Congestion Mitigation Commission Technical Analysis
Night Delivery Incentives

technical memorandum

prepared for
New York City Economic Development Corporation
New York City Department of Transportation

prepared by
Cambridge Systematics, Inc.

December 10, 2007
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33 East 33rd Street, Suite 804
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date
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Table of Contents

Executive Summary .................................................................................................. ES-1

1.0 Introduction .........................................................................................................1-1

2.0 Case Studies .........................................................................................................2-1
  2.1 Atlanta - 1996 Olympics Games Case Study .................................................. 2-1
  2.2 Port of Los Angeles-Long Beach PierPass Off-Peak Program ..................... 2-2
     Background ........................................................................................................ 2-2
     Change in Port Gate Traffic ........................................................................... 2-3
     Change in I-710 Traffic .................................................................................. 2-4
     Operational Impacts ....................................................................................... 2-7
     Community Reactions .................................................................................... 2-8
  2.3 London Congestion Pricing ............................................................................. 2-9
     Background ....................................................................................................... 2-9
     Impact on Traffic ............................................................................................. 2-9
  2.4 PANYNJ's 2001 Value Pricing Initiative in New York City ....................... 2-11
  2.5 Tappan Zee Bridge 1997 Variable Pricing Initiative for Commercial Vehicles ................................................................. 2-13
  2.6 Lessons Learned from Case Studies ............................................................. 2-17

3.0 Application to New York City ............................................................................. 3-1
  3.1 Trucking Environment and Regulations in New York City ......................... 3-1
  3.2 Night-time Deliveries Implications for New York City ................................. 3-3
  3.3 Atlanta – 1996 Olympics Games Case Study .............................................. 3-5
  3.4 Port of Los Angeles-Long Beach PierPass Off-Peak Program .................... 3-5
  3.5 London Congestion Pricing ......................................................................... 3-6
  3.6 PANYNJ's Value Pricing Initiative ............................................................... 3-7
  3.7 Tappan Zee Bridge Variable Pricing Initiative ........................................... 3-7
  3.8 New York City Nighttime Delivery Policy Incentives Research ................ 3-8
     Joint Receiver-Carrier Policies ..................................................................... 3-8
     Restaurant Industry Study ............................................................................ 3-13
  3.9 Estimated Impact on VMT in the New York City CBD ............................... 3-14
     $7 Toll per Axle for Trucks and Commercial Vehicles .............................. 3-16
     $7 Toll per Axle and $2,000 Tax Deduction ............................................... 3-16
     Truck Ban During Peak Period .................................................................... 3-16
Table of Contents, continued

4.0  Key Findings and Conclusions ................................................................. 4-1
5.0  References and Sources of Additional Information ................................. 5-1
List of Tables

Table 2.1 Port of Long Beach Truck Traffic by Time Period ................................. 2-4
Table 2.2 I-710 Distribution of Class 9 to 14 Trucks by Time Period .................. 2-5
Table 2.3 I-710 Weekend Trucks ........................................................................ 2-5
Table 2.4 I-710 Hourly Change in Class 9-14 Truck Traffic (Southbound) ......... 2-6
Table 2.5 I-710 Hourly Change in Class 9-14 Truck Traffic (Northbound) ....... 2-7
Table 2.6 Impact of Congestion Pricing Program on Truck Traffic .................. 2-11
Table 2.7 Toll Rates before and after Value Pricing Initiative ............................ 2-12
Table 3.1 Expected Carriers’ Off-Peak Delivery Market Share as a Function of Toll Savings to Carriers and Tax Deductions to Receivers ................................................................. 3-9
Table 3.2 Expected Carriers’ Off-Peak Delivery Market Share as a Function of Toll Savings to Carriers and Shipping Cost Discounts to Receivers ........................................................................ 3-10
Table 3.3 Delivery and Departure Time for Truckers in a Six-Stop Tour during the Off-Peak (Minutes after the Off-Peak Hour Starts) ............... 3-11
Table 3.4 Receivers’ Willingness to Accept Off-Peak Deliveries by Incentive 3-14
Table 3.5 Shift in Peak Period VMT by Scenario .................................................. 3-17
List of Figures

Figure 2.1 PANYNJ Toll Facilities ................................................................. 2-12
Figure 2.2 Map of Tappan Zee Corridor and Tappan Zee Bridge .......... 2-14
Figure 2.3 Truck Traffic at the Tappan Zee Bridge before and after Variable Pricing Implementation ......................................................... 2-16
Figure 3.1 Designated Truck Routes in Manhattan .................................. 3-2
Figure 3.2 Minimum Toll Surcharge to Switch an Entire Tour to the Off-Peak Hours ................................................................. 3-12
Figure 3.3 Baseline VMT ........................................................................ 3-18
Figure 3.4 $7/Axle Toll Scenario .............................................................. 3-18
Figure 3.5 $7/Axle Toll and $2,000 Incentive Scenario ......................... 3-19
Figure 3.6 Truck Ban Scenario .................................................................. 3-19
Executive Summary

On any given workday, the Manhattan Central Business District hosts nearly two million workers from around the region, hundreds of thousands of tourists, and several hundred thousand residents. Streets are congested with cars, trucks, buses, taxis, pedestrians, and cyclists. The saturated roadways slow bus service, cause emergency vehicles to lose valuable response time, and contribute to the region’s air pollution problems.

A possible approach to reduce congestion in New York is to target truck traffic. This document reviews previous experiences in utilizing incentives and regulations that aim to reduce truck traffic or shift deliveries to off-peak periods including costs, benefits, and lessons learned for New York City. The research also incorporates negative impacts for consideration, such as economic impacts on businesses and trucking companies. The case studies include the 2001 Value Pricing Initiative carried out by the Port Authority of New York and New Jersey, the 1997 commercial vehicle variable pricing initiative at the Tappan Zee Bridge, London’s Congestion Pricing Program, the 1996 Atlanta Olympic Games, the Port of Los Angeles/Long Beach’s PierPass Off-Peak program, and results from empirical research conducted in New York City.

Theses case studies suggest that commercial vehicles are not prone to shift their time of operations as a result of toll increases during the peak hours of the day. The main reason for this is that the receivers tend to dictate the time of delivery, and for the most part are open only during regular business hours. Accepting off-peak deliveries would require establishments to incur additional costs in terms of personnel, security, and utilities necessary to keep the business open. Hence, the success of any off-peak delivery program hinges on the receivers’ willingness to accept it, which would require that they obtain economic benefits higher than the marginal costs incurred. Research shows that financial incentives for receivers such as tax deductions for employees working the off-peak shifts or reductions in shipping costs have a greater impact on the market for off-peak deliveries than just tolls. Programs targeting both carriers and receivers, such as the PierPass Off-Peak program, seem to have a better success rate than those targeting a single entity.
1.0 Introduction

On any given workday, the Manhattan Central Business District hosts nearly two million workers from around the region, hundreds of thousands of tourists, and several hundred thousand residents. Streets are congested with cars, trucks, buses, taxis, pedestrians, and cyclists. The saturated roadways slow bus service, cause emergency vehicles to lose valuable response time, and contribute to the region’s air pollution problems.

According to Texas Transportation Institute’s Urban Mobility Report, New York City ranks second in the nation in terms of annual delay. The majority of the delay is spent during the peak hour, with travelers experiencing 46 hours of annual delay (per traveler) in 2005, up from 34 hours in 2000, a 35 percent increase. This congestion costs the City and its residents over $7 billion in 2005, costing each peak traveler approximately $888.

By 2030, nearly a million more residents, 750,000 more jobs, and millions more visitors are expected to further strain the City’s transportation system. The current system cannot handle the anticipated increase in traffic and meaningful infrastructure-based solutions are challenging, costly, and lengthy to implement. A comprehensive and innovative set of strategies must be implemented to make a profound change in travel behavior.

A possible approach to reducing congestion in New York is to target truck traffic, which has been increasing at a high rate over the last decade. New York City’s bridges and tunnels handled 35.5 million trucks in 2006, a 31 percent increase over 1997 volumes; these facilities have experienced an annual increase of 2.7 percent, or 835,000 more trucks every year during that period.1 This figure is expected to continue increasing at an even higher rate for the next 25 years.2 A major factor is that trucks handle nearly 70 percent of the freight going to and from the New York City-Newark-Bridgeport statistical area. This market share is projected to increase to 76 percent by 2035, presenting a significant challenge given the available infrastructure.3 Due to limited connections to the national rail network, New York City is unusually truck dependent as documented in NYMTC’s Regional Freight Plan (June 2004) and the Cross Harbor Tunnel Draft

1 New York Metropolitan Transportation Council (MTA and PANYNJ facilities only), http://www.nymtc.org/data_services/TTV.html.
3 Ibid.
EIS (April 2004). In general, freight traffic is growing at higher rates than passenger vehicles, population, or general economic growth.\(^4\)

A large portion of truck traffic in the City occurs during the peak hours of the day, exacerbating the City’s congestion problems.\(^5\) Hence, a potential source of relief could be to encourage truckers to shift their operations to off-peak hours (either nighttime or very early morning) through tolling. However this idea presents several challenges: Do truckers have the flexibility to shift the time of their operations? What level of toll rates would be required for carriers to consider this? Are businesses willing to accept deliveries and have their shipments picked up during off-hours? Are other incentives, in addition to or in lieu of tolls, required in order for both carriers and receivers to change their logistics patterns? What impacts will night-time truck traffic have on the city’s residents? This document addresses these questions through the evaluation of similar cases in the United States and around the world, and studies other alternatives for addressing these issues.

This document consists of five sections:

- **Section 1.0** presents a definition of the problem at hand;
- **Section 2.0** provides an overview of case studies in the United States and around the world;
- **Section 3.0** discusses how these case studies might translate to New York City; and
- **Section 4.0** presents a summary of the key findings; and
- **Section 5.0** presents references and sources of additional information.

The document studies the idea of congestion pricing for trucks in addition to other alternatives implemented worldwide to understand the benefits and issues associated with each. Congestion pricing is the practice of charging motorists more to use a roadway, bridge, or tunnel during periods of the heaviest use. Its purpose is to reduce automobile use during periods of peak congestion, thereby easing traffic and encouraging commuters to walk, bike or take mass transit as an alternative. This is a powerful policy tool that has the potential to: reduce congestion and improve travel times; generate revenues that can be dedicated to improving the City’s transportation infrastructure (roadways and transit facilities); and stem the amount of pollution spewed from tailpipes on City streets, helping the City reduce greenhouse gas emissions and achieving cleaner air.


\(^5\) Ibid.
Most studies and implementations of congestion pricing thus far relate primarily to passenger traffic, which has proven to be more responsive to changes in tolls rates than commercial vehicles. Commercial vehicles present different challenges. Truck delivery and pickup logistics are much more complicated and require more planning and punctuality than passenger travel. Many truckers travel from all over the Northeast, East Coast, and points west to make deliveries into New York City, thus making it harder to change the entire logistics chain for a potential toll saving (generally not higher than $30 for large trucks). Nonetheless, there exists a potential pool of carriers who might be willing to alter their operations given the right circumstances.

