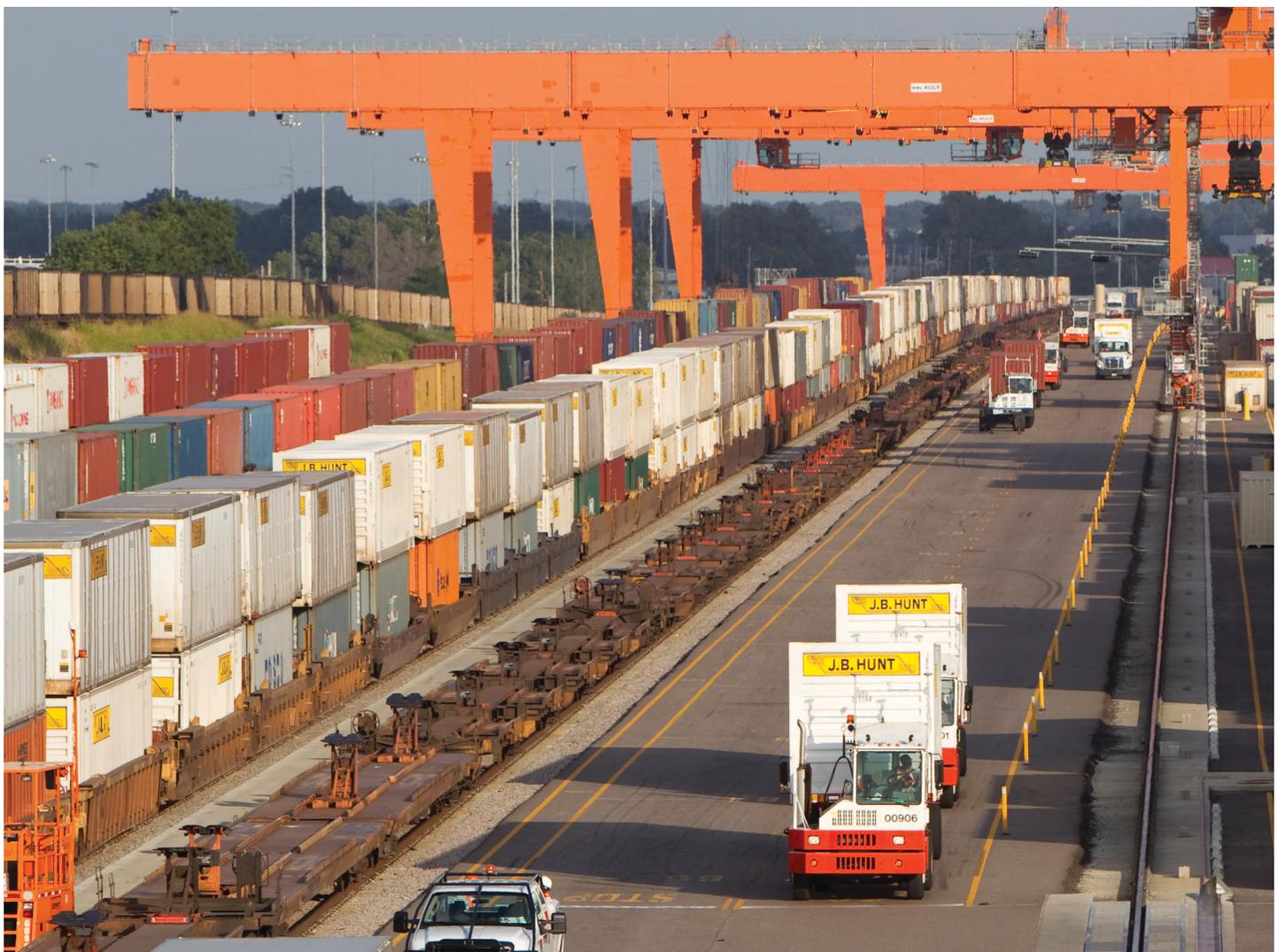


WHITE PAPER

Dwell: How Intermodal Terminal Congestion Impacts Capacity and Service



The railroad industry is experiencing a congestion issue called “dwell” that when combined with recent and forecast increases in rail volume impacts capacity, service and growth.

