City of Portland
Freight Master Plan – Implementation Phase

Technical Memorandum No. 1
Freight Innovations and Trends

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Preface

The methods and technologies used for goods movement are changing rapidly. The containerization of freight has been successfully implemented because of the standardization between container boxes and the rail cars, truck trailers, port cranes, barge, and steamship holds that move them. Because of "just-in-time" delivery operations, many shippers are able to bring goods to their customers with less reliance (and, in some case, no reliance) on warehouses or other inventory facilities. Additionally, containers offer shippers greater security with less chance of pilferage in moving their goods. These changes have enabled industries and communities to reach international and domestic locations with much higher levels of efficiency and reliability, and lesser cost.

Moreover, equipment being used by freight transportation carriers is having a significant impact on effective operations. For example, electronic communications via global positioning satellite (GPS) transponders assist motor carriers in monitoring deliveries, completing reporting requirements, and evaluating roadway conditions. Similar technology on railroads assists in dispatch and operations of trains traveling within the same corridor as well as significantly improving rail system safety.

This memorandum presents an array of innovations and trends that are being introduced (as well as researched) throughout the freight industry and in communities throughout the world. Understanding these future trends is critical to the successful development of several elements of the Freight Master Plan – Implementation Phase, such as developing solutions and strategies to improve freight mobility; recommending freight mobility performance indicators and measures; and recommending an action plan for the Office of Transportation Freight Program.

The material described within this memorandum was assembled through research of several databases including those sponsored by the Transportation Research Board, National Cooperative Highway Research Program, Federal Highway Administration, Association of American Railroads, American Trucking Associations, University of California Library, and multiple states, regions, port districts, and cities.

Other documents being completed for the Freight Master Plan – Implementation Phase are:

- *Technical Memorandum No. 2 – Synthesis of Data*
- *Technical Memorandum No. 3 – Existing Conditions*
- *Technical Memorandum No. 4 – Assessment of Freight System Needs*
- *Technical Memorandum No. 5 – Solutions and Strategies to Improve Freight Mobility*
- *Technical Memorandum No. 6 – Recommended Freight Mobility Performance Indicators and Measures*
- *Technical Memorandum No. 7 – Recommendations for Continuing Activities by the Office of Transportation Freight Program*

This paper is being completed as part of a larger effort by the City of Portland's Office of Transportation to incorporate freight mobility considerations in execution of the agency's planning, operations, design, and implementation programs. The objectives of the Freight Master Plan – Implementation Phase are to: 1) help educate the public about the needs of the City's freight system, policies, and regulations; 2) update the City of Portland's Freight Element and corresponding Transportation System Plan; 3) establish (or reinforce) policies regarding the freight network and freight operations; 4) establish the action plans and areas of interest for the

Office of Transportation's Freight Program; and 5) develop a protocol for selection and monitoring of freight mobility projects.

This project is partially funded by a grant from the Transportation and Growth Management (TGM) Program, a joint program of the Oregon Department of Transportation and the Oregon Department of Land Conservations and Development. This TGM grant is financed, in part, by funds provided by the federal Transportation Equity Act for the 21st Century (TEA-21), the City of Portland, and the State of Oregon.

1. INTRODUCTION

One of the most profound effects of our growing global economy has been its impact on how goods are shipped. The record-setting demand in freight shipment has forced dramatic changes in the way we handle and distribute goods at landside as our landside operations struggle to maintain pace with the demand being shipped into and out of ports, other freight terminals, on railroads, and on trucks. These extremely high demands are affecting the distribution of both international and domestic goods; containers and bulk cargo; and long-haul and local deliveries.

According to the Federal Highway Administration (FHWA),[1] the number of freight movements in the U.S. is anticipated to more than double by the year 2020, and shipments in the Portland region are expected to grow at a faster rate than the national average. Moreover, while each mode will handle increasing levels of freight, the role of trucks will become increasingly more critical, as trucks support nearly every shipment regardless of the primary transportation mode used. In addition, trucks often carry out a customer's specific requirements – such as, door-to-door service, special handling, and quicker schedules – which is becoming typical in many shipments.

The practice of logistics – operating plans for moving freight through each step of the supply and distribution chain – is fundamental for shippers and their customers to guarantee deliveries in a reliable manner and to reduce transportation costs which, if not effectively planned, can significantly affect business bottom line and meeting their customer's needs.

This technical memorandum explores the very recent growth trends in freight movement and the changing manner in which shippers and transportation providers are altering the ways they receive and distribute goods to accommodate current demands and future growth trends. Research for this paper has included a literature search of publications produced by trade organizations, port authorities, federal and state transportation agencies, leading economists, and the movers of freight (steamship lines, towboats, railroads, air cargo, pipelines and motor carriers). In addition, information on the subject was gained through interviews with five members of the Portland Freight Committee, including:

- Oregon Transfer – a company providing logistics, warehousing, transportation, and management services for shippers.
- Starboard Alliance, Inc. – a firm providing logistics planning for firms nationwide.
- Columbia Sportswear – a manufacturer and shipper of apparel throughout the U.S.
- Merchant's Exchange of Portland – a trade organization representing the maritime industry.
- Jet Delivery Systems – a local motor carrier specializing in air freight.
- USF Reddaway – a national long-haul motor carrier.

Finally, the research benefited from the observations and insights of leading consultants of the Parsons Brinckerhoff team, including analysts involved in air and marine cargo, port facility development, economic analysis of trade, goods delivery planning, railroad, and motor carrier operations. The team of in-house experts includes Don Grigg, Senior Planner for Parsons Brinckerhoff Ports & Marine, and Bill Burgel, Manager of Rail Operations for HDR, Inc.

[1] Freight Analysis, Challenges, Concerns and Future Directions, Federal Highway Administration, Office of Freight Management and Operations, Washington, DC, April 2004. Tallies do not include the value of pipeline products.

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2. TRENDS IN FREIGHT MOVEMENTS

According to the Bureau of Transportation Statistics, between 1993 and 2002, total freight tonnage in the U.S. increased from 13.4 billion tons to 15.8 billion tons (an 18 percent increase),[2] and the value of that freight increased by 45 percent.[3] This rapid growth in freight movement is evidence of our increasing demand for more goods. The success of the freight mobility systems is a key element in maintaining increasing consumer spending, manufacturing output, and the success of the U.S. economy. This growth also reflects the transition from U.S. to North American Freight Treaty Alliance (NAFTA) and now to Asian-produced goods resulting in a strong increase in goods flowing through West Coast ports. This section describes some of the growing freight demands and the changing equipment and infrastructure that are being introduced to keep the supply chain working in tandem with growth in import and export demand.

As shown in Table 1, trucks are the predominant mode in terms of tonnage and value of tonnage of freight moved throughout the U.S. They carry about 70 percent of total freight tons, followed by railroads which move 17 percent of freight tonnage, water and pipelines each carry 7 percent, and air freight carries less than 1 percent. Freight tonnage increased by 22 percent between 1993 and 2002, with the sharpest increases being experienced in pipelines, water, and air systems.

