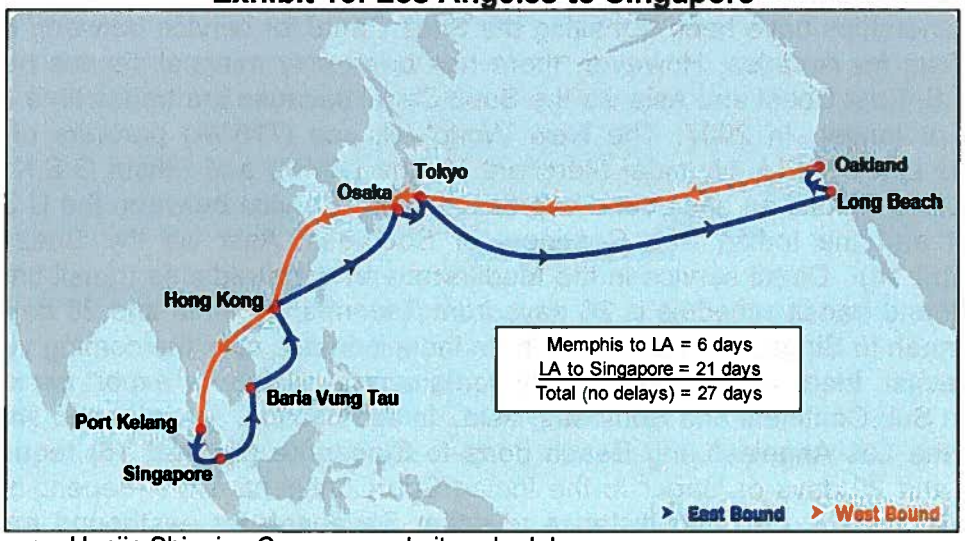
Containerships have been transiting the Suez Canal for service between Europe and Asia for decades. However, there has been only minimal service between the U.S. East Coast and Asia via the Suez Canal because the transit time was 32 days or longer. In 2007, The New World Alliance (TNWA) partners of Asian Pacific Lines (APL), Hyundai Merchant Marine (HMM) and Mitsui O.S.K. Lines (MOL) introduced an eastbound express all-water service between the U.S. East Coast and the Indian Sub Continent or Southeast Asia via the Suez Canal **(Exhibit 14)**. Direct service in the Mediterranean ports reduces transit time. An eastbound transit schedule is 26 days from Savannah to India and 28 days from Savannah to Singapore. As imports from India increase over the coming years as is forecast, there will be more empty containers available for export back to the Indian Sub Continent and Southeast Asia. In comparison, a westbound shipment from the Los Angeles/Long Beach ports to Singapore **(Exhibit 15)** requires 27 days and 29 days or longer to the Indian Sub Continent. Thus, depending on a container's U.S. overland distance to either Savannah for eastbound transit to Singapore or to Los Angeles for westbound transit to Singapore, the transit duration will be similar in both directions.

Exhibit 14: U.S. East Coast to Singapore via Suez Canal



Source: Hanjin Shipping Company website schedules

Exhibit 15: Los Angeles to Singapore



Source: Hanjin Shipping Company website schedules

Port Access

The super post-Panamax vessels are limited by the number of ports on the East Coast and none on the Gulf Coast that can accommodate a 50-foot deep draft. Ports with adequate draft are New York/New Jersey, Norfolk and Savannah. The other major ports on the East Coast and Gulf Coast have channel drafts that range in depth from 35 feet to 45 feet in depth. These ports can accommodate most of the post-Panamax vessels but not the super post-Panamax vessels. New Orleans has a project in development called "Sea Point" that would be an off-shore container transfer platform enabling super post-Panamax containerships to dock against it to transfer containers to smaller vessels or to barges that can carry containers up the Mississippi River to New Orleans or further.

Although the super post-Panamax and many post-Panamax containerships may not be able to call at the ports with drafts less than 40 feet, the freight they carry can still reach the shallow draft ports by transferring containers from the large vessels to smaller vessels at container transfer terminals in the Caribbean. The top three container ports in the Caribbean are: Kingston Container Terminal (KCT) in Jamaica, rated at 2.8 million TEU, annual capacity; Free Port in Bahamas, rated at 2.4 million TEUs; and Port of Spain in Trinidad and Tobago with more than one million TEUs.

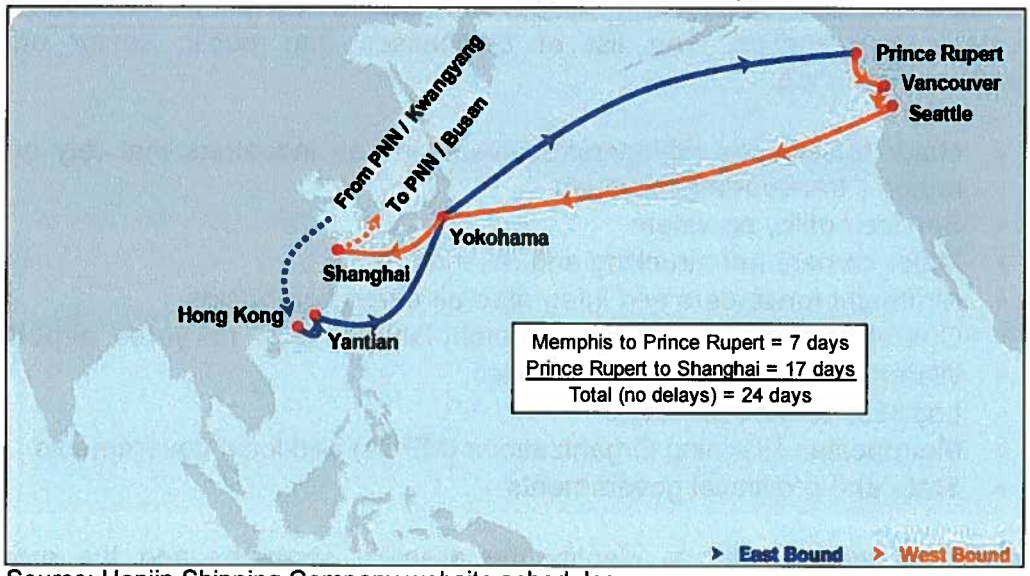
Port of Prince Rupert and CN Rail Service for the Midwest

A recent improvement in containerized service between northern Asia and the U.S. rounds out the four corners strategy. It was the introduction of vessel service calling at the Port of Prince Rupert in British Columbia combined with express double-stack intermodal rail service to Chicago provided by Canadian National (CN) Railroad. The service commenced in late 2007. In 2008 it handled more than 180,000 TEUs and in 2009 it handled 260,000 TEUs. Prince Rupert was the only port in North America to experience growth during the current

recession, a testimony to its Shanghai/Chicago express business model. The port's start-up phase was designed to handle 500,000 TEUs annually. In Phase II, the port will be expanded to enable the handling of two million TEUs per year. The inbound service was designed with an emphasis on speed to expedite consumer freight from China to Prince Rupert in 11 days on COSCO and Hanjin containerships and from Prince Rupert to Chicago on CN's express intermodal trains in four days (103 hours with over 95 percent consistent performance) for a total of 15 days. Further service on to Memphis requires an additional two days.

The return journey from Memphis to Prince Rupert (or Seattle) requires seven days and the vessel journey to China **(Exhibit 16)** requires 17 days for a total of 24 days. This is four days longer than transit through the ports in Los Angeles; however, port processing time in Prince Rupert could require less time because the CN has an on-dock rail terminal. Hanjin is exploring a variation on the string which would provide a last port of call back in Prince Rupert on the return journey, enabling a quicker line-haul from the Port of Prince Rupert to Asia. Whereas all inbound international containers are loaded with freight, only about 30 percent of the containers return to Prince Rupert loaded with exports such as paper and forest products, dry grains, chemicals, processed food, and aluminum. The other 70 percent are returned empty to Asia.

Exhibit 16: Prince Rupert to Shanghai



Source: Hanjin Shipping Company website schedules

The net effect of shifting more containers to the East Coast via the Panama Canal is that the two western Class 1 railroads (UP and BNSF) may seek new business opportunities into and out-of the Pacific Northwest. To maintain high utilization of existing assets it is possible they could explore expanded services at intermittent (second or third tier) locations such as the IPH study area. However, the impact of the change in container flows may not become evident until years after the Panama Canal Expansion project is complete.

STAKEHOLDER VIEWS ON IPH MODAL ASSETS

As part of the study effort the consultant team conducted nearly 50 interviews with a wide array of private sector freight interests including shippers, service providers and public sector stakeholders. In addition, three regional forums were held during December of 2009. These half-day forums in Pullman, WA, Sandpoint, ID and Spokane Valley, WA were attended by interested citizens, business representatives, local governments and elected officials.

In general most businesses that the consultant team spoke to were satisfied with the access to and level of services available across the modal spectrum within the IPH study area. Comments about levels of service were concentrated primarily around the availability and cost of trucking services, which was sometimes seasonal. Because the IPH study area is a producer region with more outbound than inbound freight, shippers often have to pay premium rates because carriers must "deadhead" or travel empty to pick up loads. Public officials interviewed by the consultant team seemed to express more concerns with access to rail services, than most private sector shippers that were interviewed.

Strengths, Weaknesses, Opportunities and Threats

Ultimately the consultant team visited in-person or by phone 48 public and private sector entities. The list of businesses and public sector entities interviewed included:

- Major businesses (shippers/receivers) in key industries that rely on the region's transportation system
- Service / utility providers
- Major carriers from trucking and rail modes
- Air freight forwarders and integrated air cargo companies
- Operators of major intermodal / freight facilities (e.g., rail yards, airports)
- Warehouse and distribution facilities
- Logistics service providers
- Metropolitan Planning Organizations (MPOs) and local governments
- State and provincial governments

Participants were asked to identify the greatest strengths and the greatest weakness of the regional transportation system. The responses as presented by those who were interviewed are summarized below as Strengths, Weaknesses, Opportunities and Threats.

Strengths:

- Geographically close to the border with Canada
- Less Than Truckload (LTL) services in the region and the level of competition among trucking companies serving the regional hub of Spokane
- The greatest region transportation asset is I-90, we also have a great airport and good rail service
- The size of the community and its people
- The proximity of the Inland Pacific Region to the Port of Seattle is one of the major transportation strengths
- The ability to use trucks at the 105,500 lb. weight limit was one of the biggest strengths of the region, as many other regions of the U.S. are limited to 80,000 lbs.
- Two Class I railroads provide service and The Park (Spokane Business & Industrial Park) in Spokane Valley is unique in that not many industrial parks are served by two Class I railroads
- Trucking service in the region is relatively good and convenient
- Overall rail service is good
- Rail service from the east has improved a lot over the past eight years

Weaknesses

- Lack of backhauls / lane balance in the region results in higher trucking costs; one of the region's biggest challenges is the lack of backhauls – "only 10-15 percent of our outbound trucks return loaded." "The constant search for backhauls to balance shipping lanes is challenging and costly."
- Containers coming into Spokane from the coast go back empty
- The north/south corridor is the biggest issue – need a better connection to Canada. The region needs a north-south freeway. The north-south freeway started in the 1960's and its still not finished, it is a stretch that should take 6 minutes to drive 6 miles, instead it takes 45 to 50 minutes
- The most challenging transportation issue is carrier availability; the backhaul issue makes it difficult to attract carriers to remote areas
- Seasonality of agriculture steals drivers and equipment from the available pool
- Overall conditions of the regional road network (near Spokane) and winter maintenance
- Bigelow Gulch: truck drivers avoid the road in the winter due to safety concerns

- Market Street is one example of a local street that is difficult to negotiate due to intersection design
- Rail rates are poor and getting worse
- The lack of a double stack intermodal facility is the greatest weakness as currently rail containers are transloaded from flatbeds
- A longer runaway that would enable direct international flights from Asia to land at Spokane International Airport
- Trucking shipments from Seattle over the mountain passes in winter often causes delays and introduces variability in the supply chain
- Getting drivers to and from the plant, congestion and lack of access management on routes between major loading points and I-90
- Low track weight on UP from Spokane to Plummer (18 miles at 263,000 lbs.)
- Container supply & adequate facilities
- Better cell phone coverage in market area would be really good: drivers rely on them, and communications are key
- Load limits on federal system. Ability to carry more freight per truck (CA limit is 80K lbs) / various states have various limits
- Eastern connections for inbound products are costly (from Michigan, Connecticut, South Carolina, and Chicago)

Opportunities

- Increase regional freight mobility among national/international trade corridors, urban by-passes, and other freight dependent networks (Note: *the discussion comment focused on the highway network*).
- Develop a north/south corridor to equalize trade/lane balance with Canadian trade partners in British Columbia and elsewhere in Canada
- Create interoperability between major regional truck routes (consistency in regulations, geometric design, etc.)
- Continue to improve and develop communications and technology applications for fostering efficient freight transportation in the region
- Preservation of existing short line and regional railroads to facilitate economic development and improved Class I rail efficiency
- Preserving the Spokane airport as a regional airfreight hub for the IPH study area
- Creation of a regional comprehensive master plan for the entire IPH influence area

- Transporting over-dimension loads of oil rig and other heavy equipment through the region
- Establishing a regional freight shippers group
- Develop inbound market for goods coming into the Ports of Lewiston, Whitman County and Clarkston. Currently many barges and containers arrive empty

Threats

- Truck parking issues along I-90
- Access and design issues (Dover Bridge height and weight restrictions, Trent Avenue, Bigelow Gulch, Market Street in Francis, Airway Heights connections on Highway 2, and others) at freight generating facilities
- Border crossing constraints (hours of operation, planning for future needs, etc.)
- Project funding streams and project prioritization schemes within the region
- The seasonality of safely moving freight within the IPH study area
- Local airport easements
- Railroad grade crossings impact on general traffic stream safety
- Utility, broadband, and other general services constraints in rural areas

Shippers and carriers all had some comments or concerns about the modes they used or provide. Their concerns will be discussed in more detail throughout the remainder of this working paper. In addition, modal issues discovered during the course of data analysis and research conducted for the study will also be addressed. **Appendix A** provides an extensive summary of the stakeholders contacted and their comments regarding the freight transportation systems in the IPH study area.

