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Subject: Freedom of Information Online Request Form

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List of specific record(s):
Economic Analysis of the Effect of the Recent PANYNJ Toll Increase on NYCT

THE PORT AUTHORITY OF NY & NJ

Daniel D. Duffy
FOI Administrator

February 7, 2013

Ms. Mary McLaughlin
Staten Island Chamber of Commerce
130 Bay Street
Staten Island, NY 10301

Re: Freedom of Information Reference No. 13477

Dear Ms. McLaughlin:

This is a response to your September 14, 2012 request, which has been processed under the Port Authority's Freedom of Information Code (the "Code", copy enclosed) for copies of records related to the Economic Analysis of the Effect of the Recent Port Authority Toll Increase on NYCT.

Material responsive to your request and available under the Code can be found on the Port Authority's website at http://www.panynj.gov/corporate-information/foi/13477-O.pdf. Paper copies of the available records are available upon request.

This report was previously provided to Staten Island Assemblywoman Nicole Malliotakis in response to litigation that she brought in Staten Island Supreme Court.

It should be noted that this study is considered a draft version. Various questions remain open, and, therefore, the Port Authority does not consider the report final. However, in the interests of transparency, the Port Authority and NYCT are each consenting to the release of the report in its current form

Please refer to the above FOI reference number in any future correspondence relating to your request.

Very truly yours,

Daniel D. Duffy
FOI Administrator

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Economic Analysis of the Effect of the Recent PANYNJ Toll Increase on NYCT

The Port Authority of New York & New Jersey

and

New York Container Terminal

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May 2012

Economic Analysis of the Effect of the Recent PANYNJ Toll Increase on NYCT

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Economic Analysis of the Effect of the Recent PANYNJ Toll Increase on NYCT

Executive Summary

On September 18, 2011, the tolls on Port Authority (PA) bridges and tunnels were increased by $2.00 per axle. The same annual increase is planned for the next four consecutive years. The last toll increase is planned for December 6, 2015.

On January 1, 2012, the New Jersey Turnpike Authority increased the tolls on the New Jersey Turnpike (Turnpike) by 53%. There has been no announcement for further increases.

New York Container Terminal (NYCT) argued that the PA bridge and tunnel toll increase is causing an undue financial burden on its customers. Other New Jersey container terminals in the Port vicinity can be accessed without a toll bridge, everything else being equal.

A comparison of one-week drayage operations between NYCT and Global Container Terminal (GCT) was undertaken in terms of toll costs for both the New Jersey Turnpike (NJTP) and the PA bridges and tunnels. The focus of this comparison was on the top seven origin and destination (O-D) city pairs. An identical survey questionnaire was developed and surveys carried out for five consecutive days at both terminals simultaneously between 6:00 AM. and 1:00 PM from February 27 to March 2, 2012. The surveys generated 3,161 responses for NYCT and 3,579 responses for GCT's respectively. During the same week NYCT's truck count was 8,189 and GCT count was 8,022.

The methodology used for toll cost comparison is based on statistical O-D analysis to determine and compare both the bridge toll cost and the Turnpike toll cost per truck for each terminal. This methodology was applied to compare the toll costs before and after the announced toll increase. More specifically, detailed analysis was concentrated on the seven top locations that accounted for most traffic, as required by NYCT's management and the PA.

There are a few types of comparisons: the comparison of the toll increase at the same location, the comparison of the toll increase between the locations and the final comparison for the total toll increase effect. This multidimensional toll increase analysis was done for all the top seven locations and all locations altogether.

The analysis indicates that the marginal difference in toll costs per round trip for the top seven locations in drayage operations at NYCT is $12.30 more than that of GCT. In addition, the analysis also indicates that there is a fundamental difference in the toll costs between the two terminals. NYCT users pay an estimated toll of $48.17 ($10.12 average toll cost per axle x 4.76 average number of axles) for crossing one of the PA bridges to Staten Island. Before the toll increase this figure was estimated at $36.27 ($7.62 x 4.76). GCT users from the same top seven

locations do not have to pay any PA tolls. However, this figure was historically in place before this analysis took place (Table ES 1).

Table ES1: Comparison of Toll Costs Before and After Toll Increase

	Before toll increase	**After toll increase**	**Column difference**	**Marginal effect** (row and column difference)
NYCT	**$39.23***	**$52.70****	$13.47	**$12.30**
GCT	**$2.19**	**$3.36**	$1.16	
Row difference	$37.03	$49.34		
Marginal effect (column and row difference)	**$12.30**			

Note: * PA toll of $36.27 plus Turnpike toll of $2.96 = $39.23
** PA toll of $48.17 plus Turnpike toll of $4.53 = $52.70

The future toll increases on the bridges without any change in the Turnpike tolls will directly be reflected in the marginal toll effect. For example, a two-dollar increase per axle due to take effect in December 2012 will increase the marginal effect on NYCT tolls by $10.00 (Table ES 2).

Table ES2: Marginal Toll Effect

	Weighted avg. of toll (1)	**Toll increase (2)**	**Cumulative toll increase (3)**	**% of annual toll increase from (1)**
2010	$ 37.03			
2011	$ 49.34		$ 12.30	33.2%
2012	$ 59.34	$ 10.00	**$ 22.30**	20.3%
2013	$ 69.34	$ 10.00	$ 32.30	16.9%
2014	$ 79.34	$ 10.00	$ 42.30	14.4%
2015	$ 89.34	$ 10.00	$ 52.30	12.6%
Total toll increase		**$ 40.00**		**97.4%**

The actual cost in 2015 for a five-axle truck using one of the three bridges going to NYCT would be: E-ZPass overnight $93.00, E-ZPass off-peak $102.00, E-ZPass peak $108.00 and for cash $126.00.

The truckers using NYCT and GCT have a choice not to use any toll road. Therefore, the toll cost of a GCT user could be zero. Under those circumstances the comparison of the toll increase is only the bridge toll increase.

It should be noted that based on the summary of daily activity reports provided, there are sizable differences between the number of containers received and delivered for both terminals. For the

survey week, for GCT there was a total of 5,625 containers received, including load in and empty in and 5,442 containers out. The net is 183, indicating the terminal had more in-flow containers than out-flow containers. For NYCT there were a total of 5,030 received and 5,428 containers out. The net is a negative 398, indicating the terminal had more out-flow containers than in-flow containers. There could be many factors contributing to this result. To gain full knowledge, further analysis is needed.

Economic Analysis of the Effect of the Recent PANYNJ Toll Increase on NYCT

1. Background

Tolls for tunnels and bridges are assessed on all vehicles, both passenger and freight. Within the area of the Port of New York there are six Marine Container Terminals (MCTs): APM Terminal (NJ), Maher Terminal (NJ), PNCT (NJ), Global Container Terminal (NJ), Red Hook (NY), and NYCT (NY). NYCT is located in Staten Island, adjacent to the Goethals Bridge. An overwhelming majority of the import/export logistics facilities, such as warehouses and distribution centers, are located on the New Jersey (NJ) side; truckers need to pay tolls when undertaking drayage operations between NJ and MCT. Drayage operations to and from other MCTs in NJ have no bridge crossing toll to be paid unless the drayage operation is to or from the east crossing the Holland or Lincoln Tunnels or is to or from north and east crossing the George Washington or Newburgh-Beacon Bridges or the Verrazano-Narrows Bridge from Brooklyn.

The toll increase by the Port Authority of New York & New Jersey (PA) on its tunnels and bridge crossings starting on September 18, 2011, is the first of five planned toll increases. The toll will increase every December, with the last toll increase expected to go into effect in 2015. A toll increase could have various effects on operations; they are divided into three major effects on container drayage operations:

1. Direct and immediate impact on the cost of drayage
2. Indirect or lagged effect of terminal selection or relocation of operations by terminal users within the Port of NY/NJ (shippers, truckers, shipping lines, etc.). The toll increase has the potential to cause a redistribution effect on terminal activity associated with two factors of the toll increase: the toll increase itself and the relative change in the price of doing business within the six MCTs of the Port. These two effects are known in microeconomics as *income* and *substitution effects*.
3. Potential long-term effect of relocation of operations to other terminals within the Port and/or ports away from the Port of NY/NJ. This long-term effect impacts on the Port's competitive status due to a possibility of moving away from the Port of NY/NJ altogether

to other East Coast or West Coast ports. Again, these effects are a part of the income and substitution effects mentioned above.

The focus of this analysis is on the direct and immediate effect on NYCT. More specifically, what is the marginal difference of toll costs in drayage operations between NYCT and Global Container Terminal (GCT), representative of an NJ MCT?

2. Drayage Operations

A truck arriving at the terminal could be one of the following: tractor only (bobtail), chassis with no container, or chassis with container that is loaded or empty. A truck could arrive at the terminal to drop off and pick up a container (double move), drop off a container (single move), pick up a container (single move) or just drop off a chassis or pick up a chassis.

The toll costs for bridges, tunnels, and the Turnpike are a function of origin and destination (O-D) of the trip, and the route selected as well as the number of axles of a truck, method of payment and time of day. Such toll costs differ from one terminal to another due to their respective locations and the need to cross a toll facility.

2.1 NYCT Drayage Operations vs. GCT Drayage Operations

The selection of GCT operations for comparison to the NYCT is due to the similar weekly activity but a different geographic location. Global Terminal, APM Terminal, Maher Terminal, and PNCT are all in NJ. All these terminals use a similar toll road infrastructure, namely the New Jersey Turnpike (Turnpike) and the bridge and tunnel crossings when hauling freight west.

NYCT and GCT each have different location characteristics and road access choices, therefore, a cost differential in accessing the MCT. For container drayage between NYCT or GCT and logistics facilities, truckers need to cross either a bridge or tunnel and/or pay a toll on roads such as the Turnpike or bridge. The specific characteristics of each of the MCTs are specified below.

2.2 NYCT

NYCT, located in Staten Island, must be accessed through one of the four bridges that connect the Island to the rest of the metropolitan area unless the truck O-D is on the Island. The three PA bridges: Goethals, Outerbridge and Bayonne, all charge the same for the one-way inbound trip to the Island. The Verrazano-Narrows Bridge, a New York City MTA bridge, charges the one-way toll at a different rate than the PA bridges and tunnels. The PA toll bridge/tunnel rates are expected to increase every December until December 5, 2015, for a total of four increases.

NYCT must be accessed through one of the four bridges that connect the Island to the rest of the metropolitan area.

The only toll road that connects to a toll bridge is the Turnpike. However, the non-toll road Route 1-9 can be used to access the Goethals Bridge. The tolls on the Turnpike vary by: distance, time of day (peak, off-peak), type

of payment (E-ZPass, cash), and the class of truck (number of axles). These tolls are fixed for the time being. However, it must be recognized that tolls on the Turnpike were increased by 53% on January 1. 2012.

2.3 Global Container Terminal (GCT)

GCT is located in Bayonne, NJ. In order to get access to the terminal, there are several alternatives, including toll and toll-free roads. From the south, the main road is Route 440 via the Bayonne Bridge (a PA toll bridge), and from the east and north via the Turnpike (a toll road). The roads that do not require a toll are local roads and main arteries, such as Route 1-9, and Route 440.

Truckers undertaking drayage trips to and from NYCT or GCT also use main highways, bridges and tunnels in the region. These include: I-78, I-278 and I-287. Additional bridges and tunnels in the metropolitan area include: George Washington Bridge, Verrazano-Narrows Bridge, Outer Bridge Crossing, Lincoln Tunnel and Holland Tunnel.

In order to get to the GCT a truck could use a toll or a toll free road.

3. Methodology

In order to determine truck drayage patterns related to both NYCT and GCT, an Origin - Destination (O-D) analysis based on a survey (Appendix A) was used to determine truck routes and thereby the total bridge and road toll costs. The survey was structured to provide information from the point of trip origin to the terminal and from the terminal to the point of destination. Thus, the survey has information of two trips; one trip from its origin to the terminal and another from the terminal to the next destination. In this respect, the terminal is an intermediate point for container drop-off and pick-up.

The survey was undertaken from 6:00 AM to 1:00 PM in five consecutive days, Monday to Friday, the week of February 27 to March 2, 2012. The security personnel asked truckers questions from the survey form at the terminal entry gates, and answers were recorded on the survey forms. When an answer was not provided, the space was left blank.

The O-D survey data for both the inbound and outbound trips collected at the MCT gate includes the following: (For survey form details, please see Appendix)

- Time survey taken
- Nature of the trip: pickup or delivery or both
- Types of equipment involved such as chassis, bobtail, empty or loaded container
- Use of toll facilities (bridges and Turnpike), if any
- Time (at toll plaza and at the terminal gate)
- Payment method
- City and state at origins and destinations

he survey has information of two trips; one trip <u>to</u> the terminal and another <u>from</u> the terminal to the next destination.

- Routes taken including highways and arterial roads

After the data was tabulated, the toll cost of drayage was analyzed for each terminal. The toll cost comparison is based on toll rates provided by the PA and the New Jersey Turnpike Authority (NJTA).

NYCT and GCT provided summaries of daily gate activities for the five days of the survey. The summaries provide inbound and outbound transaction counts for chassis, bobtail, empty container, and loaded container, the same categories that were surveyed.

4. Research Results

The research results are divided into two sections: NYCT and GCT. Each section includes an analysis of daily and hourly distribution of truck drayage trips, routing, O-D patterns, toll facilities use, and toll cost comparisons between the two terminals.

4.1 NYCT

4.1.1 Daily distribution

The NYCT survey generated a total of 3,161 survey responses, which are 38.9% of the weekly terminal activity with a daily distribution identified in Table 1. There are four types of inbound and outbound trucks at the MCT gate: bobtail/flatbed, trucks with chassis only, trucks with chassis/empty containers, and truck with chassis/loaded containers.

The NYCT survey generated a total of 3,161 survey responses, which are 38.9% of the weekly terminal activity.

Table 1: NYCT Container Daily Activity, and Survey Responses

	27-Feb		28-Feb		29-Feb		1-Mar		2-Mar	
	Activity	Survey	Activity	Survey	Activity	Survey	Activity	Survey	Activity	Survey
Load In (export)	313	137	339	133	499	157	383	94	351	130
Load Out (import)	829	347	852	387	928	408	838	310	469	267
Empty In	703	365	642	364	574	309	698	242	528	262
Empty Out	281	66	289	82	311	140	296	103	335	133
Chassis In	129	74	171	89	183	153	148	115	136	105
Chassis Out	0	24	1	19	6	16	4	10	6	25
Bobtail In	491	30	473	39	551	90	522	115	355	104
Bobtail Out	508	171	448	139	533	170	587	140	545	174
Total in	1,636	606	1,625	625	1,807	709	1,751	566	1,370	601
Total out	1,618	608	1,590	627	1,778	734	1,725	563	1,355	599
Total Activity	**3,254**	**1,214**	**3,215**	**1,252**	**3,585**	**1,443**	**3,476**	**1,129**	**2,725**	**1,200**
Survey total		**622**		**636**		**717**		**578**		**608**
Survey % of total		**38.2%**		**39.6%**		**40.0%**		**33.3%**		**44.6%**

In terms of percent the daily container terminal activity distribution is provided in Table 2.

Table 2: NYCT Container Daily Activity, and Survey Responses in Percent

	27-Feb		28-Feb		29-Feb		1-Mar		2-Mar	
	Activity	Survey	Activity	Survey	Activity	Survey	Activity	Survey	Activity	Survey
Load In (export)	19%	23%	21%	21%	28%	22%	22%	17%	26%	22%
Load Out (import)	51%	57%	54%	62%	52%	56%	49%	55%	35%	45%
Empty In	43%	60%	40%	58%	32%	44%	40%	43%	39%	44%
Empty Out	17%	11%	18%	13%	17%	19%	17%	18%	25%	22%
Chassis In	8%	12%	11%	14%	10%	22%	8%	20%	10%	17%
Chassis Out	0%	4%	0%	3%	0%	2%	0%	2%	0%	4%
Bobtail In	30%	5%	29%	6%	30%	13%	30%	20%	26%	17%
Bobtail Out	31%	28%	28%	22%	30%	23%	34%	25%	40%	29%

The daily distribution of activity and survey differs because the survey data is for about half of the working day. In addition, there are some errors in data recorded by the surveyors. There might also be some cases of miscommunications between the surveyor and the trucker.

In the past, shipping lines and terminal operators provided chassis to truckers or customers for container pickup and delivery. When a trucker was dispatched to the MCT for pickup only, he came with a tractor only; obviously this is a bobtail in movement. However, many shipping lines are no longer providing chassis to truckers and customers. Truckers need to rent chassis from a third party chassis provider or have their own chassis, though some terminal operators still provide a chassis pool. As a result, truckers have to bring their chassis to the MCT for pickup and delivery. Chassis use is no longer shipping line specific; rather, it is generic like a car rental business. Since this third-party-owned chassis does not register with the MCT and the MCT does not physically handle these chassis, there are two types of bobtail transactions: true tractor only and tractor with third-party chassis, the MCT classifies both in a single bobtail category. This leads to some discrepancies between the recorded daily gate activities provided by the MCT and the survey in terms of bobtail transactions. For example, a Canadian trucker arriving with his own chassis will be recorded as a bobtail in both terminals, but will pay a five-axle toll.

The hourly truck arrival is divided between the "Time" the survey was taken and the "Time arrival at the toll plaza" (self-explanatory). The second is used to determine the toll payment rate for the Goethals Bridge and the Turnpike. In addition, when the "Time of arrival at toll plaza" is not available, an allowance of 15 minutes from the "Time" the survey was taken is used for toll rate determination. For example, if the "Time" survey taken indicates 6:10 AM, it is assumed that the truck passed the toll facility at 5:55 AM. Therefore, it will be counted as an "overnight rate" for the Goethals Bridge.

"Time" when the surveys were taken and the "Time of arrival at the plaza" are used to determine the toll rate.

The number of trucks' "Time" and the "Time arrival at the plaza" is largest at the opening time of 6:00 AM. The ratio of trucks for which the "Time" is available is 99.1% (Table 3).

Table 3: NYCT Truck "Time" by the Hour of the Day

	0600-0659	0700-0759	0800-0859	0900-0959	1000-1059	1100-1159	1200-1259	Total validated	Validated/ total	Avg.	Day total
27-Feb	92	95	72	83	104	64	104	614	98.7%	88	622
28-Feb	97	108	75	121	129	87		617	97.0%	103	636
29-Feb	152	95	92	135	101	84	56	715	99.7%	102	717
1-Mar	111	88	78	74	77	78	72	578	100.0%	83	578
2-Mar	103	99	77	95	106	119	8	607	99.8%	87	608
Total	**555**	**485**	**394**	**508**	**517**	**432**	**240**	**3,131**	**99.1%**	**447**	**3,161**
Avg.	**111**	**97**	**79**	**102**	**103**	**86**	**60**	**626**	**99.1%**	**92**	**632**

The truck's "Time of arrival at the plaza" is a key variable in determining toll costs. In the survey the data for this variable was not always recorded on the survey form. The validation[1] ratio dropped from 99.1% to 94.9% when comparing "Time" and "Time of arrival at the plaza". However, with the modification of the 15-minute window (indicated above), the validation ratio was 96.6%, a 1.7% increase in validation associated with the modification (Table 4). Thus, the last was used in determining the toll cost. The Table 4 incorporates this modification and provides a distribution accordingly. The hourly arrival data available is comprehensive.

Table 4: NYCT Time of Arrival at the Toll Plaza by Hour of Day

									Modification					
	0-0559	0600-0659	0700-0759	0800-0859	0900-0959	1000-1059	1100-1159	1200-1259	600-615	% of day	Total validated	Validated/ total	Avg.	Day total
27-Feb	23	88	84	73	78	96	71	60	16	2.6%	589	94.7%	72	622
28-Feb	18	84	91	74	109	112	73		9	1.4%	570	89.6%	80	636
29-Feb	30	129	91	90	130	104	89	41	8	1.1%	712	99.3%	88	717
1-Mar	12	103	87	73	78	72	75	67	10	1.7%	577	99.8%	71	578
2-Mar	8	98	96	76	89	111	113	4	12	2.0%	607	99.8%	74	608
Total	**91**	**502**	**449**	**386**	**484**	**495**	**421**	**172**	**55**	**1.7%**	**3,000**	**94.9%**	**375**	**3,161**
Avg.	**18**	**100**	**90**	**77**	**97**	**99**	**84**	**43**	**11**	**1.7%**	**611**	**96.6%**	**77**	**632**

4.2 GCT

4.2.1 Daily distribution

The GCT survey had 3,579 responses. This number of responses is 44.6% of the total week's activity of 8,022 trucks. Table 5 provides a summary and comparison in terms of number of transactions and type of transaction.

The GCT survey had 3,579 responses, 44.6% of the total weekly activity of 8,022 trucks.

[1] Validation requires that the field tested have complete information in all categories.

Table 5: GCT Container Daily Gate Activities and Survey Responses

	27-Feb		28-Feb		29-Feb		1-Mar		2-Mar	
	GCT	Survey	GCT	Survey	GCT	Survey	GCT	Survey	GCT	Survey
Load in	421	161	583	241	507	294	458	373	519	287
Load out	803	371	865	406	761	377	905	511	841	403
Empty in	653	463	647	409	586	306	626	376	625	387
Empty out	301	120	276	135	276	135	203	99	211	94
Chassis in	34	44	22	24	32	54	23	32	38	17
Chassis out	17	40	57	7	74	28	39	41	48	23
Bobtail in	440	3	451	20	457	0	446	1	454	1
Bobtail out	453	150	503	167	491	132	436	133	550	169
Total in	**1,548**	**671**	**1,703**	**694**	**1,582**	**654**	**1,553**	**782**	**1,636**	**692**
Total out	**1,574**	**681**	**1,701**	**715**	**1,602**	**672**	**1,583**	**784**	**1,650**	**689**
Gross Total	**3,122**	**1,352**	**3,404**	**1,409**	**3,184**	**1,326**	**3,136**	**1,566**	**3,286**	**1,381**
# of Trucks	**1,548**	**684**	**1,703**	**728**	**1,582**	**681**	**1,553**	**789**	**1,636**	**697**
Survey % of total number of trucks		**44.2%**		**42.7%**		**43.0%**		**50.8%**		**42.6%**

The percentages of the daily container terminal activity and survey activity are presented in Table 6.

