



**New York Metropolitan Transportation Council
North Jersey Transportation Planning Authority**

2010/2011 Regional Household Travel Survey
Final Report



October 2014

Disclaimer

The preparation of this report has been financed through the U.S. Department of Transportation's Federal Transit Administration and Federal Highway Administration. This document is disseminated under the sponsorship of the New York Metropolitan Transportation Council in the interest of information exchange. The contents of this report reflect the views of the authors who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Federal Transit Administration, Federal Highway Administration or the State of New York. This report does not constitute a standard, specification or regulation.

This report, 2010/2011 Regional Household Travel Survey, was funded through the New York Metropolitan Transportation Council SFY 2010/2011 Unified Planning Work Program project Regional Household Travel Survey PTCS08D00.P07. This report was funded through matching grants from the Federal Transit Administration and from the Federal Highway Administration.

Acknowledgements

The Regional Household Travel Survey was performed under NYSDOT/NYMTC **CONTRACT #COO0780, PIN: PTCS08AO1 and NJTPA Contract 11/205 Regional Household Travel Survey: NJTPA Component.**

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Table of Contents

Glossary of Terms and Report Acronyms	1
Organization of the Report	2
Executive Summary	3
THE REGIONAL HOUSEHOLD TRAVEL SURVEY: OVERVIEW	3
1.0 Objectives of the Survey	16
1.1 Background of the Survey	16
1.2 Regional Best Practice Model: Travel Forecasting	17
1.3 The RHTS and Other Travel Surveys and Databases	17
1.4 Availability of RHTS Data Products	17
1.4.1 Data Files	17
2.0 Survey Planning and Approach	19
2.1 Metropolitan Study Area	19
2.2 Data Requirements and Survey Content	20
2.3 Sampling Plan	24
2.3.1 Sampling Plan Goals	24
2.3.2 Survey Universe	27
2.3.3 Sampling Frame	27
2.4 Survey Pre-Test	29
2.4.1 Methods and Design	29
2.4.2 Evaluation	30
2.4.3 Impact of Pre-test on Final Survey Design	34
2.5 Description of Survey Interview Process	35
2.5.1 Interviewer Selection and Training	35
2.5.2 Advance Notification Mailing	36
2.5.3 Recruitment Interview	37
2.5.4 Placement of Materials	39
2.5.5 Reminder Call	39
2.5.6 Travel Data Retrieval Interview	40
2.6 Data Processing	41
2.6.1 Sample Management Procedures	41
2.6.2 Recruitment Data Processing	41
2.6.3 Retrieval Data Processing	42
2.6.4 Geocoding	42
2.7 Public Outreach	42
2.7.1 Public Outreach Plan	43
2.7.2 External Website	45

3.0 Survey Data Collection	48
3.1 Data Collection Schedule	48
3.2 Data Collection Resources and Management	48
3.3 Adjustments to Survey Procedures	48
3.4 Achieved Sample	48
3.5 Response Rates	51
3.6 Data Quality Standards	53
3.6.1 Completed Household	53
3.6.2 Completed Person Record	53
3.6.3 Acceptable Partial Household	53
3.6.4 Acceptable Partial Person Record	53
3.6.5 Tolerance for Proxy Person Reports	53
3.6.6 Tolerance for Location Geocoding	54
3.6.7 Data Post-Processing and Imputation	54
3.7 Survey Sample Representativeness: Validation and Weighting	55
3.7.1 Overview of the Expansion and Travel Adjustment Factors	55
3.7.2 Multi-Stage Process for Weighting and Adjustment of Survey Data	55
3.7.3 Level 1: Simple Expansion – Preliminary Stage	56
3.7.4 Level 2: Balancing by Household Type and Person Characteristics	58
3.7.5 Summary of Trip Adjustment Factors – Using the GPS Sample	62
3.8 GPS Sub-Sample	69
3.8.1 Recruitment Methods and Results	70
3.8.2 Wearable GPS Equipment	76
3.8.3 Deployment Procedures	77
3.8.4 Deployment Results	81
3.8.5 Prompted Recall Methodology	84
3.8.6 Participation Results	84
3.8.7 GPS Final Conclusions	87
4.0 Summary of Survey Results	88
4.1 Travel Analysis and Reporting: Introduction	88
4.2 General Description of Travel and Trip Rates	94
4.2.1 General Travel	94
4.2.2 General Origin/Destination (O/D) Patterns	97
4.2.3 Modes of Travel	102
4.2.4 Reasons for Travel: Trip Purpose	109
4.2.5 Travel Distance and Travel Times	111
4.2.6 Time of Day and Other Variations in Travel	114
4.3 Travel by Different Types of Households	119
4.3.1 Household Size	119

4.3.2 Household Income	123
4.3.3 Vehicle Ownership	127
4.3.4 Household Structure	129
4.4 Variation in Travel by Person Characteristics	131
4.4.1 Age	131
4.4.2 Gender	135
4.4.3 Ethnicity	137
4.4.4 Work and "Lifecycle" Status	138
4.4.5 Variations in Travel by Licensed Driver Status and Disability Status	142
4.5 Focus on Auto Vehicle Trips	144
4.5.1 Origin-Destination (O/D) Patterns	144
4.5.2 Time of Day	145
4.5.3 Purpose of Travel – Auto Trips	148
4.5.4 Trip Length & Travel Time	149
4.5.6 Vehicle Occupancy – Auto Vehicle Trips	151
4.6 Public Transportation Trips	155
4.6.1 Origin-Destination (O/D) Patterns	155
4.6.2 Time of Day	156
4.6.3 Purpose of Travel – Transit Trips	159
4.6.4 Trip Length	161
4.7 Walk and Other Non-Motorized Trips	167
4.7.1 Time of Day	167
4.7.2 Purpose of Travel – Non-Motorized Trips	169
4.7.3 Trip Length	171

List of Tables and Figures

Table 1: Households and Person Trip Rates: Comparison between 1997/1998 Survey and 2010/2011 Survey	5
Table 2: Household Trip Rates by Household Income	5
Table 3: Household Trip Rates by Household Structure	5
Table 4: Household Trip Rates by Household Size	5
Table 5: Person Trip Rates by Gender and Trip Type	5
Table 6: Person Trip Rates by Age Group and Trip Type	6
Figure 1: Person Trip Rates by Lifecycle Status	6
Figure 2: Origin-Destination Patterns in Region (Work Trips)	7
Figure 3: Origin-Destination Patterns in Region (Non-Work Trips)	7
Figure 4: Primary Mode used for All Trips	8
Figure 5: Primary Mode used for each Trip Purpose	9
Figure 6: Primary Mode used for each Destination Location	10
Figure 7: Percentage of Trips by Trip Purpose	11
Figure 8: Distribution of Trips by Time of Day and Time Period (Work Trips)	12
Figure 9: Distribution of Trips by Time Period (Non-Work Trips)	13
Table 7: Person Trip Rates by Day of Week	13
Table 8: Mean and Median Travel Times	14
Figure 10: How far and how long do we travel by origin location of trip	15
Table 1-1: Overall Completed Survey Summary	16
Figure 2-1: Regional Household Travel Survey Study Area	20
Table 2-2: Final Sampling Plan: Sample Targets by County and Sample Bin	27
Table 2-3: Pre-test Outcomes for Recruitment and Retrieval	30
Table 2-4: Pre-test Recruitment Productivity	31
Table 2-5: Pre-test Retrieval Productivity	31
Table 2-6: Pre-test Completion and Refusal Rates by County	32
Table 2-7: Pre-test Recruitment Geographic Distribution by County and GPS vs. Diary Status	33
Table 2-8: Summary Statistics on Pre-test Data (Universe = Total Pre-test Retrievals)	34
Figure 2-2: Locations of Households Invited to Participate (Map of Region)	36
Figure 2-3: Recruitment Household Locations (Map of Region)	39
Figure 2-4: Data Processing Flow Chart	42
Figure 2-5: RHTS Project Logo	43
Figure 2-6: Regional Travel Survey Public Website – Above the Fold	46
Figure 2-7: Regional Travel Survey Public Website – Below the Fold	46
Figure 2-8: Post Survey Public Website	47
Table 3-1: Distribution of Retrieved Households by County and Sampling Bin	49