GATEWAYS SERVING THE IPH STUDY AREA

During stakeholder outreach activities the issue of border crossings was raised by a variety of shippers and carriers, most often in connection with the need for an improved north-south highway corridor. A number of shippers and carriers also indicated that they avoided having to ship goods or send drivers across the border into Canada due to increasing levels of paperwork and delays that can be encountered when the required paperwork is not in order. At least one carrier noted that while improvements in capacity were underway at the Eastport/Kings Gate crossing at Eastport, Idaho, currently there are only eight parking spots for trucks at this crossing.

During interviews a number of stakeholders in Washington expressed their desire for an improved 24-hour crossing at Laurier. During the Spokane Valley Stakeholders Forum on December 3, 2009 a delegation from Trail, B.C. also presented a coordinated interest in the development of a north-south corridor that would follow US-395 north to the crossings near Northport, WA. The proposal that US-395/SR-22 be the corridor of choice was based on a variety of claims:

- The Canadian government is investing millions of dollars to improve the corridor near the North Port crossing in Canada as part of it Asian-Pacific Gateway Corridor initiative.
- With nine miles of additional track and a cooperative agreement between the Canadian Pacific Railway and BNSF, this could eventually become a rail corridor linking U.S. railroads to the port at Prince Rupert Sound.
- The proposed route is the shortest distance to a number of large aquifers that are the source of hydro-electric power generation. These aquifers could eventually be diverted to provide potable water to the Southwestern U.S. becoming a major energy corridor to the Pacific Northwest.
- This route would save millions of dollars over the proposed "black-fiber" routing of sensitive defense and intelligence fiber optic networks from the U.S. lower mainland to Alaska.

The Wilbur Smith Associates research team looked into the validity of these claims and found little substantive evidence to support these statements. For instance:

- Discussions with provincial transportation officials indicated that they were keenly aware that the West Kootenay–Northeast Washington Joint Highway Corridor Study had resulted in a negative cost/benefit ratio for improvements on the Washington side of the border and that as a result no improvements in Washington were currently planned. British Columbia officials noted that with no improvements being made on the U.S. side of the border in Washington, improvements in support of the Pacific Gateway

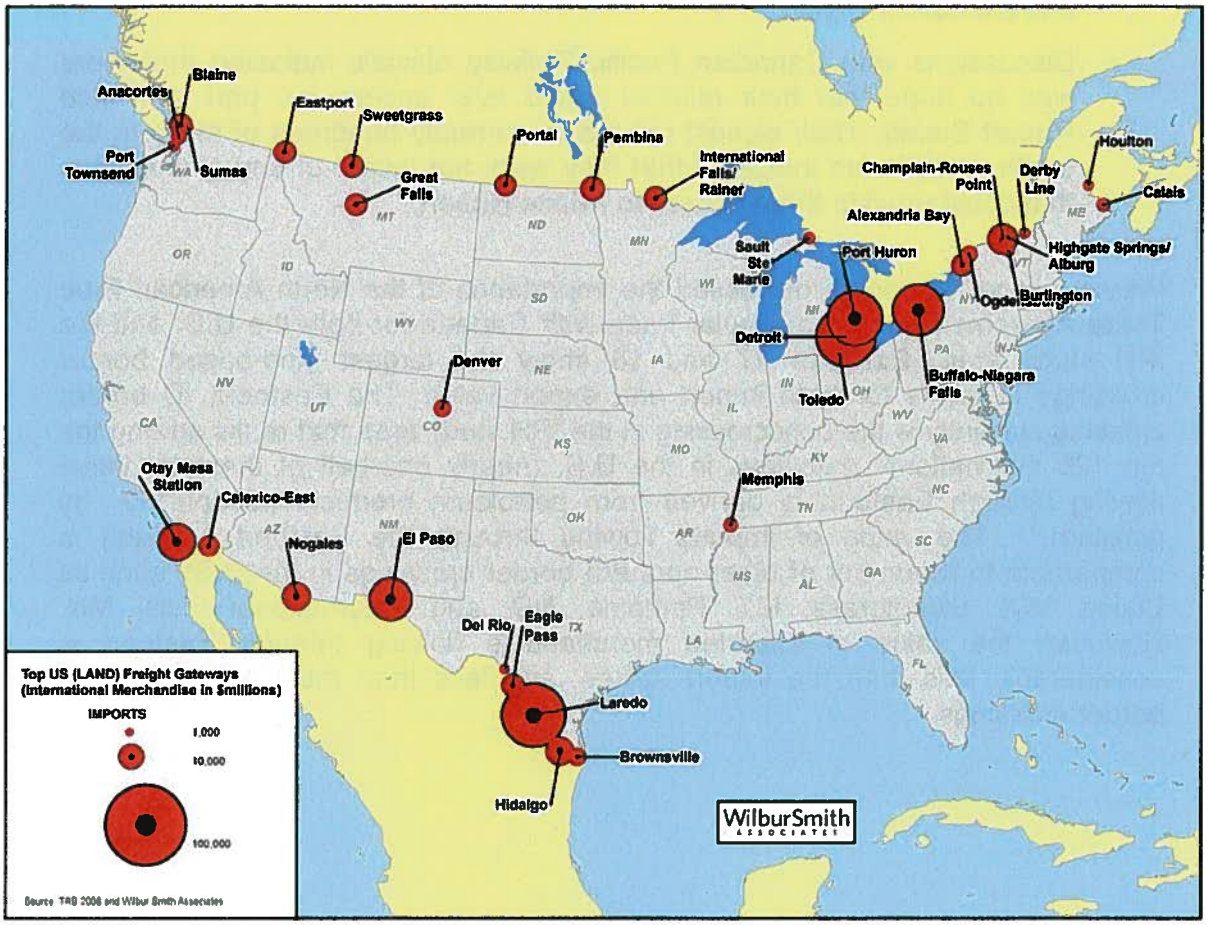
Corridor strategy were being directed to Kingsgate and Provincial Highway 3 in the border region.

- Discussions with Canadian Pacific Railway officials indicated that there was no hope that their railroad would ever access the port at Prince Rupert Sound. Their closest rail line is currently hundreds of miles to the south. BNSF also indicated that they were not aware of any connections that could provide them access to Prince Rupert.

Previous working papers discussed the importance of the North American Free Trade Agreement and in particular trade with Canada for both the U.S. and the IPH study area. **Exhibits 17** and **18** show the largest land-based border crossings in terms for both import and export value. The Eastport, ID border crossing currently is the only crossing in the IPH study area that ranks among the top 125 international gateways in the U.S. (nearly one-half of the total value flowing through Eastport is derived from petroleum products transported by pipeline).[4] The value of imports flowing through the Eastport crossing is comparable to a number of other northern border crossings in the U.S., such as Blaine, WA; Sweetgrass, MT; Pembina, ND; and, International Falls, MN. However, the value of exported merchandise flowing through Eastport is considerably less than the import values, and less than most other northern border crossings.

[4] Bureau of Transportation Statistics, North American Transborder Freight Data: http://www.bts.gov/programs/international/transborder/TBDR_FastFactsTGMPC.html

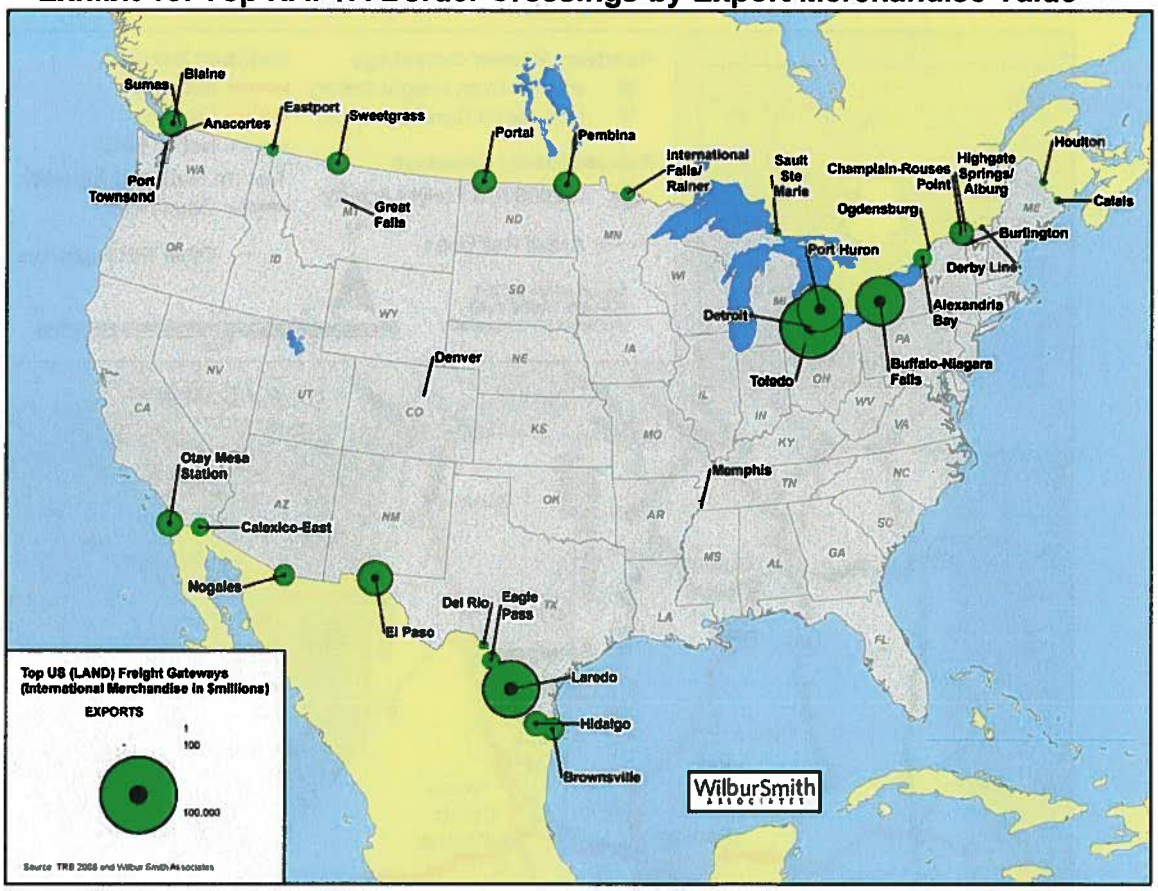
Exhibit 17: Top NAFTA Border Crossings by Import Merchandise Value



Notes: All data—Trade levels reflect the mode of transportation as a shipment enters or exits a U.S. Customs port. Flows through individual ports are based on reported data collected from U.S. trade documents. Low-value shipments (imports less than $1,250 and exports less than $2,500) and intransit shipments are not included in trade data.

Source: BTS Transborder Freight Data, as of April 2009.

Exhibit 18: Top NAFTA Border Crossings by Export Merchandise Value

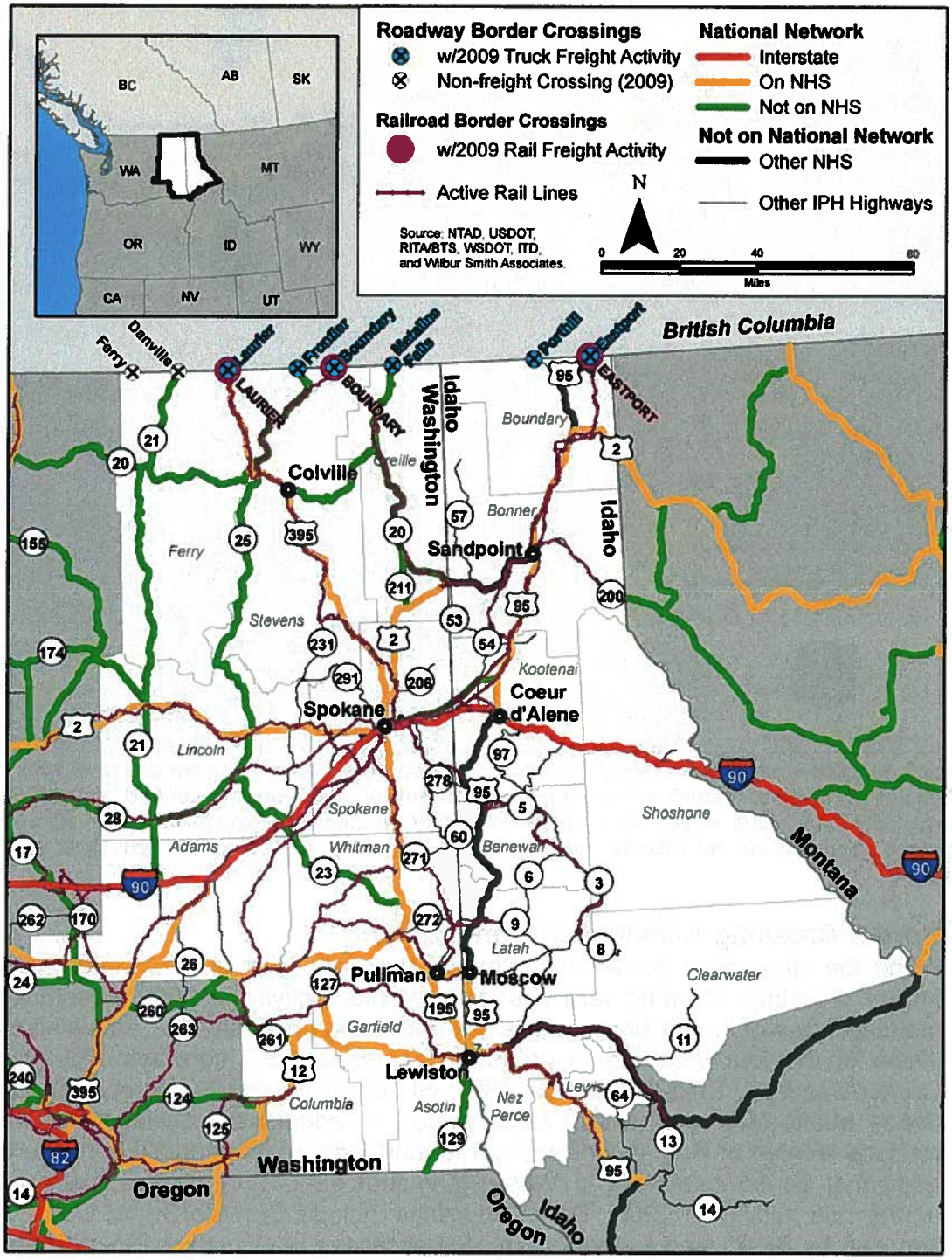


Notes: All data—Trade levels reflect the mode of transportation as a shipment enters or exits a U.S. Customs port. Flows through individual ports are based on reported data collected from U.S. trade documents. Low-value shipments (imports less than $1,250 and exports less than $2,500) and intransit shipments are not included in trade data. Source: BTS Transborder Freight Data, as of April 2009.