Table 6: GCT Container Daily Gate Activities and Survey Responses in Percentage

	27-Feb		28-Feb		29-Feb		1-Mar		2-Mar	
	GCT	Survey	GCT	Survey	GCT	Survey	GCT	Survey	GCT	Survey
Load In	27.2%	24.0%	34.2%	34.7%	32.0%	45.0%	29.5%	47.7%	31.7%	41.5%
Load out	51.0%	54.5%	50.9%	56.8%	47.5%	56.1%	57.2%	65.2%	51.0%	58.5%
Empty in	42.2%	69.0%	38.0%	58.9%	37.0%	46.8%	40.3%	48.1%	38.2%	55.9%
Empty out	19.1%	17.6%	16.2%	18.9%	17.2%	20.1%	12.8%	12.6%	12.8%	13.6%
Chassis in	2.2%	6.6%	1.3%	3.5%	2.0%	8.3%	1.5%	4.1%	2.3%	2.5%
Chassis out	1.1%	5.9%	3.4%	1.0%	4.6%	4.2%	2.5%	5.2%	2.9%	3.3%
Bobtail in	28.4%	0.4%	26.5%	2.9%	28.9%	0.0%	28.7%	0.1%	27.8%	0.1%
Bobtail out	28.8%	22.0%	29.6%	23.4%	30.6%	19.6%	27.5%	17.0%	33.3%	24.5%

Some discrepancies are reflected in chassis and bobtail movements, bobtail in and bobtail out in particular. Tables 5 and 6 indicate that terminal gate activities of bobtail in and bobtail out have very similar percentage; however, the survey shows huge differences between bobtail in and bobtail out (a small number of bobtail in, but large number of bobtail out). However, the

percentage of empty in from the survey is much larger than that of the terminal gate activity summary. An explanation was provided earlier.

Since the terminal gate activity summary does not show the breakdown between true bobtail and tractor–third party bobtail, the calculation of toll costs for both the Turnpike and PA bridges and tunnels will be based on the number of axles for inbound trucks obtained from the surveys.

4.2.2 Hourly distribution

GCT hourly service provides an overall validation of 74%. This figure is due to the low entry of "time" on the survey (Table 7).

Table 7: GCT Hourly Truck Arrival and Validation

	0600-0659	0700-0759	0800-0859	0900-0959	1000-1059	1100-1159	1200-1259	Total validated	Validated/ total	Avg.	Day total
27-Feb	87	81	76	67	88	82	46	527	77.0%	75	684
28-Feb	81	94	61	70	60	76	52	494	67.9%	71	728
29-Feb	93	97	90	48	7	81	72	488	71.7%	70	681
1-Mar	98	96	66	79	95	78	36	548	69.5%	78	789
2-Mar	93	98	22	104	100	101	73	591	84.8%	84	697
Total	**452**	**466**	**315**	**368**	**350**	**418**	**279**	**2,648**	**74.0%**	**378**	**3,579**
Avg.	**90**	**93**	**63**	**74**	**70**	**84**	**56**	**530**	**74.0%**	**76**	**716**

The truck arrival at the toll plaza has a validation rate of only 34.4%. Again, this line of entry on the survey was very low (Table 8).

Table 8: GCT "Time of Arrival at the Toll Plaza" by Hour of Day

	0-0559	0600-0659	0700-0759	0800-0859	0900-0959	1000-1059	1100-1159	1200-1259	Total validated	Validated/ total	Avg.	Day total
27-Feb	11	46	44	35	47	49	40	22	294	43.0%	37	684
28-Feb	27	42	35	34	33	35	29	19	254	34.9%	32	728
29-Feb	17	42	48	39	2	16	39	10	213	31.3%	27	681
1-Mar	17	37	45	39	35	48	34	1	256	32.4%	32	789
2-Mar	18	42	23	13	39	35	35	10	215	30.8%	27	697
Total	**90**	**209**	**195**	**160**	**156**	**183**	**177**	**62**	1232	**34.4%**	**154**	**3,579**
Avg.	**18**	**42**	**39**	**32**	**31**	**37**	**35**	**12**	**246**	**34.4%**	**31**	**716**

The low validation rate in Table 8 is overcome by estimating the "Time of arrival at the toll plaza" from the "Time". The estimated outcome utilizes two assumptions. First, when the survey did not specify "Time of arrival at the toll plaza" when using the PA bridges, 15 minutes lag time was allowed to get to the terminal; 15 minutes were added to the determination of toll payment, because a truck that arrives at the terminal at 6:03 AM had to pass the toll plaza before 6:00 AM and should be considered paying the "overnight" toll rate. Thus, overnight toll rate is applied. Second, a truck that is using the Turnpike will have a lag time of 30 minutes for the same reasons that the bridge user had. For example, a survey that is marked the "time" at 9:15 AM will still be charged at the off-peak time for the Turnpike toll.

Making these modifications for the purpose of determining toll peak and off-peak time toll rate resulted in Table 9. This table provides a count for toll distribution. The result is a validation ratio of 74.4%.

Table 9: GCT Toll Distribution and Validation

	PA				NJT			Day total	Validation rate
	Peak PA	Off peak	Overnight	Total	NJT peak	NJT off-peak	Total		
27-Feb	308	205	24	537	224	313	537	684	78.5%
28-Feb	280	173	42	495	228	267	495	728	68.0%
29-Feb	299	161	31	491	286	204	490	681	72.0%
1-Mar	321	194	34	549	245	303	548	789	69.5%
2-Mar	305	252	32	589	235	357	592	697	84.9%
Total	**1,513**	**985**	**163**	**2,661**	**1,218**	**1,444**	**2,662**	**3,579**	**74.4%**

However, this validation above has a limited meaning and impact because the number of trucks that actually use toll roads en route to GCT is relatively small. The majority arrives at the GCT via non-toll roads.

4.3 General Description of Drayage Trips

4.3.1 NYCT

The surveys captured key routing information with respect to city and state of origin and destination, bridges and tunnel crossing, and Turnpike use for the drayage trips to and from NYCT. The survey responses identified 98.9% inbound and 98.5% outbound starting and finishing locations, respectively. The survey results are identified in Table 10.

The survey responses identified 98.9% inbound and 98.5% outbound starting and finishing locations, respectively.

Table 10: NYCT Inbound and Outbound O-D Survey Response Profile

	Inbound			Outbound		
	Sub-division	**# of responses**	**% of total Survey**	**Sub-division**	**# of responses**	**% of total survey**
Locations		3,126	98.9%		3,114	98.5%
Enter Turnpike		2,038	64.5%		2,043	64.6%
Exit Turnpike		2,041	64.6%		2,025	64.1%
Use of bridges		3,193	**101.0%**		3,048	**96.4%**
Use a Staten Island Bridge		3,108	98.3%		2,972	94.0%
Goethals Bridge	2,385		**75.5%**	2,309		**73.0%**
Bayonne Bridge	318		**10.1%**	296		**9.4%**
Outerbridge Crossing	286		**9.0%**	270		**8.5%**
Verrazano-Narrows Bridge	119		3.8%	97		3.1%
George Washington Bridge		78	2.5%		68	2.2%
Lincoln Tunnel		2	0.1%		1	0.0%
Other bridges (Tappan Zee, Delaware)		5	0.2%		9	0.3%
Total		3,161	100%		3,161	100%

The NYCT inbound and outbound traffic indicates an extensive use of Staten Island bridges, 98.3% and 94.0%, respectively. However, a truck en route to NYCT might use more than one bridge such as the George Washington Bridge and the Goethals Bridge. Therefore, the total number of inbound bridges used is 101%. However, the total number of bridges used outbound is only 96.4%.

Almost all traffic to NYCT is from a destination other than Staten Island. The NYCT inbound traffic uses one of the three PA bridges at a rate of 94.6%. NYCT outbound traffic uses these bridges at a rate of 91.0%. From the three bridges the Goethals is most popular, inbound 75.5% and outbound 73%.

The NYCT inbound and outbound traffic indicates an extensive use of Staten Island bridges, 98.3% and 94.0%, respectively.

The NYCT inbound and outbound traffic uses the Turnpike at a rate of more than 64%.

4.3.2 GCT

In general, Table 11 provides a summary of inbound and outbound traffic profile. Out of 3,579 survey responses at GCT, 3,426 and 3,414 provided location names for origin and destinations respectively. The number of truck trips that used the Turnpike are 1,615 and 1,548 out of 3,579 for inbound and outbound respectively (Table 11).

The O-D traffic to GCT using bridges and tunnels is quite limited. The use of bridges and tunnels including Staten Island Bridges from origins to GCT and to destinations from GCT accounts for only 11.5% and 7.1% of the total truck trips, respectively. The use of Staten Island bridges accounts 5.4% and 2.7% for inbound and outbound truck trips, respectively. This indicates that trucks from origins east of Hudson River do not go back there on their return trip from GCT; rather they go to destinations west of Hudson River. The majority of the traffic at GCT does not use any bridge or tunnel, 88.5% and 92.9% for inbound and outbound, respectively. In addition, the majority of the truck trips do not use the Turnpike either; only 45.1% and 43.3% for inbound and outbound trips, did use the Turnpike respectively.

The use of bridges and tunnels including Staten Island Bridges from origins to GCT and to destinations from GCT accounts for only 11.5% and 7.1% of the total truck trips, respectively.

Table 11: Use of Turnpike and Bridges for Truck Trips at GCT

	Inbound			Outbound		
	Sub-division	**# of responses**	**% of total survey**	**Sub-division**	**# of responses**	**% of total survey**
Locations		3,426	95.7%		3,414	95.4%
Enter Turnpike		1,615	45.1%		1,548	43.3%
Exit Turnpike		1,613	45.1%		1,514	42.3%
Use of Bridges/Tunnels		411	11.5%		254	7.1%
Use of Staten Island Bridges		169	4.7%		78	2.2%
Goethals Bridge	3		0.1%	17		0.5%
Verrazano-Narrows Bridge	32		0.9%	54		1.5%
Outerbridge Crossing	1		0.0%	7		0.2%
Bayonne Bridge	133		3.7%		191	5.3%
George Washington Bridge		188	5.3%		151	4.2%
Lincoln Tunnel		54	1.5%		25	0.7%
Total			3,579		3,579	

4.4 Sample Size and Validation

In order to provide credence to the study, it is important to have a sufficient sample size. The objective is to select a sample size that will provide a high level of confidence in order to be able to infer related features from the sample to the population. The alternative, an analysis of the population, is very costly.

The survey size was determined based on the average gate activity provided by NYCT a few weeks prior to the survey data collection for the study. The average gate activity for NYCT was 1,600 gate counts. This implies that, in order to get a significance level of 99%, the valid sample size should be a minimum of 470 surveys. Since there was anticipation that some of the surveys would be incomplete or unusable, the total number of surveys was adjusted upwards (see Table 12 column "Number of surveys count").

Table 12: Significance Level and Validation of Data

	Number of surveys count	Payment method count	Axles count	Daily gate count	Minimum sample size confidence level			Payment method confidence level	Axles conf. level
					90%	95%	99%		
NYCT									
27-Feb	622	610	435	1,636	233	311	473	> 99%	> 95%
28-Feb	636	615	482	1,625	233	311	472	> 99%	> 95%
29-Feb	717	703	560	1,807	237	317	486	> 99%	> 99%
1-Mar	578	565	435	1,751	236	315	482	> 99%	> 95%
2-Mar	608	602	463	1,370	227	300	448	> 99%	> 99%
AVG.	**632**	**619**	**475**	**1,638**	**233**	**311**	**473**	> 99%	> 99%
Total	**3,161**	**3,095**	**2,375**	**8,189**	**263**	**367**	**616**	> 99%	> 99%
GCT									
27-Feb	684	391	684	1,548	232	308	465	> 95%	> 99%
28-Feb	728	303	728	1,703	235	313	479	> 90%	> 99%
29-Feb	681	274	681	1582	232	309	469	> 90%	> 99%
1-Mar	789	369	789	1553	232	308	466	> 95%	> 99%
2-Mar	697	331	697	1636	233	311	473	> 95%	> 99%
AVG.	**716**	**334**	**716**	**1,604**	**233**	**310**	**470**	> 95%	> 99%
Total	**3579**	**1,668**	**3579**	**8,022**	**263**	**367**	**615**	> 99%	> 99%

The terminal gate activity data was provided based on a complete day of work: NYCT from 6:00 AM to 5:00 PM and GCT from 6:00 AM to 7:00 PM. The survey data collection, however, was from 6:00 AM to 1:00 PM in both terminals for five consecutive days.

The survey analysis utilizes various sub-sections of the survey data subject to standard statistical methodologies.[2] Each one of the sub-sections was tested for significance and validation. Validation requires that the field-tested data has complete information in all categories. For example, for the analysis of PA toll cost which incorporates the analysis of the number of axles and the method of payment, both must have a populated database. Thus, the "Payment method" and the "Axles count" from the survey are next to each other for the determination of significance level (Table 12). For example, on Feb 27, the sample size or "Number of surveys

[2] James Bartlett, Joe Kotrlik, and Chadwick Higgins, "Organizational Research: Determining Appropriate Sample Size in Survey Research", Information Technology and Performance Journal, Vol.19, No.1, Spring 2001.

count" was 622 the "Payment method" included 610 responses, which is more than the required 473 for a significance level of 99% (see payment method column). However, the "Axles count" was 435, which is below the 99% confidence level but above 95% confidence. The "Minimum sample size confidence level" was based on "Daily gate count" and was the foundation of significant level determination.

All surveys were checked for validation. A survey form that did not validate was corrected for simple errors or omissions. This includes misspelled names of locations, and correcting obvious inconsistencies based on cross information in the survey form. When it was impossible to correct, the entry was left blank. For example, the validation demonstrates that the NYCT total method of payment of 3,095 counts for 97.9% of the number of surveys (3,161).

A 99% confidence level was achieved for "Payment method" in each of the five days for NYCT (Table 12). In GCT the level of confidence is 90% and 95%. However, in the case of "Axles count" GCT has the 99% confidence level and NYCT's confidence level range is 95% to 99%. In a similar manner other confidence measures were taken. The lowest level of confidence was 90% with the majority of 95% or better.

The high confidence level obtained all through the analysis provides robust statistical confidence in the analytical results that follow.

4.5 Toll Rate

A truck arriving in NYCT from a location other than Staten Island pays a bridge toll. The roads leading to the bridge could also be toll roads such as the Turnpike.

4.5.1 PANYNJ

The contemporary tolls charged *per axle* by the PA are based on four rates: cash, E-ZPass peak, E-ZPass off-peak and E-ZPass overnight. The rate structure and proposed changes are provided in Table 13.

The contemporary tolls charged *per axle* by the PA are based on four rates: cash, E-ZPass peak, E-ZPass off-peak and E-ZPass overnight.

Table 13: PANYNJ Toll Rates and Implementation Schedule

Effective date	Cash	E-ZPass peak	E-ZPass off-peak	E-ZPass overnight
Before Sept. 18, 2011	$8.00	$8.00	$7.00	$5.50
September 18, 2011	$13.00	$10.00	$9.00	$7.50
December 2, 2012	$15.00	$12.00	$11.00	$9.50
December 1, 2013	$17.00	$14.00	$13.00	$11.50
December 7, 2014	$19.00	$16.00	$15.00	$13.50
December 6, 2015	$21.00	$18.00	$17.00	$15.50

Source: The Port Authority of NY & NJ, Current and Revised Proposal 2011 to 2015 Toll Rates.

Since September 18, 2011, the cash rate is the same all through the day at $13.00 per axle. The

next change is due on December 2, 2012. PA peak time for E-ZPass rates is weekdays 6:00 AM to 10:00 AM and 4:00 PM to 8:00 PM and Saturday and Sunday 11:00 AM to 9:00 PM. The overnight hours are 10:00 PM to 6:00 AM. Off-peak rates apply to all the other hours. Using these rates, a typical truck of five axles crossing the Goethals Bridge during peak time paying by E-ZPass is charged $50.00 ($10.00 toll rate x 5 axles) for the crossing. However, the same crossing in 2015 will be $90.00. The annual toll structure charge is an additional $2.00 per axle each year until 2015 (Table 13).

4.5.2 New Jersey Turnpike

The New Jersey Turnpike toll and the PA bridge tolls are a cost of doing business for a trucker. The Turnpike classifies trucks by the number of axles. The Turnpike toll rate for trucks is determined by number of axles, distance traveled on the Turnpike and method of payment (cash, E-ZPass or E-ZPass off-peak). Peak period is determined by the NJ Turnpike Authority by the time of entry Monday to Friday 7:00 AM to 9:00 AM and 4:30 PM to 6:30 PM (Figure 1). For example, a truck with five axles (class 5 truck) travelling from exit 13A to 13 is charged $12.25 for cash (per axle rate - $2.45), $11.00 using E-ZPass (per axle rate - $2.20) and $10.50 using E-ZPass off-peak time (per axle rate -$2.10).[3] The Turnpike toll tables do not identify a specific method of charges in the charges per axle. Each truck class has its own rate schedule table.

<table>
<tr><th></th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th><th>12</th><th>13</th><th>14</th><th>15</th><th>16</th><th>17</th><th>18</th><th>19</th><th>20</th><th>21</th><th>22</th><th>23</th><th>24</th></tr>
<tr><td>Port Authority bridges toll rate schedule</td><td colspan="5">Overnight</td><td colspan="5">Peak hours</td><td colspan="3">Off-peak</td><td colspan="2">hours</td><td colspan="6">Peak hours</td><td colspan="3">Overnight</td></tr>
<tr><td>NJ Turnpike toll rate schedule</td><td colspan="5">Off-peak hours</td><td colspan="2"></td><td colspan="3">Peak hours</td><td colspan="5">Off-peak</td><td colspan="2">hours</td><td colspan="3">4:30 to 6:30 peak</td><td colspan="7">Off-peak hours</td></tr>
<tr><td>Survey schedule</td><td colspan="5"></td><td colspan="8">Survey time</td><td colspan="11"></td></tr>
</table>

Figure 1: Week Schedule for Toll Rates and the Survey

The Turnpike toll increase on January 1, 2012, by 53% was across the board. It was the first increase since 2008. This ratio will be used to determine the Turnpike toll rate before the increase.

The total toll cost for a trucker using any one of the MCTs is a combination of the PA toll and the Turnpike toll. Thus, a trucker decides the toll when making the route selection. Furthermore, a trucker has also to remember that the peak time schedules for the bridge crossing and the Turnpike are not the same (Figure 1).

4.6 NYCT: Data Analysis

Survey data analysis focuses on the drayage toll cost at NYCT. The toll paid is a function of the truck number of axles, peak or off-peak toll or overnight rates and the method of payment (cash

[3] http://www.state.nj.us/turnpike/toll-rates.html , 02/23/2012.

or E-ZPass).

4.6.1 Truck trips

During the week of study the total number of inbound truck trips at the NYCT was 8,189 with a daily average of 1,638 trucks. The survey obtained 3,161 responses. Thus, this is the sample size used in the analysis.

Inbound truck trips are divided into four categories based on the number of axles of the truck (Table 14). For example, the five-axle trucks dominated the results with 83.6% of the total number of trucks and 88.1% of the total number of axles. The average number of axles for an inbound truck was 4.76.

The distinction between the number of trucks by axles and the number of axles is made because the toll structure is based on the number of axles, not the number of trucks. Thus, the total number of axles is the root of determining the toll costs for the truckers. The total number of inbound axles for the duration of the survey was 14,992 (Table 14). The number of axles for the trucks that were serviced by NYCT during the same week of the survey is estimated at 36,533 axles (8,189 x 4.76) using the same ratios.

Table 14: NYCT Inbound Truck Distribution by Axles

Number of axles	Number of trucks by axle (inbound)	% of truck axles from total (inbound)	Total number of axles	% of number of axles from total
3	388	12.3%	1,164	7.8%
4	48	1.5%	192	1.3%
5	2,642	83.6%	13,210	88.1%
6	71	2.2%	426	2.8%
N/A	12	0.4%		0.0%
Total	3,161	100.0%	14,992	100.0%
Average number of axles per inbound truck	3,149		**4.76**	

The trucks arriving in the terminal are subject to two different methods of determining the peak and off-peak time, the PA and the NJT. Their schedules are different. Thus, the distribution of arrival is different.

4.6.2 Bridge Tolls

The survey indicates that 3,095 responded to the toll payment method. The distribution between cash and E-ZPass was 17.1% and 82.9% for the use of cash and E-ZPass respectively (Table 15). Furthermore, from the cash payers 68% arrived at the toll plaza during peak time. The distribution in Table 15 also takes into account that there are times that the survey is missing the "Time of arrival at toll plaza"; therefore, a lag of 15 minutes was allowed to make the trip to the MCT and be charged at the appropriate rate. For example, when a truck response questionnaire does not have an entry for "Time arrival at the toll plaza," but there is an entry at "Time" such as 6:05 AM. In tabulating the data for this truck a 15-minute window is applied taking count of the

time it takes to arrive in the terminal from the Goethals Bridge. Thus, it placed this entry in the category of the "overnight" toll rate. This methodology and assumption were made in all cases that apply.

Table 15: NYCT Inbound Truckers' Arrival Time and Method of Payment

	Method of payment					
	Cash		**E-ZPass**			**Total**
Number of responses	529		2,566			3,095
Distribution of responses	17.1%		82.9%			
Arrival distribution						
	Peak	Off-peak	Peak	Off-peak	Overnight	
Truck arrival time	350	165	1,508	954	84	3,061
Distribution within category	68.0%	32.0%	59.2%	37.5%	3.3%	
Overall distribution	11.4%	5.4%	49.3%	31.2%	2.7%	

The breakdown of trucks arriving in the terminal during PA peak time and off-peak time schedules is 60.7% and 39.3%, respectively. This distribution is for payment in cash and E-ZPass. The E-ZPass payers are distributed between the 49.3% of the trucks who pay E-ZPass peak rates, 31.2% who pay E-ZPass off-peak rates and the rest (2.7%) who pay E-ZPass overnight rates (Table 15).

The determination of tolls is subject to validation or a reduction in database sample to draw from. This reduction is due to the fact that some of the information from the responders is missing. For example, if a survey reported paying in cash but with no information about the number of axles, there will be missing information with respect to the number axles. Applying this principle to Table 14, the report says that there are 388 trucks with three axles; however, when we add to this base how many paid cash or E-ZPass the number is only 366 (Table 16). This is a reduction of about 6%. Thus, the number declines in all the categories. Therefore, the base for toll cost determination is on a reduced base of the observations and therefore an adjustment to the corresponding ratios. However, the differences are not very significant overall.

