R|S|G INC.
RESOURCE SYSTEMS GROUP, INC.

Final Report:

2007 MTA/METRO-NORTH RAILROAD ORIGIN-DESTINATION SURVEY

Submitted by:

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INTRODUCTION

This report summarizes the 2007 MTA Metro-North Origin-Destination (OD) Survey as conducted by Resource Systems Group, Inc. (RSG) for the Metropolitan Transportation Authority (MTA) of New York. This project was undertaken to accomplish three main objectives. First, the OD survey and counting of Metro-North (MNR) customers will enhance and validate MTA's regional transit forecasting models which provide the basis for New Starts transit initiatives and funding. Second, the survey will help MNR to understand how its customers travel and help the agency more closely match service with the travel needs of its customers. Third, comprehensive passenger counts and surveys that describe customers' use of the MNR system will be critical for the operational and planning needs of Metro-North.

RSG and its subcontractors conducted this study for Metro-North's three east-of-Hudson commuter railroad lines: the Harlem, Hudson, and New Haven lines. The study required, on average, 35 in-field staff during weekdays and over 100 in-field staff on both Saturdays and Sundays. The field work lasted over 6 months with a short intermission during the summer months.

RSG and its subcontractors administered the survey and passenger counts from March 2007 through October 2007, with no surveys or counts conducted during July and August. Respondents had the option of completing a paper-based version of the survey or completing an online, web-based questionnaire. A total of 206,000 paper surveys were handed out to Metro-North customers aboard all inbound trains on the Harlem, Hudson, and New Haven lines for weekdays, Saturdays, and Sundays. The questionnaire asked customers about various aspects of their Metro-North trip, including trip frequency, purpose, origin and destination, boarding and alighting stations, and various demographic questions. In addition to survey distribution, field workers counted the total number of passengers on board the train, the number of passengers getting on (for outbound trains), or the number of passengers getting off (for inbound trains). These count data were used for expanding the survey data to actual passenger totals for each station, by day of week, and by time of day. In addition, these counts are an important data source for Metro-North's operating and planning needs.

APPROACH

APPROACH OVERVIEW

The survey was designed to obtain weekday, Saturday, and Sunday travel patterns for customers who use the three Metro-North Railroad commuter rail lines: the Harlem, Hudson, and New Haven lines.

This section of the report describes the sampling plan developed to collect highly detailed and representative origin-destination information, the structure of the questionnaire, and discusses the details of the administration of the survey.

As mentioned in the introduction, in addition to distributing the OD questionnaire, "control data" in the form of passenger counts was collected. This allowed for later corrections for possible differential response by time of travel, stations used, demographics, trip origins/destinations, etc. The counts are also very important for operational understanding of the system. Onboard passenger counts were conducted on all trains for the three lines. The methods used for obtaining the control counts are also described in this section.

SAMPLING PLAN

Survey

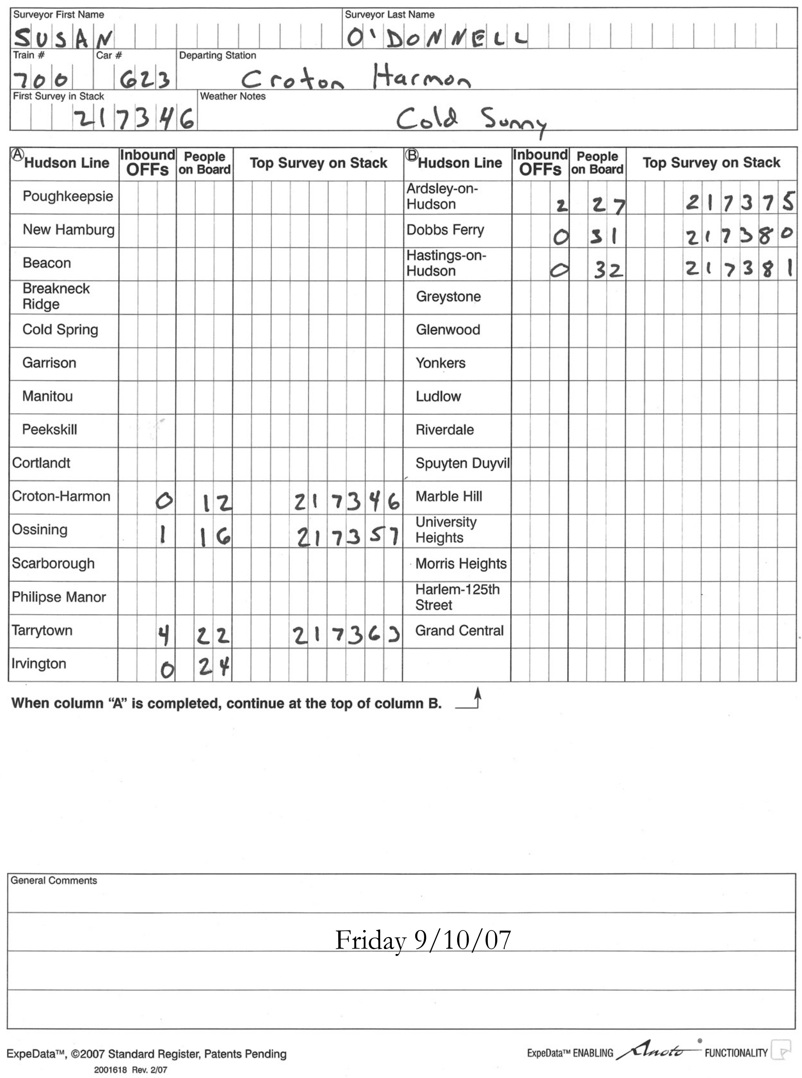
Distribution of surveys took place onboard all MNR trains traveling in the inbound direction (towards Manhattan). Survey agents attempted to hand questionnaires to every passenger on these trains: this is 100% sampling or a census of riders. A census distribution was conducted because staff were already onboard conducting passenger counts for every train in the system and there was a relatively low marginal cost of handing out surveys to every passenger on a train at the same time (i.e., the cost of printing the surveys, the logistics of getting them into staff hands, and inputting the data). Therefore, the surveys were handed out *concurrently with* the conducting of passenger counts. Conducting the survey work simultaneously with counts lowered costs, increased efficiency, and had the added benefit of being the most theoretically sound approach considered (i.e., the control counts and surveys done at the same time allow for better response rate calculations).

In order to conduct counts and distribute surveys, each train car was typically staffed with two survey agents, with each person responsible for counting and distributing surveys in their half of the car. Prior to onboard survey distribution, field staff would count passengers getting off at a given station. Once the "offs" were counted, questionnaires were distributed to any new passengers

Distributing surveys to all passengers on all trains at all stations in one direction (inbound) meant that nearly all passengers were sampled, but only sampled once. The surveys were carefully designed to capture information about passengers' inbound as well as outbound trips. If survey distribution had been conducted in both directions, a large proportion of riders would have received multiple questionnaires, which likely would have resulted in potential respondent confusion, redundant data and, not insignificantly, many unused questionnaires that would have been thrown away due to an increase in refusals from respondents who had already received a form earlier in the day.

In order to track the distribution of surveys, the packets of surveys to be given out to passengers were sequentially ordered (numeric portion of password incremented by one from one questionnaire to the next). This allowed field staff to track the number of questionnaires distributed at each station by recording the number of the top survey in their stack next to the appropriate station on the survey form, (an example of this is shown in Figure 1 below). This meant that only the first survey that was to be distributed at a station/stop needed to be recorded. During the analysis phase a mathematical calculation was performed that found the difference between the number recorded for the previous station and the one recorded for the next station. This yielded the number of questionnaires distributed at each station. A total of 256,000 survey questionnaires were printed to ensure there were always enough on hand and approximately 206,000 were distributed amongst inbound customers of the three lines.

Figure 1. Example of Inbound Count Form



Surveyor First Name: SUSAN
Surveyor Last Name: O'DONNELL
Train #: 700
Car #: 623
Departing Station: Croton Harmon
First Survey in Stack: 217346
Weather Notes: Cold Sunny

Ⓐ Hudson Line	Inbound OFFs	People on Board	Top Survey on Stack	Ⓑ Hudson Line	Inbound OFFs	People on Board	Top Survey on Stack
Poughkeepsie				Ardsley-on-Hudson	2	27	217375
New Hamburg				Dobbs Ferry	0	31	217380
Beacon				Hastings-on-Hudson	0	32	217381
Breakneck Ridge				Greystone			
Cold Spring				Glenwood			
Garrison				Yonkers			
Manitou				Ludlow			
Peekskill				Riverdale			
Cortlandt				Spuyten Duyvil			
Croton-Harmon	0	12	217346	Marble Hill			
Ossining	1	16	217357	University Heights			
Scarborough				Morris Heights			
Philipse Manor				Harlem-125th Street			
Tarrytown	4	22	217363	Grand Central			
Irvington	0	24					

When column "A" is completed, continue at the top of column B.

General Comments

Friday 9/10/07

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Onboard Passenger Counts

The sampling plan for conducting passenger counts was designed to survey every passenger on every inbound train. However, in order to ensure an accurate understanding of system ridership to calibrate and validate ridership forecasting models, to obtain known ridership data by station for operational and planning needs, as well as to correct for any nonresponse biases in the survey, counts of all inbound and outbound trains were required. This requirement meant conducting counts on all outbound and inbound trains, so a methodology was constructed that accurately and efficiently accommodated counting every person that boarded and alighted every train in the study—1,378 trains in all covering both directions to create a complete weekday, Saturday, and Sunday trip profile.

It was determined that conducting passenger on/off counts onboard trains was the most effective methodology. A large part of the rationale for this approach was that staff could be used in dual roles as counters and survey distributors, which reduced costs. It was also felt to be a less risky way to obtain counts as once onboard a train, staff were kept busy with reasonable but continuous tasks to keep them engaged. Using a station platform-based approach would have meant they would have had big gaps of time doing nothing. It was also more comfortable for staff, as they would not be exposed to inclement weather and they had time between trains to eat and take care of personal needs.

Two approaches were developed for conducting the onboard counts in order to both simplify the process and reduce the number of necessary personnel: one process for inbound trains and another for outbound trains. To minimize confusion and to increase accuracy, staff counted only "ons" in the outbound direction and "offs" in the inbound direction. In both directions, head counts of everyone on the train were conducted at each stop. This was a critical part of the process as will be described below.

To define and clarify the difference between the two approaches used for inbound and outbound trains, the table below shows each step used for conducting the onboard passenger counts:

Table 1. Procedures Used to Conduct Onboard Passenger Counts

Procedural Steps:	Inbound Trains Towards GCT	Outbound Trains Away From GCT
Step 1: Origin Station	After doors closed, counters conducted a head count (using a hand clicker) of everyone seated in the portion of the car that that counter was responsible for. This number was recorded on a count sheet customized for the line and direction of travel (inbound sheet shown above in **Figure 1**).	Same procedure as for inbound trains. Customized count sheet for outbound direction shown below in **Figure 2**.
Step 2: At Each Subsequent Station	Counters counted the number of people that exited the door(s) they were responsible for and entered this number in the "Inbound Offs" column of the form for the appropriate station. *Alightings were counted instead of boardings because, with the exception of Grand Central, there are fewer inbound alightings than boardings.*	Counters counted the number of people that entered the door(s) they were responsible for and wrote this number in the "Outbound Ons" column of the form for the appropriate station. *Boardings were counted instead of alightings because there are fewer outbound boardings than alightings.*
Step 3: After Doors Closed at Each Station	Once riders had settled into their seats, a head count of everyone in the car was conducted and recorded in the "People on Board" column for the appropriate station.	Same procedure as for inbound trains.
Step 4: At Destination Station	Steps 2 and 3 were repeated until train reached GCT. There was no need to record "Inbound Offs" at GCT because everyone was required to get off at GCT. The number of "People on Board" recorded at Harlem/125th Street was the same as the number of "offs" at GCT.	Steps 2 and 3 were repeated until train reached final destination station. There was no need to record "Outbound Ons" at the final destination station because no riders board at the final destination station.

During the analysis phase, the number of passengers that boarded at each station on inbound trains was calculated by subtracting the head count obtained at previous station from the head count obtained at the current station along with the current station's "offs" calculation (Table 2, refer to Figure 1 for inbound count sheet).

Table 2. Example of Inbound Train Counts with Derived Ons based on off counts and People on Board Counts

Station Number	Station	People Onboard	People Onboard at Previous Stop	Offs	Calc. Ons
1	Croton Harmon	22	0	0	22
2	Ossining	27	22	0	5
3	Scarborough	27	27	0	0
4	Philipse Manor	27	27	0	0
5	Tarrytown	30	27	6	9
6	Irvington	39	30	2	11
7	Ardsley on Hudson	41	39	0	2
8	Dobbs Ferry	41	41	0	0
9	Hastings on Hudson	40	41	1	0
10	Greystone	40	40	0	0
11	Glenwood	41	40	1	2
12	Yonkers	31	41	11	1
13	Ludlow	33	31	0	2
14	Riverdale	33	33	0	0
15	Spuyten Duyvil	33	33	0	0
16	Marble Hill	33	33	0	0
17	University Heights	30	33	3	0
18	Morris Heights	30	30	0	0
19	Harlem125thStreet	25	30	5	0
20	Grand Central	0	25	25	0

During the analysis phase, the "off" counts were calculated by taking the previous station's head count, adding the number of passengers that boarded at the current station and then subtracting the head count obtained at the current station. Using numbers from the count form shown in Figure 2, to calculate the number of passengers that alighted at Morris Heights, the formula would be calculated as shown below (Table 3).

Figure 2. Example of Outbound Count Form

Surveyor First Name	Surveyor Last Name
SUSAN	O'DONNELL

Train #	Car #	Departing Station
703	8801	Grand Central Station

Weather Notes: Sunny and Warm

(A) Hudson Line	Outbound ONs	People on Board	(B) Hudson Line	Outbound ONs	People on Board
Grand Central	22	22	Tarrytown		
Harlem-125th Street	2	24	Philipse Manor		
Morris Heights	3	26	Scarborough		
University Heights	1	27	Ossining		
Marble Hill			Croton-Harmon		
Spuyten Duyvil			Cortlandt		
Riverdale			Peekskill		
Ludlow			Manitou		
Yonkers			Garrison		
Glenwood			Cold Spring		
Greystone			Breakneck Ridge		
Hastings-on-Hudson			Beacon		
Dobbs Ferry			New Hamburg		
Ardsley-on-Hudson			Poughkeepsie		
Irvington					

When column "A" is completed, continue at the top of column B.

General Comments

Friday 9/10/07

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Table 3. Example of Outbound Train Counts with Derived Offs based on On counts and People on Board Counts

Station Number	Station	People Onboard	People Onboard at Previous Stop	Ons	Calc. Offs
1	Grand Central	35	0	35	0
2	Harlem125thStreet	43	35	8	0
3	Morris Heights	52	43	11	2
4	University Heights	79	52	27	0
5	Marble Hill	112	79	36	3
6	Spuyten Duyvil	112	112	0	0
7	Riverdale	112	112	0	0
8	Ludlow	116	112	8	4
9	Yonkers	119	116	18	15
10	Glenwood	128	119	9	0
11	Greystone	127	128	0	1
12	Hastings on Hudson	122	127	2	7
13	Dobbs Ferry	110	122	0	12
14	Ardsley on Hudson	109	110	0	1
15	Irvington	95	109	1	15
16	Tarrytown	76	95	10	29
17	Philipse Manor	76	76	0	0
18	Scarborough	72	76	0	4
19	Ossining	37	72	0	35
20	Croton Harmon	0	37	0	37

It should be noted that during the survey pre-test, different passenger count methodologies were attempted, including one utilizing less field staff. The final methodology was selected due to its being the most effective and accurate approach.

During the first couple of weeks of data collection, onboard count and survey password data was recorded using digital pens. The digital pen is a slightly oversized ballpoint pen with a small built-in camera near the ink cartridge which records all of the pen strokes and the time of the pen strokes as they occur. The pens can be used to write on any type of paper; however, in order to record information in a digital format, paper containing a special background pattern must be used. The forms used to collect onboard count and survey password information were all designed with digital pen use in mind and were printed on this special paper. When used properly, digital pens allow for faster data downloading and less time spent on post processing of data.

After a couple of weeks of reviewing digital count forms, it became apparent that the digital pen technology took too long to validate using the vendor's (Expedata) website. It was too slow and tedious, and there were too many errors in the digital pen interpretation software. Since each form needed to be reviewed by a human anyway, it was decided that it would be more effective to have the forms input by a data entry firm. This way all data from the forms would be interpreted by people who could exercise judgment when deciding what kinds of edits were necessary.

As noted previously, a contingency was developed to have the firm that was scanning the survey forms (DTI-Skyline) also scan the count forms. The images of the count forms were turned over to the same firm doing the data input for the survey forms (Tab Services Company) who input the information from the count forms. Once the data was input it was turned over to RSG and imported into the project database where logic reviews were conducted as in the prior method. The main difference between the two methods was that RSG's website used in the second approach was much more efficient than Expedata's website.

The count review tool allowed reviewers to look at each train in its entirety along with all of the individual count sheets associated with each train. Reviewers could see the most recent aggregate count calculations at the top of the form along with the individual count sheets at the bottom (Figure 3). The digital data for each count form was displayed along with a link that would allow editing of an individual form's data (Figure 4). In addition to the form's data, the edit pane also contained a link to a TIF file of the actual image of the count form that was filled out by the count agent. Reviewers had all information at their disposal both at the individual train and aggregate levels, which helped facilitate accurate edits. Immediately after making edits to individual count forms, the aggregate counts were re-run (automatically) and the reviewers could see the impact the edits had on the overall calculations for the entire train.

Figure 3. Sample Screen of Count Review Web Tool

Count Data Review

Refresh Data

Train Number: 1300
Satorsun: 0
Survey Date: 9/11/2007
Origin Time: 00:25:00
Current Status: 6
Train Direction: Outbound

Total Data: 119
Total Calculated Value: 119

As of 10/15/2007 2:42:29 PM

Actual Stations Where Train Stops

Station Name	Station Number
GrandCentral	1
Harlem125thStreet	2
Fordham	3
MtVernonEast	4
Pelham	5
NewRochelle	6
Larchmont	7
Mamaroneck	8
Harrison	9
Rye	10
PortChester	11
Greenwich	12
CosCob	13
Riverside	14
OldGreenwich	15
Stamford	16

Count of Data Items Per Sheet

Sheetid	Date	People On Board	On Off Counts
CONTROL000384.TIF	9/11/2007	15	3
CONTROL000385.TIF	9/11/2007	13	3
CONTROL000386.TIF	9/11/2007	13	2
CONTROL000387.TIF		14	1
CONTROL000388.TIF	9/11/2007	14	3
CONTROL000389.TIF	9/11/2007	8	2

Count Data Aggregated to Train Level

Station	Station Number	People on Board	POB at Prev Stop	Ons	Calc. Offs
GrandCentral	1	104	0	104	0
Harlem125thStreet	2	112	104	8	0
Fordham	3	115	112	5	2
MtVernonEast	4	104	115	1	12
Pelham	5	95	104	1	10
NewRochelle	6	67	95	0	28
Larchmont	7	54	67	0	13
Mamaroneck	8	37	54	0	17
Harrison	9	25	37	0	12
Rye	10	24	25	0	1
PortChester	11	11	24	0	13
Greenwich	12	6	11	0	5
CosCob	13	6	6	0	0
Riverside	14	4	6	0	2
OldGreenwich	15	1	4	0	3
Stamford	16	0	1	0	1

Count Data at the disaggregate Sheet Level

SheetID/Tif File	Station	Station Number	People on Board	POB at Prev Stop	Ons	Calc. Offs	Type
CONTROL000384.TIF	GrandCentral	1	9	0	9	0	Ons
CONTROL000384.TIF	Harlem125thStreet	2	13	9	2	-2	ONS
CONTROL000384.TIF	Fordham	3	14	13	1	0	ONS
CONTROL000384.TIF	MtVernonEast	4	9	14	0	5	Ons (mc)
CONTROL000384.TIF	Pelham	5	9	9	0	0	Ons (mc)
CONTROL000384.TIF	NewRochelle	6	6	9	0	3	Ons (mc)
CONTROL000384.TIF	Larchmont	7	5	6	0	1	Ons (mc)
CONTROL000384.TIF	Mamaroneck	8	4	5	0	1	Ons (mc)
CONTROL000384.TIF	Harrison	9	4	4	0	0	Ons (mc)
CONTROL000384.TIF	Rye	10	4	4	0	0	Ons (mc)
CONTROL000384.TIF	PortChester	11	3	4	0	1	Ons (mc)
CONTROL000384.TIF	Greenwich	12	2	3	0	1	Ons (mc)
CONTROL000384.TIF	CosCob	13	2	2	0	0	Ons (mc)
CONTROL000384.TIF	Riverside	14	2	2	0	0	Ons (mc)
CONTROL000384.TIF	OldGreenwich	15	1	2	0	1	Ons (mc)
CONTROL000384.TIF	Stamford	16	0	1	0	1	Ons (mc)
CONTROL000385.TIF	GrandCentral	1	37	0	37	0	ONS
CONTROL000385.TIF	Harlem125thStreet	2	37	37	0	0	Ons (mc)

Figure 4. Example of Count Form Edit Pane

Clean Sheet

Sheetid:
CONTROL000384.TIF
View Tiff File
Change Train Number:
Change SatorSun:
Comments: TUESDAY 9-11-07 12 25 AM

As of 10/15/2007 2:57:42 PM

Station	Type	Count	New Value	Type	Count	New Value
GrandCentral	PEOPLE ON BOARD	9		Ons	9	
Harlem125thStreet	PEOPLE ON BOARD	13		ONS	2	
Fordham	PEOPLE ON BOARD	14		ONS	1	
MtVernonEast	PEOPLE ON BOARD	9				
Pelham	PEOPLE ON BOARD	9				
NewRochelle	PEOPLE ON BOARD	6				
Larchmont	PEOPLE ON BOARD	5				
Mamaroneck	PEOPLE ON BOARD	4				
Harrison	PEOPLE ON BOARD	4				
Rye	PEOPLE ON BOARD	4				
PortChester	PEOPLE ON BOARD	3				
Greenwich	PEOPLE ON BOARD	2				
CosCob	PEOPLE ON BOARD	2				
Riverside	PEOPLE ON BOARD	2				
OldGreenwich	PEOPLE ON BOARD	1				
Stamford						

Submit New Values

The count review process was an iterative collaboration between RSG and MNR. Due to the large number of trains that were counted and the fact that there were two distinct field efforts (counts and surveys), count sheets were delivered to RSG by the data input firm in relatively large batches that would include data from several trains. RSG project personnel would review a batch of trains and then send the edited counts to MNR for review. MNR project personnel would inform RSG of any issues found during their reviews of the counts. Some issues required slight adjustments to a specific train or trains while others required that a train be recounted. The counts obtained by RSG needed to fit within certain thresholds that were determined by MNR using historical count data. MNR typically had a few GCT counts for each train that had been conducted within the last year that were compared to RSG counts at GCT. If the RSG counts did not fit within certain parameters set by the historical data (typically within 30% of the historical average), the train would need to be recounted. A total of 195 trains were recounted as a result of the original RSG counts not fitting within these parameters. Many of these recounts were due to anomalous circumstances during the count (e.g., a fire near the tracks that affected train service). In other cases, recounts were needed due to concerns that the data collected was not valid, as no explanation for the variation between the counts and the historical averages was found.

Shift Scheduling

The objective of the shift scheduling task was to group the 1,378 trains to be counted and surveyed into workable shifts so that they could be staffed by field crews. Since there were many possible ways of building a shift plan for such a large number of trains, the key objective of this task was to build an efficient shift plan that would be both logistically achievable and financially viable.

The train schedule in effect at the beginning of the fieldwork was provided to RSG in a spreadsheet. Using a specially written Excel macro, RSG converted the train schedule to database format (one line per station stop per train). The database list was cleaned to remove additional trains that would not be counted or surveyed, such as special holiday trains and Shore Line East trains that are shown on the New Haven Line schedule. The final list of trains included information about each trains' origin and destination stations and times.

A second Excel macro was then used to walk through the database of trains and build shifts. The database of trains was divided into the three lines and into weekdays, Saturdays and Sundays, so the process was executed nine times to build nine sets of shifts (one set for each of the east of Hudson lines).

The algorithm in the Excel macro was programmed with several heuristics to aid the construction of reasonable shifts. These included:

1. Where possible, shifts should begin at Grand Central Terminal, as GCT was the easiest place for most staff to access the MNR system
2. The shift should begin with the first available (uncounted) train of the day
3. At the end of the first train (i.e. at the arrival time at the destination station), look for the next train back to the origin station that leaves in more than 10 minutes after arrival (30 for Grand Central Terminal) but less than 2 hours, so that staff has time to get ready for the next train
4. Repeat step 3 to add trains to the shift
5. Once the shift length reaches seven hours, close the shift at the end of the next train, if possible at the station where the shift began
6. If at any point there are no uncounted trains from the current station to board and work within 2 hours, start a search process to either 1) wait longer than two hours for a train , 2) travel to another station to get to a train that needs to be counted, or 3) travel back to the station where the shift began and finish the shift

The algorithm ran until all trains for the particular line and day of the week were assigned to a shift. The algorithm was run for many iterations, (i.e. many complete shift patterns were created), with a random element for the start point of a shift: while starting a shift at Grand Central Terminal was preferred, some shifts were started at other stations. After many iterations, the shift pattern that minimized field staff work time was selected. The final step of the shift creation process was to manually review the shifts created by the algorithm and make adjustments to any particularly difficult or inefficient shifts.

While many of the shifts were "ideal shifts" in that they were seven to nine hours long, started and finished at Grand Central Terminal, and consisted mostly of trains that had yet to be counted, a significant number of non ideal shifts were created as well. These included short shifts or shifts with one or more "travel trains" where the field staff had to take a non-work train during their shift to get to another work train.

One issue that led to the creation of short shifts was the inherent imbalance in the weekday train schedule, where there is an excess of inbound trains in the AM peak and outbound trains in the PM peak. During the middle part of the day, there were relatively few trains that needed to be counted. Therefore, many shifts consisted of an inbound AM peak train followed by a travel train to return to the originating stations, or an outbound PM peak train followed by a travel train back.

Once the shifts had been created for each line and day of the week, they were grouped into work days of 4-5 shifts for weekdays or 8-10 shifts for weekends (given the lower number of available weekend days in the field schedule, work on weekends was required to be much more intensive). The objective of the groupings was to ensure that the staffing requirements were relatively constant across the day. Therefore, each day would have shifts from early morning through late evening, rather than, say, all morning shifts.

These work days were then randomly assigned across the field calendar, avoiding any days identified as holidays or other atypical travel days (for example when major events were taking place in New York City).

The train schedule changed several times during the fieldwork period. At each schedule change, RSG was provided with a revised train schedule spreadsheet. The schedule was converted to a database using the routine developed at the beginning of the project. Any trains in the schedule that were new, removed or altered (i.e. different timing, station stops) were identified and updated in the shift schedule. If that caused a shift to be unworkable (for schedule changes that made connections with following trains impossible), replacement shifts were manually constructed.

Scheduling Site

Once RSG constructed and scheduled shifts, the field staff agencies assigned staff to each shift. The aggressive nature of the schedule, the large number of people that were needed to staff each day, and the overall logistical complexity and collaboration required to conduct the project necessitated the creation of a tool could be used to keep track of field staff throughout the project. This staff logistics, coordination, and scheduling tool, developed by RSG, was an interactive web site that allowed staffing supervisors from each firm to submit the names of people that would be working specific shifts (Figure 5). Staffing firm representatives could simply click on any day that shifts were scheduled and view the shifts scheduled for that day by line. The example in Figure 6 below shows all of the shifts that were scheduled for the New Haven Line on 9/27/07.

Figure 5. Home Screen of Shift Scheduling Site

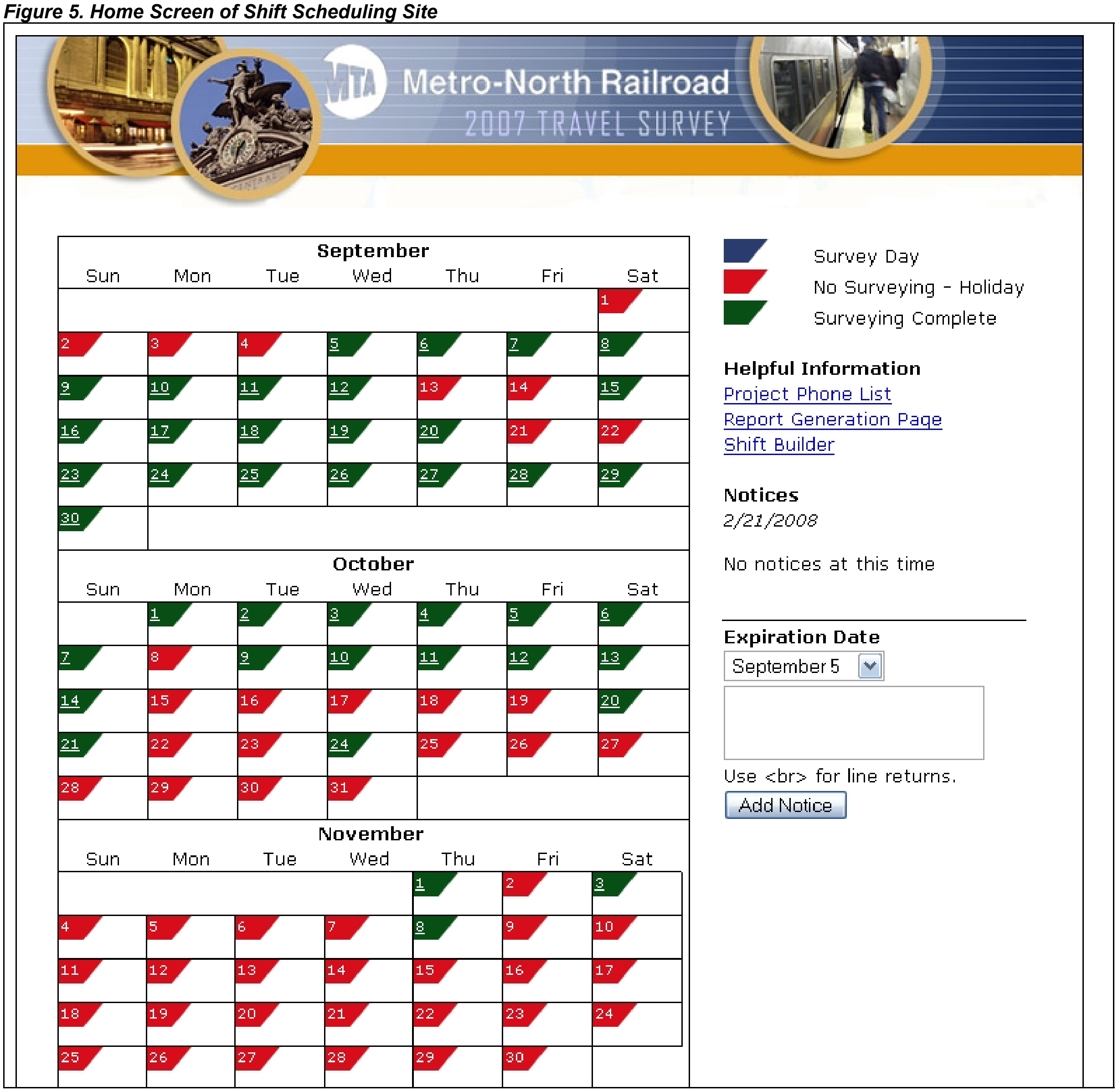
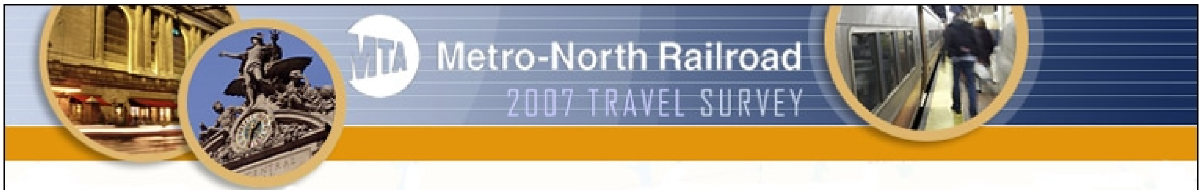


Figure 6. Example of Shifts Scheduled For New Haven Line on 9/27/07 on Scheduling Site



Select a new date | Select a different line

Survey Date: THURSDAY, 9/27/2007

Trains in red are not counted or surveyed and are for travel purposes only.

Please note that times listed after midnight are for the the next day. Survey days run from 4 AM to 4 AM the next day.

	Train	Line	Starting Station	Ending Station	Starting Time	Ending Time	Remaining Staff Required
Shift Number:	33						Reschedule this shift
Staff this train	1521	New Haven	New Haven	Grand Central	06:23	08:05	0 of 16
Staff this train	**1514**	**New Haven**	**Grand Central**	**New Haven**	**08:34**	**10:33**	**0 of 16**
Shift Number:	249						Reschedule this shift
Staff this train	**1710**	**New Haven**	**Grand Central**	**New Canaan**	**07:24**	**08:39**	**0 of 14**
Staff this train	1741	New Haven	New Canaan	Grand Central	08:49	10:11	0 of 14
Shift Number:	10						Reschedule this shift
Staff this train	1544	New Haven	Grand Central	New Haven	16:12	18:09	0 of 9
Staff this train	**1587**	**New Haven**	**New Haven**	**Grand Central**	**18:57**	**20:40**	**0 of 9**
Staff this train	1586	New Haven	Grand Central	New Haven	21:07	22:56	0 of 16
Staff this train	**1597**	**New Haven**	**New Haven**	**Grand Central**	**23:18**	**01:05**	**11 of 12**
Staff this train	1502	New Haven	Grand Central	New Haven	01:49	03:44	0 of 12
Staff this train	1503	New Haven	New Haven	Grand Central	04:12	05:47	0 of 12
Shift Number:	14						Reschedule this shift
Staff this train	**1871**	**New Haven**	**Danbury**	**South Norwalk**	**14:38**	**15:25**	**1 of 16**
Staff this train	**1571**	**New Haven**	**South Norwalk**	**Grand Central**	**15:38**	**16:45**	**1 of 16**
Staff this train	1254	New Haven	Grand Central	Harrison	17:14	17:54	0 of 16
Staff this train	**1370**	**New Haven**	**Harrison**	**Stamford**	**19:07**	**19:32**	**0 of 4**
Staff this train	1874	New Haven	Stamford	Danbury	19:43	20:43	1 of 4
Staff this train	1893	New Haven	Danbury	South Norwalk	20:58	21:53	0 of 4
Staff this train	1890	New Haven	South Norwalk	Danbury	23:26	00:15	0 of 4

All information necessary for staffing shifts was available on the website, including the train line, specific start and end times and all locations for each train, and the number of staff necessary for each train. Staffing agents could add staff to shift rosters using several methods (Figure 7). If they had people they knew could work all trains on a shift, they simply clicked on the first train of the shift, entered names into the appropriate fields and then clicked a button that carried the names forward to all trains on the shift. Often times, however, people were not able to work an entire shift, making it necessary to staff at the individual train level. To do this, the staffing agent would click on a specific train on the shift and enter their staff's names, then click a button that submitted the names for that train only.