Border Crossing Activity and Constraints

Along the study area border with Canada there are a total of six international border crossings showing recent truck container activity in 2009. Washington maintains four of the six border crossings and Idaho maintains the remaining two. Three of the four Washington crossings are served by highways: US-395 at Laurier/Cascade, British Columbia (BC); SH-25 at Frontier/Paterson, BC; and, SH-31 above Metaline Falls at Nelway, BC. An additional crossing using local roads is located at Boundary/Waneta, BC, northeast of Northport. There are two additional border crossings in Washington that show only vehicle, pedestrian and/or bus activity in 2009. These crossings include Danville/Grand Forks, BC serviced by SH-21 and Ferry/Midway, BC accessed via Customs Road/CR-501. Both of the Idaho border crossings in Idaho are served by highways: US-95 at Eastport/Kingsgate, BC and SH-1 at Porthill/Rykerts, BC. **Exhibit 19** shows the location of all the border crossings within the IPH study area with respect to the National Network and NHS.

Exhibit 19: IPH Study Area - Border Crossings



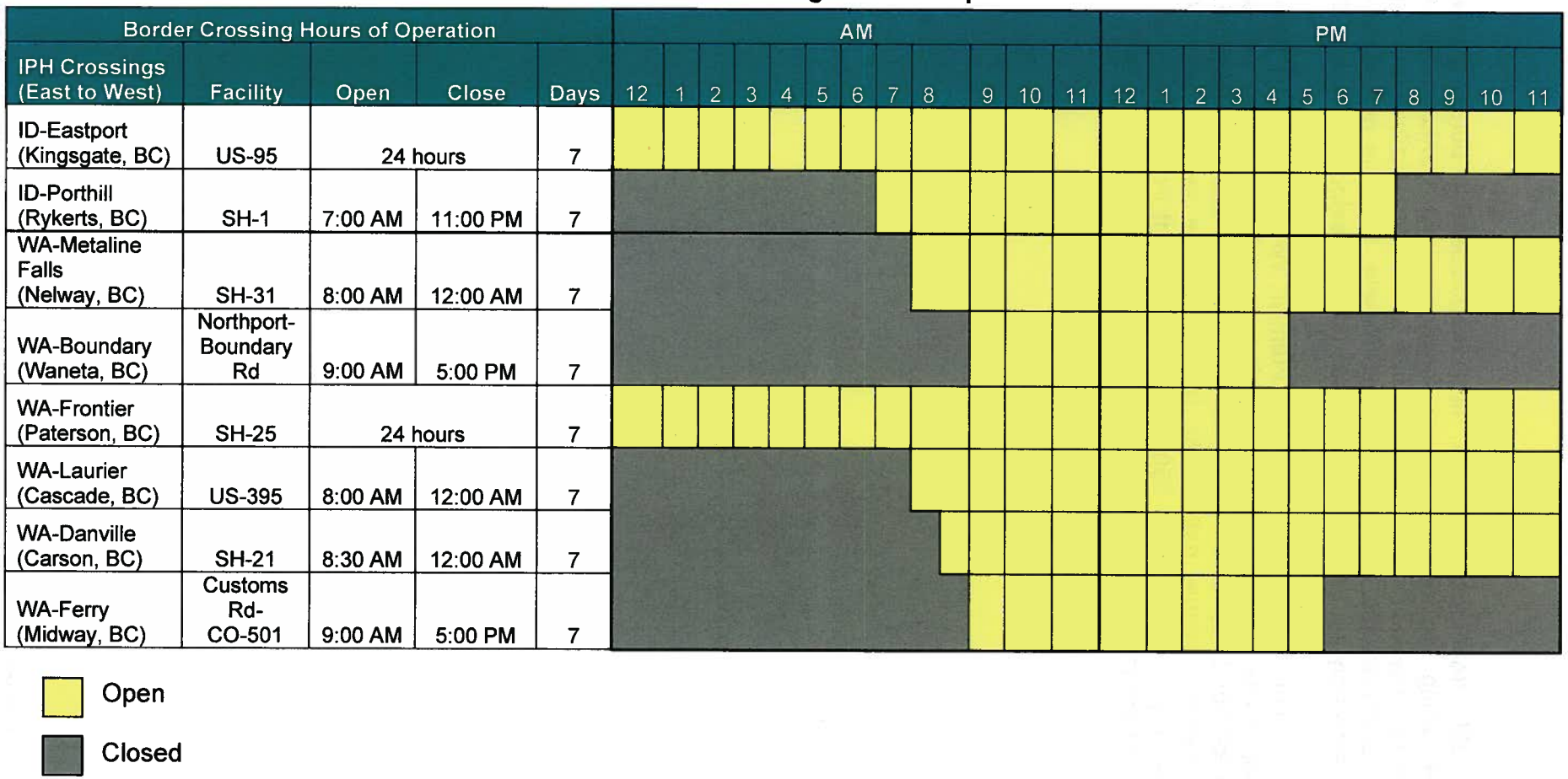
Source: National Transportation Atlas Database (NTAD) 2009, USDOT, WSDOT, ITD, RITA-BTS, and Wilbur Smith Associates.

In terms of 2009 train crossing activity, three international rail border crossings are located along the IPH study area boundary with Canada. The two Washington rail crossings served by Kettle Falls International Railway (KFR) are found at Laurier/Cascade, BC and Boundary/Waneta, BC. The one Idaho rail crossing is served by the Union Pacific Railroad (UP) at Eastport/Kingsgate, BC.

Among the border crossing sites, only the Frontier, WA/Paterson, BC (SH-25) and Eastport, ID/Kingsgate, BC (US-95) stations provide 24-hour service year round (**Exhibit 20**). Despite this, activity is highest at the Porthill and Eastport, ID locations. Average annual daily traffic (AADT) volume reaches about 670 vehicles per day at Eastport and 530 vehicles per day at Porthill. None of the Washington crossings serve daily volumes exceeding 350 vehicles per day.

Exhibit 20: Border Crossing Hours of Operation

Border Crossing Hours of Operation				
IPH Crossings (East to West)	Facility	Open	Close	Days
ID-Eastport (Kingsgate, BC)	US-95	24 hours		7
ID-Porthill (Rykerts, BC)	SH-1	7:00 AM	11:00 PM	7
WA-Metaline Falls (Nelway, BC)	SH-31	8:00 AM	12:00 AM	7
WA-Boundary (Waneta, BC)	Northport-Boundary Rd	9:00 AM	5:00 PM	7
WA-Frontier (Paterson, BC)	SH-25	24 hours		7
WA-Laurier (Cascade, BC)	US-395	8:00 AM	12:00 AM	7
WA-Danville (Carson, BC)	SH-21	8:30 AM	12:00 AM	7
WA-Ferry (Midway, BC)	Customs Rd-CO-501	9:00 AM	5:00 PM	7

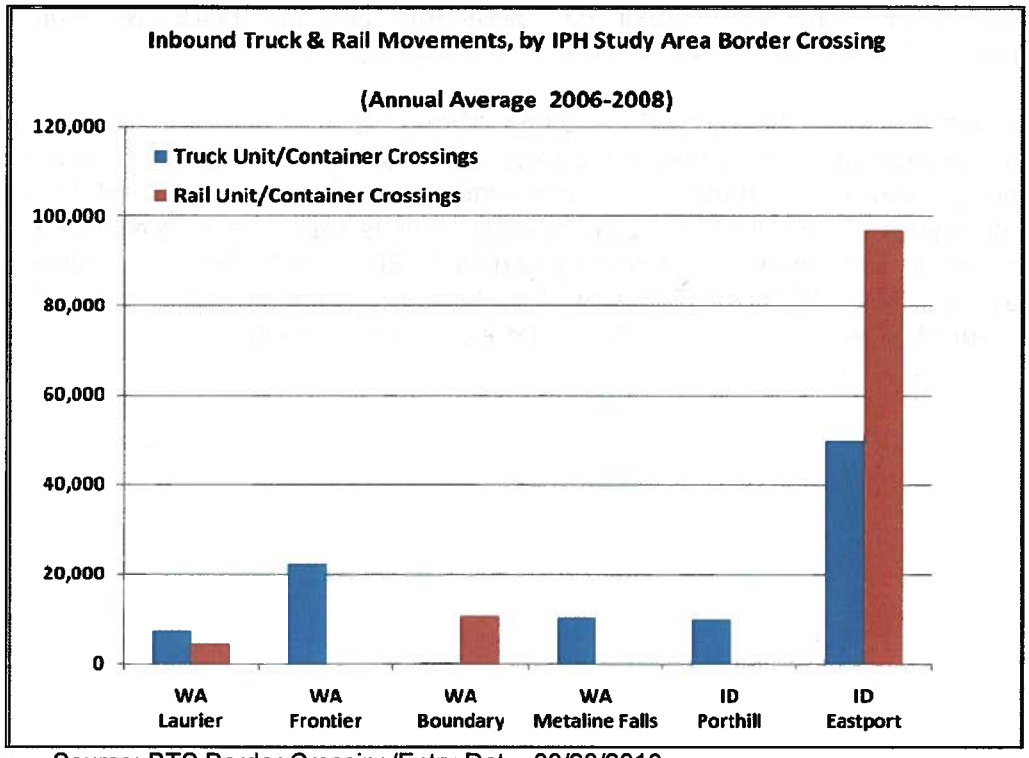


Source: U.S. Customs and Border Protection http://apps.cbp.gov/bwt/

The BTS Border Crossing/Entry Data also gives counts for Truck and Rail container crossings **(Note: Container Crossings is defined by BTS as any conveyance entering the U.S. used for commercial purposes, full or empty).** The classification of inbound "containers" includes: stakebed truck, truck with a car carrier, van, pickup truck/car, flatbed truck, piggyback truck with two linked trailers/containers (i.e. 2 containers), straight truck, bobtail truck, railcar, rail flatbed car stacked with containers (e.g. if there are multiple containers on a rail car each is counted as a unit), and tri-level boxcar with multiple containers inside (each is a container unit). The series only includes inbound shipments. Customs and Border Protection does not collect comparable data on outbound crossings.

The inbound BTS border crossing data for commercial container/units is shown in the bar chart of **Exhibit 21**. Among the study area ports of entry (POE's) annual commercial truck and rail crossings volumes are highest at the Eastport, ID (US-95). On an average basis, truck crossing volume at Eastport is approximately 50,000 container/units crossings per year, during the period 2006 to 2008. This volume represented 50 percent of the six 'active' study area crossings with documented inbound truck container activity in 2009. The next highest truck volume POE is Frontier, WA/Paterson, BC (SH-25) with an annualized volume of 22,287 crossings, representing 22 percent of all IPH study area inbound truck volume. Two crossings; Danville and Ferry recorded zero inbound truck container counts in the BTS data series.

Exhibit 21: Border Crossing Percent Share Inbound Volume (Truck & Rail)



Source: BTS Border Crossing/Entry Data, 03/23/2010
http://www.bts.gov/help/border_crossing_entry_data.html

Together the two Idaho POEs; Porthill, ID (SH-1) and Eastport (US-95) crossings represent 60 percent of all inbound truck container crossings in the IPH study area. The Washington POEs at Laurier, WA (US-395), Frontier, WA (SH-25) and Metaline Falls combined represent the remaining 40 percent of inbound truck container crossings in the study area.

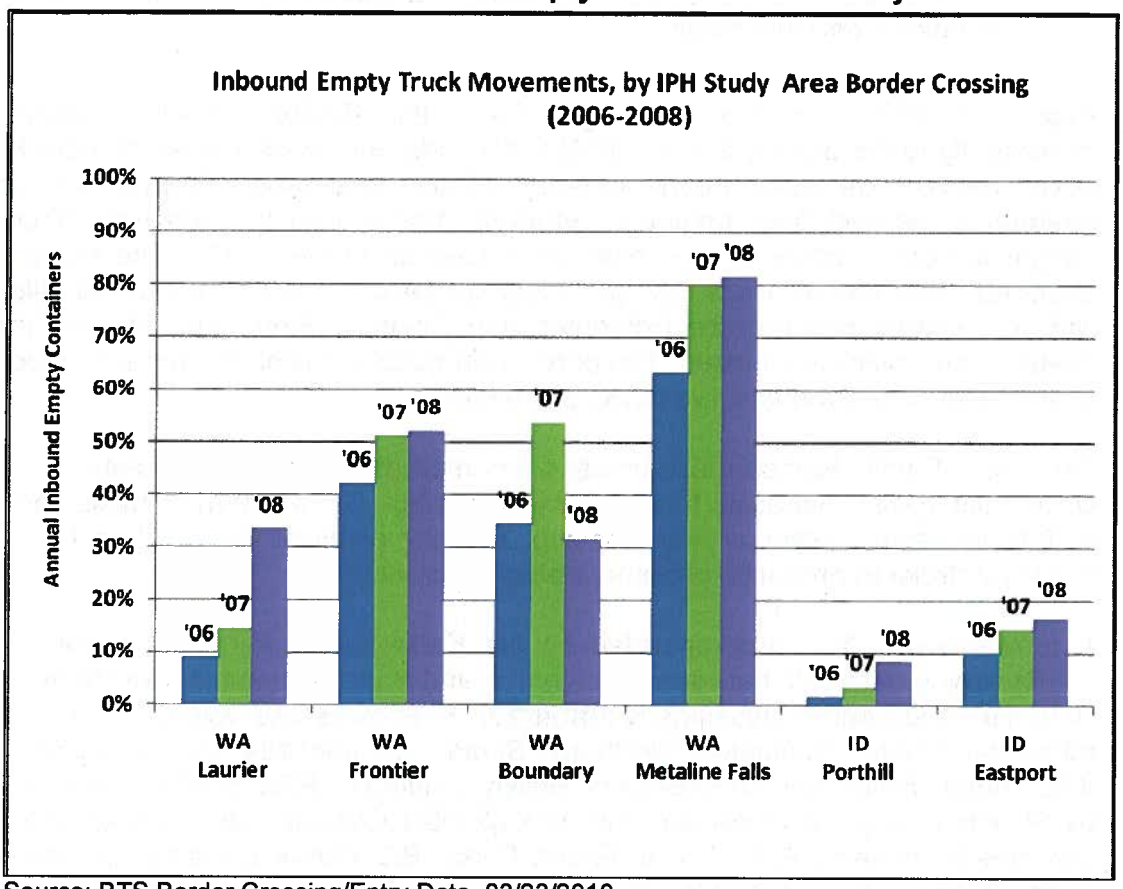
For rail container/unit crossings, the Eastport POE (Union Pacific) represents 86 percent of all inbound railroad volume. The remaining rail volumes are split between the Boundary WA POE (Kettle Falls Railroad) 10 percent, and Laurier (Kettle Falls Railroad), 4 percent.