Table 16: NYCT Bridge Inbound Distribution by Axles and Time of Day

Axles	**Cash**	**E-ZPass**			**Total**	**% of total axles**
		Peak	**Off-peak**	**Overnight**		
3	336	468	270	24	1,098	7.5%
4	20	108	64	0	192	1.3%
5	2,020	6,395	4,090	350	12,855	**88.2%**
6	42	228	150	6	426	2.9%
Totals axles	2,418	7,199	4,574	380	14,571	100.0%
Distribution from total	16.6%	49.4%	31.4%	2.6%	100.0%	

Table 17 captures the distribution of payment method and time of day for the sample data. The percent of the number of axles from total is very similar to the complete sample. The most

significant difference is the cash payment that is estimated at 16.6%, where before it was estimated at 17.1% (Table 15). This distribution will be the basis for further toll determination.

The axle's distribution and payment distribution obtained from the survey sample and recorded in Table 16 is used to determine the weekly distribution of axles from the total weekly activity of 8,189 trucks. For example, the 88.2% of five axles from the survey (Table 16) accounts for an estimated a total of 36,123 axles from the total weekly activity or population recorded in Table 17. This total is divided between the methods of payments, 16.6% in cash (5,994 axles), 49.4% in E-ZPass peak rate (17,847 axles), 31.4% in E-ZPass off peak (11,339 axles) and 2.6% overnight rate (942 axles). Furthermore, the total number of axles for the survey is 39,842 (Table 17).

Table 17: NYCT Inbound Truckers' Toll Payment Method

Axles	Cash	E-ZPass			Total number of axles	% of total axles
		Peak	Off-peak	Overnight		
Payment distribution	**16.6%**	**49.4%**	**31.4%**	**2.6%**		
3	307	915	581	48	1,851	7.54%
4	72	213	135	11	432	1.32%
5	5,994	17,847	11,339	942	**36,123**	**88.22%**
6	238	710	451	37	1,436	2.92%
Totals axels	**6,612**	**19,685**	**12,507**	**1,039**	**39,842**	**100.0%**

The total number of axles in Table 17 multiplied by toll rate in Table 13 is the foundation for obtaining the estimated total bridge toll cost. For example, assuming that the patterns obtained from the survey are applied to the rest of the days of the week, the total number of axles that paid cash is estimated at 6,612 (Table 17). Using the distributions obtained during the survey and applying them to the rest of the week, the 8,189 actual week's activity costing the truckers in 2012 is estimated at a total of $403,154 (Table 18).[4] Annually, applying the same assumptions, in 2012 the truckers pay an estimated total of almost $21 million in bridge tolls. The rest of the table obtained the results assuming the same as above.

Table 18: NYCT Inbound Truckers Estimated Bridge Toll Costs

Year	Cash	E-ZPass			Total per week	Annual
		Peak	Off-peak	Overnight		
2010	$ 52,893	$ 157,477	$ 87,549	$ 5,715	$ 303,634	$ 15,788,975
2011	$ 85,952	$ 196,846	$ 112,563	$ 7,793	**$ 403,154**	**$ 20,964,001**
2012	$ 99,175	$ 236,216	$ 137,577	$ 9,871	$ 482,839	$ 25,107,605
2013	$ 112,399	$ 275,585	$ 162,590	$ 11,949	$ 562,523	$ 29,251,208
2014	$ 125,622	$ 314,954	$ 187,604	$ 14,027	$ 642,208	$ 33,394,812
2015	$ 138,845	$ 354,324	$ 212,618	$ 16,105	$ 721,893	$ 37,538,416

Note: the annual figures are based on 52 weeks per year.

[4] Note: The next increase takes effect on Dec 2, 2012 (see above); therefore the critical figures for the present time are the 2011 figures because the rates were determined in 2011 for most of the duration of 2012.

The results recorded in Table 19 estimate that the average toll bridge cost per axle before the toll increase was $7.62 and after the first toll increase in 2011 it is estimated at $10.12 an axle, a difference of $2.50 per axle; i.e., a five-axle truck pays $12.50 more after the toll increase. The future year's toll increase is estimated to increase trucks' bridge toll cost at a rate of $2.00 an axle.

The toll increase for 2010 to 2011 is estimated to cost the truckers $5.1 million, a 32.8% increase (Table 19). The toll payment for future years, assuming that the toll rates proposed prevail, and assuming the same distributions of axles and payment methods between cash and E-ZPass continues, the annual increase through 2015 is estimated to be more than $4.1 million; an increase at a decreasing rate (Table 19).

Table 19: NYCT Inbound Truckers' Estimated Annual Bridge Toll Cost

	Week toll cost			Annual toll cost		
Year	**Total**	**Per axle**	**Axle difference**	**Total**	**Total difference**	**% difference**
2010	$ 303,634	$ 7.62		$ 15,788,975		
2011	$ 403,154	**$ 10.12**	**$ 2.50**	$ 20,964,001	**$ 5,175,026**	**32.8%**
2012	$ 482,839	$ 12.12	**$ 2.00**	$ 25,107,605	**$ 4,143,604**	19.8%
2013	$ 562,523	$ 14.12	$ 2.00	$ 29,251,208	**$ 4,143,604**	16.5%
2014	$ 642,208	$ 16.12	$ 2.00	$ 33,394,812	**$ 4,143,604**	14.2%
2015	$ 721,893	$ 18.12	$ 2.00	$ 37,538,416	**$ 4,143,604**	12.4%

4.7 Cluster Analysis

Cluster analysis provides a focus on the key locations for the purpose of determining an overall traffic distribution pattern. In general, five to eight locations that capture the bulk of the traffic activity are an indicator of the terminal inbound and outbound activities and are used as an instrument for future expectations and estimates for toll costs. The cluster analysis starts with cluster determination, followed by each location analysis before a cluster summary.

Cluster analysis provides a focus on the key locations for the purpose of determining an overall traffic distribution pattern.

4.7.1 Cluster determination

Cluster analysis focuses on the origin to destination activities of leading locations. The largest number (81.4%) of truck trips arriving in NYCT during the seven hours a day of the week the survey was conducted is primarily originated in NJ (Table 20). Thus, a further analysis to develop the origin of a trip profile was carried out through a cluster analysis.

Table 20: Truck Inbound Distribution by State and Canada

State	Number	% of total
NJ	2,573	81.4%
NY	244	7.7%
PA	167	5.3%
MA	72	2.3%
CT	40	1.3%
CANADA	25	0.8%
MD	10	0.3%
RI	7	0.2%
DE	6	0.2%
OH	6	0.2%
ME	2	0.1%
NH	2	0.1%
GA	1	0.0%
Other	6	0.2%
Total	**3,161**	**100.0%**

Drayage to NYCT exhibits 10 distinct inbound and outbound destinations (Table 21) ranked in the same order for O-D. The top 10 inbound and outbound origins and destinations capture 66.8% and 67.1% of the weekly survey activities respectively (Table 21).

Table 21: Top Ten NYCT Locations for Inbound and Outbound Trips

Rank (inbound = base)	Location	Inbound				Outbound			
		Number	% of total top ten	% of total top seven	% of total survey	Number	% of total top ten	% of total top seven	% of total survey
1	**Newark**	**836**	**39.6%**	**44.5%**	**26.4%**	**849**	**40.2%**	**44.6%**	**26.9%**
2	**Kearny**	**331**	**15.7%**	**17.6%**	**10.5%**	**305**	**14.4%**	**16.0%**	**9.6%**
3	**Elizabeth**	**239**	**11.3%**	**12.7%**	**7.6%**	**284**	**13.4%**	**14.9%**	**9.0%**
4	**Jersey City**	**138**	**6.5%**	**7.3%**	**4.4%**	**148**	**7.0%**	**7.8%**	**4.7%**
5	**Linden**	**128**	**6.1%**	**6.8%**	**4.0%**	**116**	**5.5%**	**6.1%**	**3.7%**
6	**Edison**	**110**	**5.2%**	**5.9%**	**3.5%**	**103**	**4.9%**	**5.4%**	**3.3%**
7	**Carteret**	**96**	**4.5%**	**5.1%**	**3.0%**	**97**	**4.6%**	**5.1%**	**3.1%**
8	Secaucus	86	4.1%		2.7%	66	3.1%		2.1%
9	Bayonne	83	3.9%		2.6%	96	4.5%		3.0%
10	N. Bergen	66	3.1%		2.1%	58	2.7%		1.8%
Total number of trucks for the top 10 locations		**2,113**	**66.8%**			**2,122**	**67.1%**		
Total number of trucks for the top seven locations subsample		**1,878**		**100%**	**59.4%**	**1,902**		100%	**60.2%**
Total Survey		**3,161**			**100%**	**3,161**			100%

The top seven locations, where each one is more than 3% of the total survey or more than 4.5% which are 96 inbound and outbound truck activities a week, are selected for additional cluster

evaluation. The cluster analysis objective is to develop a base for O-D comparison between NYCT and GCT.

The top seven locations provide 1,878 origins and 1,902 destinations; 59.4% and 60.2% of the total weekly survey responses, respectively (Table 21). Cluster analysis started with cluster validation. Cluster validation implies that there is a complete O-D match for all data fields within the database. Therefore, the total number of observations decreased to 1,579 (Table 22).

These clusters clearly demonstrate that a large number of trucks (87.5%) travel to and from the same location (Table 22). Data analysis also demonstrates that in almost all instances the same destinations are also ranked in the same order for the inbound or outbound destinations. For example, Newark originated and returned 624 of a total of 680 originations and 684 destinations to Newark; these are 91.8% and 91.2%, respectively.

Table 22: Origin to Destination Trip Analysis

O/D	Carteret	Edison	Elizabeth	Jersey City	Kearny	Linden	Newark	Grand total	% return to origin
Carteret	84	1	1		1		1	88	95.5%
Edison		59	7	6	4	1	10	87	67.8%
Elizabeth	1	3	180	7	3	1	11	206	87.4%
Jersey City	2	6	3	94	4		10	119	79.0%
Kearny	1	7	11	2	250	1	15	287	87.1%
Linden		2	4		2	91	9	108	84.3%
Newark	2	7	13	21	12	5	624	684	91.2%
Grand Total	**90**	**85**	**219**	**130**	**276**	**99**	**680**	**1,579**	
% return to origin	93.3%	69.4%	82.2%	72.3%	90.6%	91.9%	91.8%		**87.5%**

Note: The overall percent return to the origin (87.5%) is a weighted average of all top seven locations.

The top seven O-Ds for NYCT are responsible for 50% of the inbound and outbound traffic. However, the survey responses indicated that Newark has 836 inbound truck trips. These truck trips are 44.5% of the total top seven O-D trips in the survey responses. The same 836 responses are also 26.4% from all the 3,161 survey responses obtained (Table 21). Therefore, the ratio of 26.4% will be used in determining overall performance for Newark in the overall analysis. Similarly, the inbound percent of total surveys will be used for all the seven locations.

4.7.2 Analysis of top seven locations

The top seven locations are analyzed for bridge toll costs based on number of truck axles, time of arrival and method of payment. Furthermore, the analysis utilizes all the distributions obtained above. The objective is to provide an answer for the toll increase effect, using "what if" hypothesis, with the same flow pattern that had been in the past and assuming that they will be the same in the future. We note that this is an over-simplification, but without continuous daily data, for the purpose of this project, we expect that the outcome will be significant and sufficient to provide an order of magnitude of the toll increases and their effects.

The top seven locations are highlighted in Tables 21 and 22. The analysis will use Newark as an example to demonstrate how the calculation for toll costs (PA and Turnpike) is undertaken.

4.7.2.1 Newark

Newark's share of the number of inbound trucks in the survey is 26.4% (Table 21); i.e., 2,166 trucks from the weekly activity (8,819 trucks x 26.4% is Newark's share). The trucks axle distribution of the survey was determined in Table 17 and repeated in Table 23 below. Using this distribution the number of axles per truck category is obtained (Table 23). For example, the number of trucks with five axles that pay cash is 317 with a total number of axles of 1,584. Altogether, the 2,166 trucks pay for 10,537 axles (Table 25); i.e., the average truck of this sub-sample has 4.86 axles.

Table 23: Newark's Weekly Number of Axles for Bridge Toll Payment

# of axles	Dist. in %	Dist. by axles	Number of trucks by axle and payment method				Number of axles for toll payment purpose			
			Cash	Peak	Off-peak	Over-night	Cash	Peak	Off-peak	Over-night
			16.6%	49.4%	31.4%	2.6%				
3	7.54%	169	28	83	53	4	84	250	159	13
4	1.32%	28	5	14	9	1	19	56	35	3
5	88.22%	1,908	**317**	943	599	50	**1,584**	4,713	2,996	248
6	2.92%	61	10	30	19	2	60	180	114	9
Total		**2,166**	360	1,070	680	56	1,747	5,199	3,304	274

The total bridge toll cost for the truckers during this week is estimated at $106,623 (Table 24). Annually, the total toll cost is estimated to be over $5.54 million (using 52 weeks per year).

Table 24: NYCT Newark Weekly and Annual Bridge Toll Costs

	Week toll cost						Annual toll cost		% change
# of axles	1,749	5,205	3,309	274	10,537				
Year	Cash	Peak	Off-peak	Over-night	Total	Difference	Total	Difference	
2010	$13,993	$ 1,642	$ 23,160	$1,507	$ 80,302		$4,175,694		
2011	$22,739	$52,052	$ 29,777	$ 2,055	**$ 106,623**	$26,321	**$5,544,397**	$1,368,703	32.8%
2012	$26,237	$62,463	$ 36,394	$2,603	$127,697	$21,074	$6,640,235	$1,095,839	19.8%
2013	$ 9,735	$72,873	$ 43,012	$3,151	$148,771	$21,074	$7,736,074	$1,095,839	16.5%
2014	$33,233	$83,284	$ 49,629	$3,698	$169,844	$21,074	$8,831,913	$1,095,839	14.2%
2015	$36,732	$93,694	$ 56,246	$ 4,246	$190,918	$21,074	$9,927,752	$1,095,839	12.4%

4.4.2.2 Bridge Tolls for the Top Seven Locations

The determination method used for Newark is applied to all the other top locations (Appendix A). A summary of the top seven locations demonstrated for example that Kearny's total annual bridge toll cost for 2011 is estimated at more than $2.19 million (Table 25). As determined before, the results also indicate that the annual toll increase from 2010 to 2011 is 32.8%, exhibiting an increase at a decreasing rate of thereafter (Table 24).

Table 25: NYCT Weekly and Annual Bridge Toll Cost of Top Seven Locations

Year	Newark	Kearny	Elizabeth	Jersey City	Linden	Edison	Carteret
	Total number of axles (week)						
	10,537	**4,172**	**3,012**	**1,739**	**1,613**	**1,386**	**1,210**
	Week total cost						
2010	$ 80,302	$ 31,794	$ 22,957	$ 13,256	$ 12,295	$ 10,566	$ 9,221
2011	**$ 106,623**	**$ 42,216**	**$ 30,482**	**$ 17,600**	**$ 16,325**	**$ 14,029**	**$ 12,244**
2012	$ 127,697	$ 50,559	$ 36,507	$ 21,079	$ 19,552	$ 16,802	$ 14,664
2013	$ 148,771	$ 58,903	$ 42,531	$ 24,558	$ 22,778	$ 19,575	$ 17,084
2014	$ 169,844	$ 67,247	$ 48,556	$ 28,037	$ 26,005	$ 22,348	$ 19,504
2015	$ 190,918	$ 75,591	$ 54,581	$ 31,515	$ 29,232	$ 25,121	$ 21,924
	Annual total cost						
2010	$ 4,175,694	$ 1,653,295	$ 1,193,769	$ 689,289	$ 639,341	$ 549,433	$ 479,506
2011	**$ 5,544,397**	**$ 2,195,210**	**$ 1,585,061**	**$ 915,223**	**$ 848,903**	**$ 729,526**	**$ 636,677**
2012	$ 6,640,235	$ 2,629,088	$ 1,898,345	$ 1,096,115	$ 1,016,687	$ 873,715	$ 762,515
2013	$ 7,736,074	$ 3,062,967	$ 2,211,629	$ 1,277,007	$ 1,184,471	$ 1,017,905	$ 888,353
2014	$ 8,831,913	$ 3,496,846	$ 2,524,913	$ 1,457,900	$ 1,352,255	$ 1,162,094	$ 1,014,191
2015	$ 9,927,752	$ 3,930,725	$ 2,838,197	$ 1,638,792	$ 1,520,039	$ 1,306,283	$ 1,140,029

In conclusion, in 2012[5], the bridge toll cost an estimated average of $10.12 per axle using the 4.76 average number of axles per truck that arrive at NYCT as a base; i.e., a truck pays an average of $48.17 in bridge tolls. In addition, as indicated before this is an increase of $12.50 from the previous year.

4.7.3 Turnpike Tolls

Toll payments for the Turnpike are derived from the number of trips made by the truckers via the Turnpike. From the 3,161 survey records only 2,041 indicated that they used the Turnpike (64.6%). From the Turnpike users 1,952 (95.6%) or 61.7% of the total survey responses arrived in NYCT via Turnpike Exit 13 and the Goethals Bridge; i.e., this is the basis for determining the truckers' Turnpike toll cost. The truck distribution of Turnpike use is outlined in Table 26. The dominating entry point en route to NYCT is Turnpike Exit 13A (Table 26). Similarly, the dominating outbound point from NYCT to the Turnpike is also Exit 13A. A comparison of the distribution between the points of entry and exit is also similar (Table 26).

[5] See footnote number 2.

Table 26: NYCT Inbound Turnpike Use

Point of Entry/Exit (Exit number)	**12**	**13A**	**14 & 14A**	**15** (E,W,X)	**16** (E,W)	**18** (E,W)	**Other**	**Total**
Number of users - inbound	96	**1,007**	226	193	108	106	216	**1,952**
% of total inbound	4.9%	**51.6%**	11.6%	9.9%	5.5%	5.4%	11.1%	100%
Number of users - outbound	97	**965**	235	165	102	79	220	**1,863**
% of total outbound	5.2%	**51.8%**	12.6%	8.9%	5.5%	4.2%	11.8%	100%

The Turnpike toll payments are cash or E-ZPass. The number of cash payers en route to NYCT is 269 or 13.8%. The E-ZPass users totaled 1,655 (84.8%), the balance (1.4%) did not specify payment method.

The Turnpike toll rates are based on the truck's number of axles or "truck class". Each truck class has three toll rates: cash, E-ZPass peak and E-ZPass off-peak. In addition, the toll rate is determined by the distance traveled and is listed in the "toll rate schedule" posted by the New Jersey Turnpike Authority.[6] Since the Turnpike tolls are paid each time a truck enters the Turnpike, tolls are charged from the origin to NYCT and from NYCT to the destination.

4.7.3.1 Turnpike Toll for the Top Seven Locations

Using the Turnpike toll rates an analysis of the top seven sites was carried out to determine the toll cost per site, i.e., for each one of the seven sites and back to the same site.

4.7.3.2 Newark

The survey indicated that the Newark originated a total of 664 NYCT **inbound** Turnpike toll-paying truck trips, representing 21% of the survey. These trucks paid an estimated Turnpike toll of $1,918 or a weighted average of $2.89 per truck. Applying the same ratios for the same week, the estimated total number of trucks that use Newark as their Turnpike entry is 1,720 (Table 27). The Newark to NYCT trip is estimated to cost the truckers a total of $4,968 a week (Table 27).

Table 27: Newark to NYCT Inbound Turnpike Estimated Truck Use and Tolls Paid

	Number of trucks	Total toll cost	Avg. toll per truck
Cash toll	75	$ 282.75	$ 3.77
Peak toll	174	$ 503.05	$ 2.89
Off-peak toll	415	$ 1,131.70	$ 2.73
Total tolls	664	$ 1,917.50	**$ 2.89**
Trucks % of total Survey	21.0%		
Estimated number of Newark trucks from week activity	1,720	$ 4,968	

[6] http://www.state.nj.us/turnpike/documents/c5sched-2012.pdf

The truckers' entrance to the Turnpike en route to NYCT (Table 28) is primarily through Exit 13A (77.3%). Most trucks are five axles (80.4%). Most trucks used the Turnpike at off-peak time (62.5%). Also, most trucks use E-ZPass (88.7%). This profile is similar to all the other top seven locations as well.

Table 28: Trucks En Route to NYCT Entrance to Turnpike by Number of Axles and Tolls Paid

Turnpike Entrance	Number of trucks by axle				Toll paid by axle				Total paid
	3	4	5	6	3	4	5	6	
	Peak rate								
14			22	1			$ 116.60	$ 5.90	$ 122.50
13A	15	5	119	1	$ 21.75	$ 9.50	$ 261.80	$ 2.60	$ 295.65
15E	1		9		$ 5.60		$ 69.75		$ 75.35
15W			1				$ 9.55		$ 9.55
Subtotal									**$ 503.05**
	Off-peak rate								
10			1				$ 7.65		$ 7.65
14	5	1	68	2	$ 19.25	$ 4.05	$ 343.40	$ 11.80	$ 378.50
13A	36	6	281	5	$ 50.40	$ 10.80	$ 590.10	$ 12.25	$ 663.55
15E			6	1			$ 44.10	$ 8.60	$ 52.70
15W			2				$ 18.10		$ 18.10
8A			1				$ 11.20		$ 11.20
Subtotal									**$ 1,131.70**
	Cash rate								
12			1				$ 2.75		$ 2.75
14	1		17	2	$ 4.35		$ 103.50	$ 13.80	$ 121.65
13A	12		1	34	$ 19.80	$ 2.15	$ 83.30		$ 105.25
14E	1		4		$ 6.10		$ 33.60		$ 39.70
16E			1				$ 13.40		$ 13.40
Subtotal									**$ 282.75**
Total									**$ 1,917.50**

Note: The breakdown of other locations and all truck entering the Turnpike en route to NYCT is in Appendix B

A truck that originates in Newark has a very high likelihood, 88% to 90%, to return to Newark (Table 22). An analysis of NYCT outbound truck destination indicated that 572 trucks were headed back to Newark. This is equivalent to 90.2%[7] of the trucks returning to Newark, obtained in Table 22. Thus, the return to Newark is consistent with the profile.