Figure 3-1: Participating (Retrieved) Household Locations (Map of Region)	50
Table 3-2: RHTS Sample Dispositions	51
Table 3-3: Response Rates by State and County	52
Table 3-4: Response Rates by Recruitment Mode	53
Figure 3-2: Level 1 (Preliminary) Expansion Process	56
Table 3-5: Level 1 Expansion – with Census Tract–Level Household Count	57
Figure 3-3: Level 2 (Final) Expansion Process	58
Table 3-6: Comparison of Expansion at Different Stages	61
Table 3-7: Comparison of Number of Households at County Level	62
Figure 3-4: Methodology used for tour frequency correction factors – Level 3.1	63
Table 3-8: Tour Correction Factor by Tour Purpose – Level 3.1	64
Table 3-9: Tour Correction Factor by Tour Mode – Level 3.1	64
Table 3-10: Tour Correction Factor by Tour Duration – Level 3.1	64
Table 3-11a: Tour rates by number of stops for GPS portion of the survey – Level 3.2	65
Table 3-11b: Tour rates by number of stops for Non-GPS portion of the survey – Level 3.2	65
Figure 3-5: Methodology used for stop correction factor	66
Table 3-11c: Stop Correction factor for tours with number of stops – After Normalization for number of tours with activity duration less than 15 minutes. – Level 3.2	66
Table 3-11d: Tour rates by number of stops for Non-GPS portion of the survey – Level 3.2	66
Figure 3-6: Average Level 3 Weights	67
Figure 3-7: Distribution of final weights (with correction factors) – Manhattan and Brooklyn	68
Figure 3-8: Map of the RHTS Region	69
Figure 3-9: GPS Memory Jogger Example (front and back)	70
Figure 3-10: Recruit Script GPS Text – Introduction	72
Figure 3-11: Recruit Script GPS Text Post Opt-in	73
Figure 3-12: Incentive Insert Examples	74
Table 3-12: GPS Households – Recruitment Results by County	75
Table 3-13: GPS Recruits by Mode and Sample Type*	76
Figure 3-13: The GlobalSat GPS Data Logger	76
Figure 3-14: GPS Cover Letter and Instructions	78
Figure 3-15: Equipment Retrieval Letter	82
Table 3-14: GPS Deployment by Final Status	83
Figure 3-16: TripBuilder Web Software	84
Table 3-15: GPS Retrievals by Mode and Sample Type	85
Table 3-16: GPS Recruits and Retrievals by County	85
Table 3-17: GPS Trip Rates – Household (Unweighted)	86
Table 3-18: GPS Trip Rates – Persons	86

Table 3-19: Average Person & Household Trip Rates by GPS Type and by Retrieval Mode (unweighted)	87
Table 4-0: Geographic Groups	89
Figure 4-1: Distribution of Weekday Trips by Residence - County Group (Level 1)	94
Figure 4-2: Distribution of Weekday Trips by Residence - Political Boundaries (Level 3)	95
Table 4-1: Mean Household and Person Trip Rates by Residence County Group (Level 1)	96
Table 4-2: General Origin/Destination (O/D) Patterns by County Group (Level 1) of Trip Origin – All Weekday Trips – Row Percent	97
Figure 4-3: General Origin-Destination Markets: Metro Area, Weekday Trips, Work	98
Figure 4-4: General Origin-Destination Markets: Metro Area, Weekday Trips, Non-work	99
Table 4-3: General Origin/Destination (O/D) Patterns by County Group (Level 1) of Trip Origin – Work Trips	100
Table 4-4: General Origin/Destination (O/D) Patterns by County Group (Level 1) of Trip Origin – Non-Work Trips	101
Figure 4-5: Percentage of Travel by Travel Mode (All Study Area)	102
Figure 4-6: Percentage of Travel Mode by County Group (Level 1) of Trip Origin	103
Table 4-5: Distribution of Trips by Travel Mode Group and Residence (All Trip Purposes)	104
Table 4-6: Distribution of Trips by Origin/Destination (O/D) Market and Travel Mode Group	105
Table 4-7: Trip Purpose by General Travel Mode	106
Table 4-8: Time Period of Travel by General Travel Mode	106
Table 4-9: Travel Mode by Trip Destination	107
Table 4-10: Trip Purpose by Residence	109
Table 4-11: Trip Purpose by Trip Origin/Destination	110
Table 4-12: Trip Duration (minutes) by Trip Purpose and Residence	111
Table 4-13: Median Trip Distance (in miles) by Trip Purpose and Home Residence	113
Table 4-14: Person Trip Rates** by Day of Week	114
Table 4-15: Distribution of Trips by Time of Departure, Trip Purpose and Trip Origin	115
Figure 4-7: Distribution of Trips by Time of Departure (Overall)	117
Figure 4-8: Distribution of Trips in NYMTC Counties * by Time of Departure	117
Figure 4-9: Distribution of Trips in NJTPA Counties** by Time of Departure	118
Figure 4-10: Distribution of Trips by Time of Departure by Regional Boundaries*** (Level 2)	118
Table 4-16: Household Size by Residence	119
Table 4-17: Household Trip Rates by Household Size and Residence	121
Table 4-18: Household Trip Rates by Trip Purpose (Work/Non-work), Travel Mode (Vehicle/Transit) and Household Size	122

