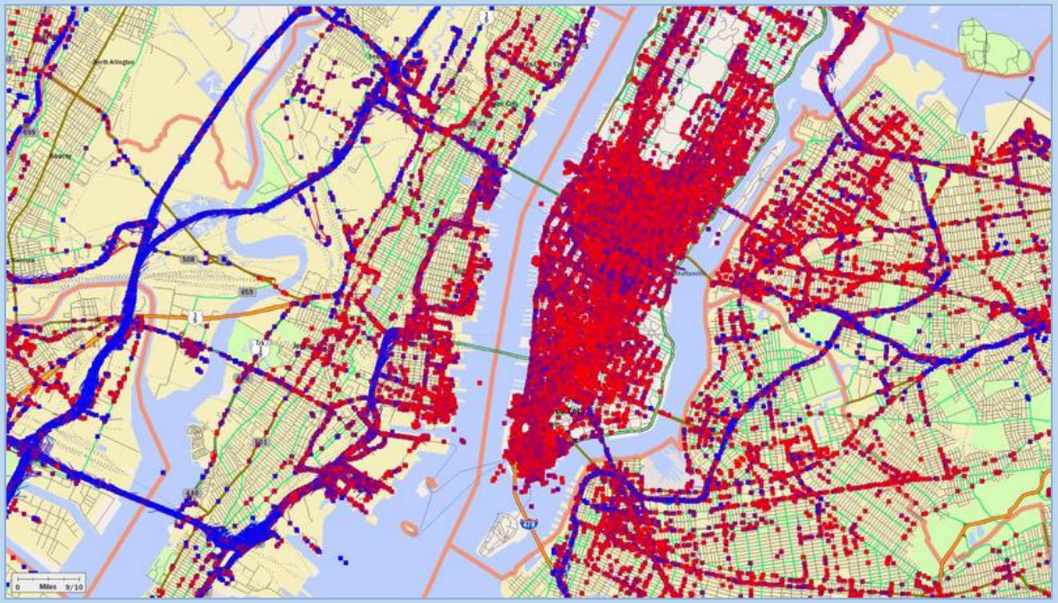
New York City Off-Hour Deliveries

CASE STUDY

Using truck GPS data to estimate the potential benefits of shifting daytime deliveries to non-peak hours.

Freight Challenges	Congestion Final 50-Feet Access
Data Sources Used	Administrative Records, Global Positioning System
Analytical Approaches	Speed, Location



Speed Reduction on Local Streets Due to Truck Deliveries

Source: NYC DOT Of-Hour Delivery Program. [Online]. http://www.nyc.gov/html/dot/html/motorist/offhoursdelivery.shtml

WHAT ARE THE FREIGHT CHALLENGES?

At peak times of the day, trucks both contribute to and suffer from traffic congestion, particularly in dense urban areas with a large volume of traffic and many freight receivers such as stores and restaurants. This congestion reduces the productivity of delivery services, which take longer at peak hours of the day, and increases shipping costs. In addition to traffic congestion, a lack of available loading zones during daytime hours can make it difficult for drivers to find a place to park and complete the “final 50 feet” of their deliveries to businesses and homes. One way to reduce the impact of deliveries on urban congestion and vice versa is to move delivery times to the ”off-hours”, i.e. early morning, late evening, or night when overall traffic volume is lower.

WHAT WAS THE GOAL OF THE PROJECT?

NYCDOT and a group of research partners created the Off-Hour Truck Delivery Pilot Program to evaluate the potential benefits of off-hour deliveries in Manhattan. This year-long program used financial incentives to encourage freight receivers to receive shipments at non-peak times, and freight shippers to serve these businesses at off-hours. The overall goal of the project was to reduce congestion, lower transportation costs, and improve air quality.

WHAT DATA SOURCES WERE USED?

Two types of data were used for this project: records of truck GPS observations, and administrative records on shipping and operations costs at participating carriers and receivers. GPS records came from two sources: modified smartphones installed in participating carriers’ trucks, or from proprietary GPS record databases maintained by each carrier. In both cases, researchers collected time-stamped observations of specific trucks’ location and speed. Each carrier collected or provided GPS data for at least one month. A sample of one carrier’s data is shown at left, with bright red dots indicating a speed of 5 mph or lower, and bright blue dots indicating a speed of 35 mph or higher. The graphic shows that overall traffic speeds on local urban streets are extremely low, exactly where deliveries are most common,.

New York City Off-Hour Deliveries

Delivery Spots for One Participating Company

Source: NYC DOT Of-Hour Delivery Program. [Online]. Available: http://www.nyc.gov/html/dot/html/motorist/offhoursdelivery.shtml

References

1. Holguin-Veras et al, "The New York City Off-hour Delivery Project: Lessons for City Logistics", Procedia - Social and Behavioral Sciences, Volume 125, 2014, Pages 36-48.

Contact Information

Office of Freight Mobility, New York City DOT
ohdnyc@dot.nyc.gov , (212) 839 6670

WHAT ANALYTICAL APPROACHES WERE APPLIED?

In order to evaluate the impact of the program, NYCDOT and its partners needed information on travel times and delivery schedules between peak and non-peak delivery trips. Insight on travel speeds came directly from GPS observations, and these observations of travel speed could be compared between non-peak and peak hours to estimate travel times across Manhattan. Overall changes in travel times or delivery schedules could also be determined by comparing the start and end times for similar delivery routes during peak and non-peak hours. Information on overall delivery time for a delivery truck route also came from administrative records and observations provided by participating carriers.

Insights into the differences in delivery times between peak and non-peak hours were fused with administrative records on fuel costs, labor costs, and other shipping costs to determine the potential savings of operating at off hours. This trip and cost information was also incorporated into the truck trip and decision-making models used by the MPO, so the potential costs and benefits to carriers and receivers under different possible policy changes could be estimated [1].

WHAT WERE THE RESULTS?

This project demonstrated that GPS and administrative record data can be combined to estimate the time and cost savings associated with moving freight deliveries to non-peak hours. A best practice from this study is data fusion: using administrative data to assign costs or other quantitative attributes to phenomena observed through GPS records. Being able to assign costs or additional insights to phenomena like delivery trips helps make the project more relevant for decision-makers.

HOW WERE THE RESULTS VISUALIZED OR COMMUNICATED?

Results of the Pilot Program were presented mainly via written media, including a final report, a page on NYCDOT's website, written academic papers, and brochures. A more unique form of visualization for some of these materials were maps of specific vehicles' tours through the city, which helped readers understand how the truck GPS data was collected and analyzed. The map at left is an example, it shows one day of delivery stops associated with one participating company's GPS-equipped trucks.