The analysis calculated the Turnpike toll cost for NYCT **outbound** truck trips, using he same methodology for the inbound trip toll costs. The result shows that the outbound average estimated Turnpike toll cost per truck is $3.73, $0.84 more (29%) than the inbound trip of $2.89 (Table 29).

[7] The number of 572 trucks is based on a total of 1,863 trucks. Once put on the same base it is equivalent to 599 trucks or 90.2% of the original amount.

Table 29: NYCT to Newark Outbound Turnpike Estimated Truck Use and Tolls Paid

	Number of trucks	Total toll cost	Avg. toll per truck
Cash toll	63	$ 281.15	$ 4.46
Peak toll	143	$ 605.95	$ 4.24
Off-peak toll	366	$ 1,248.90	$ 3.41
Total tolls	572	$ 2,136.00	**$ 3.73**
Trucks % of total Survey	18.1%		
Estimated number of Newark trucks from week activity	1,482	$ 5,534	

Combining the outbound and inbound Turnpike tolls, the average truck originating in Newark pays an estimated $6.62 ($2.89 + $3.73) in Turnpike tolls for a round trip between Newark and NYCT.

This methodology was applied to determine the Turnpike toll cost for all the top seven locations (see appendix for all other locations). An overall estimate for the inbound direction was also determined (see appendix). Furthermore, since the Turnpike toll increased on January 1, 2012, by 53%, a determination of the toll before the toll rate increase was also calculated.

4.7.4 All top seven locations

The overall **inbound** toll cost per truck is an estimated weighted average of $4.77. However, the amount of toll rate is associated with distance, as expected; the farther the location from the terminal, the larger the toll. For example, Newark, Elizabeth and Carteret are closer to NYCT; their inbound tolls are estimated at $2.89, $2.68, and $2.68, respectively. The same three locations' outbound tolls are estimated at $3.73, $2.94, and $3.00, respectively (Table 30).

Table 30: Origin to NYCT Turnpike Estimated Inbound and Outbound Toll Cost

	Category of toll rate from the survey and their total cost					Resp. ratio from survey of 3,161	Avg. toll per truck	Ratio in the week activity of 8,189	Toll cost per week	Annual toll cost
	Cash rate	Peak rate	Off-peak rate	All rates	Total cost					
All NJ sites inbound to exit 13	198	389	1,012	1,599	$7,624	50.6%	**$ 4.77**	4,142	**$19,751**	$ 1,027,052
Inbound: top seven locations										
Newark	75	174	415	664	$1,918	21.0%	**$ 2.89**	1,720	$ 4,968	$ 258,312
Kearny	14	56	122	192	$ 844	6.1%	**$ 4.40**	497	$ 2,188	$ 113,752
Elizabeth	35	40	106	181	$ 485	5.7%	**$ 2.68**	469	$ 1,255	$ 65,282
Jersey City	6	8	27	41	$ 208	1.3%	**$ 5.08**	106	$ 539	$ 28,041
Linden	10	13	30	53	$ 210	1.7%	**$ 3.96**	137	$ 543	$ 28,256
Edison	5	7	19	31	$ 182	1.0%	**$ 5.86**	80	$ 471	$ 24,477
Carteret	11	12	63	86	$ 231	2.7%	**$ 2.68**	223	$ 598	$ 31,092
Inbound weighted average							**$ 3.27**			
Outbound: top seven locations										
Newark	63	143	366	572	$2,136	18.1%	**$ 3.73**	1,482	$ 5,534	$ 287,747
Kearny	12	52	110	174	$ 818	5.50%	**$ 4.70**	451	$ 2,119	$ 110,182
Elizabeth	31	34	97	162	$ 476	5.12%	**$ 2.94**	420	$ 1,234	$ 64,157
Jersey City	8	9	29	46	$ 247	1.46%	**$ 5.37**	119	$ 640	$ 33,274
Linden	13	11	25	49	$ 219	1.55%	**$ 4.46**	127	$ 566	$ 29,442
Edison	5	10	24	39	$ 234	1.23%	**$ 6.00**	101	$ 606	$ 31,516
Carteret	11	11	62	84	$ 252	2.66%	**$ 3.00**	218	$ 653	$ 33,975
Outbound weighted average							**$ 3.89**			
Overall top seven locations' weighted toll average							**$ 3.56**			

The combined inbound and outbound tolls for the seven top locations range from a low estimate of $5.62 to a high estimate of $11.86 (Table 31).

Table 31: Estimated Inbound and Outbound Tolls for NYCT Turnpike's Top Seven Locations

Location	Tolls		
	Inbound	Outbound	Total
Newark	$2.89	$ 3.73	$6.62
Kearny	$4.40	$ 4.70	$9.10
Elizabeth	$2.68	$ 2.94	$5.62
Jersey City	$5.08	$ 5.37	$10.45
Linden	$3.96	$ 4.46	$8.42
Edison	$5.86	$ 6.00	$11.86
Carteret	$2.68	$ 3.00	$5.68

The toll cost for all truckers inbound to NYCT (Exit 13) for the survey week is estimated at a total of $19,751 (Table 30). The average round trip toll per truck using Exit 13 is estimated in 2012 at $9.54 ($4.77 x 2); before the Turnpike toll increase of 53% in 2012, the estimated round trip toll would have been $6.23 (a difference of $3.31).

4.7.5 All Turnpike inbound entries and exits

Turnpike inbound toll costs for the truckers for the entire survey sample are estimated at $11,345 (Table 32). From the 1,966 Turnpike sample, 279 (14.2%) paid in cash an estimated total of $1,895. The balance of the 1,687 trips paid an estimated total of $9,450 using E-ZPass. The E-ZPass peak (463 trips) and off-peak (1,224 trips) toll costs are estimated to be $2.612 and $6,838 respectively for the survey sample. The weighted average toll per truck for the whole survey sample is estimated at $5.77.

Table 32: NYCT Inbound Turnpike Toll Collection for All Survey Responses

Toll payment method	Number of trips	% of total	Truckers toll cost	% of total toll cost	Avg. Toll
Cash	**279**	14.2%	$1,895	16.7%	$ 6.79
E-ZPass					
Peak	463	23.6%	$ 2,612	23.02%	$ 4.64
off-peak	1,224	62.3%	$ 6,838	60.27%	$ 5.59
Total	1,966	100.0%	**$ 11,345**	100.0%	**$ 5.77**

Table 33(a) shows the distribution between cash and E-ZPass payments on the Turnpike. .Assuming all the trucks followed the same pattern of operation as obtained in the survey sample, for the survey week **inbound** truckers paid the Turnpike Authority an estimated total of $47,254 in tolls (Table 33(a)). Extending the same assumption, the annual Turnpike toll costs are estimated to be about $2.46 million, using 52 weeks per year.

The survey indicates that only 62.2% (1,966 out of 3,161) of the **inbound** trucks that arrived at NYCT used the Turnpike. This figure is due to missing information in some surveys and because some trucks did not use the Turnpike. Therefore, applying this ratio to the weekly operation provides an operational estimate based on the survey ratios; the truckers' Turnpike weekly and annual tolls are estimated at $29,390 and about $1.53 million, respectively (Table 33(b)).

The total number of **outbound** trips is 62% of the total survey responses (1,959/3,161). Applying this ratio to the weekly activity at NYCT for the survey week provides an estimated total of 5,075 outbound trips that pay Turnpike tolls. These tolls, using the distribution between cash and E-ZPass shown in Table 33(c), provide an estimate of an annual Turnpike toll cost of $1,488,761. This estimated amount is $39,513 smaller compared to the estimate stated in Table 33(b).

The estimated **outbound** average Turnpike trip toll is $5.64 (Table 33(c)). This estimate is a 2.2% difference from the figure obtained before of $5.77 (Table 32). However, for the purpose of simplification, the larger figure, $5.77, of the estimated Turnpike toll will be used.

Table 33: NJ Turnpike Weekly and Annual Toll Payment

Toll payment method	Number of trips	Avg. toll	Estimated weekly tolls	Estimated annual tolls
a. Inbound toll cost for all trucks during the survey week				
Cash	1,162	$6.79	$7,893	$410,450
E-ZPass				
Peak	1,929	$5.64	$10,879	$565,719
Off-peak	5,098	$5.59	$28,482	$1,481,041
Total	8,189	$5.77	**$47,254**	**$2,457,210**
b. Inbound toll cost for the trucks that used the Turnpike				
Cash	723	$6.79	$4,909	$255,281
E-ZPass				
Peak	1,199	$5.64	$6,766	$351,852
Off-peak	3,171	$5.59	$17,714	$921,141
Total	5,093	$5.77	**$29,390**	**$1,528,274**
c. Outbound Turnpike toll cost during the survey week				
Cash	287	$ 6.49	$1,862	$96,803
E-ZPass				
Peak	444	$ 5.88	$2,610	$135,707
Off-peak	1,228	$ 5.36	$6,580	$342,160
Total	1,959	**$ 5.64**	**$11,051**	**$574,670**

The Turnpike toll rates are based on the number of truck axles. The survey sample indicates that the average truck that arrived at NYCT has 4.76 axles. The same average truck pays an estimated amount of $48.17 for PA bridges and an estimated amount of $5.77[8] for Turnpike tolls; the combined PA and Turnpike toll is $53.94 (Table 34). The toll on an outbound trip via the Turnpike does not include PA bridge tolls; i.e., a complete round trip via the Turnpike will cost in tolls an estimated amount of $59.71 ($48.17 + $5.77 x 2), assuming that the outbound trip costs the same in Turnpike tolls as the inbound trip.

Before the 2012 Turnpike toll increase, the Turnpike toll would have been 53% less or an estimated average of $3.77[9]. Using this figure, the combined bridge and Turnpike toll would have been $55.71 for a round trip. This is a $4.00 difference.

The inbound and outbound Turnpike tolls paid for the top seven locations are different. The top seven locations' estimated round trip toll (inbound and outbound) has a range of $53.52 to $59.89 (Table 34). The difference between the low and the high is $6.37 or 12%. Furthermore,

[8] This average is from survey responses.
[9] A 53% increase is obtained by $3.77 x 1.53 = $5.77 (or $5.77 x 0.6535 = $3.77)

the average of the two is only 1.7% below all the NJ Turnpike inbound entrances at Exit 13 or an estimated toll of $57.71.

Table 34: Turnpike Toll Cost

	Turnpike Avg. toll 2012	**Bridge Avg. toll**	**Total (inbound only)**	**Total (inbound and outbound)**
All survey responses	**$ 5.77**	**$ 48.17**	**$53.94**	**$59.71**
All inbound From Turnpike Exit 13	$ 4.77	$ 48.17	$52.94	**$57.71**
Top seven locations				
Newark	$ 2.89	$ 48.17	$51.06	$53.95
Kearny	$ 4.40	$ 48.17	$52.57	$56.97
Elizabeth	**$ 2.68**	$ 48.17	$50.85	**$53.52**
Jersey City	$ 5.08	$ 48.17	$53.25	$58.32
Linden	$ 3.96	$ 48.17	$52.13	$56.09
Edison	**$ 5.86**	$ 48.17	$54.03	**$59.89**
Carteret	$ 2.68	$ 48.17	$50.85	$53.54

4.7.5 NYCT summary

The bridge's estimated average toll before the toll increase was $7.62 per axle or $36.27 for an average truck of 4.76 axles (Table 35). After the toll increase the bridge's estimated toll increased by $2.50 to an estimated $10.12 per axle to $48.17 (Table 35) for an average truck of 4.76 axles. The average toll of a Turnpike user en route to NYCT is estimated at $5.77 each way or $11.54 for a round trip. Before the toll increase this round trip estimate would have been $7.54.

The bridge toll and the Turnpike toll increase raised the toll cost for an average trucker by an estimated $15.90 (Table 35). Furthermore, the toll increase affected the top seven in a range of an estimated increase of $13.85 (Elizabeth) to an estimated increase of $16.01 (Edison). The weighted average increase for all inbound trucks is estimated at $15.20.

The amounts estimated from the surveys are expected to have some errors due at the time the survey was filled, interpretation of eligible survey forms and accuracy. Thus, an error in the range below 5% is consistent with the validation and the confidence interval outlined above and is acceptable.

Table 35: NYCT Total Tolls Effect (Turnpike and bridges)

	Turnpike inbound	Turnpike outbound	Turnpike total (inbound & outbound)	Bridge tolls	Total toll
	Before Turnpike toll increase by 53% and Bridge toll increase				
All survey responses	$ 3.77	$ 3.77	**$ 7.54**	**$ 36.27**	$ 43.81
All inbound from Turnpike Exit 13	$ 3.12	$ 3.12	$ 6.23	$ 36.27	$ 42.51
Top seven					
Newark	$ 1.89	$ 2.44	$ 4.33	$ 36.27	$ 40.60
Kearny	$ 2.88	$ 3.07	$ 5.95	$ 36.27	$ 42.22
Elizabeth	$ 1.75	$ 1.92	$ 3.67	$ 36.27	$ 39.94
Jersey City	$ 3.32	$ 3.51	$ 6.83	$ 36.27	$ 43.10
Linden	$ 2.59	$ 2.91	$ 5.50	$ 36.27	$ 41.77
Edison	$ 3.83	$ 3.92	$ 7.75	$ 36.27	$ 44.02
Carteret	$ 1.75	$ 1.96	$ 3.71	$ 36.27	$ 39.98
	After toll increase				
All survey responses	**$ 5.77**	$ 5.77	**$ 11.54**	**$ 48.17**	$ 59.71
All inbound from Turnpike Exit 13	$ 4.77	$ 4.77	$ 9.54	$ 48.17	$ 57.71
Top seven					
Newark	$ 2.89	$ 3.73	$ 6.62	$ 48.17	$ 54.79
Kearny	$ 4.40	$ 4.70	$ 9.10	$ 48.17	$ 57.27
Elizabeth	$ 2.68	$ 2.94	$ 5.62	$ 48.17	$ 53.79
Jersey City	$ 5.08	$ 5.37	$ 10.45	$ 48.17	$ 58.62
Linden	$ 3.96	$ 4.46	$ 8.42	$ 48.17	$ 56.59
Edison	$ 5.86	$ 6.00	$ 11.86	$ 48.17	$ 60.03
Carteret	$ 2.68	$ 3.00	$ 5.68	$ 48.17	$ 53.85
	Difference (before and after toll increase)				
All survey responses	$ 2.00	$ 2.00	$ 4.00	$ 11.90	**$ 15.90**
All inbound from Turnpike Exit 13	$ 1.65	$ 1.65	$ 3.31	$ 11.90	**$ 15.20**
Top seven					
Newark	$ 1.00	$ 1.29	$ 2.29	$ 11.90	$ 14.19
Kearny	$ 1.52	$ 1.63	$ 3.15	$ 11.90	$ 15.05
Elizabeth	$ 0.93	$ 1.02	$ 1.95	$ 11.90	$ 13.85
Jersey City	$ 1.76	$ 1.86	$ 3.62	$ 11.90	$ 15.52
Linden	$ 1.37	$ 1.55	$ 2.92	$ 11.90	$ 14.82
Edison	$ 2.03	$ 2.08	$ 4.11	$ 11.90	$ 16.01
Carteret	$ 0.93	$ 1.04	$ 1.97	$ 11.90	$ 13.87

4. 8 Research Results: GCT

As indicated before the survey data analysis focuses on the drayage toll cost at GCT. The toll paid is a function of the number of truck's axles, peak or off-peak toll or overnight rates, and the method of payment (cash or E-ZPass).

4.8.1 Bridges

The O-D traffic to GCT using bridges is quite limited. For example, during the survey week the number of trucks that crossed the George Washington Bridge en route to GCT account for 5.6%, compared to 2.4% en route to NYCT. But the number of trucks that cross the Verrazano-Narrows Bridge en route to GCT is 1.0%, compared to 3.7% en route to NYCT. The majority of the inbound traffic (87.7%) en route to Global Terminal does not use any bridge or tunnel (Table 36). The GCT truck trips using the bridge are very limited, around 10%. In comparison, trucks en route to NYCT use a Staten Island bridge 98.4% of the time. Furthermore, the total use of bridges is above 100.9% of the survey sample because some trucks cross more than one bridge.

Table 36: Bridge Use in Arriving in GCT

	GCT			NYCT	
Bridge/Tunnel	**Account**	**% of sub-total**	**% of total**	**Account**	**% of total**
Goethals	3	0.1%	0.1%	2,385	75.5%
Verrazano-Narrows	32	1.0%	0.9%	119	3.8%
Outerbridge Crossing	1	0.0%	0.0%	286	9.0%
Bayonne	133	4.0%	3.8%	319	10.1%
George Washington	188	5.6%	5.4%	78	2.5%
Lincoln	54	1.6%	1.6%	2	0.1%
None	**2,931**	**87.7%**	**84.4%**		
Sub-Total	3,342	100.0%	96.2%	3,189	100.9%
Other	131	3.8%	3.8%		
Total responses	**3,473**		**100.0%**		
Total Survey	**3,579**			**3,161**	**100.0%**

A bridge use is not directly linked or required for entering or exiting the GCT terminal for locations in New Jersey. Therefore, the analysis of bridge use is similar to the bridge use from other container terminals in the region. For example, a truck whose origin is GCT and whose final destination is Brooklyn would most likely use a route that includes the Bayonne Bridge and the Verrazano-Narrows Bridge; i.e., 32 trucks might have taken these two bridges. Therefore, all bridges associated with GCT would be treated like the George Washington Bridge, Lincoln Tunnel, and the others.

4.8.2 Turnpike

The number of trips using the Turnpike en route to GCT is summarized in Table 37. The O-D analyses indicate that the majority of the trucks arriving at GCT do not use the Turnpike. Turnpike users are only 45.1% (Table 37). The number that indicated the use of Exit 14A off the

Turnpike en route to GCT was 1,579 (44.1%). The majority of the trucks arrive in GCT via another route.

Table 37: O-D Entry and Exit to GCT

	Number reported	% of total
Enter Turnpike	1,614	45.1%
Exit Turnpike	1,613	45.1%
Exit at 14A	1,579	44.1%
Total survey	3,579	100.0%

The truckers that exited the Turnpike at Exit 14A en route to GCT are the focus to determine their toll cost on the toll road. The origins of these trucks are practically from any Turnpike exit/entrance. The relatively small total number of trucks in this category is due to incomplete information that was provided on the survey. However, since this is the only source of information, it is the foundation for Turnpike cost determination. Furthermore, this sample size might get even smaller due to subcategories such as peak or off-peak payment that is also missing.

When using the Turnpike, the most popular entry en route to GCT is Exit 14 for 39.9% of the trucks (Table 38). After leaving GCT, the use of the Turnpike indicates a similar pattern to the inbound trips (Table 38). Exits 18E and 18W account for 13.2% of the inbound Turnpike use; together with Exit 14 they account for 53.1% of the inbound trucks using the Turnpike. The outbound number of trucks is somewhat smaller with a similar distribution of exits' importance; Exit 14 again has the largest number of users (38.1%).

Table 38: Top 10 Entry Points En Route to GCT

Point of Entry/ Exit (Exit #)	**10**	**11**	**12**	**13**	**13 A**	**14**	**15** (E,W)	**16** (X,E,W)	**18** (E,W)	**8 A**	**Others**	**Total**
Number of trips **inbound**	72	65	77	90	108	**630**	48	71	208	53	208	**1,577**
% of total **inbound**	4.6%	4.1%	4.9%	5.7%	6.8%	**39.9%**	3.0%	4.5%	13.2%	3.4%	13.2%	100%
Number of trips **outbound**	95	60	67	109	101	**564**	16	57	175	74	164	1,481
% of total **outbound**	6.4%	4.1%	4.5%	7.4%	6.8%	**38.1%**	1.1%	3.9%	11.8%	5.0%	11.1%	100%

The trucks en route to GCT used various routes, including the Turnpike (Table 39). Some of the trucks used multiple routes. The most popular routes are Route 440 and Route 1-9. The non-Turnpike users utilized Route 440 and Route 1-9, at a combined rate of 85.4% of the total non-Turnpike users or 88.1% of total trips to GCT (Table 39). Furthermore, since the utilization of these routes is mutually exclusive, their use is even more after adding their utilization by the Turnpike users for a total of 3,457 trips and an overall total of 84.0% of the truck trips.

Table 39: Major Highways Used by Trucks That Did and Did Not Use Turnpike

Major highway	Non-Turnpike users			Turnpike users			Total major highway use		
	Account	% of total survey	% of total	Count	% of total survey	% of total	Count	% of total survey	% of total
Rt. 78	176	4.9%	5.1%	121	7.5%	17.9%	297	5.7%	7.2%
Rt. 1-9	**1,513**	**42.3%**	**43.8%**	**229**	**14.2%**	**33.8%**	**1,742**	**33.5%**	**42.1%**
Rt. 440	**1,544**	**43.1%**	**44.3%**	**190**	**11.8%**	**28.1%**	**1,734**	**33.4%**	**41.9%**
I-278	46	1.3%	1.3%	17	1.7%	2.5%	63	1.2%	1.5%
I-287	56	1.6%	1.6%	25	1.5%	3.7%	81	1.6%	2.0%
Other	122	3.4%	3.9%	95	5.9%	14.0%	217	4.2%	5.2%
Total	**3,457**	**96.6%**	**100%**	**677**	**41.9%**	**100%**	**4,134**	**79.6%**	**100%**
Total survey	**3,579**	**100.0%**		**1,614**	**100.0%**		**5,193**	**100.0%**	

The distribution of trucks en route to GCT by method of payment and rate is identified in Table 40. Truck movement on the Turnpike is dominated by five-axle trucks (94.2%). From the 1,670 truckers who responded to the question about method of payment, 72.8% paid using E-ZPass.