The four staffing firms were each provided unique links that allowed them to access the same website. These links served a number of purposes.

1. Automatically identified the firm submitting information to project database
2. Prevented one firm from deleting or modifying data provided by another
3. Permissions to the website were greatly restricted. Staffing firms were not allowed to reschedule or modify shifts in any way. Only RSG personnel had this ability.

All work slots on each shift were filled on a first come first served basis. The system was set up so that modifying or deleting a name on a shift could only be done using the link from the company of the person who was to be deleted or by someone at RSG. RSG had full privileges and could modify records regardless of who initially generated them.

Figure 7. Example of Scheduling Site Page for Staffing of Shifts

The scheduling site had additional features that helped maintain an efficient accounting of field operations, including a link with the phone numbers for all relevant staff, and a link that contained a variety of reports on issues directly pertinent to fieldwork. An example of one of these reports is the

Individual Schedule report. Using this tool, the person responsible for scheduling their firm's personnel could pull up all of the shifts of an individual that had been scheduled to work.

Other tools were built into the site to assist GCT field supervisors with assembling the correct number of count forms and survey packets when preparing materials for shifts. One such tool was the ability to generate a list of work trains that were scheduled to leave from or arrive at GCT during the day. This made it easier to identify points in the day when staff would come in to pick up or drop off materials at GCT.

In addition to scheduling individual staff and providing tools for the field supervisors, the scheduling site was also used to check in completed shifts and to reschedule shifts that were not completed as originally scheduled. Shifts needed to be rescheduled for a variety of reasons, such as lack of staff, inclement weather and rail operations issues. Occasionally an individual train or trains from a shift needed to be rescheduled because they were not completed properly. Every attempt was made to move the train into an existing future shift that could accommodate it; however these individual trains were often converted into shifts containing only one train. Only RSG personnel had access to these shift rescheduling capabilities.

SURVEY INSTRUMENT

The bi-lingual (English on one side and Spanish on opposing side) survey questionnaire consisted of a five-panel card (9 by 21 inches) that included information about the study, along with instructions on how to participate. Respondents were encouraged to fill out the questionnaire onboard the train they were on and hand it back to a survey agent. They were also given the option of filling out the questionnaire and mailing it back (postage-paid via Business Reply Mail) or logging on to the Internet and completing the questionnaire online. Respondents who chose to complete the survey online, logged onto RSG's website using the address provided on the cover of the paper questionnaire and used a unique password (also printed on the front of each paper questionnaire) to access the survey.

An example of the paper and online questionnaire layouts are shown in Appendices A and B. A "generic" paper-based design of the questionnaire was developed so that the questionnaire could be used on all three lines without multiple questionnaire versions. Each survey had a unique password serial number imprinted on the front panel. Passwords were nine digits long with a one digit letter code, a six digit number, followed by two random letters. The password served three major roles:

1. *Train Identification* – The password provided an identifier that could be related to a specific train. As stated earlier, survey, agents recorded the numeric portion of the password of the first survey they handed out at each station/stop. The packets of surveys were in sequential order (numeric portion of password). During the processing of the data recorded on the forms, numeric ranges for the questionnaires distributed at each stop on each train were calculated. These ranges were then related to the passwords of completed questionnaires which allowed for the identification of the specific train on which the survey was distributed.
2. *Access to Web Survey* – The password allowed respondents the option of completing the survey online. The password was necessary to gain access to the survey on the web.

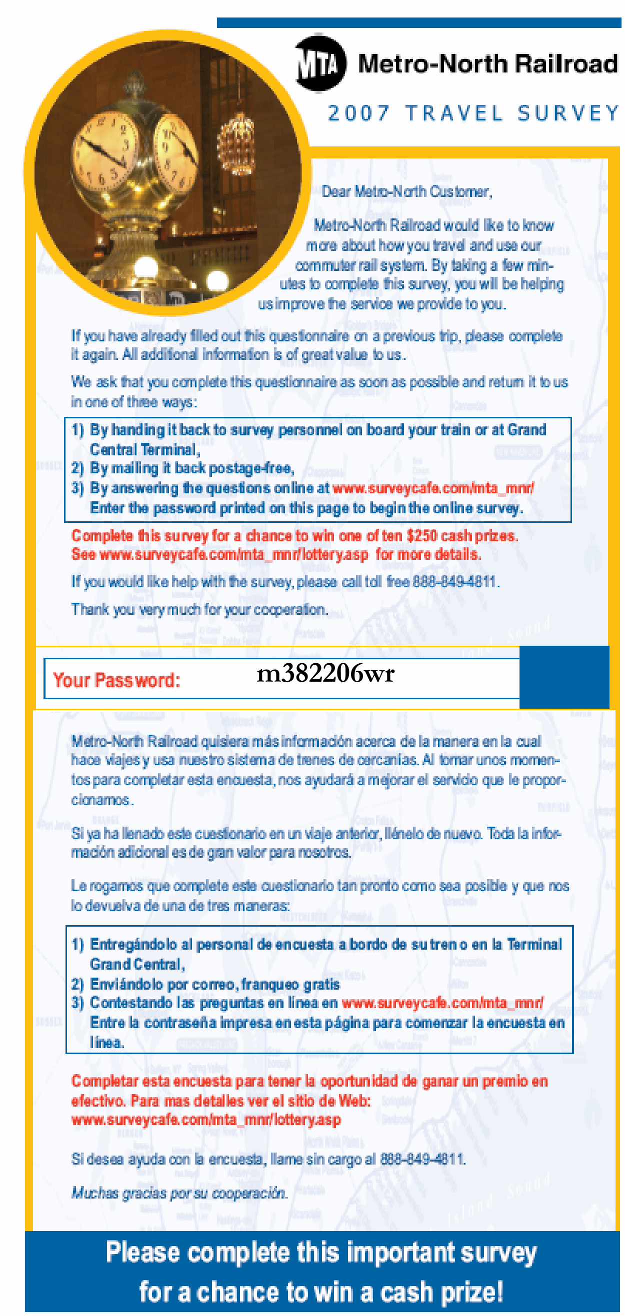
Additionally, the password prevented respondents from completing more than one web survey for one survey form. Once a password had been used to complete a survey, that password would no longer allow access back to the web survey. The random two letter code at the end of the password prevented respondents from trying to answer the survey multiple times by running down sequentially through a list of passwords.

3. *Unique Data Identifier* – Finally, the password served a as a unique identifier, providing a way to check for duplicates between the web and paper surveys as well as a way to quickly match the input survey data back to a specific survey form. A small number of respondents filled out both a web survey and their paper survey. Only one survey per customer per train was permitted, so these duplicates were reconciled such that only one survey per person is in the final data set.

Questionnaire Covers

The cover of each questionnaire included a plea to potential respondents to participate, information about the cash drawing to further incentivize them to participate, information about how to participate online, and information on how to contact the survey team for any assistance that might be required to complete the survey (Figure 8).

Figure 8. Example Questionnaire Cover



Metro-North Railroad

2007 TRAVEL SURVEY

Dear Metro-North Customer,

Metro-North Railroad would like to know more about how you travel and use our commuter rail system. By taking a few minutes to complete this survey, you will be helping us improve the service we provide to you.

If you have already filled out this questionnaire on a previous trip, please complete it again. All additional information is of great value to us.

We ask that you complete this questionnaire as soon as possible and return it to us in one of three ways:

1) By handing it back to survey personnel on board your train or at Grand Central Terminal,
2) By mailing it back postage-free,
3) By answering the questions online at www.surveycafe.com/mta_mnr/ Enter the password printed on this page to begin the online survey.

Complete this survey for a chance to win one of ten $250 cash prizes. See www.surveycafe.com/mta_mnr/lottery.asp for more details.

If you would like help with the survey, please call toll free 888-849-4811.

Thank you very much for your cooperation.

Your Password: m382206wr

Metro-North Railroad quisiera más información acerca de la manera en la cual hace viajes y usa nuestro sistema de trenes de cercanías. Al tomar unos momentos para completar esta encuesta, nos ayudará a mejorar el servicio que le proporcionamos.

Si ya ha llenado este cuestionario en un viaje anterior, llénelo de nuevo. Toda la información adicional es de gran valor para nosotros.

Le rogamos que complete este cuestionario tan pronto como sea posible y que nos lo devuelva de una de tres maneras:

1) Entregándolo al personal de encuesta a bordo de su tren o en la Terminal Grand Central,
2) Enviándolo por correo, franqueo gratis
3) Contestando las preguntas en línea en www.surveycafe.com/mta_mnr/ Entre la contraseña impresa en esta página para comenzar la encuesta en línea.

Completar esta encuesta para tener la oportunidad de ganar un premio en efectivo. Para mas detalles ver el sitio de Web: www.surveycafe.com/mta_mnr/lottery.asp

Si desea ayuda con la encuesta, llame sin cargo al 888-849-4811.

Muchas gracias por su cooperación.

Please complete this important survey for a chance to win a cash prize!

Questionnaire

The survey questionnaire consisted of a five panel fold out booklet that contained English on one side and Spanish on the opposing side. One panel contained Business Reply Mail postage so that respondents could fold the questionnaire and mail it back postage free. The full questionnaire design can be seen in Appendix A.

The questionnaire was developed to capture travel information such as line, train number, and day of week (which were all tied to a password and which the respondent did not need to fill in), trip purpose, stations used, geographic locations of trip origin and destination, other modes used during trip, fare type and a number of demographic questions such as income, age and ethnicity.

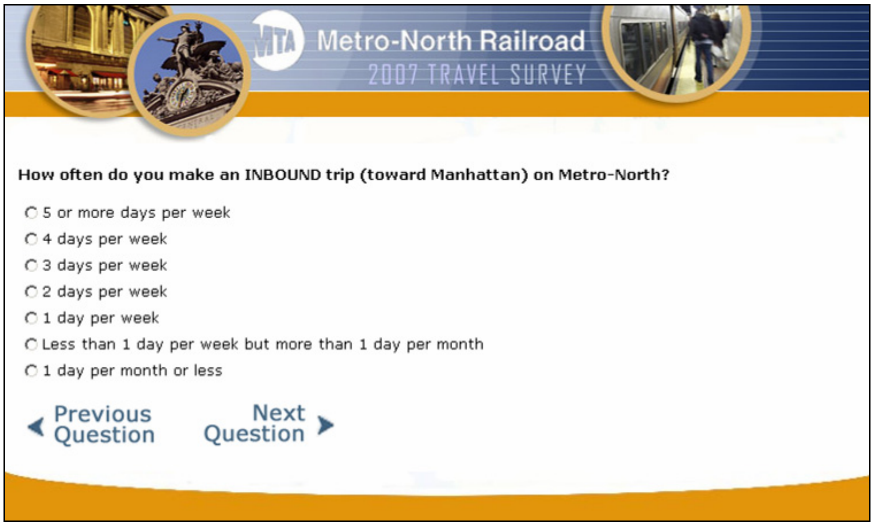
As an incentive to participate, potential respondents were told that ten cash prizes of $250 each would be awarded by random drawing from the pool of completed surveys. For those who wished to participate in the drawing, space was provided at the end of the questionnaire to provide their name, address, telephone number, and email address. The final question of the survey, located just below the contest contact information asked if the MTA could contact the participant to participate in future surveys. For respondents who indicated yes, the contest information serves a dual purpose of contact for winning, as well as contact information for future research.

Online Questionnaire

All survey participants were given the option to complete the survey questionnaire online at RSG's web site. Instructions for participating online were provided on the front of the paper questionnaire. The respondent could use the password provided on the paper questionnaire to access the survey. In addition to providing information about the line, train number and day of week the questionnaire was distributed, it also served a security feature that would allow the participant to participate online only once. Once a password was used, it could not be used again to take another survey.

The online version of the questionnaire contained the same questions as the paper version. For this study, 1,445 respondents (1.6% of 92,732 total responses) chose the online option. An example of a question from the online survey is shown in Figure 9 below. Screenshots of every question can be found in Appendix B.

Figure 9. Trip Purpose Question (Web Survey)



PRETEST AND TRAINING

To ensure a smooth field administration of the MNR OD survey, a pretest was conducted approximately one month before the start of the full fieldwork. This allowed time to edit the survey instrument, if necessary, based on a review of customers' responses to ensure there were no areas in the questionnaire that pre test respondents found difficult to understand, interpret, or answer. Having the pretest one month ahead of fieldwork also allowed time to reprint the final revised questionnaire and ship the final survey instruments to a storage area in Grand Central terminal. Moreover, the pretest allowed field staff to practice the procedures for passenger counting and survey distribution that were to be followed throughout the fieldwork. In addition, the RSG and Eng-Wong, Taub supervisors needed to observe the procedures so they could recognize any potential problems or confusing logistical instructions and modify and/or clarify any issues. Finally, due to the variety of different train car configurations on the MNR system, the pretest allowed the team to learn how to handle train car differences.

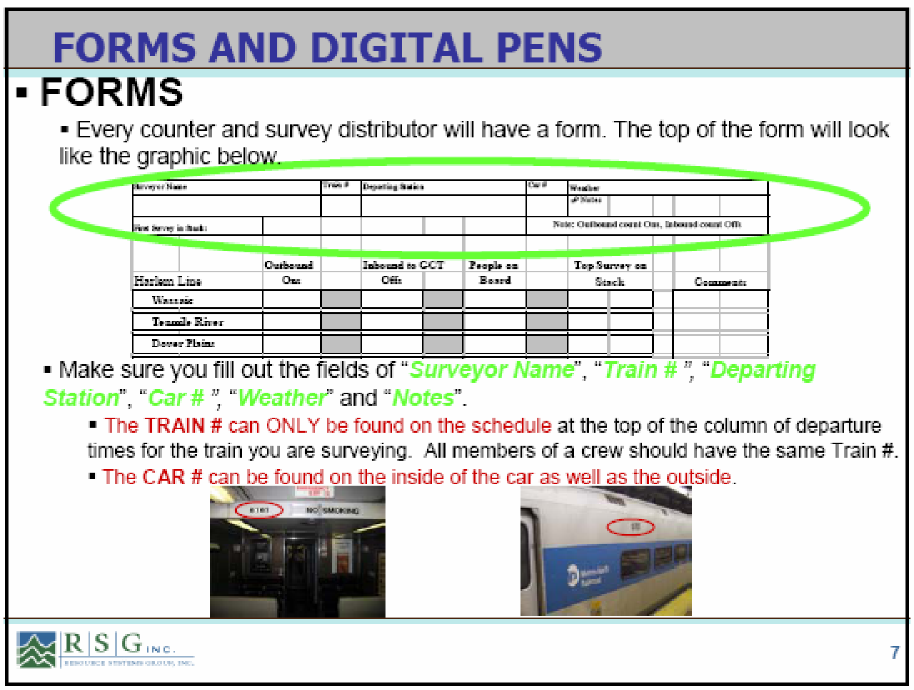
The pretest took place from Wednesday, February 14th through Saturday, February 17th and covered all the various types of trains that would be surveyed later in the full fieldwork: weekdays and weekends; AM peak, midday, and PM peak; Harlem, Hudson, and New Haven lines. As an added safety precaution, all surveyors and supervisors (Taurus Market Research, Eng-Wong, Taub & Associates, SRBI, and RSG) underwent MTA's badging requirements which included photographing each surveyor and supervisor as well as conducting identity and criminal background checks. Before the initial boarding of trains to conduct the pretest on February 14th, a training session was held to cover:

- General overview of the study
- Organization of the survey crew

- Counting Procedure
- Survey distribution & collection procedures
- Materials Checklist
- "What If's" – Thinking on your feet

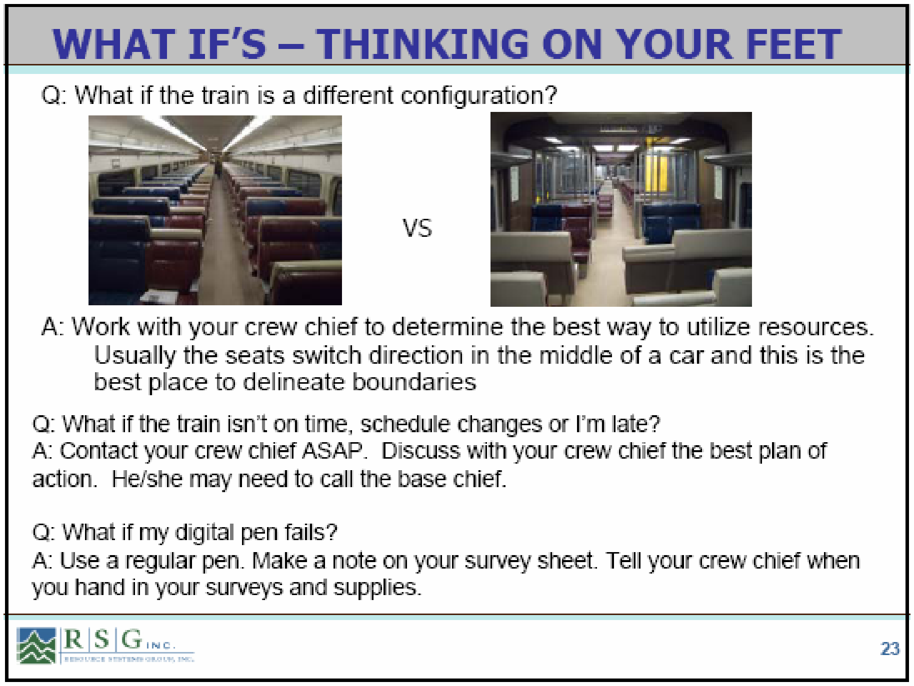
Having a comprehensive training session and documentation of the training was important to ensure that all surveyors and supervisors thoroughly understood all procedures and could answer any riders' questions in a uniform way. The training session established that there would be one crew chief assigned to each shift and that there would be two crew members counting and distributing surveys in each open car of the train for each run during that shift. Included were diagrams of the seating plans for the various types of train cars along with detailed instructions on how to fill out the count forms (Figure 10).

Figure 10. Page from Training Manual with Details on Use of Digital Pens and Count Forms



Surveyors were shown how to fill out the count forms to record both the survey distribution and the passenger counts. Detailed lists were provided showing the necessary materials each surveyor/counter would need for their runs, and a few pages of "What if…" questions were shown to prepare surveyors for possible problem scenarios and to let them know what to do should service disruptions or other unexpected changes in plans occur (Figure 11).

Figure 11. Page from Training Manual Showing "What If's..."



The complete training manual used on February 14th is shown in Appendix C. Once the training session was over, supervisors, crew chiefs, and field staff were shown around GCT to familiarize them with the train platform areas and to show them where all materials would be stored (in a location below platform level at Track 34, arranged for and provided by MNR). The training session and GCT tour were complete in time for the first crew to make the first scheduled pretest run on the Harlem Line. The schedule of all pretest trains is shown below (Table 4).

Table 4. Schedule of Trains for Pretest 2/14/08 - 2/17/08

Schedule/Train Detail													
Count Date	Market Tested	Line	Direction	Train Number	Otime	Dtime	Ostation	Dstation	Minimum Number of Open Cars	Total Cars	Equipment Type	Estimated Surveys to Distribute	Staff Required per Train
2/14/07	Early PM Peak	Harlem	Out	551	3:55 PM	4:35 PM	Grand Central	North White Plains	4	8	M7	0	12
2/14/07	PM Peak	Harlem	In	580	5:33 PM	6:27 PM	North White Plains	Grand Central	7	8	M7	700	21
2/15/07	Midday	Hudson	Out	817	9:51 AM	11:40 AM	Grand Central	Poughkeepsie	3	6	CD	0	9
2/15/07	Midday	Hudson	In	860	12:33 PM	2:20 PM	Poughkeepsie	Grand Central	4	6	CD	400	12
2/16/07	AM Peak	New Haven	Out	1406	6:02 AM	7:03 AM	Grand Central	Stamford	4	9	MMC	0	12
2/16/07	AM Peak	New Haven	In	1325	7:24 AM	8:22 AM	Stamford	Grand Central	7	7	MM	700	21
2/17/07	Weekend	New Haven	Out	6522	11:07 AM	12:52 PM	Grand Central	New Haven	9	9	MMC	0	27
2/17/07	Weekend	New Haven	In	6537	1:57 PM	3:40 PM	New Haven	Grand Central	9	8	MM	900	27

The first day of the pretest was interrupted by a blizzard. Crews had to be rearranged and travel plans were revised, but the two late afternoon/evening runs were completed between GCT and North White Plains.

Midway through the pretest period, we reported on survey distribution and passenger counting to MNR staff and decided which revisions needed to be made in the procedures. The actual survey distribution and counts from the pretest train runs were deemed complete. Procedural plans were revised to emphasize the leadership required of the crew chiefs and to emphasize the authority of the MNR conductors over the onboard crew. A few text revisions were made to the survey questionnaire to improve response accuracy and the revised instrument was sent to the printer.

DATA COLLECTION (FIELD WORK)

Data collection took place in two phases in 2007. The first phase occurred between early March through the middle of June and the second phase took place between early September through the first week in November. During the course of data collection, onboard counts were conducted on all 1,378 trains and OD survey questionnaires were distributed on all 686 inbound trains. Over 300 surveyors from four New York/New Jersey based field staff firms participated in the fieldwork..

Staff from RSG coordinated the fieldwork effort with staff working out of Grand Central Terminal (GCT) and out of their Vermont office. Weekly conference calls were held between MTA/MNR and RSG staff to get updates on how the fieldwork was progressing, plan for upcoming events, and proactively anticipate problems and discuss solutions, as well as handle any problems that may have arisen in the preceding week.

Field supervision was conducted primarily within the confines of GCT. Here field supervisors assembled materials for shifts (count forms, survey questionnaires, pens, pencils, bags, etc.) as well as distributed and received materials to and from crews. There was at least one field supervisor on duty whenever trains were actively being worked and during very high volume days, weekends in particular, there often were two supervisors on duty for at least a portion of the day. Field supervisors were in constant communication with staff at RSG to provide day-to-day field support and serve as the eyes and ears for RSG management. If a field supervisor was unable to address an issue, a call was immediately placed to RSG management, who then developed solutions solving the problem. Another responsibility of the field supervisors at GCT was to schedule with DTI the pick-ups of complete surveys for scanning.

In addition to RSG's field supervision, MNR hired an oversight firm to ensure that work was being done in accordance to the schedule and methodology. This firm audited approximately 25% of the work performed by field staff and sent reports to MNR for all temporary employees, grading their performance on each run that was observed. Where necessary, input was given to RSG on the quality of an individual's work. Re-training was conducted when necessary.

Field supervisors had access to the same web-based scheduling tool that was being used by RSG and the principals of the staffing firms. This tool, along with other enhancements, allowed the supervisors at GCT to efficiently prepare materials in advance of shifts and to greatly minimize the impact of last minute changes. Field supervisors became very familiar with the actual day-to-day operations of MNR and quickly became adept at making recommendations on issues such as rescheduling trains from shifts that were not entirely completed, logistics for making sure materials were received by crew chiefs on shifts that would not be coming to GCT, and informing field staff of alternative means of getting to where they needed to be when there were operational issues that caused delays or canceled trains.

On a typical day, several crews of field staff would conduct onboard counts and distribute survey questionnaires (on inbound trains only) on "shifts" of logically grouped trains that ranged in number as few as one train to as many as ten. Shifts were constructed to maximize the amount of work time on trains (counting and distributing questionnaires) and minimize the amount of down time (traveling on non-work trains, waiting for next work train, etc.) for crews. However, it should be noted that many shifts were made up of single trains due to the fact that there were often many more trains traveling in a particular direction, such as inbound trains in the AM peak, making it difficult to construct an efficient multiple work train shift.

Crews varied in size depending on the number of open cars per train and on the time of day. MNR was able to give RSG information on the expected number of cars that would be open on each train. Crew sizes varied from shift to shift and even within individual shifts, ranging from as few as three field staff to as many as 22. An example would be a shift where the first train was an AM Peak inbound and was comprised of a large number of cars and volumes that warranted 18 staff to adequately count and distribute questionnaires, but the second train (going outbound) only required ten staff. On such a shift, staff would usually drop off mid-shift. On other shifts, staff might be added on as PM peak trains started.

Each crew consisted of a crew chief and an assistant crew chief and varying numbers of counting/distribution staff (two per car, both counting and distributing). The job of the crew chiefs was to organize the crew and ensure that counts and questionnaire distribution were conducted for each train scheduled on the shift. Some specific duties the crew chiefs were responsible for included picking up supplies (count forms, pens, questionnaires, pencils etc.) from the field supervisors located in GCT, meeting and organizing the crew prior to each train, ensuring that staff were doing their job correctly and that they were adequately supplied with count forms and survey questionnaires, and troubleshooting (covering for missing staff member, communications with conductor, communications with field supervisors, etc.). Crew chiefs and assistant crew chiefs played critical roles in the successful outcome of shifts.

Onboard Counts

Field staff conducted onboard counts for all trains on their shift, both inbound and outbound. As described in the Approach section, the manner in which the counts were conducted varied slightly depending on the direction the train was traveling. On outbound trains, staff recorded the number of passengers that boarded at each stop and also conducted head counts at each stop after recording the number of people that boarded. For inbound trains, staff recorded the number of passengers that alighted at each stop followed by a head count.

The number of staff covering an individual car varied depending on the anticipated passenger volume for the entire train. If the anticipated volume of the train divided by the number of open cars was less than 50 passengers per car for the entire trip, the train was often assigned one staff member per each open car. However, it was often the case that a low volume shift would still be staffed with two staff per car, as other trains in the shift required more staffing anyway. If the volume was high enough for a passenger to car ratio of 50 or more passengers per car, two field staff agents were assigned to each car. In cars that were covered by two people, each field agent covered half of the car. Staff determined in advance where the midpoint of the car was so that each had a clearly defined territory to cover. When multiple agents were covering one car, each recorded the data they collected on their own count sheets. If a shift turned out to be understaffed due to more cars being open than anticipated, both the crew chief and the assistant crew chief were available to count and distribute.

At the end of each run, field staff turned in their count sheets to the crew chief. Crew chiefs turned in all count/survey sheets to the field supervisor at GCT at the end of the next train that ended at GCT or held on to the materials and made arrangements to deliver them to a field supervisor within a day or two of the shift the data was collected.

OD Survey

The OD survey questionnaire was distributed to passengers on trains traveling in the inbound direction only. Field staff working on trains traveling inbound were responsible for conducting both onboard counts and distributing questionnaires. Field staff was instructed to distribute survey questionnaires only after they had completed the onboard counts.

Field staff working inbound trains recorded onboard count information on forms similar to those used for outbound trains. The inbound count sheets also contained space to record information about surveys distributed at each stop. Field staff were given packets of surveys that contained 25 questionnaires each. The number of packets provided to each staff member was determined by the predicted volume of passengers for the car (or half car) they would be covering for the entire train. Consequently, if it was estimated that there would be 35 passengers per car, each staff member would be given two packets of 25 (always rounded up) each with sequential ordering of passwords. Staff were instructed to keep the packets in the same order as they were provided (rubber bands bound multiple packets) and distribute from the top of the first packet and work their way down through additional packets. The numeric portion of the passwords incremented by one, usually in descending order. By distributing questionnaires in this manner, a count of how many questionnaires were distributed at each stop could be calculated.

As illustrated in Figure 12 below, there is a space for "Top Survey On Stack" next to the count fields. Field staff were asked to write in the numeric portion of the password of the first survey they would be distributing at each station. A mathematical calculation from station to station could then be done that would result in the total number of questionnaires distributed at each station. In the example below, the numeric portion of the first questionnaire that was distributed at Croton-Harmon was 217346 and the first questionnaire distributed at Ossining was 217357. This information allowed RSG to calculate that 11 surveys were distributed at Croton-Harmon (217357 – 217346). It should be noted that the questionnaires in this example were in ascending order, where usually questionnaires were in descending order. RSG used an algorithm to determine order first, before calculating questionnaire ranges for a given train or station.

Figure 12. Example of Inbound Count Form

Surveyor First Name	Surveyor Last Name
SUSAN	O'DONNELL

Train #	Car #	Departing Station
700	623	Croton Harmon

First Survey in Stack	Weather Notes
217346	Cold Sunny

Ⓐ Hudson Line	Inbound OFFs	People on Board	Top Survey on Stack	Ⓑ Hudson Line	Inbound OFFs	People on Board	Top Survey on Stack
Poughkeepsie				Ardsley-on-Hudson	2	27	217375
New Hamburg				Dobbs Ferry	0	31	217380
Beacon				Hastings-on-Hudson	0	32	217381
Breakneck Ridge				Greystone			
Cold Spring				Glenwood			
Garrison				Yonkers			
Manitou				Ludlow			
Peekskill				Riverdale			
Cortlandt				Spuyten Duyvil			
Croton-Harmon	0	12	217346	Marble Hill			
Ossining	1	16	217357	University Heights			
Scarborough				Morris Heights			
Philipse Manor				Harlem-125th Street			
Tarrytown	4	22	217363	Grand Central			
Irvington	0	24					

When column "A" is completed, continue at the top of column B.

General Comments

Friday 9/10/07

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2001618 Rev. 2/07

ExpeData™ ENABLING Anoto® FUNCTIONALITY

DATA PROCESSING

Data processing was necessary for both the survey questionnaires and for the count/password forms filled out by field staff. The data processing technique for the survey questionnaire remained constant throughout the project. Data processing for the count/password forms however evolved due to some limitations concerning the initial process early on in the first phase of field.

Count Data Input

As described in earlier sections of this report, onboard count data were recorded on paper forms that were line and direction (Inbound/Outbound) specific. During the first couple of months the data was recorded using digital pens.

Within the first few weeks of fieldwork, it was determined that there were a high number of misinterpreted strokes. Due to the high percentage of misinterpretations and the fact that each edit took several seconds to execute, it became apparent that a different method for data processing would be necessary.

Because a significant amount of human resources were reviewing all of the count sheets for misinterpretations, it was determined that a more traditional data input method would be more efficient. As paper count forms were collected at GCT, they were sent to a digital scanning firm, DTI, located in Manhattan. This firm scanned the paper forms into PDF files. These files were then transferred via a secure FTP site to Tab Services Company in Chicago. Tab Services then conducted data input of the PDF files. They used a double entry system whereby two separate individuals enter data from the same form and then run a routine to ensure the records match exactly. If they do not match, they are reconciled manually. This ensures that the interpretation of what was written is very accurate. Once the input data was sent to RSG, most of the review focused on the logic of the count data rather than on data input corrections.

Survey Data Input

The data input method used for the survey questionnaire was the same as the method described above for the count forms using Tab Services. The same scanning firm picked up the questionnaires several times a week from the field supervisors at GCT . They then scanned the questionnaires into PDF format and made them available to Tab Services via the FTP site. Tab Services used the same double entry technique used for the count forms.

Count Data Review

After receiving the train count data from the data entry firm and importing them into RSG's database, each train count went through a thorough review process to ensure the data were complete and accurate. RSG developed its own count data review website as a means to effectively and efficiently complete this process. This website consisted of three web pages: a homepage where all train counts were listed and categorized based on their review status; a page for each train that showed its counts at both the aggregate and individual count sheet levels; and a page that allowed the counts for an individual count sheet to be revised.

The count data review homepage acted as a central hub for the review process. Here each train was listed by review status, (there were 12 levels, see Figure 13). All trains that were not ready for review had a review status value of "0"and did not appear in the train list on the count data review homepage. Trains that were ready to be reviewed, but had yet to be looked at, had a review status value of "1".

Figure 13. Count Data Review Homepage

Count Data Review

Trains to be reviewed
As of 2/1/2008 9:29:17 AM

Train Number	SatOrSun	Review Status	Last Reviewed	Non-Digital Pen	Spring/Fall Train	Review this Train
6558	1	6	12/12/2007 1:37:00 PM		Fall Train	Review
336	0	7	1/10/2008 1:34:00 PM	1	Spring Train	Review
534	0	7	12/20/2007 3:22:00 PM		Spring Train	Review
594	0	7	12/20/2007 4:06:00 PM		Spring Train	Review
668	0	7	12/20/2007 4:02:00 PM		Spring Train	Review
683	0	7	11/26/2007 11:40:00 AM		Fall Train	Review
711	0	7	1/24/2008 3:36:00 PM		Spring Train	Review
723	0	7	12/19/2007 4:54:00 PM		Spring Train	Review
779	0	7	12/20/2007 9:48:00 AM		Spring Train	Review
893	0	7	12/20/2007 10:13:00 AM		Spring Train	Review
1225	0	7	1/2/2008 12:49:00 PM		Spring Train	Review
1260	0	7	1/7/2008 5:08:00 PM		Spring Train	Review
1313	0	7	1/2/2008 12:14:00 PM		Spring Train	Review
1325	0	7	11/26/2007 11:48:00 AM		Fall Train	Review
1357	0	7	1/3/2008 11:05:00 AM		Spring Train	Review
1369	0	7	1/3/2008 11:50:00 AM		Spring Train	Review
1383	0	7	1/3/2008 3:09:00 PM		Spring Train	Review
1385	0	7	1/3/2008 3:23:00 PM		Spring Train	Review
1391	0	7	1/3/2008 3:54:00 PM		Spring Train	Review
1410	0	7	1/3/2008 4:44:00 PM		Fall Train	Review
1412	0	7	1/24/2008 3:41:00 PM		Spring Train	Review
1504	0	7	1/3/2008 4:38:00 PM	1	Spring Train	Review
1510	0	7	1/10/2008 2:38:00 PM		Fall Train	Review
1526	0	7	1/7/2008 4:38:00 PM		Fall Train	Review
1539	0	7	11/26/2007 11:50:00 AM		Fall Train	Review
1559	0	7	1/3/2008 11:27:00 AM		Spring Train	Review
1579	0	7	1/3/2008 12:44:00 PM		Spring Train	Review
1581	0	7	1/3/2008 3:02:00 PM		Fall Train	Review
1710	0	7	1/7/2008 12:29:00 PM		Fall Train	Review
1752	0	7	1/8/2008 9:59:00 AM		Spring Train	Review
1811	0	7	1/2/2008 11:35:00 AM		Fall Train	Review
1906	0	7	1/24/2008 3:31:00 PM		Fall Train	Review
1916	0	7	1/24/2008 3:31:00 PM		Fall Train	Review
1935	0	7	1/24/2008 3:30:00 PM		Fall Train	Review
1951	0	7	1/24/2008 3:30:00 PM		Fall Train	Review
1963	0	7	1/24/2008 3:30:00 PM		Fall Train	Review
6306	1	7	1/8/2008 5:27:00 PM		Spring Train	Review
6308	1	7	1/9/2008 8:59:00 AM		Fall Train	Review
6327	1	7	1/8/2008 12:18:00 PM		Spring Train	Review
6338	2	7	1/9/2008 3:10:00 PM		Spring Train	Review

Status

0 Not ready for review
1 Ready for first level review
2 Reviewed but corrections to expedata site cannot be made
3 Reviewed and corrections to count data have been made on expedata site, awaiting additional download and review
4 Reviewed and no corrections necessary
5 Comparison to Spring 2006 data is close enough, ready for submission to client
6 Comparison to Spring 2006 data is way off, need "upper level" review (weather conditions, other factors)
7 Submitted to client
8 Client does not approve of counts
9 Client approves of counts
10 Train must be recounted in fall
99 Hybrid (Both Digital Pen/Scanned Data)

Review Status	Number of Trains
0	2
6	1
7	86
9	1282

Upon selecting a train with a review status of "1", the reviewer would typically begin with an analysis of the train's aggregate counts (top of Figure 14). This first step was helpful in identifying any obvious data issues. An example of an issue was when the number of people on board at the last station was greater than zero, due to counters not entering the final "offs" at GCT (since they knew that everyone onboard had alighted). After identifying an issue, the reviewer analyzed the individual count sheets to identify which sheets required edits/additions to their data (bottom of Figure 14). To correct this issue, the reviewer clicked on a link for each individual count sheet that opened a separate web page where data could be manually edited. Often, multiple count sheets needed editing in order to properly align the aggregate counts. To check if all necessary count sheets had been edited, the reviewer clicked the "Refresh Data" button on the train's count data web page to update the train's aggregate counts.