Table 4-19: Household Trip Rates by Household Income and Residence	123
Table 4-20: Distribution of Trips by Travel Mode, Household Income and Residence	125
Table 4-21: Number of Vehicles by Household Size and Income	127
Table 4-22: Number of Vehicles by Household Size and Residence - Regional Boundaries (Level 2)	127
Table 4-23: Household Trip Rates by Household Size and Number of Vehicles	128
Table 4-24: Distribution of Trips by Number of Household Vehicles and Travel Mode	128
Table 4-25: Household Structure by Income	129
Table 4-26: Household Trip Rates by Household Structure and Residence	130
Table 4-27: Trip Rates by Purpose (Work/Non-Work) and Age Group	131
Table 4-28: Average Person Trip Rates by Age Group and Residence	132
Table 4-29: Distribution of Trips by Age Group and Time of Day	133
Table 4-30: Distribution of Trips by Age Group and Trip Purpose	134
Table 4-31: Distribution of Trips by Age Group and Travel Mode	135
Table 4-32: Trip Rates by Trip Purpose (Work/Non-Work Types) and Gender	136
Table 4-33: Distribution of Trips by Gender and Travel Mode	136
Table 4-34: Trip Rates by Trip Purpose (Work/Non-Work Types) and Ethnicity Types	137
Table 4-35: Distribution of Trips by Ethnicity and Travel Mode Group	137
Table 4-36: Person Trip Rates** by Trip Purpose (Work/Non-Work) and Employment Status	138
Table 4-37: Trip Rates by Travel Mode and Employment Status	138
Table 4-38: Distribution of Trips by Lifecycle Status and Trip Purpose	139
Table 4-39: Distribution of Trips by Lifecycle Status and Time of Departure	140
Table 4-40: Distribution of Trips by Lifecycle Status and Travel Mode	141
Table 4-41: Distribution of Trips by Travel Mode Group and Licensed Driver Status	142
Table 4-42: Incidence of Disabilities within Survey Population	142
Table 4-43: Distribution of Trips for Persons with Disabilities by Type of Disability and Travel Mode	143
Table 4-44: Distribution of Auto Trips by Origin-Destination (O/D) Market and County Group (Level 1) of Trip Origin (row %)	144
Figure 4-11: Distribution of Auto Trips by Departure Hour	145
Table 4-45: Distribution of Auto Trips by Trip Purpose (Work/Non-Work), Time of Departure and Trip Origin	146
Figure 4-12: Distribution of Auto Trips by Time of Departure	147
Table 4-46: Distribution of Auto Trips by Trip Purpose (Work/Non-Work) and Trip Origin	148
Table 4-47: Median Travel Time and Trip Distance by Trip Origin (County) - Auto Trips	149
Table 4-48: Distribution of Auto Trips by Trip Origin (Regional Boundaries (Level 2)) and Trip Distance (Ranges)	151

Table 4-49: Mean Vehicle Occupancy by Trip Purpose (Work/Non-Work) and County Group (Level 1) of Trip Origin – Auto Trips	151
Table 4-50: Mean Vehicle Occupancy by Trip Departure Period (Peak/Off-Peak) and Trip Origin (County Group-Level 1) – Auto Trips	152
Table 4-51: Distribution of Auto Trips by Vehicle Occupancy and Trip Origin (County Group-Level 1)	152
Table 4-52: Distribution of Auto Trips by Vehicle Occupancy and Trip Purpose	153
Table 4-53: Distribution of Auto Trips by Vehicle Occupancy and Departure Time Period	154
Table 4-54: Distribution of Transit Trips by Origin-Destination (O/D) Market and County Group (Level 1) of Trip Origin	155
Figure 4-13: Distribution of Transit Trips by Departure Hour	156
Table 4-55: Distribution of Transit Trips by Trip Purpose (Work/Non-Work), Time of Departure and Trip Origin	157
Figure 4-14: Distribution of Transit Trips by Time of Departure	158
Table 4-56: Distribution of Trips by Public Transportation: Travel Mode and Trip Purpose (Work/Non-Work)	159
Table 4-57: Distribution of Transit Trips by Trip Purpose (Work/Non-Work) and Trip Origin	159
Table 4-58: Travel Time and Distance by County of Trip Origin – Transit Trips	161
Table 4-59: Median Travel Time and Trip Distance by Travel Mode – Transit Trip	163
Table 4-60: Distribution of Transit Trips by Trip Distance (Range) and Trip Origin (Regional Boundaries-Level 2)	164
Table 4-61: Distribution of Transit Trips by Trip Travel Time (Ranges) and Trip Origin (Regional Boundaries-Level 2)	164
Table 4-62: Distribution of Transit Trips by Access Mode to Premium Transit Modes (w/o Subway) and Trip Origin (County Group-Level 1)	165
Table 4-63: Distribution of Transit Trips by Access Mode to Premium Transit Modes (w/o Subway) and Trip Destination (County Group-Level 1)	166
Figure 4-15: Distribution of Non-Motorized Trips by Departure Hour	167
Table 4-64: Distribution of Non-Motorized Trips by Departure Period and Trip Origin (Regional Boundaries-Level 2)	168
Figure 4-16: Distribution of Non-Motorized Trips by Departure Period	168
Table 4-65: Distribution of Non-Motorized Trips by Trip Purpose (Work/Non-Work) and Trip Origin	169
Table 4-66: Travel Time and Distance by Trip Origin – Non-Motorized Trips	171
Table 4-67: Trip Distance (Range) by Trip Origin – Non-Motorized Trips	172

Glossary of Terms and Report Acronyms

- ACS - American Community Survey (US Census)
- CASI - Computer Assisted Self Interviewing (Web)
- CATI - Computer Assisted Telephone Interviewing
- CDF - Continuous Data Flow
- DBE - Disadvantaged Business Enterprise
- DSF - United States Postal Service's Delivery Sequence File
- FAQ - Frequently Asked Questions
- GPS - Global Positioning System
- HOV - High Occupancy Vehicle
- MDB - Multi-Dimensional Balancing (weighting Stage 2)
- MPH – Miles per Hour
- MPO – Metropolitan Planning Organization
- MSG - Marketing Systems Group
- MTA - New York Metropolitan Transportation Authority
- NHTS - National Household Travel Survey
- NJRTME – North Jersey Regional Transportation Model - Enhanced
- NJTPA – North Jersey Transportation Planning Authority
- NMEA – National Marine Electronics Association
- NYBPM – New York Best Practices Model
- NYMTC – New York Metropolitan Transportation Council
- PB - Parsons Brinckerhoff
- PIO - Public Information Officer
- PR - Prompted Recall
- PUMA - ACS' Public Use Microdata Area (geographic)
- PUMS - ACS' Public Use Microdata Sample
- RHTS – 2010/2011 Regional Household Travel Survey
- RTFM - Regional Transit Forecasting Model
- RT-HIS – 1997/1998 Regional Travel Household Interview Survey
- SPSS – Statistical Package for Social Scientists (an IBM Statistical Software Package chosen as the primary analytical tool for this project)
- TAZ - Transportation Analysis Zone
- TBW – TripBuilder™ Web

Organization of the Report

This report is organized as follows.

Section 1: Executive Summary – This section provides a summary of the survey results, a review of the purpose and objectives of the survey and a comparison to the 1997/1998 surveys used for transportation planning and travel demand model development.

Section 2: Objectives of the Survey – Provides an overview of the objectives and use of outcomes of the survey, which will support the development and update of travel demand models and assist public decision-makers in better understanding how well the transportation system is functioning under the demands placed upon this system.

Section 3: Survey Planning and Approach – Includes the survey planning stages, design, and methodological approach. The survey sampling plan, results of the Pre-test, and review of public outreach efforts are also presented.