The primary challenge is that truckers are not always in control of their schedule; they generally have to cater to the convenience of their customers, who for the most part operate during the peak hours of the day. Hence, a congestion pricing program would not be very effective for deterring a trucker from delivering supplies to an office that closes at 6:00 p.m. every day. However, it does have the potential of swaying local carriers who deliver goods to a 24-hour supermarket to do so during the nighttime or the early morning (before 6:00 a.m.). Further complicating the problem is the fact that there are many different types of trucking companies ranging from independent local owner/operators to large national carriers, to fleets owned and operated by single shippers. Decision-making within these organizations varies widely.

This document reviews other jurisdictions’ experiences in utilizing incentives and regulations that aim to shift truck deliveries to off-peak periods including costs, benefits, and lessons learned for New York City. The research also incorporates negative impacts for consideration, such as economic impacts on businesses and trucking companies. The case studies include past experiences from New York’s bridges and tunnels, London’s Congestion Pricing Program, the 1996 Atlanta Olympic Games, private Port programs, and empirical research from New York City.
2.0 Case Studies

The following case studies cover previous experiences of programs and mandates implemented in the United States and around the world to reduce truck traffic or promote off-peak operations. The last two studies, the PANYNJ’s 2001 Value Pricing Initiative in New York City and the Tappan Zee Bridge 1997 Variable Pricing Initiative for Commercial Vehicles, cover previous experiences with truck tolling in or around New York City and can shed light on the impacts that a similar program might have in New York City’s central business district.

2.1 ATLANTA – 1996 OLYMPICS GAMES CASE STUDY

The challenge of transporting thousands of visitors while maintaining acceptable air quality led Atlanta city officials to aggressively implement a suite of transportation control measures during the 1996 Olympic Games.

Measures included increases in the quantity and frequency of transit services; outreach efforts to encourage voluntary shifts in normal business hours and increased telecommuting; and closure of the downtown to private automobile travel. In addition, an outreach campaign was conducted to encourage commercial vehicles to voluntarily consolidate their deliveries and, as much as possible, shift them out of peak hours. This required the cooperation of private businesses (groceries, retailers, distribution centers, etc.), which had to adjust their hours of operation to receive off-peak deliveries.

Traffic counts were collected at four locations through the metropolitan area to gauge the impact of the transportation control measures on traffic volumes. Weekday morning peak traffic counts decreased 22.5 percent from normal levels, while 24-hour traffic counts showed little change from pre-Game levels. Much of the reduction in peak-hour traffic can be attributed to heightened transit ridership, which increased 217 percent during the Games.

In addition, surveys of employers in metropolitan Atlanta indicated that there was a widespread effort to adjust schedules around the Games, including

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shifting of work hours; compression of the work week, and increased vacations. There were no empirical studies of the impact specifically of truck delivery shifts on peak-hour traffic, given that this was just one of many changes in place during the Games.

However, anecdotal evidence from the freight industry indicates that shifts did occur. Most freight stakeholders appreciated having the opportunity to deliver during off-peak hours since it allowed them to improve their bottom line by reducing the costs associated with traveling during congested periods. Outside of the Olympics, they are forced to travel during congested periods to meet the delivery requirements of their customers.

Off-peak deliveries are so attractive to the freight industry that they raised the issue during recent discussions surrounding Atlanta's Freight Mobility Plan, which is currently under development. The delivery industry, particularly Coca-Cola, which is headquartered in Atlanta, suggested that an Olympics-style campaign be conducted to encourage local businesses to accept off-peak deliveries. The possibility of piloting such a campaign in a limited section of the city is under discussion. It has been acknowledged that this type of pilot would require working with the diverse delivery needs of local businesses to make off-peak delivery possible. Some of these needs include just-in-time delivery (manufacturing sector); narrow delivery windows (grocery sector); and quick delivery of hot cement to construction sites within 3 hours of mixing (construction industry). More detailed needs are listed in Atlanta's Freight Mobility Plan Needs Assessment.

### 2.2 PORT OF LOS ANGELES-LONG BEACH PIERPASS OFF-PEAK PROGRAM

#### Background

On July 29, 2005, the PierPass Off-Peak program was initiated. Under this program, all international container terminals in the Ports of Los Angeles and

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Long Beach established four new evening shifts per week (Monday through Thursday 6:00 p.m. to 3:00 a.m.) and one new weekend shift (Saturday 8:00 a.m. to 6:00 p.m.). As an incentive for trucks to use the new shifts, a traffic mitigation fee is now assessed for loaded containers moving through the terminal gates during the peak daytime shift between 8:00 a.m. and 5:00 p.m. on Mondays through Fridays. The original fee for the program was $40 per 20-foot equivalent unit (TEU), or $80 for the typical 40-foot container, it has been recently raised to $50 and $100. There is no fee for empty containers, chassis (a container trailer with no cargo container attached), or bobtails (a tractor, truck cab, without a trailer attached) moving through the gates at the Port. There is also no fee for containers that utilize the Alameda Corridor (a 20-mile roadway connecting the Ports of LA and LB to downtown Los Angeles) and already pay the Alameda Corridor Transportation Authority (ACTA) fee. The traffic mitigation fee is collected for all containers, and then refunded to those using the off-peak hours. The beneficial cargo owners (shippers, consignees, or their agents) are responsible for payment of the fee. Neither the trucking community nor the water carriers is assessed a fee under this program. The fees collected are used to cover the estimated $160 million annual cost of keeping the terminals open at night. The initial goal of the program was to shift 25 to 30 percent of the daily volume to off-peak periods.

PierPass is a special-purpose entity created by the marine terminal operators in the Ports of Los Angeles and Long Beach. PierPass is a nonprofit organization that will collect the fees and disburse them to the marine terminal operators within the Port. PierPass intends to sunset the fee after 2 or 3 years when 40 percent of the commerce through the Ports is expected to shift to nighttime operations. PierPass will be subject to an external audit, the results of which will be published for the trade community.

PierPass was initiated in large part as a response to proposed state legislation (California General Assembly Bill 2041) that included a “peak-hour surcharge” to cover the costs of extended terminal hours and infrastructure costs on nearby highways. Unlike the PierPass Off-Peak program, the program proposed by this bill would not have been managed by the Port, the terminal operators, or the shipper community.

**Change in Port Gate Traffic**

The Off-Peak program has been widely adopted by the shipper community. On its first day of operations, more than 1,000 port users registered for the program and over 7,500 containers were shipped during nighttime rather than daytime operations. On a typical day, more than 10,000 trucks use the new Off-Peak shifts. On January 6, 2006, PierPass announced that more than 1 million truck trips had been diverted from peak daytime traffic since the start of the Off-Peak program. And by May 2007, it was announced that the Off-Peak program had
diverted more than 5 million truck trips from peak daytime traffic since the program’s start in July 2005.\textsuperscript{12}

The PierPass Off-Peak program has resulted in a substantial shift in port-related truck traffic. At the Port of Long Beach (according to traffic engineering staff at the Port), the percentage of port traffic that operated during daytime hours (8:00 a.m. to 6:00 p.m.) decreased from 90 percent before the Off-Peak program to 66 percent after the Off-Peak program (Table 2.1). Most of the shift in truck traffic occurred in trucks using nighttime operations rather than shifting to weekend operations. The nighttime weekday percent of truck traffic increased from 2 percent to 24 percent, while the percent of truck traffic on the weekends increased only slightly (7 percent to 10 percent). This shift to nighttime operations at the Port has held fairly constant over the life of the program. During the first week after the program began, daytime traffic dropped to 65 percent of total gate moves and held steady at between 63 percent and 66 percent of total gate moves through the middle of September 2005. As shown in Table 2.1, this percentage has held steady throughout the first 6 months of the program.

Table 2.1  Port of Long Beach Truck Traffic by Time Period

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Daytime Weekday Truck Traffic</th>
<th>Nighttime Weekday Truck Traffic</th>
<th>Weekend Truck Traffic</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – January 1, 2005 to</td>
<td>90%</td>
<td>3%</td>
<td>7%</td>
<td>100%</td>
</tr>
<tr>
<td>July 23, 2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 – July 24, 2005 to</td>
<td>66%</td>
<td>24%</td>
<td>10%</td>
<td>100%</td>
</tr>
<tr>
<td>December 31, 2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Port of Long Beach Transportation Planning.

Note: Excludes data for Matson/Pier A Port of Long Beach with service to Hawaii.

The Off-Peak program is well ahead of its targets. When launched, PierPass set its goal to shift 15 percent to 20 percent of all cargo movement to Off-Peak shifts by the end of the first full year of operation, and 30 percent to 35 percent by the end of the second year. The Off-Peak program reported it reached its two-year goal in just two months.

Change in I-710 Traffic

Changes in truck traffic at the port gates impact truck activity on the I-710 freeway. Data from a California Department of Transportation (Caltrans) classification count station on I-710 at the Pacific Coast Highway were used to estimate the change in truck activity resulting from the Off-Peak program. Data

were compared for the first two weeks in May 2005 with the first two full weeks in February 2006. Table 2.2 shows the distribution of truck trips by time period for each of these two months. Most notable in this data summary is the noticeable increase in the amount of truck traffic in the late night period (7:00 p.m. to 6:00 a.m.). In the northbound direction, the percent trucks in nighttime traffic increased from 16.7 percent to 27 percent. In the southbound direction, the percent of trucks in nighttime increased from 17.4 percent to 28 percent. Slight decreases in truck traffic are evident during both the morning commute peak period (6:00 a.m. to 9:00 a.m.) in the southbound direction, and in the evening commute peak period (3:00 p.m. to 7:00 p.m.) in the northbound direction. Midday truck traffic has decreased substantially in both directions.

### Table 2.2  I-710 Distribution of Class 9 to 14 Trucks by Time Period

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Northbound</th>
<th>Southbound</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 2005</td>
<td>February 2006</td>
<td>May 2005</td>
</tr>
<tr>
<td>6 a.m. – 9 a.m.</td>
<td>15.2%</td>
<td>12.0%</td>
</tr>
<tr>
<td>9 a.m. – 3 p.m.</td>
<td>51.4%</td>
<td>44.8%</td>
</tr>
<tr>
<td>3 p.m. – 7 p.m.</td>
<td>16.7%</td>
<td>16.0%</td>
</tr>
<tr>
<td>7 p.m. – 6 a.m.</td>
<td>16.7%</td>
<td>27.0%</td>
</tr>
<tr>
<td>Total</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
<tr>
<td>8 a.m. – 6 p.m.</td>
<td>72.9%</td>
<td>63.8%</td>
</tr>
<tr>
<td>6 p.m. – 8 a.m.</td>
<td>27.1%</td>
<td>36.2%</td>
</tr>
<tr>
<td>Total</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Source: Caltrans.

The data also indicate that there has been a slight increase in the amount of trucks during the weekend time periods. Table 2.3 shows that the number of trucks on Saturday and Sunday increased from 60,744 trucks to 63,142 trucks from May 2005 to February 2006 on I-710. This is a 3.8 percent increase compared to a 1.9 percent increase in the total volume of trucks Class 9 to 14 on the weekdays during the same time period.