Figure 14. Count Data Web Page for a Train

Count Data Review

Refresh Data

Train Number: 594
Satorsun: 0
Survey Date: 3/29/2007
Origin Time: 21:03:00
Current Status: 7
Train Direction: Inbound

Total Data: 177
Total Calculated Value: 177

As of 2/1/2008 10:39:13 AM

Actual Stations Where Train Stops

Station Name	Station Number
NorthWhitePlains	1
WhitePlains	2
Hartsdale	3
Scarsdale	4
Crestwood	5
Tuckahoe	6
Bronxville	7
Fleetwood	8
MtVernonWest	9
Wakefield	10
Woodlawn	11
WilliamsBridge	12
BotanicalGarden	13
Fordham	14
Harlem125thStreet	15
GrandCentral	16

Count of Data Items Per Sheet

Sheetid	Date	People On Board	On Off Counts
50.131.10.68	3/30/2007 1:45:00 AM	15	16
50.131.10.70	3/30/2007 1:45:00 AM	16	16
50.131.10.71	3/30/2007 1:09:00 AM	0	0
50.131.8.240	3/30/2007 1:48:00 AM	16	16
50.131.8.241	3/30/2007 1:44:00 AM	16	16
50.131.8.242	3/30/2007 12:58:00 AM	0	0
50.131.8.244	3/30/2007 1:44:00 AM	16	16
50.131.8.245	3/30/2007 1:45:00 AM	16	16
50.131.9.237	3/30/2007 1:44:00 AM	16	15

Count Data Aggregated to Train Level

Station	Station Number	People on Board	POB at Prev Stop	Offs	Calc. Ons
NorthWhitePlains	1	8	0	0	8
WhitePlains	2	96	8	1	89
Hartsdale	3	102	96	0	6
Scarsdale	4	111	102	1	10
Crestwood	5	127	111	0	16
Tuckahoe	6	131	127	2	6
Bronxville	7	151	131	2	22
Fleetwood	8	147	151	8	4
MtVernonWest	9	139	147	16	8
Wakefield	10	134	139	7	2
Woodlawn	11	114	134	20	0
WilliamsBridge	12	102	114	12	0
BotanicalGarden	13	99	102	6	3
Fordham	14	59	99	43	3
Harlem125thStreet	15	42	59	17	0
GrandCentral	16	0	42	42	0

Count Data at the disaggregate Sheet Level

SheetID/Tif File	Station	Station Number	People on Board	POB at Prev Stop	Offs	Calc. Ons	Type
50.131.10.68	NorthWhitePlains	1	5	0	0	5	Offs
50.131.10.68	WhitePlains	2	15	5	1	11	Offs
50.131.10.68	Hartsdale	3	16	15	0	1	Offs
50.131.10.68	Scarsdale	4	16	16	0	0	Offs
50.131.10.68	Crestwood	5	24	16	0	8	Offs
50.131.10.68	Tuckahoe	6	25	24	0	1	Offs
50.131.10.68	Bronxville	7	26	25	0	1	Offs
50.131.10.68	Fleetwood	8	26	26	0	0	Offs
50.131.10.68	MtVernonWest	9	26	26	3	3	Offs
50.131.10.68	Wakefield	10	22	26	5	1	Offs
50.131.10.68	Woodlawn	11	17	22	8	3	Offs
50.131.10.68	WilliamsBridge	12	16	17	1	0	Offs
50.131.10.68	BotanicalGarden	13	16	16	0	0	Offs
50.131.10.68	Fordham	14	10	16	7	1	Offs
50.131.10.68	Harlem125thStreet	15	10	10	0	0	Offs
50.131.10.68	GrandCentral	16	0	10	10	0	Offs
50.131.10.70	NorthWhitePlains	1	1	0	0	1	Offs
50.131.10.70	WhitePlains	2	10	1	0	9	Offs
50.131.10.70	Hartsdale	3	11	10	0	1	Offs
50.131.10.70	Scarsdale	4	12	11	1	2	Offs
50.131.10.70	Crestwood	5	12	12	0	0	Offs
50.131.10.70	Tuckahoe	6	14	12	0	2	Offs
50.131.10.70	Bronxville	7	16	14	0	2	Offs
50.131.10.70	Fleetwood	8	17	16	0	1	Offs
50.131.10.70	MtVernonWest	9	15	17	2	0	Offs
50.131.10.70	Wakefield	10	15	15	0	0	Offs
50.131.10.70	Woodlawn	11	16	15	0	1	Offs
50.131.10.70	WilliamsBridge	12	15	16	2	1	Offs
50.131.10.70	BotanicalGarden	13	14	15	1	0	Offs
50.131.10.70	Fordham	14	6	14	8	0	Offs
50.131.10.70	Harlem125thStreet	15	3	6	3	0	Offs
50.131.10.70	GrandCentral	16	0	3	3	0	Offs
50.131.10.71	NorthWhitePlains	1	0	0	0	0	Offs (mc)
50.131.10.71	WhitePlains	2	0	0	0	0	Offs (mc)
50.131.10.71	Hartsdale	3	0	0	0	0	Offs (mc)
50.131.10.71	Scarsdale	4	0	0	0	0	Offs (mc)
50.131.10.71	Crestwood	5	0	0	0	0	Offs (mc)
50.131.10.71	Tuckahoe	6	0	0	0	0	Offs (mc)
50.131.10.71	Bronxville	7	0	0	0	0	Offs (mc)
50.131.10.71	Fleetwood	8	0	0	0	0	Offs (mc)
50.131.10.71	MtVernonWest	9	0	0	0	0	Offs (mc)
50.131.10.71	Wakefield	10	0	0	0	0	Offs (mc)
50.131.10.71	Woodlawn	11	0	0	0	0	Offs (mc)
50.131.10.71	WilliamsBridge	12	0	0	0	0	Offs (mc)

To double check the count sheets when revisions were required, the revisable web page for each individual count sheet had a link to a PDF of the actual count sheet, thus allowing for the resolution of any differences between the data in RSG's database and that on the count sheet (Figure 15 and Figure 16).

Figure 15. Revisable Web Page for an Individual Count Sheet (#50.131.10.68)

Clean Sheet

Sheetid:
50.131.10.68

View Tiff File

Change Train Number:

Change SatorSun:

Comments: THURSDAY 3/29/07 FIRST: 230762 LAST: 230738

As of 2/1/2008
10:45:46 AM

Station	Type	Count	New Value	Type	Count	New Value
NorthWhitePlains	People On Board	5		Offs	0	
WhitePlains	People On Board	15		Offs	1	
Hartsdale	People On Board	16		Offs	0	
Scarsdale	People On Board	16		Offs	0	
Crestwood	People On Board	24		Offs	0	
Tuckahoe	People On Board	25		Offs	0	
Bronxville	People On Board	26		Offs	0	
Fleetwood	People On Board	26		Offs	0	
MtVernonWest	People On Board	26		Offs	3	
Wakefield	People On Board	22		Offs	5	
Woodlawn	People On Board	17		Offs	8	
WilliamsBridge	People On Board	16		Offs	1	
BotanicalGarden	People On Board	16		Offs	0	
Fordham	People On Board	10		Offs	7	
Harlem125thStreet	People On Board	10		Offs	0	
GrandCentral				Offs	10	

Submit New Values

Figure 16. Actual PDF of Individual Count Sheet (#50.131.10.68)

50.131.10.68

Surveyor First Name: KARL | Surveyor Last Name: LAFAZE

Train #: -594 | Car #: 4074 | Departing Station: North White Plains

First Survey in Stack: 230962 | Weather Notes:

Ⓐ Harlem Line	Inbound OFFs	People on Board	Top Survey on Stack	Ⓑ Harlem Line	Inbound OFFs	People on Board	Top Survey on Stack
Wassaic				Valhalla			
Tenmile River				North White Plains		5	230962
Dover Plains				White Plains	1	15	58
HM Valley-Wingdale				Hartsdale	0	16	49
Appalachian Trail				Scarsdale	0	16	48
Pawling				Crestwood	0	24	47
Patterson				Tuckahoe	0	25	40
Southeast				Bronxville	0	26	40
Brewster				Fleetwood	0	26	40
Croton Falls				Mt. Vernon West	0	26	40
Purdy's				Wakefield	5	22	40
Golden's Bridge				Woodlawn	8	19	40
Katonah				Williams Bridge	1	16	40
Bedford Hills				Botanical Garden	0	16	40
Mount Kisco				Fordham	7	10	40
Chappaqua				Tremont			39
Pleasantville				Melrose			
Hawthorne				Harlem -125th Street	0	10	39
Mount Pleasant				Grand Central			

When column A is completed, continue at the top of column B.

General Comments:
Thursday 3/29/07
First: 230962
Last: 230938

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2001612 Rev. 2/07
ExpeData™ ENABLING Anoto FUNCTIONALITY

In addition to making sure the first station's count was in order, reviewers performed many other data checks. For example, based on the availability of a cheaper subway alternative and MNR prohibitions, it was expected that very few people would travel between Grand Central Terminal and

Harlem-125th Street Station on MNR. Reviewers would check to make sure trains' counts at these stations reflected this expectation.

Two other barometers used to judge the accuracy and credibility of the count data: whether or not the total number of people who got on the train equaled the total number of people who got off, and MNR's 2006 count data. A train's total on/off counts had to be equal and the 2007 train count needed to be close to those observed in 2006 in order for it to proceed to the next stages of review. Also, each station had a calculated off for outbound trips and a calculated on for inbound trips. Reviewers checked a train's aggregate counts to make sure the calculated counts for each station were not negative.

If all three of the above criteria were met, the reviewer changed the train's review status to 3. In order to ensure that the data were as accurate as possible, RSG reviewed each train at least twice. Thus upon obtaining a review status of 3, a train was reviewed a second time using the same process described above. If its counts passed this second round of review, the train's review status became a 5. Trains that had a review status of 5 were deemed ready to submit to MNR for review.

Before submission to MNR, each train count had to go through one last step. This entailed running a RSG-designed macro in Excel that would automatically ensure that a train's total on/off counts were equal, the first and last stations' counts were logical, and that Harlem-125th Street Station's counts were not too high (this check was also used for Fordham Station). If the macro found no issues, the train's review status became a 7, and RSG sent the counts to MNR. If the macro did discover an issue, the train's review status became a 4, meaning it would be looked at again.

After receiving positive feedback from MNR, RSG changed a train's review status to 9 if it was approved by MNR and 8 if it was not. Any trains with an 8 were subsequently recounted.

Survey Data Cleaning

Data was collected from total of 92,726 questionnaires. The majority of survey data collected was from paper questionnaires (98.5%) and 1.5 % was collected via the internet. One issue that needed to be addressed was that data collected on paper is often incomplete Consequently, a significant amount of effort was put in to cleaning data. An example of this concerns the names of stations that respondents boarded and alighted during their trips. In the web version of the survey, respondents would choose their station from drop lists, ensuring that the proper spelling and naming convention for the station was provided. In the paper survey, station names were often misspelled, abbreviated or represented in a different manner than they were in the web instrument. This meant finding misspelled station names, common abbreviations, and variations on station names and updating them to the proper spelling/format.

Another part of data cleaning involved imputing values for variables where no information was provided from the answers provided in other variables. An example of this was the coding of Question 8 (How much did you pay to park?) based on the answer provided in Question 6 (Where did you park?). Both contained an option "Did not park". Many respondents answered one, but not the other. In the case of respondents who did not answer Question 6 but did indicate "Did not park" in Question 8, the value for "Did not park" was imputed for Question 6. Similarly, if a respondent indicated "Did not park" in Question 6 and provided no information for Question 8, the value for "Did not park" was imputed for Question 8.

Geocoding

The survey collected two distinct pieces of geographical data that needed to be geocoded: the respondent's origin and destination of the described trip. Geocoding is a process whereby one type of geographical data is related to another type. Respondents were asked to provide specific geographical information about the origin and destination of their trip by way of actual address or intersections. The information collected was run through a combination of automated and manual processes that converted the information provided by respondents into coordinates (latitudes and longitudes). These coordinates could then be related to other levels of geography such as the zip code centroids or municipality centroids.

Data collected from paper questionnaires are often incomplete. The address information for the origin and destination of the trips is often incomplete. A great deal of effort was expended "cleaning" this data. This meant correcting misspelled information, imputing state information in records lacking it where the state was obvious given the context of the project and other information provided. New York City for example is obviously in New York State. In some cases respondents provided only zip codes and no other information. To obtain city and state information, the zip code was referenced in a zip code table containing city, state and other information and the corresponding city and state were written back to the survey record.

Records were geocoded to as many as three different levels of geography; street level, zip code level and municipality level. The most precise level is street level. For records that could only be geocoded to the zip code level, the coordinates returned correspond with the centroid of the zip code, essentially the geographic midpoint in the area the zip code covers. Records for which only a municipality level of geocoding was achieved, coordinates for the centroid of the municipality were returned.

SURVEY DATA EXPANSION

To expand the raw survey responses to model the inbound traveling population on the Metro-North rail system, an expansion process was developed. The following section describes the theory of this process and presents the detailed methodology and the results.

Expansion Objectives and Overview of Expansion Methodology

The objective of the expansion process was to expand the OD data from a sample size (where one reported trip represents one actual trip) to the observed population size - the total number of inbound riders of the Metro-North rail system. Multiple expansion factors were calculated depending on different criteria based on what analysis is being undertaken by the data user.

The expansion methodology used can be summarized as follows:

1. Records were selected from the sample that met a set of selection criteria for completeness. Depending on the data user's needs, four expansion factors were created, some with stricter criteria (e.g., records with boarding station, alighting station, income question answered, and access mode answered) than others (e.g., records with boarding station and alighting station answered as the only criteria)
2. The survey records were grouped into cells based on the following expansion categories: boarding station, alighting station, time of day, and day of week
3. Expansion factors were then calculated to expand the survey data to the marginal distribution (i.e., the totals for each of the expansion categories) of the boarding and alighting count data
4. A database of trips was produced from the survey data, with each survey record assigned one or more of the four expansion factors depending on the completeness of the survey. Some records had no weights if they did not meet the minimum criteria, but these records did have useful information (e.g., boarding station and access mode) which made them worth keeping for unweighted analyses

Data Sources Used

Two data sources were used to develop the database of expanded trips. They are summarized below:

1. Inbound station counts—both boardings and alightings by time of day and day of week by station
2. OD data from returned surveys—the actual OD station pairs described by respondents

Inbound Boarding and Alighting Station Counts

Boarding and alighting passenger counts were aggregated to time of day and day of week periods. For expansion purposes, four periods where used: Weekday AM-Peak, Weekday Off-Peak, Saturday and Sunday. These aggregated totals were used as the target totals in marginal weighting process described later in this section. Table 5 provides an example of station counts by time period. The full list is available in Appendix E.

Table 5. Example of Inbound Boarding/Alighting Station Counts by Time Period

	Inbound AM Peak		Inbound Off-Peak		Inbound Saturday		Inbound Sunday	
Station	Boarding Count	Alighting Count	Boarding Count	Alighting Count	Boarding Count	Alighting Count	Boarding Count	Alighting Count
New Haven	1697	0	1915	0	4364	0	3191	0
Poughkeepsie	969	0	935	0	1830	0	1460	0
Stamford	3467	2454	4258	1475	4168	1862	3153	1363
Wassaic	65	0	208	0	256	0	428	0

OD Data

For MTA's regional transit forecasting needs, three strict sets of criteria were necessary to expand to. A survey record needed to minimally have:

1. Latitudes and longitudes of the ZIP Code centroid for both the origin and destination of the trip described
2. A description of the origin and destination (home, work, school, shopping, other)
3. Access and egress mode to the MNR rail system
4. Boarding station and alighting station
5. Trip purpose
6. MNR rail line where respondent was surveyed (New Haven, Harlem, or Hudson)
7. Time period of trip (AM Peak, Off-Peak, Saturday or Sunday)

Records which met the above set of criteria were denoted as Level 1 complete.

To be Level 2 complete, a survey record needed to be Level 1 complete and have:

1. Household income question answered

Finally, to be Level 3 complete, a survey record needed to be Level 2 complete and have:

1. Number of buses/subways used after exiting the last MNR train
2. Car availability question answered
3. Household employment question answered

For non-forecasting use, a simpler set of criteria was developed in order to expand the data up to population totals. To be included for this less stringent expansion, a survey record needed:

1. Boarding station and alighting station questions answered

2. Time period (AM Peak, Off-Peak, Saturday, or Sunday)

Table 6 shows a summary of the records that were selected for weighting.

Table 6. Number of Usable Survey Records

Criteria	Count of Usable Surveys
Level 1	40,988
Level 2	35,683
Level 3	30,900
General Use	65,277

For each set of criteria, the OD data was then aggregated to boarding station, egress station, rail line and time period. Table 7 provides an example of the aggregated OD data.

Table 7. Level 1 Survey Data Aggregated to Boarding Station, Alighting Station, Time Period, and Day of Week

Boarding Station	Egress Station	Unexpanded OD Pairs from Survey			
		AM Peak	Off-Peak	Saturday	Sunday
New Haven	Grand Central	259	226	275	293
Poughkeepsie	Grand Central	343	131	200	189
Stamford	Grand Central	610	278	125	94
Wassaic	Grand Central	23	39	32	51

Marginal Weighting Process

For each set of data, a marginal approach was taken so that expansion to both the boarding and alighting station counts was possible, thereby controlling the data on both trip ends. An iterative process was followed for each boarding station, alighting station, time of day, and day of week period combination to estimate weights. An SQL-based routine was developed to accomplish this iterative weighting. Boarding or alighting counts for stations which were not described in any of the OD pairs in the survey dataset were aggregated with nearby stations.

Here is a brief summary of the process:

1. Initial expansion factors were calculated by dividing the boarding count data by the survey data with matching boarding stations.
2. These expansion factors were then applied to the OD pair for the appropriate station, time of day, and day of week.
3. Expansion factors were then calculated by dividing the alighting station count data by the matching alighting station survey records.

4. These expansion factors were then applied to each survey record's OD pair.
5. Steps 1 through 4 were iterated until the target counts for boarding station, alighting station and period converged to within 2 riders of the target number.

Summary of the Expansion Results

The objectives of the data expansion process were to correct the distribution and the boardings and alightings reported in the surveys to actual observed boarding and alighting counts. This was achieved for each of the expansion criteria for which data were available: boarding station, alighting station, time of day, and day of week periods. For the strictest set of criteria, one record from the survey dataset represents 7.43 actual trips. For the least strict set, one record represents 3.66 trips. Table 8 provides the average expansion applied to the survey data set for a sample of boarding stations, using the strictest set of criteria, and can therefore be compared to the overall average of 7.43 trips. The stations shown in Table 8 below have been selected to maintain consistency with previous tables. Note that some stations have a higher weight than the average, while others are below the overall average of 7.43.

Table 8. Average Level 1 Expansion for a Sample of Boarding Stations

Boarding Station	Average Expansion
New Haven	18.85
Poughkeepsie	9.74
Stamford	36.36
Wassaic	3.95

DATA ANALYSIS AND RESULTS

From the control count and survey efforts described above, 92,732 returned surveys were collected and these were expanded based on the boarding and alighting counts as described in the expansion section above.

The primary purpose of this study was to collect core traveler origin and destination information for MNR riders and to understand how, where, and why they are using the MNR system and their demographic characteristics. What follows are some basic findings and results from the dataset to provide a summary overview. MNR and MTA have been provided the dataset in an SPSS format that is fully weighted and labeled, so that they can conduct their own analyses to answer questions that can range from macro level understandings about the MNR system to identifying details about a single station, such as how many people who use New Haven station begin their trip in North Haven using the bus. These data also have many uses. The data can and are being used to validate forecasting models in the region (MTA's RTFM) so that it is properly calibrated to current travel behaviors and can be used to forecast future travel patterns and ridership based on new transportation projects and other changes in MNR service.

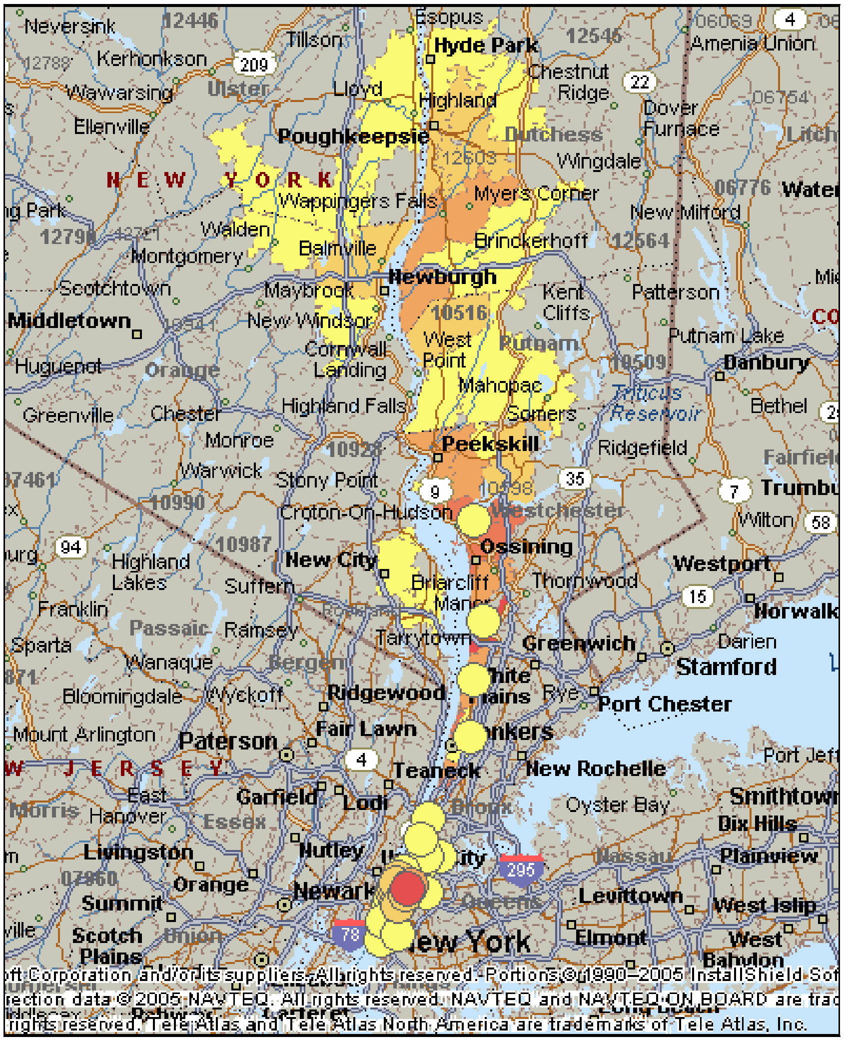
Below, we present some general overall results of the data.

ORIGINS AND DESTINATIONS BY LINE

To illustrate the value of this dataset for understanding travel patterns on the MNR system, origin-destination maps are presented below for trips made in the 6 AM to 9 AM Peak period at the zip code level. Origins are designated by the shaded zip codes and destinations are represented by shaded circles. Trip volumes are scaled from cool (lower) to hot (higher).

Figure 17 shows the map of origins and destinations the Hudson line in the AM Peak period. Note that there are a few minor destinations along the route at Croton Harmon, Tarrytown, and Yonkers with the vast majority of destinations in Manhattan. Croton Harmon and Tarrytown are the largest origin areas (designated by the darker shade of orange). Also note there is certainly some traffic coming from west of Hudson, though the volumes are lower, crossing at Newburgh/Beacon and on the Tappan Zee Bridge.

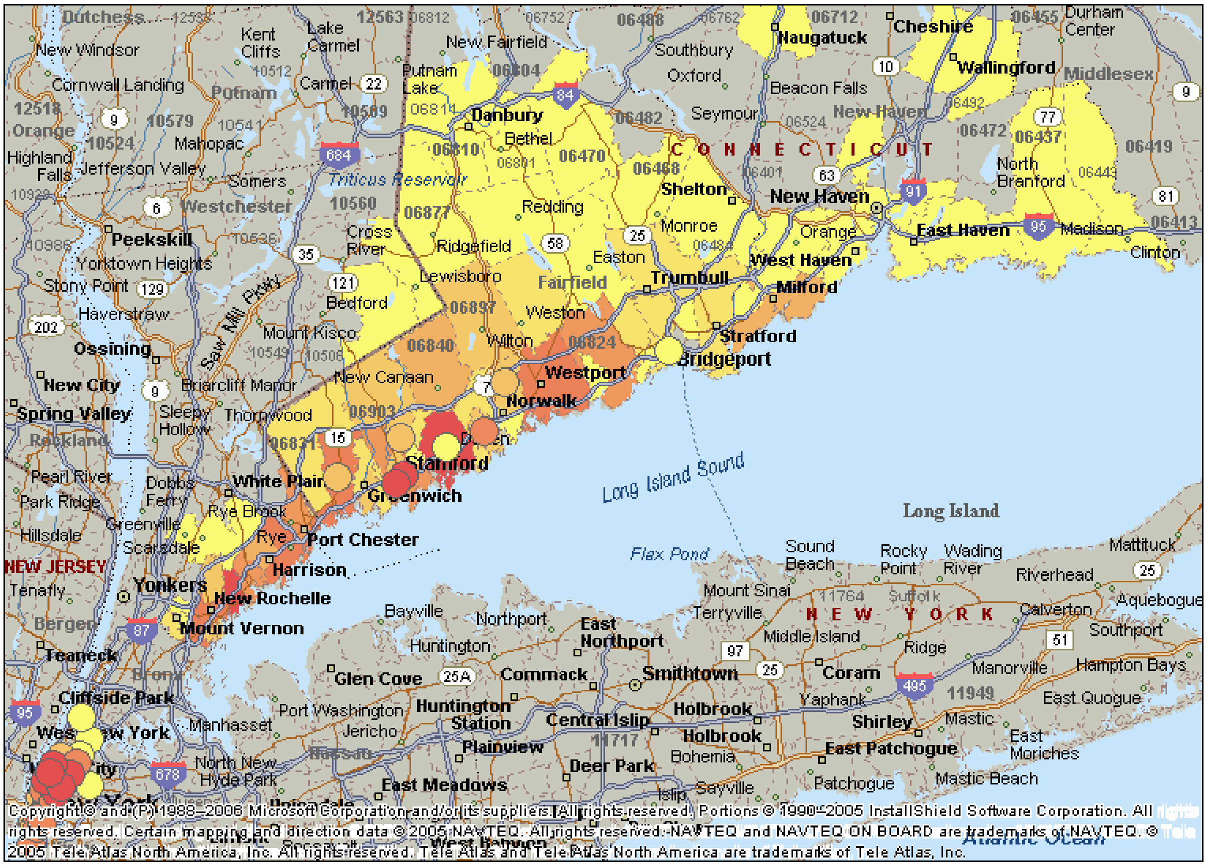
Figure 17. Overall Origins and Destinations for AM Peak Trips on Hudson Line



Logo: Resource Systems Group, Inc.

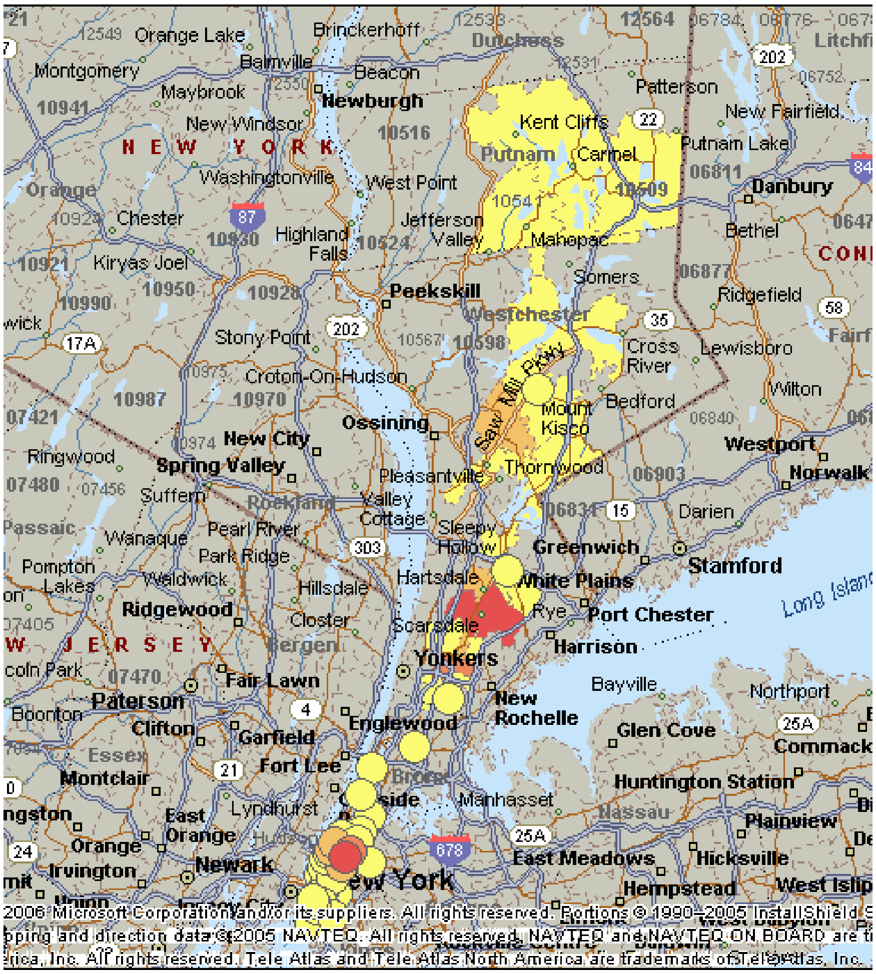
Figure 18 below is of the New Haven Line and shows the major origins in the AM Peak period with greater than 50 riders (many branch line zip codes do not meet this criteria). Clearly Manhattan is the major destination, but Stanford and Greenwich are also major destinations, as well as major origins. Darien is another major origin with significant ridership, as is the Larchmont/New Rochelle area.

Figure 18. Overall Origins and Destinations for AM Peak Trips on New Haven Line



For the Harlem line, AM Peak period ridership is seen to have Westchester zip codes for the predominant origin and Manhattan, as expected, for the primary destination (Figure 19). Fordham, White Plains, and Mt Vernon are intermediate destinations with significant ridership.

Figure 19. Overall Origins and Destinations for AM Peak Trips on Harlem Line



As seen in the charts below (Figure 20 and Figure 22), there is a wide range of boarding stations on the Harlem and New Haven lines. White Plains station (23%) in particular dominates ridership boardings on the Harlem line. Stamford is the largest station (14%) on the New Haven line, though not nearly as dominant as White Plains in comparison. For the Hudson line (Figure 21), the distribution is more even, though the more dominant station boardings occur further out on the line at Tarrytown (11%) and beyond (Croton Harmon (12%), Beacon (11%), and Poughkeepsie (11%)).