Table 40: Distribution of Trucks En Route to GCT by Cash and E-ZPass (peak, off-peak)

Axles	Total	% of total	Cash		E-ZPass							
					Peak		Off-peak		Overnight		Total	
			Count	% of total	Count	% of total	Count	% of total	Count	% of total	Count	% of total
3	30	0.8%	4	0.9%	4	0.9%		0.0%	1	1.7%	6	0.5%
4	31	0.9%	10	2.2%	1	0.2%	4	1.6%		0.0%	5	0.4%
5	3,370	94.2%	421	92.7%	424	93.0%	243	96.8%	55	94.8%	1,154	95.1%
6	148	4.1%	19	4.2%	27	5.9%	4	1.6%	2	3.4%	49	4.0%
Total	3,579		454		456		251		58		1,214	
% of total			12.7%		12.7%		7.0%		1.6%		33.9%	

The truckers who responded to the survey question indicating Turnpike use of Exit 14A en route to GCT were only 1,399 (39.1%) of the survey responses. These trucks had a total of 7,921 axles (Table 41). The distribution between cash and E-ZPass payment is 27.9% in cash and 72.1% in E-ZPass. The distribution of axles between the two categories is also similar. This result is due to the dominating five-axle trucks (93.1%) of the total reported entries to GCT via Exit 14A.

Table 41: Truck Use of the Turnpike for Inbound Trip at Exit 14A to GCT

	Cash	E-ZPass	Totals
Number of trucks	391	1008	**1,399**
% of total of number of trucks	27.9%	72.1%	100.0%
Number of axles	1,960	5,067	7,921
% of total of number of axles	24.7%	75.3%	100.0%

The total number of truckers who paid the tolls in cash or E-ZPass is only 1,025 (Table 42 (a.)). This segment of sample size is chipped away due to missing information. However, the E-ZPass off-peak rate (the lowest from all rates) is used by 41.2% of the truckers. Cash tolls are 42.8% of the total (Table 42 (b.)).

The average trucker paid an estimated inbound toll of $13.75 (Table 42 (c.)) with cash payer averaging an estimated $15.41 for the inbound trip. This ratio also translates to an average truck inbound toll per axle of an estimated $2.74 (Table 42 (d.)).[10]

The estimated truckers' cost of Turnpike inbound tolls for the week of the GCT survey is estimated at $49,729 (Table 42 (f)), and annually it is estimated to be close to $2.6 million. Assuming that the outbound trip has a similar Turnpike toll cost the total trip cost is double.

Table 42: Toll Cost for Trucks Using the Turnpike for Inbound Trip to GCT

	Cash	E-ZPass		Totals
		Peak	Off-peak	
a. Number of relevant records that contain relevant information of all the fields	**391**	**212**	**422**	**1,025**
% of total for (a) above	**38.1%**	**20.7%**	**41.2%**	**100.0%**
b. Total toll (for survey responses)	$ 6,025	$ 2,681	$5,384	$ 14,090
% of total	42.8%	19.0%	33.2%	100.0%
c. Average payment per truck	$ 15.41	$ 12.65	$ 12.76	$ 13.75
d. Average payment per axle	$ 3.07	$ 2.50	$ 2.55	$ 2.74
e. Estimated number of trucks using the Turnpike	616	334	664	**1,614**
Estimated total toll cost (week of survey)	$ 21,264	$ 9,463	$19,001	**$ 49,729**
f. Estimated ratio of trucks arriving at Global that use the Turnpike from the total of 3,579 surveyed	17.2%	9.3%	18.6%	45.1%

The 53% Turnpike toll increase at the beginning of 2012 indicates that the average truck pays an estimated additional amount of $4.76 or $0.95 per axle; i.e., for the survey week the total cost for truckers would have been only $32,498. Truckers paid an estimated additional $17,231.

4.8.3 Clusters

A key objective of the study is to focus on the largest O-D activities. The top seven O-D pairs are shown in Tables 43 and 44.

Table 43 shows that the top seven O-D clusters account for more than 50% of the total survey total truck trips. Among them, Newark alone is the largest O-D, representing more than 20% of the largest inbound and outbound traffic respectively. In addition, the ranking order for both the

[10] Even though Turnpike the truck rates are not a multiple of rate and axles, this figure is provided.

inbound and outbound trips is the same. Furthermore, the top four O-D pairs account for more than 42% of the total survey flow, indicating a highly concentrated traffic pattern.

Table 43: GCT Top Seven Inbound and Outbound Locations

	Inbound Trips				Outbound Trips			
Rank	**Origin city**	**# of trucks**	**% of survey total**	**Cum. %**	**Destination city**	**# of trucks**	**% of survey total**	**Cum. %**
1	**Newark**	747	20.9%	20.9%	**Newark**	757	21.2%	21.2%
2	**Elizabeth**	410	11.5%	32.3%	**Elizabeth**	406	11.3%	32.5%
3	**Jersey City**	198	5.5%	37.9%	**Jersey City**	179	5.0%	37.5%
4	**Kearny**	168	4.7%	42.6%	**Kearny**	175	4.9%	42.4%
5	**Linden**	128	3.6%	46.1%	**Linden**	129	3.6%	46.0%
6	**Bayonne**	90	2.5%	48.6%	**Bayonne**	93	2.6%	48.6%
7	**Carteret**	73	2.0%	50.7%	**Carteret**	75	2.1%	50.7%
	Total	1,814	50.7%		**Total**	1,814	50.7%	
	Others	1,765	49.3%		**Others**	1,765	49.3%	
	Survey Total	3,579	100.0%		**Survey Total**	3,579		

Table 44 shows the volumes of the top seven O-D pairs. The high percentages of the same O-D in their respective origin and/or destination indicate that most of the truck traffic goes to the same locations. Overall, 85.3% of the traffic has the same origin and destination for these top seven O-D pairs. These clusters and O-D traffic flow are similar to NYCT.

Table 44: GCT Top Seven O-D Pairs and Their Respective Percentages

O/D	**Bayonne**	**Carteret**	**Elizabeth**	**Jersey City**	**Kearny**	**Linden**	**Newark**	**Grand Total**	**In Bound Same O/D %**
Bayonne	69		6	1	1	2	11	90	76.7%
Carteret		67	2			1	3	73	91.8%
Elizabeth	5		351	12	10	6	26	410	85.6%
Jersey City	9		10	144	5	4	26	198	72.7%
Kearny	1	6	9	5	135	1	11	168	80.4%
Linden	1		7	3	4	107	6	128	83.6%
Newark	8	2	21	14	20	8	674	747	90.2%
Total	93	75	406	179	175	129	757	1,814	
Outbound same O/D %	74.2%	89.3%	86.5%	80.4%	77.1%	82.9%	89.0%		**85.3%**

4.8.4 Analysis of the Top Seven Clusters

The following is a detailed analysis of the individual clusters with respect to their truck volume in peak and off-peak times, Turnpike use, payment methods, and axle count for the trucks in terms of toll costs. Since all these locations are west of the Hudson River and close to GCT, no PA bridges or tunnel tolls are considered in this cluster analysis.

To calculate the Turnpike toll costs, the same factors, considerations and validation used in NYCT are utilized. Again, the maximum information is used for every determination. As before, when partial information is available, such as "Time," a determination is made with respect to the appropriate toll rate described above. The same windows and lags are applied.

Using the published current Turnpike rates for 3-, 4-, 5-, and 6-axle trucks with respect to cash and E-ZPass payment, the toll costs are calculated. After the toll cost per truck for each cluster location is obtained, an overall weighted average cost per truck for each of the top seven O-D clusters is provided.

An example of rate determination used Newark. Newark is the largest O-D cluster in the survey. Both inbound and outbound toll costs are calculated. Tables 45 and 46 show the results for both the inbound trips.

Table 45: GCT Turnpike Toll Payment for Newark Inbound Trucks

Newark Inbound Truck TP Toll Payment									
Cash									
TP Entrance	**Toll rate by axles**				**Number of trucks by axle**				**Tolls paid**
	3	**4**	**5**	**6**	**3**	**4**	**5**	**6**	
14	4.9	5.65	$ 6.90	$ 8.05	1	2	52	3	$ 399.15
Sub. Total					1	2	52	3	$ 399.15
E-ZPass Peak									
TP Entrance	**Toll rate by axles**				**Number of trucks by axle**				**Tolls paid**
	3	**4**	**5**	**6**	**3**	**4**	**5**	**6**	
14			$ 6.20				46		$ 285.20
Sub. Total							46		$ 285.20
E-ZPass Off-Peak									
TP Entrance	**Toll rate by axles**				**Number of trucks by axle**				**Tolls paid**
	3	**4**	**5**	**6**	**3**	**4**	**5**	**6**	
14	$ 4.30	5.05	$ 5.90	6.9	1	1	74	1	$ 452.85
Sub. Total					1	1	74	1	$ 452.85
Total					2	3	172	4	$ 1,137.20

Similar to the NYCT, multiplying the number of trucks with 3, 4, 5, and 6 axles from the survey, toll payments are obtained for cash, E-ZPass peak and E-ZPass off-peak. Table 46 shows a summary for the inbound trips.

Table 46: GCT Summary of Toll Payment for Newark Inbound Trucks

Newark Inbound Summary			Avg. toll per truck
Payment Type	**Number of trucks**	**Total toll paid**	
Cash Toll	58	$399.15	$6.88
E-ZPass Peak Toll	46	$ 285.20	$6.20
E-ZPass Off-Peak Toll	77	$452.85	$5.88
Sample Total	181	$1,137.20	$6.28
Total NJT Users	231		
% of Survey Total	78.4%		

Table 46 indicates that 58 trucks paid cash, 46 trucks used E-ZPass during peak time, and 77 trucks used E-ZPass during off-peak time. On average, the toll payment for a truck using the Turnpike coming to GCT pays $6.28. From the 231 Turnpike users, only 181 survey forms provided complete information, such as survey time, payment type, and Turnpike entrance and exit numbers. Due to its proximity to GCT, all trucks from Bayonne arriving and leaving the terminal do not use the Turnpike; therefore no toll costs are incurred for the truck trips surveyed.

4.8.5 Toll Costs for the Top Seven O-D Clusters

Using the same methodology, the toll costs for all the top seven O-D clusters are analyzed and summarized in Table 47. It shows that the toll costs are affected by the distance between GCT and the trip origin or destination; the closer the location to the terminal, the lower the toll costs. For example, the average toll for truck from/to Carteret is the highest (Turnpike, Exit 12) compared to Newark (Turnpike, Exit 14). For inbound trucks, the weighted average toll for the top seven O-D clusters is $8.47 and for outbound trucks, the weighted average toll is $8.44. The overall weighted average toll for both the inbound and outbound trucks is $8.46.

Due to small sample size in toll use, there is a concern with respect to locations like Jersey City and Kearny. The large difference in the inbound toll and the outbound toll for Jersey City highlights the issue and the toll cost. Toll costs for all other inbound and outbound O-D pairs are similar. All the calculations for each cluster's location are in Appendix C

Table 47: GCT Estimated Overall Toll Costs for the Top Seven O-D Clusters

Inbound Toll Costs for the Top Seven O-D Clusters for GCT							
City	**Cash**	**Peak**	**Off-peak**	**Total**	**% of total in category**	**Total tolls**	**Avg. toll per truck**
Newark	58	58	77	181	78.4%	$ 1,137.20	$ 6.28
Elizabeth	47	26	45	118	53.2%	$ 1,000.40	$ 8.48
Jersey City	11	5	7	23	63.9%	$ 146.10	$ 6.35
Kearny	1	1	7	9	69.2%	$ 75.80	$ 8.42
Linden	38	11	21	70	97.2%	$ 774.75	$ 11.07
Bayonne	0	0	0	0	0	$ -	$ -
Carteret	25	8	17	50	61.7%	$ 687.45	$ 13.75
Total	180	109	174	451		$ 3,821.70	$ 8.47
Outbound Toll Costs for the Top Seven O-D Clusters for GCT							
City	**Cash**	**Peak**	**Off-peak**	**Total**	**% of total in category**	**Total tolls**	**Avg. toll per truck**
Newark	57	44	61	162	76.1%	$ 1,051.95	$ 6.49
Elizabeth	40	20	47	107	76.1%	$ 843.10	$ 7.88
Jersey City	8	3	4	15	63.9%	$ 50.85	$ 3.39
Kearny	1	1	7	9	69.2%	$ 75.80	$ 8.42
Linden	38	11	21	70	97.2%	$ 774.75	$ 11.07
Bayonne	0	0	0	0	0	0	0
Carteret	25	8	17	50	61.7%	$ 687.45	$ 13.75
Total	169	87	157	413		$ 3,483.90	$ 8.44
Overall Toll Costs for the Top Seven O-D Clusters for GCT (Weighted Average)							
City	**Cash**	**Peak**	**Off-peak**	**Total**		**Total tolls**	**Avg. toll per truck**
	349	196	331	864		$ 7,305.60	$ 8.46

The combination of tolls for round trips from and to the same location in the top seven clusters range from a low estimate of $9.74 to a high estimate of $27.50 (see Table 48). In the table the tolls from Jersey City are questionable for the reasons stated earlier.

Table 48: GCT Estimated Round Trip Toll for the Top Seven O-D Clusters

Round Trip Toll Costs			
City	**Inbound**	**Outbound**	**Total**
Newark	$ 6.28	$ 6.49	$ 12.78
Elizabeth	$ 8.48	$ 7.88	$ 16.36
Jersey City	$ 6.35	$ 3.39	$ 9.74
Kearny	$ 8.42	$ 8.42	$ 16.84
Linden	$ 11.07	$ 11.07	$ 22.14
Bayonne	$ -	$ -	$ -
Carteret	$ 13.75	$ 13.75	$ 27.50

Weighted Avg.	**$8.47**	**$8.44**	**$16.91**

5. NYCT and Global: A comparison

There is a fundamental difference between the two terminals. The trucks arriving in GCT do not have to use a toll bridge. They could also refrain from using a toll road. The choice made is reflected in the total number of the toll road users out of the total number of the GCT users and total number of NYCT users. Theoretically, since a trucker does not have to use a toll road en route to GCT or NYCT, the Turnpike toll cost for a trucker could be zero.

The survey analysis indicated that out of the 747 inbound trucks en route from Newark to GCT, 181 used the Turnpike (24.2%); out of 757 outbound trucks, 162 used the Turnpike (21.4%). Therefore, when comparing the average toll cost of a truck en route to GCT, the comparison is correct only for the ones that use the Turnpike, 24.2% and 21.4% inbound and outbound, respectively. Similarly, out of 836 trucks en route from Newark to NYCT, 664 used the Turnpike (79.4%). Outbound, from the 849 trucks en route from NYCT to Newark, 572 used the Turnpike (67.4%). As indicated in Table 49 there is a large difference between NYCT and GCT. This difference must be accounted for when comparing the two terminals. Since there is no use of bridge en route to GCT, there are no bridge comparisons.

Table 49: NYCT an GCT Inbound and Outbound Activity

	NYCT						**GCT**					
	Inbound			**Outbound**			**Inbound**			**Outbound**		
	Total	**NJT users**	**% of Total**	**Total**	**NJT users**	**% of Total**	**total**	**NJT users**	**% of Total**	**Total**	**NJT users**	**% of Total**
Total (all the survey)	1,768	1,217	68.8%	1,799	1,052	58.5%	1,724	361	20.9%	1,721	323	18.8%
Top Seven												
Newark	**836**	**664**	**79.4%**	**849**	**572**	**67.4%**	**747**	**181**	**24.2%**	**757**	**162**	**21.4%**
Elizabeth	239	181	75.7%	284	162	57.0%	410	118	28.8%	406	107	26.4%
Jersey City	138	41	29.7%	148	46	31.1%	198	23	11.6%	179	15	8.4%
Kearny	331	192	58.0%	305	174	57.0%	168	1	0.6%	175	1	0.6%
Linden	128	53	41.4%	116	49	42.2%	128	21	16.4%	129	21	16.3%
Carteret	96	86	89.6%	97	49	50.5%	73	17	23.3%	75	17	22.7%
Edison	110	31	28.2%	103	39	37.9%						
Bayonne							90	0		93	0	

Note: Edison is the top seventh of NYCT and Bayonne is in the top seven of GCT.

Each inbound and outbound activity's relative share in the total is used to determine an overall average. This average is the basis for comparison between the two terminals.

Taking into consideration the Turnpike use differences, the figures used for toll roads are adjusted. For example, the inbound average Turnpike toll cost per trucker from Newark is estimated at $6.28 (Table 47). The ratio of inbound trucks from the total inbound activity is 24.2% (Table 49). The average cost of the inbound activity from the total number of inbound trucks is $1.52 ($6.28 x 24.2%). The modified figures for NYCT and GCT are used for comparison.

The comparison of toll costs for the two terminals has three dimensions: vertical comparison, horizontal comparison and net comparison; the last is also net effect or marginal effect.

The **vertical comparison** (column difference in Table 50) compares the toll cost changes, at a given point in time, before and after the toll increase **between** NYCT and GCT. Before the toll increase a trucker using NYCT paid an estimated $39.23, and a trucker using GCT paid an estimated $2.19. The difference is $37.03. Similarly, after the toll increase the difference is $49.34. These figures are part of the cost of doing business in each terminal and the difference in costs between the terminals. ***This comparison has a constant time or is fixed in time.***

The **horizontal comparison** (row difference in Table 50) compares the toll cost before and after the toll increase for the **same terminal** at different points in time. Before the toll increase a trucker using NYCT paid an estimated $39.23 per trip. After the toll increase the same trucker pays an estimated $52.70 for the same trip. A trucker who used NYCT paid an estimated additional $13.47 after the toll increase. The trucker who used GCT paid $1.16 more after the toll increase. ***This comparison does not keep time constant or is not fixed in time.***

The vertical and horizontal differences compare separately between two terminals with respect to constant time (fixed time) and for same terminal in two different points in time. However, the overall toll increase affects both (fixed and not fixed in time). Therefore, what is the net affect?

The net effect is obtained by "row and column difference" and/or the "column and row difference" (Table 50). The result of this comparison provides a **net comparison,** which is also **net effect** or a **marginal effect.** Thus, the marginal effect of the toll increase is an estimated $12.30 (Table 50).

Table 50: Comparison of Toll Cost Before and After Toll Increase

	Before toll increase	**After toll increase**	**Column difference**	**Marginal effect** (column and row difference)
NYCT	**$39.23**	**$52.70**	$13.47	**$12.30**
GCT	**$2.19**	**$3.36**	$1.16	
Row difference	$37.03	$49.34		
Marginal effect (row and column difference)	**$12.30**			

A comparison of the top seven locations of NYCT and GCT indicated that only six of the locations are common in both NYCT and GCT. In the NYCT top seven, Bayonne is not one of the common locations. In the GCT top seven locations, Edison is not one of the common locations. Therefore, the comparison is between two terminals of six common locations. However, when comparing all seven locations but excluding Bayonne in NYCT and excluding Edison in GCT, the results change slightly. The estimated marginal difference increases are from $12.30 to $12.32 (see Appendix F for a table). This difference is ignored.

Table 51: NYCT and GCT Top Six Comparison of Toll Cost Before and After Toll Increase

		Before toll increase	After toll increase	Column difference	Marginal effect
Newark	**NYCT**	**$39.41**	**$52.98**	$13.57	**$12.56**
	GCT	**$1.90**	**$2.91**	$1.01	
	Row difference	$37.51	$50.07		
Kearny	**NYCT**	**$39.69**	**$53.40**	$13.71	**$13.68**
	GCT	**$0.06**	**$0.10**	$0.03	
	Row difference	$39.63	$53.31		
Elizabeth	**NYCT**	**$38.69**	**$51.388**	$13.18	**$11.62**
	GCT	**$2.95**	**$4.52**	$1.57	
	Row difference	$35.74	$47.36		
Jersey City	**NYCT**	**$38.35**	**$51.35**	$13.00	**$12.65**
	GCT	**$0.67**	**$1.02**	$0.35	
	Row difference	$37.68	$50.33		
Linden	**NYCT**	**$38.57**	**$51.69**	$13.12	**$11.87**
	GCT	**$2.36**	**$3.62**	$1.25	
	Row difference	$36.21	$48.08		
Carteret	**NYCT**	**$38.83**	**$52.09**	$13.26	**$11.07**
	GCT	**$4.13**	**$6.32**	$2.19	
	Row difference	$34.70	$45.77		
Edison (only for NYCT)	**NYCT**	**$37.76**	**$52.09**	$14.34	**$7.12**
	GCT	**$13.61**	**$20.83**	$7.22	
	Row difference	$24.14	$31.26		

Note: Bayonne's impact is zero cost on GCT (Table 38) therefore it is excluded from the table.

6. Conclusion

The truckers using NYCT and GCT have a choice not to use any toll road. Therefore, the toll cost of a GCT user could be zero. Under those circumstances the comparison of the toll increase is only the bridge toll increase.

Traffic to both terminals uses the Turnpike. The intensity of Turnpike use is different; therefore the Turnpike toll cost differs.

An analysis of toll cost serving the two terminals indicates that the marginal effect of NYCT users is an estimated weighted average of $12.30 more than GCT since the toll increase went into effect.

Furthermore, the analysis also indicates that there is a fundamental difference in the toll structure between the terminals. NYCT users pay an estimated toll of $48.17 ($10.12 average toll cost per axle x 4.76 average number of axles) for crossing one of the PA bridges to Staten Island. Before the toll increase this figure was estimated at $36.27 ($7.62 x 4.76). However, this figure was historically in place before this analysis took place.

The future toll increases on the bridges without any change in the Turnpike tolls will directly be reflected in the marginal toll effect. For example, a two-dollar increase per axle due to take effect in December 2012 will increase the marginal effect on NYCT tolls by $10.00 (Table 52).

Table 52: Marginal Toll Effect

	Weight avg. of toll (1)	**Toll increase (2)**	**Cumulative toll increase (3)**	**% of toll increase from (1)**
2010	$ 37.03			
2011	$ 49.34		$ 12.30	33.2%
2012	$ 59.34	$ 10.00	**$ 22.30**	20.3%
2013	$ 69.34	$ 10.00	$ 32.30	16.9%
2014	$ 79.34	$ 10.00	$ 42.30	14.4%
2015	$ 89.34	$ 10.00	$ 52.30	12.6%
Total toll increase		**$ 40.00**		**97.4%**

The actual cost in 2015 for a five-axle truck using one of the three bridges leading to NYCT, according to the PA, would be: E-ZPass overnight $93.00, E-ZPass off-peak $102.00, E-ZPass peak $108.00 and for cash $126.00.

It should be noted that, based on the summary of daily activity reports provided, there are sizable differences between the number of containers received and delivered for both terminals. For the survey week, for GCT there were a total of 5,625 containers received including load in and empty in and 5,442 containers out. The net is 183, indicating the terminal had more in-flow containers than out-flow containers. For NYCT there were a total of 5,030 containers received

and 5,428 containers out. The net is a negative 398, indicating the terminal had more out-flow containers than in-flow containers. There could be many factors contributing to this result. To gain full knowledge, further analysis is needed.