Extreme dwell takes over much-needed ramp space, limiting the space available for trains to load and unload. This reduces the railroad’s ability to accept additional cargo. Every additional minute a train is stuck at the rail yard unable to unload, money is lost.⁹ Collectively, the transportation industry must reduce rail facility congestion and dwell. It is critical that railroads find a way to increase their terminal throughput before dwell pushes costs and congestion to insurmountable levels.

Although a certain amount of dwell is expected so trucks can pick up the containers at the rail facility, excessive dwell prevents timely pickup and delivery because railroads do not have sufficient parking to deramp additional containers.

It is necessary for shippers, railroads and carriers to collaborate and identify the key attributes creating dwell and implement effective solutions to these inefficiencies. Investments are being made to the railroad infrastructure in the sum of \$29 billion in 2015 alone.^{6,7} But more needs to be done to decrease dwell and reduce the burden on terminal capacity and yard availability.

“Dwell” is the period of time starting when the container is unloaded from the train and ending when the container has departed from the rail facility.

This report will review the common causes of dwell, the consequences of excessive rail storage congestion and what can be done to curb this problem and help the railroad operate as efficiently as possible.

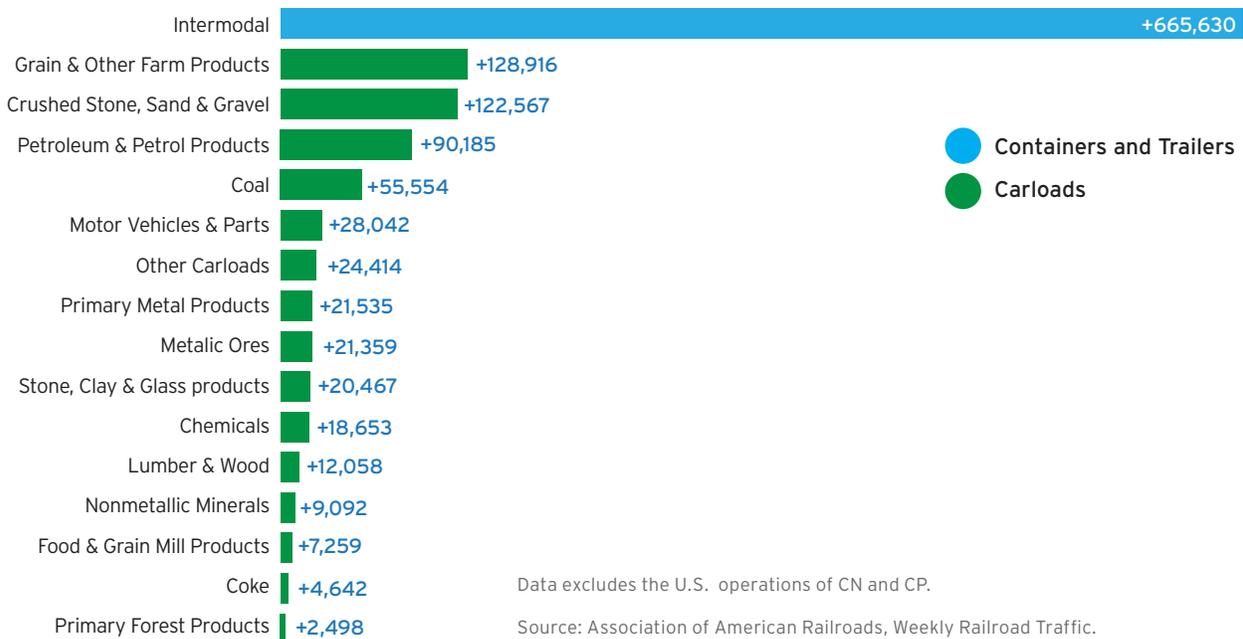


Rail volume is on the rise

In 2014, U.S. railroads saw an increase of 1.2 million shipments, including 665,630 intermodal shipments. According to the Association of American Railroads (AAR), "Thanks to a variety of factors including a record grain crop in 2013, increased demand for coal to generate electricity, and better general economic conditions, railroads saw a 4.5 percent increase in carload and intermodal traffic in 2014 compared with 2013." The majority of that increase was a direct impact of rising intermodal demand, which grew more than five times the next fastest growing rail services (commodity grain and farm products).