### Table 2.3  I-710 Weekend Trucks

<table>
<thead>
<tr>
<th>Month</th>
<th>SB</th>
<th>NB</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 2005</td>
<td>29,579</td>
<td>31,165</td>
<td>60,744</td>
</tr>
<tr>
<td>February 2006</td>
<td>32,961</td>
<td>30,181</td>
<td>63,142</td>
</tr>
</tbody>
</table>

Source: Caltrans.

Tables 2.4 and 2.5 show the hourly distribution of trucks within the full daytime period of 6:00 a.m. to 8:00 p.m., along with the change in the percentage of truck traffic by period. The third column in these tables reflects the effective
percentage change in truck traffic for that hour, adjusting for overall growth in truck traffic. Both of these tables show fairly significant reductions in hourly truck volumes for the morning commute peak, midday, and the early part of the evening commute peak. However, the tables also show that for some hours of the evening commute peak, particularly in the northbound direction, traffic has actually increased, suggesting a preference by shippers for extending their pickup and deliveries at the Port into the early part of the Off-Peak period. Potentially, appointment systems could be used to smooth this trend and realize even greater congestion reduction benefits from the Off-Peak program. Under this type of program truckers would have to set up a pick-up/drop-off timeslot ahead of time (by Internet or by phone); this would allow the port to cap the number of transactions in a particular hour to avoid peak times in lieu of smoother operations throughout the off-peak hours. However, at this time no such appointment system is contemplated.

Table 2.4 I-710 Hourly Change in Class 9-14 Truck Traffic (Southbound)

<table>
<thead>
<tr>
<th>Hour</th>
<th>May 2005</th>
<th>February 2006</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 a.m.</td>
<td>3.5%</td>
<td>2.6%</td>
<td>-26.3%</td>
</tr>
<tr>
<td>7 a.m.</td>
<td>4.5%</td>
<td>3.5%</td>
<td>-20.6%</td>
</tr>
<tr>
<td>8 a.m.</td>
<td>7.2%</td>
<td>6.1%</td>
<td>-15.6%</td>
</tr>
<tr>
<td>9 a.m.</td>
<td>10.3%</td>
<td>8.0%</td>
<td>-22.0%</td>
</tr>
<tr>
<td>10 a.m.</td>
<td>9.8%</td>
<td>8.1%</td>
<td>-17.2%</td>
</tr>
<tr>
<td>11 a.m.</td>
<td>9.7%</td>
<td>8.5%</td>
<td>-12.1%</td>
</tr>
<tr>
<td>12 p.m.</td>
<td>7.0%</td>
<td>6.3%</td>
<td>-10.0%</td>
</tr>
<tr>
<td>1 p.m.</td>
<td>6.5%</td>
<td>6.4%</td>
<td>-1.3%</td>
</tr>
<tr>
<td>2 p.m.</td>
<td>8.0%</td>
<td>7.3%</td>
<td>-7.8%</td>
</tr>
<tr>
<td>3 p.m.</td>
<td>6.2%</td>
<td>5.7%</td>
<td>-7.9%</td>
</tr>
<tr>
<td>4 p.m.</td>
<td>5.1%</td>
<td>4.6%</td>
<td>-9.9%</td>
</tr>
<tr>
<td>5 p.m.</td>
<td>3.1%</td>
<td>2.7%</td>
<td>-13.9%</td>
</tr>
<tr>
<td>6 p.m.</td>
<td>2.4%</td>
<td>3.1%</td>
<td>28.1%</td>
</tr>
<tr>
<td>7 p.m.</td>
<td>2.1%</td>
<td>4.2%</td>
<td>97.3%</td>
</tr>
<tr>
<td>Total</td>
<td>85.4%</td>
<td>77.2%</td>
<td>-8.2%</td>
</tr>
</tbody>
</table>

Source: Caltrans.
Table 2.5  I-710 Hourly Change in Class 9-14 Truck Traffic (Northbound)

<table>
<thead>
<tr>
<th>Hour</th>
<th>May 2005</th>
<th>February 2006</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 a.m.</td>
<td>3.4%</td>
<td>2.8%</td>
<td>-17.1%</td>
</tr>
<tr>
<td>7 a.m.</td>
<td>4.2%</td>
<td>3.8%</td>
<td>-10.8%</td>
</tr>
<tr>
<td>8 a.m.</td>
<td>4.6%</td>
<td>5.4%</td>
<td>17.4%</td>
</tr>
<tr>
<td>9 a.m.</td>
<td>7.2%</td>
<td>7.2%</td>
<td>0.1%</td>
</tr>
<tr>
<td>10 a.m.</td>
<td>9.1%</td>
<td>8.1%</td>
<td>-10.6%</td>
</tr>
<tr>
<td>11 a.m.</td>
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<td>12 p.m.</td>
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<td>3 p.m.</td>
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<td>5 p.m.</td>
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<td>Total</td>
<td>85.0%</td>
<td>75.2%</td>
<td>-9.8%</td>
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Source: Caltrans.

Operational Impacts

Information on the operational impacts of the Off-Peak program has come from numerous sources. The Off-Peak program has been credited with more smoothly flowing shipments through the Ports during the peak autumn shipping period. This allowed retailers to keep their shelves well-stocked during the critical holiday shopping season. Prior to the introduction of Off-Peak, a surge of imports created bottlenecks at the port complex just before Christmas in 2004. This led some importers to threaten to bypass the Ports and take their business elsewhere if the situation failed to improve. At the height of the 2005 season for containerized goods arriving from Asia, the Port of Long Beach was not experiencing any significant congestion, according to Don Snyder, Director of Trade and Maritime Services.

Bruce Wargo, General Manager of PierPass, believes that the PierPass program is popular with low-margin exporters such as those that ship wastepaper, and with high-volume importers who own distribution centers that already stay open at night.

In a PierPass survey in September 2005, 73 percent of truck drivers serving importers and exporters said they have experienced an improvement in traffic since the program’s launch and 58 percent reported being able to accommodate more cargo trips. However, according to the same survey, many drivers
reported that shorter waiting times at the port had not materialized. It is suspected that much of this has to do with staffing issues during the Off-Peak shifts.

The costs of the Off-Peak program are slowly making their way through the cargo supply chain. According to the Fracht web site, a logistics company based in Australia, the extra costs of the PierPass Traffic Mitigation Fee have affected Less-than-Container-Load (LCL) rates from the United States to Australia in the form of a U.S. $3.00 PierPass Fee per shipment. Another company, TNT Freight Management, has set up a line of credit for the Off-Peak program by advancing charges for additional administration, plus the monitoring of clearance. The cost associated with performing these functions is $25.00 per Full Container Load (FCL). These charges are passed on to the account of the paying party.

Community Reactions

Before the beginning of the Off-Peak program, PierPass reached out to community stakeholders to explain the program and its expected changes to traffic patterns and air quality. The outreach team made presentations to Los Angeles and Long Beach City Council members, the I-710 Freeway Oversight Committee, the San Pedro Chamber of Commerce, the Harbor City/Harbor Gateway Chamber of Commerce, the Coolidge Triangle Neighborhood Association, the DeForest Park Neighborhood Association, and many others. Also, because PierPass is a first-of-its-kind program, it was widely advertised both before and during its implementation. Reactions to these presentations and publicity around the region have generally been positive.

One neighborhood group has vocally opposed the shift to nighttime operations. In a letter to the Long Beach (LB) Harbor Commission, PierPass executives and locally elected officials, amplified by a press release and a newly launched web site (www.polb.org, “People of Long Beach”), North Long Beach’s Coolidge Triangle neighborhood insisted that the Ports of Long Beach and Los Angeles stop the PierPass Off-Peak program until an Environmental Impact Report is prepared and circulated to impacted communities and health and noise impacts are mitigated. The neighborhood group noted that while nighttime operations would reduce congestion, the forecasted increase in Port of Long Beach traffic would mean that the number of trucks during the daytime would still increase. Therefore, the residents of the neighborhood would still have to fight truck traffic during the day, and they would be exposed to significantly increased air pollution and noise during nighttime operations.

Another issue, which although not currently being raised by neighborhood groups has been noted in public meetings, is the longer-term potential for nighttime traffic to increase to unacceptable levels as overall port traffic grows. Cambridge Systematics recently completed a study funded by the Ports of Long Beach and Los Angeles to look at various options for truck trip reductions at the ports. One of the investigated strategies involved an extended gate hour
program with a shift distribution similar to the current shift distribution under the Off-Peak program.

There also are trucking interests that do not have favorable impressions of the Off-Peak program. The Teamsters are opposed to the fee based on their belief that it will further squeeze revenues available for paying truck drivers, thereby causing their real incomes to fall. They are concerned that the truckers will get even more hours of work and less pay for the extra hours. Another concern is that the truckers will have to be available at the whim of the steamship lines and trucking company dispatchers to work any and all hours of the night or day and weekends. Some in the trucking industry believe that unlike other unionized port workers, truckers (who generally are not unionized at the ports) will not receive shift premiums or overtime pay for extended and off-peak hours of work.

2.3 LONDON CONGESTION PRICING

Background

Since February 17, 2003 motorists driving in central London on weekdays between 7:00 a.m. and 6:30 p.m. were required to pay £5 (approximately U.S. $10); this fee increased to £8 (U.S. $16) in July 2005. This fee is applied equally to passenger vehicles and trucks. There are some exemptions, including motorcycles, licensed taxis, vehicles used by disabled people, some alternative fuel vehicles, buses, and emergency vehicles. Area residents receive a 90 percent discount for their vehicles. The charging area is indicated by roadside signs and symbols painted on the roadway.13 Payments can be made at selected retail outlets, payment machines located in the area, by Internet and cellular telephone messaging, any time during that day. Motorists can purchase weekly, monthly, and annual passes with modest (15 percent) discounts. A network of video cameras records the license plate numbers of vehicles and matches it with the paid list. The owners of vehicles that have not paid as required are sent a $160 fine. This fine is reduced to $80 if paid within two weeks, and increases to $240 if not paid after a month – the same policy for parking penalties in the inner London area.14

Impact on Traffic

Just over a million people enter central London during a typical weekday morning peak (7:00 – 10:00 a.m.). Over 85 percent of these trips are by public transport. Prior to the congestion pricing program about 12 percent of peak-

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14 Ibid.
period trips were by private automobile. During the program’s first year traffic entering the charge zone decreased by 14 percent, a reduction of approximately 54,000 vehicles per day (including personal and commercial vehicles).

A large portion of people who changed their travel patterns as a direct result of the new pricing scheme switched to public transportation to enter the City, particularly bus. Others changed their travel time or route in response to the charge, particularly those who drove through the City’s streets to get to their destination, while a minority shifted mode to taxis, motorcycles, bicycles, or to walking.

As a result traffic speeds in the charge zone have increased considerably. Average traffic speed during charging days (including time stopped at intersections) increased 37 percent, from 8 miles per hour prior to the charge up to 11 miles per hour after pricing was introduced. Peak period congestion delays declined about 30 percent, and bus congestion delays declined 50 percent. Bus ridership increased 14 percent and subway ridership about 1 percent.