Appendix A

Top Seven Locations: NYCT Number of Weekly Axles for Toll Payment

Newark

# of axles	Dist. in %	Dis. by axles	Number of trucks by axles and payment method				Number of axles for toll payment purpose			
			Cash	Peak	Off-peak	Over-night	Cash	Peak	Off-peak	Over-night
			16.6%	49.4%	31.4%	2.6%				
3	7.54%	169	28	83	53	4	84	250	159	13
4	1.32%	28	5	14	9	1	19	56	35	3
5	88.22%	1,908	317	943	599	50	1,584	4,713	2,996	248
6	2.92%	61	10	30	19	2	60	180	114	9
Total		2,166	360	1,070	680	56	1,747	5,199	3,304	274

	Week toll cost						Annual toll cost		% change
# of axles	1,749	5,205	3,309	274	10,537				
Year	Cash	Peak	Off-peak	Over-night	Total	Difference	Total	Difference	
2010	$13,993	$ 1,642	$ 23,160	$1,507	$ 80,302		$4,175,694		
2011	$22,739	$52,052	$ 29,777	$ 2,055	**$ 106,623**	$26,321	**$5,544,397**	$1,368,703	32.8%
2012	$26,237	$62,463	$ 36,394	$2,603	$127,697	$21,074	$6,640,235	$1,095,839	19.8%
2013	$ 9,735	$72,873	$ 43,012	$3,151	$148,771	$21,074	$7,736,074	$1,095,839	16.5%
2014	$33,233	$83,284	$ 49,629	$3,698	$169,844	$21,074	$8,831,913	$1,095,839	14.2%
2015	$36,732	$93,694	$ 56,246	$ 4,246	$190,918	$21,074	$9,927,752	$1,095,839	12.4%

Kearny

# of axles	Dist. in %	Dis. by axles	Number of trucks by axles and payment method				Number of axles for toll payment purpose			
			Cash	Peak	Off-peak	Over-night	Cash	Peak	Off-peak	Over-night
			16.6%	49.4%	31.4%	2.6%				
3	7.54%	65	11	32	20	2	32	96	61	5
4	1.32%	11	2	6	4	0	8	22	14	1
5	88.22%	756	126	374	238	20	628	1,869	1,188	98
6	2.92%	25	4	12	8	1	25	74	47	4
Total		858	142	424	269	22	693	2,061	1,310	108

	Week toll cost						Annual toll cost		% change
# of axles	693	2,061	1,310	108	4,172				
Year	Cash	Peak	Off-peak	Over-night	Total	Difference	Total	Difference	
2010	$ 5,540	$16,487	$ 9,170	$ 597	$ 31,794		$ 1,653,295		
2011	$ 9,003	$20,609	$ 11,790	$ 814	$ 42,216	$ 10,421	$ 2,195,210	$ 541,915	32.8%
2012	$ 10,388	$24,731	$ 14,410	$ 1,030	$ 50,559	$ 8,344	$ 2,629,088	$ 433,879	19.8%
2013	$ 11,773	$28,853	$ 17,030	$ 1,247	$ 58,903	$ 8,344	$ 3,062,967	$ 433,879	16.5%
2014	$ 13,158	$32,975	$ 19,650	$ 1,464	$ 67,247	$ 8,344	$ 3,496,846	$ 433,879	14.2%
2015	$ 14,543	$37,097	$ 22,270	$ 1,681	$ 75,591	$ 8,344	$ 3,930,725	$ 433,879	12.4%

Elizabeth

# of axles	Dist. in %	Dis. by axles	Number of trucks by axles and payment method				Number of axles for toll payment purpose			
			Cash	Peak	Off-peak	Over-night	Cash	Peak	Off-peak	Over-night
			16.6%	49.4%	31.4%	2.6%				
3	7.54%	47	8	23	15	1	23	69	44	4
4	1.32%	8	1	4	3	0	5	16	10	1
5	88.22%	546	91	270	172	14	453	1,349	858	71
6	2.92%	18	3	9	6	0	18	54	34	3
Total		619	103	306	194	16	500	1,488	946	78

	Week toll cost						Annual toll cost		% change
# of axles	500	1,488	946	78	619				
Year	Cash	Peak	Off-peak	Over-night	Total	Difference	Total	Difference	
2010	$ 4,000	$ 11,905	$ 6,621	$ 431	$ 22,957		$1,193,769		
2011	$ 6,501	$ 14,881	$ 8,513	$ 587	$ 30,482	$ 7,525	$1,585,061	$ 391,292	32.8%
2012	$ 7,501	$ 17,857	$ 10,405	$ 744	$ 36,507	$ 6,025	$1,898,345	$ 313,284	19.8%
2013	$ 8,501	$ 20,833	$ 12,296	$ 901	$ 42,531	$ 6,025	$2,211,629	$ 313,284	16.5%
2014	$ 9,501	$ 23,810	$ 14,188	$1,057	$ 48,556	$ 6,025	$2,524,913	$ 313,284	14.2%
2015	$ 10,501	$ 26,786	$ 16,080	$1,214	$54,581	$ 6,025	$2,838,197	$ 313,284	12.4%

Jersey City

# of axles	Dist. in %	Dis. by axles	Number of trucks by axles and payment method				Number of axles for toll payment purpose			
			Cash	Peak	Off-peak	Over-night	Cash	Peak	Off-peak	Over-night
			16.6%	49.4%	31.4%	2.6%				
3	7.54%	27	4	13	8	1	13	40	25	2
4	1.32%	5	1	2	1	0	3	9	6	0
5	88.22%	315	52	156	99	8	262	779	495	41
6	2.92%	10	2	5	3	0	10	31	20	2
Total		358	59	177	112	9	289	859	546	45

	Week toll cost						Annual toll cost		
# of axles	289	859	546	45	1,739				% change
Year	Cash	Peak	Off-peak	Over-night	Total	Difference	Total	Difference	
2010	$ 2,310	$ 6,874	$ 3,823	$ 249	$ 13,256		$ 689,289		
2011	$ 3,754	$ 8,592	$ 4,915	$ 339	$ 17,600	$ 4,345	$ 915,223	$ 225,934	32.8%
2012	$ 4,331	$ 10,311	$ 6,008	$ 430	$ 21,079	$ 3,479	$1,096,115	$ 180,892	19.8%
2013	$ 4,908	$ 12,029	$ 7,100	$ 520	$ 24,558	$ 3,479	$1,277,007	$ 180,892	16.5%
2014	$ 5,486	$ 13,748	$ 8,192	$ 611	$ 28,037	$ 3,479	$1,457,900	$ 180,892	14.2%
2015	$ 6,063	$ 15,466	$ 9,285	$ 701	$ 31,515	$ 3,479	$1,638,792	$ 180,892	12.4%

Linden

# of axles	Dist. in %	Dis. by axles	Number of trucks by axles and payment method				Number of axles for toll payment purpose			
			Cash	Peak	Off-peak	Over-night	Cash	Peak	Off-peak	Over-night
			16.6%	49.4%	31.4%	2.6%				
3	7.54%	25	4	12	8	1	12	37	24	2
4	1.32%	4	1	2	1	0	3	9	5	0
5	88.22%	293	49	145	92	8	243	723	459	38
6	2.92%	10	2	5	3	0	10	29	18	2
Total		332	55	164	104	9	268	797	507	42

	Week toll cost						Annual toll cost		% change
# of axles	268	797	507	42	1,613				
Year	Cash	Peak	Off-peak	Over-night	Total	Difference	Total	Difference	
2010	$2,142	$ 6,376	$ 3,546	$ 231	$ 12,295		$ 639,341		
2011	$,482	$ 7,970	$ 4,559	$ 315	$ 16,325	$ 4,030	$ 848,903	$ 209,562	32.8%
2012	$4,017	$ 9,564	$ 5,572	$ 398	$ 19,552	$ 3,227	$1,016,687	$ 167,784	19.8%
2013	$4,553	$11,158	$ 6,586	$ 482	$ 22,778	$ 3,227	$1,184,471	$ 167,784	16.5%
2014	$,088	$12,752	$ 7,599	$ 566	$ 26,005	$ 3,227	$1,352,255	$ 167,784	14.2%
2015	$5,624	$14,346	$ 8,612	$ 650	$ 29,232	$ 3,227	$,520,039	$ 167,784	12.4%

Edison

# of axles	Dist. in %	Dis. by axles	Number of trucks by axles and payment method				Number of axles for toll payment purpose			
			Cash	Peak	Off-peak	Over-night	Cash	Peak	Off-peak	Over-night
			16.6%	49.4%	31.4%	2.6%				
3	7.54%	21	4	11	7	1	11	32	20	2
4	1.32%	4	1	2	1	0	2	7	5	0
5	88.22%	251	42	124	79	7	209	621	395	33
6	2.92%	8	1	4	3	0	8	25	16	1
Total		285	47	141	89	7	230	685	435	36

	Week toll cost						Annual toll cost		% change
# of axles	230	685	435	36	1,386				
Year	Cash	Peak	Off-peak	Over-night	Total	Difference	Total	Difference	
2010	$ 1,841	$ 5,479	$ 3,047	$ 198	$ 10,566		$ 549,433		
2011	$ 2,992	$ 6,849	$ 3,918	$ 270	$ 14,029	$ 3,463	$ 729,526	$ 180,092	32.8%
2012	$ 3,452	$ 8,219	$ 4,789	$ 342	$ 16,802	$ 2,773	$ 873,715	$ 144,189	19.8%
2013	$ 3,913	$ 9,589	$ 5,659	$ 415	$ 19,575	$ 2,773	$1,017,905	$ 144,189	16.5%
2014	$ 4,373	$10,958	$ 6,530	$ 487	$ 22,348	$ 2,773	$1,162,094	$ 144,189	14.2%
2015	$ 4,833	$12,328	$ 7,401	$ 559	$ 25,121	$ 2,773	$1,306,283	$ 144,189	12.4%

Carteret

# of axles	Dist. in %	Dis. by axles	Number of trucks by axles and payment method				Number of axles for toll payment purpose			
			Cash	Peak	Off-peak	Over-night	Cash	Peak	Off-peak	Over-night
			16.6%	49.4%	31.4%	2.6%				
3	7.54%	19	3	9	6	0	9	28	18	1
4	1.32%	3	1	2	1	0	2	6	4	0
5	88.22%	219	36	108	69	6	182	542	344	29
6	2.92%	7	1	4	2	0	7	22	14	1
Total		249	41	123	78	6	201	598	380	31

	Week toll cost						Annual toll cost		% change
# of axles	201	598	380	31	1,210				
Year	Cash	Peak	Off-peak	Over-night	Total	Difference	Total	Difference	
2010	$ 1,607	$ 4,782	$ 2,660	$ 173	$ 9,221		$ 479,506		
2011	$,611	$ 5,977	$ 3,419	$ 236	$ 12,244	$ 3,023	$ 636,677	$ 157,172	32.8%
2012	$ 3,013	$ 7,173	$ 4,179	$ 299	$ 14,664	$ 2,420	$ 762,515	$ 125,838	19.8%
2013	$ 3,415	$ 8,368	$ 4,939	$ 362	$ 17,084	$ 2,420	$ 888,353	$ 125,838	16.5%
2014	$ 3,816	$ 9,564	$ 5,699	$ 425	$ 19,504	$ 2,420	$1,014,191	$ 125,838	14.2%
2015	$ 4,218	$ 10,759	$ 6,459	$ 488	$ 21,924	$ 2,420	$1,140,029	$ 125,838	12.4%

Appendix B

Top Seven Locations: NYCT Inbound Turnpike Tolls

Kearny

Truck en route to NYCT entrance to Turnpike by number of axles and tolls paid

Turnpike entrance	Number of trucks by axles				Tolls paid by axle				Total paid
	3	4	5	6	3	4	5	6	
	Peak rates								
10			1				$ 8.05		$ 8.05
11			1				$ 5.60		$ 5.60
12			2				$ 5.20		$ 5.20
14			1				$ 5.30		$ 5.30
13A	3		30		$ 4.35		$ 66.00		$ 70.35
15E			14	2	$ 16.80		$ 108.50	$ 12.40	$ 137.70
15W			1				$ 9.55		$ 9.55
16E			1				$ 12.25		$ 12.25
Subtotal									**$ 254.00**
	Off-peak rates								
9			1				$ 9.20		$ 9.20
12	1		3		$ 1.80		$ 7.35		$ 9.15
14			1				$ 5.05		$ 5.05
13A	4	1	62	1	$ 5.60	$ 1.80	$ 130.20	$ 2.45	$ 140.05
15E	4	2	32		$ 21.20	$ 12.20	$ 235.20		$ 268.60
15W			7				$ 63.35		$ 63.35
15X			1				$ 10.40		$ 10.40
16E			2				$ 23.30		$ 23.30
Subtotal									**$ 529.10**
	Cash rates								
9			1				$ 10.65		$ 10.65
13A	3		6		$ 4.95		$ 14.70		$ 19.65
15E	2		2		$ 12.20		$ 8.40		$ 20.60
15W			1				$ 10.40		$ 10.40
Subtotal									**$ 61.30**
Total									**$ 844.40**

Kearny to NYCT Turnpike use and tolls paid

	Number of trucks	Totals	Avg. per truck
Cash Toll	14	$ 61.30	$ 4.38
Peak Toll	56	$ 254.00	$ 4.54
Off-peak Toll	122	$ 529.10	$ 4.34
Total Toll	192	$ 844.40	$ 4.40
Truck % of total Survey	6.1%		
Estimated number of Kearny truck from total	497	$ 2,188	

Elizabeth

Truck en route to NYCT entrance to Turnpike by number of axles and tolls paid

Turnpike entrance	Number of trucks by axles				Tolls paid by axle				Total paid
	3	4	5	6	3	4	5	6	
	Peak rates								
9			1				$ 9.70		$ 9.70
11			1				$ 5.60		$ 5.60
13A	4		34		$ 5.80		$ 74.80		$ 80.60
Subtotal									**$ 95.90**
	Off-peak rates								
10			1				$ 7.65		$ 7.65
14			3	1			$ 15.15	$ 12.25	$ 27.40
13A	3	1	90	1	$ 4.20	$ 1.80	$ 189.00	$ 12.25	$ 207.25
14A			2				$ 21.40		$ 21.40
15E			1				$ 7.35		$ 7.35
15W			1				$ 9.05		$ 9.05
16E			1				$ 11.65		$ 11.65
8A			1				$ 11.20		$ 11.20
Subtotal									**$ 302.95**
	Cash rates								
10	1				$ 6.35				$ 6.35
12			1				$ 2.75		$ 2.75
13A	6		25	2	$ 9.90		$ 61.25	$ 5.50	$ 76.65
Subtotal									$ 85.75
Total									**$ 484.60**

Elizabeth to NYCT Turnpike use and tolls paid

	Number of trucks	Totals	Avg. per truck
Cash toll	35	$ 85.75	$ 2.45
Peak toll	40	$ 95.90	$ 2.40
Off-peak toll	106	$ 302.95	$ 2.86
Total tolls	181	$ 484.60	$ 2.68
Truck % of total Survey	5.7%		
Estimated number of Elizabeth trucks from total	469	$ 1,257	

Jersey City

Truck en route to NYCT entrance to Turnpike by number of axles and tolls paid

Turnpike entrance	Number of trucks by axles				Tolls paid by axle				Total paid
	3	4	5	6	3	4	5	6	
	Peak rates								
14			2				$ 10.60		$ 10.60
13A	1	1	2		$ 1.45	$ 1.90	$ 4.40		$ 7.75
15E	1				$ 5.60				$ 5.60
15X			1				$ 10.95		$ 10.95
Subtotal									$ 34.90
	Off-peak rates								
14	2		7	1	$ 7.70		$ 35.35	$ 5.90	$ 48.95
13A			9				$ 18.90		$ 18.90
14A	1		1		$ 7.70		$ 10.70		$ 18.40
15E	1		4		$ 5.30		$ 29.40		$ 34.70
15X			1				$ 10.40		$ 10.40
Subtotal									$ 131.35
	Cash rates								
13A			2				$ 5.50		$ 5.50
14A	1				$ 8.65				$ 8.65
15E			2				$ 19.70		$ 19.70
15W	1				$ 8.05				$ 8.05
Subtotal									$ 41.90
Total									$ 208.15

Jersey City to NYCT Turnpike use and tolls paid

	Number of trucks	Totals	Avg. per truck
Cash toll	6	$ 41.90	$ 6.98
Peak toll	8	$ 34.90	$ 4.36
Off-peak toll	27	$ 131.35	$ 4.86
Total tolls	41	$ 208.15	$ 5.08
Truck % of total Survey	1.3%		
Estimated number of Jersey City trucks from total	106	$ 539	

Linden

Truck en route to NYCT entrance to Turnpike by number of axles and tolls paid

Turnpike entrance	Number of trucks by axles				Tolls paid by axle				Total paid
	3	4	5	6	3	4	5	6	
	Peak rates								
14			1				$ 5.30		$ 5.30
13A			8				$ 17.60		$ 17.60
15W			1				$ 9.55		$ 9.55
18W			3				$ 51.60		$ 51.60
Subtotal									$ 84.05
	Off-peak rates								
13A	2		24	1	$ 2.80		$ 50.40	$ 2.45	$ 55.65
15E			1				$ 7.35		$ 7.35
16W			1				$ 11.65		$ 11.65
8A			1				$ 13.15		$ 13.15
Subtotal									$ 87.80
	Cash rates								
10			1				$ 8.65		$ 8.65
12			1				$ 2.75		$ 2.75
13A			7				$ 17.15		$ 17.15
8A	1				$ 9.35				$ 9.35
Subtotal									$ 37.90
Total									$ 209.75

Linden to NYCT Turnpike use and tolls paid

	Number of trucks	Totals	Avg. per truck
Cash toll	10	$ 37.90	$ 3.79
Peak toll	13	$ 84.05	$ 6.47
Off-peak toll	30	$ 87.80	$ 2.93
Total tolls	53	$ 209.75	$ 3.96
Truck % of total Survey	1.7%		
Estimated number of Linden trucks from total	137	$ 543	

Edison

Truck en route to NYCT entrance to Turnpike by number of axles and tolls paid

Turnpike entrance	Number of trucks by axles				Tolls paid by axle				Total paid
	3	4	5	6	3	4	5	6	
	Peak rates								
10		2	1				$ 16.10	$ 9.55	$ 25.65
11		1	1				$ 5.60	$ 6.45	$ 12.05
13A	1	1			$ 1.45		$ 2.20		$ 3.65
Subtotal									$ 41.35
	Off-peak rates								
10			8	2			$ 61.20	$ 18.10	$ 79.30
11			2				$ 10.60		$ 10.60
13A			5	2			$ 10.50	$ 4.90	$ 15.40
Subtotal									$ 105.30
	Cash rates								
10	1		3		$ 6.35		$ 25.95		$ 32.30
12			1				$ 2.75		$ 2.75
Subtotal									$ 35.05
Total									$ 181.70

Edison to NYCT Turnpike use and tolls paid

	Number of trucks	Totals	Avg. per truck
Cash toll	5	$ 35.05	$ 7.01
Peak toll	7	$ 41.35	$ 5.91
Off-peak toll	19	$ 105.30	$ 5.54
Total tolls	31	$ 181.70	$ 5.86
Truck % of total Survey	1.0%		
Estimated number of Edison trucks from total	80	$ 469	

Carteret

Truck en route to NYCT entrance to Turnpike by number of axles and tolls paid

Turnpike entrance	Number of trucks by axles				Tolls paid by axle				Total paid
	3	4	5	6	3	4	5	6	
	Peak rates								
10			1				$ 8.05		$ 8.05
12	1		9		$ 1.90		$ 23.40		$ 25.30
13A			1				$ 2.20		$ 2.20
Subtotal									$ 35.55
	Off-peak rates								
8			1				$ 13.15		$ 13.15
12	2	1	54	2	$ 3.60	$ .10	$ 132.30	$ 5.70	$ 143.70
14			1				$ 5.05		$ 5.05
13A			2				$ 4.20		$ 4.20
Subtotal									$ 166.10
	Cash rates								
12			10				$ 27.50		$ 27.50
13A	1				$ 1.65				$ 1.65
Subtotal									$ 29.15
Total									$ 230.80

Carteret to NYCT Turnpike use and tolls paid

	Number of trucks	Totals	Avg. per truck
Cash toll	11	$ 29.15	$ 2.65
Peak toll	12	$ 35.55	$ 2.96
Off-peak toll	63	$ 166.10	$ 2.64
Total tolls	86	$ 230.80	$ 2.68
Truck % of total Survey	2.7%		
Estimated number of Carteret trucks from total	223	$ 598	

NJ Turnpike Totals

Truck en route to NYCT entrance to Turnpike by number of axles and tolls paid

Turnpike entrance	Number of trucks by axles				Tolls paid by axle				Total paid
	3	4	5	6	3	4	5	6	
	Peak rates								
1			1				$ 32.45		$ 32.45
2			2				$ 58.00		$ 58.00
4			1				$ 22.80		$ 22.80
7			3				$ 51.60		$ 51.60
8			1				$ 13.85		$ 13.85
9			2	1			$ 15.40	$ 11.25	$ 26.65
10			6	1			$ 48.30	$ 9.55	$ 57.85
11			5	1			$ 28.00	$ 6.45	$ 34.45
12	1		12		$ 1.90		$ 31.20		$ 33.10
14	1		31	1	$ 4.05		$ 164.30	$ 6.20	$ 174.55
13A	24	7	208	2	$ 34.80	$ 13.30	$ 457.60	$ 5.20	$ 510.90
15E	2		24	2	$ 11.20		$ 186.00	$ 18.10	$ 215.30
15W			3				$ 28.65		$ 28.65
15X			11				$ 120.45		$ 120.45
16E	1		15	2	$ 9.05		$ 183.75	$ 28.50	$ 221.30
16W			5	1			$ 61.25	$ 14.25	$ 75.50
18W	1		3		$ 12.25		$ 51.60		$ 63.85
7A			3				$ 46.65		$ 46.65
8A			5				$ 59.00		$ 59.00
Subtotal									$ 1,846.90
	Off-peak rates								
2			4	1			$ 110.20	$ 31.80	$ 142.00
4	1		1		$ 15.20		$ 21.65		$ 36.85
6			4				$ 87.60		$ 87.60
7	2		8		$ 23.30		$ 130.80		$ 154.10
8			7				$ 92.05		$ 92.05
9	1		11		$ 6.90		$ 101.20		$ 108.10
10			16	2			$ 122.40	$ 18.10	$ 140.50
11	1		6		$ 3.85		$ 31.80		$ 35.65
12	4	1	60	2	$ 7.20	$ 2.10	$ 147.00	$ 5.70	$ 162.00
14	6	1	96	5	$ 30.80	$ 4.05	$ 484.80	$ 29.50	$ 549.15
13A	49	8	500	10	$ 68.60	$ 14.40	$ 1,050.00	$ 24.50	$ 1,157.50
14A	1		4		$ 7.70		$ 42.80		$ 50.50
15E	6	2	50	1	$ 31.80	$ 12.20	$ 367.50	$ 8.60	$ 420.10
15W			16	1			$ 144.80	$ 7.65	$ 152.45
15X	5		30		$ 38.50		$ 312.00		$ 350.50