Demand for U.S. freight rail service has surged in 2014¹

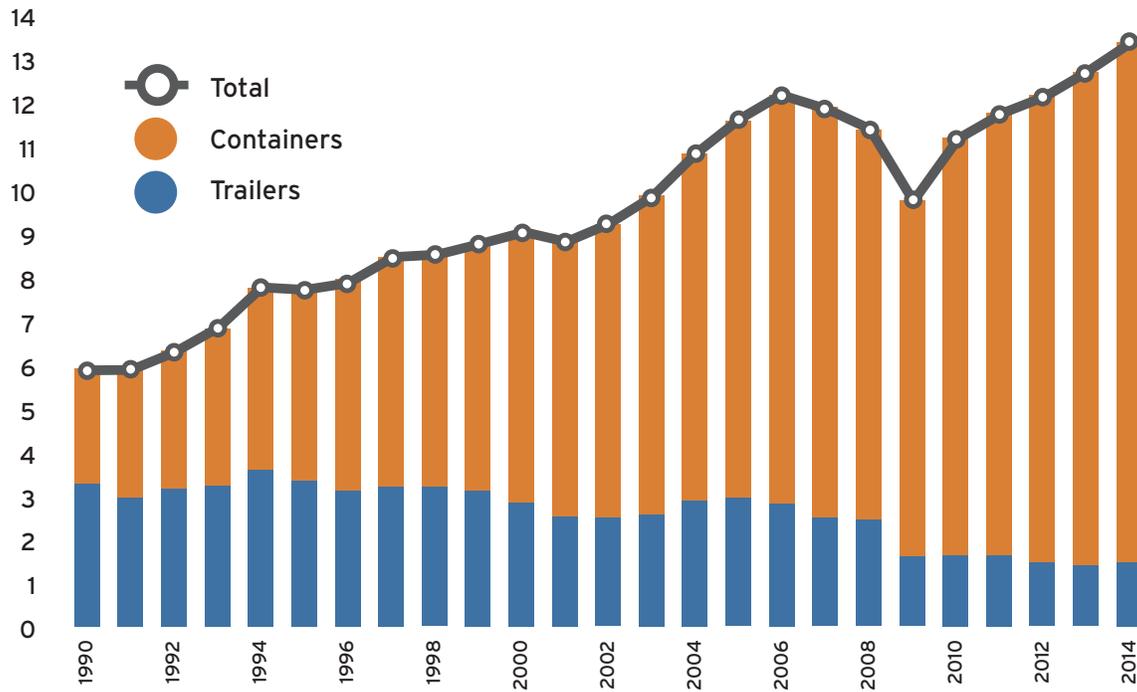
U.S. Freight Rail Traffic Growth 2014 vs. 2013*



Recent forecasts from the Federal Highway Administration project total U.S. freight shipments will rise to 28.5 billion tons in 2040.² According to the AAR, "...freight rail in general, and intermodal rail specifically, represents a viable and socially beneficial way to help meet this growing demand."² As freight volume and rail traffic continue to rise, inefficiencies in the intermodal network become more transparent and have a compounding negative impact for railroads, carriers and shippers. Addressing these inefficiencies in the intermodal network will assist the entire supply chain and result in improved services. One inefficiency—destination ramp dwell—can have notable impact on service levels and capacity for shippers. Fortunately, this inefficiency can be managed when all parties work together.

U.S. rail intermodal traffic: 1990-2014²

In millions



Source: Association of American Railroads

Dwell and the impact on the network

With limited available land and capital to expand intermodal facilities, railroads must find ways to increase their terminal throughput to handle ever-increasing volumes. While U.S. railroads have constructed some new terminal facilities in recent years, many older locations are in large metropolitan areas and surrounded by other development, which means adding additional acreage can be extremely costly and challenging.³ Therefore, becoming more efficient with existing facilities is a more viable option.

Managing dwell is one way to maximize the capacity of an existing facility. To proactively address dwell, it is first necessary to understand it and define how it impacts the network.