Another aspect of border crossing selection efficiency is the amount of empty or "deadhead" traffic. All motor carrier operations perform with a certain degree of empty miles, where the carrier moves empty equipment with no related revenue to offset cost. The higher the imbalance of loaded units moving in one direction, compared to empty units moving in the opposite direction, the greater the possibility alternative routings will be sought. The idea being that alternative routes (via alternative POEs), while possibly generating more circuitous miles and cost, may create a more balanced flow. At POEs where the percentage of empty movements approach zero, traffic is more likely to continue utilizing the crossing.

Exhibit 22 identifies the percent of inbound empty truck units at each of the border crossings within the study area, for the available (full-year) counts 2006 to 2008. Eastport, ID and Porthill, ID consistently had the lowest percentage of empty truck movements over the three year time period.

The percentage of empty trucks moving inbound through Laurier, WA has more than doubled since the onset of the recession. All other crossings show a similar trending increase in empty truck movements with the exception of Boundary which shows a considerable spike in 2007. This is reflective of a relatively large increase in truck container crossing counts in 2007 (442) compared with 84 in 2006 and 38 in 2008. As a whole the Boundary crossing only constitutes 0.2 percent of all truck container crossing counts in the study area.

Exhibit 22: Percent Inbound Empty Truck Movements by IPH POE



Source: BTS Border Crossing/Entry Data, 03/23/2010
http://www.bts.gov/help/border_crossing_entry_data.html,

A summary of the commodities shipped through the Washington border crossings was conducted in 2007.[5] It notes the highly variable nature of commodity flows, depending on shifting commodity prices and modal competition. The significant findings of the survey shown below while varied tend to be associated with raw materials, heavy manufacturing and chemicals:

- Lower level usage of the Laurier crossing on US-395 is partially due to the lower populations in close proximity and a lack of related consumable needs. Wood products are the predominant commodity at Laurier.
- The preference for the Frontier crossing may be related to the smelting and metals refining industries located in southern British Columbia in proximity to this crossing. Chemicals and wood products dominate at the Frontier crossing.
- The primary commodities observed at Metaline Falls include primary and fabricated metal products, and wood products.

[5] *Projections of Washington-British Columbia Trade and Traffic by Commodity, Route, and Border Crossing*, H Galloway et al, Strategic Freight Transportation Analysis, WSU, May, 2007)

- Commodities moving across the border at Boundary are dominated by chemicals and machinery.

Based on BTS TransBorder Freight Data, the Eastport border crossing consistently ranks among the top 20 U.S./Canada commercial ports of entry by dollar volume, (however nearly one-half of the total value flowing through Eastport is derived from petroleum products transported by pipeline).[6] Truck routing is heavily influenced by cost, as a function of total VMT. The shortest identified, truck friendly route selection incorporates this crossing and is identified with movements between the Edmonton and Calgary Alberta markets and the Oregon and California markets. The primary products crossing the border include lumber and wood products, livestock, and fertilizer.

The Union Pacific Railroad also crosses the international border at Eastport, ID. Daily train traffic averages three at this crossing. On an annual basis, over 68,000 containers enter at this crossing. Primary commodities shipped by rail include petroleum products, propane, potash, and lumber.

A former BNSF line, now operated by the Kettle Falls International Railroad (KFR) serves rail traffic between Washington and British Columbia, over both the Boundary and Laurier crossings **(Exhibit 23)**. KFR owns and operates over 160 miles of former Burlington Northern Santa Fe trackage in Northeastern Washington State and Southeastern British Columbia. KFR operates from the BNSF interchange at Chewalah, WA to Columbia Gardens, BC. A second line operates from Kettle Falls, WA to Grand Forks, BC, before crossing the border again to reach San Poil, WA. KFR has a very diverse traffic base, including lumber, plywood, wood products, minerals, metals, fertilizer, industrial chemicals, and abrasives.[7] Continuing service remains with the BNSF.

On October 31, 2008 the KFR submitted an intention to abandon the KFR rail line between mile post (MP) 34.3 near Laurier, WA and through Grand Forks, BC at MP 47 to and including MP 48.8 near Danville, WA, including all yard tracks, sidings and spur tracks. After the notice was filed, Pacific Abrasives and Supply, Inc. a Canadian firm in Grand Forks, BC commissioned a study of the impacts on the regional economy if the abandonment proceeds. The study estimated that if the KFR line is abandoned, current shippers on the rail line will experience an increase in shipping costs of $2.7 million to $7.3 million per year (Canadian $), with a project loss in GDP to the regional economy of $30 million over ten years.[8]

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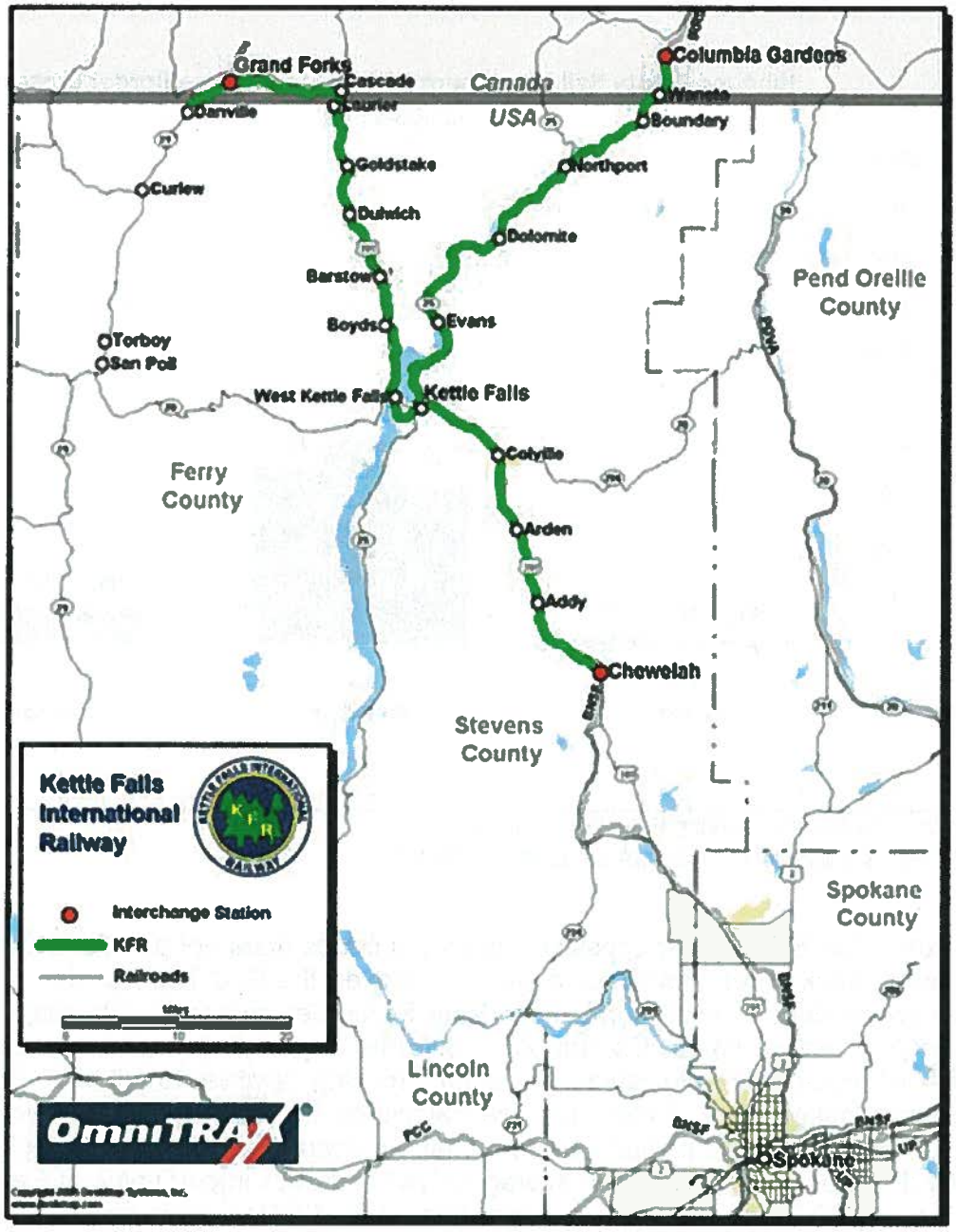
[6] Bureau of Transportation Statistics, North American Transborder Freight Data: http://www.bts.gov/programs/international/transborder/TBDR_FastFactsTGMPC.html

[7] http://www.omnitrax.com/rail_kfr.aspx#, 03/11/2010

[8] *A Study of: The Economic Impacts of the Proposed Abandonment of the Kettle Falls International Railway Line (KFR) Between MP 34.3 to MP 48.8 (A Canadian Perspective) Final Report.* Lochaven Management Consultants, November 9, 2009.

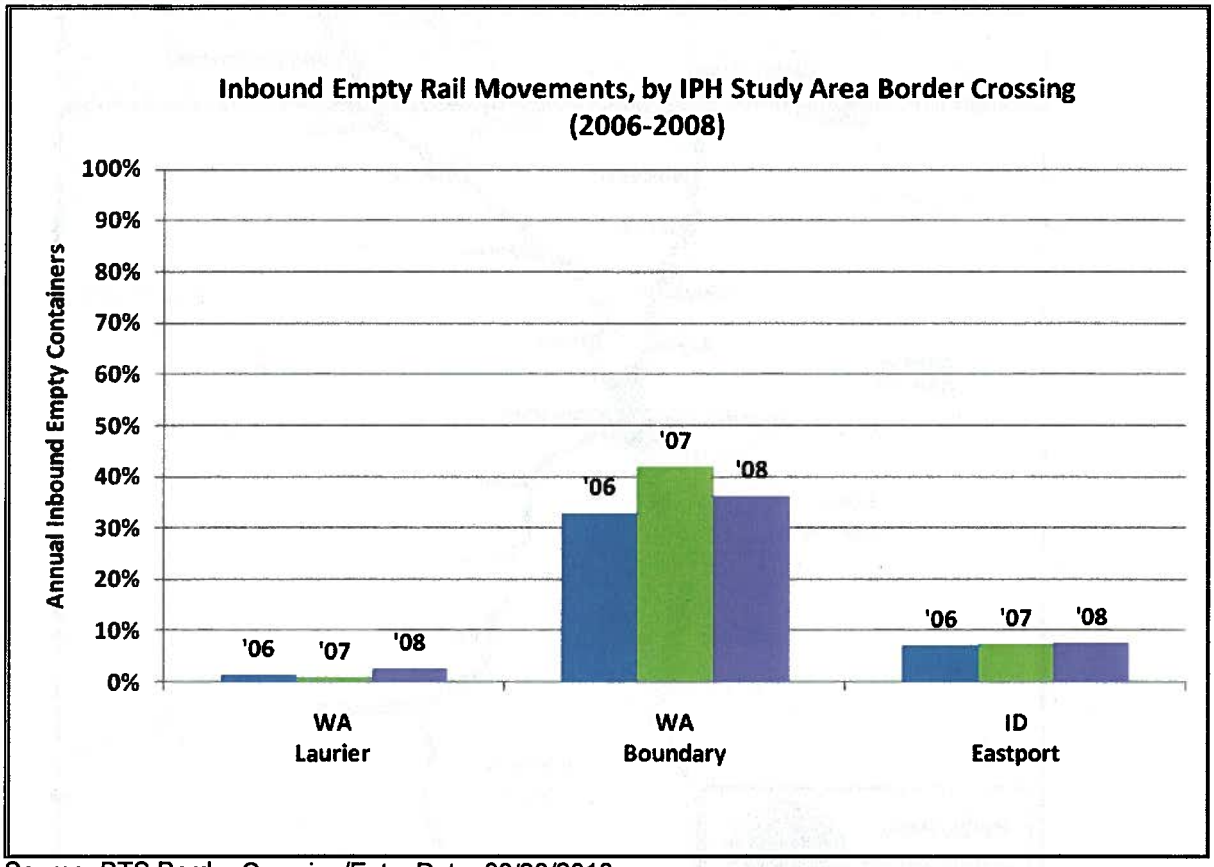
Exhibit 23: Kettle Falls International Railroad (KFR)



Source: OmniTRAX, Inc.

The rail crossing at Eastport continues to perform in a balanced environment, related to percent of empties **(Exhibit 24).** Boundary shows a spike in 2007 which is a more significant finding for this crossing with respect to rail. Boundary represents the second highest rail crossing in the study area with 10 percent of the activity during the period 2006 to 2008 **(Exhibit 21)**. The Eastport crossing accounts for 86 percent while the Laurier crossing accounts for only 4 percent.