Trucks also move over 74 percent of the value of freight traveling in the U.S., followed by water (10 percent), air (9 percent), and railroads, water, and pipelines (3-4 percent each). Here again, air and pipeline systems experienced the greatest market share increases between 1993 and 2002; with the value of total freight moved in the U.S. increasing by 43 percent.

Table 1. U.S. Freight Tonnage and Value by Single Mode, 1993 - 2002

	Tons *(in millions)*			Value *(in billions; 2000 dollars)*		
	1993	2002	Percent Difference	1993	2002	Percent Difference
Truck	6,386	7,622	19%	$4,684	$6,660	41%
Railroad	1,544	1,817	18%	$278	$388	30%
Water	505	714	41%	$620	$867	47%
Air	7	10	24%	$395	$777	97%
Pipeline	484	722	49%	$312	$285	80%
	8,926	***10,885***	***22%***	***$6,289***	***$8,977***	***43%***

Source: 2002 Commodity Flow Survey, USDOT Bureau of Transportation Statistics, Washington, DC December 2003 (preliminary).
Note: Table does not include multiple mode transfers. That is, table identifies the primary mode used in freight shipments.

[2] *2002 Commodity Flow Survey*, U.S. Department of Transportation, Bureau of Transportation Statistics Table 1, Commercial Freight Activity in the United States by Mode of Transportation: 1993, 1997, and 2002, Washington, DC, 2004. These figures include multiple mode movements which are not included in Table 1.
[3] Ibid. Commodity value grew from $7.2 trillion to $10.5 trillion.

The miles traveled by mode increased significantly between 1993 and 2002 (see Table 2), but the change is not great enough to expect that one mode might be encroaching on another's market. Finally, Table 3 summarizes the total ton-miles and the value of those ton-miles by mode between 1993 and 2002. An interesting result of this analysis is that while truck ton-miles increased by 51 percent over the period, the value on a ton-mile basis decreased by 7 percent. This can be explained by the fact that truck travel is growing at a faster rate than the value of the traditional commodities moved by trucks. An interesting phenomenon to continue to observe is the rapid rate of increase in the value of goods moving by air and marine modes, and whether there will be new requirements associated with the speed at which commodities are moved to and from airports and marine ports, as well as handling requirements to ensure less damage to those commodities.

Table 2. Average Miles per Shipment by Mode

	1993	2002	Percent Difference
Truck	144	199	38%
Railroad	766	911	19%
Water	N/A	577	N/A
Air	1,415	1,819	29%
Pipeline	N/A	N/A	N/A

Source: 2002 Commodity Flow Survey.

Table 3. Value of U.S. Freight Tonnage by Ton-Mile (in 2000 dollars)

	Ton-Miles (in billions)			Value / Ton-Mile (in 2000 dollars)		
	1993	2002	Percent Difference	1993	2002	Percent Difference
Truck	870	1,311	51%	$5.06	$4.73	-7%
Railroad	943	1,199	27%	$0.26	$0.27	2%
Water	272	323	19%	$0.23	$0.28	24%
Air	4	6	39%	$34.69	$50.27	45%
Pipeline	N/A	N/A	N/A	N/A	N/A	N/A

Source: 2002 Commodity Flow Survey

2.1 Growing Levels of Demand from Users

Over the next 15 years, the total U.S. freight tonnage is anticipated to grow by over 125 percent and the value of those shipments is projected to increase from $9 trillion to $30 trillion.[4] Domestic freight will continue to dominate the picture, accounting for nearly 90 percent of the total tonnage moved, and growing from about 1.5 billion tons to 3.3 billion tons in the year 2020.[5]

[4] *Freight Analysis, Challenges, Concerns and Future Directions*, Federal Highway Administration, Office of Freight Management and Operations, Washington, DC, April 2004. Tallies do not include the value of pipeline products.

[5] Ibid.

As discussed later in this section, the freight tonnage and tonnage values forecast for the Portland/ Vancouver region indicate that the region will grow at a higher rate than the national average.

Table 4. U.S. Freight Tonnage and Value by Mode Between 2002 – 2020

	Tons (in millions)			Value (in billions)		
	2002	2020	Percent Difference	2002	2020	Percent Difference
Truck	8,108	19,199	137%	$7,458	$23,372	213%
Railroad	1,933	3,593	86%	$388	$1,662	328%
Water	760	1,747	130%	$109	$415	281%
Air	20	50	150%	$777	$4,505	480%
Pipeline	768	N/A	N/A	$194	N/A	N/A

Source: 2002 Commodity Flow Survey
Note: Table does not include multiple mode transfers.

2.2 Shifting Freight Shipper Patterns

Prior to the mid-1980's, manufacturers kept warehouses in most metropolitan areas from where they shipped their products directly to customers. Companies then began to consolidate these warehouses; and then in 1990's, warehouses in smaller metropolitan areas (like Portland) began to close due to increased conglomeration and the fact that, with transportation costs and warehousing/inventory costs being about equal, some companies started eliminating the inventory/warehousing, and kept more goods in transit. One stakeholder characterized the result of these events as: "It became a no-brainer; close warehouses and keep everything on the road." In areas such as Portland, local warehouses were nearly empty of inventory.

In addition, shippers are dividing their shipments between multiple ports to test the on-time performance of inland supply chain movements from those ports. Diversification of these origination port locations also allows shippers to negotiate competitive rates. Shippers are also using a variety of modes to meet specific shipping requirements. These practices often result in contingency plans; i.e., where shippers can redirect planned shipping methods based on conditions in the supply chain. That is, by diversifying shipping strategies, shippers have options for when a transportation provider cannot meet a planned schedule. Shippers are trying not to be wholly dependent on one means of shipping. From a risk management point of view it is problematic to ship in only one primary manner.

2.3 Impact of Growing Congestion Levels on Freight Mobility

Congestion can impose added costs to businesses in the manner of unmet deliveries, added fuel cost and driver wages, additional inventory costs, delayed product promotions, loss of business to competitors, impact to supply chain and distribution processes, overtime wages to shift shipping to off-peak periods, and in the case of time-sensitive commodities, damage to product. Moreover, many businesses have incurred increased bottom-line costs through hiring additional staff and purchasing equipment to improve the reliability of their shipments, and in some instances, have retooled to accommodate different modes which may help meet delivery schedule requirements.

A recent study by the Federal Highway Administration found that "shippers and carriers value transit time in the range of $25 to $200 per hour, depending on the product being carried... (and that) the cost of unexpected delay for trucks is another 50 to 250 percent higher."[6]

According to the Oregon Traffic Congestion Management System, traffic on freeways in the state's urban areas grew about "six times faster than (any addition of roadway) lane miles,"[7] and "urban freeway lanes in 2002 were carrying almost double the amount of traffic they carried in 1982."[8] This growth in freeway demand (which has been accommodated with appreciable added freeway capacity) has led to longer periods of congestion (i.e., extending past the typical peak-hour periods), slower travel speeds, and productivity losses.

Analyses completed for the I-5 Trade Corridor Strategic Plan forecast that the region's congestion levels are anticipated to worsen, with delays extending beyond the two-hour peak periods, without making needed infrastructure improvements. Even with these improvements, congestion levels are expected, at best, to remain as they are today, over the next 10 to 15 years.