**Impact on Truck Traffic**

While the primary focus of this program was to reduce passenger vehicle traffic entering and traversing the City’s streets, the program has also experienced success in deterring truckers from traveling to and within the charge zone. The impact was felt primarily during the program’s first two years (2003 and 2004); however truck traffic started to pick up in the subsequent two years (2005 and 2006) due to natural economic growth. During the first year of operation truck traffic entering the charge zone decreased by 11 percent followed by a 5 percent decrease on the second year, a 4 percent decrease on the third, and an increase of 6 percent from 2005 to 2006. Truck-miles traveled within the charge zone decreased the first two years by 8 percent and 7 percent, however miles increased in 2005 with an 8 percent increase followed by a 2 percent increase the following year. By 2006 the volume of trucks entering the region had decreased by 13 percent (roughly 2,000 trucks annually) since the program’s inception, and the number of truck-miles traveled has experienced a net decrease of approximately 7 percent (3,000 truck-miles annually).

The recent increase in truck VMT is likely the result of economic growth, the natural growth in demand for freight goods, and/or an increase in productivity by the freight carriers. As Table 2.6 shows, trucks entering the region decreased by 13 percent while the miles covered by trucks decreased by half that amount.

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15Ibid.


17Ibid.
7 percent. This suggests that fewer trucks are on the road and those trucks are making more stops along their routes into the City, indicating that the carriers have found a way to make their truck trips more efficient. In summary, the decrease in truck traffic is apparent at entry points and within the zone.

### Table 2.6 Impact of Congestion Pricing Program on Truck Traffic

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<tr>
<td>Trucks Entering the Charge Zone</td>
<td>-11%</td>
<td>-5%</td>
<td>-4%</td>
<td>6%</td>
<td>-13%</td>
</tr>
<tr>
<td>Truck-Miles within the Charge Zone</td>
<td>-7%</td>
<td>-8%</td>
<td>8%</td>
<td>2%</td>
<td>-7%</td>
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Source: Transport for London.

This apparent increase in productivity coupled with the natural growth in freight demand (from increases in population and demand for goods purchased over the Internet) could potentially nullify the benefits reaped during the initial years of the project. More time and data is needed to analyze how truckers will adapt in the coming years and fully evaluate the impact of this program on the commercial sector.

### 2.4 PANYNJ’s 2001 Value Pricing Initiative in New York City

In March 2001 the Port Authority of New York and New Jersey (PANYNJ) introduced a time of day pricing initiative throughout its six facilities which bring traffic into New York City (the George Washington Bridge, Lincoln Tunnel, Holland Tunnel, Bayonne Bridge, Goethals Bridge, and Outerbridge Crossing). These facilities are depicted in Figure 2.1. The program was aimed to help finance the PANYNJ’s capital budget and to reduce inbound traffic during the peak hours of the day (6:00 – 9:00 a.m. and 4:00 – 7:00 p.m. on weekdays).

The discounts were made available only to E-ZPass customers traveling during off-peak hours. As shown in Table 2.7, passenger car customers would save $1.00 for shifting to the off-peak hours, while truckers would save $1.00 per axle, and $2.50 if they moved to overnight hours.

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When the program was introduced, toll rates also were increased, which led to some confusion for the public. In fact, only 25 percent of surveyed commercial vehicle drivers understood the time-of-day discounts that were available to them through E-ZPass. The lack of understanding coupled with the small cost savings was not effective for changing users’ behaviors. Furthermore, over 60 percent of
the carriers said that they did not have the flexibility to change their schedule to the off-peak hours because the customer would not allow it. Fifteen percent mentioned that the cost from the tolls was passed on to the customers.

Approximately 20 percent of respondents indicated that they changed their operations due to the toll increase/congestion pricing. Out of this group, a small portion (14 percent, representing 2.8 percent of the total sample) stopped using the facilities altogether given the increase in toll rates and other costs of doing business in New York City. Some of the specified operational changes included: switching to E-ZPass or increasing its use, increasing shipping charges to customers in order to offset the toll, and adjusting the delivery route. Approximately 6.2 percent of carriers decreased their usage of the facilities, and a very small portion (0.5 percent) switched to the off-peak hours. Finally, as was the case with the London example, a large portion of the users that decreased their use of the PANYNJ facilities reported making productivity adjustments to deal with the new price. These adjustments included longer travel times during a trip, more stops, and increased shipment size.

In summary, most users did not just change one aspect of their operation to deal with pricing, but rather used a combination of modifications including productivity increases, change in facility usage, and cost transfers. It is important to note that none of the carriers that changed behavior did so by simply decreasing usage of the facility or shifting to off-peak hours. Instead this behavior was combined with productivity increases to offset the costs. The research suggests that 42.79 percent of the strategies affected only the carriers, 32.66 percent of the strategies primarily impacted the receivers, while the remaining 24.55 percent of the strategies involved both parties.

2.5 TAPPAN ZEE BRIDGE 1997 VARIABLE PRICING INITIATIVE FOR COMMERCIAL VEHICLES

The information for this case study is based on the findings of a financial audit conducted by State of New York’s Office of the State Comptroller, Division of Management Audit and State Financial Services. The study aimed to evaluate the economic and operational impact of the 1997 Congestion Relief Initiative.19

The Tappan Zee Corridor is the 15-mile section of the New York State Thruway between Suffern in Rockland County and Elmsford in Westchester County which includes the Tappan Zee Bridge (see Figure 2.2). The Corridor is the most heavily traveled section on the Thruway, carrying as many as 125,000 vehicles per day. One-way peak traffic on the Bridge can be more than 7,000 vehicles per hour during workday morning commuting hours. An extension in 1993 of I-287, 19 New York State Thruway Authority’s Tappan Zee Corridor Congestion Relief Initiative. Report 98-S-58. http://www.osc.state.ny.us/audits/audits/9899/98s58.pdf.
which now serves as a beltway around New York City for East Coast travelers, led to an increase in traffic—especially commercial traffic—and contributed to the overall traffic congestion in the Corridor. In fact, from 1993 to 1996 total commercial traffic at the Bridge Toll Plaza increased by 70 percent.

Figure 2.2  Map of Tappan Zee Corridor and Tappan Zee Bridge

Source: Governor’s I-287 Task Force—Long-Term Needs Assessment and Alternatives Analysis for the I-287 Tappan Zee Bridge Corridor.

The Spring Valley Toll Barrier (Barrier) is located nine miles northwest of the Bridge. Rockland County residents had complained for years about paying Barrier tolls; area residents use the Thruway as a local highway because there are few alternative routes that allow quick access across the county. Prior to July 15, 1997, Barrier tolls (collected from both northbound and southbound travelers) were 40 cents for passenger vehicles, and from 50 cents to $1.50, depending on vehicle class, for commercial vehicles. Residents also complained about increased traffic, which affects quality of life, air pollution, noise, and safety issues in the Corridor. In calendar year 1996, 27 million vehicles, including 24 million passenger vehicles, crossed this facility. To address the congestion and
other traffic-related issues, the Authority’s Board of Directors approved the Tappan Zee Corridor Congestion Relief Initiative (Initiative), which was implemented on July 15, 1997. The Initiative resulted in closing the Barrier as a toll station for all but northbound commercial traffic, and in raising Bridge and Barrier tolls for certain vehicles and for certain travel times. A major goal of the Initiative was to decrease Corridor congestion, particularly at the Barrier, and thus reduce noise, air pollution, and safety concerns. The Initiative was also intended to discourage commercial traffic on the Bridge, especially during peak periods.

- **Removal of the Southbound Barrier** - All southbound traffic maintains travel at highway speed. Toll charges are eliminated for all passenger and commercial southbound traffic.

- **Conversion of the Northbound Barrier** - Only northbound commercial vehicles are required to stop and pay a toll at the Barrier. Since there is no longer a southbound toll, the northbound toll is doubled so that commercial vehicles pay the equivalent of a round trip toll. Thus, during off-peak hours, E-ZPass customers pay $1.00 to $3.00 (double the prior commercial rate); cash and charge-card customers pay double the E-ZPass rate ($2.00 to $6.00) at all times.

- **Increase of Bridge Tolls** - Tolls continue to be collected from southbound traffic only. As at the Barrier, the prior commercial Bridge toll ($3.75 to $10.00) is now the E-ZPass commercial rate; cash and charge-card commercial customers pay double the E-ZPass rate ($7.50 to $20.00) at all times. The noncommuting passenger vehicle toll increased from $2.50 to $3.00 per trip. The E-ZPass carpool and commuter rates (50 cents and $1.00, respectively) did not change.

- **Congestion/Incentive Pricing for Commercial Vehicles** - During the busiest peak times at the Bridge (between 7:00 a.m. and 9:00 a.m.) and the Barrier (between 4:00 p.m. and 6:00 p.m.), E-ZPass commercial customers pay double the standard E-ZPass rate. The higher rates decrease to standard E-ZPass rates during the hour before and the hour after the busiest peak times.

To summarize, commercial vehicles using cash or charge cards pay twice the E-ZPass rate 24 hours a day, while those using E-ZPass pay higher rates only during rush hours. Congestion/Incentive pricing is intended to encourage truckers to convert to E-ZPass (Authority traffic data shows that E-ZPass traffic lanes move faster), and to discourage them from traveling during peak hours.

As a result of the initiative, commercial traffic on the Bridge during this period decreased by 8.2 percent, dropping from 1.47 million recorded trips in the Pre-Initiative year to 1.35 million recorded trips in the Post-Initiative year (see Figure 2.3; note that these figures represent one-way traffic only since toll is only charge in one direction). These results were significant for the first year; however, as shown in Figure 2.3, traffic volumes quickly rebounded to pre-initiative volumes in 1999, and continued increasing for the next five years.
Furthermore, passenger car volumes increased from the pre to the post initiative period by over 200,000 (compared to the truck decrease of 120,000); whether or not these are related is not known, but the net impact of the initiative was nearly insignificant.

**Figure 2.3  Truck Traffic at the Tappan Zee Bridge before and after Variable Pricing Implementation**


Note: Data for 1995-1998 was provided for one-way traffic only while the remaining data is for two-way traffic. In order to graph these together, the traffic volumes from 1995-1998 were multiplied by two. While this is not 100 percent accurate, the graph still shows the general trend with increasing truck traffic volumes after 1998, and a slight decrease after the implementation of the initiative in 1997.

One of the main goals of the Initiative was to discourage commercial traffic in the Corridor during peak travel periods. However, data maintained by the Thruway Authority reveals that commercial traffic volume at the Bridge during the morning peak period actually increased after the implementation. The results are based on a comparison of a six-month period prior to the Initiative (January 1, 1997 through June 30, 1997) to that of the same period in the subsequent year (January 1, 1998 through June 30, 1998).

It was found that, while overall commercial traffic did decrease, the percentage of commercial vehicles that cross the Bridge during peak hours actually increased slightly. In the period before the Initiative, 18 percent of the 773,000 commercial vehicles that crossed the Bridge did so during the four-hour peak period (6:00 a.m. to 10:00 a.m.); in the period after, 20 percent of 712,000 commercial vehicles crossed the Bridge during the peak hours.
To determine whether this pattern was continuing at the Bridge, the study by the Comptroller’s Office also compared peak-hour commercial traffic volume during the first three months of the Initiative (July 1, 1997 through September 30, 1997) to the same three-month period in 1998. It was found that commercial traffic had increased by 1 percent (3,000 trips) overall, but by 8 percent (5,000 vehicles) during the four-hour peak period. These statistics indicate that commercial peak-hour volume is not decreasing.