Exhibit 24: Percent of Inbound Empty Rail Movements by IPH POE

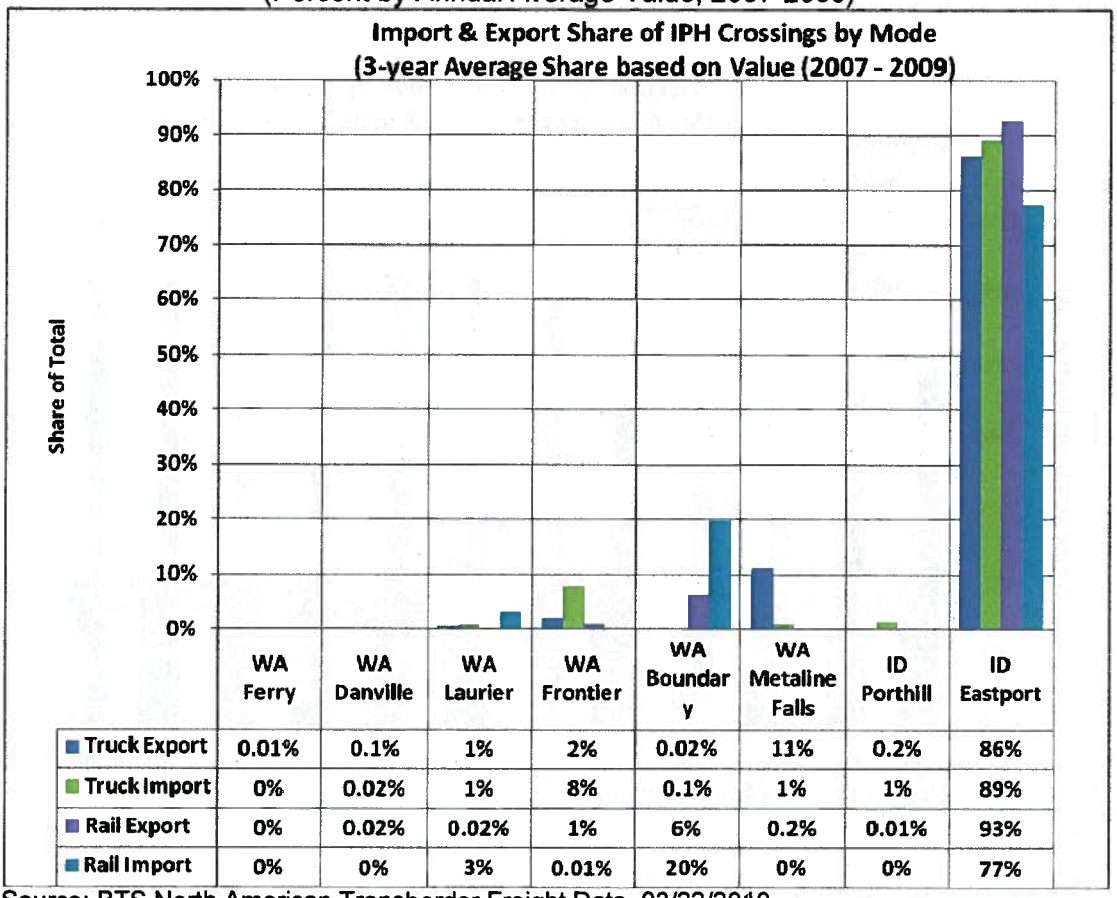


Source: BTS Border Crossing/Entry Data, 03/23/2010
http://www.bts.gov/help/border_crossing_entry_data.html,

As noted, the BTS Border Crossing/Entry data series does not provide outbound container truck or rail movement counts. However, the BTS Transborder Freight Data series does provide comparison data for border crossings with respect to import and export value. **Exhibit 25** shows the import and export percentage share of truck and rail values for each crossing relative to all IPH border crossings based on a 3-year average calculated for 2007 to 2009. From the 'value' perspective, it is quite evident that Eastport significantly outweighs all other IPH crossings. The 3-year average of rail and truck import value at Eastport equates to $2.3 billion versus an export total of $1.4 billion. In comparison to the findings presented in **Exhibit 17** and **Exhibit 18** the import versus export gap at this crossing closes only when considering movements by truck and rail. This is highly indicative of the $4.4 billion of imported pipeline movements over this crossing which was included in the 2008 BTS Top 125 Gateways analysis.

Exhibit 25: Border Crossing Share of Import & Export Value; (Truck & Rail)

(Percent by Annual Average Value, 2007-2009)



	WA Ferry	WA Danville	WA Laurier	WA Frontier	WA Boundary	WA Metaline Falls	ID Porthill	ID Eastport
Truck Export	0.01%	0.1%	1%	2%	0.02%	11%	0.2%	86%
Truck Import	0%	0.02%	1%	8%	0.1%	1%	1%	89%
Rail Export	0%	0.02%	0.02%	1%	6%	0.2%	0.01%	93%
Rail Import	0%	0%	3%	0.01%	20%	0%	0%	77%

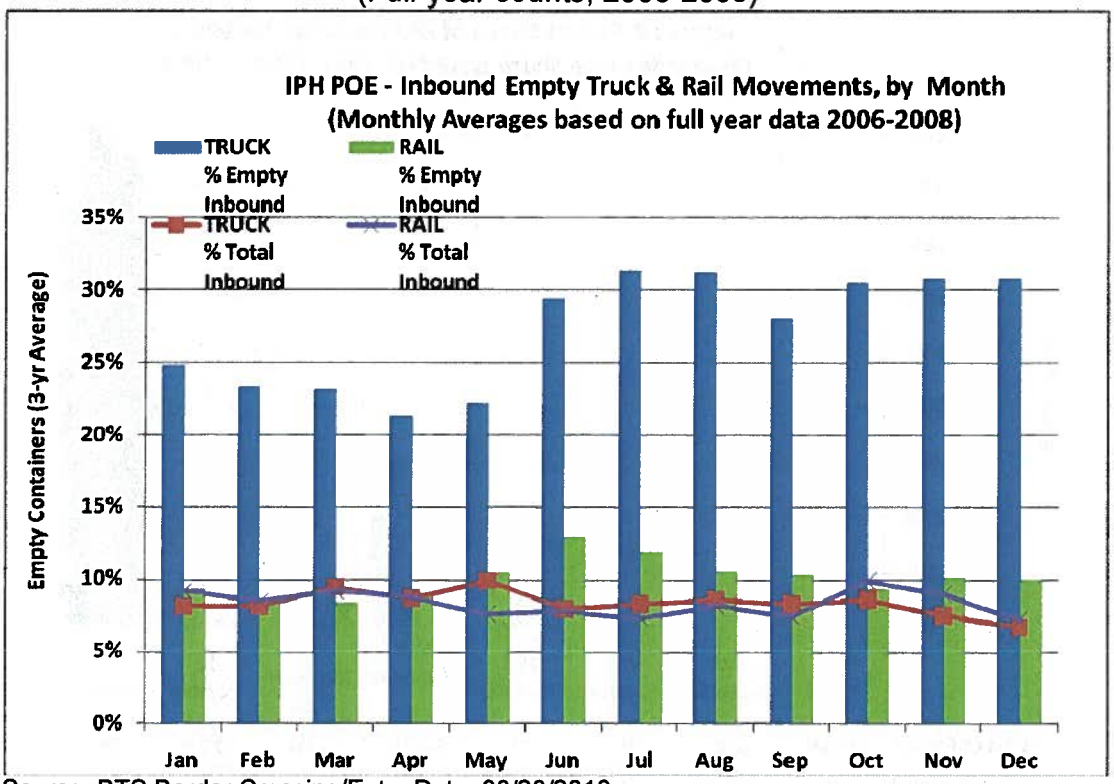
Source: BTS North American Transborder Freight Data, 03/22/2010
http://www.bts.gov/programs/international/transborder/TBDR_QA.html

Seasonal Border Crossing Activity

The industry interviews and freight forums conducted throughout the study area revealed a primary stakeholder issue pertaining to the variable (seasonal) accessibility to transport modes including an interrelated issue regarding the lack of backhauls during harvest time. While the border crossing/empty container counts are reflective of inbound traffic only, they do offer a good indication of empty truck and rail movements back to (i.e., through) the IPH study area border crossings. **Exhibit 26** gives a monthly profile of the empty inbound movements, based on a monthly 3-year average for both truck and rail.

Exhibit 26: Monthly Inbound Movements for IPH Border Crossings

(Full-year counts, 2006-2008)



Source: BTS Border Crossing/Entry Data, 03/23/2010
http://www.bts.gov/help/border_crossing_entry_data.html,

The profile indicates some notable seasonal relationships within and between the modes as follows:

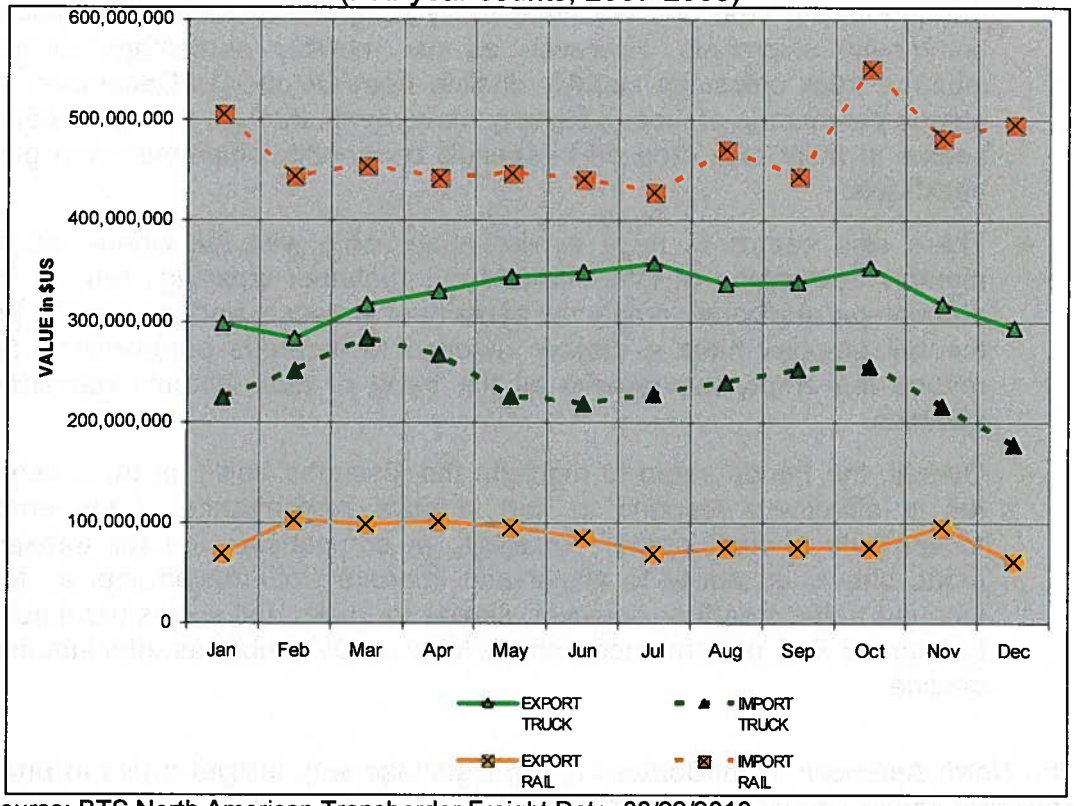
- Percent of inbound empty truck movements shows a sharp increase in June, peaking in July, with a relatively steady percent empty throughout the remainder of the year. There is a steady decline from December through April, until May shows the increasing empty trend toward the June spike and July peak.
- Percent of inbound empty rail movements, alternatively, begins to rise one month earlier in April and shows a steady increase until peaking in June, one month earlier than the truck movements. There is a steady decrease from the June peak to October and then seems to flatten out for the remainder of the year with further steady declines from December through March until beginning the increasing trend again in April.
- There seems to be a relationship where, as the monthly percentage of total inbound truck crossings lessen, the percentage of inbound empty truck containers are either steady or increase. Vice versa as the monthly percentage of total inbound truck crossings rise, the percentage of inbound empty containers decrease. This seems to point to the fact that

there is a consistent industry specific lane imbalance that is consistent throughout the year and not necessarily weighted to particular seasonal commodity shipments. However, as the monthly percentage of total inbound truck crossings steadily decline from October to December, the steady percentage of inbound empty movements through the same period seems to point to a drop off in specific commodity shipments with good backhauls.

- There also seems to be a similar relationship with rail where, as the monthly percentage of total inbound rail container crossings reduce, the percentage of inbound empty rail containers increase, and vice versa. Yet, the rail empties have a clearer reaction to increase performance and reduce the empty movements as the trend of total inbound movement steadies.
- Overall, the trends seem to highlight the lessened ability of truck versus rail to effectively respond to and improve performance of the empty movements through border crossings. In comparison, the rail transport mode shows an ability to adjust and improve PoE movements as total inbound traffic steadies; however, similar to trucks, rail shows the inability to improve PoE performance from October to December as total inbounds decline.

The North American TransBorder Freight Database was utilized again to profile seasonal import versus export border crossing freight flow data by rail and truck. The database includes two sets of tables; one is commodity based with state level detail only, while the other provides geographic detail in terms of Value and Tonnage. The geographic detail database is the best publicly available approximation for analyzing and comparing border crossing imports versus exports, and is provided in terms of value only. The geographic tonnage detail is available for Imports only. **Exhibit 27** shows the seasonality of import versus exports by rail and truck value for the IPH border crossings averaged by month over the 3-fullyear period 2007 to 2009.

Exhibit 27: Monthly Import and Export Values for IPH Border Crossings
(Full-year counts, 2007-2009)



Source: BTS North American Transborder Freight Data, 03/22/2010
http://www.bts.gov/programs/international/transborder/TBDR_QA.html

Some of the key seasonal findings relative to the monthly profile are as follows:

- Export value of truck movements begins to steadily increase from February through a July peak, then shows a decline in August until another peak in October (possibly indicating the end of the apple harvest), and then shows a continuing decline through February
- An obvious relationship is seen where import truck values show a diverging decline compared to truck exports beginning in April through June. This relationship seems to point to a profound seasonal lack of backhaul through June (i.e., identifies the impact of no value truck returns). The gap begins to close slightly in July with continuing improvements in August and September. Beginning in August and continuing through December, there is a non-diverging, comparative and consistent fluctuation between import and export value. With the exception of a noticeable diverging in January, this trend continues until beginning to significantly diverge in April. With the exception of January, this finding suggests a more consistent import and export value relationship for the IPH crossings from October and through the winter until March.

- Rail shows a sharp increase in October import values over a rather steady export value, and a moderate increase in August also over a steady export value.
- Rail does show comparatively large diverging values of increased import value over decreased export value in December and January.

Border Crossing Opportunities and Constraints

Free and Secure Trade (FAST) service is a joint venture between the U.S. Customs and Border Protection and the Canada Border Services Agency (CBSA). This service allows a pre-screened membership the ability to cross the border in a simpler manner and reduce the frequency of delays.

When a FAST-approved driver arrives at the border, he or she presents three bar-coded documents to the border services officer (one for each of the participating parties: the driver, the carrier and the importer). The officer can quickly scan the bar codes while all trade data declarations and verifications are done at a later time, away from the border. Under FAST, eligible goods arriving for approved companies and transported by approved carriers using registered drivers are cleared into Canada or the United States with greater speed and certainty, which reduces costs for FAST participants.[9]

This service is available at nineteen border crossings, none of which are in the IPH study area. The crossings at Oroville, WA and Sweetgrass, MT are the closest FAST processing centers. Introduction of this service at a crossing may serve as an attraction to traffic currently directed by this consideration.