Figure 20. Boarding Stations on Harlem Line

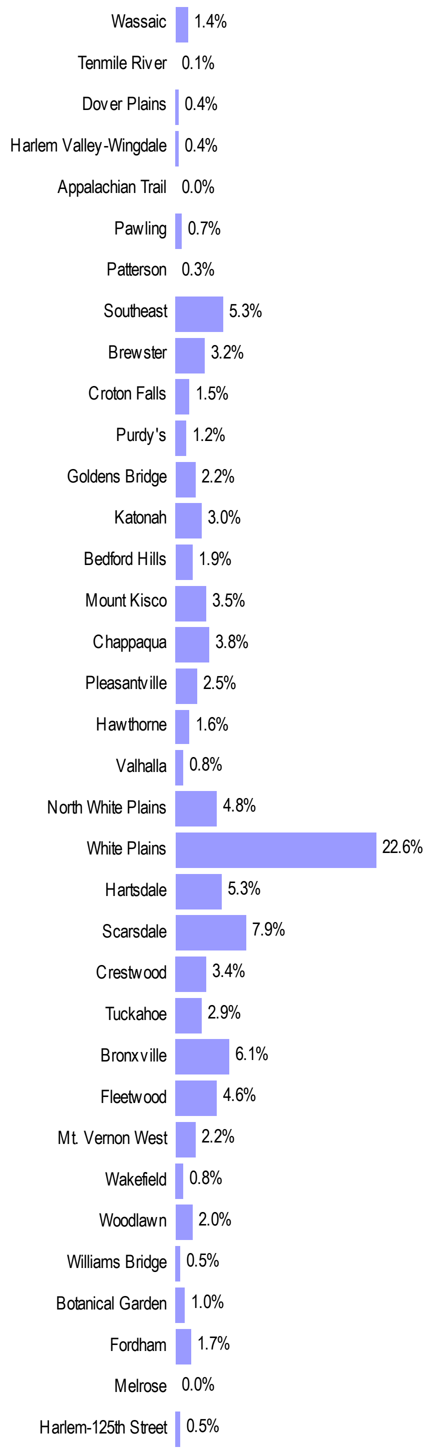


Figure 21. Boarding Stations on Hudson Line

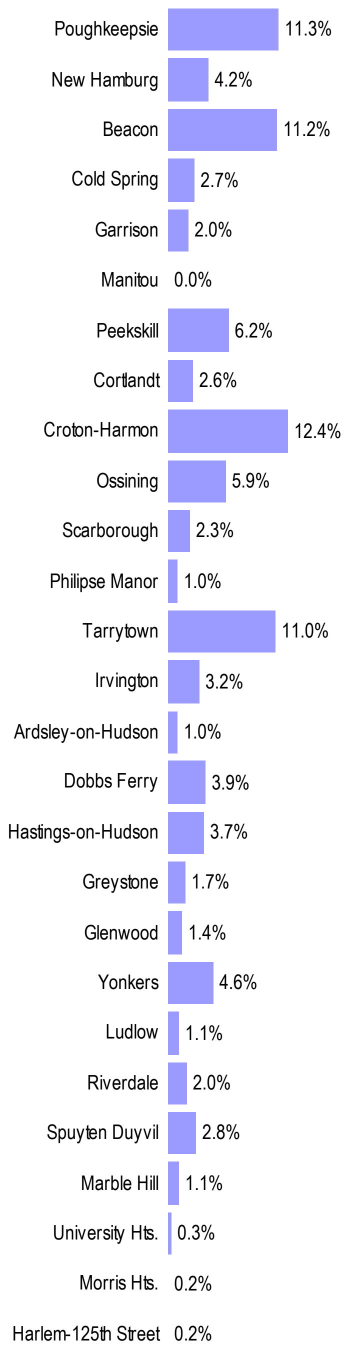
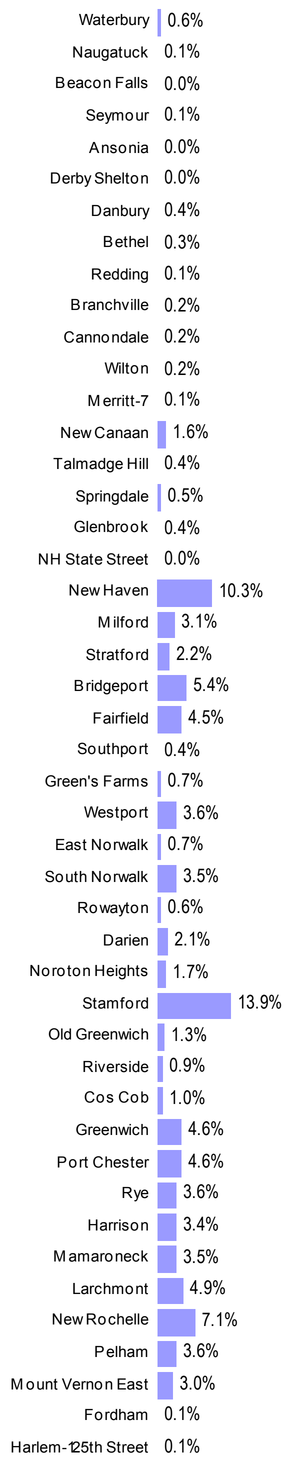


Figure 22. Boarding Stations on New Haven Line



On the destination side, the distributions are heavily skewed towards alightings at Grand Central Terminal. GCT dominates all other stations by a wide margin. Other major destination stations of note (based on each line's volumes) include Harlem-125th Street, Fordham, White Plains, Stamford, Yonkers, and Marble Hill (Figure 23, Figure 24, and Figure 25).

Figure 23. Destination Stations on Harlem Line

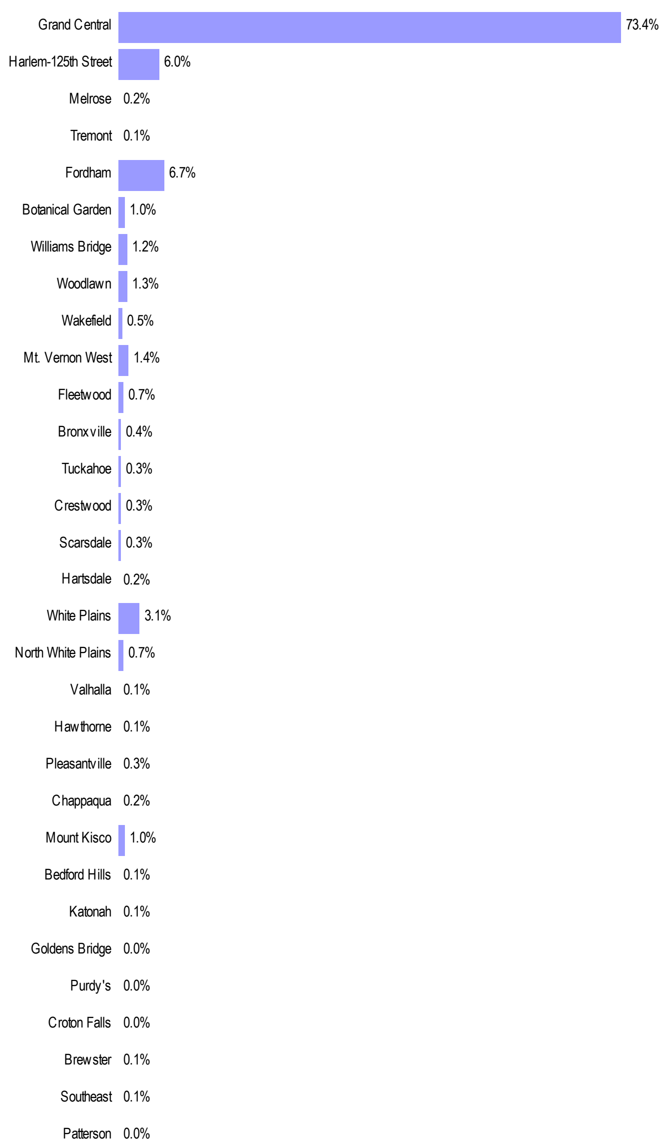


Figure 24. Destination Stations on Hudson Line

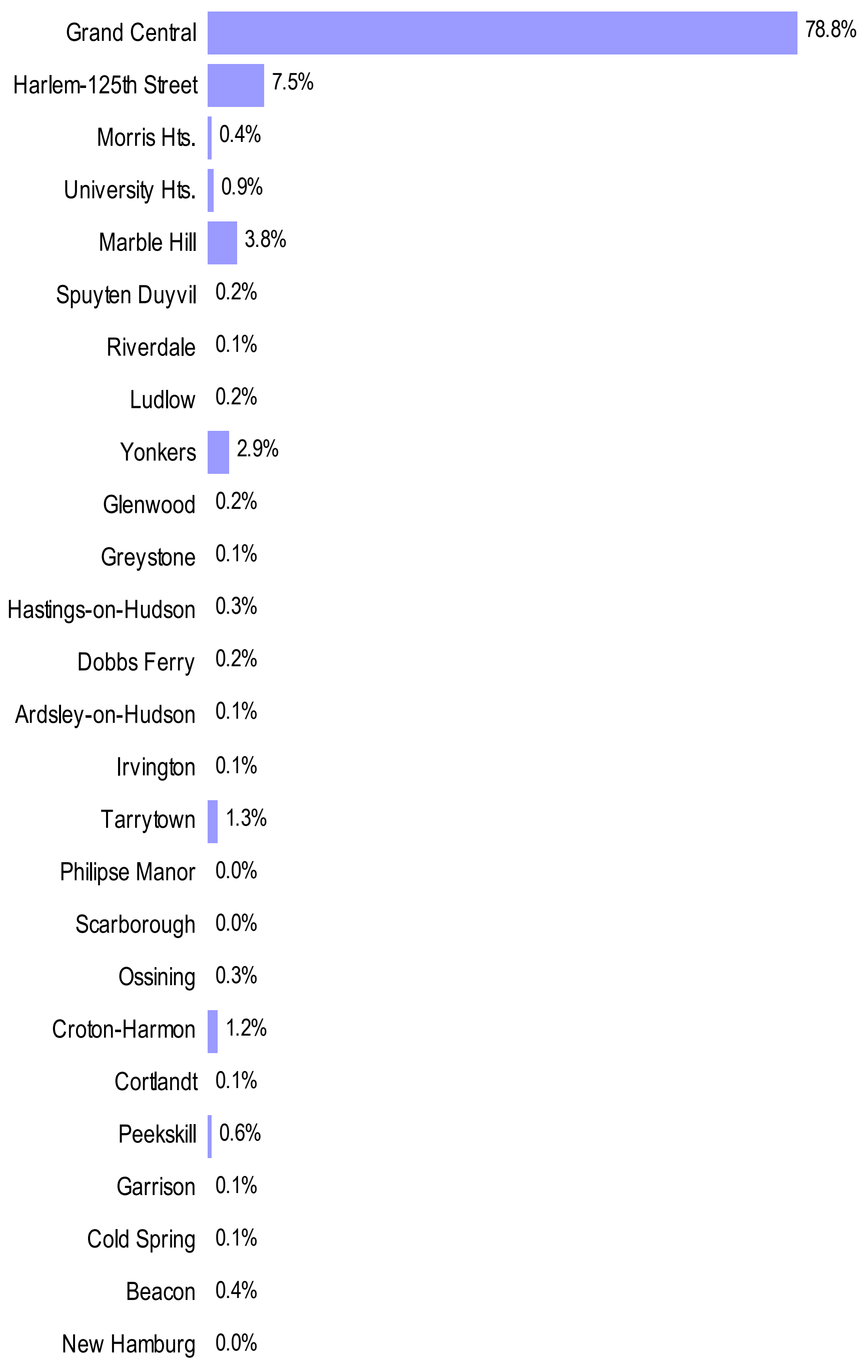
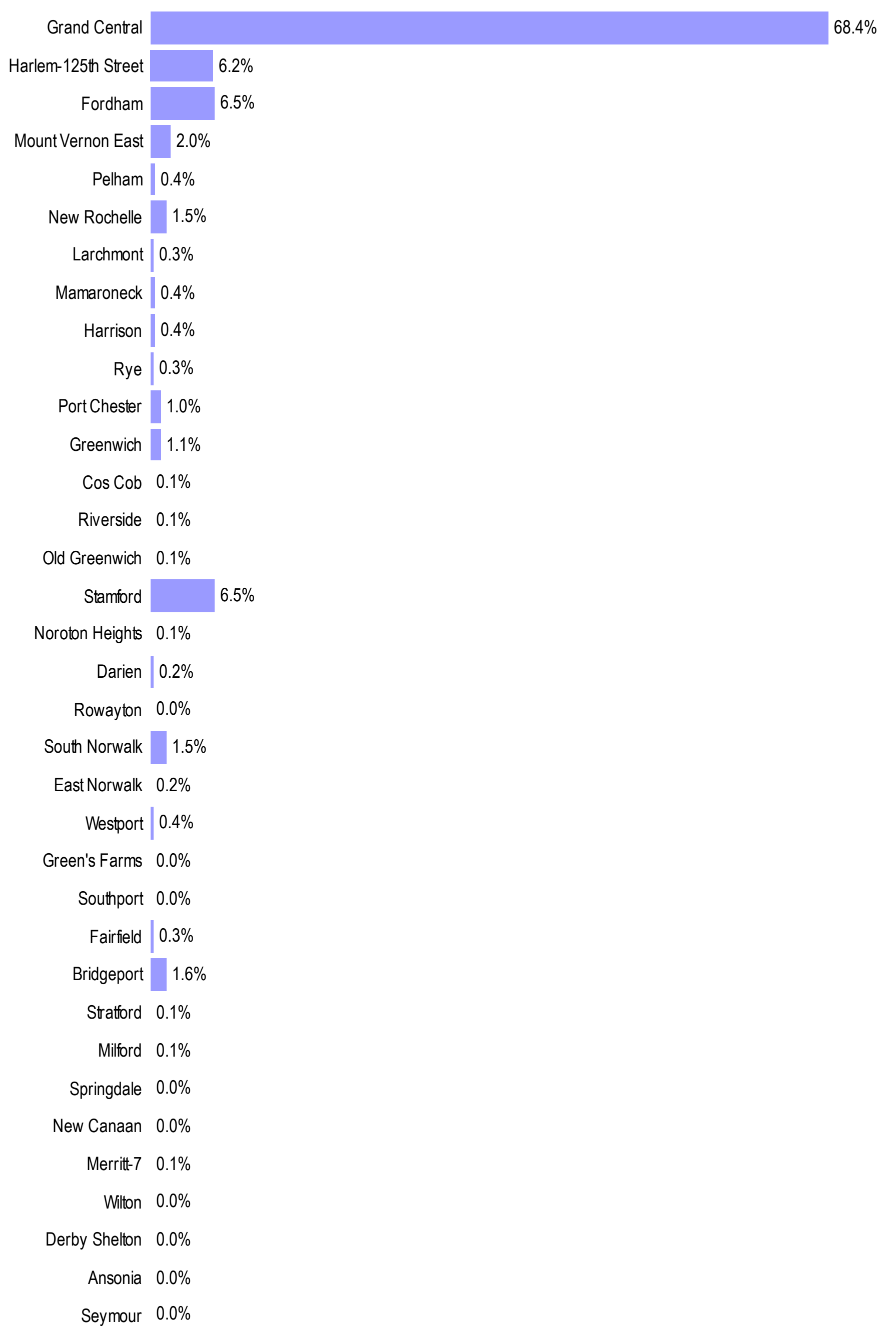


Figure 25. Destination Stations on New Haven Line



RESULTS BY MARKET SEGMENTS

The distribution of responses among Peak/Off-Peak and Work/Non-Work segmentations are shown below (Table 9). Peak travel comprises 63% of all trips with the remaining 37% made during the off-peak period. Peak travel is dominated by work trips while off-peak travel is almost divided evenly between work and non-work trips.

Table 9. Respondents by Defined Market Segments

Markets	Quick Market Description	Description of Market	Inbound Weighted Weekday Trips	Market Share	Graph
1	Typical MNR Commute w/Drive Access	"Traditional" MNR Commute, average weekday, HBW, auto-access, AM peak period with employment end at 125th/GCT.	46,026	36.6%	
2	Typical MNR Commute w/Walk Access	Average weekday, HBW, walk access, AM peak period with employment end at 125th/GCT.	16,767	13.3%	
3	Typical MNR Commute w/Bus Access	Average weekday, HBW, bus access, AM peak period with employment end at 125th/GCT.	2,253	1.8%	
4	Peak-Period non-work to Manhattan	Average weekday, non-work purpose, all access modes, AM peak period with attraction end at 125th/GCT.	6,575	5.2%	
5	Off-Peak commute to Manhattan	Average weekday, HBW purpose, all access modes, off-peak period with employment end at 125th/GCT.	10,495	8.3%	
6	Off-Peak non-work to Manhattan	Average weekday, non-work purpose, all access modes, off-peak period with attraction end at 125th/GCT.	14,618	11.6%	
7	Inbound MNR Intermediate Market	Average weekday, all purposes, all access modes, all day inbound (production-to-attraction) riders to non-Manhattan stations.	14,434	11.5%	
8	Reverse-peak commuting Manhattan Riders	Average weekday, HBW purpose, all access modes, PM peak, outbound (production-to-attraction) riders with home end at 125th/GCT.	4,033	3.2%	
9	Reverse-peak commuting non-Manhattan Riders	Average weekday, HBW purpose, all access modes, PM peak, outbound (production-to-attraction) riders with home end outside Manhattan.	4,060	3.2%	
10	All off-peak reverse commuting	Average weekday, HBW purpose, all access modes, off-peak, outbound (production-to-attraction) riders.	3,418	2.7%	
11	All non-work reverse trips	Average weekday, non-work purpose, all access modes, all day, outbound (production-to-attraction) riders.	3,177	2.5%	
		Total Defined	125,856	100.0%	
Undefined		Not enough data to classify	3,263	2.5%	
Total		**ALL RECORDS**	**129,120**	**100.0%**	

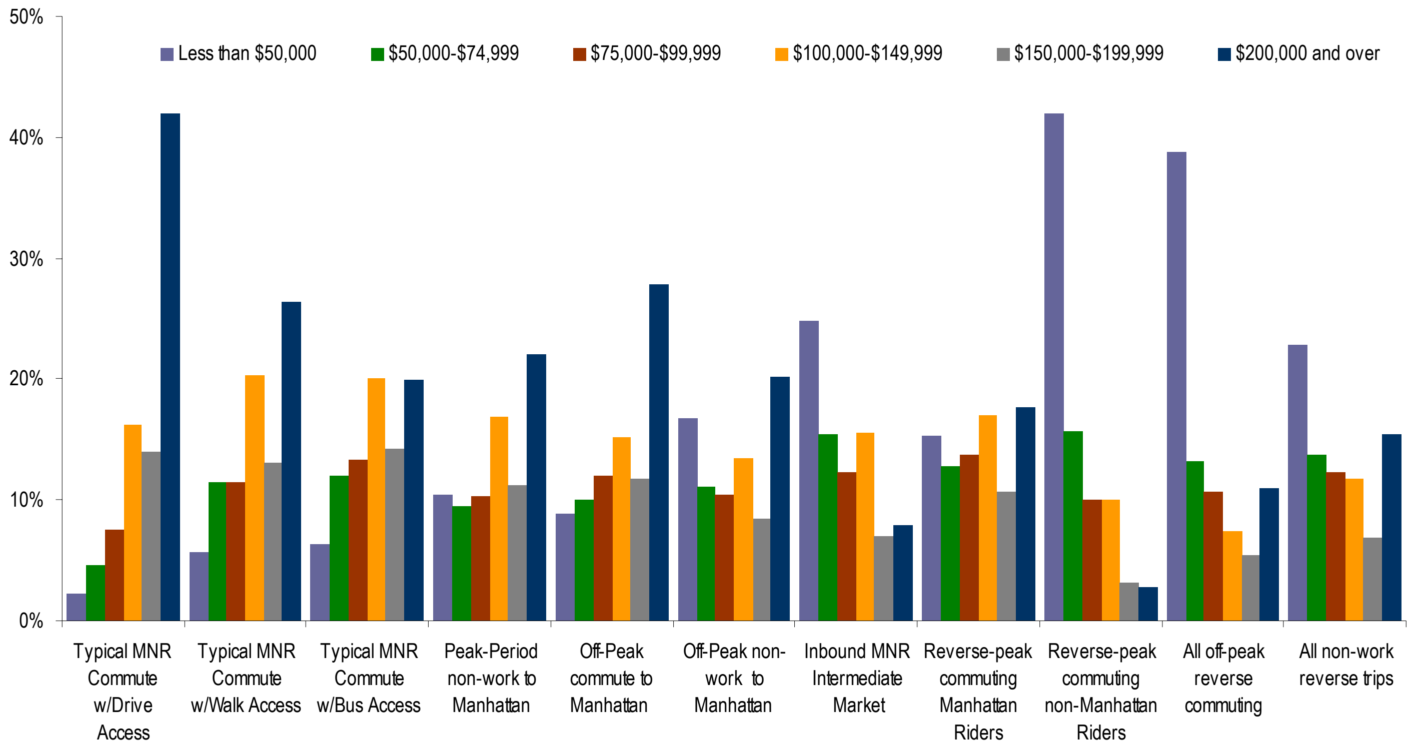
Demonstrating the important role MNR serves in reducing auto congestion, 83% of the Typical MNR Commute segment respondents (with drive, walk, or bus access) said they had a car available to make the trip they described (Table 10). For non-work travelers, nearly 60% indicated they had a car available at the time the trip was made.

Table 10. Car Availability by Market Segment

Market Segment	Percentage Car Available	Graph
Typical MNR Commute w/Drive Access	91.5%	
Typical MNR Commute w/Walk Access	65.0%	
Typical MNR Commute w/Bus Access	55.7%	
Peak-Period non-work to Manhattan	74.9%	
Off-Peak commute to Manhattan	75.2%	
Off-Peak non-work to Manhattan	65.9%	
Inbound MNR Intermediate Market	54.6%	
Reverse-peak commuting Manhattan Riders	24.1%	
Reverse-peak commuting non-Manhattan Riders	30.7%	
All off-peak reverse commuting	20.8%	
All non-work reverse trips	37.9%	

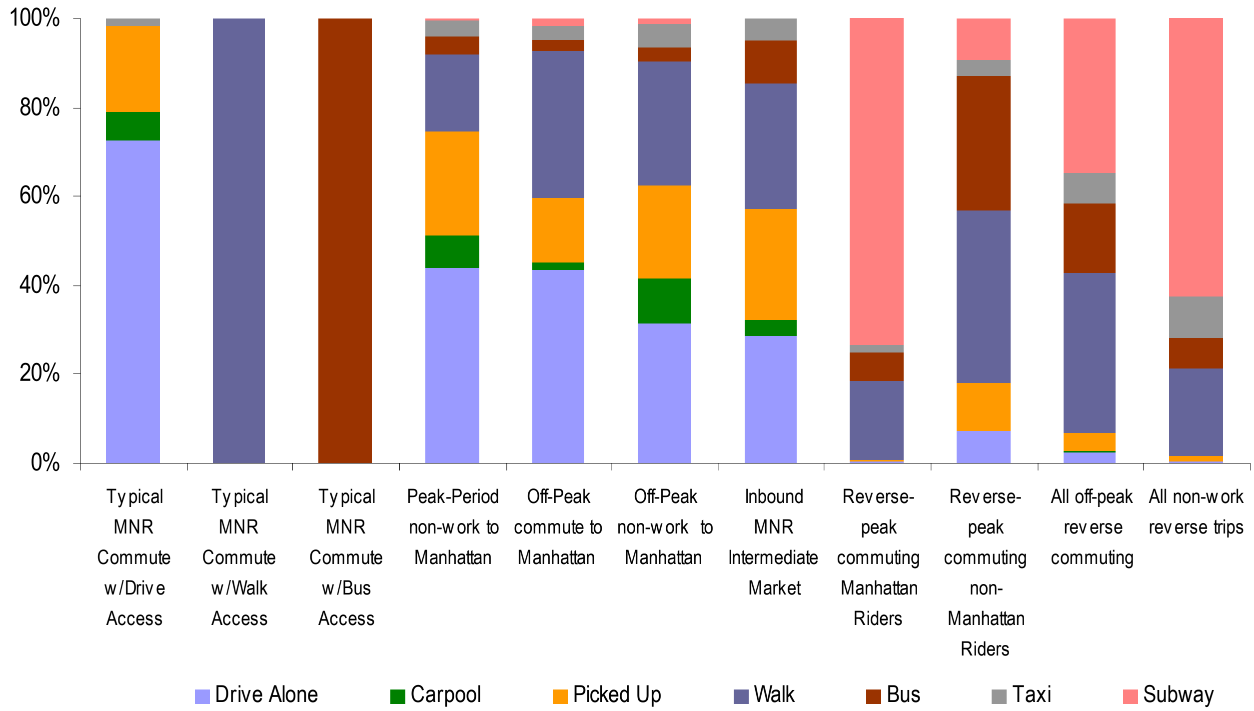
MNR serves customers of a wide variety of income levels. Respondents who drive to the station and are making AM peak work trips have the highest percentage of respondents making over $200,000 per year (Figure 26). Reverse peak commuters have the lowest income distributions. Off-peak commuters and non commuters have a similar income distribution to that of the other AM peak travelers (commuters who walk or take a bus to the station and non-work travelers who are going to Manhattan).

Figure 26. Income by Market Segment



Three of the market segments for this study have been defined by the access modes used to get to the respondents' stations (e.g., "Commute with Drive Access", "Commute with Walk Access", "Commute with Bus Access") and therefore, results shown in the chart below (Figure 27) are confirmation of the respondents' answers. Additional market segments, not defined by the access modes (e.g., Off-peak, Reverse-peak, Work, and Non-work trips) are more interesting in which to observe access modes. Note that the general access mode for reverse-peak trips from Manhattan is 72% subway, while for reverse-peak commuters starting somewhere other than Manhattan subway is only 9%; these non-Manhattan commuters are more likely to walk (39%) or take a bus (30%) to MNR. For peak period riders going into Manhattan for non-work trips, a high percentage drive alone to the station (43%), the same is true for off-peak non-work trips (31%) and for off-peak work trips (43%) into Manhattan.

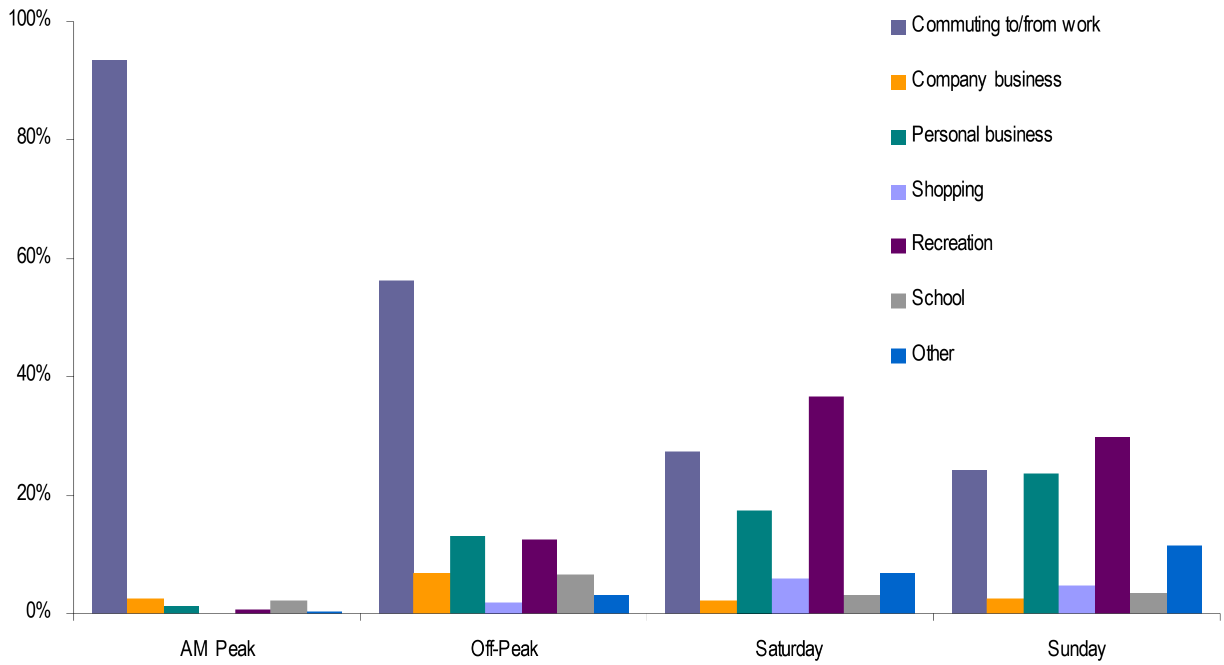
Figure 27. Access Mode by Market Segment



RESULTS BY TIME OF DAY

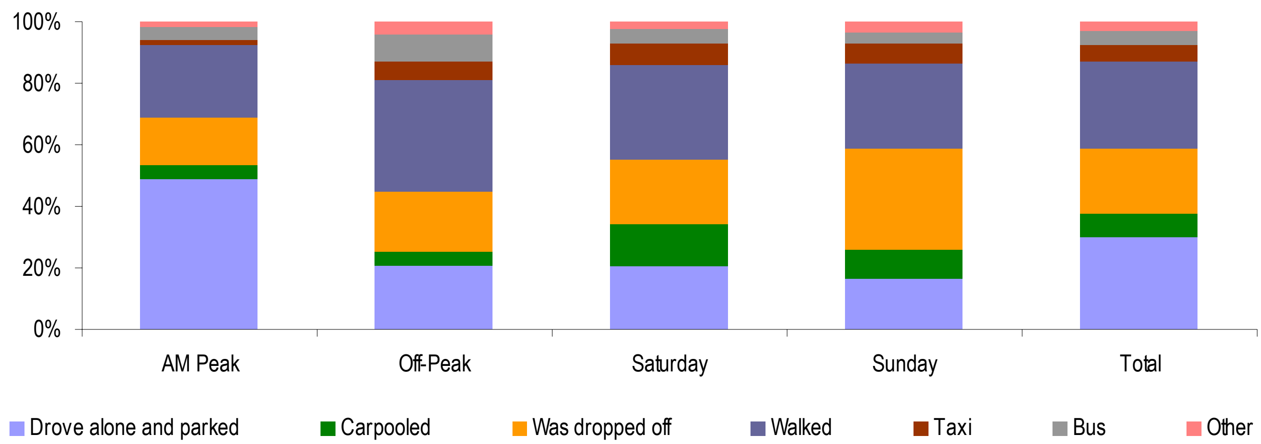
As can be expected, the majority of AM peak trips (93%) are commute trips; almost 60% of off-peak trips are commute trips with another 7% described as company business (Figure 28). Most of the school trips are made in the off-peak period. The biggest percentage of personal business and recreation takes place on the weekend.

Figure 28. Trip Purpose by Time of Day



Access modes by time of day results (Figure 29) show that driving alone is the dominant mode only for AM peak travelers. Shared rides by carpooling comprised an average of 5% of weekday trips, peak or off-peak, while the percentage went up to an average of 12% on weekends. About 30% of all trips were accessed by walking, overall and on weekends, with 37% walk access in the off-peak weekdays, but only 24% for the AM peak. Overall, most people either walk or drive alone to MNR, with nearly the same 30% access share each. Sundays have the highest percentage (35%) of drop off's.

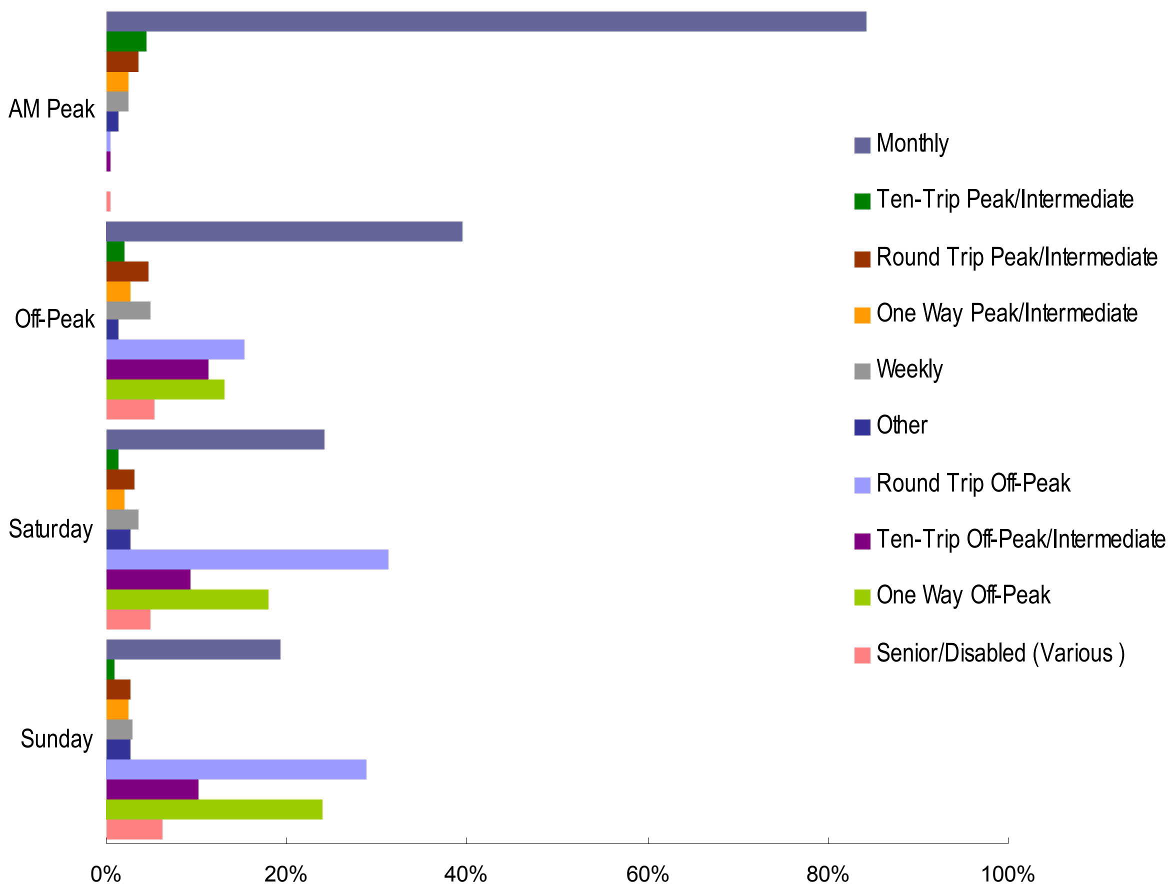
Figure 29. Access Mode by Time of Day



FARE MEDIA OPTIONS

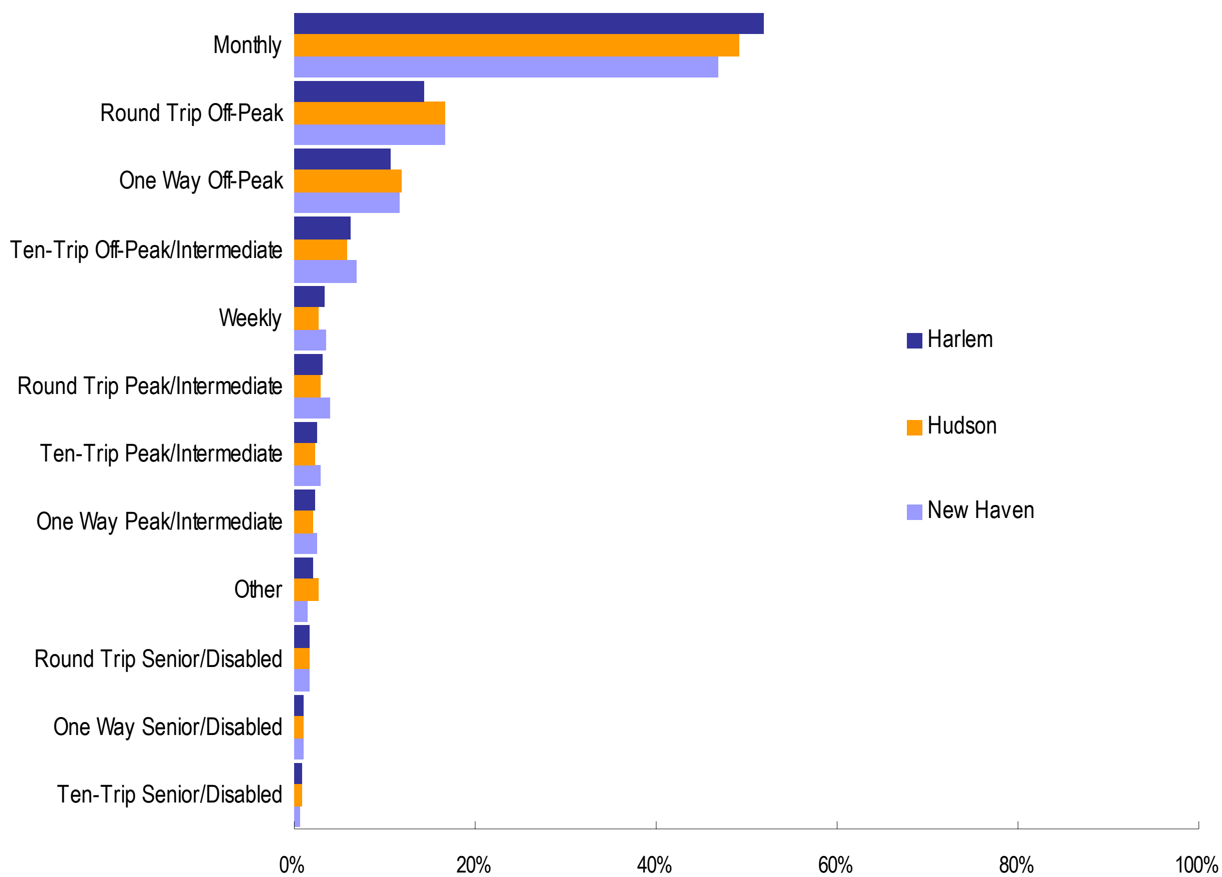
MNR provides a variety of fare media options to serve different markets. Nearly 85% of respondents making AM Peak trips use a Monthly pass, while an average of 40% of all off-peak trips are made with a Monthly and about one quarter of Saturday and Sunday trips use Monthly passes (Figure 30). Off-peak weekday and weekend travelers were more likely to use the Round-Trip or One-Way Off-Peak pass, likely because this fare option is geared for them.