16E	1		33		$ 7.65		$ 384.45		$ 392.10
16W	2	1	10		$ 17.20	$ 10.00	$ 104.85		$ 132.05
18E			1				$ 16.35		$ 16.35
18W	1	1	6	1	$ 11.65	$ 13.55	$ 98.10	$ 18.80	$ 142.10
7A			11				$ 162.25		$ 162.25
8A			17	1			$ 201.60	$ 13.15	$ 214.75
Subtotal									$ 4,698.65
	Cash rates								
2			1				$ 31.65		$ 31.65
4			2				$ 49.90		$ 49.90
6		2	2			$ 42.20	$ 50.30		$ 92.50
7			2		$ 26.80		$ 37.60		$ 64.40
9			2		$ -		$ 21.30		$ 21.30
10	2		5		$ 12.70		$ 43.25		$ 55.95
11			2				$ 12.20		$ 12.20
12			15				$ 41.25		$ 41.25
14	2		18	2	$ 8.70		$ 101.70	$ 13.80	$ 124.20
13A	24	1	83	2	$ 39.60	$ 2.15	$ 203.35	$ 5.50	$ 250.60
14A	1				$ 8.65				$ 8.65
15E	3		8		$ 18.30		$ 67.20		$ 85.50
15W	1		3		$ 8.05		$ 31.20		$ 39.25
15X			1				$ 12.00		$ 12.00
16E	1		3		$ 9.85		$ 40.20		$ 50.05
16W	1		1		$ 9.85		$ 13.40		$ 23.25
18W	1		2		$ 13.40		$ 37.60		$ 51.00
7A			1				$ 16.90		$ 16.90
8A	1		3		$ 9.35		$ 38.55		$ 47.90
Subtotal									$ 1,078.45
Total									$ 7,624.00

All locations to NYCT Turnpike use and tolls paid

	Number of trucks	Totals	Avg. per truck
Cash toll	198	$1,078.45	$ 5.45
Peak toll	389	$1,846.90	$ 4.75
Off-peak toll	1,012	$4,698.65	$ 4.64
Total tolls	1599	$7,624.00	$ 4.77
Truck % of total Survey	50.6%		
Estimated number of all locations	4,142	$19,751	

Appendix C

Top Seven Locations: NYCT Outbound Turnpike Tolls

Newark

Turnpike exit	Number of truck axles				Toll paid by axle				Total paid
	3	4	5	6	3	4	5	6	
	Peak rates								
1	1	0	0	0	$ 23.05	$ -	$ -	$ -	$ 23.05
4	0	0	1	0	$ -	$ -	$ 22.80	$ -	$ 22.80
9	0	0	2	0	$ -	$ -	$ 19.40	$ -	$ 19.40
10	0	0	1	0	$ -	$ -	$ 8.05	$ -	$ 8.05
12	0	0	1	0	$ -	$ -	$ 2.60	$ -	$ 2.60
14	0	0	16	2	$ -	$ -	$ 84.80	$ 12.40	$ 97.20
13A	8	2	88	1	$ 11.60	$ 3.80	$ 193.60	$ 2.60	$ 211.60
15E	1	0	3	0	$ 5.60	$ -	$ 23.25	$ -	$ 28.85
15W	0	0	2	0	$ -	$ -	$ 19.10	$ -	$ 19.10
15X	0	1	0	0	$ -	$ 9.35	$ -	$ -	$ 9.35
16E	0	0	5	0	$ -	$ -	$ 61.25	$ -	$ 61.25
16W	2	0	2	0	$ 18.10	$ -	$ 24.50	$ -	$ 42.60
7A	0	0	3	0	$ -	$ -	$ 51.60	$ -	$ 51.60
8A	1	0	0	0	$ 8.50	$ -	$ -	$ -	$ 8.50
Subtotal									$ 605.95
	Off peak rates								
2	1	0	0	0	$ 19.45	$ -	$ -	$ -	$ 19.45
6	0	0	1	0	$ -	$ -	$ 21.90	$ -	$ 21.90
7	0	0	1	0	$ -	$ -	$ 16.35	$ -	$ 16.35
8	0	0	1	0	$ -	$ -	$ 13.15	$ -	$ 13.15
10	0	0	1	0	$ -	$ -	$ 7.65	$ -	$ 7.65
12	1	0	1	0	$ 1.80	$ -	$ 2.45	$ -	$ 4.25
14	1	1	71	1	$ 3.85	$ 4.05	$ 358.55	$ 5.90	$ 372.35
18	0	0	3	0	$ -	$ -	$ 49.05	$ -	$ 49.05
13A	20	7	230	5	$ 28.00	$ 12.60	$ 483.00	$ 12.25	$ 535.85
14A	0	0	1	0	$ -	$ -	$ 10.70	$ -	$ 10.70
14C	1	0	0	0	$ 9.45	$ -	$ -	$ -	$ 9.45
15E	0	0	3	0	$ -	$ -	$ 22.05	$ -	$ 22.05
15W	0	0	2	0	$ -	$ -	$ 18.10	$ -	$ 18.10
15X	0	0	1	0	$ -	$ -	$ 10.40	$ -	$ 10.40
16E	1	0	2	0	$ 8.60	$ -	$ 23.30	$ -	$ 31.90
18E	0	0	1	0	$ -	$ -	$ 16.35	$ -	$ 16.35
7A	0	0	1	0	$ -	$ -	$ 14.75	$ -	$ 14.75
8A	1	0	6	0	$ 8.00	$ -	$ 67.20	$ -	$ 75.20
Subtotal									$ 1,248.90
	Cash rates								

12	0	0	1	0	$ -	$ -	$ 2.75	$ -	2.75
14	1	0	15	2	$ 4.35	$ -	$ 84.75	$ 13.80	102.9
18	0	0	1	0	$ -	$ -	$ 18.80	$ -	18.8
13A	9	0	27	0	$ 14.85	$ -	$ 66.15	$ -	81
15E	1	1	2	0	$ 6.10	$ 7.20	$ 16.80	$ -	30.1
16E	0	0	2	0	$ -	$ -	$ 26.80	$ -	26.8
18W	0	0	1	0	$ -	$ -	$ 18.80	$ -	18.8
Subtotal									$ 281.15
Total									$ 2,136.00

	Number of trucks	Totals	Avg. per truck
Cash Toll	63	$ 281.15	$4.46
Peak Toll	143	$ 605.95	$4.24
Off-peak Toll	366	$ 1,248.90	$3.41
Total Toll	572	$ 2,136.00	$3.73
Truck % of total Survey	18.10%		
Estimated number of Newark truck from total	1,482	$5,534	

Kearny

Turnpike exit	Number of truck axles				Toll paid by axle				Total paid
	3	4	5	6	3	4	5	6	
	Peak rates								
8			1		$ -	$ -	$ 13.85	$ -	$ 13.85
9			1		$ -	$ -	$ 9.70	$ -	$ 9.70
11	1		1		$ 4.05	$ -	$ 5.60	$ -	$ 9.65
12			2		$ -	$ -	$ 5.20	$ -	$ 5.20
14			1		$ -	$ -	$ 5.30	$ -	$ 5.30
13A	2		26		$ 8.10	$ -	$ 57.20	$ -	$ 65.30
15E			6	1	$ -	$ -	$ 46.50	$ 9.05	$ 55.55
15W			4	1	$ -	$ -	$ 38.20	$ 11.00	$ 49.20
16E	1		1		$ 9.05	$ -	$ 12.25	$ -	$ 21.30
16W			1		$ -	$ -	$ 12.25	$ -	$ 12.25
7A			2		$ -	$ -	$ 31.10	$ -	$ 31.10
Subtotal									$ 278.40
	Off peak rates								
9			1		$ -	$ -	$ 9.20	$ -	$ 9.20
10			1		$ -	$ -	$ 7.65	$ -	$ 7.65
12			2		$ -	$ -	$ 4.90	$ -	$ 4.90
14			5		$ -	$ -	$ 25.25	$ -	$ 25.25
13A	3	1	57	1	$ 4.20	$ 1.80	$ 119.70	$ 2.45	$ 128.15
15E	3	1	25		$ 15.90	$ 6.10	$ 183.75	$ -	$ 205.75
15W		1	4		$ -	$ 7.35	$ 36.20	$ -	$ 43.55
16E			3		$ -	$ -	$ 34.95	$ -	$ 34.95
16W			1		$ -	$ -	$ 11.65	$ -	$ 11.65
7A			1		$ -	$ -	$ 14.75	$ -	$ 14.75
Subtotal									$ 485.80
	Cash rates								
13A	2		6		$ 3.30		$ 14.70		$ 18.00
15E	1				$ 6.10		$ -		$ 6.10
15W			2		$ -		$ 20.80		$ 20.80
15X	1				$ 8.80		$ -		$ 8.80
Subtotal									$ 53.70
Total									$ 817.90

	Number of trucks	Totals	Avg. per truck
Cash Toll	12	$ 53.70	$4.48
Peak Toll	52	$ 278.40	$5.35
Off-peak Toll	110	$ 485.80	$4.42
Total Toll	174	$ 817.90	$4.70
Truck % of total Survey	5.50%		
Estimated number of Kearny truck from total	451	$2,119	

Elizabeth

Turnpike exit	Number of truck axles				Toll paid by axle				Total paid
	3	4	5	6	3	4	5	6	
	Peak rates								
11	0	0	1	0	$ -	$ -	$ 5.60	$ -	$ 5.60
14	1	0	1	0	$ 4.05	$ -	$ 5.30	$ -	$ 9.35
13A	2	0	28	0	$ 2.90	$ -	$ 61.60	$ -	$ 64.50
8A	0	0	1	0	$ -	$ -	$ 11.80	$ -	$ 11.80
Subtotal									$ 91.25
	Off-peak rates								
10	0	0	1	0	$ -	$ -	$ 7.65	$ -	$ 7.65
11	0	0	1	0	$ -	$ -	$ 5.30	$ -	$ 5.30
12	0	0	1	0	$ -	$ -	$ 2.45	$ -	$ 2.45
14	0	0	5	1	$ -	$ -	$ 25.25	$ 5.90	$ 31.15
13A	1	1	80	1	$ 1.40	$ 1.80	$ 168.00	$ 2.45	$ 173.65
14A	0	0	1	0	$ -	$ -	$ 10.70	$ -	$ 10.70
15E	0	0	2	0	$ -	$ -	$ 14.70	$ -	$ 14.70
16E	0	0	1	0	$ -	$ -	$ 11.65	$ -	$ 11.65
8A	0	0	1	0	$ -	$ -	$ 11.20	$ -	$ 11.20
Subtotal									$ 268.45
	Cash rates								
14	1	0	0	1	$ 4.35	$ -	$ -	$ 6.90	$ 11.25
13A	5	0	20	0	$ 8.25	$ -	$ 49.00	$ -	$ 57.25
15E	0	0	1	0	$ -	$ -	$ 8.40	$ -	$ 8.40
16E	0	0	1	0	$ -	$ -	$ 13.40	$ -	$ 13.40
16W	0	0	1	0	$ -	$ -	$ 13.40	$ -	$ 13.40
7A	1	0	0	0	$ 12.85	$ -	$ -	$ -	$ 12.85
Subtotal									$ 116.55
Total									$ 476.25

	Number of trucks	Totals	Avg. per truck
Cash Toll	31	$ 116.55	$3.76
Peak Toll	34	$ 91.25	$2.68
Off-peak Toll	97	$ 268.45	$2.77
Total Toll	162	$ 476.25	$2.94
Truck % of total Survey	5.1%		
Estimated number of Elizabeth truck from total	420	$1,234	

Jersey City

Turnpike exit	Number of truck axles				Toll paid by axle				Total paid
	3	4	5	6	3	4	5	6	
	Peak rates								
12	1	0	1	0	$ 1.90	$ -	$ 2.60	$ -	$ 4.50
14	0	0	2	0	$ -	$ -	$ 10.60	$ -	$ 10.60
13A	0	0	3	0	$ -	$ -	$ 6.60	$ -	$ 6.60
15E	1	0	0	0	$ 5.60	$ -	$ -	$ -	$ 5.60
18E	0	0	1	0	$ -	$ -	$ 17.20	$ -	$ 17.20
Subtotal									$ 27.30
	Off-peak rates								
6	0	0	1	0	$ -	$ -	$ 21.90	$ -	$ 21.90
9	0	0	1	0	$ -	$ -	$ 9.20	$ -	$ 9.20
10	1	0	2	0	$ 5.50	$ -	$ 15.30	$ -	$ 20.80
14	0	0	5	0	$ -	$ -	$ 25.25	$ -	$ 25.25
13A	1	0	10	0	$ 1.40	$ -	$ 21.00	$ -	$ 22.40
14A	2	0	1	0	$ 15.40	$ -	$ 10.70	$ -	$ 26.10
15E	0	0	2	0	$ -	$ -	$ 14.70	$ -	$ 14.70
15X	0	0	3	0	$ -	$ -	$ 31.20	$ -	$ 31.20
Subtotal									$ 171.55
	Cash rates								
12	0	0	1	0	$ -	$ -	$ 2.75	$ -	$ 2.75
13A	2	0	0	0	$ 3.30	$ -	$ -	$ -	$ 3.30
14A	1	0	0	0	$ 8.65	$ -	$ -	$ -	$ 8.65
15E	0	0	1	0	$ -	$ -	$ 13.40	$ -	$ 13.40
15W	1	0	0	0	$ 8.05	$ -	$ -	$ -	$ 8.05
15X	0	0	1	0	$ -	$ -	$ 12.00	$ -	$ 12.00
7A	0	0	1	0	$ -	$ -	$ 16.90	$ -	$ 16.90
Subtotal									$ 48.15
Total									$ 247.00

	Number of trucks	Totals	Avg. per truck
Cash Toll	8	$ 48.15	$6.02
Peak Toll	9	$ 27.30	$3.03
Off-peak Toll	29	$ 171.55	$5.92
Total Toll	46	$ 247.00	$5.37
Truck % of total Survey	1.5%		
Estimated number of Jersey City truck from total	119	$640	

Linden

Turnpike exit	Number of truck axles				Toll paid by axle				Total paid
	3	4	5	6	3	4	5	6	
	Peak rates								
18	0	0	2	0	$ -	$ -	$ 34.40	$ -	$ 34.40
13A	0	0	8	0	$ -	$ -	$ 17.60	$ -	$ 17.60
15W	0	0	1	0	$ -	$ -	$ 9.55	$ -	$ 9.55
Subtotal									$ 61.55
	Off-peak rates								
6	0	0	1	0	$ -	$ -	$ 21.90	$ -	$ 21.90
9	0	0	1	0	$ -	$ -	$ 9.20	$ -	$ 9.20
11	0	0	2	0	$ -	$ -	$ 10.60	$ -	$ 10.60
13A	0	0	18	0	$ -	$ -	$ 37.80	$ -	$ 37.80
15E	0	0	1	0	$ -	$ -	$ 7.35	$ -	$ 7.35
15W	0	0	1	0	$ -	$ -	$ 9.05	$ -	$ 9.05
16W	0	0	1	0	$ -	$ -	$ 11.65	$ -	$ 11.65
Subtotal									$ 107.55
	Cash rates								
8	1	0	0	0	$ 10.65	$ -	$ -	$ -	$ 10.65
10	0	0	1	0	$ -	$ -	$ 8.65	$ -	$ 8.65
14	0	0	1	0	$ -	$ -	$ 5.65	$ -	$ 5.65
13A	0	0	10	0	$ -	$ -	$ 24.50	$ -	$ 24.50
Subtotal									$ 49.45
Total									$ 218.55

	Number of trucks	Totals	Avg. per truck
Cash Toll	13	$ 49.45	$3.80
Peak Toll	11	$ 61.55	$5.60
Off-peak Toll	25	$ 107.55	$4.30
Total Toll	49	$ 218.55	$4.46
Truck % of total Survey	1.6%		
Estimated number of Linden truck from total	127	$566	

Edison

Turnpike exit	Number of truck axles				Toll paid by axle				Total paid
	3	4	5	6	3	4	5	6	
	Peak rates								
10	0	0	2	0	$ -	$ -	$ 16.10	$ -	$ 16.10
11	0	0	0	1	$ -	$ -	$ -	$ 6.45	$ 6.45
13A	0	0	4	2	$ -	$ -	$ 8.80	$ 5.20	$ 14.00
8A	0	0	1	0	$ -	$ -	$ 11.80	$ -	$ 11.80
Subtotal									$ 48.35
	Off-peak rates								
9	0	0	1	0	$ -	$ -	$ 9.20	$ -	$ 9.20
10	0	0	4	2	$ -	$ -	$ 30.60	$ 18.10	$ 48.70
13A	0	0	9	0	$ -	$ -	$ 18.90	$ -	$ 18.90
14A	0	0	1	0	$ -	$ -	$ 10.70	$ -	$ 10.70
15E	0	0	2	0	$ -	$ -	$ 14.70	$ -	$ 14.70
16W	0	0	1	0	$ -	$ -	$ 11.65	$ -	$ 11.65
7A	1	0	1	0	$ -	$ -	$ 14.75	$ -	$ 14.75
8A	1	0	1	1	$ 8.00	$ -	$ 11.20	$ 13.15	$ 32.35
Subtotal									$ 160.95
	Cash rates								
10	0	0	2	0	0	$ -	$ 17.30	$ -	$ 17.30
13A	0	0	3	0	0	$ -	$ 7.35	$ -	$ 7.35
Subtotal									$ 24.65
Total									$ 233.95

	Number of trucks	Totals	Avg. per truck
Cash Toll	5	$ 24.65	$4.93
Peak Toll	10	$ 48.35	$4.84
Off-peak Toll	24	$ 160.95	$6.71
Total Toll	39	$ 233.95	$6.00
Truck % of total Survey	1.2%		
Estimated number of Edison truck from total	101	$606	

Carteret

Turnpike exit	Number of truck axles				Toll paid by axle				Total paid
	3	4	5	6	3	4	5	6	
	Peak rates								
6	0	0	1	0	$ -	$ -	$ 23.05	$ -	$ 23.05
10	0	0	1	0	$ -	$ -	$ 8.05	$ -	$ 8.05
12	0	0	8	0	$ -	$ -	$ 20.80	$ -	$ 20.80
13A	0	0	1	0	$ -	$ -	$ 2.20	$ -	$ 2.20
Subtotal									$ 54.10
	Off-peak rates								
12	2	1	53	1	$ 3.60	$ 2.10	$ 129.85	$ 2.85	$ 135.55
14	0	0	1	0	$ -	$ -	$ 5.05	$ -	$ 5.05
13A	0	0	2	0	$ -	$ -	$ 4.20	$ -	$ 4.20
15E	0	0	1	0	$ -	$ -	$ 7.35	$ -	$ 7.35
8A	0	0	1	0	$ -	$ -	$ 11.20	$ -	$ 11.20
Subtotal									$ 163.35
	Cash rates								
10	0	0	1	0	$ -	$ -	$ 8.65	$ -	$ 8.65
12	0	0	8	0	$ -	$ -	$ 22.00	$ -	$ 22.00
13A	1	0	1	0	$ 1.65	$ -	$ 2.45	$ -	$ 4.10
Subtotal									$ 34.75
Total									$ 252.20

	Number of trucks	Totals	Avg. per truck
Cash Toll	11	$ 34.75	$3.16
Peak Toll	11	$ 54.10	$4.92
Off-peak Toll	62	$ 163.35	$2.63
Total Toll	84	$ 252.20	$3.00
Truck % of total Survey	2.7%		
Estimated number of Carteret truck from total	218	$653	

Appendix D

Top Seven Location: GCT Inbound Turnpike Tolls

Newark

Newark Inbound Truck TP Toll Payment									
Cash									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
14	4.9	5.65	$ 6.90	$ 8.05	1	2	52	3	$ 399.15
Sub. Total					1	2	52	3	$ 399.15
E-ZPass Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
14			$ 6.20				46		$ 285.20
Sub. Total							46		$ 285.20
E-ZPass Off-Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
14	$ 4.30	5.05	$ 5.90	6.9	1	1	74	1	$ 452.85
Sub. Total					1	1	74	1	$ 452.85
Total					2	3	172	4	$ 1,137.20

Newark Inbound Summary			Avg. Toll per Truck
Payment Type	Number of Trucks	Total Toll Paid	
Cash Toll	58	$ 399.15	$ 6.88
E-ZPass Peak Toll	46	$ 285.20	$ 6.20
E-ZPass Off-Peak Toll	77	$ 452.85	$ 5.88
Sample Total	181	$ 1,137.20	$ 6.28
Total TP Users Selected*	231		
% of Survey Total	78.4%		

Elizabeth

Elizabeth Inbound Truck TP Toll Payment									
Cash									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
14			$ 6.50	8.05			29	1	$ 196.55
13A			$ 12.30				17		$ 209.10
Sub. Total							46	1	$ 405.65
E-ZPass Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
14			$ 6.20				10		$ 62.00
13A			$ 11.25				15	1	$ 168.75
Sub. Total			13.15				25	1	$ 230.75
E-ZPass Off-Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
13			$ 10.70				3		$ 32.10
14			$ 5.90				23		$ 135.70
13A			$ 10.70	$ 12.50		1	16	2	$ 196.20
Sub. Total						1	42	2	364
Total						1	113	4	$ 1,000.40