Some of the border crossings serving the IPH study area are likely to be constrained by investments in efficiency improvements. In the current environment of fiscal constraints coupled with the need to increase the security and efficiency of U.S. border crossings, the US Customs and Border Protection Agency has tended to focus in investments on the highest volume crossing. Many low volume border crossings, especially across the U.S. border with Canada have struggled to maintain hours, staffing and technology improvements.

The I-90 Corridor to the Gateways of Seattle - Tacoma

I-90 Snoqualmie Pass Winter Closures

I-90 is the primary east-west corridor across Washington State, linking eastern Washington and northern Idaho to the Seattle/Puget Sound area. From Seattle, it extends eastward 3,111 miles to Boston, Massachusetts, making it the longest limited access highway in the world. I-90 crosses the Washington Cascade Range (or Cascades) in Washington at Snoqualmie Pass (elevation 3,022 feet), where it is subject to accidents, rock slides, avalanches, and extreme weather.

[9] http://www.cbsa-asfc.gc.ca/prog/fast-expres/menu-eng.html, 03/11/2010

"Despite efforts and improvements made to this vital cross country interstate, accidents, avalanches, rock slides, and extreme weather have continued to close Snoqualmie Pass for an average of 120 hours per year."[10]

Alternative east-west routes across the Cascades include US-2 at Stevens Pass and US 12 at White Pass. Both are two-lane State highways with pass elevations above 4,000 feet, and are also subject to winter closures. Travel on these routes is characterized by lower speeds, local access, and poorer alignments compared to I-90. I-90 across Snoqualmie Pass is a strategic freight corridor due to the international, domestic, and intrastate trade that it carries. Thirty-five million tons of freight cargo, or $500 billion worth of goods, crosses I-90 Snoqualmie Pass each year. Average daily traffic (ADT) volume at the pass in 2007 was 28,000 vehicles per day, including about 6,000 trucks daily.

In 2008, the Washington State Department of Transportation (WSDOT) commissioned a study to estimate the economic losses associated with winter closures of I-90 at Snoqualmie Pass. The study identified total losses of $28 million associated with the 89-hour closure of I-90. The losses included employment loss, reductions in sales tax revenue, and reductions in personal income.

The study also noted the role of truck parking areas during winter closures, noting that federal rules require a ten-hour rest period after 11 hours of driving. Trucks frequently park on ramps, shoulders, and weigh stations during these emergencies, compromising safety for all users.

More recently WSDOT announced a new Commercial Vehicle (CV) Pass System intended to support freight movement during major transportation disruptions, such those often encountered on I-90. The Commercial Vehicle Pass System will be activated when major freight highways are closed or severely restricted, and a limited-capacity detour is available nearby. CV passes will be issued online based on the highway detour's capacity and the priority of goods carried, as determined by the State Emergency Management Division. WSDOT conducted tests of the new system during January and February of 2010.

WSDOT has also identified a Preferred Alternative for improvements east of Snoqualmie Pass to address the avalanche and rock slide hazards and mitigate the road closures caused by such events. The I-90 Snoqualmie Pass East Project will provide an additional lane in each direction between Hyak and the Keechelus Dam for a distance of about five miles. The project will also improve safety by flattening sharp curves, expand the snowshed, stabilize rocky slopes, build new bridges, install avalanche fences, and provide wildlife crossings. Funding of the $545 million project is provided by the State's Transportation Partnership Package, with completion scheduled for 2015. A second phase of the project would continue the widening of I-90 ten miles eastward to Easton. Funding for this phase has not yet been identified.

[10] http://www.wsdot.wa.gov/Projects/I90/SnoqualmiePassEast/HyaktoKeechelusDam/History

The performance of I-90 within the IPH study area is discussed in detail in *Technical Memorandum #1: The IPH Multimodal Infrastructure Report*. Aside from some peak hour congestion in the metropolitan areas, I-90 in the study area performs well. Shipper and carriers interviewed in the region also see I-90 as a valuable regional asset. However, continued investments in intelligent transportation systems (ITS) to get information out to the carrier community faster and provide up to date closure and route alternative information will benefit the shipper community and increase the value of this important asset.

TRUCK TRANSPORT ISSUES AND OPPORTUNITIES

Highway and Truck Issues in the IPH Study Area

While truck transport represents one independent mode, it is also the primary integrator between the other modes in an intermodal/multimodal network. Highways were often the primary concern of shippers interviewed during the stakeholder outreach efforts. Many pointed to specific highway bottlenecks and deficient highway facilities such as Bigelow Gulch Road and the Huetter Bypass, but the need for an efficient north-south corridor extending from the Canadian border through the region was the most often cited highway deficiency.

Other frequently raised issues included the difficulty of getting competitive trucking rates to external markets when carriers must "deadhead" or travel empty into the region. A number of manufacturers also noted that regional season demands, due to agricultural harvests, often left them searching for equipment or carriers to serve their needs.

A number of shippers also noted the benefits they derive from being able to operate longer combination vehicles (LCVs) in the region. However, a number of shippers also noted the increased benefits that could come from greater uniformity in size and weight regulations across the Western U.S. One carrier operating LCV's in Idaho noted that they sometimes get warnings on "Blue Routes" in the study area due to off-tracking regulations. Blue Routes limit doubles configurations to 61 feet of trailers and 75 feet overall length without a permit. Configurations operating on these routes cannot exceed 5.5 feet of off-tracking.[11] Among the Blue Routes in the IPH study area: SH3, SH5, SH6, SH8, SH9, the eastern portion of SH200 and US-12.

Key Elements of the IPH Study Area Truck Network

Public sources of truck traffic volumes have been assembled and mapped to visualize the proportional distribution of freight traffic on the IPH network. Linear network GIS data for WSDOT and IDT were coalesced to be able to map the proportional distribution of AADT truck volumes on the entire IPH study area highway network. The proportional line thickness identifies various sections of roadways with relatively higher levels of truck volumes. While the information does not specifically indicate the level of commodity flow in terms of tonnage and/or value it does identify highway sections and connections maintaining proportionally larger volumes of truck traffic activity. This information offers additional best available data to review, compare, and prioritize route-based modal issues. **Exhibit 28** show average annual daily truck (AADT) volumes for the IPH regional highway network. **Exhibit 29** provides additional detail for Spokane and Coeur d'Alene.

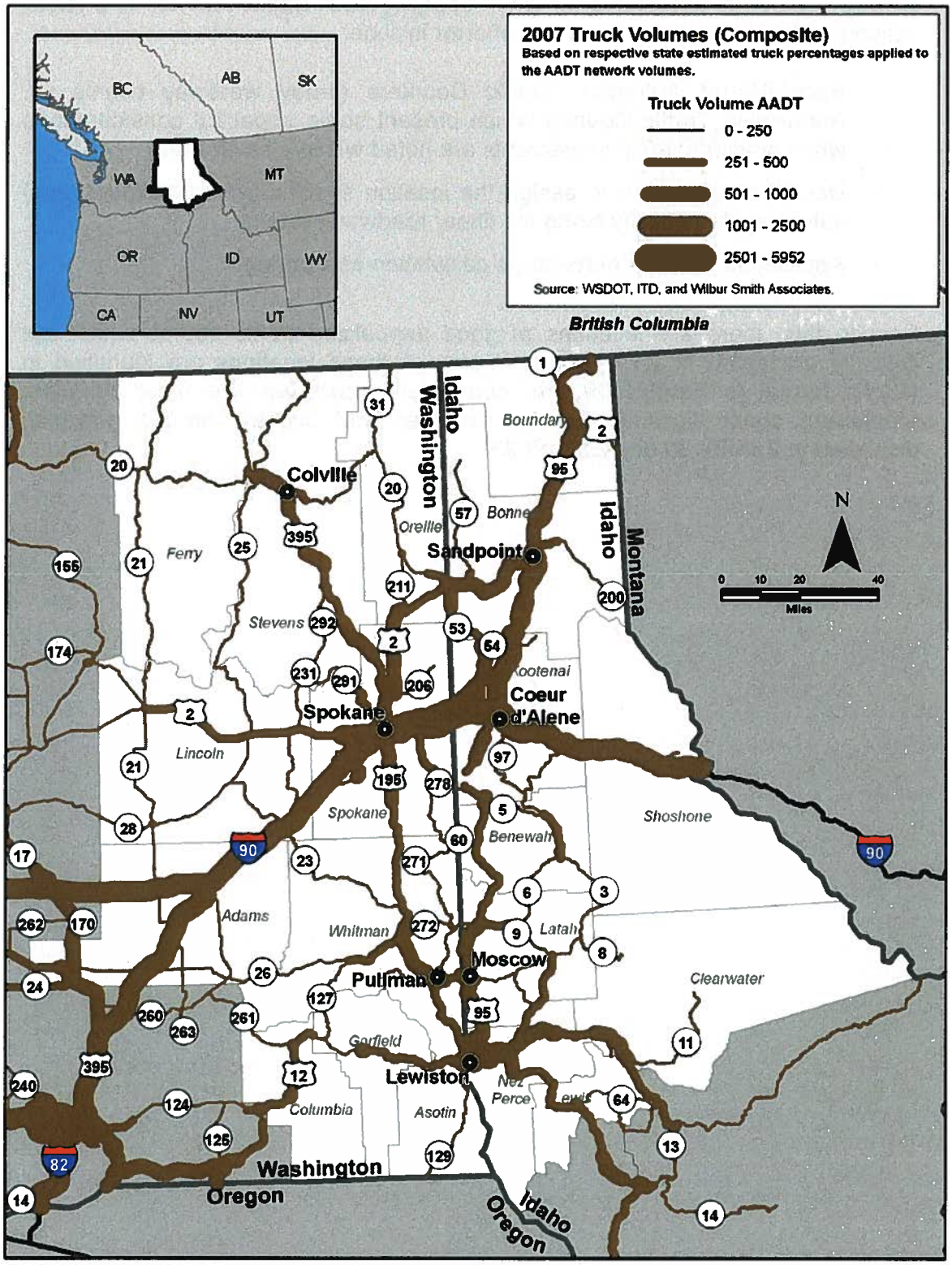
[11] Routes Designated for Extra-Length Combinations: http://itd.idaho.gov/dmv/poe/documents/extra.pdf

It is important to note that in the case of this 'best available' public data there are several sources of potential error when applying truck traffic volumes to a linear network. The three primary sources of error include:

- Variability of Automatic Traffic Counters (3-day weekday counts vs. Annualized Traffic Counts) which present some impactful considerations when seasonal truck movements are noted within a study area.
- Use of an algorithm to assign the location specific (horizontal/positional) values systematically along the linear roadway system.
- Application of truck percentage calculation assignment

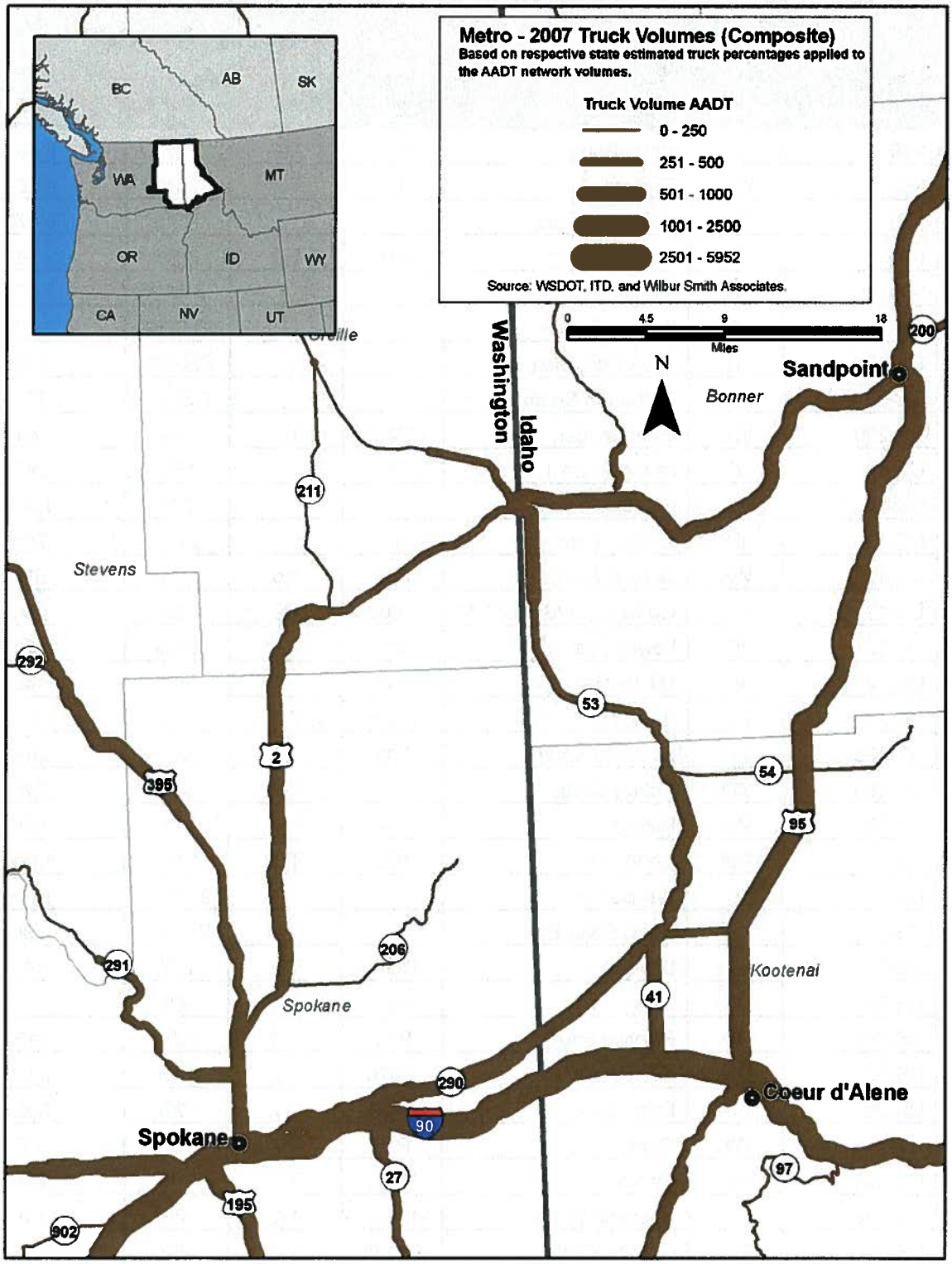
Despite this, there are locations of good annualized traffic counts which are typically presented in ATR reports. Some of these locations are identified in tabular format in **Exhibit 30.** For comparison purposes, the most complete annualized count locations can be reviewed and overlaid on the networks displayed in **Exhibit 28** and **Exhibit 29**.