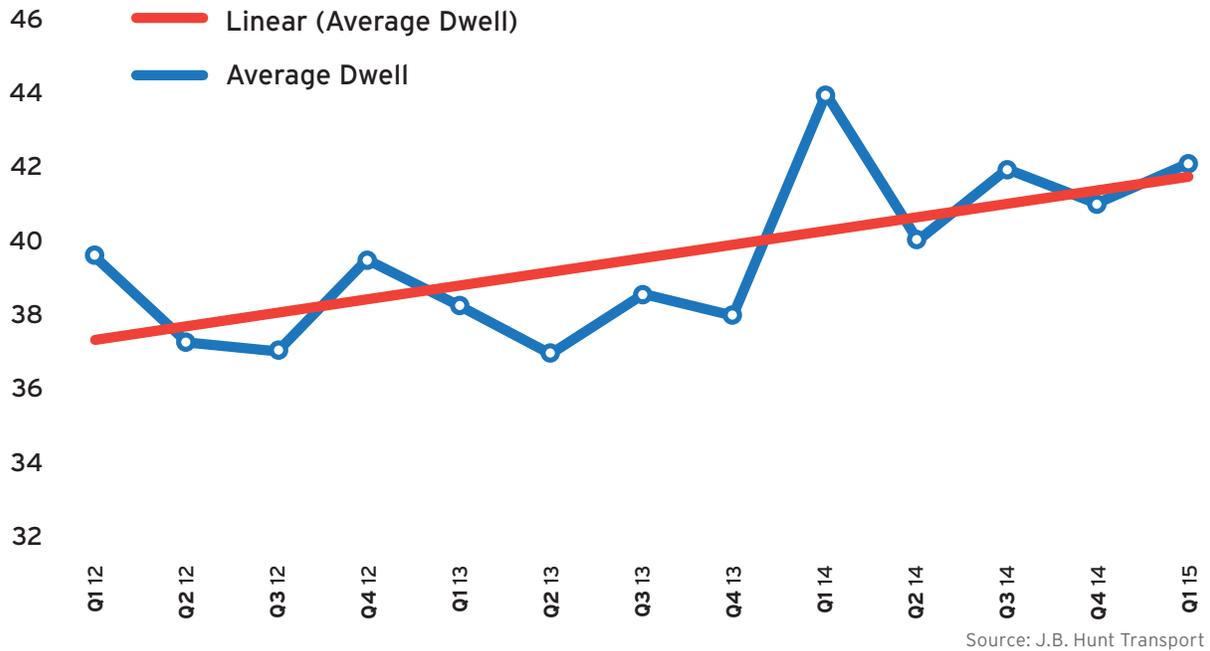
Dwell hours increase when the receiving facility does not accommodate a timely delivery, usually because the facility is closed or lacks space. Dwell hours can also surge when rail service is disrupted and unpredictable, particularly when the receiver and drayage community are not able to sufficiently flex with train arrivals and deramps.

It is important to note that a certain amount of dwell occurs and is expected, allowing for the efficient pick up of containers/trailers at rail facilities. Although the railroads commonly allow a reasonable amount of dwell before enforcing charges (referred to here as “free time”), it is best practice to outgate freight well before this time expires. The ability to be flexible and accept loads within 24 hours of deramp—largely considered a key trait in becoming a shipper of choice—can help minimize dwell. Loads with excessive dwell time occupy valuable

ramp space and limit capacity to load and unload trains, restricting current rail operations and inhibiting future growth. Furthermore, carriers and equipment providers are negatively impacted when loads with high dwell consume valuable container/chassis resources.

A J.B. Hunt survey of three undisclosed Class I railroads revealed that dwell is rising significantly with increases in rail volume. Dwell, on average, exceeds the ideal 24 hours by more than 17 hours.