2.4 Pressures on Transportation Modes

In addition to the above changing freight patterns, the new rules restricting truck driver working hours went into effect in January 2004,[9] which are expected to significantly impact shipping operations by the motor carrier industry and the customers they serve. This is not only problematic for long-haul trucking, but for local deliveries, where smaller businesses restrict receiving times to just a few hours during the day.

The restricted hours have significantly changed the way goods are "dispatched" within any community as well. In many instances, shippers might need drivers to make two round trips each day, but now can only make one trip which not only reduces service levels, but also increases transportation costs.

With respect to the railroad industry, both locally and nationally, railroads have picked up the "warehousing" that others eliminated. For example, in Texas, many plastics companies have constructed Storage-in-Transit yards for fully-loaded rail cars ready to be distributed on the nation's rail network on a moment's notice. This is a type of warehousing that guarantees that products will be available when needed. Also, rail freight traffic is at an all time high and the nation's railroads are reaching congestion levels to the point that they are now turning away business. If shippers insist, then less profitable rail traffic is removed from the congested corridor resulting in more trucks on the highway. Unfortunately, because of the current shortage in truck drivers, shippers of these low-value shipments are at a loss as to how to move their products to potential markets.

While the airspace in the Portland area may not be saturated, there may be airports to which Portland-areas goods are being sent which may be restricting air shipments due to airport congestion. The increase in regional jets (with their smaller capacity) with the proliferation in

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[6] *Freight Transportation Improvements and the Economy*, Federal Highway Administration, Washington, DC, July 2004, page iii.

[7] *Statewide Congestion Overview for Oregon*, Oregon Department of Transportation, Transportation Planning Analysis Unit, Salem, OR, page iii, February 2004.

[8] Ibid; page iii.

[9] Driving hours were increased from 10 to 11 hours in any 24-hour period, but the number of hours that a driver can be "on duty" was reduced from 15 hours to 14 hours/24-hour period. The rules also increased the period of time between driver shifts from 8 to 10 hours.

low-cost airlines has created long queues for take-offs and landing at selected airports throughout the nation. If this trend continues, Portland-based air cargo could be affected.

2.5 Availability of Labor

An unfortunate trend in the transportation industry is the shortage of workers to meet the shipping demands. These labor shortages exist in the motor carrier, railroad and longshoremen industries, and have been sustained since 2002.

According to an article in the Los Angeles Business Journal:[10]

> "A lack of railroad staff and equipment...along with staffing troubles at the ports,...have kept arriving steamships stacked at sea...In Los Angeles, a shortage of longshoremen created additional problems getting cargo transferred from ships to rails. On August 9 (2004), 12 vessels arriving at the ports of Los Angeles or Long Beach were unable to unload their cargo. That left 60 ships at the ports as of August 10 (2004), including 35 carrying containers that would be transferred to rail."

As a result of these delays, steamship lines sought to hire an additional 2,000 part-time workers at the ports; union officials, however, claimed that as many as 10,000 additional workers were needed.[11]

According to several experts, labor shortages in the railroad industry began in 2002 when railroads "underestimated the number of employees that would take advantage of a federal rule change that granted early retirement with full benefits to some railroad industry workers."[12] As a result, the Burlington Northern Santa Fe Railway (BNSF) plans to add about 8,500 workers in the next four years, while Union Pacific Railroad (UP) announced plans to hire 7,500 workers before the end of 2005.

The motor carrier industry has also been experiencing a labor shortage problem, and the outlook is for increasing demand for truck drivers and warehouse employees. For example, the U.S. Department of Labor projects that there the demand for truck drivers will grow by 18 percent between 2002 and 2012[13] (or from 3.2 million to 3.8 million).

Other occupations related to freight movement, such as air cargo handlers, "material-moving machine and vehicle operators," crane and tower operators, will also be in greater demand than there is projected supply.[14]

Both motor carriers and railroads are finding that today's workers are demanding higher wages and less taxing working conditions. They are discovering that being on-call, working midnights in outside inclement conditions, being subjected to random drug testing, and being away from home are factors that today's potential workers are avoiding. Recently, the Burlington Northern Santa

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[10] *Railroads Raise Rates Despite Long Waits for Delivery Dates*, David Greenberg, Los Angeles Business Journal August 16, 2004.
[11] Ibid.
[12] *Railroads Raise Rates Despite Long Waits for Delivery Dates*, David Greenberg, Los Angeles Business Journal August 16, 2004.
[13] *Occupational Employment Projections to 2012*, David Hecker, U.S. Department of Labor, Monthly Labor Review, February 2004, Washington, DC http://stats.bls.gov/opub/mlr/2004/02/art5abs.htm.
[14] Ibid.

Fe Railway scanned over a thousand applicants only to find three workers who would accept working conditions as described above.

2.6 Availability of Industrial Land

One common misperception about our manufacturing and transportation businesses sectors – in Portland and throughout the U.S. – is that there is ample available industrial land to meet our needs. As a result of this misperception, many communities are experiencing rapid redevelopment of their industrial areas for mixed-use projects, which generates much higher returns/land area than industrial purposes. In many cases, land is being lost that is ideal for industrial purposes– i.e., near ports, railroad yards, warehouses, rail and road transportation systems, etc. – that would be very expensive to successfully redevelop as industrial zones.

In fact, in the City of Portland, there are currently 1,810 acres of vacant, buildable land zoned for industrial purposes, however, only 143 acres are considered development ready.[15] In addition, there may not be enough large parcels (within the 1,810 acres of vacant land, there are only six available parcels over 50 acres, all of which are located in the City portion of the Columbia Corridor; and only 14 available sites between 20 and 50 acres) to meet the demand for large parcels. Larger firms, which generate a significant amount of the industrial area's employment, have few options in the City of Portland for the large parcels they need to develop industries.

2.7 Public Funding Trends

While public funding has become a real source of financing freight system improvements, the amount of funding that is available falls short of the need for improvements. The delays in approving disbursement of a new Federal Transportation Trust Fund, and the differences in funding-level proposals between the U.S. Congress and the Executive Branch, have resulted in extensions of the vote on the federal bill.

The states are more financially constrained and generally focus on regulatory and certification issues. Some states, however, are finding ways to make funding available. In Oregon, OTIA 4 is being proposed as a freight-oriented program with lots of rail improvements. A detailed project list has been developed by the Port of Portland and Oregon Rail Users League (ORULE) and "is ready to go." Oregon also has an annual budget for safety projects (about $2 million per year), which is typically used for grade separations, train signals, and gates (e.g., locations were road and rail interface).

On the marine side, the federal and state funding pictures generally look bleak. Some federal grants have been issued to ports for perimeter security and supply chain tracking. Federal and state funding continues to focus on off-site road improvements via TEA-21. There is no stable federal funding program for marine ports; all money comes from local sources. The feds do sometimes contribute towards channel deepening projects, and some states have contributed funds for the local share (Oregon and Washington are making contributions for the Columbia River deepening project).

Depending on the size of the new TEA-21, there will be some level of freight rail capacity assistance (e.g., for C.R.E.A.T.E – Chicago Region Environmental And Transportation Efficiency

[15] *Industrial Districts Atlas* (in progress), communication from Steve Kountz, Portland Bureau of Planning, January 19, 2005.