Section 4: Survey Data Collection – This section covers implementation of the RHTS, the data collection schedule, resources management, and adjustments to survey procedures, to achieved sample, response rates, data quality control issues, and survey sample representativeness. A summary of the GPS sub-sample effort is also included in this section.

Section 5: Summary of Survey Results – Beginning with an introduction and exploration of general trip rates, this section then looks at variance in travel behavior by differing types of households and personal characteristics. It concludes with an analytical focus on auto-vehicle, transit, and non-motorized trips.

Executive Summary

THE REGIONAL HOUSEHOLD TRAVEL SURVEY: OVERVIEW

The New York Metropolitan Transportation Council (NYMTC) and the North Jersey Transportation Planning Authority (NJTPA) jointly sponsored the 2010/2011 Regional Household Travel Survey (RHTS), a comprehensive survey of the travel behavior characteristics and related demographics of residents within 28 counties of the New York-New Jersey-Connecticut metropolitan area. The survey area included: the five boroughs of New York City (NYC) – Manhattan, Queens, Bronx, Brooklyn (Kings), and Staten Island (Richmond); Nassau and Suffolk counties on Long Island; five Hudson Valley counties – Westchester, Dutchess, Putnam, Rockland and Orange; 14 counties in New Jersey – Bergen, Passaic, Hudson, Essex, Union, Morris, Somerset, Middlesex, Monmouth, Ocean, Hunterdon, Warren, Sussex, and Mercer; and Fairfield and New Haven counties in Connecticut.

NYMTC is a regional council of governments that is the metropolitan planning organization for New York City, Long Island and the lower Hudson Valley, providing a collaborative planning forum to address transportation-related issues, develop regional plans and make decisions on the use of federal transportation funds. NJTPA is the metropolitan planning organization for the 13-county northern New Jersey region, overseeing over \$2 billion in transportation improvement projects and providing a forum for interagency cooperation and public input.

The data, gathered though the survey provides information on travel and mobility patterns, enables updates to state and regional travel demand models and ultimately assists transportation professionals and decision makers in better understanding the needs of the traveling public. The previous Regional Travel Household Interview Survey (RT-HIS), which collected similar data, was performed in 1997/1998.

Through the RHTS, demographic and trip data were collected from 18,965 households, including a sub-sample of 1,930 households whose members also provided travel data using wearable global positioning system (GPS) devices. The sample was designed to account for the large number of households in the region and the unique diversity of its demographics, transportation systems and travel behavior. Households were recruited by either computer-assisted telephone interviewing (CATI) or mail, and their travel information was retrieved by CATI, mail or using the software program TripBuilder™ through the project website. To increase participation, the survey was available in English, Spanish, Russian and Chinese, which are the four predominantly-spoken languages in the region. Travel data were collected for a 24-hour weekday period between September 2010 and November 2011, and households were provided diaries to assist in recording travel. This was the first large-scale travel survey ever conducted to use this approach for a GPS subsample and proved to be a successful method in one of the most challenging GPS environments in the United States. The online GPS-based prompted recall method used also proved to bring some hard-to-reach socio-demographic groups into the RHTS who may otherwise not have participated.

To support comparisons, the survey was largely designed for consistency with the one conducted in 1997/1998, aiming to capture overall travel patterns in the region. However, substantial enhancements were also made, such as including the GPS subsample which improved accounting for short, non-work walk trips. Due to such methodological differences, caution must be taken when comparing results across the two surveys

This report presents the weighted linked trip findings. A linked trip is travel between an origin and a destination defined by a primary activity that may or may not include mode transfers or stops. The weighting includes the application of trip correction factors based on a comparison of the diary and GPS trips. The final data set includes the unweighted data as well as weight variables.

Unless otherwise noted, the primary mode of transportation, determined based on a mode hierarchy (as detailed in section 4.1 of the report), was used for trips using multiple modes. For example, for a trip to work which includes walking to a train station, taking the train to a station close to office, then walking to the office, uses two modes (rail and walk). Rail would be the primary mode since it is higher on the mode hierarchy than walking.

KEY FINDINGS:

- The approximately 22 million residents in the New York-New Jersey-Connecticut travel survey study area made approximately 80 million individual trips on an average weekday.
- Household trip rates increased with household income, the presence of children in the household and household size
- Slightly more than 82% of all trips in the study area were intra-county, an increase from 78% in the 1997/1998 survey.
- Nearly 67% of all trips in the study area were made by automobile, followed by non-motorized trips (18%), defined as trips made by walking and bicycle.
- Manhattan, the other boroughs of New York City, and Hudson County New Jersey had the highest percentages of non-motorized trips within their physical areas (56%, 32% and 31%, respectively).
- Lower income populations (making less than \$30,000 annually) are more likely to use bus services (10%), or walk/bike (24%) as the main mode for their trips than those of higher income.
- Public transit serves 8% of all weekday trips in the region.
- Approximately 67% of all intra-county trips and 95% of all inter-county trips in the region were made by automobile, while 66% of travel to Manhattan was made by rail.
- Over 80% of commute trips into Manhattan use some form of public transit.
- 54% of all trips are between home and destinations other than work (e.g., social/recreation, shopping, school, etc.); 23% of trips involve the workplace.
- Work trips in the region normally took between 32 and 35 minutes, with work trips from Manhattan averaging 30 minutes, while work trips from the other NYC boroughs averaged 42 minutes (the high in the region).

Who is traveling?

- *THE APPROXIMATELY 22 MILLION RESIDENTS IN THE NEW YORK-NEW JERSEY-CONNECTICUT TRAVEL SURVEY STUDY AREA MAKE APPROXIMATELY 80 MILLION INDIVIDUAL TRIPS ON AN AVERAGE WEEKDAY.*

For each sampled weekday, participating households averaged slightly more than 10 trips, and household members averaged four trips each. By comparison, the 1997/1998 RT-HIS showed trip rates of more than eight trips per household and slightly more than three per person; however, the increase in reported trip rates is mainly due to the improved accounting of trips (mostly short distance walk trips) by GPS correction factor. The unadjusted trip rates from 2010/2011 survey are very similar to that of 1997/1998 (Table 1).

Table 1: Households and Person Trip Rates: Comparison between 1997/1998 Survey and 2010/2011 Survey

	1997/1998 Survey*	2010/2011 Survey
Trip Rates per Household	8.3	10.1 (8.1**)
Trip Rates per Person	3.2	4.0 (3.2**)

Note: * the estimates are based on the updated compendium of results reweighted with Census 2000 figures (Feb 2005)
 ** Unadjusted with GPS correction factor

- **HOUSEHOLD TRIP RATES INCREASED WITH HOUSEHOLD INCOME, THE PRESENCE OF CHILDREN IN THE HOUSEHOLD AND HOUSEHOLD SIZE.**

Among all trips made by household members, women had higher trip rates than men (table 5). Also, persons 35-54 years of age (closely followed by the 55-64 age group) had higher trip rates than the other age groups.