Average Dwell

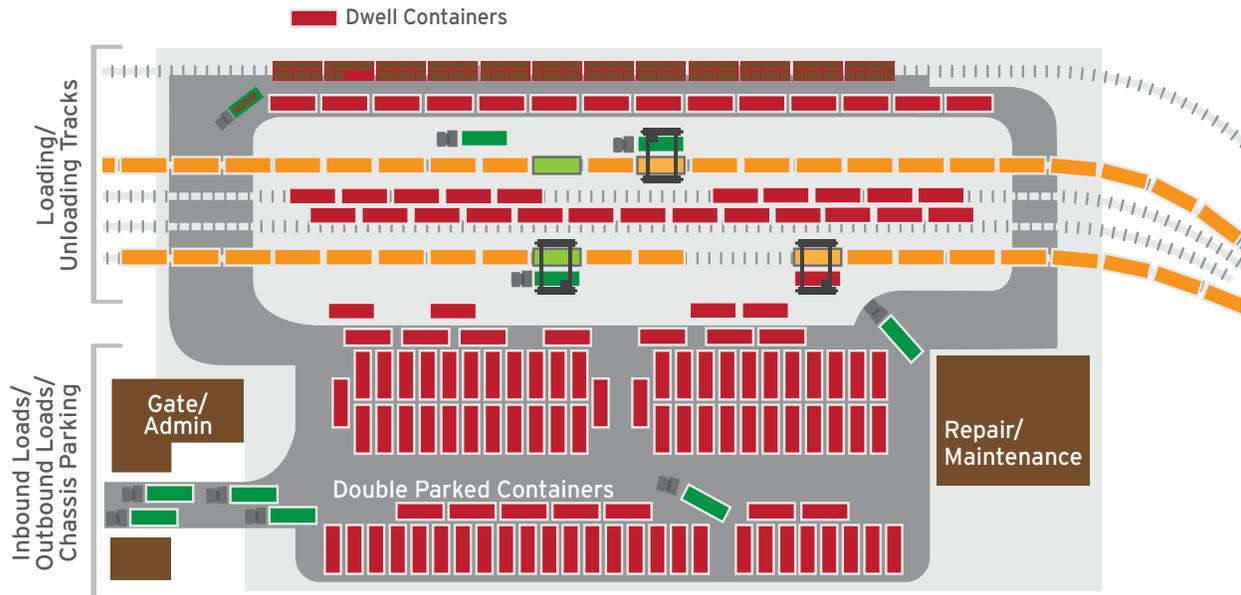


If dwell is not reduced, growth, capacity and service will be negatively impacted.

When railroads do not have available parking space to deramp additional containers, they are forced to hold containers on cars for excessive periods of time. Since outbound service is often dependent on the cars generated by inbound deramps, this can negatively impact and limit the railroad's ability to accept additional traffic in the gate.

According to an analysis by Hofstra University of a CSX terminal model, "... a problem with [ramp] yard operations will create delays both at the rail track and gate operations and have an impact on the terminal productivity and the quality of its services."³ As growth, capacity and service are negatively affected, railroads and carriers will be unable to accommodate customers with the level of flexibility previously expected. These approaching outcomes are forcing carriers and the railroads to take action.

Intermodal ramp facility



It has become necessary for the industry to invest in increased capacity. According to a publication by RailwayAge, "...with significant segments of the rail network operating at near 100% capacity, and predictions for accelerated rail freight and rail passenger demand to continue well into the future, added capital investment in rail facilities, devices, and equipment is essential to assure the nation's global competitiveness, productivity, job growth, mobility requirements, standard of living, quality of life, tranquility, and national security."⁴



In the past few years, the railroads have made unprecedented investment in their networks with the goal of accommodating growing volumes.⁵ In 2015, freight railroads will make roughly \$29 billion in private investment into the freight rail transportation system and hire approximately 15,000 people.^{6,7} In addition to these investments, railroads are collaborating closely with carriers to forecast demand and improve on inefficiencies such as excessive dwell.

