Project Summary

Texas Department of Transportation

0-5684: Impacts of Dray System Along Ports, Intermodal Yards, and Border Ports of Entry

Background

Dray activity, which is the short haul truck movement of intermodal cargo, impacts patterns of congestion and air pollution in Texas due to the growing role played by international trade in the Texas economy. Dray truck activity is concentrated on the urban road network and occurs principally during daylight hours. In this sense, dray activity more directly impacts urban traffic and air quality when compared with other types of trucking. This project examines the dray component of the intermodal supply chain as operative at Texas ports, intermodal yards, and border ports of entry. The study of drayage as an autonomous area of transportation research is a comparatively new phenomenon. The research charts the relevant similarities and differences in dray operations around the state. Dray activity at ports, intermodal yards, and border ports of entry share a sufficient number of characteristics that in studying these components in concert with each other, the relevant distinctions can be elucidated.

Research Performed by:

Center for Transportation Research (CTR), The University of Texas at Austin

The University of Texas at San Antonio, (UTSA)

Research Supervisor:
Rob Harrison, CTR

Researchers:
Nathan Hutson, CTR
Jolanda Prozzi, CTR
John McCray, UTSA

Project Completed: 8-31-08

What the Researchers Did

Through interviews, surveys, direct data collection, and modeling, the researchers described the impact dray activity has on surrounding urban areas in terms of congestion, safety, and air quality. The researchers profiled the population of dray firms operating in Houston, Dallas, and Laredo through phone interviews with management and in-person interviews with drivers. Formal surveys were conducted at the Port of Houston, the Union Pacific Englewood Rail Yard in Houston, and the Union Pacific Port Laredo Rail Yard in Laredo. The researchers used information collected in calibrating a model that estimates the total net impact of key criteria pollutants and vehicle miles traveled (VMT) from dray activity at a large generator, the Port of Houston. The model was used to predict the impact of changes in emissions and VMT that could be realized through different actions. The researchers also assessed the net effect of dray activity on congestion on specific corridors that have a high percentage of dray vehicles.

What They Found

The surveys examined driver demographics, compensation, work hours, operational patterns, usage of different road corridors as well as cargo origins and destinations. While drayage shares some similarities in all of the case studies, for example, in almost all cases drivers are paid per delivery, some significant distinctions were also found. For example, a high percentage of dray drivers serving the port and the rail yard in Houston were found to be owner operators, yet in Laredo this situation is reversed. Most Port of Houston drivers log between 100-200 miles and can usually make 3-4 round trip deliveries from a warehouse or distribution center to the port container terminal per day.

At both studied rail yards, average distance from origin to destination was shorter than the equivalent trips from the port. This, combined with shorter processing times and longer operating hours, meant that dray drivers serving both were able to make more deliveries per day, on average, when compared with drivers exclusively serving the Port of Houston. Drivers, many of whom work 10 hour days, spend significant time in congestion however they are rarely stopped for extended periods. The researchers gathered detailed data on truck movements by tracking trucks equipped with GPS and a program that logged not only the truck location, but also the speed, number of stops, and VMT. The program can also map the route on a digital road network.

After determining that drayage VMT tends to be concentrated on a few major corridors within an urban area, the researchers performed a traffic analysis on two major dray corridors in Houston, Highways 225 and 146, to see whether the dray contribution to total traffic flow was sufficient to produce significant impacts on the level of service (LOS) on those corridors. Despite the fact that dray activity has been growing significantly and this growth is expected to continue, it was determined that compared with total traffic flow, the impact of drayage is modest on the major highway corridors in Houston. The only corridors that are dramatically impacted by dray activity are those in the immediate vicinity of the port. Further from the port, the direct impact on traffic volume drops sharply.

By using an emissions and activity model developed through the EPA specifically to measure dray activity, the researchers developed methods to improve the impact of dray activity on air quality and urban mobility. The model allowed the researchers to test different scenarios, such as modernizing the fleet of trucks, or changing the percentage of containers utilizing alternative modes and test the impacts on emissions, VMT, and total fuel consumption. The model showed that a combination of operational improvements, combined with fleet modernization, has the potential to substantially improve the total air quality impact of drayage in Houston. With adjustments, this model could be extended to other terminal generators.

What This Means

The Dray sector is evolving rapidly. Change in the sector is driven not only by the growth of international trade, but also by broader economic changes that are producing a restructuring of the trucking industry within the United States. State DOT's should be cognizant of the role that drayage plays in the intermodal supply chain and also the presence that drayage has within urban areas. The concentration of dray activity within urban centers has been seen as a problem, in part due to the advanced age of many of the trucks, yet the confinement of drayage to a descript geographic locality is also potentially beneficial as it aides public agencies that would seek to target this fleet for improvement and modernization. The confined patterns of dray movement as well as local ownership of trucks and residency of drivers mean that the dray sector is understandable even if it is still not well known. Certain efforts have already been made that have the potential to mitigate dray impacts on air quality, for example many trucks performing drayage are already eligible for emissions reductions grants under the Texas Emissions Reductions Plan (TERP). It is possible that future policies may more specifically target the dray sector, factoring in the elements that make drayage a distinct component of the trucking industry.

For More Information:
0-5684-2 Drayage Activity in Texas

Research Engineer - Duncan Stewart, TxDOT, 512-465-7403
Project Director - Melisa Montemayor, TxDOT, 956-712-7456
Research Supervisor - Rob Harrison, CTR, 512-232-3113

www.txdot.gov
keyword: research

Texas Department of Transportation
Research and Technology Implementation Office
P.O. Box 5080
Austin, Texas 78763-5080
512-465-7403