Table 2: Household Trip Rates by Household Income

	Below \$30k	\$30k-\$74.9k	\$75k-\$99.9k	\$100+	Did not Provide	Overall Mean
Household Trips per Day	7.5	9.5	11.5	12.9	8.4	10.1

Table 3: Household Trip Rates by Household Structure

	2+ Workers with Child(s)	2+ Workers no Children	1 Worker with Child(s)	1 Worker no Children	No Workers with Child(s)	No Workers no Children	Overall Mean Trip Rate
Household Trips per Day	16.7	10.2	15.6	6.4	12.5	5.8	10.1

Table 4: Household Trip Rates by Household Size

	1	2	3	4+	Overall Mean Trip Rate
Household Trips per Day	4.8	8.2	11.4	17.1	10.1

Table 5: Person Trip Rates by Gender and Trip Type

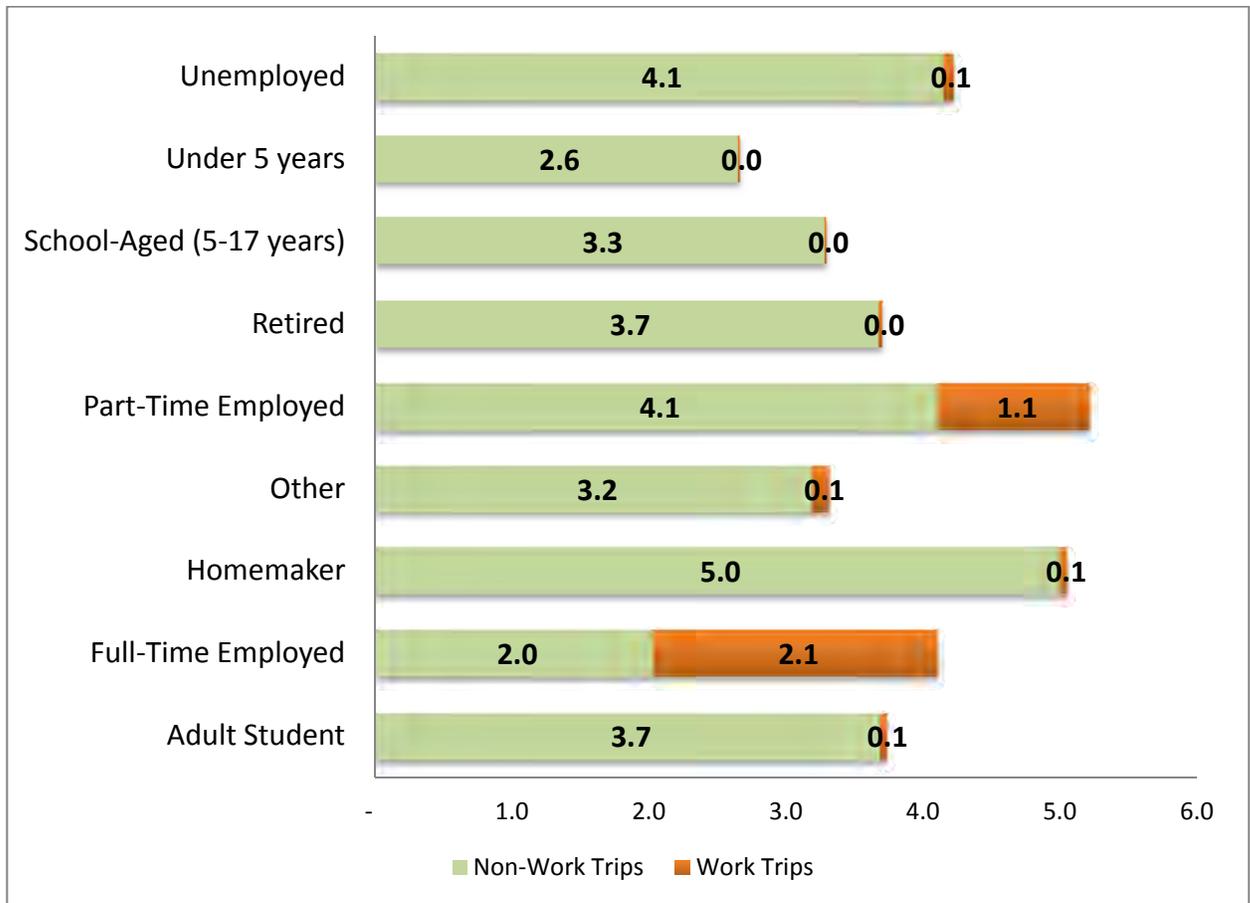
Gender	Trip Types		
	Work	Non-Work	Total
Male	1.0	2.7	3.8
Female	0.9	3.3	4.2
Did not Provide	0.2	2.0	2.2
Overall	1.0	3.1	4.0

Table 6: Person Trip Rates by Age Group and Trip Type

Age Group	Work Trips	Non-Work Trips	Total
Younger than 16 years	0.0	3.1	3.1
16-18 years	0.1	3.4	3.5
19-24 years	0.9	2.4	3.3
25-34 years	1.5	2.5	4.0
35-54 years	1.6	3.2	4.7
55-64 years	1.3	3.3	4.6
65 years or older	0.4	3.3	3.7
Age not Provided	0.9	3.0	3.9
Total	1.0	3.1	4.0

The highest trip rates are made by the part-time employed. Homemakers make the most non-work trips followed by unemployed and part-time employed people.

Figure 1: Person Trip Rates by Lifecycle Status



Where are we traveling?

- **SLIGHTLY MORE THAN 82% OF ALL TRIPS IN THE STUDY AREA WERE INTRA-COUNTY, AN INCREASE FROM 78% IN THE 1997/1998 SURVEY.**

Both work and non-work trip patterns are similar between the 1997/1998 survey and the 2010/2011 survey (figures 2 and 3). A large majority of all trips in the study area were within the same county (82%), an increase from 78% in the 1997/1998 RT-HIS. Fewer work trips (63%) were within the same county, compared to 88% of non-work trips (in 1997/1998, 62% of work trips were within the same county and 84% of non-work trips).

Figure 2: Origin-Destination Patterns in Region (Work Trips)