Figure 30. Ticket Type by Time of Day



Across all three lines, nearly half of all fares are paid using a Monthly pass (Figure 31). The next most used fare media is the Round-Trip Off-Peak with about 15% of the market, followed by the One-Way Off-Peak with an average of 11% share.

Figure 31. Fare Type by Line



CONCLUSIONS

These examples suggest the broad applications of this dataset to a number of macro and micro level analyses. This rich dataset will allow MNR to better understand the ridership behavior and trip patterns throughout its system and make changes to better serve this demand.

APPENDIX A: QUESTIONNAIRE DESIGN

APPENDIX B: SCREEN SHOTS OF QUESTIONS IN ONLINE SURVEY

APPENDIX C: TRAINING MANUAL

APPENDIX D: COMPLETE SCHEDULE OF FIELDWORK

APPENDIX E: LIST OF INBOUND STATION COUNTS

APPENDIX A

PAPER-BASED SURVEY INSTRUMENT

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO. 15 [illegible]

POSTAGE WILL BE PAID BY ADDRESSEE

METRO-NORTH RAILROAD 2007 TRAVEL SURVEY
CHURCH STREET STATION
PO BOX 3478
NEW YORK NY 10277-1935

Tell us about THIS INBOUND TRIP ON THIS TRAIN *(towards Manhattan)*

If this is a round trip, please describe just the one-way inbound portion.

1. What is the main purpose of this INBOUND trip on this train? *(Select one answer only.)*

- ☐ Commuting to/from work
- ☐ Company business
- ☐ Personal business (e.g., medical/visiting)
- ☐ Shopping
- ☐ Recreation (e.g., dining/entertainment/vacation)
- ☐ School
- ☐ Other, please specify: ____________

2. How often do you make an INBOUND trip *(toward Manhattan)* on Metro-North? *(Select one answer only.)*

- ☐ 5 or more days per week
- ☐ 4 days per week
- ☐ 3 days per week
- ☐ 2 days per week
- ☐ 1 day per week
- ☐ Less than 1 day per week but more than 1 day per month
- ☐ 1 day per month or less

3. Where did you begin this trip on this train? *(Please print clearly.)*

ZIP Code, if known: ____________

City/Town: ____________ State: ______

Address/Nearest intersection: ____________

4. Is this address where you... ? *(Select one answer only.)*

- ☐ Live
- ☐ Work
- ☐ Attend School
- ☐ Shop
- ☐ Other ____________

5. How did you get to the Metro-North station for this trip on this train? *(Select all that apply.)*

- ☐ Drove alone and parked
- ☐ Carpooled, please indicate the number of people in the car including yourself ________
- ☐ Was dropped off
- ☐ Walk
- ☐ Taxi
- ☐ Bus, please specify route or bus number ____________
- ☐ Other, please specify: ____________

6. Where did you park for this trip on this train?

- ☐ Did not park
- ☐ Parked directly at the Metro-North station
- ☐ Parked on the street or at an off site parking facility
- ☐ Other, please specify: ____________

7. Please indicate how many minutes it took you to get from your parking spot to the train platform: ______ Minutes *(Enter 0 if did not park.)*

8. How much did you pay to park?

- ☐ Did not park
- ☐ Paid $____ *(If parking was free, please write in "$0.")* *(Select one answer only.)*
  - ☐ Daily
  - ☐ Weekly
  - ☐ Monthly
  - ☐ Other, please specify: ____________

9. For this trip, what was the Metro-North station where you boarded this train?

____

10. How long did it take to get to the FIRST Metro-North station from where you started this trip? ______ Minutes

11. When was your train scheduled to depart from this Metro-North station?

___ : ___ ☐ AM ☐ PM *(Please check one box)*

12. In the course of this Metro-North train trip on this train, will you (did you) transfer between Metro-North trains to reach your final destination?

- ☐ No, I will not (did not) transfer
- ☐ Yes, I will transfer (did transfer) at:

please specify the stop or stops where you will (or did) transfer

- ☐ Southeast
- ☐ Croton-Harmon
- ☐ North White Plains
- ☐ White Plains
- ☐ Bridgeport
- ☐ South Norwalk
- ☐ Stamford
- ☐ Other, specify: ____________

13. At which station will (or did) you exit your LAST Metro-North train?

This should not be the same as your answer to question 9.

- ☐ Grand Central Terminal
- ☐ Fordham
- ☐ Harlem/125th St.
- ☐ Other, please specify: ____________
- ☐ White Plains
- ☐ Greenwich
- ☐ Stamford

14. At the end of this trip, how will (did) you get from your LAST Metro-North station (Q.13) to your FINAL destination? *(Please select all that apply.)*

- ☐ Walk
- ☐ Taxi
- ☐ Bus, please specify the first route or bus number you will take (or took) after exiting your last Metro-North train: ________
- ☐ Subway, please specify the first subway line you will take (or took) after exiting your last Metro-North train:
  - ☐ (red) ☐ (purple) ☐ (orange)
  - ☐ (green) ☐ (grey)
- ☐ Parked and will drive (or drove) alone
- ☐ Parked and will carpool (or carpooled), please specify the number of people in the car including yourself: ___
- ☐ Will be (or was) picked up
- ☐ Other, please specify: ____________

PLEASE SEAL WITH TAPE [illegible]

15. After exiting your last Metro-North train, how many subways and/or buses will (or did) you take to reach your FINAL destination?

Number of subways and/or buses ______

16. What is (or was) the FINAL destination for this trip? (Not the Metro-North station, subway station, or bus stop.) *(Please print clearly.)*

This should not be the same as your answer to question 3.

ZIP Code, if known: ____________

City/Town: ____________ State: ______

Address/Nearest intersection: ____________

17. Is this the address where you... ? *(Select one answer only.)*

- ☐ Live
- ☐ Work
- ☐ Attend School
- ☐ Shop
- ☐ Other ____________

18. How long will (did) it take to get from your LAST Metro-North station (Q.13) to your FINAL destination? ______ Minutes

19. What type of train ticket did you use for this trip?

☐ Monthly	☐ With UniTicket ☐ No UniTicket	☐ One Way	☐ Peak/Intermediate ☐ Off-Peak/Intermediate ☐ Senior/Disabled
☐ Weekly	☐ With UniTicket ☐ No UniTicket	☐ Round Trip	☐ Peak/Intermediate ☐ Off-Peak/Intermediate ☐ Senior/Disabled
☐ Other specify: ________		☐ Ten Trip	☐ Peak/Intermediate ☐ Off-Peak/Intermediate ☐ Senior/Disabled

Tell us about your OUTBOUND TRIP *(away from Manhattan)*

20. When will (or did) you make the other half of this trip going OUTBOUND (away from Manhattan)? *(Select one answer only.)*

- ☐ Same day
- ☐ Different day, please indicate day/date: ________
- ☐ I will (or did) not make an outbound trip (skip to question 22)

21. How will (or did) you make the other half of this trip going outbound (away from Manhattan)? *(Select one answer only.)*

- ☐ I will (or did) use the SAME Metro-North station for my outbound trip.
  Scheduled departure time for your first outbound train:
  ___ : ___ ☐ AM ☐ PM *(please check one box)*
- ☐ I will (or did) use a DIFFERENT Metro-North station for my outbound trip.
  Scheduled departure time for your first outbound train:
  ___ : ___ ☐ AM ☐ PM *(please check one box)*
  First Metro-North station where you will get on (or got on) going outbound:
  ____
  Last Metro-North station where you will get off (or got off):
  ____
- ☐ I will not (or did not) use Metro-North for my outbound trip.
  Please describe how you will make (or made) this trip:
  ____

Tell us a little more about yourself

22. Which answer below best describes your job or occupation? *(Select one answer only.)*

- ☐ Professional, Technical, and Related
- ☐ Executive, Administrative, and Managerial
- ☐ Service occupations
- ☐ Administrative Support, Including Clerical
- ☐ Transportation and Material Moving
- ☐ Machine Operators, Assemblers, and Inspectors
- ☐ Retired, Student, or Not Employed
- ☐ Sales
- ☐ General Labor
- ☐ Precision Production, Craft, and Repair

23. In which of the following industries are you employed? *(Select one answer only.)*

- ☐ Construction/Natural Resources/Mining
- ☐ Education
- ☐ Health Services/Health Care
- ☐ Financial Activities
- ☐ Government
- ☐ Wholesale Trade
- ☐ Other services, please specify: ____________
- ☐ Information
- ☐ Leisure and Hospitality
- ☐ Manufacturing
- ☐ Professional/Business Services
- ☐ Transportation and Utilities
- ☐ Retail Trade

24. How many drivers (including yourself) are in your household? ___

25. How many people (including yourself) in your household are employed? ___

26. How many operable vehicles (cars, motorcycles, pickup trucks, SUVs, or vans) are in your household? ___

27. Are you a licensed driver? ☐ Yes ☐ No

28. Did you have a car available for this trip? ☐ Yes ☐ No

29. What is your household income? *(Select one answer only.)*

- ☐ Less than $15,000
- ☐ $15,000-$24,999
- ☐ $25,000-$34,999
- ☐ $35,000-$49,999
- ☐ $50,000-$74,999
- ☐ $75,000-$99,999
- ☐ $100,000-$149,999
- ☐ $150,000-$199,999
- ☐ $200,000 and over

30. Are you...? ☐ Male ☐ Female

31. What is your age? ___ Years

32. Are you of Hispanic origin? ☐ Yes ☐ No

33. Are you...?

- ☐ White
- ☐ American Indian
- ☐ Other, please specify: ____________
- ☐ Black
- ☐ Asian or Pacific Islander

34. How often do you buy food, snacks, or other goods and services within a 5 minute walk of the Metro-North station where you typically board the train for your inbound (toward Manhattan) trip?

- ☐ 4 or more times a week
- ☐ 1-3 times a week
- ☐ Less than once a week
- ☐ Never

35. How important was Metro-North rail service in choosing the location of your home?

☐ Very ☐ Somewhat ☐ Moderately ☐ Slightly ☐ Not at all

36. What percent of your Metro-North ticket is paid by your employer?

___% (Please write in 0% if you pay the entire cost of your trip.)

Please use the space below to leave comments.

____
____
____

Please fill in your contact information below in order for us to contact you in case you win a cash prize.

Name: ____________

Street: ____________

City/Town: ____________ State: ______ Zip: ______

Telephone: ____________

Email: ____________

May we contact you to participate in future MTA travel surveys?

☐ Yes ☐ No

Thank you for your time!

Cuéntenos acerca de su VIAJE DE IDA (hacia Manhattan)

1. ¿Cuál fue el propósito principal de este viaje?

2. ¿Con qué frecuencia hace este viaje de ida (hacia Manhattan) por Metro-North?

- ☐ 5 o más días por semana
- ☐ 4 días por semana
- ☐ 3 días por semana
- ☐ 2 días por semana
- ☐ 1 día por semana
- ☐ Menos de 1 día por semana, pero más de 1 día al mes
- ☐ 1 día al mes o menos

3. ¿Dónde comenzó este viaje?

Código Postal, si lo conoce: ____________

Ciudad/Pueblo: ____________ Estado: ______

Dirección o intersección más cercana: ____________

4. ¿En esta dirección el lugar donde ... (Marque una sola respuesta)

- ☐ Vive?
- ☐ Trabaja?
- ☐ Asiste a la escuela?
- ☐ Va de compras?
- ☐ Otro ____________

5. ¿Cómo llegó a la estación de trenes de Metro-North para este viaje?

6. ¿Dónde estacionó para este viaje?

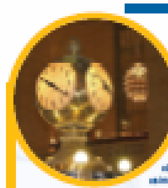
7. Indique cuántos minutos le tardó llegar desde su lugar de estacionamiento al andén de trenes. ___

8. ¿Cuánto pagó por el estacionamiento?

Cuéntenos acerca de su VIAJE DE REGRESO (al viaje fuera de Manhattan)

Díganos algo acerca de usted:

¡Gracias por su ayuda!



Metro-North Railroad

2007 TRAVEL SURVEY

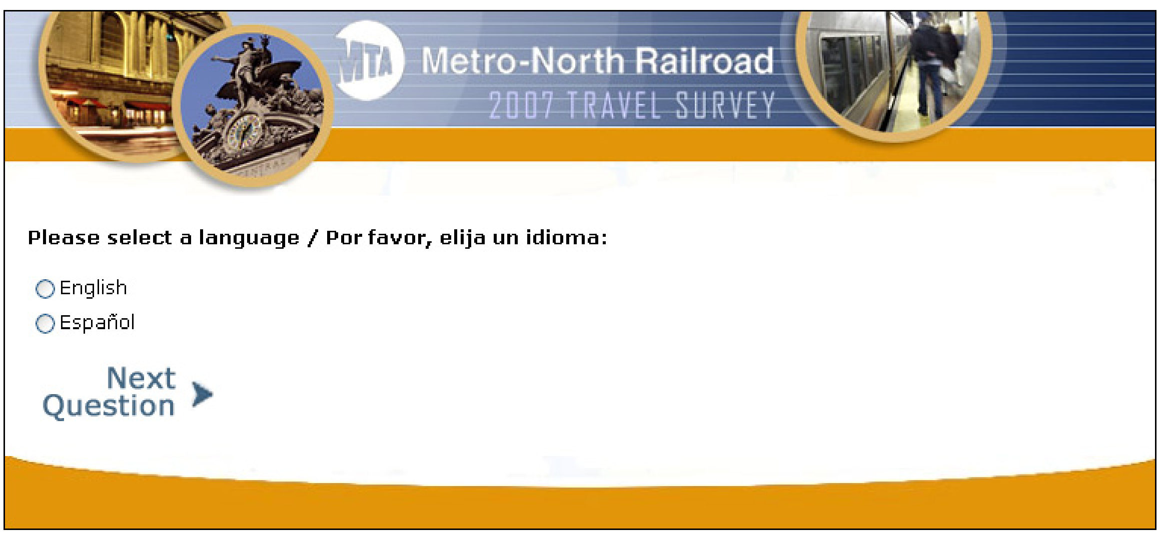
Your Password

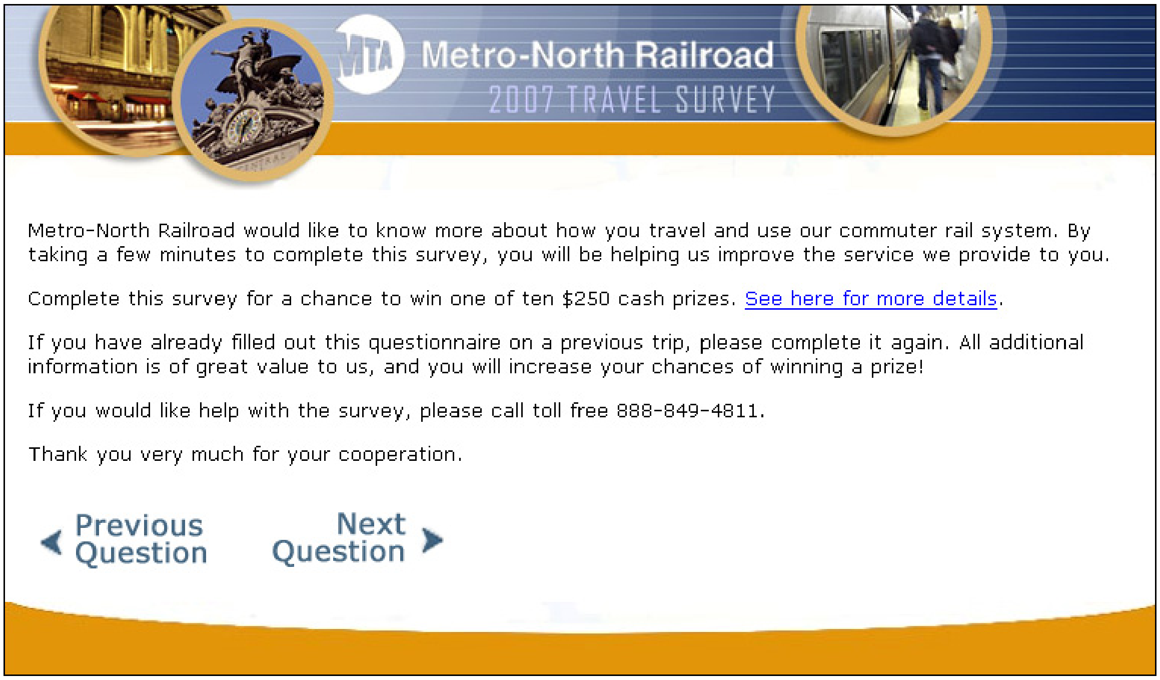
Please complete this important survey for a chance to win a cash prize!

APPENDIX B

SCREEN SHOTS WEB-BASED SURVEY


MTA
Metro-North Railroad
2007 TRAVEL SURVEY
For Information/Para informacion:
1-888-849-4811
mtamnr@rsginc.com
Begin Survey


MTA
Metro-North Railroad
2007 TRAVEL SURVEY
Please select a language / Por favor, elija un idioma:
English
Español
Next Question



Metro-North Railroad

2007 TRAVEL SURVEY

Metro-North Railroad would like to know more about how you travel and use our commuter rail system. By taking a few minutes to complete this survey, you will be helping us improve the service we provide to you.

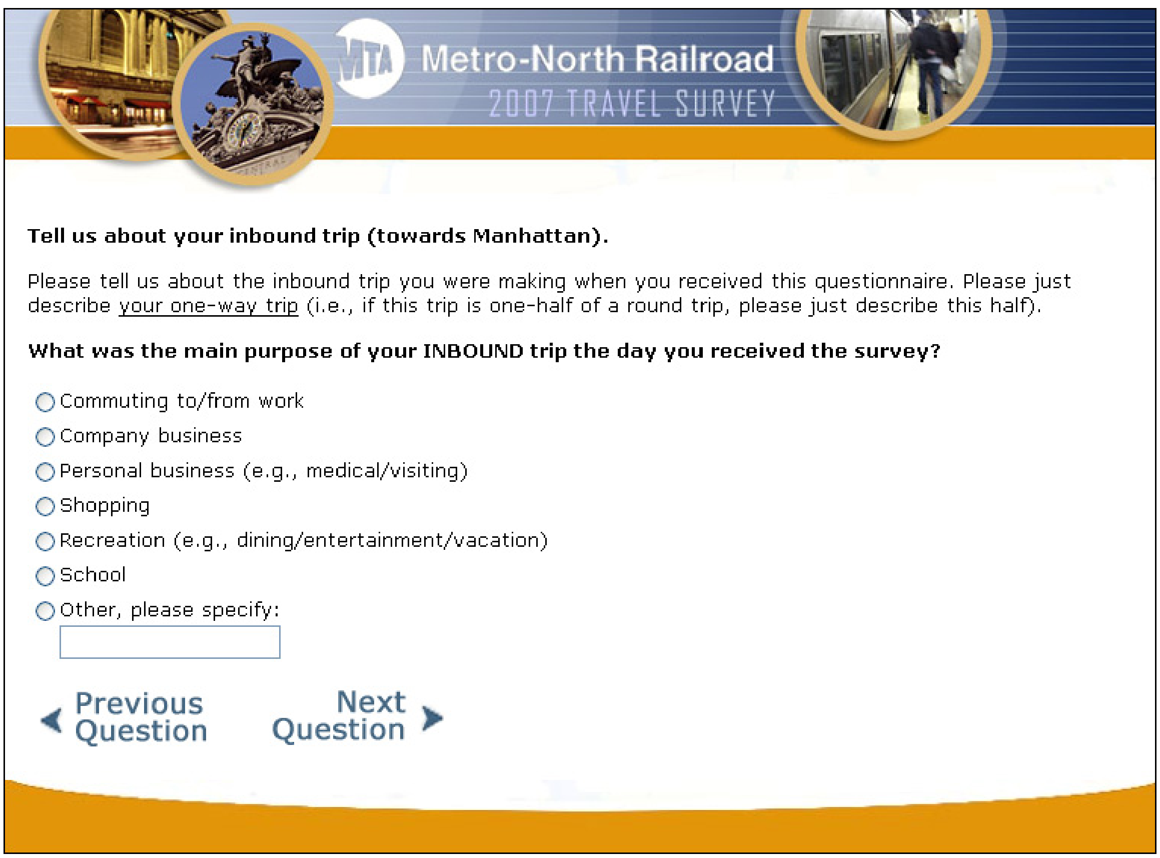
Complete this survey for a chance to win one of ten $250 cash prizes. See here for more details.

If you have already filled out this questionnaire on a previous trip, please complete it again. All additional information is of great value to us, and you will increase your chances of winning a prize!

If you would like help with the survey, please call toll free 888-849-4811.

Thank you very much for your cooperation.

Previous Question   Next Question



Metro-North Railroad

2007 TRAVEL SURVEY

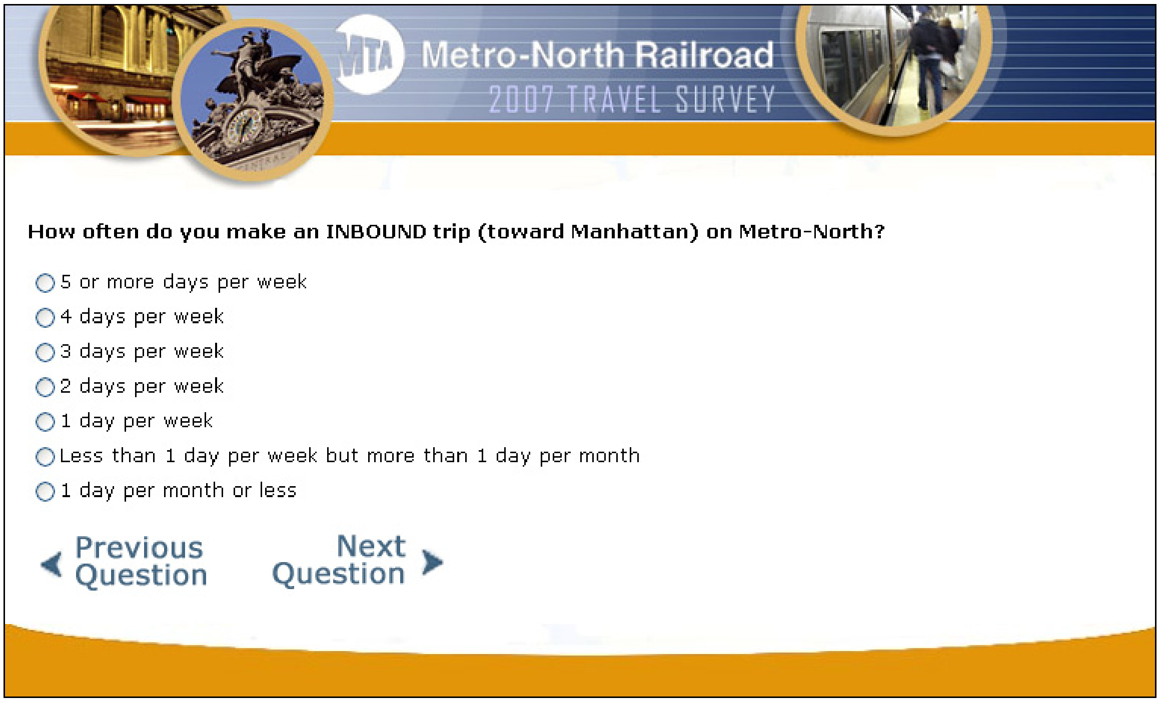
Tell us about your inbound trip (towards Manhattan).

Please tell us about the inbound trip you were making when you received this questionnaire. Please just describe your one-way trip (i.e., if this trip is one-half of a round trip, please just describe this half).

What was the main purpose of your INBOUND trip the day you received the survey?

- ○ Commuting to/from work
- ○ Company business
- ○ Personal business (e.g., medical/visiting)
- ○ Shopping
- ○ Recreation (e.g., dining/entertainment/vacation)
- ○ School
- ○ Other, please specify:

Previous Question   Next Question

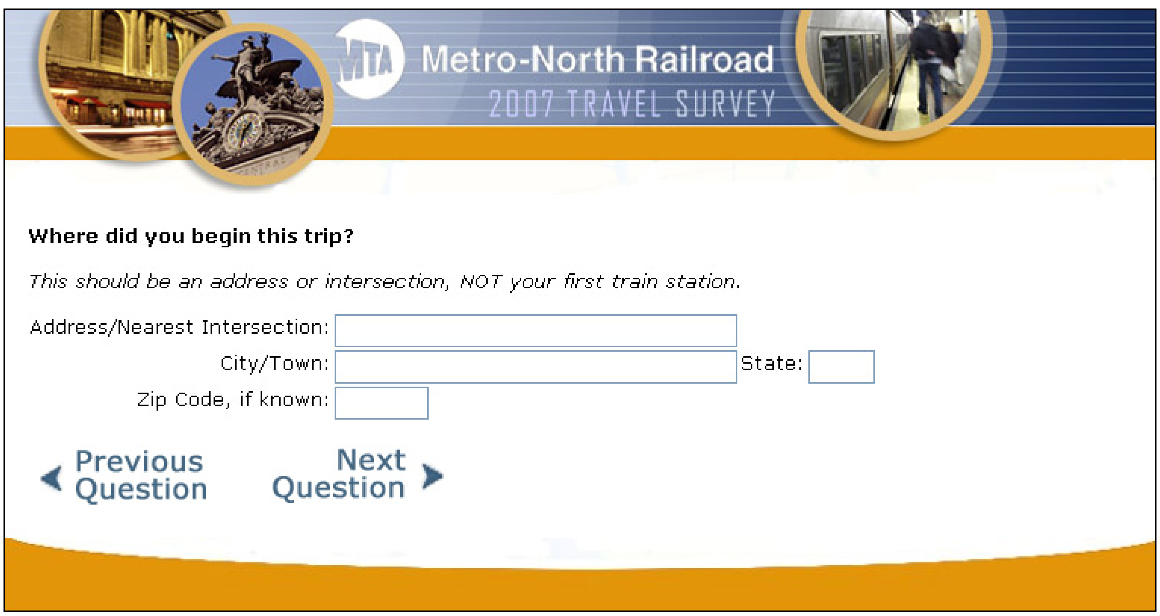


Metro-North Railroad
2007 TRAVEL SURVEY

How often do you make an INBOUND trip (toward Manhattan) on Metro-North?

- ◯ 5 or more days per week
- ◯ 4 days per week
- ◯ 3 days per week
- ◯ 2 days per week
- ◯ 1 day per week
- ◯ Less than 1 day per week but more than 1 day per month
- ◯ 1 day per month or less

Previous Question   Next Question



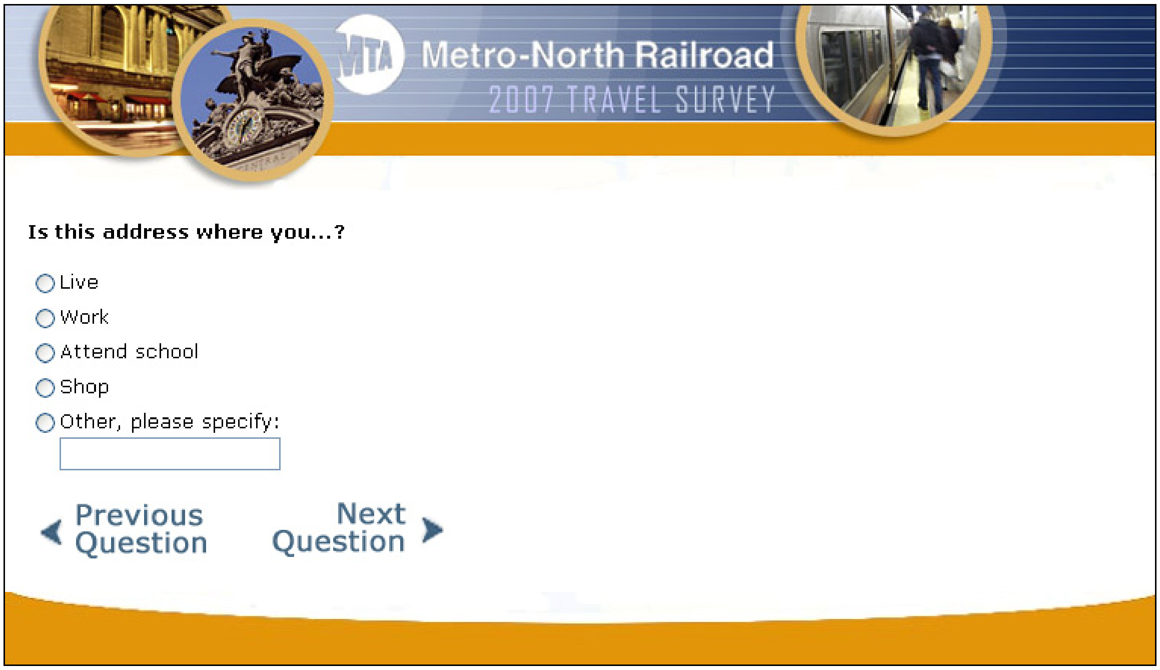
Metro-North Railroad
2007 TRAVEL SURVEY

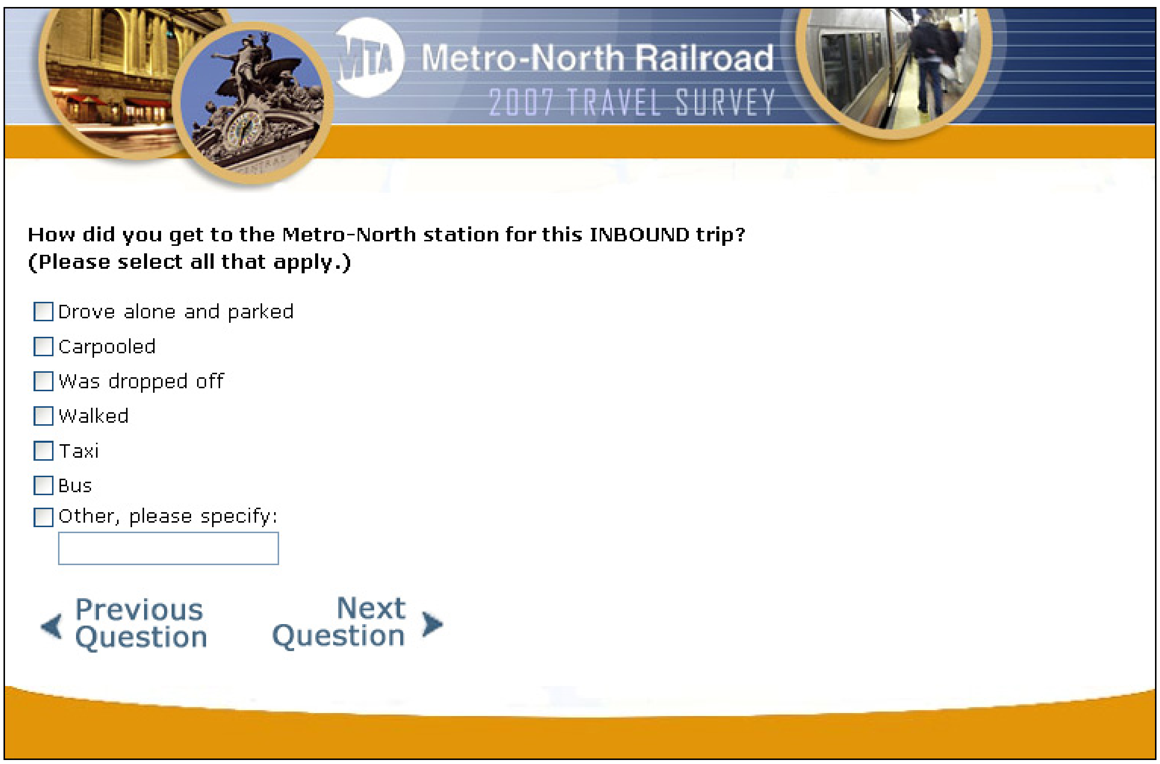
Where did you begin this trip?