Exhibit 28: Regional Truck Volumes (2007)



Source: WSDOT, ITD, and Wilbur Smith Associates

Exhibit 29: Spokane and Coeur d'Alene Truck Volumes (2007)



Source: WSDOT, ITD, and Wilbur Smith Associates

Exhibit 30: IPH Annual Average Daily Truck Traffic

Highway	State	Location	Data Station (Mile Post)	Strategic Freight Corridor	Percent of Trucks	Annual Average Daily Truck Traffic (ID – 2008) (WA – 2007)
I-90	WA	Idaho Border	P24	T-1	12%	5,880
I-90	WA	Fishtrap	R014	T-1	25%	4,250
I-90	ID	Post Falls East	-	-	7.45%*	3,576
I-90	WA	Ritzville West	P10	T-1	25%	2,500
I-90	ID	Montana Border	-	-	32.84%*	2,003
I-90	ID	Kellogg East	-	-	16.67%*	2,000
SH-200	ID	Clark Fork East	-	-	13.08%*	144
SH-53	ID	Rathdrum South	-	-	7.30%*	715
SR-290	WA	Idaho border	P33	T-2	19%	1,444
US-12	ID	Lewiston East	6	-	15%	1,950
US-12	ID	Lewiston West	-	-	5.24%*	1,048
US-12	ID	Orofino East	19	-	27%	756
US-12	WA	Dayton West	P05	No	26%	550
US-12	WA	Garfield Co./SR 127 W	R067	No	23%	480
US-12	ID	Lowell East	85	-	34%	167
US-12	ID	MT Border	84	-	26%	148
US-195	WA	Spokane	-95.6	T-2	12%	1,040
US-195	WA	Spokane South	P15	T-2	12%	1,030
US-195	WA	Colton South	P13	T-2	17%	820
US-195	WA	Pullman	P14	T-2	21%	650
US-2	WA	Chattaroy	P28	T-2	11%	1,980
US-2	ID	WA Border	-	-	9.09%*	1,000
US-2	ID	Priest River East	-	-	9.84%*	590
US-2	WA	Davenport	R064	T-2	15%	440
US-395	WA	Orient	P26	T-2	18%	-
US-395	WA	Ritzville South	P7C	T-1	30%	2,130
US-395	WA	Kettle Falls	R070	T-2	14%	1,110
US-395	WA	Loon Lake	R063	T-2	12%	1,030
US-395	WA	Orient	P26	T-2	18%	130
US-395	WA	Spokane	R102	T-2	4%	920
US-395	WA	Spokane North	-166.62	T-2	4%	510
US-395	WA	Colville North	-241.89	T-2	16%	350
US-395	WA	Canada Border	-270.6	T-3	22%	100
US-395 /I-90	WA	Spokane South	-279.2	T-1	14%	3,650

Highway	State	Location	Data Station (Mile Post)	Strategic Freight Corridor	Percent of Trucks	Annual Average Daily Truck Traffic (ID – 2008) (WA – 2007)
US-95	ID	Sandpoint South	310	-	9%	1,980
US-95	ID	Sandpoint North	119	-	13%	1,885
US-95	ID	Coeur d'Alene North	48	-	4%	1,320
US-95	ID	Bonners Ferry	16	-	11%	825
US-95	ID	Potlatch South	15	-	20%	820
US-95	ID	Craigmont North	139	-	18%	576
US-95	ID	Genesee North	98	-	13%	546
US-95	ID	Canada Border	46	-	39%	390

Notes: *Percentages calculated using cross tabulation of provided 2007 counts, rounded to two decimals. Resulting percentage was applied to the provided 2008 AADT.

Source: WSDOT, *2007 Annual Traffic Report, 2008 Annual Traffic Report.* ITD, *2007 Yearly Traffic Flow Maps, 2008 Yearly Traffic Flow Maps.*

Regional North-South Connections

North-south freight movement serving the Inland Pacific Hub study area includes primary routes US-395 and US-2 in eastern Washington and US-95 in western Idaho.

US-395: In Spokane, US-395 travels concurrently with US-2 on Division Street and Ruby Street, in an urban/suburban environment characterized by low speeds, traffic signal control, and uncontrolled access. It is estimated that the US-395 corridor carries over 7 million tons of freight valued at $13.5 billion annually through Spokane.[12] North of the "North Division Y" (divergence of North Division St. and the Newport Highway), US-2 extends into Idaho with a connection to US-95 in Sandpoint. North of the Spokane urban/suburban environment, US-395 continues north to the Canadian border at Laurier, WA.

Completion of the North Spokane Corridor (NSC) east of downtown Spokane will provide a multi-lane limited access facility for designation as US-395. The NSC project will construct a 60 mph limited access urban freeway along a new alignment starting at the I-90 Thor/Freya Street interchange, running northward 10.5 miles, interchanging with existing US-2 and rejoining the current US-395 route at Wandermere, approximately three miles north of the "North Division Y." The project shifts the US-395 alignment from Division Street to Market Street, approximately two miles to the east. Other interchanges will be located at Trent Avenue (SR-290), Wellesley Avenue, Francis/Freya Street, Parksmith Drive, and Farwell.

[12] http://www.wsdot.wa.gov/Projects/US395/NorthSpokaneCorridor/Facts.htm

The Francis to Farwell segment between the Francis/Freya and Farwell Interchanges opened to traffic in August, 2009. It is anticipated that the Farwell to Wandermere segment will be open to traffic by late summer 2011. Upon completion of the north end of the NSC corridor, approximately 5.7 miles will then be operational. When completed, the corridor is expected to improve freight and commuter mobility through the metropolitan area. The rest of the freeway will be built as funding is made available. In order to provide an interim connection to I-90, Spokane County has completed an Environmental Impact Statement for the widening of Bigelow Gulch Road between Francis Avenue on the west and Wellesley Avenue on the east. The first phase of this project, between Francis Avenue and Argonne Road, will serve to connect the North-South Corridor to I-90 until funding for completion of the North-South Corridor is secured.

With respect to the NSCs freight specific modal implications, the vicinity around the Francis and Freya freeway interchange includes a collection of distribution and light industrial companies. This area is likely to attract additional industrial businesses through the gravitational pull of its existing agglomeration economies, improved immediate highway access, improved access options to long-distance distribution highway facilities, and overall traffic flow performance. Completed elements of the NSC now offer enhanced access for long-distance distribution to the northeast via US-2 and northwest via US-395. Following future funding and completion of the envisioned NSC I-90 connection, more efficient distribution options will also be realized to the south, east, and west. Ultimately, this node is well positioned for comprehensive directional distribution commodities.

Continuing north of Spokane, US-395 consists of two to three lanes, with intermittent climbing lanes and four-lane sections, continuing approximately 100 miles to the border crossing at Laurier. The northern portions of US-395 wind through sparsely populated mountainous terrain. The biggest challenge for US-395 becoming a significant international trade corridor is the lack of population centers north of Colville. In addition, in an environment of fiscal constrains and the need to increase security and efficiency of U.S. border crossings, as a low volume border,

South of Spokane, US-395 runs concurrent with I-90 west to Ritzville, and turns south towards the Tri-Cities. It consists of a limited access four-lane facility between Kennewick and I-90.

US-2: US-2 extends north of Spokane as a two-lane State Highway with intermittent four-lane divided segments, including left- and right-turn lanes and center two-way left-turn lanes. It connects to Newport, at the Idaho border, 47 miles north of Spokane. Crossings at the Canadian border are available at Eastport and Porthill, Idaho, 90 to 100 miles beyond Newport.
US-95: US-95 provides the only continuous north-south route in western Idaho, extending from the Oregon state line to the border with Canada, a distance of 538 miles. For most of its length, it is a rural two-lane State highway. Idaho may widen portions of the corridor to a four-lane divided highway as warranted by

traffic, safety and funding considerations. This widening has been completed in Coeur d'Alene north of I-90, portions west of Coeur d'Alene Lake, and south of Moscow to Lewiston.

Construction is underway on several segments of US-95 from north of Hayden to north of Sandpoint. Between Wyoming Avenue and the SH-53 junction, a two-lane section of US-95 is being widened to connect with four-lane segments on both ends. Widening the highway will create four continuous lanes from Coeur d'Alene to north of Garwood. A traffic signal at Lancaster Road will also be constructed to improve safety. In Sandpoint, the ITD is constructing an alternate alignment for US-95 entitled the 'Sand Creek Byway' project. It consists of 2.1 miles of new alignment connecting US-95, from the northern end of the Long Bridge, directly to SH-200 and US-95 north of Sandpoint. The project includes six bridges, 65 retaining walls, and a pedestrian/bike pathway. Construction will continue into 2012 and represents one of the largest single projects in Idaho Transportation history.

Other areas of US-95 are programmed for widening in the Capital Investment Program (2009-2013). These include the segment between the top of Lewiston Hill to Genesee, Thorn Creek Road to Moscow, and segments between Garwood and Sagle. Completion of the widening of additional segments is dependent on funding availability.

Opportunities and Constraints for North-South Connections

One potential opportunity that cuts across US-395, US-2 and US-95 is to view the connectivity between these three routes as a regional trade corridor. This potential corridor would take advantage of current and planned improvements to the US-395 (e.g. the North Spokane Corridor), US-95 (e.g., the Sandpoint by-pass) and U.S. and Canadian upgrades to the Eastport/Kings Gate border crossings. Linking US-395 and US-95 via US-2 also offers the most direct route between Spokane to the Canadian population centers of Calgary and Edmonton.

Urban Bypass / Truck Routes

There are a number of urban projects in the study area have the potential to ease urban traffic congestion and serve regional truck circulation. The Bigelow Gulch/Forker Connector would be located in Spokane County along the existing Bigelow Gulch Road corridor. It would extend from Francis Avenue in Spokane to an intersection near Sullivan Road and Wellesley Avenue on the east. Parts would consist of widening Bigelow Gulch Road to an urban five-lane cross-section, and parts would be constructed as a rural four-lane section.

The corridor is heavily used today, with Argonne Road, as a circumferential route in the northeast quadrant of the Spokane metropolitan area. The new connector would be positioned to serve truck traffic for the numerous industries located in this portion of the Spokane River Valley. The route would be accessed from I-90 at the Sullivan Road or Argonne Road interchanges. With the completion of the

North Spokane Corridor, an interchange at Freya St would provide north-south connections.

The environmental clearance for the project was secured from the FHWA in April, 2008. The portion of the project west of Argonne Road is currently under design, and funding is committed in the County's 2009-2012 Transportation Improvement Plan.

Seventy miles north of Spokane improvements to US-395 in Colville began as a study to "bypass" the downtown area. However, a community led project projected that moving traffic off "main street" would lead to the demise of some local businesses. An alternative solution is taking a phased approach to making improvements that will protect the viability of downtown businesses while also providing alternative routes for truck traffic. A city street in Colville has been designated the preferred Colville Truck Route to keep large commercial vehicle out of the downtown area. The truck route features to roundabouts, a north and south constructed to accommodate very large vehicles. The roundabout projects were conceived to increase intersection capacity, provide ease of turning movements for trucks, and provide a "gateway" into the community. [13]

In Idaho, the Huetter Bypass has been proposed to relieve the portion of US-95 between Coeur d'Alene and Hayden. It would be developed as a controlled-access north-south route between I-90 and SH-53. It would occupy portions of Huetter Road and the Union Pacific Railroad right-of-way. The project would provide benefits to freight movement by avoiding the congested US-95 arterial route. The bypass would consist of four lanes initially, with provision for future widening to six lanes. Interchanges would be located at I-90 between Post Falls and Coeur d'Alene, at SH-53, and at one-mile intervals to serve local destinations.

The project will require an environmental review to identify a Preferred Alternative. Efforts are currently underway to preserve right-of-way for the corridor. The time frame for construction of the Huetter Bypass is expected to be 11 to 15 years in the future.