The study indicated that among the reasons commercial traffic on the Bridge has not declined as expected are that commercial truckers may not have enough incentive, or enough schedule flexibility, to change their travel times to avoid peak hours, or to change their travel patterns to use other routes. In addition, truckers who continue to pay by cash, or who cross the Bridge during peak hours, may not know about congestion pricing. In fact, an Authority survey conducted in November 1997 and another survey done in the summer of 1998 showed that many commercial truckers were still unaware of the congestion pricing policy.

2.6 Lessons Learned from Case Studies

The case studies presented here provide several important lessons for any future off-peak delivery program. In particular, it seems clear that tolls are not likely to have a significant impact on the time of operations for truckers. The reasons for this are that current programs may not provide enough incentive for truckers to shift, truckers do not have enough schedule flexibility to change their travel times to avoid peak hours (receivers tend to control delivery times), and in general truckers do not have the flexibility or incentive to change their travel patterns to use other routes. The following key points can be drawn from these cases:

- Truck tolls of even $20 (Tappan Zee Bridge) or $6 per axle (PANYNJ) do not have a significant impact on truckers’ operations in New York. The main reaction from truckers to these initiatives was to switch to or increase the use of E-ZPass at the toll facilities. While the price increase did cause a significant decrease in traffic at the Tappan Zee Bridge in the first year, truck volumes quickly bounced back and continued increasing in the subsequent years. Similar results were experienced with the PANYNJ’s Initiative.

- The London Program did manage to reduce truck traffic entering the region by 13 percent since its inception, however truck miles traveled within the region decreased by only half that amount (7 percent). These numbers agree with the findings from the PANYNJ survey, which indicated that some truckers deal with toll increases by increasing productivity (e.g., increasing payload and the number of stops on their trip).

- Freight carriers seem to be interested in the idea of doing business during the off-peak hours; however they are constrained by the demands of their
customers, the receivers. The receivers, generally, are constrained from doing business during the off-peak because of the cost and inconvenience of having their business open to receive deliveries during that time.

- Programs that provide incentives for carriers and receivers/shippers such as the PierPass Off-Peak program have the potential to achieve greater success than programs targeting just the shippers. This program provided financial incentives to shippers for doing business during the nighttime period ($40 per TEU, $80 for the typical container) as well as the potential for time savings for the truckers (both on the highways and at the port).

- Outreach is very important for these programs to be successful. Even though it is an extraordinary situation, the success in the reduction of peak-hour traffic during Atlanta’s Olympic Games is based almost solely on the outreach program conducted prior to the event. On the other hand, a large portion of truckers surveyed after the Tappan Zee and the PANYNJ initiatives were not aware that congestion pricing programs were in place, limiting the possible impacts.
3.0 Application to New York City

The case studies covered in Section 2.0 talk about different situations in which off-peak delivery programs were implemented or researched in public and private environments. This section discusses how the findings from these case studies apply to New York City conditions today. A snapshot of the local trucking environment is provided along with findings from research investigating alternative nighttime delivery policies and incentives in New York City. Section 3.2 also covers several implications that need to be considered when discussing off-peak delivery programs for New York City.

3.1 Trucking Environment and Regulations in New York City

New York City regulations define a truck as any vehicle or combination of vehicles designed for the transportation of property, which has either of the following characteristics: two axles with six tires, or three or more axles. The City has numerous regulations that restrict local and through trucks to designated truck routes, and limit the sections where they may enter, stop, stand, or park.

Through trucks are limited to a handful of roadways, and may not use some of the main arteries such as 34th Street between the Queens Midtown Tunnel and Dyer Avenue during times of the day with heavy traffic (11:00 a.m. and 6:00 p.m.). Local truckers must always carry a bill of lading, or similar document, showing the points of origin and destination of the trip and are required to stay within the designated truck routes. For deliveries outside the truck routes, operators must leave a designated truck route at the intersection that is nearest to his or her destination, proceed by the most direct route, and then return to the nearest designated truck route using the most direct route.

Several zones within Manhattan have stricter restrictions on truck traffic. Chelsea, Chinatown, Greenwich Village, Little Italy, Lower East Village, and the Garment District have special considerations limiting the access of trucks with the purpose of making deliveries or pick-ups in those zones, and limits them to designated roads. The Financial District and the Midtown Core (from 7th Avenue and 42nd Street to 3rd Avenue and 59th Street) prohibit trucks longer than 33 feet. See Figure 3.1 below for the designated truck routes (in blue) and the limited truck zones.

These regulations, coupled with the volume of traffic in Manhattan and many of the narrow streets in the central business district, limit the truck traffic in that region to primarily medium to small delivery trucks.
Figure 3.1  Designated Truck Routes in Manhattan

Source: New York City Department of Transportation.
3.2 **NIGHT-TIME DELIVERIES IMPLICATIONS FOR NEW YORK CITY**

Several implications need to be considered when discussing programs for off-peak deliveries in New York City. While such a program might be successful at shifting truck traffic to the off-peak, it could in turn generate negative impacts that might negate the benefits. These may include night-time traffic and noise, increase in goods prices in the City, and increased congestion during the beginning of the off-peak hours. This section briefly discusses these issues and how they might affect Manhattan.

- **Do we really want deliveries during the night-time?**
  
  The noise and truck traffic associated with night-time deliveries would likely be unwelcomed by Manhattan residents. Consider the case of perishables (such as fruits and vegetables) being transported from the Hunts Point Food Distribution Center in the Bronx to different sectors throughout Manhattan. Deliveries usually originate during the early morning (6 AM) and recur several times throughout the day. A complete shift to the off-peak would likely imply truck deliveries as early as 2 AM to supermarkets and other grocery retailers in Manhattan. Deliveries at this time would be required in order for trucks to make 5-6 stops and be out of Manhattan before the start of the peak hour (6 AM). The first delivery would take place at around 2 AM and the last somewhere around 5-6 in the morning.

  An environmental study would need to be conducted to get a clear idea of the noise levels that such traffic would generate, but given the volume of business being conducted out of this location (the Bronx Terminal Market generates over $1.5 billion in revenue annually, more than any other terminal market in the world)\(^\text{20}\) it would stand to reason that it would be very significant. This is just one example of how such a policy/program would impact deliveries into Manhattan.

- **If total buy-in to an off-peak program is not achieved, the result might be more truck traffic than before.**

  One key factor that needs to be considered is the level of buy-in from receivers for an off-peak delivery program. Consider for example the case of a truck delivering goods to five restaurants in Manhattan. Assume that given a number of financial incentives, three of these restaurants opt to start accepting deliveries during the night-time, but the other two decide against it. As a result that truck will likely go into Manhattan during the day-time to make two deliveries, and then come back at night to make the remaining

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\(^{20}\) New York City Terminal Produce Co-Operative Market.  
http://www.terminalmarkets.com/huntspoint.htm
three, in the end creating more traffic and congestion than with no program at all. In the long-run the market may reorganize itself so that individual truckers only do deliveries during the daytime or night-time but there is no guarantee of this, and in the meantime the results might be the opposite of the program’s goal.

- **Economic impact would reverberate throughout the City.**

  If a policy is implemented in Manhattan that would force carriers to make deliveries during the off-peak hours (6PM – 6AM), the Borough’s residents might stand to lose more with rising costs at their local store than they gain through decreased congestion. The cost of doing business during the night-time would likely be felt be the city’s residents when they go to the corner store, the supermarket, the pharmacy and other local stores throughout their neighborhood.

  Consider that a trucker doing business during the off-peak hours might charge extra higher rate per hour than during the daytime. This cost is likely to be passed on to the receiver(s), who likely will pass it on to the consumers. The extent of the increase is hard to measure, but the cost of living in Manhattan would increase at some level as a direct impact of this policy.

- **Trucks might line up outside of the City’s borders to wait for 6PM.**

  An overnight delivery program (especially a ban on peak hour deliveries) has the potential to create a chokepoint at the toll booths during the change from peak to off-peak hours. Truckers waiting to make deliveries right after 6PM are likely to wait in an area close to the toll booths. Rest areas and truck stops are already over capacity and no designated waiting areas are available. This lack of space might translate into truckers waiting alongside the highway, exacerbating congestion problems at that time. This also would pose a serious safety issue.

  A similar situation takes place at the ports in New Jersey, on the New York harbor. Overnight trucks traveling to the ports have to wait until the gates open. Given the lack of rest area parking, the trucks tend to wait in roadways around the region. There are studies underway to address this issue by three metropolitan planning organizations (MPOs) in the region: the New York Metropolitan Transportation Council (NYMTC), the North Jersey Transportation Planning Authority (NJTPA), and the South Western Regional Planning Agency (SWRPA).

- **A program could be conceived to ban only the larger trucks from entering Manhattan during the daytime.**

  Banning only large trucks during the daytime would likely mean that several carriers would shift to smaller trucks and still deliver during the day (given the receivers’ demands). This would result in increased congestion given the added number of vehicles, especially at the toll booths where more transactions would need to be processed.
These issues need to be taken into account when considering an off-peak delivery program for Manhattan. They highlight the complexity of truck delivery patterns and their supply chain. These factors are not included here to advocate against any such program, but rather as key information that should be used to elaborate any successful program or policy of this type. The following subsections discuss the findings of the case studies and how their lessons can apply to New York City conditions today.

3.3 Atlanta – 1996 Olympics Games Case Study

This is an extraordinary case in which stakeholders were expecting the City to be suddenly and temporarily flooded with traffic from people attending the Olympic Games in addition to the freight traffic associated with running this event. As a result it is hard to extrapolate the results from a two-week outreach program to a full-time off-peak delivery initiative. Nonetheless, it is very interesting to note that carriers were very interested in the idea of doing business either in the early morning or in the evening, as avoiding traffic would allow them to be more productive and operate more efficiently.

Off-peak deliveries are so attractive to the freight industry in the region that that the issue was raised during recent discussions surrounding Atlanta’s Freight Mobility Plan, which is currently under development. The City of Atlanta is considering the possibility of piloting such a campaign in a limited section of their jurisdiction. However, not enough information is available to understand how receivers and shippers feel about this type of program. This information would be key in assessing the feasibility and potential effectiveness of such a project.

The principal lesson learned from this program is that outreach to stakeholders is very important to the success of this type of program. Receivers and carriers must be educated to ensure they understand how the program works, the overall benefits associated with doing business in the off-peak hours, and find ways to translate these benefits into monetary savings for both sides (such as lower shipping costs due to the reduction in travel time traversing the City’s bridges and tunnels).

Clearly, it remains to be seen whether a measure implemented for a short period of time to respond to a high-profile event can be mainstreamed into normal operations.