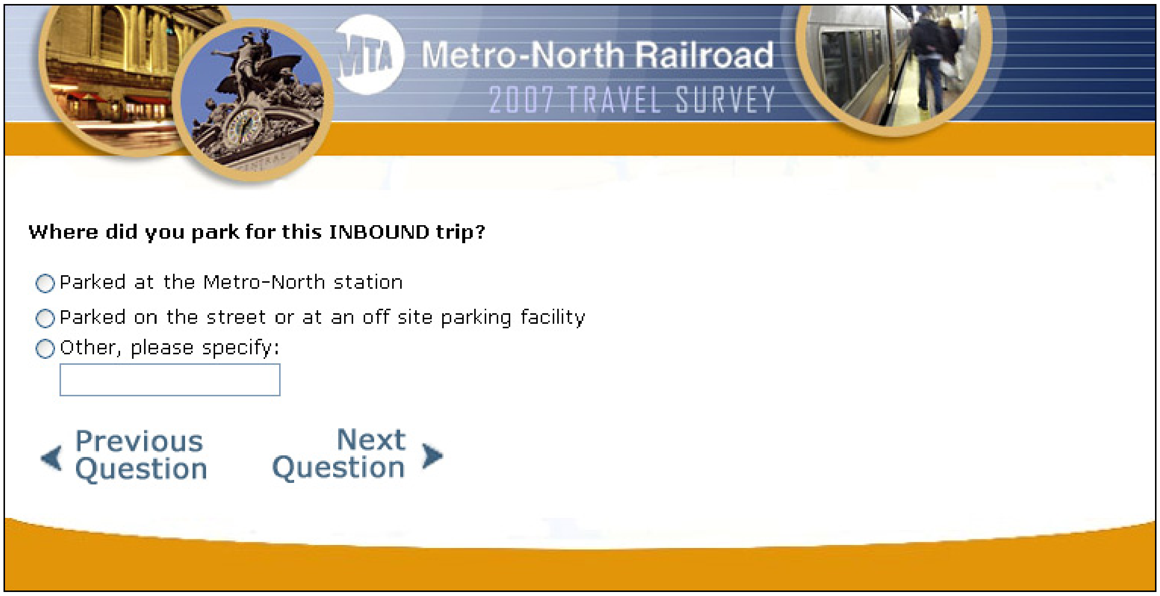
This should be an address or intersection, NOT your first train station.

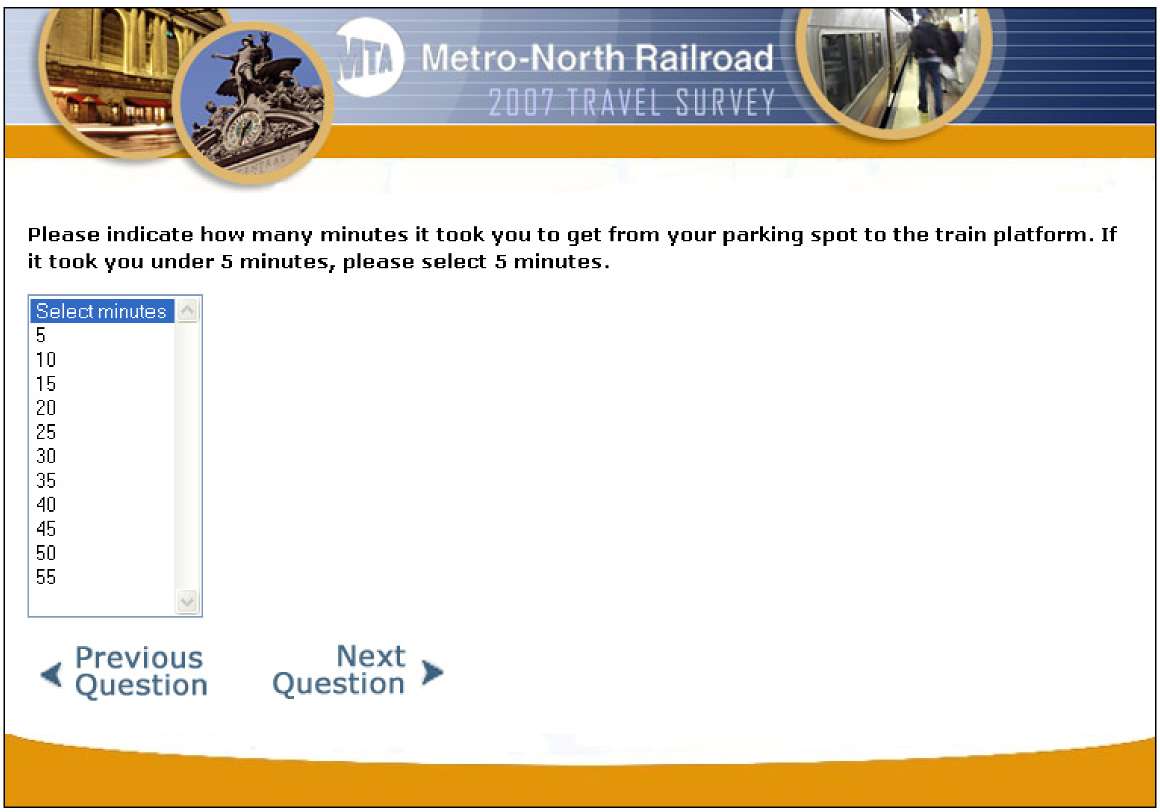
Address/Nearest Intersection:
City/Town: State:
Zip Code, if known:

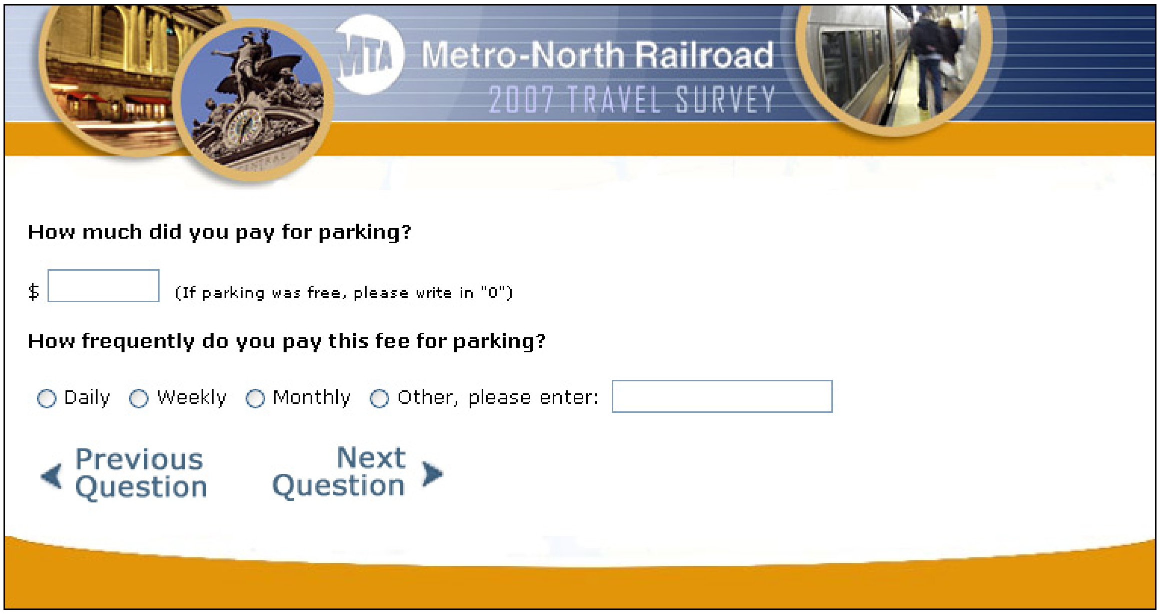
Previous Question   Next Question

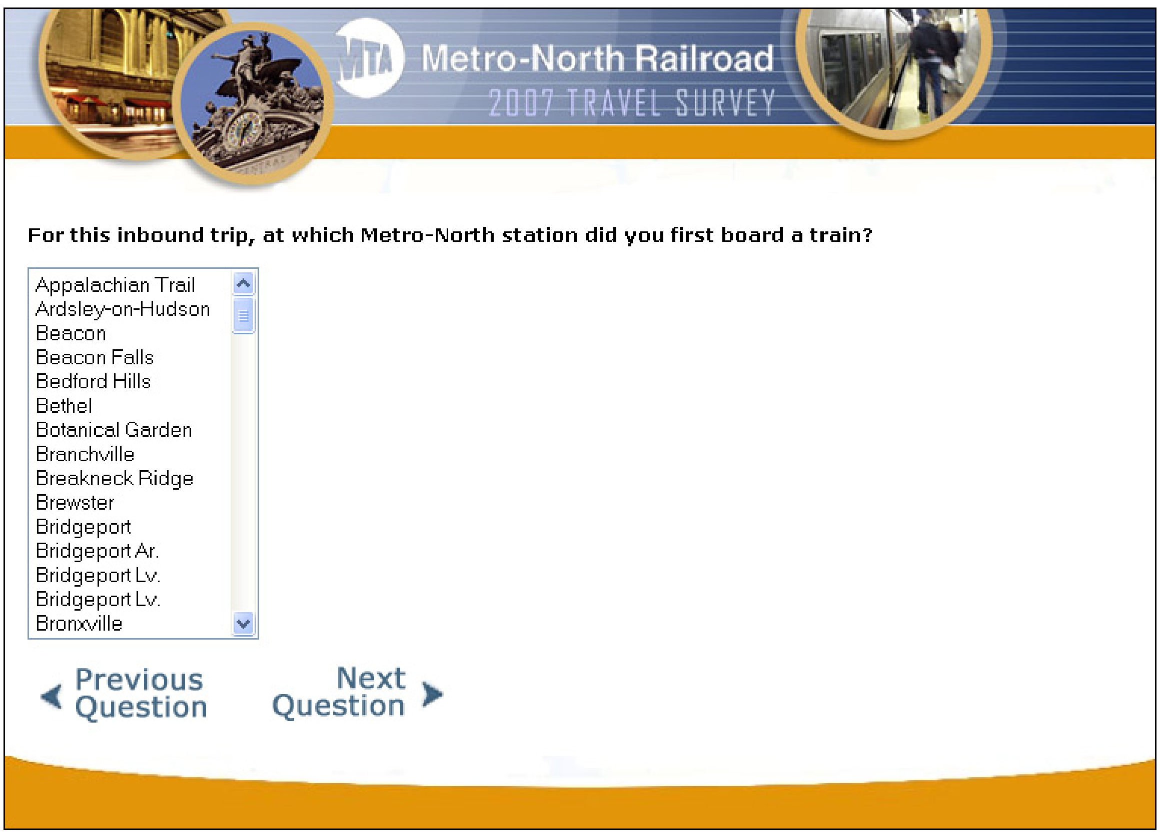

Metro-North Railroad
2007 TRAVEL SURVEY
Is this address where you...?
Live
Work
Attend school
Shop
Other, please specify:
Previous Question
Next Question

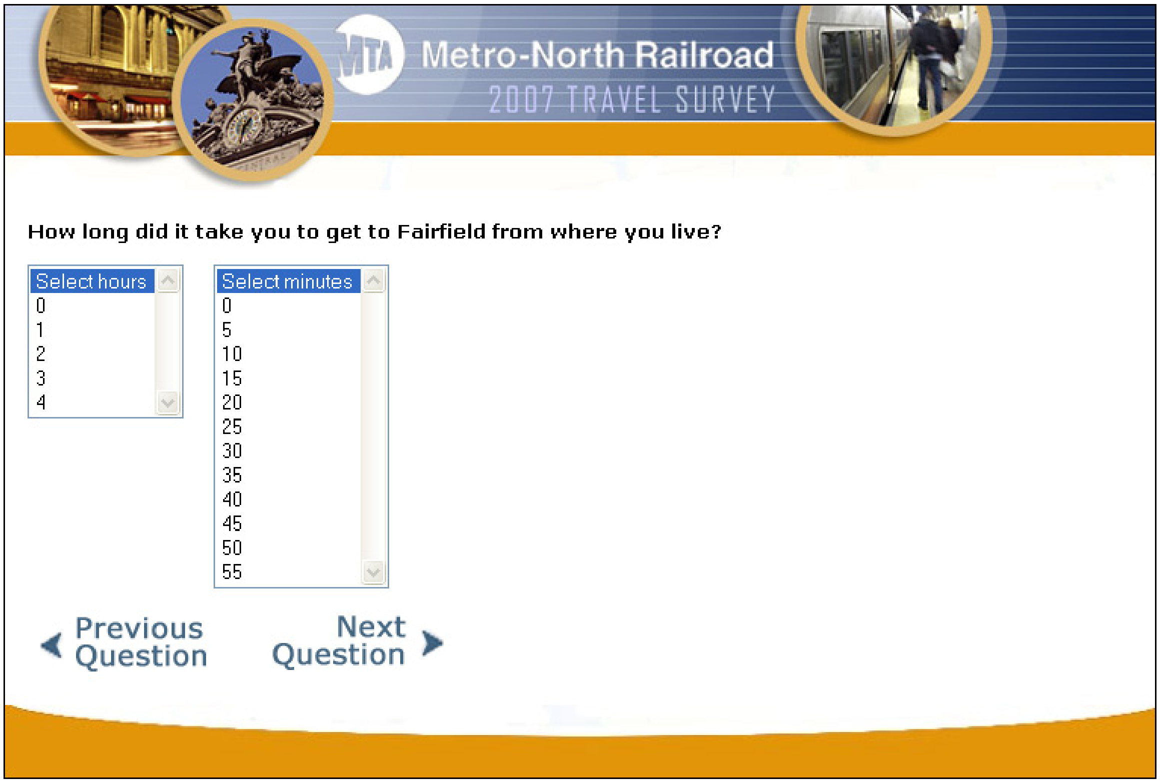

Metro-North Railroad
2007 TRAVEL SURVEY
How did you get to the Metro-North station for this INBOUND trip?
(Please select all that apply.)
Drove alone and parked
Carpooled
Was dropped off
Walked
Taxi
Bus
Other, please specify:
Previous Question
Next Question

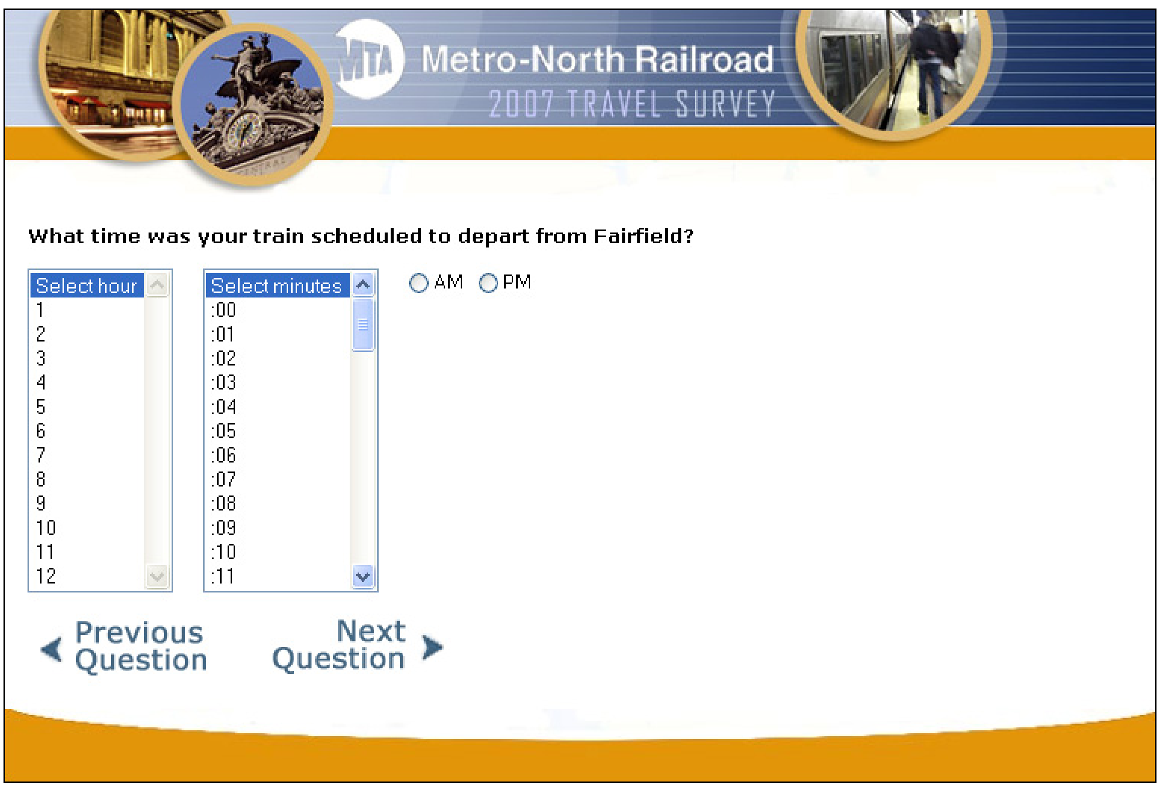

MTA
Metro-North Railroad
2007 TRAVEL SURVEY
Where did you park for this INBOUND trip?
Parked at the Metro-North station
Parked on the street or at an off site parking facility
Other, please specify:
Previous Question
Next Question

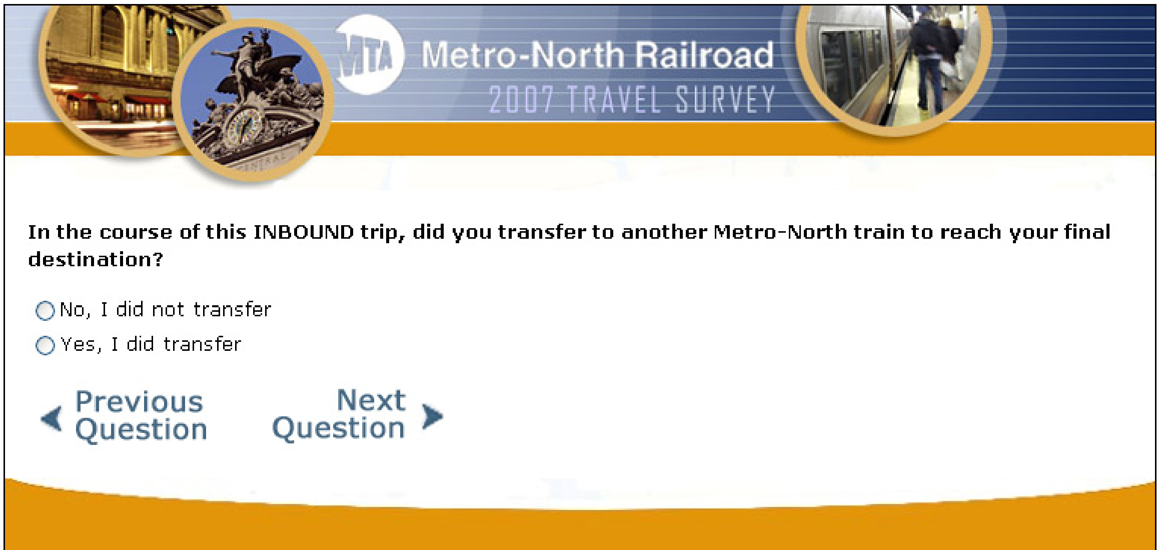

MTA
Metro-North Railroad
2007 TRAVEL SURVEY
Please indicate how many minutes it took you to get from your parking spot to the train platform. If it took you under 5 minutes, please select 5 minutes.
Select minutes
5
10
15
20
25
30
35
40
45
50
55
Previous Question
Next Question


MTA
Metro-North Railroad
2007 TRAVEL SURVEY
How much did you pay for parking?
$ (If parking was free, please write in "0")
How frequently do you pay this fee for parking?
Daily Weekly Monthly Other, please enter:
Previous Question
Next Question


MTA
Metro-North Railroad
2007 TRAVEL SURVEY
For this inbound trip, at which Metro-North station did you first board a train?
Appalachian Trail
Ardsley-on-Hudson
Beacon
Beacon Falls
Bedford Hills
Bethel
Botanical Garden
Branchville
Breakneck Ridge
Brewster
Bridgeport
Bridgeport Ar.
Bridgeport Lv.
Bridgeport Lv.
Bronxville
Previous Question
Next Question


Metro-North Railroad
2007 TRAVEL SURVEY
How long did it take you to get to Fairfield from where you live?
Select hours
0
1
2
3
4
Select minutes
0
5
10
15
20
25
30
35
40
45
50
55
Previous Question
Next Question


Metro-North Railroad
2007 TRAVEL SURVEY
What time was your train scheduled to depart from Fairfield?
Select hour
1
2
3
4
5
6
7
8
9
10
11
12
Select minutes
:00
:01
:02
:03
:04
:05
:06
:07
:08
:09
:10
:11
AM
PM
Previous Question
Next Question



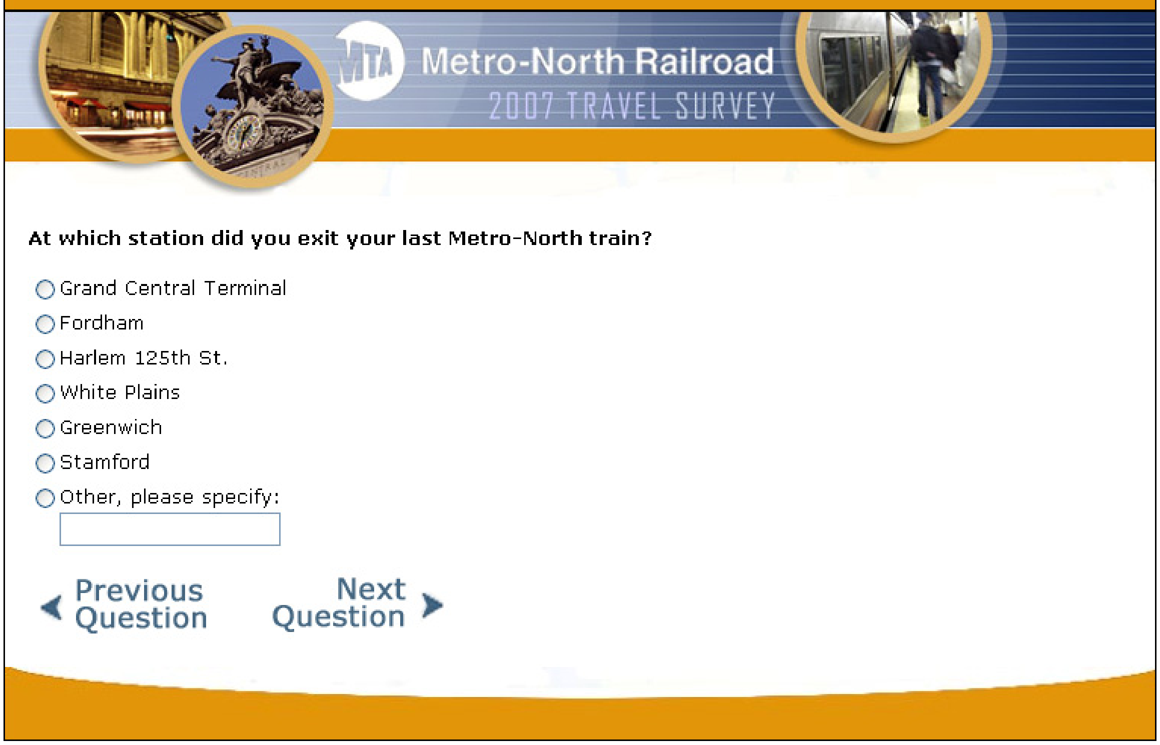
Metro-North Railroad

2007 TRAVEL SURVEY

In the course of this INBOUND trip, did you transfer to another Metro-North train to reach your final destination?

- ◯ No, I did not transfer
- ◯ Yes, I did transfer

< Previous Question   Next Question >



Metro-North Railroad

2007 TRAVEL SURVEY

At which station did you exit your last Metro-North train?

- ◯ Grand Central Terminal
- ◯ Fordham
- ◯ Harlem 125th St.
- ◯ White Plains
- ◯ Greenwich
- ◯ Stamford
- ◯ Other, please specify:

< Previous Question   Next Question >

Metro-North Railroad
2007 TRAVEL SURVEY

After exiting Grand Central Terminal, how did you get to your FINAL destination? (Please select all that apply.)

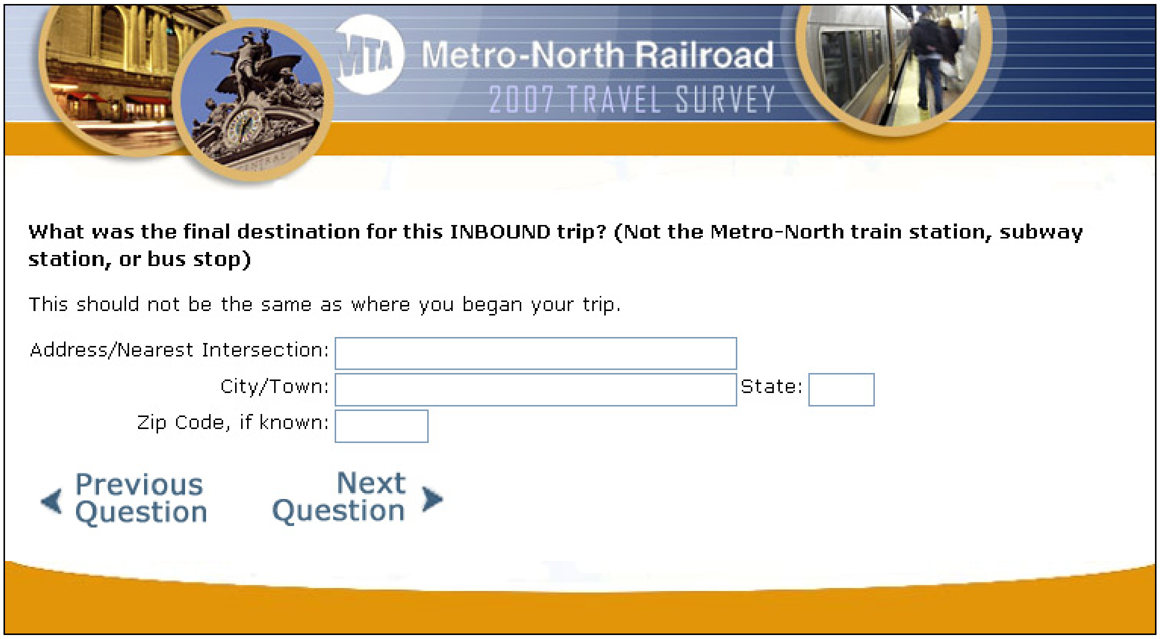
- [x] Walked
- [ ] Taxi
- [ ] Bus
- [x] Subway
  - Please specify the first subway line you took after exiting your last Metro-North train
    - ○ 1 2 3
    - ○ 4 5 6
    - ○ 7
    - ○ S
    - ○ B D F V
- [ ] Parked and drove alone
- [ ] Parked and carpooled
- [ ] Was picked up
- [ ] Other, please specify:

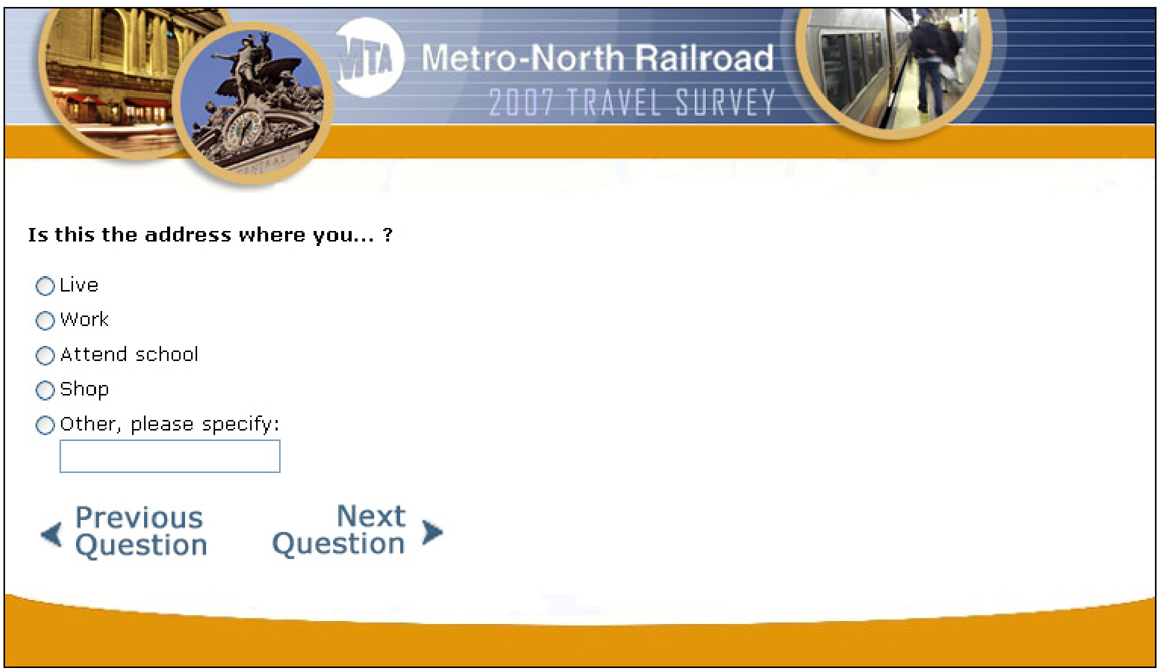
Previous Question | Next Question

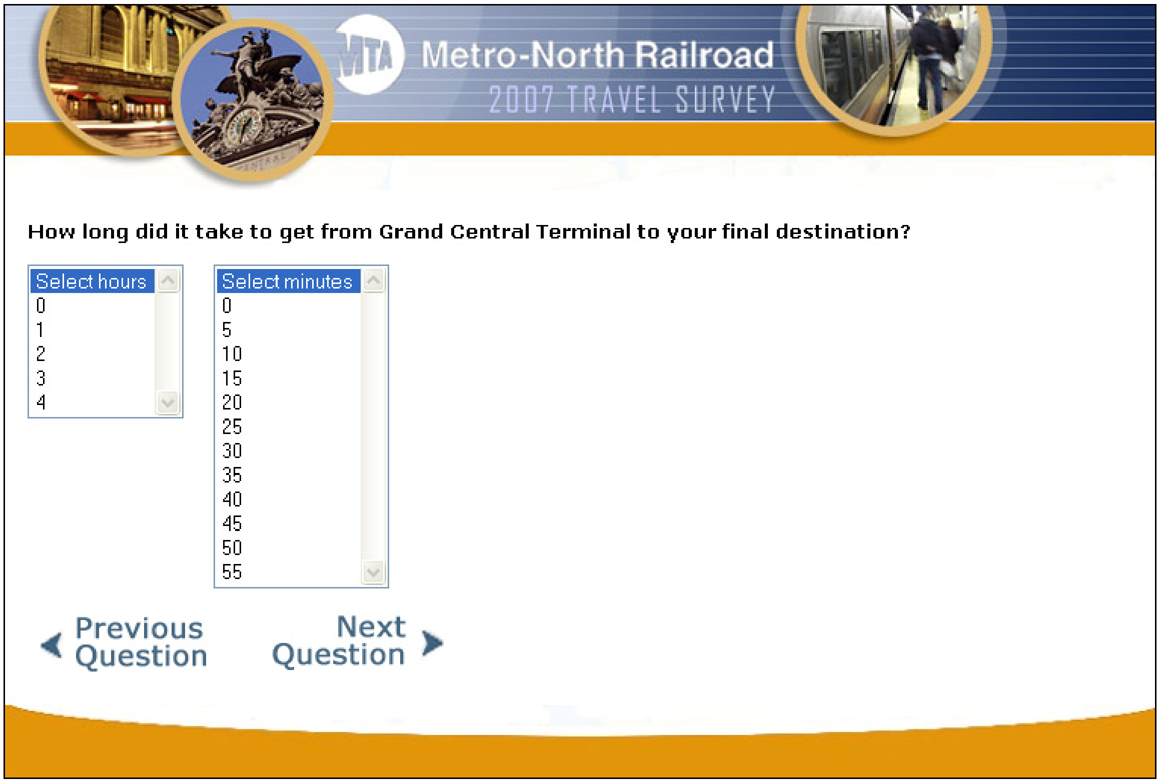
Metro-North Railroad
2007 TRAVEL SURVEY

After exiting your last Metro-North train, how many subways and/or buses did you take to reach your final destination?

Previous Question | Next Question


MTA
Metro-North Railroad
2007 TRAVEL SURVEY
What was the final destination for this INBOUND trip? (Not the Metro-North train station, subway station, or bus stop)
This should not be the same as where you began your trip.
Address/Nearest Intersection:
City/Town:
State:
Zip Code, if known:
Previous Question
Next Question


MTA
Metro-North Railroad
2007 TRAVEL SURVEY
Is this the address where you... ?
Live
Work
Attend school
Shop
Other, please specify:
Previous Question
Next Question


Metro-North Railroad
2007 TRAVEL SURVEY

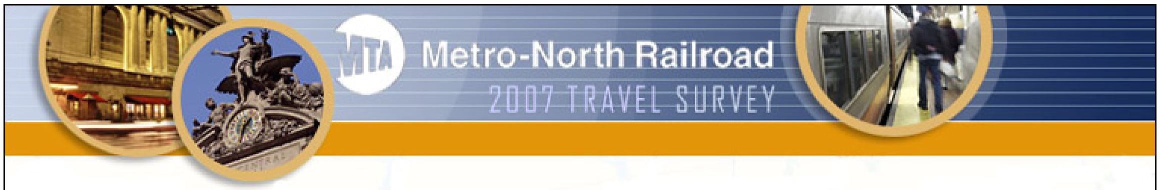
How long did it take to get from Grand Central Terminal to your final destination?

Select hours
0
1
2
3
4

Select minutes
0
5
10
15
20
25
30
35
40
45
50
55

Previous Question

Next Question



What type of train ticket did you use for this trip?