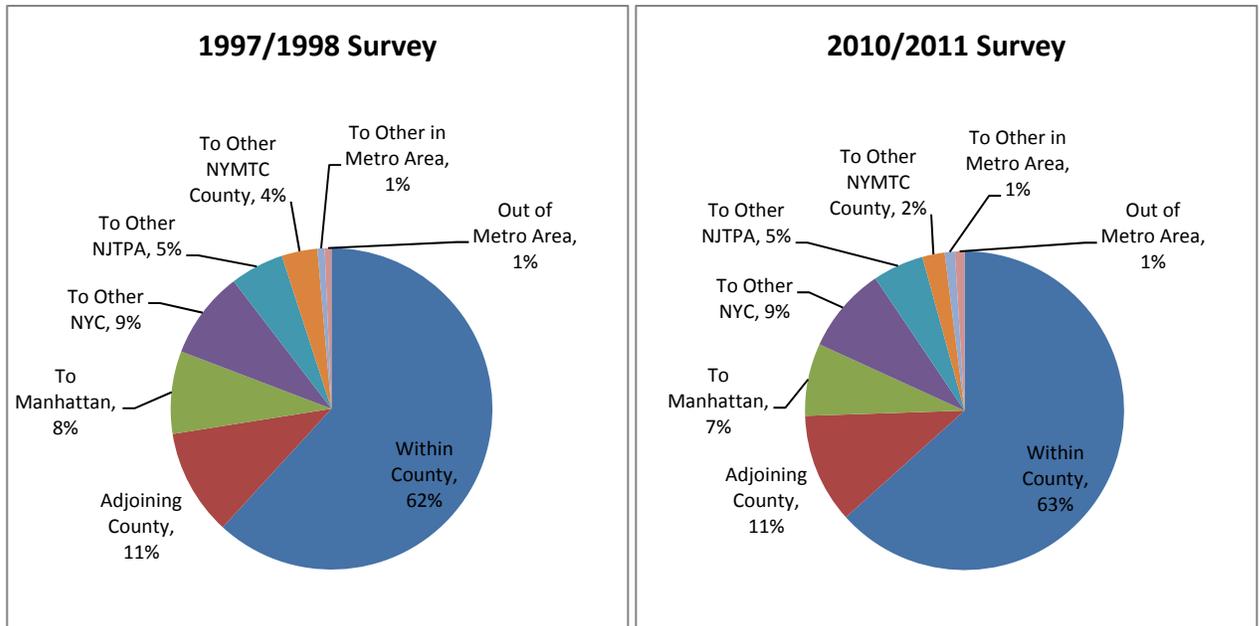
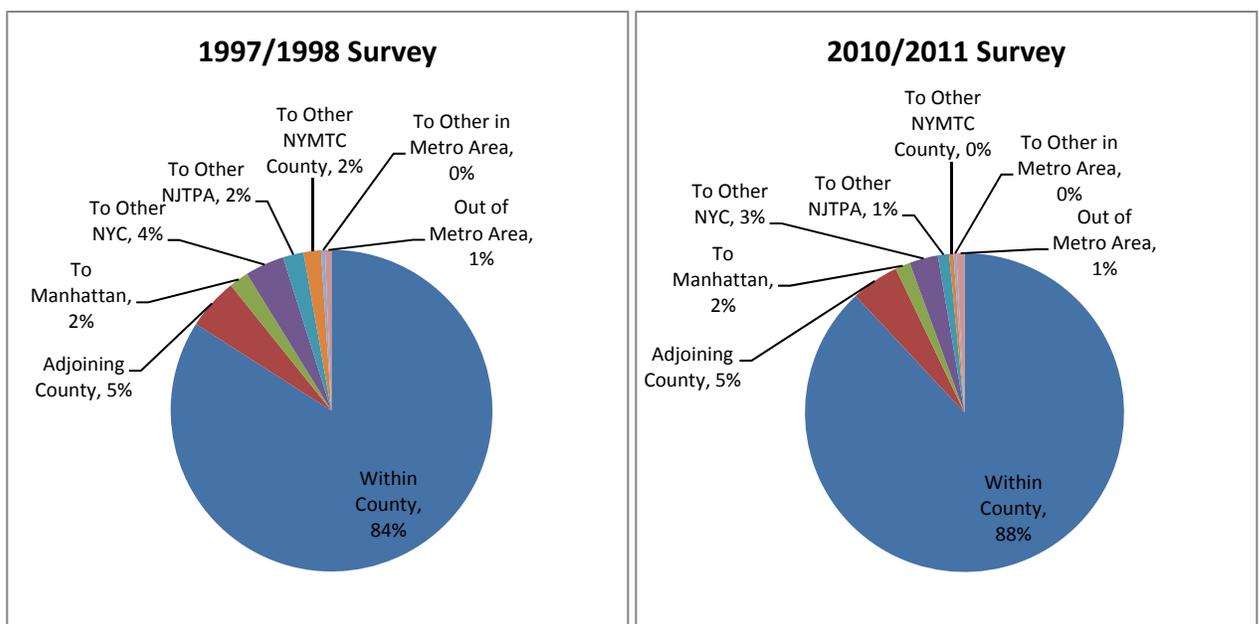


Figure 3: Origin-Destination Patterns in Region (Non-Work Trips)

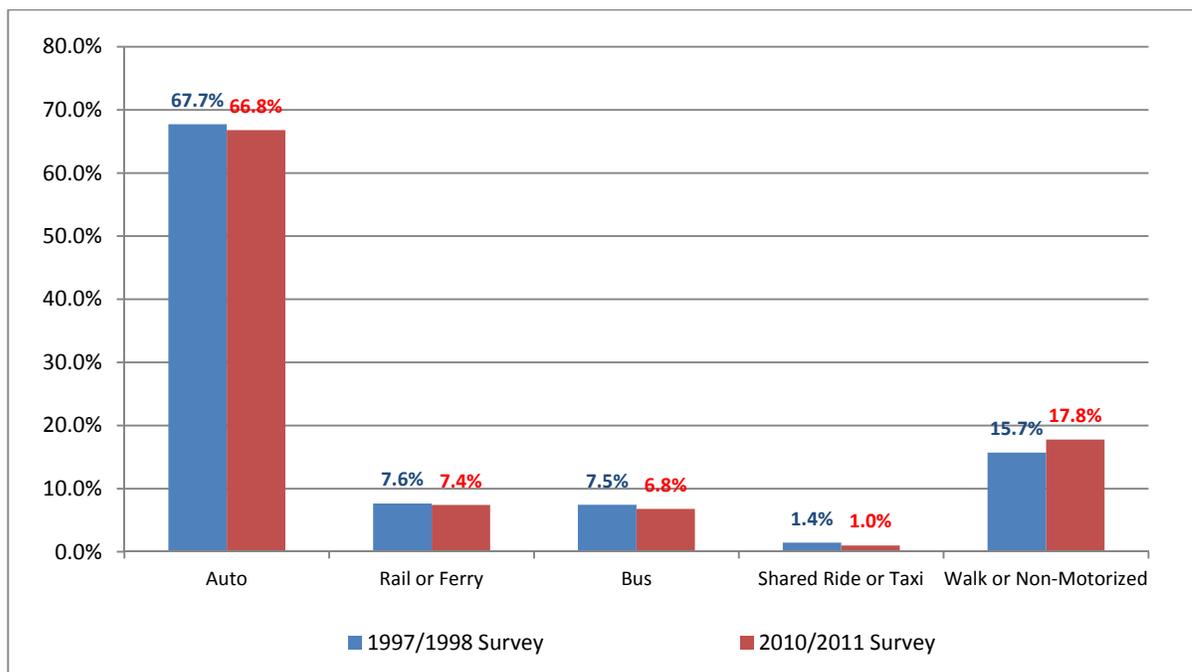


How we travel:

- **NEARLY 67% OF ALL TRIPS IN THE STUDY AREA WERE MADE BY AUTOMOBILE, FOLLOWED BY NON-MOTORIZED TRIPS (18%), DEFINED AS TRIPS MADE BY WALKING AND BICYCLE.**
- **MANHATTAN, THE OTHER BOROUGHS OF NEW YORK CITY, AND HUDSON COUNTY NEW JERSEY HAD THE HIGHEST PERCENTAGES OF NON-MOTORIZED TRIPS WITHIN THEIR PHYSICAL AREAS (56%, 32% AND 31%, RESPECTIVELY).**
- **LOWER INCOME POPULATIONS (MAKING LESS THAN \$30,000 ANNUALLY) ARE MORE LIKELY TO USE BUS SERVICES (10%), OR WALK/BIKE (24%) AS THE MAIN MODE FOR THEIR TRIPS THAN THOSE OF HIGHER INCOME.**
- **PUBLIC TRANSIT SERVES 8% OF ALL WEEKDAY TRIPS IN THE REGION.**

The choice in mode of travel has not changed greatly from the 1997/1998 survey. The majority of all trips in the study area were made by automobile (67%), although there are fewer auto passenger trips than in 1997/1998. Travelers make slightly more walk trips in the 2010/2011 survey; however, this might be due to better accounting of these trips. As expected, Manhattan, the other New York City boroughs and the urbanized areas of Hudson County in New Jersey had the highest percentages of non-motorized trips within their physical boundaries (56%, 32% and 31%, respectively). Except for Brooklyn, Queens, Manhattan and the Bronx, Hudson County is the only county in the study area with an auto mode share less than 70% (with 47% of trips by auto), a non-motorized mode share greater than 25% (with 31% of trips using non-motorized means) or a rail/ferry mode share greater than 5% (with 11% of trips via rail/ferry).

Figure 4: Primary Mode used for All Trips



The purpose of the trip impacts the mode of travel used. Rail is a popular mode for work purposes, while walking is a more popular travel mode for non-work purposes such as shopping and social/recreation trips. The popularity of the bus mode for school trips is primarily due to school buses.

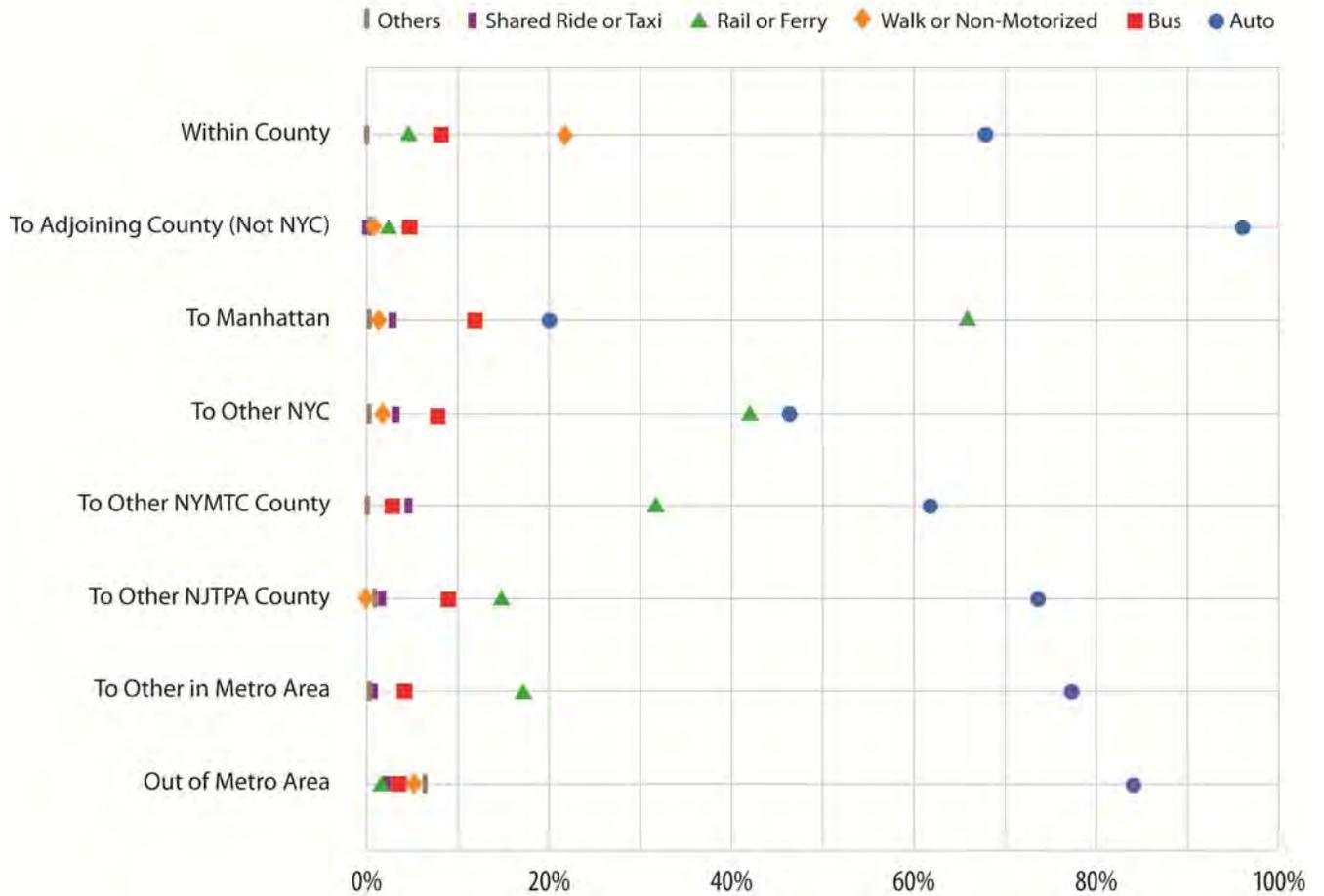
Figure 5: Primary Mode used for each Trip Purpose



- **APPROXIMATELY 67% OF ALL INTRA-COUNTY TRIPS AND 95% OF ALL INTER-COUNTY TRIPS IN THE REGION WERE MADE BY AUTOMOBILE, WHILE 66% OF TRAVEL TO MANHATTAN WAS MADE BY RAIL.**

New York City (the five boroughs) impacts these numbers greatly; for counties outside of the City, 84% of intra-county trips are made by auto.