Project[16]). Railroads are slowly coming around to being willing to accept federal money for capacity. FHWA also contributes funds for grade separations.

Improvements to freight rail operations have occasionally come as a result of a state's interest in improving passenger train service. That is, in Oregon and Washington, for example, passenger train service operates on Union Pacific Railroad and Burlington Northern Santa Fe Railway tracks. The passenger rail service has received direct government subsidies in increasing capacity, which has directly benefited the operation of freight trains.

A very important and strategic funding innovation involves partnerships between the public and private sectors to construct needed freight system improvements. Known as public–private-partnerships, or PPP's, infrastructure is being created that is sometimes paid for by way of user fees (e.g., toll roads), short-term loans paid back with user fees (e.g., the Alameda corridor), and for site development (e.g., Cascade Station land at Portland International Airport).

[16] See http://www.aar.org/PubCommon/Documents/CREATE.pdf.

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3. EMERGING FREIGHT INNOVATIONS

Each of the freight modes and their corresponding facilities are modernizing and expanding their infrastructure and equipment to accommodate growing customer demands for distribution at marine ports and inland distribution. A brief list of selected innovations that are gaining popularity is provided below.

- E-Commerce – placing and tracking customer orders over the Internet. Vastly improves accuracy of shipping and reduces administrative expenses. Customers and shippers are provided with real-time travel information about roads and/or waiting times at ports. E-Commerce also includes information about the destination of packages through *electronic container seals.*
- Short-Sea Operations – widely used in Europe and Asia, this practice uses barges and steamships to move freight between relatively closely-spaced marine ports which had been moved by truck and railroad.
- Joint dispatch of trains – essentially this involves direct communication between different railroads utilizing the same track to coordinate movements to reduce empty mileage and reduce congestion. Combined with *Positive Train Separation* technologies, which provide a signal failsafe for use of track, safety is enhanced despite the increased use of track.
- Remote Control Locomotive (RCL) technologies, Electronically Controlled Braking (ECB) or Electro-Pneumatic Braking (EPB) have the potential to greatly improve railroad efficiencies both in switching and in the handling of longer trains.
- Creation of a pool of generic containers/chassis – this reduces the time used to find empty containers to either transfer freight to local systems or to return empties for imports use. Creating a generic pool for chassis would also greatly improve intermodal efficiencies.
- Public/private partnerships – this allows for a larger pool of funds for infrastructure expansion and for an agreed upon allocation of costs and benefits associated with the infrastructure improvements.

Some specific innovations that are gaining credibility throughout the U.S. and Canada include:

- Opening port for 24-hr/day, 7-day/week operations (Los Angeles/Long Beach).
- Permitting double-parking for trucks actively engaged in loading/unloading (San Francisco and New York City).
- Dedicating street space for exclusive use by trucks in commercial areas (Vancouver, BC).
- Public purchase of rail cars to make shipment of products more economically feasible (Washington state's "grain train" program).
- "Green Light" – using electronic means to collect information on truck weights and location for use in filing tax information and avoiding stopping at weigh stations (Oregon).

3.1 Innovations at Freight Facilities

The trends and innovations at ports and other distribution facilities are focused on achieving higher levels of cost effectiveness and maximizing the efficiencies gained through use of operational technologies. This is resulting in purchases of new and larger cranes, deepening marine channels, creation of additional and longer berths, and more efficient transfer conveyances to accommodate demands at port- and land –side locations.

3.1.1 Marine Ports

Economies of scale in marine shipping have driven ship sizes and unit train lengths to be much larger over time, requiring very large cargo volumes to be transferred in a short period of time.

The larger container vessels and bulk ships require larger terminals, larger cranes, deeper channels, and major dock retrofits (high infrastructure costs). These require a channel depth of 43-45 feet (for Panamax container and bulk ships) and 48-55 feet (for Post-Panamax container ships). In the container and bulk cargo trades, ports with channels shallower than 40-43 feet provide less flexibility for users of ports, and thus reduce the interest of potential tenants, shippers, and transportation providers.

Just as ships have gotten larger, unit trains have also become longer. While train lengths of 100 railcars were typical several years ago, 110-car trains are typical today and trains of 130 railcars can be anticipated in the future. Panamax bulk ships today may need to transfer 50,000-60,000 tons of cargo—the equivalent of 5-6 unit trains, each 1.3 miles in length—within a 24-hour timeframe. Likewise, Post-Panamax container ships may need to transfer 3,000 container TEUs—the equivalent of up to 10 unit trains, each 1.6 miles in length. The on-site rail, storage, and transfer facilities for this scale of container or bulk cargo operation typically necessitate site sizes of over 100 acres and as large as 200 acres for a single tenant.

These deep-water terminals must be equipped with high cranes able to handle in excess of 1,000 tons/lift. They must also be situated at berths with immediately adjacent distribution equipment – rail track, fork-lifts, remote-controlled conveyor trucks, and other vehicles.

Many seaports are also employing floating docks and cranes as a result of a lack of available marine–side land.

Intermodal typically refers to the movement of containers. The transfer of bulk commodities from one mode to another, such as lumber, wood chips, grain, petroleum, chemicals, and frozen foods, is referred to as a *reload* or a *transload* operation.

3.1.2 Transload Centers

Transloading is the process of breaking down large shipments of freight (containers or bulk) into smaller shipments. With respect to containers, transloading often involves the direct transfer of goods at a port into trailers which are transferred to a customer or distribution center. This practice allows for goods to be distributed to customers at an earlier date and allows for empty containers to be returned to steamship operators and thereby save the costs of renting the container. The improvements in time to market, customer service, and inventory reduction can be astronomical.

The West Coast apparel manufacturer OshKosh B'Gosh reported that it was able to reduce its time to market by six days using a transload operation apparel manufacturer,[17] which translated into a savings of three cents per unit, or $1.5 million/year.

Though the goal of a transload facility is to act as a crossdock, goods can be staged and some minor value-add steps performed, such as attaching store labels. The time at the third-party transload facility can be offset by delivering direct-to-store and getting the goods in front of

[17] *Break don't Bend your Supply Chain*, by Perry Trunick, Logistics Today: The Publication for Logistics Leaders, November 21, 2004.

buyers faster. Similarly, small safety stocks of finished goods can be held at some deconsolidation centers to help respond to market changes.

3.1.3 Reload Centers[18]

Throughout the country, the freight railroads have been streamlining the nation's rail system, eliminating low-volume and inefficient branch lines and focusing on higher-volume mainline traffic. An important part of this trend has been the development of freight reload facilities at key rail hubs. At these facilities, domestic freight can be efficiently received by truck and consolidated for rail shipment, or the reverse, in a hub-and-spoke system that substitutes for the costly and inefficient switching of single railcars to scattered shippers. Depending on the circumstances, freight originating up to 150 miles from the rail system can economically move by a combination of truck and rail over these reload facilities.