3.4 Port of Los Angeles-Long Beach PierPass Off-Peak Program

The results from this successful program reinforce that there is interest from the freight industry in doing business during the off-peak hours. The benefits stem primarily from the amount of traffic that truckers face during the day to travel
to/from the Ports of Los Angeles and Long Beach. In this case in particular, the program has been successful due to the fact that truckers at either port would probably save a significant amount of time in going through security and picking-up or dropping off their container. As a result, not only would shippers be saving $40 for the typical 40-foot container, but also truckers would save time at the gates and on the highways, and hence boost their productivity.

However, it should be noted that a significant portion of truck traffic at the port is likely long-haul traffic as opposed to local deliveries, giving it greater flexibility in terms of schedule. This would not be the case in New York City, as truckers go in to deliver

Nonetheless, the program demonstrates that efforts to target both receivers and carriers through financial incentives (money and time) can be very successful in achieving shifts to the off-peak period. The program would likely not have been as successful if the fees were assessed to the truckers (as opposed to the shippers), or if the nighttime operations provided no additional benefit in terms of time savings for the truckers at the port and on the highways.

3.5 LONDON CONGESTION PRICING

As a result of the pricing initiative the volume of truck traffic entering the charge region decreased by 13 percent, however during the same period truck-miles traveled within the zone decreased by only 7 percent. These findings support those from the PANYNJ’s Value Pricing Initiative survey, where truckers address increases in tolls by a combination of a small decrease in facility usage combined with a small boost in productivity through higher payloads and more stops.

While the large decrease in the number of trucks would result in lower congestion at the entry roads for the region, (in New York City this might be the bridges coming from New Jersey and Queens/Brooklyn), the increase in stops and miles covered per truck might negate some of the results inside the charging zone. Furthermore, truck regulations in Manhattan would only allow truckers to increase productivity (in terms of carrying more cargo per trip) to a certain degree. After this point is reached by most carriers, the volume of trucks entering the region will continue to increase. This is especially true in New York City were there is a very competitive market for trucking services, and the profit margins are very thin, meaning that truckers are likely already operating at or close to their maximum level of productivity.

More time is needed to fully comprehend the effect of the toll on commercial traffic in Central London. The results from this project should be followed as more data becomes available, as it could provide insight to the reaction that a similar program would have in New York City in the long run.
3.6 **PANYNJ’s Value Pricing Initiative**

The impacts of the 2001 value pricing initiative are hard to quantify for several reasons. Firstly, the tragic events of September 11, 2001 occurred six months after the program went into effect, and completely changed traffic in and around New York City for a significant period of time. In fact, it took over three years for truck volumes at the PANYNJ facilities to bounce back to 2001 levels (about 16.5 million trucks per year) and they have yet to reach 2000 volumes (over 17 million). Secondly, toll rates were increased for both the peak and off-peak periods at the same time that the pricing program was introduced. Lastly, a significant number of truckers in the region did not know about the program.

The survey of truckers using the facilities revealed that 20 percent of truckers changed their operation as a result of the program and the toll increase. The majority of these did so by switching to E-ZPass or increasing its use, increasing shipping charges to customers in order to offset the toll, and adjusting the delivery route. Approximately 6.2 percent of carriers decreased their usage of the facilities, 2.8 percent stopped using them altogether, and a very small portion (0.5 percent) switched to the off-peak hours.

The results reveal that truckers were not very responsive to the variable pricing initiative. This is due to the fact that:

- They would only be saving $1 per axle for driving during the off-peak period and $2.50 per axle for driving during the overnight hours (which would apply mainly to through traffic).
- Only 25 percent of carriers surveyed indicated that they knew about and understood the congestion pricing initiative.
- Nearly three quarters of the respondents indicated that they have to deliver during normal business hours or whenever the customer dictates (i.e., schedule is out of their control). The study showed that the average carrier has to be at the customer location within 45 minutes (before or after) of the time stated by the receiver.

3.7 **Tappan Zee Bridge Variable Pricing Initiative**

This program, as opposed to the London and the PANYNJ’s initiative, was targeted specifically at commercial vehicle traffic in traversing the Tappan Zee Corridor. The results show that even with significant differentials in tolls between the peak and the off-peak period ($3.75 to $10.00 during off-peak versus $7.50 to $20.00 in the peak depending on truck configuration) trucks are not likely to shift their schedule to off-peak hours. While truck traffic decreased by 8 percent in the year after implementation, it quickly bounced back in the following year and continued increasing for the next five years at a high pace.
Furthermore, the results showed that even when the total truck volume decreased, the number of trucks traveling during the peak hours remained essentially the same (meaning that the decrease was mainly from trucks traveling during the off-peak).

Finally, an important lesson from this program is that the reduction in truck traffic might lead to an increase in passenger car traffic given the added capacity available (which would result in better travel times). While truck traffic decreased by 120,000 trucks in the year after implementation, passenger car traffic increased by 200,000 vehicles. No data is available to tie these two together; nonetheless it shows that the potential exists for such a problem. To avoid this type of situation, parallel programs that target both commercial and passenger traffic must be implemented together.

### 3.8 New York City Nighttime Delivery Policy Incentives Research

Recent work was completed by Dr. Holguín-Veras and colleagues from the Rensselaer Polytechnic Institute that attempts to measure the impact congestion pricing would have on trucks in the New York City region. This work focuses on understanding the nature of the relationship between carriers and receivers and testing a variety of scenarios combining tolls, tax breaks, and lower shipping costs that would encourage truckers and receivers to shift their hours of operation to off-peak times. The research included the abovementioned analysis of the 2001 Value Pricing Initiative performed under contract to the PANYNJ, and subsequent studies using data from that project and other survey instruments.

**Joint Receiver-Carrier Policies**

Stated-preference surveys were conducted to better understand the necessary conditions for carriers to shift their operations to the off-peak. The surveys did not target any particular group of crossings.

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The research produced three main findings:

1. Different industry segments exhibit different degrees of sensitivity to the various types of policies considered in the study (tax breaks, shipping charges, tolls);

2. Receivers’ willingness to accept off-peak deliveries is crucial to the success of any such initiative; and

3. The willingness of receivers to accept off-peak deliveries depends to a great extent on the marginal costs of accepting off-peak deliveries vis-à-vis the financial incentive provided by the program.

Tables 3.1 and 3.2 highlight the second and third findings. They show the percent of carriers that hypothetically would be willing to partake in off-peak deliveries given a level of toll-savings (ranging from $0 to $7) for the carriers, and either tax deductions for receivers (Table 3.1), or reductions in shipping costs for receivers (Table 3.2). Looking only at the first column of either table shows that currently 11.71 percent of carriers participate in off-peak deliveries (with $0 toll savings and no incentive for carriers). Increasing toll rates in the peak hour by $7 per axle (i.e., $21 for small three-axle trucks or $28 for larger four-axle trucks) would result in only a 3 percentage point shift to the off-peak hours. Among the reasons for this is the fact that shipping costs are much higher than this amount, hence adding $21 to $28 is not a big burden for truckers. Furthermore, carriers are generally able to distribute the cost to all of their receivers along their route (for example, a three-axle truck delivering to five customers could add a relatively insignificant surcharge of $4 to each receiver to offset the toll). Finally, receivers have a significant say in the time of delivery, and will not shift to off-peak hours unless they receive savings that are higher than the cost of operating during that time. These costs can include one or two employees, in addition to security, electricity, and any other resources needed during that time.

### Table 3.1 Expected Carriers’ Off-Peak Delivery Market Share as a Function of Toll Savings to Carriers and Tax Deductions to Receivers

<table>
<thead>
<tr>
<th>Toll Savings (Dollars per Axle) to Carriers</th>
<th>–</th>
<th>$2,000</th>
<th>$4,000</th>
<th>$6,000</th>
<th>$8,000</th>
<th>$10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>–</td>
<td>11.71%</td>
<td>13.25%</td>
<td>14.52%</td>
<td>15.92%</td>
<td>17.19%</td>
<td>18.11%</td>
</tr>
<tr>
<td>$2.00</td>
<td>12.76%</td>
<td>14.40%</td>
<td>15.74%</td>
<td>17.21%</td>
<td>18.56%</td>
<td>19.52%</td>
</tr>
<tr>
<td>$3.00</td>
<td>13.23%</td>
<td>14.90%</td>
<td>16.28%</td>
<td>17.77%</td>
<td>19.15%</td>
<td>20.12%</td>
</tr>
<tr>
<td>$5.00</td>
<td>14.07%</td>
<td>15.82%</td>
<td>17.25%</td>
<td>18.80%</td>
<td>20.19%</td>
<td>21.19%</td>
</tr>
<tr>
<td>$7.00</td>
<td>14.83%</td>
<td>16.65%</td>
<td>18.14%</td>
<td>19.74%</td>
<td>21.12%</td>
<td>22.14%</td>
</tr>
</tbody>
</table>

Source: Holguín-Veras, et al.²³
Table 3.2  Expected Carriers’ Off-Peak Delivery Market Share as a Function of Toll Savings to Carriers and Shipping Cost Discounts to Receivers

<table>
<thead>
<tr>
<th>Toll Savings (Dollars per Axle) to Carriers</th>
<th>Shipping Costs Differential Given to Receivers (Percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 %</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>−</td>
<td>11.71%</td>
</tr>
<tr>
<td>$2.00</td>
<td>12.76%</td>
</tr>
<tr>
<td>$3.00</td>
<td>13.23%</td>
</tr>
<tr>
<td>$5.00</td>
<td>14.07%</td>
</tr>
<tr>
<td>$7.00</td>
<td>14.83%</td>
</tr>
</tbody>
</table>

Source: Holguín-Veras, et al.23

Receivers’ reactions were modeled to demonstrate the impacts of two policy incentives: tax savings for businesses accepting deliveries during off-peak periods and shipping costs discounts. The first row of Table 3.1 shows the impact of just the tax deduction on off-peak delivery market share. A $2,000 annual deduction would increase market share by approximately 1.5 percentage points while a $4,000 deduction would essentially yield the same results as a $7 per axle toll. A $10,000 deduction would increase the number of carriers delivering during the off-peak to 18 percent. The full range of the table goes from the current 11.71 percent of truckers conducting off-peak deliveries to a potential 22.14 percent if a $7 per axle toll was put in place in combination with a $10,000 tax deduction for receivers. The findings show that significant incentives for receivers can go much further to achieve the goal of off-peak deliveries than solely toll increases. A combination of both policies would yield maximum results.

Table 3.2 presents shipping cost savings to receivers in percentages. As illustrated, a 20 percent reduction in shipping costs would have almost the same impact as the $7 per axle toll increase during the off-peak hours. This theoretical exercise also examines the possibility of eliminating shipping costs altogether for receivers, and projects that as a result over 21 percent of the carriers would shift their hours of operation to the off-peak. Finally, a combination of $7 per axle toll with no shipping costs for receivers would result in over one quarter of carriers (26.11 percent) shifting to the off-peak.

While 100 percent shipping costs reductions and $10,000 tax breaks might seem absurd, the exercise shows the power receivers have in deciding the delivery times, and that even with these incentives (without considering toll savings) only 6.4 percent to 9.98 percent of carriers would find it feasible to shift to the off-peak. These findings underscore how important it is for receivers to operate in their current timeslot (mainly while they are open) and to avoid the inconvenience and costs associated with off-peak deliveries.