Elizabeth Inbound Summary			Avg. Toll per Truck
Payment Type	Number of Trucks	Total Toll Paid	
Cash Toll	47	$ 405.65	$ 8.63
E-ZPass Peak Toll	26	$ 230.75	$ 8.88
E-ZPass Off-Peak Toll	45	$ 364.00	$ 8.09
Total	118	$ 1,000.40	$ 8.48
Survey Total	222		
% of Survey Total	53.2%		

Jersey City

Jersey City Inbound Truck TP Toll Payment									
Cash									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
14			$ 6.90				8		$ 55.20
13A			$ 12.30				1		$ 12.30
14B			$ 2.75				1		$ 2.75
14C			$ 4.35				1		$ 4.35
Sub. Total							11	0	$ 74.60
E-ZPass Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
14			$ 4.50				5		$ 22.50
Sub. Total							5	0	$ 22.50
E-ZPass Off-Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
13	$ 8.65				1				$ 8.65
14			$ 5.90	$ 6.90			5	1	$ 36.40
14C			$ 3.95				1		$ 3.95
Sub. Total					1		6	1	$ 49.00
Total					1		22	1	$ 146.10

Jersey City Inbound Summary			Avg. Toll per Truck
Payment Type	Number of Trucks	Total Toll Paid	
Cash Toll	11	$ 74.60	$ 6.78
E-ZPass Peak Toll	5	$ 22.50	$ 4.50
E-ZPass Off-Peak Toll	7	$ 49.00	$ 7.00
Total	23	$ 146.10	$ 6.35
Survey Total	36		
% of Survey Total	63.9%		

Linden

Linden Inbound Truck TP Toll Payment									
Cash									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
12			$ 15.45	$ 17.75			1	1	$ 33.20
13		$ 10.40	$ 12.30			2	26		$ 340.60
14			$ 6.90				6		$ 41.40
13A			$ 12.30				2		$ 24.60
Sub. Total						2	35	1	$ 439.80
E-ZPass Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
12			$ 14.00	17.75			2	0	$ 28.00
13			$ 11.25				7		$ 78.75
14			$ 6.20				2		$ 12.40
Sub. Total							11		$ 119.15
E-ZPass Off-Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
11			$ 16.20				1		$ 16.20
13			$ 10.70				15		$ 160.50
14			$ 5.90				3		$ 17.70
13A			$ 10.70				2		$ 21.40
Sub. Total							21		$ 215.80
Total						2	67	1	$ 774.75

Linden Inbound Summary			Avg. Toll per Truck
Payment Type	Number of Trucks	Total Toll Paid	
Cash Toll	38	$ 439.80	$ 11.57
E-ZPass Peak Toll	11	$ 119.15	$ 10.83
E-ZPass Off-Peak Toll	21	$ 215.80	$ 10.28
Total	70	$ 774.75	$ 11.07
Survey Total	72		
% of Survey Total	97.2%		

Kearny

Kearny Inbound Truck TP Toll Payment									
Cash									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
15E			$ 9.85				1		$ 9.85
Sub. Total							1		$ 9.85
E-ZPass Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
15E			$ 9.05				1		$ 9.05
Sub. Total							1		$ 9.05
E-ZPass Off-Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
14			$ 5.90				2		$ 11.80
15E			$ 8.60				4		$ 34.40
15W			$ 10.70				1		$ 10.70
Sub. Total							7		$ 56.90
Total							9		$ 75.80

Kearny Inbound Summary			Avg. Toll per Truck
Payment Type	Number of Trucks	Total Toll Paid	
Cash Toll	1	$ 9.85	$ 9.85
E-ZPass Peak Toll	1	$ 9.05	$ 9.05
E-ZPass Off-Peak Toll	7	$ 56.90	$ 8.13
Total	9	$ 75.80	$ 8.42
Survey Total	13		
% of Survey Total	69.2%		

Carteret

Carteret Inbound Truck TP Toll Payment									
Cash									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
12			$ 15.45				20		$ 309.00
14			$ 6.90				2		$ 13.80
13A			$ 12.30	$ 14.55			2	1	$ 39.15
Sub. Total							24	1	$ 361.95
E-ZPass Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
12			$ 14.00				8		$ 112.00
Sub. Total							8		$ 112.00
E-ZPass Off-Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
12			$ 13.30				14		$ 186.20
13			$ 10.70				2		$ 21.40
14			$ 5.90				1		$ 5.90
13A			$ 10.70				1		$ 10.70
Sub. Total							18		$ 213.50
Total									$ 687.45

Carteret Inbound Summary			Avg. Toll per Truck
Payment Type	Number of Trucks	Total Toll Paid	
Cash Toll	25	$ 361.95	$ 14.48
E-ZPass Peak Toll	8	$ 112.00	$ 14.00
E-ZPass Off-Peak Toll	17	$ 213.50	$ 12.56
Total	50	$ 687.45	$ 13.75
Survey Total	81		
% of Survey Total	61.7%		

Appendix E

Top Seven Location: GCT Outbound Turnpike Tolls

Newark

Newark Outbound Truck TP Toll Payment									
Cash									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
14	4.9	5.65	$ 6.90	$ 8.05	1	1	52	3	$ 393.50
13A			$ 12.30				2		$ 24.60
Sub. Total					1	1	52	3	$ 418.10
E-ZPass Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
14			$ 6.20				44		$ 272.80
Sub. Total							44		$ 272.80
E-ZPass Off-Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
14		5.05	$ 5.90	$ 6.90		1	58	2	$ 361.05
13A			$ 10.70						
Sub. Total						1	58	2	$ 361.05
Total					1	2	154	5	$ 1,051.95

Newark Outbound Summary			Avg. Toll per Truck
Payment Type	Number of Trucks	Total Toll Paid	
Cash Toll	57	$ 418.10	$ 7.34
E-ZPass Peak Toll	44	$ 272.80	$ 6.20
E-ZPass Off-Peak Toll	61	$ 361.05	$ 5.92
Total	162	$ 1,051.95	$ 6.49
Survey Total	213		
% of Survey Total	76.1%		

Elizabeth

Elizabeth Outbound Truck TP Toll Payment									
Cash									
TP Exit	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
13			$ 12.30				2		$ 24.60
14			$ 6.90				25	1	$ 147.60
13A			$ 12.30				12		$ 172.20
Sub. Total							39	1	$ 344.40
E-ZPass Peak									
TP Exit	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
13			$ 11.25				2		$ 22.50
14			$ 6.20				7		$ 43.40
13A			$ 11.25				11		$ 123.75
Sub. Total							20		$ 189.65
E-ZPass Off-Peak									
TP Exit	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
13			$ 11.25				8		$ 148.80
14			$ 6.20				24		$ 157.50
13A			$ 11.25	$ 12.50	1	0	14	0	$ 157.50
Sub. Total					1	0	46	0	$ 463.80
Total					1	0	105	1	$ 997.85

Elizabeth Outbound Summary			Avg. Toll per Truck
Payment Type	Number of Trucks	Total Toll Paid	
Cash Toll	40	$ 344.40	$ 8.61
E-ZPass Peak Toll	20	$ 189.65	$ 9.48
E-ZPass Off-Peak Toll	47	$ 463.80	$ 9.87
Total	107	$ 997.85	$ 9.33
Survey Total	213		
% of Survey Total	50.2%		

Jersey City

Jersey City Outbound Truck TP Toll Payment									
Cash									
TP Exit	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
14B			$ 2.75				3		$ 8.25
14C			$ 4.35				5		$ 21.75
Sub. Total							8	0	$ 30.00
E-ZPass Peak									
TP Exit	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
14B			$ 2.60				1		$ 2.60
14C			$ 4.05				2		$ 8.10
Sub. Total							3		$ 10.70
E-ZPass Off-Peak									
TP Exit	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
14B			$ 2.45				1		$ 2.45
14C			$ 3.85				2	1	$ 7.70
Sub. Total					0		3	1	$ 10.15
Total					0		14	1	$ 50.85

Jersey City Outbound Summary			Avg. Toll per Truck
Payment Type	Number of Trucks	Total Toll Paid	
Cash Toll	8	$ 30.00	$ 3.75
E-ZPass Peak Toll	3	$ 10.70	$ 3.57
E-ZPass Off-Peak Toll	4	$ 10.15	$ 2.54
Total	15	$ 50.85	$ 3.39
Survey Total	27		
% of Survey Total	55.6%		

Linden

Linden Outbound Truck TP Toll Payment									
Cash									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
12			$ 15.45	$ 17.75			1	1	$ 33.20
13		$ 10.40	$ 12.30			2	18	1	$ 242.20
14			$ 6.90				4		$ 27.60
13A			$ 12.30				4		$ 49.20
Sub. Total						2	27	2	$ 352.20
E-ZPass Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
13			$ 11.25				9		$ 101.25
Sub. Total							9		$ 101.25
E-ZPass Off-Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
13			$ 10.70				8		$ 85.60
14			$ 5.90				2		$ 11.80
Sub. Total							10		$ 97.40
Total						2	46	2	$ 550.85

Linden Outbound Summary			Avg. Toll per Truck
Payment Type	Number of Trucks	Total Toll Paid	
Cash Toll	31	$ 352.20	$ 11.36
E-ZPass Peak Toll	9	$ 101.25	$ 11.25
E-ZPass Off-Peak Toll	10	$ 97.40	$ 9.74
Total	50	$ 550.85	$ 11.02
Survey Total	53		
% of Survey Total	94.3%		

Kearny

Kearny Outbound Truck TP Toll Payment									
Cash									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
15E			$ 9.85				1		$ 9.85
Sub. Total							1		$ 9.85
E-ZPass Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
15E			$ 9.05				1		$ 9.05
Sub. Total							1		$ 9.05
E-ZPass Off-Peak									
TP Entrance	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
14			$ 5.90				1		$ 5.90
15E			$ 8.60				1		$ 8.60
15W			$ 10.70				1		$ 10.70
Sub. Total							3		$ 25.20
Total					0		5	0	$ 44.10

Kearny Outbound Summary			Avg. Toll per Truck
Payment Type	Number of Trucks	Total Toll Paid	
Cash Toll	1	$ 9.85	$ 9.85
E-ZPass Peak Toll	1	$ 9.05	$ 9.05
E-ZPass Off-Peak Toll	3	$ 25.20	$ 8.40
Total	5	$ 44.10	$ 8.82
Survey Total	5		
% of Survey Total	100%		

Carteret

Carteret Outbound Truck TP Toll Payment									
Cash									
TP Exit	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
12			$ 15.45				16		$ 247.20
Sub. Total							16		$ 247.20
E-ZPass Peak									
TP Exit	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
12			$ 14.00				5		$ 70.00
Sub. Total							5		$ 70.00
E-ZPass Off-Peak									
TP Exit	Toll Rate by Axles				Number of Trucks by Axles				
	3	4	5	6	3	4	5	6	Tolls Paid
12			$ 13.30				11		$ 146.30
13			$ 10.70				2		$ 21.40
13A			$ 10.70				1		$ 10.70
Sub. Total							14		$ 178.40
Total							35		$ 495.60

Carteret Outbound Summary			Avg. Toll per Truck
Payment Type	Number of Trucks	Total Toll Paid	
Cash Toll	16	$ 247.20	$ 15.45
E-ZPass Peak Toll	5	$ 70.00	$ 14.00
E-ZPass Off-Peak Toll	14	$ 178.40	$ 12.74
Total	35	$ 495.60	$ 14.16
Survey Total	51		
% of Survey Total	68.6%		

Appendix F

Comparison of Toll Cost Before and After Toll Increase for all Seven Sites Studied

	Before toll increase	After toll increase	Column difference	Marginal effect
NYCT	**$39.15**	**$52.58**	$13.43	$12.32
GCT	**$2.08**	**$3.19**	$1.10	
Row difference	$37.07	$49.39		

Note: This comparison is for six common sites and the addition of Edison for NYCT and Bayonne for GCT.

Appendix G

NJ Turnpike Toll Tables Link

http://www.state.nj.us/turnpike/documents/2008-TP-Trucks_EZPass_off-peak-revised-101008.pdf

Appendix H

GCT Survey

DATE _____ **TIME** _____ **Interviewer ID** _____

Toll Payment Method _____ E-ZPass _____ Cash _____ Time of arrival at the toll plaza _____

Number of Visits to this terminal each week _____

1. Observe and enter **Type of Equipment** truck is hauling. *[enter a-d]* **Number of Axles** _____
   a. None – Tractor only (Bobtail)
   b. Chassis - no container
   c. Chassis with container or tank —**Circle one**: **Load** **Empty**
   d. Other _____

Interview Questions

2. "Where did you pick up that container?" OR, if no container on truck,

   "Where did you start your trip to this container terminal?"

   City (and State) _____ **OR** Zip Code _____

3. "Did you use the NJ Turnpike to get here today?" ***[Suggest answers as follows:]***
   A. If yes –

   a. At what interchange did you enter the Turnpike? _____
   b. At what interchange did you exit the Turnpike? _____
   B. If yes – "What other major highway(s) did you take?" ***[Select all that apply]***

   a. Rt. 78
   d. I-278
   e. I-28

   C. If no – "What major highway(s) did you take to get here today?" ***[Select all that apply]***

   a. Rt. 78
   d. I-278

4. "What major bridge or tunnel did you take to get here?" ***[Suggest answers as follows:]***

   a. Goethals Bridge
   b. Verrazano-Narrows Bridge
   c. Out
   d. Bayonne Bridge
   e. George Washington Bridge
   f. Lin
   g. None (Local/Staten Island origin)

5. "What type of movement will you make at this terminal today?" ***[Suggest responses a, b, c or d]***

   a. Double Move – Drop-off AND Pick-up a container

   b. Single Move – Drop-off a Container

   c. Single Move – Pick-up a Container

   d. Other (just dropping off or picking up a chassis)

6. "How will you leave the facility?" ***[Suggest responses a, b or c.]***

a. With a container —**Circle one:** **Load** **Empty**
b. Chassis only
c. Bobtail

7. "Where will you drop-off this container / OR end this part of your trip?"

City (and State)_____ **OR** Zip Code _____

8. After you leave this Port facility, what major bridge or tunnel will you take to get to your destination?"
[Suggest answers as follows:]

a. Goethals Bridge
b. Verrazano-Narrows Bridge
c. Out
d. Bayonne Bridge
e. George Washington Bridge
f. Lin
g. None (Local/Staten Island origin)

9. "After you leave this Port facility, will you use the NJ Turnpike to get to your destination?"
[Suggest answers as follows:]

A. If yes – a. "At what interchange will you enter the Turnpike?" _____
b. "At what interchange will you exit the Turnpike?" _____

B. If yes – "What other major highway(s) will you take?" ***[Select all that apply]***

d. I-2

C. If no – "What major highway(s) will you take to get to your destination?" ***[Select all that apply]***

Appendix I

NYCT Survey

DATE _____ **TIME** _____ AM/PM **Interviewer ID** _____

Toll Payment Method _____ E-ZPass _____ Cash _____ Time of arrival at the toll plaza _____

Number of Visits to this terminal each week _____

1. Observe and enter **Type of Equipment** truck is hauling. *[enter a-d]* **Number of Axles**_____
A. None – Tractor only (Bobtail)
B. Chassis - no container
C. Chassis with container or tank **Circle one: Load Empty**
D. Other _____

Interview Questions

2. "Where did you pick-up that container?" OR, if no container on truck, "Where did you start your trip to this container terminal?"
City (and State) _____ **OR** Zip Code _____

3. "Did you use the NJ Turnpike to get here today?" ***[Suggest answers as follows:]***
A. If yes –
a. At what interchange did you enter the Turnpike? _____
b. At what interchange did you exit the Turnpike? _____
B. If yes – "What other major highway(s) did you take?" ***[Select all that apply]***
a. Rt. 78
d. I-278
C. If no – "What major highway(s) did you take to get here today?" ***[Select all that apply]***
a. Rt. 78
d. I-278

4. "What major bridge or tunnel did you take to get here?" ***[Suggest answers as follows:]***

a. Goethals Bridge b. Verrazano-Narrows Bridge c.
d. Bayonne Bridge e. George Washington Bridge f.
g. None (Local/Staten Island origin)

5. "What type of movement will you make at this terminal today?" ***[Suggest responses a, b, c or d]***
a. Double Move – Drop-off AND Pick-up a container
b. Single Move – Drop-off a Container
c. Single Move – Pick-up a Container
d. Other (just dropping off or picking up a chassis)

6. "How will you leave the facility?" ***[Suggest responses a, b or c]***
A. With container **Circle one: Load Empty**
B. Chassis only
C. Bobtail

7. "Where will you drop-off this container OR end this part of your trip?"

City (and State)_____ **OR** Zip Code _____

8. After you leave this Port facility, what major bridge or tunnel will you take to get to your destination?"
   [Suggest answers as follows:]
   a. Goethals Bridge
   b. Verrazano-Narrows Bridge
   c. Out
   d. Bayonne Bridge
   e. George Washington Bridge
   f.
   g. None (Local/Staten Island origin)

9. "After you leave this Port facility, will you use the NJ Turnpike to get to your destination?"

A. If yes –
   a. At what interchange will you enter the Turnpike? _____
   b. At what interchange will you exit the Turnpike? _____

B. If yes – "What other major highway(s) will you take?" ***[Select all that apply]***

a. R
d. I-

C. If no – "What major highway(s) will you take to get to your destination?" ***[Select all that apply]***

a. R
d. I-

Appendix J

O-D Locations

CANADA

Montreal
Oakville
Ontario
Quebec City
Toronto
Preemption

CT

Bradford
Bridgeport
Chester
Danbury
East Hartford
Ford Craft
Hartford
Hatfield
Meridan
Milford
New Britain
New Haven
New Port
Newington
North Haven
Norway
Plainfield
Stanford
Stratford
Taftville
Uncasville
Waterberg
West Haven
Westerly
Winds Leek
Windsor Lock
Winthrop

DE

New Castle
Newark
Vera
Willington

GA

Lamberg Town

MA

Abridge
Agawam
Allentown
Billerica
Boston
Chickpea
Evert
Falls River
Lakefield
Lakeville
Lowell
Mansfield
Marlborough
Middle Boro
Peabody
Randolph
Raynham
Rowell
Springfield
Utridge
Waterbury
Western
Weston
Wister
Worcester
Wooster

MD

Aberdeen
Baltimore
Elkton
Nottingham
Silver Springs
Perryville

ME

Brandoff
Saco
Wells

NH

Evert

NJ

Allentown
Avenel
Bayonne
Bayville
Began
Bellville
Belvedere
Bergan
Blanton
Bloomfield
Bordentown
Bound brook
Bridgewater
Brunswick
Burlington
Camden
Carlstadt
Carlyle
Carney
Carolyn
Carteret
Chester
Clinton
Corbin
Cranbury
Cranford
Cranston
Creston
Dayton
Deep Water
Deerfield
Dover
Dumont
Durham
E. Brunswick
E. orange
Easton
Edison
Edison Bay
Elizabeth
Fairfield
Farmington
Flanders
Florence
Freehold

Frewsburg
Gibbstown
Glassboro
Hackensack
Hamilton
Hancock
Harrison
Hillside
Ironbound
Ironbound
Irvington
Jamesburg
Jersey City
Kearny
Keasbey
Lakewood
Levittown
Linden
Linden Pk
Little Ferry
Lowell
Lumberton
Mahwah
Maplewood
Marlboro
Melvin
Metuchen
Middlesex
Middletown
Milltown
Millville
Monmouth
Monmouth Junction
Monroe
Moonachie
Morganville
Morristown
MT. Lauren
Mt. Olive
N. Bergen
N. Brunswick
New Milford
Newark
Newington
Newton
Oakland
Old Bridge
Palisades
Palisades Park
Palmyra
Parlin
Passaic
Paterson
Payton
Pedricktown
Pennsauken
Perth Amboy
Pine brook
Piscataway
Plainfield
Port North
Port Reading
Princeton
Rahway
Randall
Randolph
Rayville
Richfield
Ridgefield
Robbinsville
Roselle
Ruffle
S. Amboy
S. Brunswick
S. Hackensack
S. Jersey
S. Plainfield
Saddle brook
Sayreville
Sea Girt
Secaucus
Sicklerville
Somerset
Somerville
South Hackensack
South Plainfield
Swedesboro
Teterboro
Totowa
Trenton
Union
Union City
Valley Cottage
Vineland
Wall
Waterford
West Hampton
Westville
Whippany
Woodbridge

NY

Accord
Albany
Bayou
Berlin
Binghamton
Bronx
Brooklyn
Buffalo
Cairo
Carmel
Catskill
Chester
Conklin
Cortland
Farmingdale
Fair land
Faure Bush
Fishkill
Flushing
Inwood
Ithaca
Jamaica
Jericho
Lakeport
Lindenhurst
Liverpool
Long Island
Lyndhurst

Maspeth
Melville
Middleboro
Middletown
Nyack
New Hamden
New York
Newburg
NYC
NYCT
Orangeburg
Painted Point
Painted Post
Pine Bush
Port Chester
Port wash
Portland
Queens
Rochester
Rome
Ronkonkoma
Selkirk
Simenon
Smyrna
Staten Island
Suffix
Syosset
Suffern
Utica
Valley Cottage
Valley Stream
Watersport
Webster
West NY
Westbury
Weston
Wilson
Woodbridge

OH

Cleveland
Akron

PA

Allentown
Barnesville
Bensalem
Benson
Bethlehem
Bia Boro
Bristol
Burlington
Camp Hill
Chambersburg
Clarksburg
E. Greenville
Easten
Easton
Elizabeth
Elizabeth Town
Ephrata
Ford Craft
George
Glassboro
Goldsborough
Gouldsboro
Hazleton
Helicon
Hollsopple
Kings of Prussia
Lamington
Lancaster
Lebanon
Levittown
Macungie
Malvern
Massenet
Mechanicsburg
Millburn
Montgomery
Morgantown
Morrisville
Moscow
Mountaintop
MT. Pocono
N. Philadelphia
Nazareth
Newvilla
Northampton
Palmyra
Palmyra
Parkesburg
Parkesburg
Philadelphia
Pittsburg
Pittstown
Plattsburg
Pocono
Postville
Pottsville
Reading
Rudi mg
Scranton
Sharon Hill
Tamaqua
Tobyhanna
Tremont
Waretown
Warminster
Westchester
Windburn
York

RI

Faucet
N. Kingston
Pawtucket
Province
Providence
Warwick