Strategic Freight Corridors

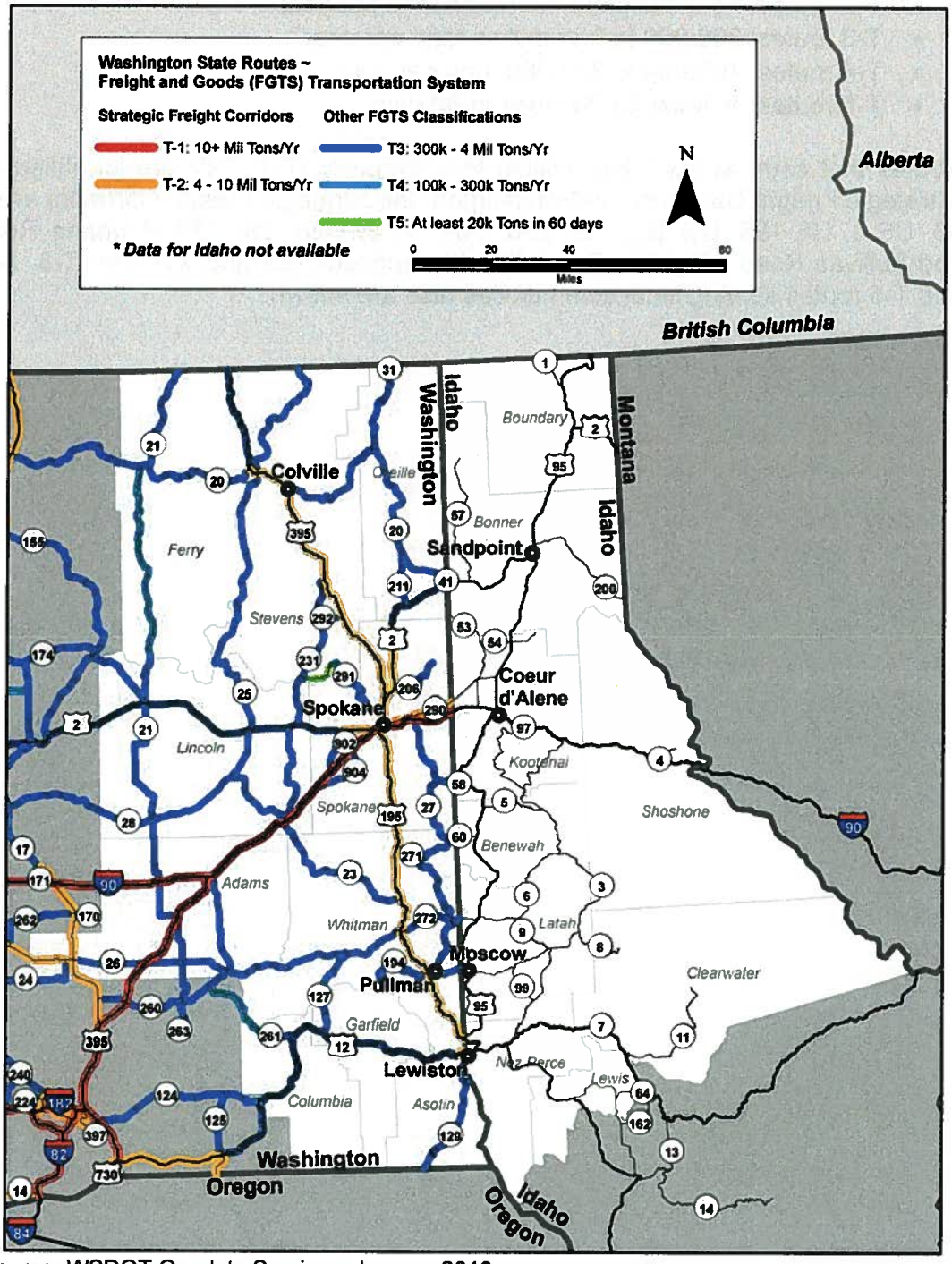
WSDOT's Freight and Goods Transportation System (FGTS) categorizes the state's roadways according to the annual truck tonnage carried. To do this, the FGTS uses five classifications:

[13] http://www.wsdot.wa.gov/biz/csd/
Photo credit: Welch-Comer Engineers and Surveys: http://welchcomer.com/

- T-1 routes: Greater than 10 million tons per year
- T-2 routes: Four million to 10 million tons per year
- T-3 routes: 300,000 to four million tons per year
- T-4 routes: 100,000 to 300,000 tons per year
- T-5 routes: At least 20,000 tons in 60 days

Routes that carry at least four million tons annually (T-1, T-2) are identified as "Strategic Freight Corridors". In Washington, the Strategic Freight Corridors are I-90, US-2, US-195, US-395, WA 290, WA 17, WA 26, WA 128, Argonne Road and Sullivan Road - Bigelow Gulch Road in Spokane **(Exhibit 31)**. The T-3, T-4, and T-5 routes serving local communities also are shown.

Exhibit 31: Washington State - Strategic Freight Corridors



Source: WSDOT Geodata Services, January 2010

Truck Transport Freight Flows by Direction

Knowledge of the truck oriented freight movement is important as it provides clues about key markets and sheds light on lane balance issues. The IPH Regional Freight Profile utilized Global Insight, Inc.'s 2007 TRANSEARCH™ database to understand the commodities that flow into, out-of, within and through the IPH study area. Understanding freight flows in the region is an initial step in understanding the economic activity of the area. A summary of regional truck flows is presented in **Exhibit 32**.

Exhibit 32: Principal Truck Freight Flows

2007 IPH Truck Freight Flows					
Principal Truck Freight Flows Inbound/Outbound Direction	Truck Tonnage	Truck Values	Total Tons (%)	Total Value (%)	Diff. in % Distribution (Value - Tons)
Internal In Study Area	**13,729,929**	**$15,528,157,528**	**15.1%**	**4.2%**	**-10.9%**
Inbound					
From West	12,628,000	$49,816,586,355	13.9%	13.4%	-0.5%
From East	2,412,529	$9,234,071,885	2.6%	2.5%	-0.2%
From North	620,627	$735,807,539	0.7%	0.2%	-0.5%
From South	3,007,499	$19,168,430,874	3.3%	5.2%	1.9%
Inbound Subtotal	**18,668,655**	**$78,954,896,654**	**20.5%**	**21.2%**	**0.8%**
Outbound					
To West	13,882,365	$64,109,180,356	15.2%	17.3%	2.0%
To East	5,054,659	$22,916,730,677	5.5%	6.2%	0.6%
To North	793,829	$500,528,618	0.9%	0.1%	-0.7%
To South	9,280,323	$23,319,455,177	10.2%	6.3%	-3.9%
Outbound Subtotal	**29,011,176**	**$110,845,894,829**	**31.8%**	**29.8%**	**-2.0%**
Inbound + Outbound					
To West	26,510,365	$113,925,766,711	29.1%	30.7%	1.6%
To East	7,467,188	$32,150,802,562	8.2%	8.7%	0.5%
To North	1,414,456	$1,236,336,157	1.6%	0.3%	-1.2%
To South	12,287,822	$42,487,886,051	13.5%	11.4%	-2.1%
Inbound + Outbound Subtotal	**47,679,831**	**$189,800,791,481**	**52.3%**	**51.1%**	**-1.3%**
Internal + Inbound + Outbound	61,409,760	$205,328,949,011	67.4%	55.3%	-12.1%
Through Traffic	**29,690,825**	**$166,236,598,903**	**32.6%**	**44.7%**	**12.1%**
Total For All Traffic	91,100,585	$371,565,547,913	100.0%	100.0%	0.0%

Source: 2007 TRANSEARCH™, Global Insight.

Principal Truck Freight Flows & Network Implications

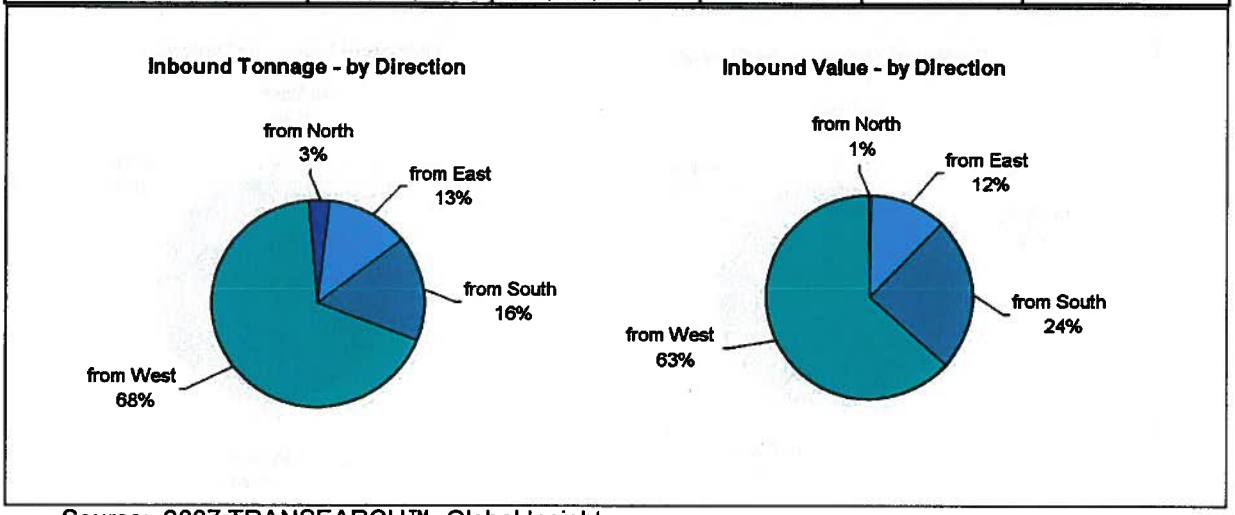
- Combined, inbound and outbound flows account for 52 percent and 51 percent of total truck freight flows by tonnage and value, respectively. Internal truck flow accounts for the remaining 15 percent of tonnage and 4 percent of value. These findings suggest that there is a significant difference in the distribution of value-to-weight for freight internally circulating the IPH study area (-10.9 percent) versus through truck traffic which shows a positive (+12.1 percent) account; i.e., internal movements tend to be high weight, low value while through movements tend to be high value, low weight.
- More commodity is destined outbound via truck (31.8 percent) versus inbound via truck (20.5 percent). This finding points to the likelihood of empty truck returns to the IPH study area.
- Through traffic accounts for 33 percent of tonnage and 45 percent of value.
- Combined, inbound and outbound truck flows show significance towards the ***West*** (29.1 percent, 30.7 percent) and ***South*** (13.5 percent, 11.4 percent), by tonnage and value, respectively.
- Of particular importance is flow to and from the ***North*** which represents only (1.6 percent and 0.3 percent) respectively, of all combined inbound and outbound flows. These findings suggest some possibly unrealized potential for increased export and import trade with northern markets.

Inbound/Outbound Directional Flows

The previous data table provides some implications about the principal truck flow directions; however, it is also important to understand inbound and outbound traffic flows and their relative significance to flow direction. This information helps to focus strategic and meaningful directional-based improvements to the truck transport network. **Exhibits 33 and 34** summarize key findings with respect to current truck transport network utilization including the distribution of actual freight flow direction.

Exhibit 33: Inbound Truck Flows to the IPH Study Area by Tons and Value

2007 IPH Truck Freight Flows					
Principal Truck Freight Flows Inbound/Outbound Direction	Truck Tonnage	Truck Values	% Subtotal Tonnage	% Subtotal Value	Diff. in % Distribution (Value - Tonnage)
Inbound					
From West	12,628,000	$49,816,586,355	67.6%	63.1%	-4.5%
From East	2,412,529	$9,234,071,885	12.9%	11.7%	-1.2%
From North	620,627	$735,807,539	3.3%	0.9%	-2.4%
From South	3,007,499	$19,168,430,874	16.1%	24.3%	8.2%
Inbound Subtotal	**18,668,655**	**$78,954,896,654**	**100.0%**	**100.0%**	**0.0%**



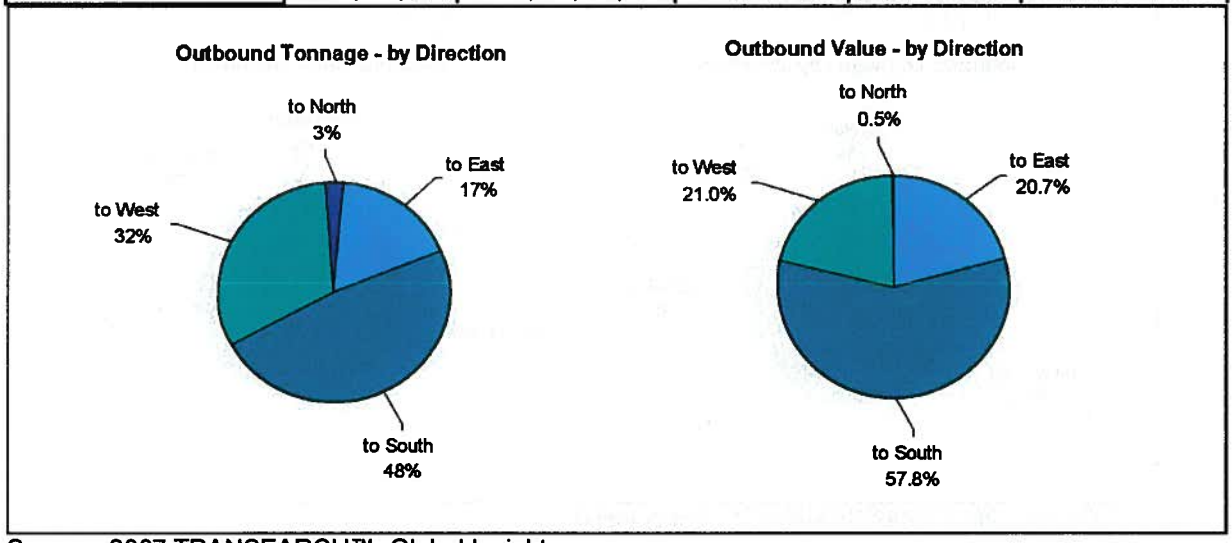
Source: 2007 TRANSEARCH™, Global Insight

Key Findings from Inbound Truck Flows

- Inbound truck transport flows from the **West** are significantly higher than all other directions with respect to both tonnage (68 percent) and value (64 percent).
- Inbound trucks from the **South** represent the next highest values with 16 percent and 24 percent, respectively, followed by the **East** with 13 percent and 12 percent, respectively.
- The larges difference in value-to-weight comparison shows positive value over tonnage differences (+8.2 percent) from the **South** compared to a negative value to tonnage differences (-4.5 percent) from the **West**.

Exhibit 34: Outbound Truck Flows from IPH Study Area by Tons and Value

2007 IPH Truck Freight Flows					
Principal Truck Freight Flows Inbound/Outbound Direction	Truck Tonnage	Truck Values	% Subtotal Tonnage	% Subtotal Value	Diff. in % Distribution (Value - Tonnage)
Outbound					
To West	13,882,365	$64,109,180,356	47.9%	57.8%	10.0%
To East	5,054,659	$22,916,730,677	17.4%	20.7%	3.3%
To North	793,829	$500,528,618	2.7%	0.5%	-2.3%
To South	9,280,323	$23,319,455,177	32.0%	21.0%	-11.0%
Outbound Subtotal	**29,011,176**	**$110,845,894,829**	**100.0%**	**100.0%**	**0.0%**



Source: 2007 TRANSEARCH™, Global Insight

Key Findings from Outbound Truck Flows

- Outbound truck transport tonnage and value flows to the **West** (47.9 percent, 57.8 percent, respectively) and the **South** (32.0 percent, 21.0 percent, respectively) are comparatively higher than all other directions, followed by the **East** with 17.4 percent and 20.7 percent, respectively.
- There is a significant difference between the value and tonnage (+10 percent) distributions for truck flows to the **West**.
- There is a large difference in outbound tonnage to the **South** (+14.6 percent) versus the **East** while the value of the two flows is nearly identical. This finding suggests that the truck transport of lower-value/high-weight commodities to the **South** versus the **East**.
- Comparing outbound truck flows to the **West** versus **South**, there is a 21 percent point spread in the difference between the value and tonnage distributions.