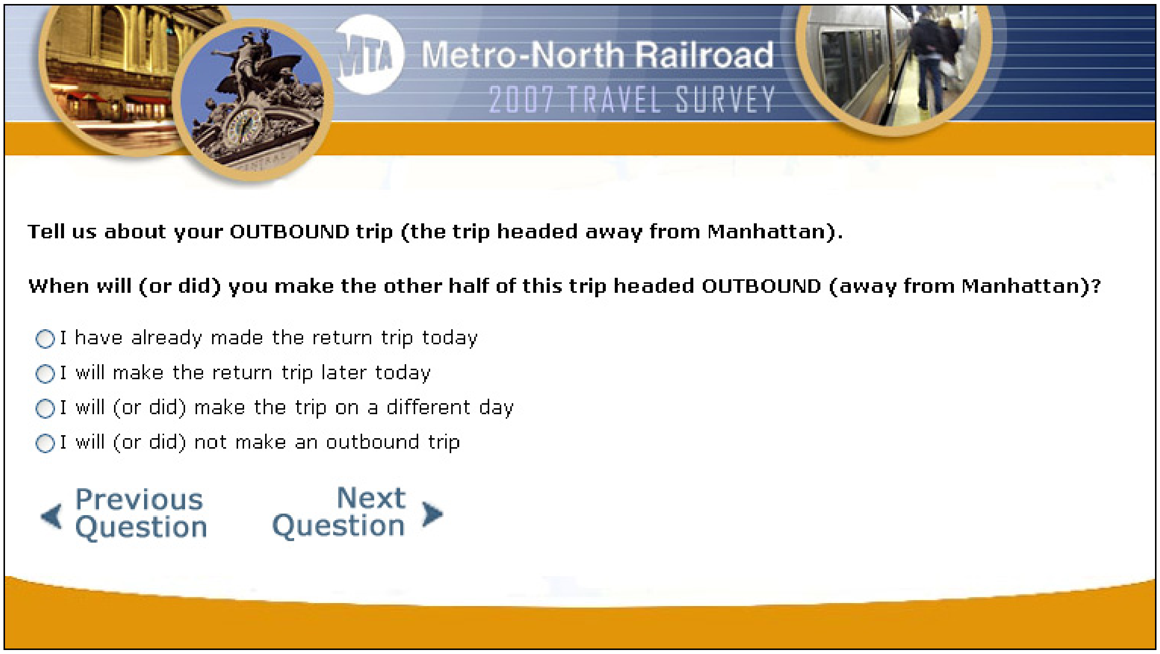
- (•) Monthly

  Please select one:

  - ( ) With UniTicket
  - ( ) Without UniTicket

- ( ) Weekly
- ( ) Ten-Trip Peak/Intermediate
- ( ) Ten-Trip Off-Peak/Intermediate
- ( ) Ten-Trip Senior/Disabled
- ( ) One Way Peak/Intermediate
- ( ) One Way Off-Peak/Intermediate
- ( ) One Way Senior/Disabled
- ( ) Round Trip Peak/Intermediate
- ( ) Round Trip Off-Peak/Intermediate
- ( ) Round Trip Senior/Disabled
- ( ) Other, please specify: ________

Previous Question   Next Question



Metro-North Railroad

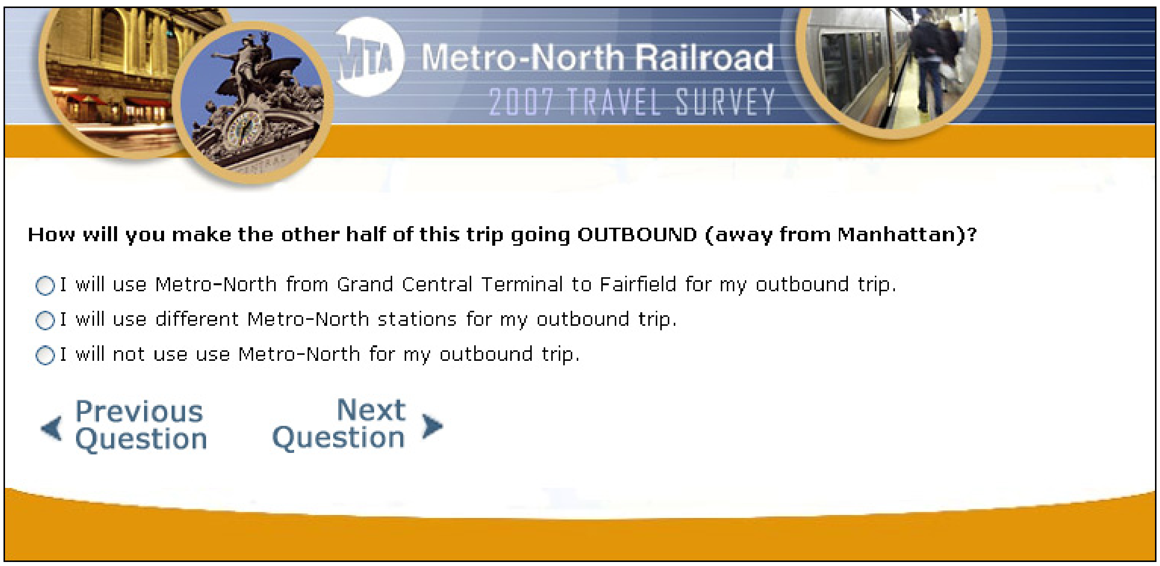
2007 TRAVEL SURVEY

Tell us about your OUTBOUND trip (the trip headed away from Manhattan).

When will (or did) you make the other half of this trip headed OUTBOUND (away from Manhattan)?

- ◯ I have already made the return trip today
- ◯ I will make the return trip later today
- ◯ I will (or did) make the trip on a different day
- ◯ I will (or did) not make an outbound trip

‹ Previous Question   Next Question ›



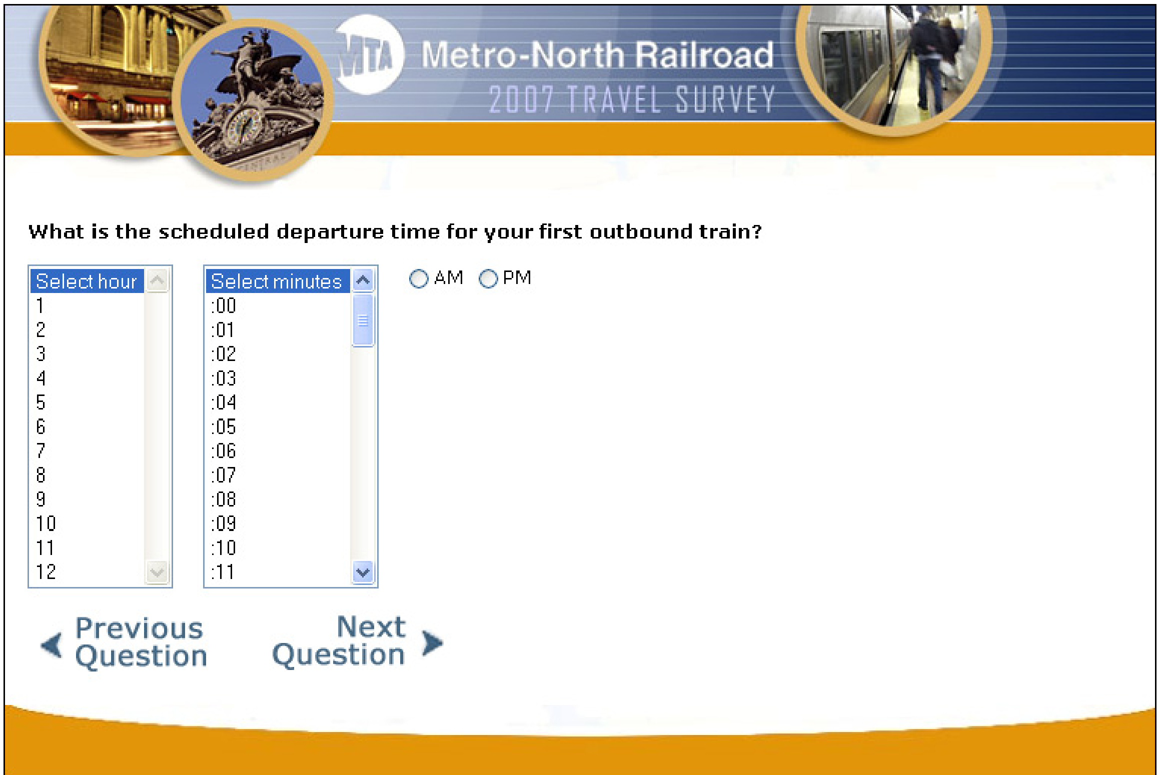
Metro-North Railroad

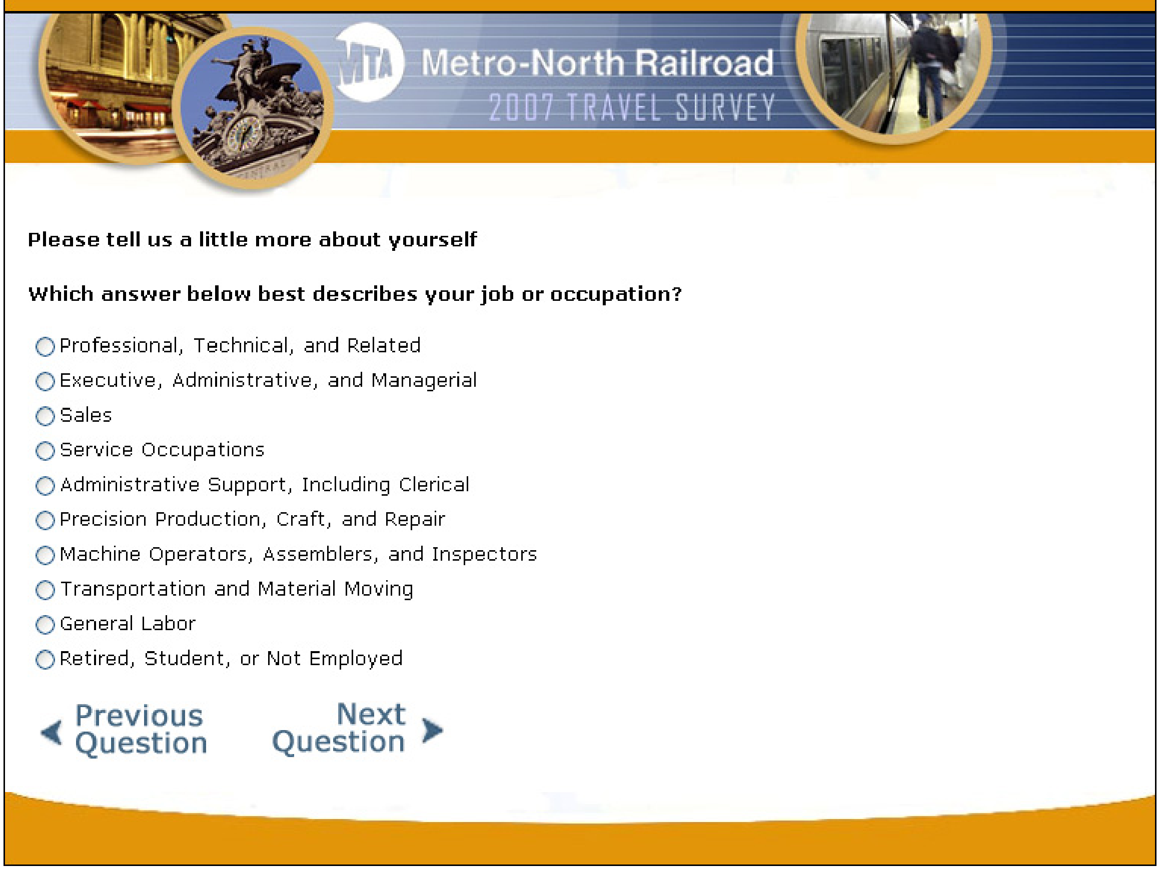
2007 TRAVEL SURVEY

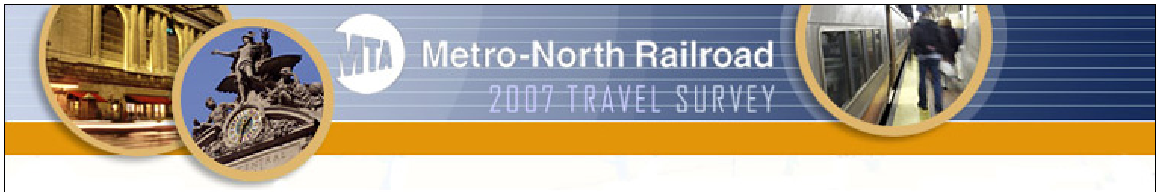
How will you make the other half of this trip going OUTBOUND (away from Manhattan)?

- ◯ I will use Metro-North from Grand Central Terminal to Fairfield for my outbound trip.
- ◯ I will use different Metro-North stations for my outbound trip.
- ◯ I will not use use Metro-North for my outbound trip.

‹ Previous Question   Next Question ›


Metro-North Railroad
2007 TRAVEL SURVEY
What is the scheduled departure time for your first outbound train?
Select hour
1
2
3
4
5
6
7
8
9
10
11
12
Select minutes
:00
:01
:02
:03
:04
:05
:06
:07
:08
:09
:10
:11
AM
PM
Previous Question
Next Question

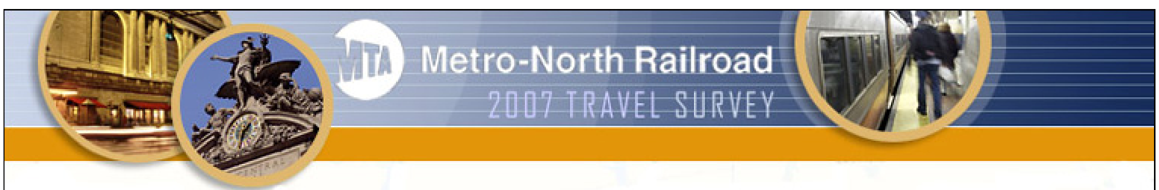

Metro-North Railroad
2007 TRAVEL SURVEY
Please tell us a little more about yourself
Which answer below best describes your job or occupation?
Professional, Technical, and Related
Executive, Administrative, and Managerial
Sales
Service Occupations
Administrative Support, Including Clerical
Precision Production, Craft, and Repair
Machine Operators, Assemblers, and Inspectors
Transportation and Material Moving
General Labor
Retired, Student, or Not Employed
Previous Question
Next Question



In which of the following industries are you employed?

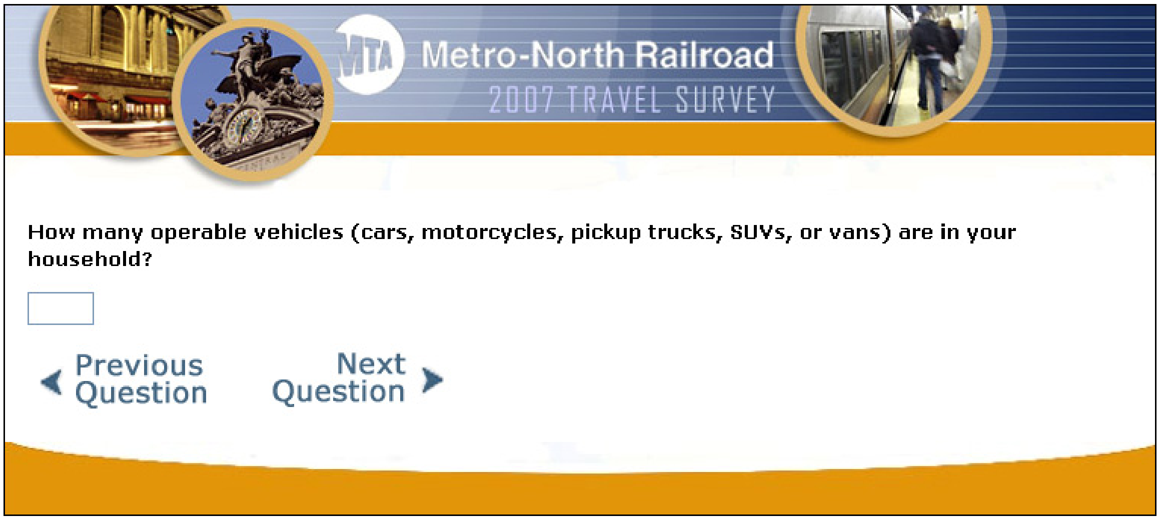
- ◯ Construction/Natural Resources/Mining
- ◯ Education
- ◯ Health Services/Health Care
- ◯ Financial Activities
- ◯ Government
- ◯ Information
- ◯ Leisure and Hospitality
- ◯ Manufacturing
- ◯ Professional and Business Services
- ◯ Transportation and Utilities
- ◯ Wholesale Trade
- ◯ Retail Trade
- ◯ Other Services, please specify:

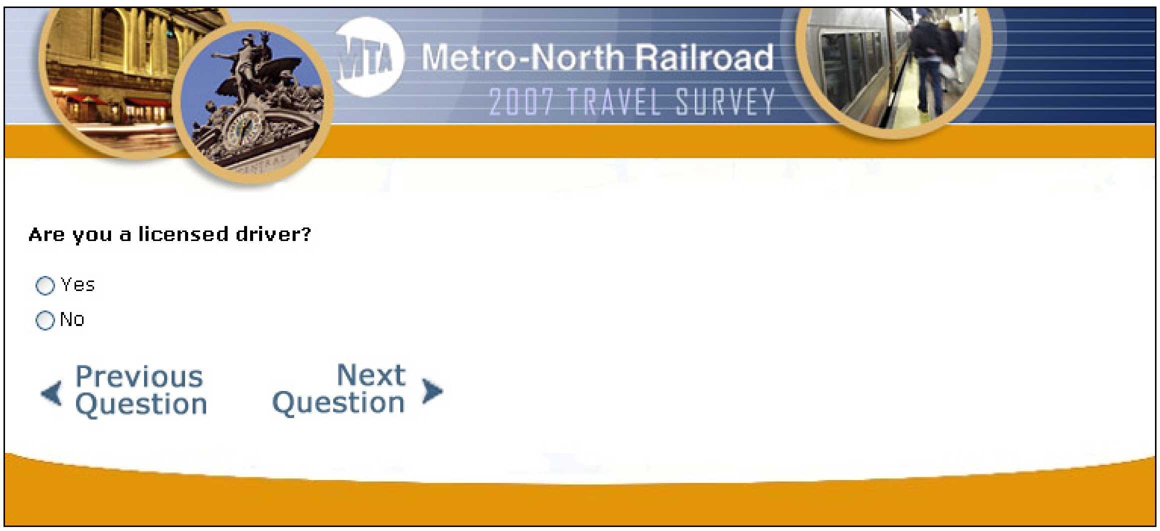
◀ Previous Question   Next Question ▶

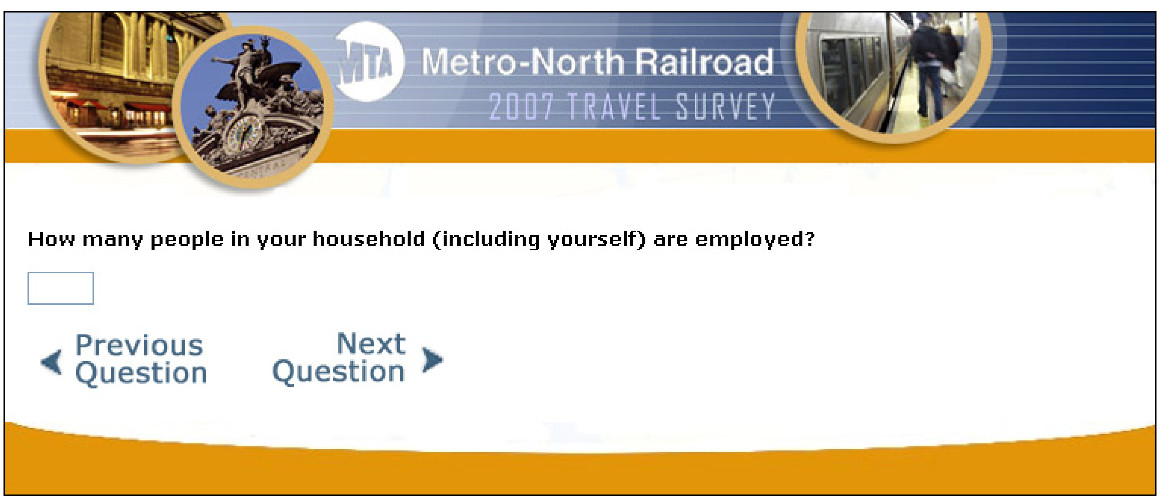


How many licensed drivers (including yourself) are in your household?

◀ Previous Question   Next Question ▶


MTA
Metro-North Railroad
2007 TRAVEL SURVEY
How many operable vehicles (cars, motorcycles, pickup trucks, SUVs, or vans) are in your household?
Previous Question
Next Question


MTA
Metro-North Railroad
2007 TRAVEL SURVEY
Are you a licensed driver?
Yes
No
Previous Question
Next Question

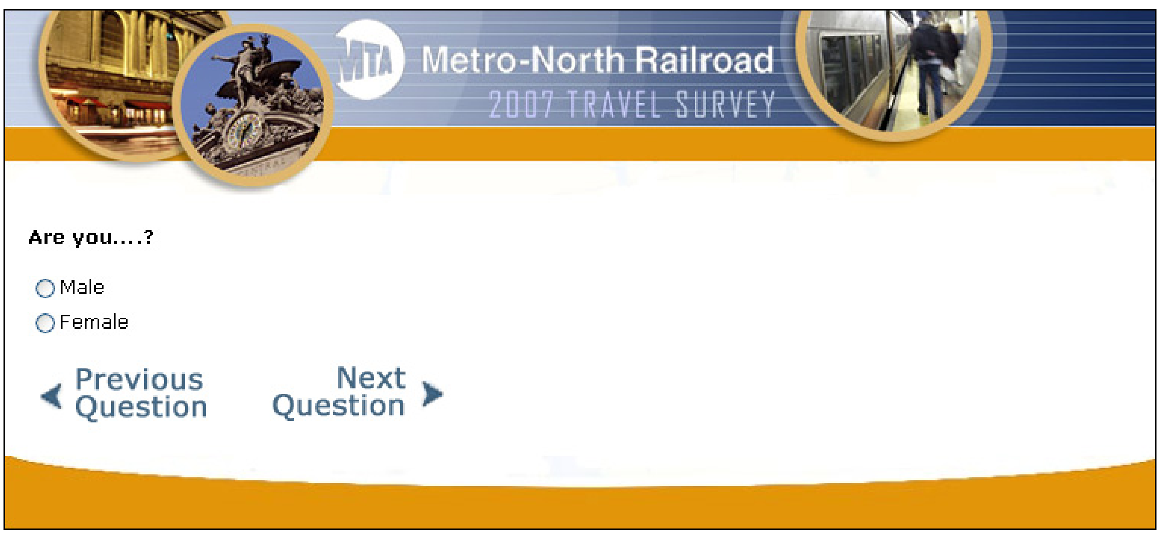

MTA
Metro-North Railroad
2007 TRAVEL SURVEY
How many people in your household (including yourself) are employed?
Previous Question
Next Question


Metro-North Railroad
2007 TRAVEL SURVEY

What is your household income?

- ◯ Less than $15,000
- ◯ $15,000-$24,999
- ◯ $25,000-$34,999
- ◯ $35,000-$49,999
- ◯ $50,000-$74,999
- ◯ $75,000-$99,999
- ◯ $100,000-$149,999
- ◯ $150,000-$199,999
- ◯ $200,000 and over

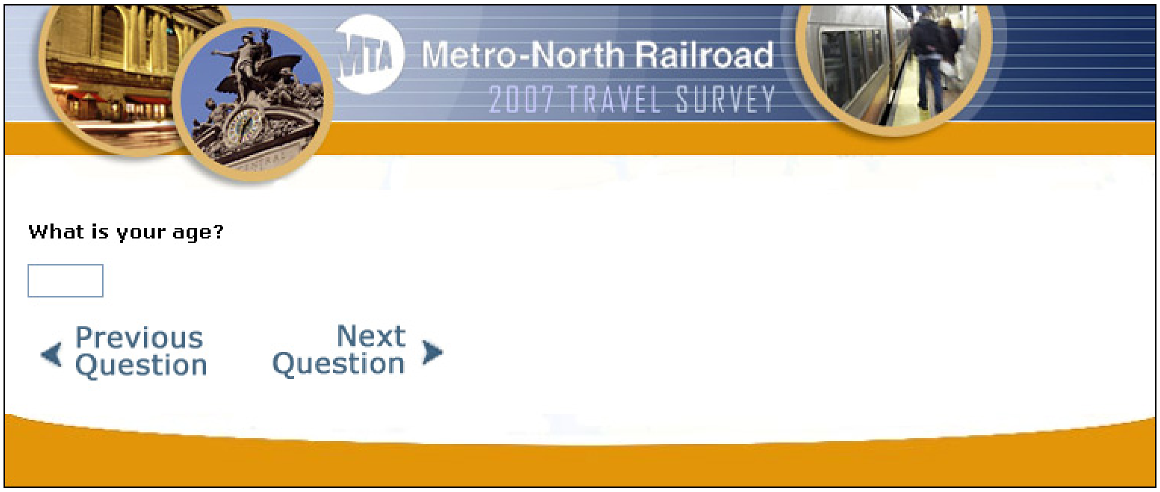
Previous Question   Next Question

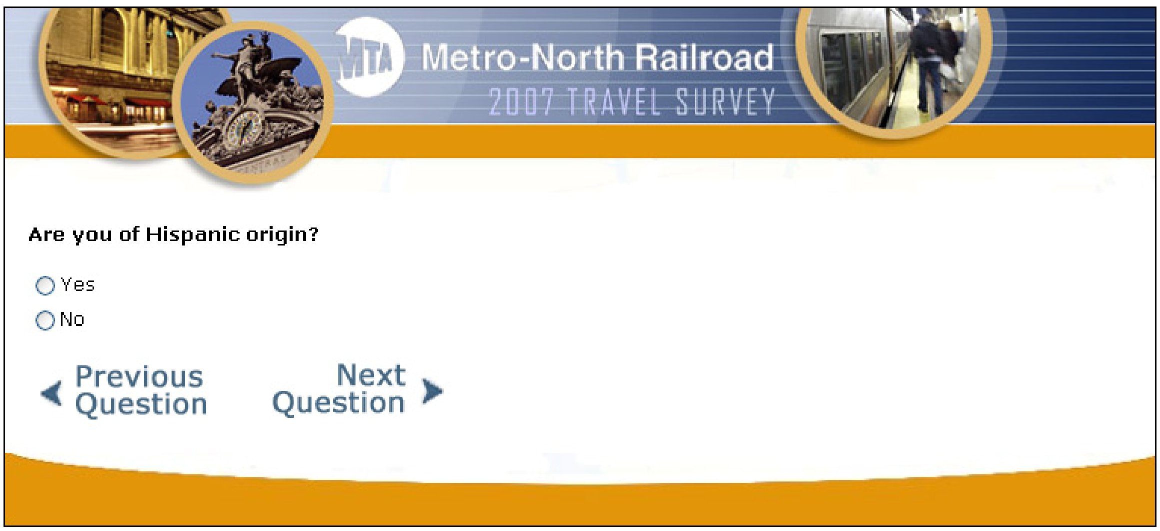

Metro-North Railroad
2007 TRAVEL SURVEY

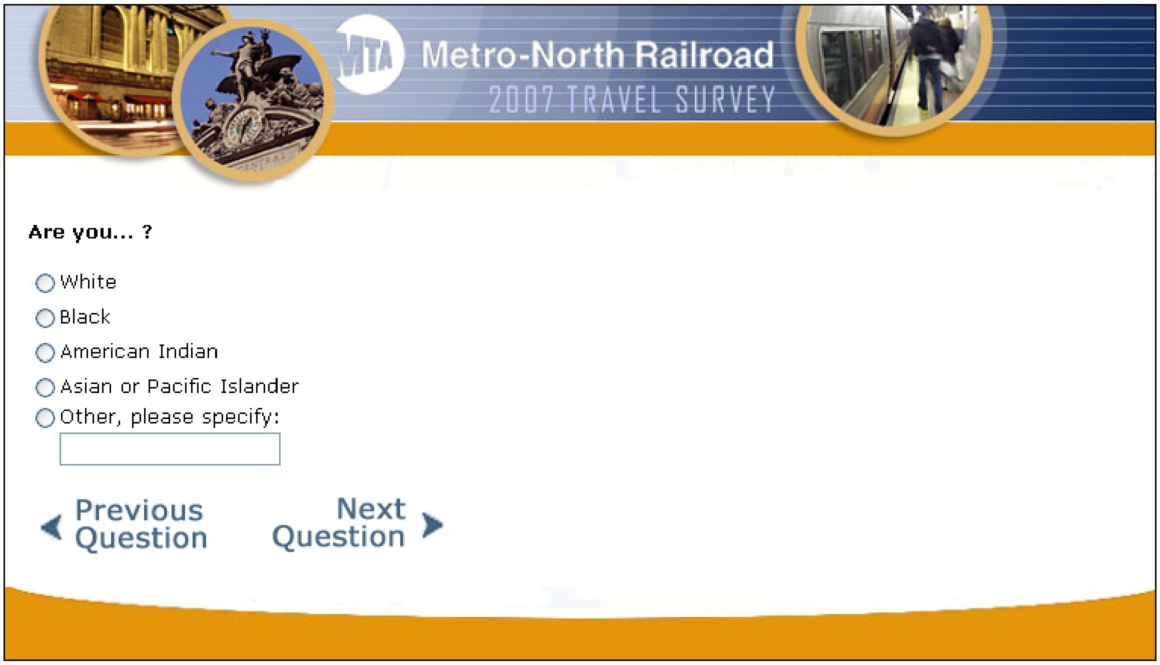
Are you....?

- ◯ Male
- ◯ Female

Previous Question   Next Question


MTA
Metro-North Railroad
2007 TRAVEL SURVEY
What is your age?
Previous Question
Next Question


MTA
Metro-North Railroad
2007 TRAVEL SURVEY
Are you of Hispanic origin?
Yes
No
Previous Question
Next Question

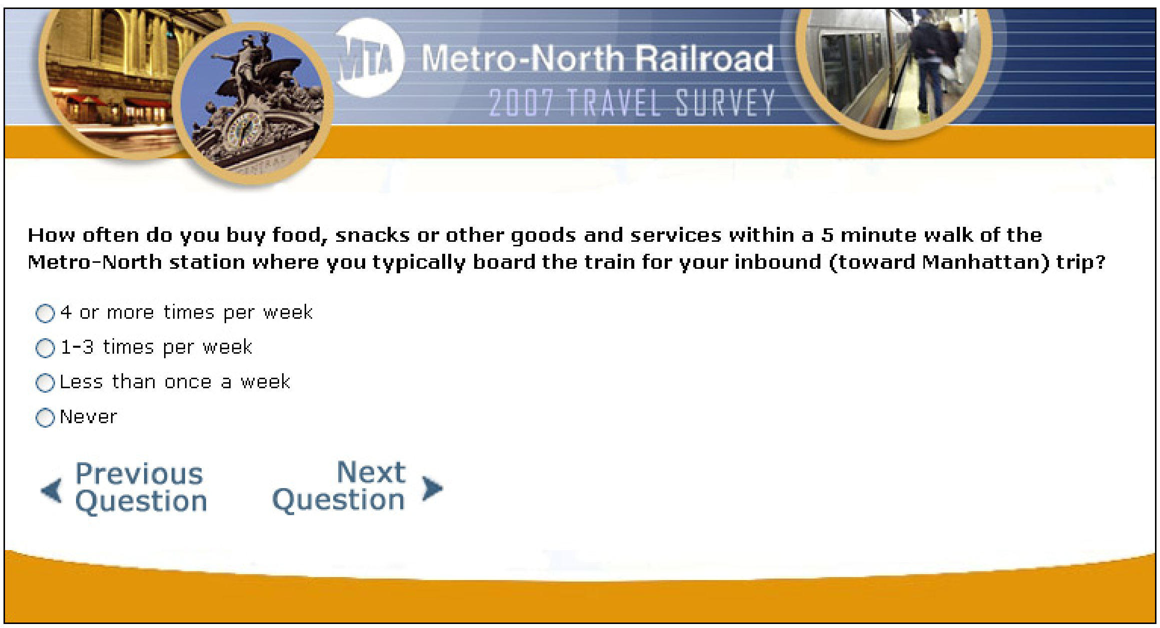


Are you... ?

- White
- Black
- American Indian
- Asian or Pacific Islander
- Other, please specify:

Previous Question

Next Question

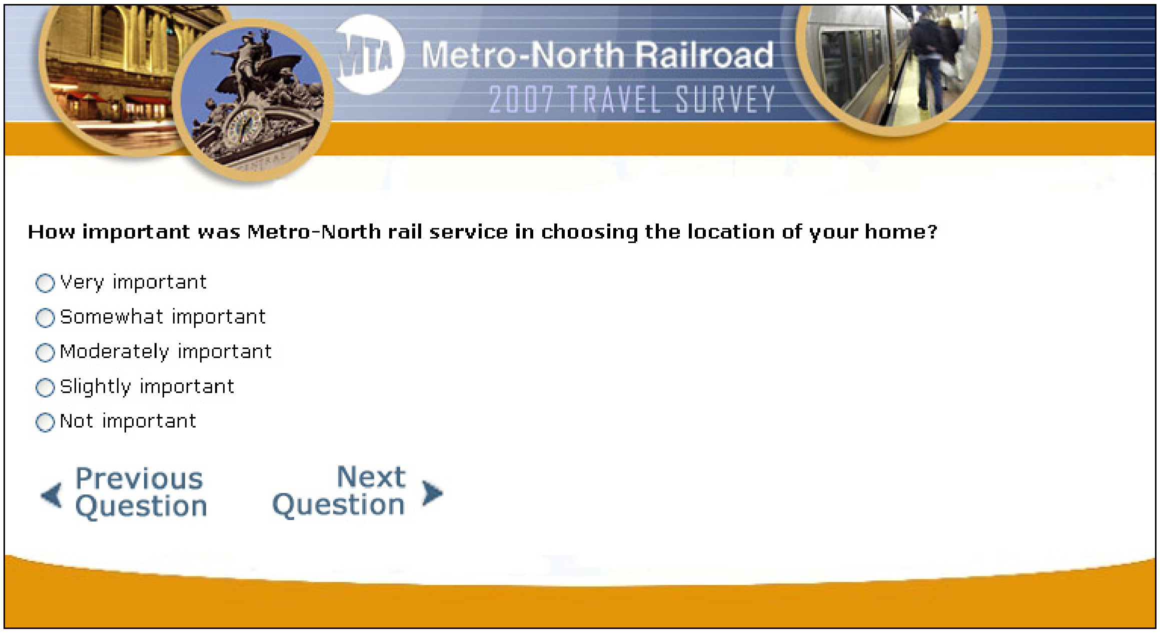


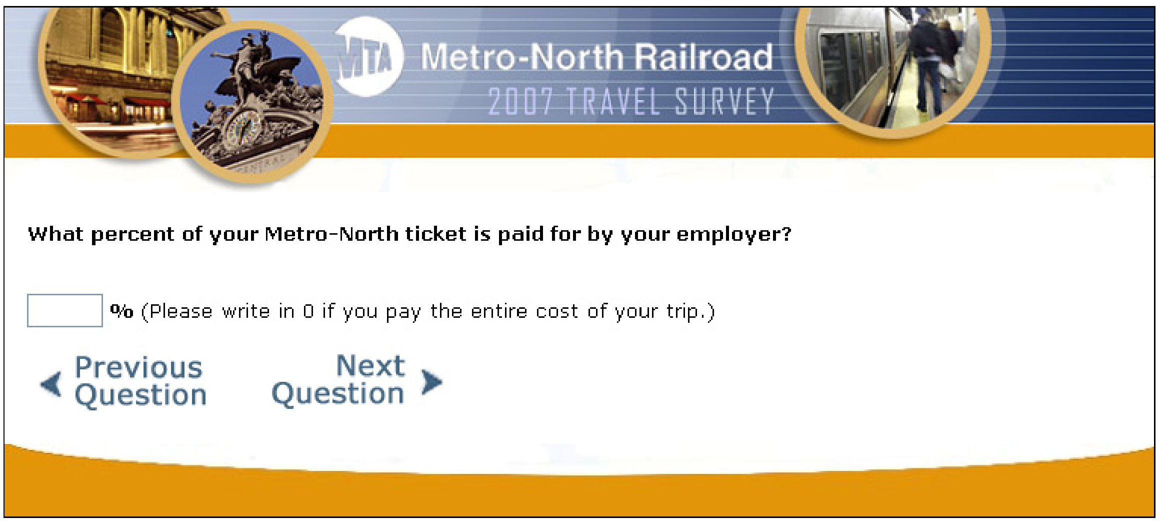
How often do you buy food, snacks or other goods and services within a 5 minute walk of the Metro-North station where you typically board the train for your inbound (toward Manhattan) trip?