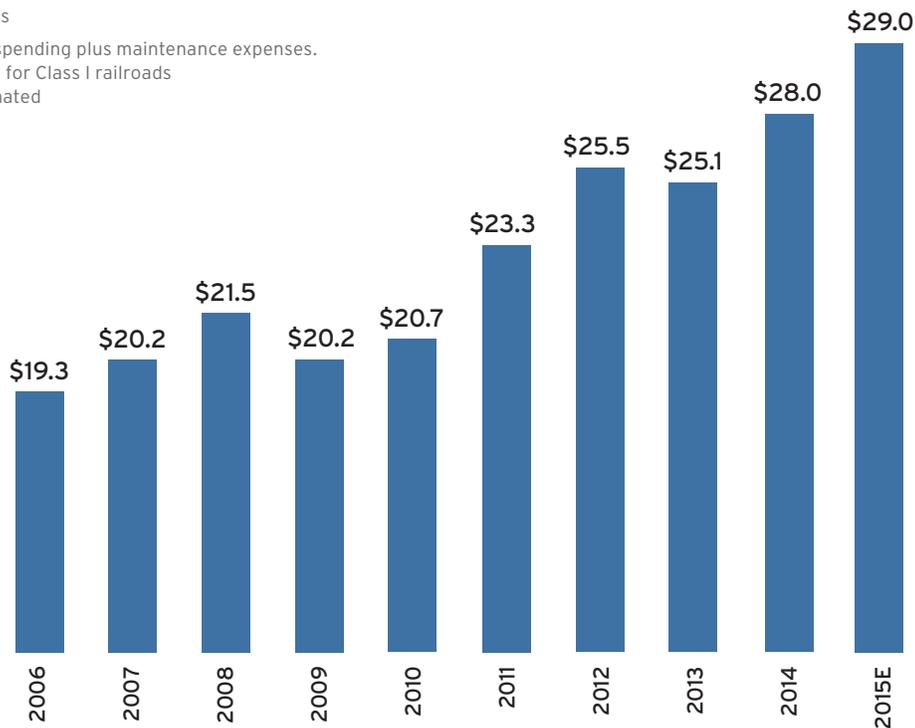
Freight railroad spending on infrastructure and equipment⁵

In billions

Capital spending plus maintenance expenses.

Data are for Class I railroads

E - Estimated



Source: Association of American Railroads

Carriers are also working closely with customers to identify the causes of dwell and provide the equipment and dray power necessary to meet demand. They are collaborating with the railroads to adapt chassis and optimize container management processes to save space at the terminals.

Increases in billing are being experienced across the industry and are not aimed at increased revenue, but instead driving behavioral change. If excessive dwell cannot be resolved through a collaborative change in practice (see recommendations below), containers with excessive dwell could be drayed offsite and stored until final delivery to the receiver. In this scenario, customers will be charged a yard pull and storage fee based upon the amount of time the container remains at the offsite facility.

Reasons for dwell

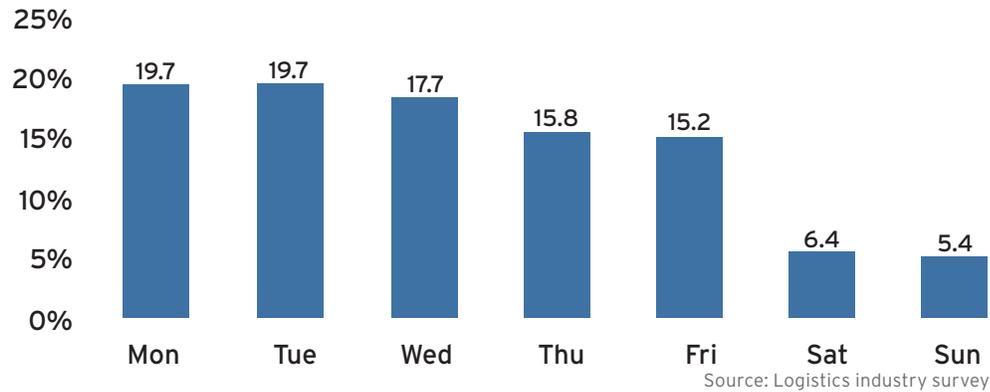
There are many reasons dwell exists and many changes in practice that can eliminate or lessen rail storage congestion.

The weekend effect

Rail traffic data indicates that dwell is the greatest for loads that deramp Fridays, Saturdays and Sundays. The majority of outgoing occurs on Mondays and Tuesdays, with Saturdays and Sundays representing the lowest percentage of all weekly outgates. This strongly suggests that the majority of receiver locations are not open or available for deliveries on weekends, a trait which is not favorable to most carriers.⁶ It is worth noting

that dwell surges on observed holidays, when receivers are commonly closed. January is the most severe month for dwell, likely due to the number of businesses that are closed at the end of December and beginning of January.