While they provide substitute truck service to industries located on abandoned branch lines, reload and transload operations have become big business as a means by which the railroads can compete with long haul truck carriers for a wide variety of shippers, whether or not they have ever been rail served. BNSF is making a major investment in reload and transload facilities, including 12 facilities in operation, under construction, or planned in Southern California, Northern California, the Northwest, Chicago, Houston, Dallas, Phoenix, Denver, and six other locations.

In Portland and the Pacific Northwest, the types of freight and reload/transload operations currently or potentially involved include:

- Lumber and other bundled forest products shipped to domestic markets from the Pacific Northwest is delivered by truck to a reload center where it is accumulated and transferred to railcars for consolidated rail shipment.
- Bulk plastics and resins for the high-tech industry, fertilizers for agriculture, and other chemicals for industry that are, likewise, shipped into Portland and the region in bulk hopper railcars and transloaded directly to trucks for small-parcel delivery to industries in the region.

3.2 Innovations in Freight Vehicles

Truck, steamship, barge, and railroad space within airplane holds is increasing to accommodate imports and exports, and motor carriers are using larger trailers and making more trips. Below is a summary of the changes in the capacity and operations of the latest transportation equipment:

3.2.1 Motor Carriers

Truck equipment is changing rapidly to meet the new trends and demands for higher levels of efficiency required in the marketplace. One of the more significant innovations has to do with truck size and weight.

As many as 27 states (including Oregon, and neighboring states of Washington, Nevada, and Idaho) issue load permits for trucks with divisible loads over the federal maximum gross vehicle weight standard of 80,000 lb[19]. In addition, five of the six western Canadian provinces permit

[18] Reloading is similar to transloading except that it is focused on moving goods between truck and rail only, as well as truck-to-truck and rail-to-rail.
[19] Ibid.

loads in excess of 80,000 lb. Outside of the western U.S., maximum allowable truck weights are as high as Michigan's 164,000 lb limit. Moreover, Florida has no weight limit for double-trailers operating off the interstate highway system.

In 2000, USDOT published the *Comprehensive Truck Weight Limits Study,*[20] which determined that liberalization of federal standards could yield annual cost savings to shippers on the order of 3 to 6 percent of the costs of heavy truck transportation ($7 billion to $13 billion annually; in 2000 dollars), and would also result in a reduction of truck traffic volume and truck vehicle miles of travel. The USDOT study asserts that even after allowing for increases in traffic that would be generated by cost savings, truck traffic volume would be lower than if the regulations were not changed because the new trucks would be more productive than the ones they replaced.

In addition to truck size and weight, truck performance has improved with improved acceleration and braking, and reduced air and noise emissions levels. Motor carriers also make good use of electronic communications technologies allowing drivers and dispatchers to report on estimated arrival times, road conditions, and changes to schedules and pickup locations, etc.

3.2.2 Steamships

According to a report by DRI-McGraw-Hill, container ship visits to the U.S. increased at a significantly higher rate (8-10 percent) over other sea-going vessel types between 1998 and 2002.[21] This growth will continue as long-haul maritime trade continues to expand, and as container ships continue to replace traditional break-bulk ships for trans-oceanic movements.

The new generation of trans-oceanic vessels commonly visiting ports are generally of two types:

- Panamax ships – so named because they are designed to be as large as possible and still be able to navigate through the Panama Canal. Typical Panamax ships hold approximately 4,000 twenty-foot equivalent units or TEUs; and
- Post-Panamax ships – which cannot navigate through the Panama Canal, but can navigate the Suez Canal. These ships are generally for Trans-Pacific and Asian-European trade. Typical Post-Panamax ships hold 6,000 TEUs and larger Post-Panamax ships are planned.

It is estimated that as much as 40 percent of the new cargo ships currently on order are of the Post-Panamax class.[22]

3.2.3 Barges

For centuries, barges have been an inexpensive, cost-effective means of transporting goods through inland waterways and between coastal ports. While barge capacities are necessarily limited by the width of navigation channels and corresponding lock facilities, they have expanded their capacity for moving goods by attaching tows of up to four barges, and are very efficient in visiting multiple ports in one trip to allow for goods to be loaded and unloaded as frequently as possible. Barges require a relatively shallow draft (between 10 and 14 feet), and can carry

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[20] *Comprehensive Truck Size and Weight Study*, USDOT, delivered to U.S. Congress August 31, 2000, Washington, DC, http://www.fhwa.dot.gov/reports/tswstudy/index.htm.

[21] *Maritime Transportation Service Report to Congress: Trends and Competitive Pressures*, USDOT Maritime Transportation Service, Washington, DC, 2004, Table III-1.

[22] *Maritime Transportation Service Report to Congress: Trends and Competitive Pressures*, USDOT Maritime Transportation Service, Washington, DC, 2004, page III-2.

mixtures of commodities, including liquid bulk and break bulk products, through tows of one to four barges.

3.2.4 Railroads

Railroads are one of the two primary means (the other being trucks) used to distribute goods from marine ports and major distribution centers to inland destinations. The major infrastructure changes made by railroads has been modernizing and rehabilitating their physical assets. Much of the rehabilitation has been related to track and signal upgrades and lengthening sidings to allow trains to travel at higher speeds with longer trains. Some of the longer trains – those serving the coal industry can carry as many as 120-140 car trains (with lengths as long as two miles) – use a distributed power system with pairs of locomotives pulling trains and pairs of locomotives pushing trains (from the rear of the train).

Railroads use a variety of equipment to move containers and liquid and break bulk goods through flat cars, side loaders, roll-on/roll-off equipment, piggyback trains, and specially designed box cars for different commodities.

With respect to train operations, efficiencies are being created through operating protocols with railroads serving the same ports and regions. At many locations, third-party switching can eliminate the "paper barriers" and allow the quick and timely movement of rail-shipped goods. Also, with increasing frequency, Class 1's are cooperating to the mutual benefit of each other but ultimately it is the rail shipper who benefits. The recently published Washington Public Ports Association (WPPA) Rail Infrastructure Analysis and the I-5 Bi-State Rail Analysis suggested several alternatives to increasing the throughput of the Pacific Northwest rail network through the judicious implementation of additional tracks and signals.

3.2.5 Air Freight

While air freight movements have been around as long as the airline industry, small package delivery services (e.g., UPS, Federal Express, Airborne, and DHL) have established an industry and an airplane inventory devoted exclusively to air cargo. Air freight is the most expensive means of freight movement because it provides the fastest travel time of any long-haul mode. Air freight is often used to move some of the most expensive cargo.

The typical aircraft used for small package air delivery are the Boeing 727 and Boeing 747. The Boeing 747 can hold up to 26,000 cubic feet of cargo (equivalent to five semi-trailers),[23] and often loads through the nose of the airplane. The cargo holds are generally equipped with electric rollers to allow pallets to be pushed through the doorway. The Airbus Super Transporter is used for loads that are too heavy and large (or irregularly-shaped) for the Boeing 747.

3.3 Logistics and Freight Operations

New operational strategies of accommodating the increasing demands of consumers and import markets are the key to moving freight effectively and maintaining our global market strategies.

Logistics are intended to make supply chain systems more efficient with resulting economic benefits. Part of the logistics equation is the preparation of contingency plans which can be employed if a transportation provider cannot meet a planned schedule. This involves a diversification of shipping strategies which can also lead to better shipping rates and schedules.