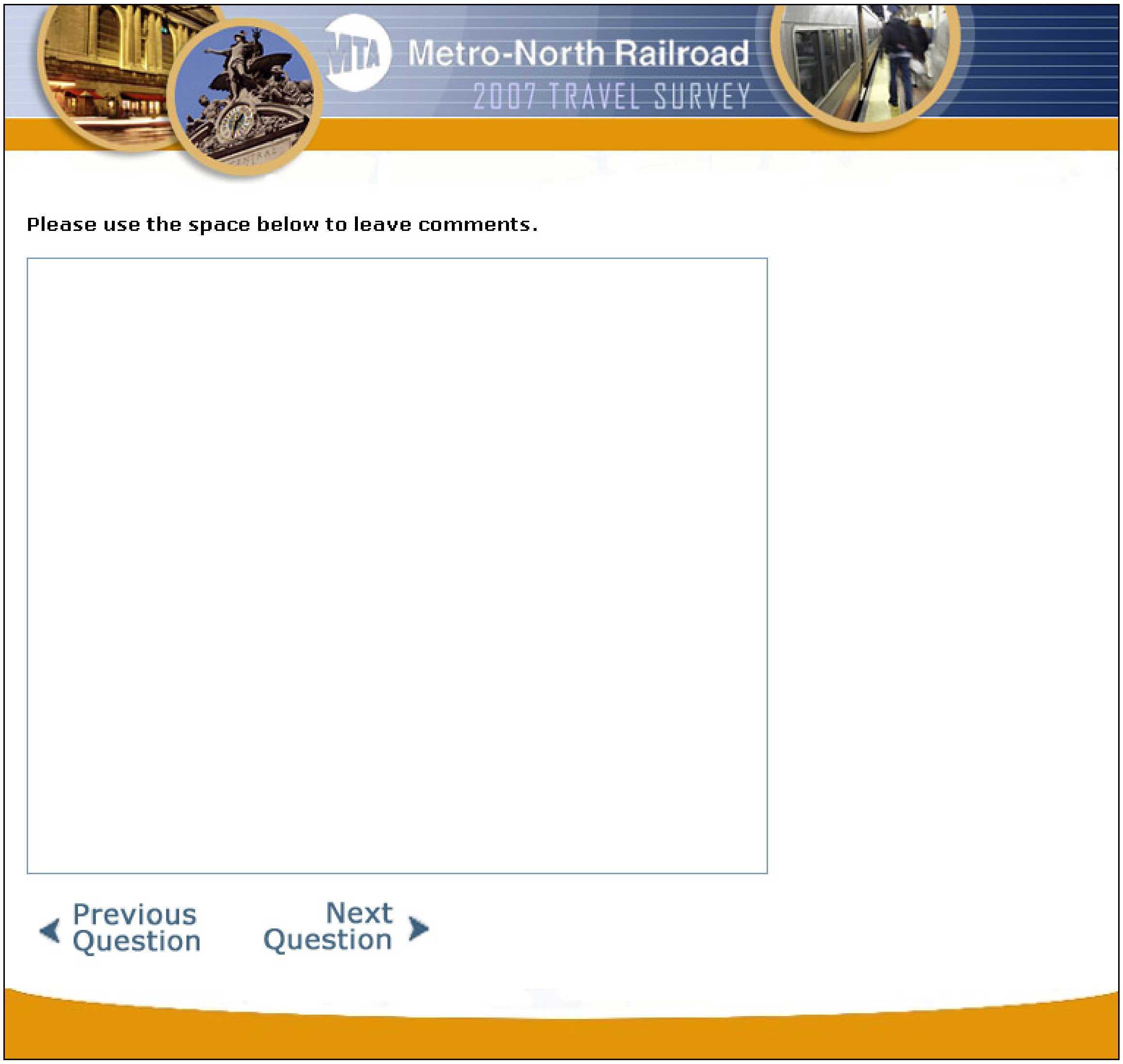
- 4 or more times per week
- 1-3 times per week
- Less than once a week
- Never

Previous Question

Next Question


Metro-North Railroad
2007 TRAVEL SURVEY
How important was Metro-North rail service in choosing the location of your home?
Very important
Somewhat important
Moderately important
Slightly important
Not important
Previous Question
Next Question


Metro-North Railroad
2007 TRAVEL SURVEY
What percent of your Metro-North ticket is paid for by your employer?
% (Please write in 0 if you pay the entire cost of your trip.)
Previous Question
Next Question


MTA
Metro-North Railroad
2007 TRAVEL SURVEY
Please use the space below to leave comments.
Previous Question
Next Question

Metro-North Railroad
2007 TRAVEL SURVEY

Please fill in your contact information below in order for us to contact you in case you win a cash prize.

Name:

Street:

City/Town:

State: ZIP Code:

Phone:

Email:

Previous Question | Next Question

Metro-North Railroad
2007 TRAVEL SURVEY

May we contact you to participate in future MTA travel surveys?

- Yes
- No

Previous Question | Next Question

Metro-North Railroad
2007 TRAVEL SURVEY

Thank you for your help in completing this survey!

APPENDIX C

TRAINING MANUAL

MTA/MNR Origin-Destination Study

Training Documentation

Metro-North Railroad

CONTENTS

- Overview of Project
- Organization of Crew
- Forms and Digital Pens
- Counting Procedure
- Survey distribution & collection procedure
- Materials Checklist
- What If's – Thinking on your feet

OVERVIEW OF PROJECT

- **What is this project all about?**
  - Metro-North Commuter Rail is updating their network model and needs a comprehensive Origin-Destination Study performed. The project is being led by RSG, with support from Taurus, EWT and SRBI.
- **Why is the project being done?**
  - With a better understanding of how many people are using the system, along with information about these people and their trips, Metro-North is better able to maximize resources and make the system more efficient.

OVERVIEW OF PROJECT

- **How is the project being performed?**
  - Every car on every train during a weekday, Saturday and Sunday in the Metro-North system east of Hudson will be counted. Surveys will be handed out to all **INBOUND** (toward Grand Central) passengers. Surveys can be returned:
    - On board
    - Mailed back
    - Completed online
- **When will this project occur?**
  - The full survey begins approximately March 1 and continues through mid-June on most weekdays and every weekend day

ORGANIZATION OF CREW

- Crews may be configured in the following **WAYS**:
  - **BUSY INBOUND TRIPS** - **2 counters** for each car and **1 survey distributor** for each car on a train.
  - OFF HOURS INBOUND TRIPS – **2 counters** for each car who will **ALSO** hand out surveys in that car.
  - ALL OUTBOUND TRIPS – **2 counters** for each car
- Additionally, one member of each crew will be assigned as a CREW CHIEF.

ORGANIZATION OF CREW

- The CREW CHIEF will also counter and/or surveyor. The crew chief will:
  - Lead the survey team for a particular train
  - Contact the train conductor(s)/engineer to let them know who is on board and what we will be doing
  - Ask conductor to make survey announcements as indicated in the Train Service Notice
  - Assign staff to count/survey cars on the train
  - Deal with any issues that arise during the survey
  - Be in touch with the BASE CHIEF. The crew chief must have the base chief's phone number.
- The BASE CHIEF will be located at GCT and will be responsible for:
  - Staying in touch with the crew chiefs and dealing with any issues that the crew chief cannot answer
  - Supply materials, schedules, etc. for all teams leaving GCT
  - Provide a meeting point at GCT for all teams

FORMS AND DIGITAL PENS

- **FORMS**
  - Every counter and survey distributor will have a form. The top of the form will look like the graphic below.

Surveyor Name		Train #	Departing Station		Car #	Weather		
First Survey in Stack					Note: Outbound count Ons, Inbound count Offs			
Harlem Line	Outbound Ons		Inbound to GCT Offs		People on Board		Top Survey on Stack	Comments
Wassaic								
Tenmile River								
Dover Plains								

- Make sure you fill out the fields of "*Surveyor Name*", "*Train #* ", "*Departing Station*", "*Car #* ", "*Weather*" and "*Notes*".
  - The TRAIN # can ONLY be found on the schedule at the top of the column of departure times for the train you are surveying. All members of a crew should have the same Train #.
  - The CAR # can be found on the inside of the car as well as the outside.

FORMS AND DIGITAL PENS

- **FORMS CONT.**
  - All Survey distributors (INBOUND ONLY) need to fill out the *First Survey in Stack* with the correct survey number.
  - Every form will have **ALL STOPS** listed from the beginning station for that line. Keep in mind that many trains will not stop at all stations. (For example, this train may leave from Wassaic but may not stop at Tenmile River). More info on how to fill out the survey/count forms will be in the next section.

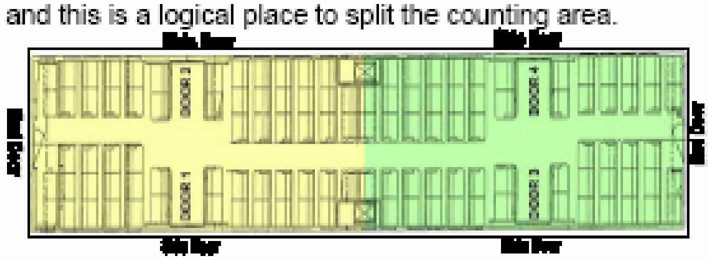
Surveyor Name		Train #	Departing Station		Car #	Weather		
First Survey in Stack					Note: Outbound count Ons, Inbound count Offs			
Harlem Line	Outbound Ons		Inbound to GCT Offs		People on Board		Top Survey on Stack	Comments
Wassaic								
Tenmile River								
Dover Plains								

FORMS AND DIGITAL PENS

- DIGITAL PENS
  - Hold the pen upright with the Logitech icon facing up (away from the paper).
  - Write clearly and legibly within the box.
  - If you make a mistake cross out the incorrect information and write the correct information next to it.
  - If the memory (sheet of paper icon) on your pen is yellow (over 50% full) or red (almost full), immediately tell your crew chief and get a new pen from him/her if you have enough time between stops. If you don't have time, just keep making your counts with the pen anyway and we'll input the data using the hard copy.
  - If the battery (battery icon) of your pen is yellow (less than 50% charged) or red (very low) tell your crew chief immediately and get a new pen from him/her if you have enough time between stops. If you don't have time, just keep making your counts with the pen anyway and we'll input the data using the hard copy.

COUNTING PROCEDURE

- Each counter is assigned a section of car, represented by the different colors.
- Generally, the seats reverse direction in the middle of the car and this is a logical place to split the counting area.



- Although many cars look like this one, note that not all cars look like this. Some have three doors or two doors at either end. The crew chief will assign the crew to each car on the train and confirm the counting/surveying procedure.

COUNTING PROCEDURE - INBOUND

- At the origin station **AFTER** the doors close and people have found their seats, use a clicker to count all people on board your section of the car. Mark this number in the "**People On Board**" column.
- At **EVERY stop**, stand next to your assigned doors and count people **EXITING** through those doors and then mark number that in the "**Offs**" column next to the station that you are at.
- Once the doors close again and people have settled then count the people on board and fill in the "**People On Board**" column for the station you just left.
- Repeat this procedure at every station up to GCT.

Harlem Line	Outbound Ons	Inbound to GCT Offs	People on Board	Trip Survey on Stock	Comments
Wassaic			3		
Tenmile River		1	7		
Dover Plains		2	18		

COUNTING PROCEDURE – INBOUND (cont.)

- FOR INBOUND COUNTS --There should never be anything written in the "Ons" column.
- It is possible (at a few stations) for the doors on both sides of the train to open– be alert and count both doors!
- **Only mark the people EXITING through the side doors. NEVER count people leaving through the end doors to another car as an "Off".**
- It is possible to have zero "Offs" but for the "People On Board" to change because people will pass through cars. ALWAYS COUNT.
- If no one exits the train, put a "0" zero. If the train does not stop at a station, LEAVE BLANK. If the train stops at a station but the doors do not open in your car (either because the car does not make the platform or doors malfunction, etc.), also LEAVE BLANK.

COUNTING PROCEDURE - OUTBOUND

- At GCT, **AFTER** the doors close and people have found their seats, use a clicker to count all people on board your section of the car. Mark this number in the "**People On Board**" column. (starting from the bottom of the page)
- At **EVERY stop**, stand next to your assigned door and count the people **ENTERING** through those doors and then mark that in the "**Ons**" column next to the station you are at.
- Once the door close again and people have settle then count the people on board and fill in the "**People On Board**" column for the station you just left.
- Repeat this procedure at every station up to your final station.

	Outbound On	Inbound to GCT Off's	People on Board	Trip Survey on Back	Comments
Wakefield					
Woodlawn					
Williams Bridge					
Botanical Garden					
Fordham					
Tremont					
Melrose	1		13		
Harlem 125th Street	2		7		
Grand Central			3		

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COUNTING PROCEDURE – OUTBOUND (cont.)

- There should **never** be anything written in the "Offs" column.
- It is possible (at a few stations) for the doors on both sides of the train to open– be alert and count both doors!
- **Only mark the people ENTERING through the side doors. NEVER count people entering through the end doors to another car as an "On".**
- It is possible to have zero "Ons" but for the "People On Board" to change because people will pass through cars. ALWAYS COUNT.
- If no one enters the train, put a "0" zero. If the train does not stop at a station, LEAVE BLANK. If the train stops at a station but the doors do not open in your car (either because the car does not make the platform or doors malfunction, etc.), also LEAVE BLANK.

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COUNTING PROCEDURE NOTES – KEY POINTS

- INBOUND AND OUTBOUND TRAINS
  - All counters must be sure to not impede the conductors or the traffic into and out of the train.
  - Remember, only count people entering or exiting through the **side doors**.
  - Hand all survey equipment in an organized manner to the crew chief once the count has been completed.
- INBOUND TRAINS
  - Be sure to help clean up the car of survey debris
  - Collect completed surveys once the train has arrived at the final destination
  - You may have to count as well as distribute surveys.

    COUNTING TAKES PRIORITY

    (Survey distribution is discussed in the next section.)

SURVEY DISTRIBUTION – INBOUND ONLY

- Write the number of the first survey in your stack (red circle) (FYI, this is redundant)
- Mark the survey number at the top of the stack of surveys at the station you just departed AFTER the doors close (blue circle). For example, if this train just left Tenmile River, mark the number of the top survey in the stack on the count form AFTER the doors close but before handing out the surveys to everyone who boarded at Tenmile River.

First Survey in Stack: 100500

Station List	Outbound Ons	Inbound to GCT Offs	People on Board	Top Survey on Stack	Comments
[illegible]			11	100500	
Tenmile River		2	17	100510	
[illegible]					

- Attempt to hand out a survey and writing implement to every individual who boarded at the last station.

Note: **Your surveys MUST be kept in numerical order.**

SURVEY DISTRIBUTION – INBOUND ONLY

- Between stops, (after you have distributed the surveys) walk through the train car and attempt to collect compete surveys and pens/pencils
- Collecting surveys is most important at the end station of the train (e.g., after Harlem 125th St. and before GCT)
- Answer as many questions as you can without impeding the progress of passengers or delaying your collection and distribution.
- If time allows, check the survey for legibility and completeness
- Remind people to return the surveys by:
  - **Giving it to you—this is the best, or:**
    - **Sending it in the mail**
    - **Completing it online**

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SURVEY DISTRIBUTION – KEY POINTS

- On many trains, you may also be counting as well as distributing and collecting surveys. **Counting takes precedence over distributing surveys and counts MUST be accurate.**
- Make sure to keep the completed surveys separate from the incomplete surveys.
- Stay out of the way of the conductors or passengers.
- At the end of the trip, collect as many surveys as possible and clean the train of all survey debris.
- Hand all completed surveys and remaining surveys and pens/pencils to your crew chief.
- Remind all passengers that even if they can't complete the survey on board, we would greatly appreciate it if they completed the survey online or to mail it back. The web address is on the paper survey.

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MATERIALS CHECKLIST - COUNTER

After receiving your badge, clicker and vest and contact numbers on your first trip,

Every day you work you need to BRING:

- ❑ Clicker/Counter
- ❑ Vest
- ❑ Clipboard
- ❑ Badge
- ❑ Cell Phone
- ❑ Cell numbers of Crew Chief and Base Chief

Every day you work you will RECEIVE:

- ❑ Fully Charged, empty and synchronized digital pen
- ❑ Appropriate Count Sheet
- ❑ Schedule
- ❑ Copy of the Train Service Notice
- ❑ Extra pen and paper for notes

MATERIALS CHECKLIST – SURVEY PERSON

After receiving your badge, carrying case, contact numbers and vest on your first trip,

Every day you work you need to BRING:

- ❑ Vest
- ❑ Badge
- ❑ Clipboard
- ❑ Cell Phone
- ❑ Cell numbers of Crew Chief and Base Chief

Every day you work you will RECEIVE:

- ❑ Stack of ordered surveys in a bag
- ❑ Writing implements
- ❑ Fully Charged, empty and synchronized digital pen
- ❑ Appropriate Count/Survey Sheet
- ❑ Schedule
- ❑ Copy of the Train Service Notice
- ❑ Extra pen and paper for notes

Significant Service Disruptions – What to do?

If a service disruption should occur the following steps must be followed:

- All survey distribution must stop immediately.
- Report the situation to the BASE CHIEF as soon as possible.

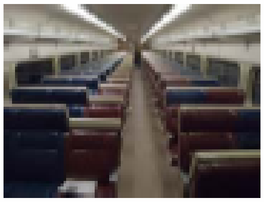
Significant Service Disruptions – What to do?

The following are all examples of significant service disruptions:

- When trains stop running and MNR passengers must continue their commute by bus
- When passengers are asked to change trains
- When a scheduled train is delayed by ½ hour or more
- When a train makes unscheduled station stops
- When a medical emergency causes delays or cancellations

WHAT IF'S – THINKING ON YOUR FEET

Q: What if the train is a different configuration?



VS

A: Work with your crew chief to determine the best way to utilize resources. Usually the seats switch direction in the middle of a car and this is the best place to delineate boundaries

Q: What if the train isn't on time, schedule changes or I'm late?
A: Contact your crew chief ASAP. Discuss with your crew chief the best plan of action. He/she may need to call the base chief.

Q: What if my digital pen fails?
A: Use a regular pen. Make a note on your survey sheet. Tell your crew chief when you hand in your surveys and supplies.

WHAT IF'S – THINKING ON YOUR FEET

Q: What if someone asks me a question and I am not able to accomplish my tasks or simply cannot answer the question?
A: Politely tell them you need to be doing something else and they can either ask you again later or they can call the number on the survey.

Q: What if I need to go to the bathroom?
A: It is your responsibility to either make sure you can fit it in time-wise or somebody else can fill your responsibility while you are gone. Every train has a bathroom and you will have plenty of time to use the bathrooms at stations between train assignments.

Q: What if there are more cars on the train than expected?
A: Discuss with your crew chief the best implementation of resources.

THINK ON YOUR FEET!

We need to make sure we have accurate counts and have tried to give everybody a survey (inbound). Many unexpected events may arise and it is your responsibility to decide how best to deal with the situation. Metro-North employees along with a team evaluating our effort will be riding many trains so it is important we are efficient, accurate, and respectful.

For Pretest - Please keep track of any unexpected questions and write them down. Also make note on how this documentation can be improved and any suggestions you may have. **THANK YOU FOR ALL YOUR HELP AND EFFORT!**

Cheat Sheet for a 2 Counter/Surveyor Train Inbound

- Doors open, count all offs
- Doors close, count people on board for your half of train
- Write down top number of your survey stack
- Distribute surveys to new entrants
- Respond to questions, receive completed questionnaires, etc.

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Cheat Sheet for a 2 Counter Train Outbound

- Doors open, count all ons
- Doors close, count people on board for your half of train
- Remember, no surveys are distributed outbound, so this is easier than inbound

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APPENDIX D

FIELD SCHEDULE

Full Schedule of Survey Days for Metro-North OD Study			
Spring Field	**Spring Field**	**Spring Field**	**Fall Field**
3/7/2007	4/20/2007	6/2/2007	9/5/2007
3/8/2007	4/21/2007	6/3/2007	9/6/2007
3/9/2007	4/22/2007	6/4/2007	9/7/2007
3/10/2007	4/23/2007	6/5/2007	9/8/2007
3/11/2007	4/24/2007	6/6/2007	9/9/2007
3/12/2007	4/25/2007	6/7/2007	9/10/2007
3/13/2007	4/26/2007	6/8/2007	9/11/2007
3/14/2007	4/27/2007	6/10/2007	9/12/2007
3/15/2007	4/28/2007	6/16/2007	9/15/2007
3/16/2007	4/29/2007	6/17/2007	9/16/2007
3/18/2007	4/30/2007	6/18/2007	9/17/2007
3/19/2007	5/1/2007	6/19/2007	9/18/2007
3/20/2007	5/2/2007	6/20/2007	9/19/2007
3/21/2007	5/3/2007	6/21/2007	9/20/2007
3/22/2007	5/4/2007	6/23/2007	9/23/2007
3/23/2007	5/5/2007	6/24/2007	9/24/2007
3/24/2007	5/6/2007	6/25/2007	9/25/2007
3/25/2007	5/7/2007	6/26/2007	9/26/2007
3/26/2007	5/8/2007		9/27/2007
3/27/2007	5/9/2007		9/28/2007
3/28/2007	5/10/2007		9/29/2007
3/29/2007	5/11/2007		9/30/2007
3/30/2007	5/12/2007		10/1/2007
3/31/2007	5/14/2007		10/2/2007
4/1/2007	5/15/2007		10/3/2007
4/3/2007	5/16/2007		10/4/2007
4/4/2007	5/17/2007		10/5/2007
4/5/2007	5/18/2007		10/6/2007
4/7/2007	5/19/2007		10/7/2007
4/9/2007	5/20/2007		10/9/2007
4/10/2007	5/21/2007		10/10/2007
4/11/2007	5/22/2007		10/11/2007
4/12/2007	5/23/2007		10/13/2007
4/13/2007	5/24/2007		10/14/2007
4/14/2007	5/26/2007		10/20/2007
4/15/2007	5/27/2007		10/21/2007
4/16/2007	5/29/2007		10/24/2007
4/17/2007	5/30/2007		11/1/2007
4/18/2007	5/31/2007		11/3/2007
4/19/2007	6/1/2007		11/8/2007

APPENDIX E

STATION BOARDINGS/ALIGHTINGS BY TIME OF DAY AND DAY OF WEEK

Station	Line	INBOUND AM PEAK Ons	Offs	INBOUND OFF PEAK Ons	Offs
Ansonia	New Haven	10	4	23	19
Beacon Falls	New Haven	5	2	1	7
Bethel	New Haven	253	0	16	231
Branchville	New Haven	140	2	20	171
Bridgeport	New Haven	1938	338	1768	3271
Cannondale	New Haven	150	0	17	145
Cos Cob	New Haven	584	51	236	644
Danbury	New Haven	204	0	38	266
Darien	New Haven	929	103	549	1377
Derby-Shelton	New Haven	10	4	24	20
East Norwalk	New Haven	466	85	207	576
Fairfield	New Haven	2168	166	852	2796
Fordham	New Haven	1208	447	2205	2938
Glenbrook	New Haven	243	4	90	327
Grand Central	New Haven	1320	29714	39514	13101
Greens Farms	New Haven	511	14	155	507
Greenwich	New Haven	1492	888	2203	2844
Harlem-125th Street	New Haven	314	937	2174	1757
Harrison	New Haven	1501	290	1198	2259
Larchmont	New Haven	2395	233	1266	3299
Mamaroneck	New Haven	1267	414	1094	2062
Merritt 7	New Haven	122	91	101	118
Milford	New Haven	1244	68	540	1580
Mt Vernon East	New Haven	1333	319	1452	2215
Naugatuck	New Haven	44	1	26	64
New Canaan	New Haven	779	1	339	1019
New Haven	New Haven	1697	168	1916	3411
New Rochelle	New Haven	2437	762	2417	4054
NH-State St.	New Haven			6	40
Noroton Heights	New Haven	1022	30	310	1156
Old Greenwich	New Haven	614	107	318	741
Pelham	New Haven	1653	168	976	2239
Port Chester	New Haven	1391	472	1445	2270
Redding	New Haven	55	0	7	58
Riverside	New Haven	498	46	219	515
Rowayton	New Haven	401	20	115	432
Rye	New Haven	1316	272	1134	2085
Seymour	New Haven	10	2	21	34
South Norwalk	New Haven	1315	797	1525	2401
Southport	New Haven	246	14	102	272
Springdale	New Haven	346	3	100	386
Stamford	New Haven	3570	3220	8061	8388
Stratford	New Haven	1143	53	328	1225
Talmadge Hill	New Haven	324	3	49	299
Waterbury	New Haven	65	0	126	199
Westport	New Haven	1574	158	884	2214
Wilton	New Haven	168	4	19	154

Station	Line	INBOUND SATURDAY Ons	Offs	INBOUND SUNDAY Ons	Offs
Ansonia	New Haven	19	23	19	29
Beacon Falls	New Haven	2	4	16	5
Bethel	New Haven	49	50	35	32
Branchville	New Haven	12	23	43	24
Bridgeport	New Haven	2079	2214	1809	1893
Cannondale	New Haven	10	5	15	16
Cos Cob	New Haven	189	259	170	142
Danbury	New Haven	106	137	87	92
Darien	New Haven	549	532	479	449
Derby-Shelton	New Haven	22	22	18	9
East Norwalk	New Haven	203	200	127	162
Fairfield	New Haven	1234	1274	941	1077
Fordham	New Haven	2702	2498	1891	1614
Glenbrook	New Haven	107	83	63	49
Grand Central	New Haven	17995	17479	14114	13464
Greens Farms	New Haven	100	76	85	68
Greenwich	New Haven	1300	1414	875	963
Harlem-125th Street	New Haven	1785	2147	1931	1874
Harrison	New Haven	866	946	587	701
Larchmont	New Haven	1219	1374	880	842
Mamaroneck	New Haven	1083	1248	788	860
Merritt 7	New Haven	18	13	8	8
Milford	New Haven	782	786	893	718
Mt Vernon East	New Haven	1742	1723	1066	1052
Naugatuck	New Haven	42	29	55	36
New Canaan	New Haven	327	418	313	297
New Haven	New Haven	4364	4127	3191	3772
New Rochelle	New Haven	2903	2787	1796	1920
NH-State St.	New Haven				
Noroton Heights	New Haven	361	335	296	293
Old Greenwich	New Haven	350	290	211	188
Pelham	New Haven	1046	1033	671	624
Port Chester	New Haven	1816	1907	1307	1440
Redding	New Haven	17	19	18	10
Riverside	New Haven	190	178	121	123
Rowayton	New Haven	87	98	144	49
Rye	New Haven	1046	1106	747	692
Seymour	New Haven	18	29	16	15
South Norwalk	New Haven	1571	1529	1205	1278
Southport	New Haven	79	99	92	67
Springdale	New Haven	100	96	64	75
Stamford	New Haven	6093	5980	4623	4991
Stratford	New Haven	649	647	450	467
Talmadge Hill	New Haven	25	29	38	28
Waterbury	New Haven	211	234	217	200
Westport	New Haven	980	940	933	738
Wilton	New Haven	20	28	13	15

Station	Line	INBOUND AM PEAK Ons	Offs	INBOUND OFF PEAK Ons	Offs
Appalachian Trail	Harlem				
Bedford Hills	Harlem	430	100	387	618
Botanical Garden	Harlem	225	218	537	413
Brewster	Harlem	753	72	438	1129
Bronxville	Harlem	2032	202	1089	3029
Chappaqua	Harlem	1446	107	573	1681
Crestwood	Harlem	1402	205	472	1610
Croton Falls	Harlem	452	57	206	530
Dover Plains	Harlem	80	0	88	122
Fleetwood	Harlem	1782	101	721	2305
Fordham	Harlem	766	364	2311	2518
Goldens Bridge	Harlem	987	86	263	1108
Grand Central	Harlem	1260	24596	31681	9739
Harlem-125th Street	Harlem	345	864	1645	1431
Hartsdale	Harlem	2141	132	708	2527
Hawthorne	Harlem	515	63	293	862
HM Valley-Wingdale	Harlem	100	7	49	134
Katonah	Harlem	724	68	521	1058
Melrose	Harlem	50	31	92	94
Mount Kisco	Harlem	763	186	771	1372
Mount Pleasant	Harlem			1	2
Mt Vernon West	Harlem	970	196	842	1559
North White Plains	Harlem	1465	238	1007	2027
Patterson	Harlem	98	0	28	156
Pawling	Harlem	198	6	94	259
Pleasantville	Harlem	622	68	576	1070
Purdys	Harlem	405	14	134	494
Scarsdale	Harlem	2933	287	1263	3874
Southeast	Harlem	966	80	1146	1902
Tenmile River	Harlem	11	1	20	37
Tremont	Harlem	48	32	52	104
Tuckahoe	Harlem	985	105	508	1329
Valhalla	Harlem	263	33	155	334
Wakefield	Harlem	395	27	201	470
Wassaic	Harlem	65	0	208	210
White Plains	Harlem	3802	2030	6694	8970
Williams Bridge	Harlem	306	85	393	527
Woodlawn	Harlem	962	86	599	1162

Station	Line	INBOUND SATURDAY Ons	Offs	INBOUND SUNDAY Ons	Offs
Appalachian Trail	Harlem	1	2	3	6
Bedford Hills	Harlem	446	360	303	292
Botanical Garden	Harlem	408	432	394	360
Brewster	Harlem	732	840	688	582
Bronxville	Harlem	1082	1181	757	784
Chappaqua	Harlem	587	562	381	435
Crestwood	Harlem	613	603	305	352
Croton Falls	Harlem	283	308	221	208
Dover Plains	Harlem	53	90	102	76
Fleetwood	Harlem	954	847	634	569
Fordham	Harlem	2060	1795	1329	1193
Goldens Bridge	Harlem	246	361	222	235
Grand Central	Harlem	11515	11507	8336	8550
Harlem-125th Street	Harlem	1360	1210	993	1065
Hartsdale	Harlem	768	709	480	477
Hawthorne	Harlem	318	283	171	234
HM Valley-Wingdale	Harlem	72	76	102	48
Katonah	Harlem	575	716	527	425
Melrose	Harlem	64	55	67	29
Mount Kisco	Harlem	905	953	740	776
Mount Pleasant	Harlem	25	13	17	10
Mt Vernon West	Harlem	684	629	450	464
North White Plains	Harlem	784	803	591	652
Patterson	Harlem	50	34	59	15
Pawling	Harlem	113	101	134	94
Pleasantville	Harlem	530	484	410	369
Purdys	Harlem	223	172	148	94
Scarsdale	Harlem	1236	1280	791	966
Southeast	Harlem	1657	1631	1590	1596
Tenmile River	Harlem	30	19	28	29
Tremont	Harlem	44	67	42	43
Tuckahoe	Harlem	611	499	334	317
Valhalla	Harlem	131	158	141	150
Wakefield	Harlem	221	199	161	179
Wassaic	Harlem	256	341	428	307
White Plains	Harlem	5249	5716	3999	4179
Williams Bridge	Harlem	397	363	311	264
Woodlawn	Harlem	687	571	472	437

Station	Line	INBOUND AM PEAK Ons	Offs	INBOUND OFF PEAK Ons	Offs
Ardsley-on-Hudson	Hudson	187	31	133	307
Beacon	Hudson	1854	34	725	2535
Breakneck Ridge	Hudson				
Cold Spring	Hudson	347	27	197	522
Cortlandt	Hudson	763	17	179	902
Croton-Harmon	Hudson	2711	475	1366	3578
Dobbs Ferry	Hudson	756	84	349	1048
Garrison	Hudson	267	9	130	478
Glenwood	Hudson	246	18	120	286
Grand Central	Hudson	465	16156	20376	5239
Greystone	Hudson	355	31	152	411
Harlem-125th Street	Hudson	125	738	1198	716
Hastings-on-Hudson	Hudson	808	73	340	1093
Irvington	Hudson	641	85	379	766
Ludlow	Hudson	178	41	129	252
Manitou	Hudson	4	0	0	4
Marble Hill	Hudson	274	247	680	588
Morris Heights	Hudson	44	34	98	120
New Hamburg	Hudson	840	5	218	1022
Ossining	Hudson	960	105	620	1373
Peekskill	Hudson	948	36	561	1390
Philipse Manor	Hudson	270	12	78	294
Poughkeepsie	Hudson	969	44	935	1777
Riverdale	Hudson	594	28	134	663
Scarborough	Hudson	726	28	127	817
Spuyten Duyvil	Hudson	901	22	194	918
Tarrytown	Hudson	1746	182	1155	2882
University Heights	Hudson	101	37	153	162
Yonkers	Hudson	717	198	937	1520

Station	Line	INBOUND SATURDAY Ons	INBOUND SATURDAY Offs	INBOUND SUNDAY Ons	INBOUND SUNDAY Offs
Ardsley-on-Hudson	Hudson	95	98	80	98
Beacon	Hudson	1557	1511	1160	1199
Breakneck Ridge	Hudson	1	2	12	6
Cold Spring	Hudson	392	282	406	265
Cortlandt	Hudson	216	204	148	134
Croton-Harmon	Hudson	1704	1562	1214	1244
Dobbs Ferry	Hudson	440	437	338	347
Garrison	Hudson	364	297	219	319
Glenwood	Hudson	212	173	160	153
Grand Central	Hudson	8286	8395	6513	5893
Greystone	Hudson	209	159	125	71
Harlem-125th Street	Hudson	982	1208	912	1115
Hastings-on-Hudson	Hudson	399	458	280	319
Irvington	Hudson	298	256	214	206
Ludlow	Hudson	192	90	110	104
Manitou	Hudson	1	5	7	1
Marble Hill	Hudson	764	722	528	662
Morris Heights	Hudson	121	173	96	73
New Hamburg	Hudson	515	609	392	346
Ossining	Hudson	768	735	533	564
Peekskill	Hudson	832	786	705	678
Philipse Manor	Hudson	57	51	46	59
Poughkeepsie	Hudson	1830	1768	1460	1641
Riverdale	Hudson	128	162	105	109
Scarborough	Hudson	124	140	89	62
Spuyten Duyvil	Hudson	173	127	123	104
Tarrytown	Hudson	1481	1636	1120	1291
University Heights	Hudson	206	175	147	118
Yonkers	Hudson	1022	1148	778	839