Outgate percentage by day-of-week



It is important to recognize that customer delivery within 24 hours of deramp is ideal. If a receiver is not open on the weekend to receive freight, one option for shippers is to adjust shipping patterns so freight arrives Monday through Friday to deliver Monday through Friday.

If adjustments to shipping patterns are not possible for shippers, it may be necessary for receivers to secure additional staffing, enabling them to receive and unload shipments during the weekend.

Transit guides

Carriers often have the ability to provide a dynamic transit guide based on day-of-week. Unfortunately, many Transportation Management Systems (TMS) cannot accommodate complex rail schedules that account for day-of-week variability. This is extremely debilitating to carriers.

Consider the example of a TMS, which can accept only a single rail schedule. The schedule does not vary dependent on day-of-week, forcing the shipper to enter a metric that predicts the highest number of days possible to complete a delivery. Now imagine a shipment that takes two days to reach its destination. Train departure days are scheduled for Monday, Wednesday and Friday. If the load ships on one of those three days, it will take two additional days beyond the day of shipping to arrive at the destination for outgate. There is no cutoff or train departure on Saturday, Sunday, Tuesday or Thursday. Therefore, if the load ships on Saturday, it will take four days to arrive at the destination for outgate, while shipping on Sunday, Tuesday or Thursday will take three days.

Sample transit schedule

Origin	Destination	Description	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Point A	Point B	Origin Rail Cutoff	Mon 1800		Wed 1800		Fri 1800		
		Dest. Availability	Wed 0800		Fri 0800		Sun 0800		
		Transit Days	2		2		2		

Since the shipper's TMS must operate under the presumption of the longest possible time to arrive at destination for outgate, rather than adjusting dependent on day-of-week, every delivery is assumed to take four days to reach its destination. Consequently, for customers shipping seven days a week, every container departing on Monday, Wednesday and Friday will be padded with two additional days, delaying outgate and creating two unnecessary days of dwell. Every container shipping on Tuesday, Thursday and Sunday will be padded with one additional day, delaying outgate and creating one unnecessary day of dwell.



Many railroads are pumping billions of dollars into improving tracks and increasing capacity. According to the Journal of Commerce, BNSF Railway plans to spend \$1.5 billion on expansion projects in 2015.⁸

A dynamic transit guide can accommodate day of week specifications. What should a shipper look for in a TMS? Important features include:

- **Day of week transit functionality:** ability to adjust predicted arrival at destination dependent on day of week
- **Electronic data interchange:** transfer of data from one computer system to another by standardized message formatting without the need for human intervention
- **Improved forecast accuracy:** enhanced accuracy in load information and demand forecasting for better pickup and delivery planning

Variability in rail service

Rail transits often involve thousands of miles of transit over varying geographies, topographies and climates. This complexity can result in unexpected events that interrupt rail transits. These service challenges and the resulting transit variability can increase dwell time, particularly when the receiver is unable to accept containers outside the time frame allocated by their transit guide. After the extraordinary weather challenges in winter of 2013-14, the railroads invested additional resources - including people, equipment and land - to provide additional flex capacity in the event of service disruption. All Class I railroads connecting in Chicago have installed a system that triggers automatically when weather metrics reach a certain magnitude.⁸ Furthermore, best-in-class carriers are prioritizing investment in technology to better schedule appointments based on historic rail service, a factor that can help minimize dwell. These same carriers have also developed contingency plans to secure additional resources in the event of a serious service disruption.

However, without increased flexibility from the receiver, these investments and changes in process will not yield the service and capacity improvements desired. By creating flexibility in delivery time, especially during service interruptions, a receiver can help restore normal operations by lessening dwell time. This flexibility can be achieved, in part, by utilizing range appointments rather than set appointments to accommodate variability.