The study also investigated the feasibility of a truck making six stops in the City being able to shift operations entirely to the off-peak hours. If a truck starts a trip
to the City at the start of the off-peak hour, takes 10 minutes traveling between customers, 15 minutes unloading, and 30 minutes to get to the first customer, then the last customer would have to operate nearly 3 hours during the off-peak period (see Table 3.3). This timing would present significant costs for receivers along the tail-end of the trip. For example, an office building that closes at 6:00 p.m. and is the last in one of these trips would have to remain open until 10:00 p.m. (assuming off-peak period starts at 7:00 p.m.).

Table 3.3  Delivery and Departure Time for Truckers in a Six-Stop Tour during the Off-Peak (Minutes after the Off-Peak Hour Starts)

<table>
<thead>
<tr>
<th>Customer</th>
<th>Arrival</th>
<th>Departure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30</td>
<td>45</td>
</tr>
<tr>
<td>2</td>
<td>55</td>
<td>70</td>
</tr>
<tr>
<td>3</td>
<td>80</td>
<td>95</td>
</tr>
<tr>
<td>4</td>
<td>105</td>
<td>120</td>
</tr>
<tr>
<td>5</td>
<td>130</td>
<td>145</td>
</tr>
<tr>
<td>6</td>
<td>155</td>
<td>170</td>
</tr>
</tbody>
</table>

These findings indicate that truckers with more stops along their routes would be less sensitive to tolls than would those with just one or two stops (given that even a $50 toll would not be sufficient for the 4th, 5th, or 6th receiver to remain open for more than two hours). Figure 3.2 shows the minimum toll surcharge that would be required for a truck to shift the entire trip to the off-peak (assuming it passes on some of the savings to the receivers to remain open for business). As illustrated, while shifting a three-stop trip to the off-peak would require a $60 toll, shifting a trip of six stops would require a toll exceeding $200. These findings added to those stated previously suggest that incentives other than solely tolls would be required in order to achieve a meaningful shift in hours of operation.
Based on findings from the stated-preference surveys, the industry segments most likely to respond favorably to off-peak delivery policies are the group of businesses consuming and transporting wood/lumber, food and metal. These receivers were found to be particularly sensitive to tax deductions. The carriers are particularly sensitive to the receivers’ request for off-peak deliveries. This combination of circumstances increases the probability of implementing off-peak deliveries.

The food establishments industry is discussed in more detail in the following subsection. Receivers of and carriers of wood/lumber and metal products are potential targets for off-peak deliveries, however, in the case of New York City the number of receivers and, consequently, the number of truck trips involved for these industry are likely not as high as those involved in the food establishment case. This suggests a smaller payoff in terms of truck trips switched to the off-peak hours. Nonetheless, these are industries that could be targeted in outreach programs. Shipments of these commodities may include wood and lumber to be used for construction or the manufacturing of furniture, metal products can also be used for manufacturing or construction work (this could include metal sheets, bars, rods, wires, and molten form to make castings and other basic metal products).
Restaurant Industry Study\textsuperscript{23}

A survey was conducted to analyze the potential for members of the food retailing business in the City (i.e., the restaurant and drinking places sector) to shift deliveries, pick-ups, and service calls to off-peak hours. This industry was targeted because these establishments are usually open during the nighttime, and previous research suggested that both carriers and receivers of these goods would be interested in off-peak deliveries. Furthermore, it is estimated that the current restaurants and drinking places in Manhattan (over 6,500) receive somewhere between 36,000 and 42,000 deliveries per day, resulting in 18,000 to 21,000 daily truck trips. This implies that even small changes in the delivery patterns for these establishments could yield significant improvements to the City’s congested roads. As a point of reference, New York City’s 22 toll river crossings facilities administered by the various transportation agencies handled over 43 million trucks in 2006. Assuming that these are distributed over a six-day week (excluding Sundays), this would equate to nearly 138,000 daily trucks, meaning that the restaurant and drinking places sector represents approximately 13 percent to 15 percent of total truck traffic in Manhattan.

The survey asked receivers whether they’d be willing to accept off-peak deliveries provided that they were rewarded financially through four different incentive programs: tax deductions for one worker, unspecified government subsidies, unspecified tax cuts, and a 20 percent surcharge in shipping costs during the peak hour. The results from these questions are shown in Table 3.4. As shown, more than half of the establishments surveyed stated that they would be willing to accept off-peak deliveries under the first two programs, nearly half (46 percent) said they would do so if tax cuts were provided, and one-third said that they would do so for a 20 percent reduction in shipping charges.

Table 3.4  Receivers’ Willingness to Accept Off-Peak Deliveries by Incentive

<table>
<thead>
<tr>
<th>Incentive</th>
<th>Accept Off-Peak Deliveries?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tax Deduction Equal to Salary of One Worker Doing Off-Peak Deliveries</td>
<td>Yes 55.40% No 44.60%</td>
</tr>
<tr>
<td>2. Government Subsidy to Restaurants Receiving Off-Peak Deliveries (Amount Not Specified)</td>
<td>Yes 57.80% No 42.20%</td>
</tr>
<tr>
<td>3. Tax Cut for Companies Receiving Off-Peak Deliveries (Amount Not Specified)</td>
<td>Yes 46.30% No 53.70%</td>
</tr>
<tr>
<td>4. 20% Reduction in Shipping Charges during Off-Peak Hours</td>
<td>Yes 33.33% No 66.67%</td>
</tr>
</tbody>
</table>

These numbers suggest that the restaurant and drinking place sector has a strong potential to respond to this type of policy given the right amount of incentive. The logistics might not necessarily be as simple though, given that carriers do not always deliver exclusively to restaurants, but may also include bodegas and delis along their trips which are usually open during business hours and not during the evening. Nonetheless, establishments in this sector should be targeted in any outreach program promoting off-peak deliveries in Manhattan.

3.9  ESTIMATED IMPACT ON VMT IN THE NEW YORK CITY CBD

Over 1.5 million vehicle trips end in the area south of 86th Street in Manhattan every day. These vehicles travel over 4.7 million vehicle miles per day. Trucks and commercial vehicles account for 13% of the vehicle trips that end in the area and 7.4% of the miles traveled in the area.\(^{24}\) Traffic data reveals that peak period VMT (vehicle-miles traveled) in this zone represents nearly 79% of the total daily VMT\(^{25}\). Truck and commercial traffic in turn accounts for 8% of peak period VMT. This section presents a brief summary of the impact that the initiatives presented in Section 3.8 would have in the mix of traffic in this section of Manhattan during the peak and off-peak periods of the day.

Given time and resource limitations several assumptions had to be made in order to complete this exercise. These are as follows:

\(^{24}\) New York City Department of Transportation.

\(^{25}\) Peak period is defined as 6AM to 8PM.
1. It was assumed that total truck VMT would remain the same within the district. The Receiver Incentives option would only shift traffic from the peak to the off-peak period; it would not reduce or generate traffic. As a result, the current overall VMT in the zone of 4.75 million would remain the same after implementing any of the initiatives. This is reflected in the last column of Table 3.5 which shows a 0% change in daily overall VMT.

2. The analysis also assumes that passenger vehicle VMT will remain constant. In reality, passenger vehicle VMT is likely to increase with fewer trucks given the improvement in travel times.

3. The percentage change in market share covered in Tables 3.1 and 3.2 were used to estimate the additional truck VMT during the off-peak. Although the number of trips varies by receiver, the total number of receivers in the zone is proportional to the total number of trips ending in the zone. In keeping with the same ratio of receivers to trips, it is assumed that a 1% receiver participation level would therefore translate to a 1% shift in trucks and commercial vehicles to the off-peak period. Likewise, it is assumed that the ratio of trips to VMT would remain the same. Therefore a 1% shift in the total number of truck and commercial vehicle trips ending in the zone would translate to a 1% shift of total truck and commercial vehicle VMT in the zone.

4. Some of the scenarios described are theoretical exercises that would not be feasible in reality, such as 100% shipping costs reduction for receivers, or $10,000 tax deductions. These are presented here merely for reference purposes and to provide the reader with a better understanding of the impact of the variables involved.

Table 3.5 contains the impacts that the different scenarios would have on peak period truck and commercial vehicle traffic and also compares it against the total peak period traffic (including all non-commercial traffic). The scenarios include tolls (from $2 to $7 per axle), tax deductions ($2,000 to $10,000 per receiver), reductions in shipping costs (10% to 100%), and a complete ban of truck and commercial vehicle traffic during the peak period. The results of the initiatives range from a 1.42% to 100.00% reduction of peak period truck and commercial vehicle traffic translating to an overall reduction of 0.11% to 8.05% in peak period VMT. These numbers highlight the significant volume of passenger car traffic in relation to trucks and other commercial vehicles.

Three scenarios will be analyzed in more detail: The $7/axle toll, the $2,000 tax deduction combined with the $7/axle toll, and the complete ban on truck and commercial vehicle traffic during the peak period. These examples are the more realistic options in terms of ease of implementation, and were chosen to help illustrate the impact of the various types of alternatives.
$7 Toll per Axle for Trucks and Commercial Vehicles

As indicated, a $7/axle surcharge (this would be $21 for a typical 3-axle truck) during the peak period (6:00 AM to 8:00 PM using VMT from the NYMTC BPM model) would result in a decrease of 12,789 daily truck and commercial vehicle miles traveled during the peak period, representing a 4.21% decrease in truck and commercial vehicle VMT, and a 0.34% decrease in overall peak period VMT. While a 4-5% reduction in truck and commercial vehicle VMT might seem significant, the numbers show that in the general picture this initiative would have an insignificant impact on peak period VMT (which would decrease only from 3.78 to 3.76 million miles traveled per day).

$7 Toll per Axle and $2,000 Tax Deduction

Combining the previously discussed scenario, which affects carriers directly, with a $2,000 incentive for receivers would result in a 6.66% shift of truck and commercial vehicle VMT to the off-peak, equivalent to 20,249 VMT per day. This in turn would translate to 0.54% overall reduction in overall peak period VMT, which is still relatively insignificant, and would likely go unnoticed by most peak-hour drivers.

Truck Ban During Peak Period

Approximately 196,000 truck and commercial vehicle trips end in Manhattan south of 86th street on a daily basis. With an average truck and commercial vehicle trip length of 1.53 miles, this translates to roughly 300,000 daily VMT. A complete ban of truck traffic during the peak period would mean that all trucks would have to enter and do business in this section of Manhattan between the hours of 8PM and 6AM. If all of these trips are transferred to the off-peak it translates to an 8.05% shift in VMT from the peak to the off-peak period. However as mentioned earlier in this chapter, such a program would likely have significant economic and environmental impacts for Manhattan residents (in terms of higher product costs, increased noise, and more traffic congestion at night).