[23] http://travel.howstuffworks.com/air-freight2.htm.

Companies work to avoid being wholly dependent on one means of shipping; because, from a risk management point of view it is risky to ship in only one primary manner. This has led to customers measuring shipments through every step of the cycle and grading transportation providers on their performance.

A driving force that is as influential as the growing demands for shipping is the practice of "just-in-time" delivery practices, where inventory is "in motion" rather than moved to a warehouse before being distributed. Some analysts believe that as much as one-quarter of the nation's freight is moved in this manner.

A new trend that has great promise for shippers and transportation providers is *trans-loading.* Trans-loading involves the use of a third-party operator to move containers directly to the customer from dockside and then quickly return the empty container to the ocean carrier. This allows consignee/importer flexibility at port facilities to move goods more quickly and in a different manner, and for the ocean carrier to also have the ability to reuse the container or bring empties back to another port. It is less efficient for the ocean carrier to bring the container directly to the customer, and a third-party operator has a better ability to respond to local conditions/ changes.

Compared with the ports of Los Angeles/Long Beach and the Puget Sound, transloading is a relatively limited practice in Portland (e.g., Fred Meyer transfers three containers worth of goods into one 53´ trailer). The Port of Portland doesn't own any equipment, but is a strong promoter of trans-load. The alternative is an "IPI move" where containers are handled multiple times and the steamship doesn't get the empty container back right away...which leads to economic benefits for the steamship lines, who will pass on better rates to those involved in trans-load. Columbia Sportswear may test trans-load in the spring 2005 and believes that if enough shippers tried it, it would help attract steamship lines back to Portland.

Other logistic strategies include:

RFID (Radio Frequency Identification) – which is an improvement over bar code scanning. Bar code scanning in warehouses, trucks, pallets, forklifts, etc., requires that an electronic sensing "gun" be aimed directly at the cargo whereas RFID collects this information "passively" and without the need to aim a device at a pallet. Wal-Mart and the U.S. Department of Defense have switched from bar code scanning technology to RFID, and it is expected that we'll begin to soon see this technology employed at Port gates, on railroads, etc.

"Merge in Transit" operation is where domestic and import cargo can be mixed at warehouses; it requires a trans-load service.

Third-Party Trucking Companies are becoming more the norm. Shippers then no longer have to maintain fleets and can save costs.

Similarly, many shippers are using Third-Party Warehouses for similar reasons.

Another important factor in developing operational strategies is the effect of the consolidation of railroads (i.e., they can serve larger markets) and the effect of "trackage rights agreements"[24] between railroads.

[24] These agreements are used by owner railroads to identify when other railroads may use their track. These agreements may also prohibit a certain railroad from using another's track.

4. NEW REGULATORY ISSUES THAT MAY LEAD TO INNOVATIONS

The freight industry is continually addressing new requirements related to customer needs, transportation system conditions, and regulations that govern their operation. This section describes the effects of new and potential regulations related to driver's hours of service, certifications and inspections of operators and cargo associated with homeland security matters, and meeting environmental regulations.

4.1 Hours of Service Regulations

In January 2004, new hours of service rules for truck drivers went into effect. These regulations increased the amount of hours a driver can drive (from 10 to 11 hours/24-hour period), but reduced the number of hours a truck driver can be "on-duty" from 15 hours to 14 hours per 24-hour period. The rules also increased the period of time between driver shifts from 8 to 10 hours. In July 2004, the U.S. Court of Appeals from the District of Columbia "vacated" the Federal Motor Carrier Safety Administration (FMCSA) rules because it did not consider the "impact of the rule on the health of drivers,"[25] and gave the FMCSA, the body that implemented the hours of service rules, time to revise them.

In January 2005, the FMCSA published a Notice to Proposed Rulemaking to seek public comment on the hours of service rules that were vacated by the Court.

These regulations are having an effect on dispatching drivers and their deliveries and meeting delivery schedules. While the reduced driving hours may result in some operating efficiencies for motor carriers, in large part these companies are already operating at high levels of efficiency. Many carriers believe firms will need to hire additional drivers and modify dispatching protocols to continue to serve customers while meeting the hours of services regulations.

4.2 Homeland Security Regulations

The Department of Homeland Security will be issuing regulations regarding freight movements in June 2005. Regulations are also focusing on the backgrounds of truck drivers, railroad engineers, barge and ship captains, and others involved in moving freight. The industry appears to be well-represented in development of the new regulations, but must continue to help regulators recognize the benefits of their security measures.

Several initiatives and innovations are already in place, such as:

- To support improved border and transportation security, funding levels have increased by $9 billion since September 11, 2001.
- Over the last three years, nearly $15 billion has been devoted to strengthening aviation security. Aviation security has been improved from the curb to the cockpit.
- New Coast Guard vessels and specialized maritime security units have been added.
- The Container Security Initiative was developed to allow U.S. inspectors to screen high-risk shipping containers at major foreign ports before they are loaded in ships bound for America.

[25] *Truckline*, A Publication of the American Trucking Associations, July 17, 2004, http://www.truckline.com/legislative/regulatory/PRESS%20RELEASE-HOS%20Rules%20Vacated.doc.

- Under the USA Patriot Act, background checks are required of all commercial drivers of vehicles (including buses) carrying hazardous materials.
- The National Targeting Center was created to get passenger lists of aircraft and container shippers to identify high-risk individuals and shipments. Today, 100 percent of high-risk cargo containers are examined by U.S. inspectors.

The motor carriers, ports, and railroads are working closely with Homeland Security staff in establishing a means of meeting security needs without unduly delaying freight shipments at borders and freight terminals/facilities. The freight transportation industry is demonstrating the value of many electronic communication technologies which may, in fact, improve current border crossings while completing comprehensive security inspections.

On the marine front, efforts to improve security after 9/11 have occurred in three ways. The initial response was to better secure the physical perimeter of facilities (i.e., guns, gates, and cameras). A second phase has focused on inspecting the contents of containers. Gamma ray scanning and radiation detection are now becoming more prevalent at marine facilities. The third layer of security focuses on improving supply chain monitoring. To jumpstart this effort, the Transportation Security Administration (TSA) initiated demonstration projects at the Port of New York and Port of Seattle ("Operation Safe Commerce"). The following measures were implemented in these two projects:

- "Trusted"/official agents were installed at initial suppliers to document/photo cargo.
- Cargo was outfitted with "smart" container seals, which are scanned for tampering at all transfer points.
- GPS was used to physically track cargo movements.
- All information, from documentation to tracking, is loaded into a secure website for analysis.

According to the Association of American Railroads (AAR), freight railroads have been on heightened alert since 9/11, and a security plan was developed by the industry with input from counter-terrorism experts. The plan includes a progressive series of counter-terrorism measures based on the level of threat against the industry. Some of the actions taken since 9/11 include: increased cyber security, restricted access to railcar location data, spot checks for employee identification, increased tracking and inspection of certain shipments, increased security of physical assets (e.g., more patrols on ROWs) and employee training (mainly to heighten their awareness and get them to report suspicious activities). The principal railroads serving Portland, the BNSF and the UP, would each have their own company programs that would fairly well mirror the national effort.