Receiver space

Increasing dwell time is placing a significant burden on terminal capacity and yard availability. Railroads have limited space to store empty and loaded containers. Rail terminals often struggle to facilitate greater rail storage, with many being landlocked either by water or city infrastructure. A 2013 publication by the AAR named Chicago and LA/Long Beach as the top two regions in terms of intermodal volume in the United States, with more than 10 million containers and trailers handled between them.² Building or expanding terminals in these metropolitan areas can be both challenging and costly.

Improved utilization of current yard space frees limited resources for investment in locomotives and additional tracks, allowing railroads to more efficiently move rail freight between points. Alternatively, these resources would be invested in the purchase of additional equipment storage at the destination.

Freight cannot and should not be stored at the rail yard if dwell time is to be reduced. The receiver must be capable of accommodating their freight, whether through an extension of operational hours, increased collaboration between shipper and receiver, additional available storage space or increased personnel.

Addressing dwell

Collectively, the transportation industry must reduce terminal congestion and dwell, or capacity, service and growth will continue to suffer. With recent growth in rail volume the negative effects of dwell will only compound and increase in severity if the inefficiency is not addressed. Shippers and receivers can assist in the prevention of dwell in several key ways, including:

- › Accommodate night and weekend deliveries
- › Alternatively, adjust shipment pattern to avoid weekend deramping
- › Update transportation management system (TMS) to accommodate dynamic transit guides
- › Create flexibility in appointment windows
- › Ensure adequate space at the receiver location

Perhaps most importantly, reducing dwell time must be a collaborative effort among shippers, railroads and carriers. Shippers and receivers can work with their carrier to identify the key attributes creating dwell and implement effective solutions to these inefficiencies. Through engagement and increased awareness of the problem, dwell can be significantly reduced increasing valuable rail ramp capacity.

For more information regarding dwell, or to receive a complimentary dwell analysis, please reach out to your J.B. Hunt representative or contact the J.B. Hunt support team at 1-800-4JBHUNT.



References

- 1 "Demand for U.S. Freight Rail Service Has Surged in 2014." Association of American Railroads. Association of American Railroads, n.d. Web. 26 Mar. 2015.
- 2 "Rail Intermodal Keeps America Moving." Association of American Railroads. Association of American Railroads, May 2015. Web. May 2015.
- 3 Rodrigue, Jean-Paul. "Configuration of a Rail Intermodal Container Terminal." The Geography of a Transport System. Dept. of Global Studies & Geography, Hofstra University, n.d. Web. 26 May 2015.
- 4 Wilner, Frank N. "Unknotting Rail Congestion Compels Investment." RailwayAge. Simmons-Boardman Publishing Inc., 28 Oct. 2014. Web. 20 Feb. 2015.
- 5 "Freight Railroad Capacity and Investment." Association of American Railroads (n.d.): n. pag. Association of American Railroads. Association of American Railroads, May 2015. Web. June 2015.
- 6 Albrecht, Thom, and Tom Sanderson. "Transportation & Logistics: Translating the Legislative and Economic Impacts." 12th Annual Shipper Symposium. Grand Hyatt DFW, Dallas, Texas. May 2014. Speech.
- 7 "Managing the Network." Association of American Railroads. Association of American Railroads, n.d. Web. 26 Apr. 2015.
- 8 Szakonyi, Mark. "Intermodal Confidence Tied to Rails' Response to Winter Weather." JOC.com. The Journal of Commerce, 5 Jan. 2015. Web. 19 Feb. 2015.
- 9 Funk, Josh. "Largest U.S. rail yard works to reduce 'dwell time' amid strong demand." Pittsburgh Post-Gazette, 26 Sept. 2006. Web. 4 Aug. 2015.

About J.B. Hunt

J.B. Hunt Transport, Inc. is a transportation logistics company focused on providing safe and reliable transportation services to a diverse group of customers throughout the continental United States, Canada and Mexico. Utilizing an integrated, multimodal approach, we provide capacity-oriented solutions centered on delivering customer value and industry-leading service. Freight solutions include Intermodal, Truckload, LTL, Dedicated and Refrigerated.

Our stock is traded on NASDAQ under the ticker symbol JBHT and is a component of the Dow Jones Transportation Average. **For more information about our company, visit www.jbhunt.com.**