The following figures show the composition of traffic in Manhattan’s Central Business District. Figure 3.3 shows the current situation, while the following three show the truck shift to the off-peak for each for the three scenarios discussed above. As shown the impact for the first two cases are negligible (less than 1%), while the ban on peak hour truck traffic results in a 6 percentage point shift to the off–peak.
Table 3.5  Shift in Peak Period VMT by Scenario

<table>
<thead>
<tr>
<th>Scenario</th>
<th>6 a.m.-8 p.m. Peak Period Truck and Commercial VMT</th>
<th>6 a.m.-8 p.m. Peak Period Overall VMT</th>
<th>6 a.m.-8 p.m. Peak Period Truck and Commercial VMT Difference (%)</th>
<th>6 a.m.-8 p.m. Peak Period Overall VMT Difference (%)</th>
<th>24-Hour Overall VMT Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>304,000</td>
<td>3,775,000</td>
<td>-1.42%</td>
<td>-0.11%</td>
<td>0%</td>
</tr>
<tr>
<td>$2 Toll/Axle</td>
<td>299,696</td>
<td>3,770,696</td>
<td>-4,304</td>
<td>-1.42%</td>
<td>0%</td>
</tr>
<tr>
<td>$3 Toll/Axle</td>
<td>297,769</td>
<td>3,769,769</td>
<td>-2,05%</td>
<td>-0.17%</td>
<td>0%</td>
</tr>
<tr>
<td>$5 Toll/Axle</td>
<td>294,326</td>
<td>3,765,326</td>
<td>-6,231</td>
<td>-2.05%</td>
<td>0%</td>
</tr>
<tr>
<td>$7 Toll/Axle</td>
<td>291,211</td>
<td>3,762,211</td>
<td>-9,674</td>
<td>-3.18%</td>
<td>0%</td>
</tr>
<tr>
<td>$2,000 Tax Deduction</td>
<td>297,687</td>
<td>3,768,687</td>
<td>(6,131)</td>
<td>-2.08%</td>
<td>0%</td>
</tr>
<tr>
<td>$4,000 Tax Deduction</td>
<td>292,482</td>
<td>3,763,482</td>
<td>(11,518)</td>
<td>-3.79%</td>
<td>0%</td>
</tr>
<tr>
<td>$6,000 Tax Deduction</td>
<td>286,743</td>
<td>3,757,743</td>
<td>(17,257)</td>
<td>-5.68%</td>
<td>0%</td>
</tr>
<tr>
<td>$8,000 Tax Deduction</td>
<td>281,537</td>
<td>3,752,537</td>
<td>(22,463)</td>
<td>-7.39%</td>
<td>0%</td>
</tr>
<tr>
<td>$10,000 Tax Deduction</td>
<td>277,766</td>
<td>3,748,766</td>
<td>(26,234)</td>
<td>-8.63%</td>
<td>0%</td>
</tr>
<tr>
<td>$2,000 Tax Deduction and $7/Axle Toll</td>
<td>283,751</td>
<td>3,754,751</td>
<td>(20,249)</td>
<td>-6.66%</td>
<td>0%</td>
</tr>
<tr>
<td>$4,000 Tax Deduction and $7/Axle Toll</td>
<td>277,643</td>
<td>3,748,643</td>
<td>(26,357)</td>
<td>-8.67%</td>
<td>0%</td>
</tr>
<tr>
<td>$6,000 Tax Deduction and $7/Axle Toll</td>
<td>271,085</td>
<td>3,742,085</td>
<td>(32,915)</td>
<td>-10.83%</td>
<td>0%</td>
</tr>
<tr>
<td>$8,000 Tax Deduction and $7/Axle Toll</td>
<td>265,428</td>
<td>3,736,428</td>
<td>(38,572)</td>
<td>-12.69%</td>
<td>0%</td>
</tr>
<tr>
<td>$10,000 Tax Deduction and $7/Axle Toll</td>
<td>261,247</td>
<td>3,732,247</td>
<td>(42,753)</td>
<td>-14.06%</td>
<td>0%</td>
</tr>
<tr>
<td>20% Shipping Cost Reduction</td>
<td>293,506</td>
<td>3,764,506</td>
<td>(10,494)</td>
<td>-3.45%</td>
<td>0%</td>
</tr>
<tr>
<td>40% Shipping Cost Reduction</td>
<td>281,537</td>
<td>3,752,537</td>
<td>(22,463)</td>
<td>-7.39%</td>
<td>0%</td>
</tr>
<tr>
<td>60% Shipping Cost Reduction</td>
<td>272,027</td>
<td>3,743,027</td>
<td>(31,973)</td>
<td>-10.52%</td>
<td>0%</td>
</tr>
<tr>
<td>80% Shipping Cost Reduction</td>
<td>266,576</td>
<td>3,737,576</td>
<td>(37,424)</td>
<td>-12.31%</td>
<td>0%</td>
</tr>
<tr>
<td>100% Shipping Cost Reduction</td>
<td>263,091</td>
<td>3,734,091</td>
<td>(40,909)</td>
<td>-13.46%</td>
<td>0%</td>
</tr>
<tr>
<td>20% Shipping Cost Reduction and $7/Axle Toll</td>
<td>278,791</td>
<td>3,749,791</td>
<td>(25,209)</td>
<td>-8.29%</td>
<td>0%</td>
</tr>
<tr>
<td>40% Shipping Cost Reduction and $7/Axle Toll</td>
<td>265,100</td>
<td>3,736,100</td>
<td>(38,900)</td>
<td>-12.80%</td>
<td>0%</td>
</tr>
<tr>
<td>60% Shipping Cost Reduction and $7/Axle Toll</td>
<td>254,647</td>
<td>3,725,647</td>
<td>(49,353)</td>
<td>-16.23%</td>
<td>0%</td>
</tr>
<tr>
<td>80% Shipping Cost Reduction and $7/Axle Toll</td>
<td>248,704</td>
<td>3,719,704</td>
<td>(55,296)</td>
<td>-18.19%</td>
<td>0%</td>
</tr>
<tr>
<td>100% Shipping Cost Reduction and $7/Axle Toll</td>
<td>244,974</td>
<td>3,715,974</td>
<td>(59,026)</td>
<td>-19.42%</td>
<td>0%</td>
</tr>
<tr>
<td>Truck ban during peak hours</td>
<td>3,471,000</td>
<td>304,000</td>
<td>-100.00%</td>
<td>-8.05%</td>
<td>0%</td>
</tr>
</tbody>
</table>
**Figure 3.3** Baseline VMT

- Off-Peak Passenger Vehicle and Bus VMT: 20%
- Peak Truck and Commercial VMT: 6%
- Off-Peak Truck and Commercial VMT: 1%
- Peak Passenger Vehicle and Bus VMT: 73%

**Figure 3.4** $7/Axle Toll Scenario

- Off-Peak Passenger Vehicle and Bus VMT: 20%
- Peak Truck and Commercial VMT: 6%
- Off-Peak Truck and Commercial VMT: 1%
- Truck and Commercial VMT Shift to Off-Peak: 0%
- Peak Passenger Vehicle and Bus VMT: 73%
Figure 3.5  $7/Axle Toll and $2,000 Incentive Scenario

Figure 3.6  Truck Ban Scenario
4.0 Key Findings and Conclusions

This section highlights the key findings from the case studies and the research projects described in this document.

- The case studies summarized in this report reveal that freight carriers have interest in the idea of doing business during the off-peak hours; however, they are constrained by the demands of their customers, the receivers. The receivers, generally, are constrained from doing business during the off-peak because of the cost and inconvenience of having their business open during that time.

- As illustrated in the Tappan Zee Variable Pricing Initiative, toll structure alone will not have a significant impact, even at $20 per truck. In fact, $20 might be an insignificant figure for most carriers given that they’d be able to pass along the cost of the tolls to the several receivers they may visit along their routes. If a truck makes 4 stops in the city, it would only need to add a relatively insignificant fee of $5 to each receiver in order to offset the toll.

- Receivers are only likely to shift operations to the off-peak hours if enough savings are provided to offset the cost and inconvenience of being open during that time. Research shows that for a truck making 6 stops along a route to the City to shift their entire operations to the off-peak, it would require the last three customers in the trip to be open for two to three hours after off-peak hours begin. As a result, it would take tolls in the range of $150 to $200 for carriers alone to switch (assuming that they’d pass along a portion of the tolls to the receivers).

- Increases in truck toll alone in the range of $7 per axle ($28 for a large 4-axle truck) might provide benefits of approximately 3 to 7 percentage points in terms of the number of trucks entering the region. However, a portion of these are likely to be offset by increases in productivity, such as trucks making more stops inside the charge zone, which will keep truck traffic inside the region at similar levels.

- Research shows that incentives for receivers such as tax breaks, government subsidies, and reduction in shipping costs can be more effective tools to engage carriers in off-peak deliveries than solely tolls. A combination of both approaches (incentives and tolls) is likely to yield the most success. Accepting off-peak deliveries can be very costly for receivers in Manhattan, hence a potential program that would force truckers to deliver during the nighttime is likely to have significant economic impacts in the region.

- The restaurant and drinking establishment sector is a significant generator of freight traffic in New York, generating approximately 18,000 to 21,000 truck trips every day. A recent survey suggests that a significant portion of these establishments in Manhattan would consider taking deliveries during the off-
peak, which could have major impact in daily truck traffic. Part of the attraction is the fact that they are already open during that time of the day. However, not all establishments have the capabilities of accepting off-peak deliveries; many for example do not have a back cargo door.

- Another potential industry sector is the daily morning deliveries in Manhattan to the food and perishable retail establishments such as bodegas and delis. Unlike restaurants, these establishments generally operate more along the hours of 6 a.m. – 6 p.m. These trips would not only be affected by time of delivery but at the beginning of the trip as well. Most of the perishables come from one of the produce markets, fish markets or meat markets within the five Boroughs or from Long Island, Connecticut, or New Jersey. These trips usually start before the peak hour and arrive in the Manhattan at the start of the peak when the establishments open. The potential exists to entice these establishments to accept deliveries at a slightly earlier time.

- It is important to note that in order for a trucker making 6 stops for deliveries in Manhattan to switch the entire route to the off-peak (after 7:00 p.m.), the last three receivers would need to be open past 9:00 p.m., which might prove to be too costly for them. Assuming conservative times for unloading and travel between stops, the last shipment would be unloaded at approximately 10:00 p.m. For early morning deliveries, this would translate into truckers entering the charge zone in the off-peak but doing most of the travel inside the zone during the peak hour, negating the desired results.

- Outreach would be an important aspect of any type of program developed. Carriers, receivers, and the community need to understand the benefits associated with such a program, including congestion relief, reduction in pollution, and the generation of revenues to improve and maintain the City’s transportation systems. In fact, follow-up surveys for the Tappan Zee and the PANYNJ’s variable pricing initiative revealed that a significant portion of truckers were unaware that such a program was in place, limiting the potential impact that the program can have.

- Complementary programs must be put in place to discourage automobile traffic from filling the void left by the lack of trucks during peak hours. Otherwise, the congestion and air pollution could be exacerbated, not decreased.

- Even if New York City develops a program to entice carriers and receivers to shift to the off-peak, in time the natural growth in demand for freight goods dictates that congestion will still occur in the peak and off-peak hours. This is mainly because trucks are the primary (if not the only) mode used for transporting goods to and from Manhattan. As a result, alternatives that promote the use of other modes should be studied in conjunction with any program.
5.0 References and Sources of Additional Information


New York Metropolitan Transportation Council (MTA and PANYNJ facilities only), http://www.nymtc.org/data_services/TTV.html.