As for marine security, there has been more progress in securing physical facilities (e.g., more security guards), and relatively less progress in monitoring freight contents (less than one percent of all containers are probably scanned). Strategic, long-term progress has been hampered by limited funding.

4.3 Environmental Regulations

On the marine front, "best-management" practices are increasingly being required by Port managers to address environmental issues. These practices generally affect the following:

- Dock designs (to minimize in-water impacts)
- Terminal construction techniques
- Stormwater management (dedicated facilities are increasingly being required)
- Hazmat collection (dedicated facilities)
- Fuels (i.e., more CNG, less diesel)
- Traffic management to reduce truck congestion/truck idling
- Ship idling (shore-based power supplies are being installed so ships don't have to idle and can shut down – called "cold ironing")

The general public is becoming increasingly concerned about rail's impacts on the environment. One of the most significant steps to improve air quality is EPA's new regulations requiring new and overhauled railroad locomotives, commonly called Type II Locomotives, to reduce emissions by 40 percent compared to the existing fleet. In addition, new federal legislation has been developed to promote rail "quiet zones." This would exempt railroads from blowing their whistles at at-grade crossings in communities where new safety improvements have been implemented.

Fixed-facilities such as repair shops, service and inspection facilities, and fuel facilities each have their own environmental regulations (beyond the scope of this memo). As track upgrades are generally confined to a railroad's ROW (and no public money is used), categorical exclusions are typical.

Lastly, some regions have tried to use commuter rail improvements as a means to mitigate non-attainment issues under the Clean Air Act (e.g., the Virginia Railway Express). This same logic could also be applied to freight trains (as a replacement for freight truckloads), although this reasoning currently remains more theoretical than empirical.

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5. WHAT OTHER JURISDICTIONS ARE DOING

A number of states and cities have established freight advisory committees who influence transportation planning and investment decision-making. In cities such as Baltimore, Los Angeles, and Seattle, these groups are very prestigious and have established an important role for freight planning/project selection in their communities.

Establishment of freight advisory committees and dedicated freight programs have evolved after citizen-sponsored initiatives sought to restrict truck movements and regulate movements (particularly through residential areas). From this, the business community helped establish collaborative working groups which resulted in:

- Truck route designations, including times of day trucks may use certain streets.
- Adequate curbside loading areas (including enforcement of them).
- "Task Force" sponsored a design charrette where participants mapped out problem areas and groups developed solutions together.
- Signage, including variable message signs, to reinforce truck routes and restrictions.
- Installed plug-in power sources for trucks to decrease idling/exhaust.

5.1 Programs

5.1.1 Federal Programs

The Federal Highway Administration (FHWA) is the federal government's primary implementing authority and review agency for surface freight transportation projects.[26] In addition to highways, the FHWA provides assistance to:

- Public ports for intermodal projects
- Public railroad agencies for grade-separation projects
- Roadways associated with airport improvement projects
- Right-of-way for pipelines

The FHWA has established a Freight Management and Operations division (http://www.ops.fhwa.dot.gov/freight) which focuses on four primary program areas:

- "Freight Analysis and research on commodity flows and related freight transportation activities, develops analytical tools, measures system performance, and examines the relationship between freight transportation improvements and the economy.
- Freight Professional Development assists transportation and planning professionals in developing the knowledge and skills needed to do their jobs effectively.
- Intermodal Freight Technology conducts operational tests of intelligent transportation system technologies, supports the development of tools to evaluate infrastructure and

[26] The Federal Railroad Administration is also a partner in federal-aid freight projects, though their mandate is limited to establishing safety and engineering standards, some freight railroad assistance, and participating in passenger rail projects and the safety of at-grade railroad crossings. The Maritime Administration and Army Corps of Engineers are responsible for ensuring the navigability of marine waterways that have been certified by Congress. The Federal Aviation Administration is a primary source of assistance for commercial airports, though some of their funding can be used for landside improvements within airport property. Federal funding supporting transportation improvements is also provided by the Department of Agriculture and the Department of Commerce (Economic Development Administration).

operational needs at border crossings, and promotes the development of standards for information exchange.
- Vehicle Size and Weight certifies state compliance with Federal standards and provides information on state enforcement."

Freight projects under development by the FHWA are considered in the Highway Trust Fund acts. The act which would reauthorize the Federal Highway Trust Fund (known as SAFETEA) will widely expand the freight emphasis of the total transportation program.

The FHWA recently published two documents that have great relevance to the development of the City's Freight Program:

- *Freight Transportation: Improvements and the Economy*[27] – refined review of the economic benefits of freight system improvements across all modes.
- *Benefit Cost Analysis of Highway Improvements in Relation to Freight Transportation: Microeconomic Framework*[28] – established a method to provide a detailed review of the benefits (primary and secondary) associated with productivity and efficiency gains due to freight highway improvements.

Bureau of Transportation Statistics (BTS) is an information gathering and analytical research unit of the USDOT. They are responsible for carrying out the U.S. Commodity Flow Survey, which is conducted every four years with output and analysis for each state.

5.1.2 State Programs

Several state governments are establishing units within their transportation departments dedicated to the integration of freight travel into their planning and development programs.[29] These new planning organizations are often assisted by advisory committees made up of stakeholders in the freight industry. Below is a description of selected state programs and some of the innovations they are involved in.

- **Oregon** – The Oregon Department of Transportation is involved in a variety of important freight mobility projects including the: 1) Oregon Transportation Investment Act (OTIA) Bridge and Roadway program – which will repair and modernize several state bridges that currently are load-limited; 2) the I-5 Trade Corridor project which includes significant capacity improvements to the highway, railroad and marine systems in the I-5 corridor of the states of Oregon and Washington; and 3) "Green Light" program which provides transponders and transmitters to allow trucks to bypass weigh stations.
- **Maryland** – The state constructed two new major roads (one included the completion of I-195 which now allows direct access between I-95 and the airport to access cargo terminals at the Baltimore-Washington International Airport. Similar to Oregon, the state

[27] *Freight Transportation: Improvements and the Economy*, Federal Highway Administration, Washington, DC, July 2004.

[28] *Benefit-Costs Analysis of Highway Improvements n Relation to Freight Transportation: Microeconomic Framework*, Federal Highway Administration, Washington, DC February 2001----. Partner documents of this publication include: Freight Benefit/Cost Study: Capturing the Full Benefits of Freight Transportation Improvements and Freight Benefit/Cost Study: Compilation of the Literature.

[29] According to the Federal Highway Administration, the following states have established intermodal freight planning units within their departments of transportation: Alaska, Arizona, Arkansas, California, Colorado, Florida, Hawaii, Maine, Maryland, Minnesota, Nebraska, Ohio, Oregon, Pennsylvania, Texas, and Washington State.

of Maryland has issued transponders for electronic toll collection and automated vehicle identification for trucks.

- **California** – Caltrans Office of Goods Movement develops strategies, policies, and methodologies that work to improve the freight transportation system in California. Consisting of the truck, rail, air, and seaport industries, the goods movement network provides vital connections between producers and consumers within the state, nationally and internationally. Caltrans also supported the *San Diego and Arizona Eastern Railway Study* which would restore freight service (along the abandoned "Desert Line") between San Diego and Imperial County with continuing service east via the Union Pacific Railroad. Restoration of the line adds two railroads to the singularly served Port of San Diego and provides a more direct and less costly route for local freight shipments between the U.S. and Mexico (i.e., by the BNSF Railroad).
- **Florida** – In 1999, the Freight Stakeholders Task Force was established. In 2000, the Department completed the first version of a Statewide Intermodal System Plan. This included the identified Strategic Freight Network, and expanded the focus to identify a Strategic Passenger Network as well. In 2000/2001, the Department began to implement the recommendations of the Statewide Intermodal System Plan by funding Phase I of a Trade Corridor Study. The final report for Phase I was finished in June 2001 and includes the consultant's recommendations for eight Trade Corridors in Florida.
- **Washington State** – The Washington State Legislative Transportation Committee and the Department of Transportation's Freight Planning unit have sponsored a variety of planning efforts (Eastern Washington Intermodal Transportation Study, Commerce Corridor Analysis, Eastern Washing Freight Mobility Study), and are implementing projects such as dozens of highway/railroad grade separations under the Freight Access Surface Transportation project (FAST), and through funding organized by the state Freight Mobility System Investment Board (FMSIB).
- **Texas** – The state of Texas is constructing a new state highway – State Highway 130 – to relieve highway and rail congestion between Austin and San Antonio. The new highway will accommodate all truck modes including tractor-trailers, and tandem-trailers, and will include a new freight railroad alignment.

In addition to the above, several states have partnered with private organizations and local agencies to construct infrastructure for freight distribution and mobility, including:

- **Port of Oakland Joint Intermodal Terminal** in Oakland, California, a project involving the Union Pacific Railroad, is an intermodal terminal at a seaport designed for the efficient transfer of containers between rail and ship.
- **UPS Air Cargo Site Development** at the Denver International Airport is an Air-Truck transfer facility for UPS. The project involves new taxiways to two UPS facilities and a cargo apron; and a roadway extension.
- **Chicago Area Consolidation Hub** improved highway access to the rail terminal which houses UPS' national consolidation operation, and includes highway/railroad grade separations, a new freeway interchange, and new facility roadways.
- **Waterville Intermodal Facility** in Waterville, Maine, is an intermodal rail-truck transfer facility, which includes warehouse space, staging areas, a new 3,000-foot by 100-foot paved loading/unloading area and new track connections to the railroad main line. Developed with Guilford Transportation Industries, the transfer facility allows central Maine products shipped in trailers and containers to move via rail, reducing heavy truck traffic and emissions.

- **Cincinnati Third Track Line** in Cincinnati, Ohio, a 3.5-mile third main rail line and bridge reconstruction was a public-private partnership between the USDOT, the state of Ohio and the Norfolk-Southern Railroad. The new track also offers opportunities to shift highway traffic to rail intermodal, mitigate congestion at rail/highway interfaces, and support air-quality improvement in a non-attainment area.

5.1.3 City Programs

A truly interesting trend is the focus that several cities have taken in recognizing the value of freight mobility to their general economies. There's a growing understanding that eliminating impediments to freight movements is an economic development tool, and that accommodating trucks and railroads can be combined with meeting community goals. The following list of cities and the freight projects they're working on was gathered from an analysis completed by agencies within the District of Columbia.

Baltimore, MD

- To eliminate through truck traffic in residential areas, the city established a network of truck routes "to separate local truck traffic from regional truck traffic."
- Established a set of zones where through truck traffic is prohibited; reinforced with signage; VMS directing drivers to truck routes.
- The city development review analyzes on- and off-street loading needs.
- The regional area established a permanent "Freight Movement Task Force", which has focused on truck parking and truck stop facilities, signage oriented to truck drivers, and education and enforcement efforts.
- "Task Force" sponsored a design charrette where participants mapped out problem areas and groups developed solutions together.

Cambridge, MA

- Densely populated, immediately north of Downtown Boston, bisected by major freight routes, community sought to approve a zoning ordinance that would ban all nighttime through truck traffic on all City streets.
- Led to a regional freight movement study which resulted in a modified zoning ordinance – "Through truck traffic are restricted to certain streets between the hours of 11PM-6AM."
- While the state required the city to suspend the ordinance, the study inspired collaboration between residents and businesses to work to: 1) prioritize roadway improvements on streets heavily utilized by trucks; and 2) implement a program of targeted loading zones at curbside during portions of the day.

Chicago, IL

- MPO established "Intermodal Advisory Task Force" in 1994.
- City DOT and Planning departments manage a program to identify and improve significant industrial corridors.
- Arterial network is frequently congested and many segments accommodate vertical clearance restrictions.
- City staff also work with shippers to identify optimum delivery schedules.
- City staff vigorously enforce parking regulations.

- Chicago Planning Group[30] working committee established a coordinated railroad operating plan and protocol through the Chicago region.

District of Columbia

- Completed a citywide truck network.
- Established a Motor Carrier Office within the District's Transportation Dept.
- Studied truck parking/loading needs by time of day.
- Proposed establishment of a permanent motor carrier advisory group.
- Developed protocol for truck restrictions/inspections for security purposes.
- Developed three proposed categories of truck routes:
  - Preferred routes – major arterials with high truck volume to major truck destinations. Oversized/overweight vehicles would have access via permit.
  - Restricted roadways – areas with unique security concerns (e.g., U.S. Capitol and White House) that accommodate high vehicle and pedestrian traffic. Vehicles with more than 2 axles or 6 tires would be prohibited from using these routes.
  - Prohibited roadways – all other streets in the District. Trucks would be banned from these streets at any time unless use of a roadway is necessary for a truck to reach its destination.

London, England

- Central London Congestion Charge program charges trucks $24/day (7AM-6:30PM Monday-Friday), which can be heavily discounted for fleets or for multiple trips/week.
- London maintains a "Lorry Ban", which restricts truck movements on residential streets during evenings and weekends. Permits are required for trucks who wish to travel on to non-designated truck routes.

Los Angeles

- MPO established and works with a "Goods Movement Advisory Committee;" and was one of the first jurisdictions to build a regional truck model.
- City's Transportation Task Force include a subcommittee dedicated to freight movement; have instituted three innovations:
  - lengthened size of loading zones to accommodate large trucks.
  - improved enforcement of loading zones.
  - developed pre-paid system for use of loading zones.
- City's Redevelopment Agency works on trucking issues as well and is seeking funding for building "truck management solutions."
- Considering opening the port of LA for 24 hrs/day, 7 days/week.
- There are no designated truck streets, in the city; however, there are acknowledged "de facto" truck streets and City has built multiple improvements designed to improve truck access/mobility in several of the heavily traveled (by trucks) corridors.

New York, NY

- MPO established a Freight Transportation Working Group; and developed a Regional Freight Plan.
- City is updating its truck route system which was last designated in 1981.

[30] A committee of representatives of six Class I railroads (UP, BNSF, CSX, Norfolk Southern, Canadian National, and Kansas City Southern), Amtrak and METRA commuter rail.