Figure 6: Primary Mode used for each Destination Location

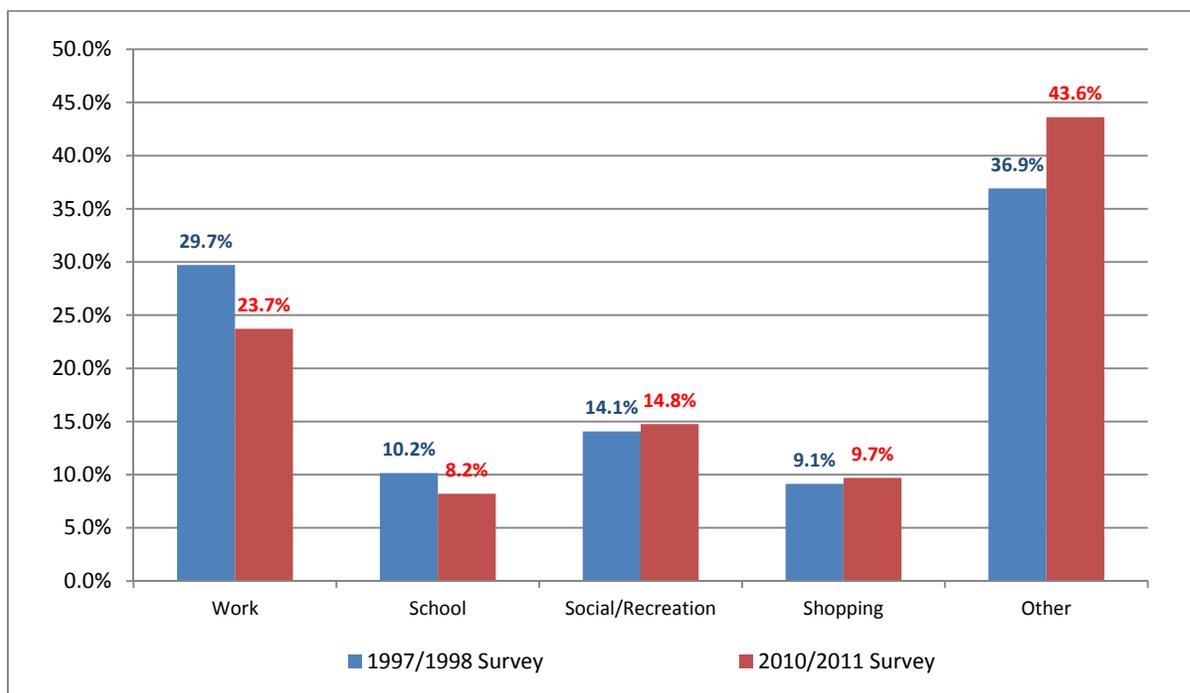


Why we travel:

- **33% OF TRIPS ARE BETWEEN HOME AND THREE MAJOR DESTINATIONS (SOCIAL/RECREATION, SHOPPING, AND SCHOOL); 24% OF TRIPS INVOLVE THE WORKPLACE**
- **OUT OF 44% OTHER TRIPS, 22% OF TRIPS INVOLVE NON-HOME BASED AND NON-WORK BASED TRIPS; THE OTHER 22% ARE HOME-BASED OTHER TRIPS SUCH AS PERSONAL BUSINESS AND SERVICING PASSENGERS (PICKING UP & DROPPING OFF)**

Close to a quarter of all trips are work related, whether commuting to or from work or other trips made due to work obligations (e.g., attending a business meeting). The 2010/2011 survey shows higher shopping and social/recreation trips than 1997/1998; however some of this increase might be due to a better accounting of these trips in the 2010/2011 survey. The GPS component of the survey indicated a tendency to under-report non-work trips in the travel diary; this under-reporting may explain differences in results between the surveys and has been adjusted in the 2010/2011 numbers.

Figure 7: Percentage of Trips by Trip Purpose



When We Travel:

The time periods throughout the day people make their trips have not changed greatly from 1997/1998. Figures 8 and 9 show the distribution of work trips by hour of the day. When aggregating these hours into five time periods (Night, AM Peak, Midday, PM Peak, and Evening), the distribution by time period has changed very little. For example, the figures show a small increase in both work (30% to 31%) and non-work trips (39% to 42%) for the midday (10:00 am-4:00 pm) period. There has also been a slight decrease in work (5% to 4%) and non-work (11% to 8%) trips during the Evening period (8:00 pm-12:00am). Most of this change is due to the GPS adjustment; the GPS portion of the survey provided better accounting of non-work trips.

Figure 8: Distribution of Trips by Time of Day and Time Period (Work Trips)

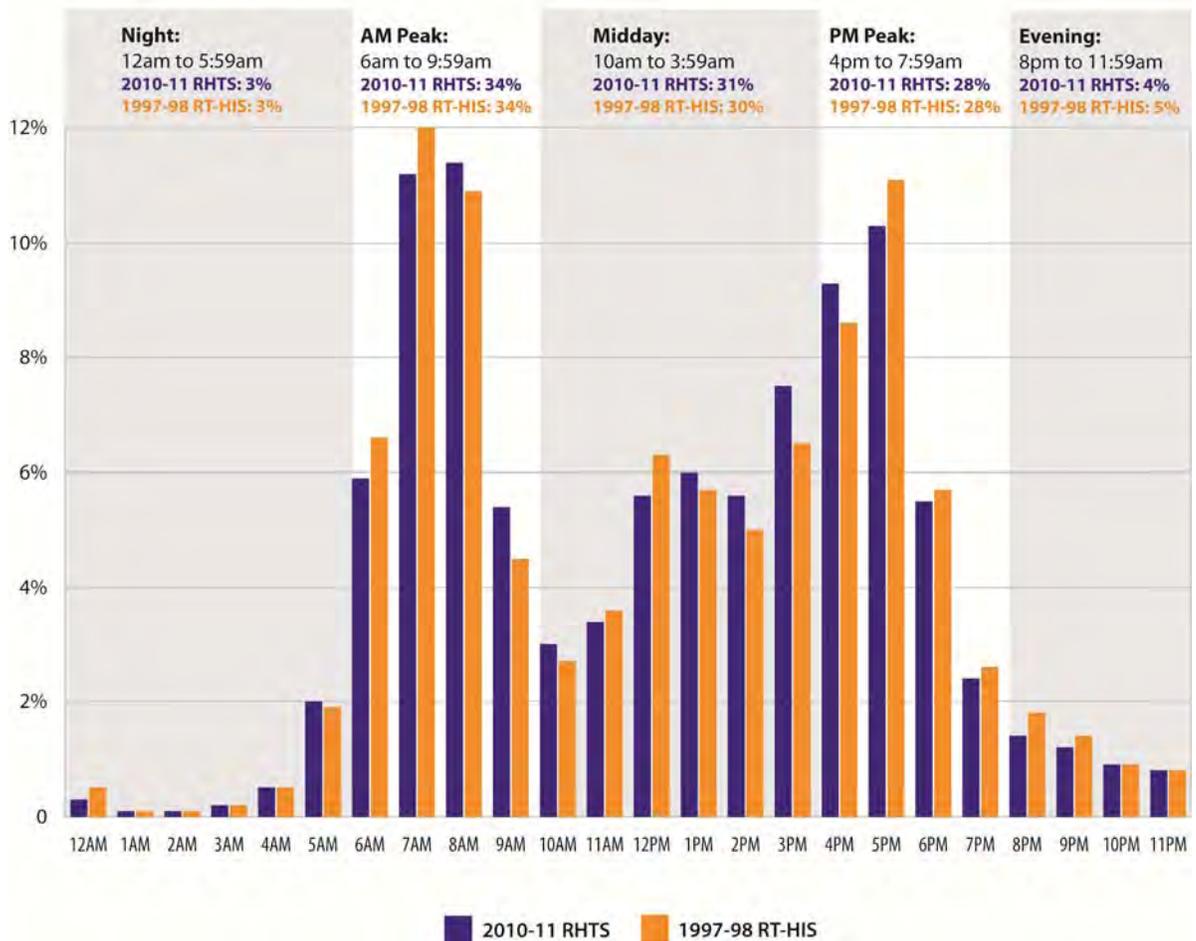
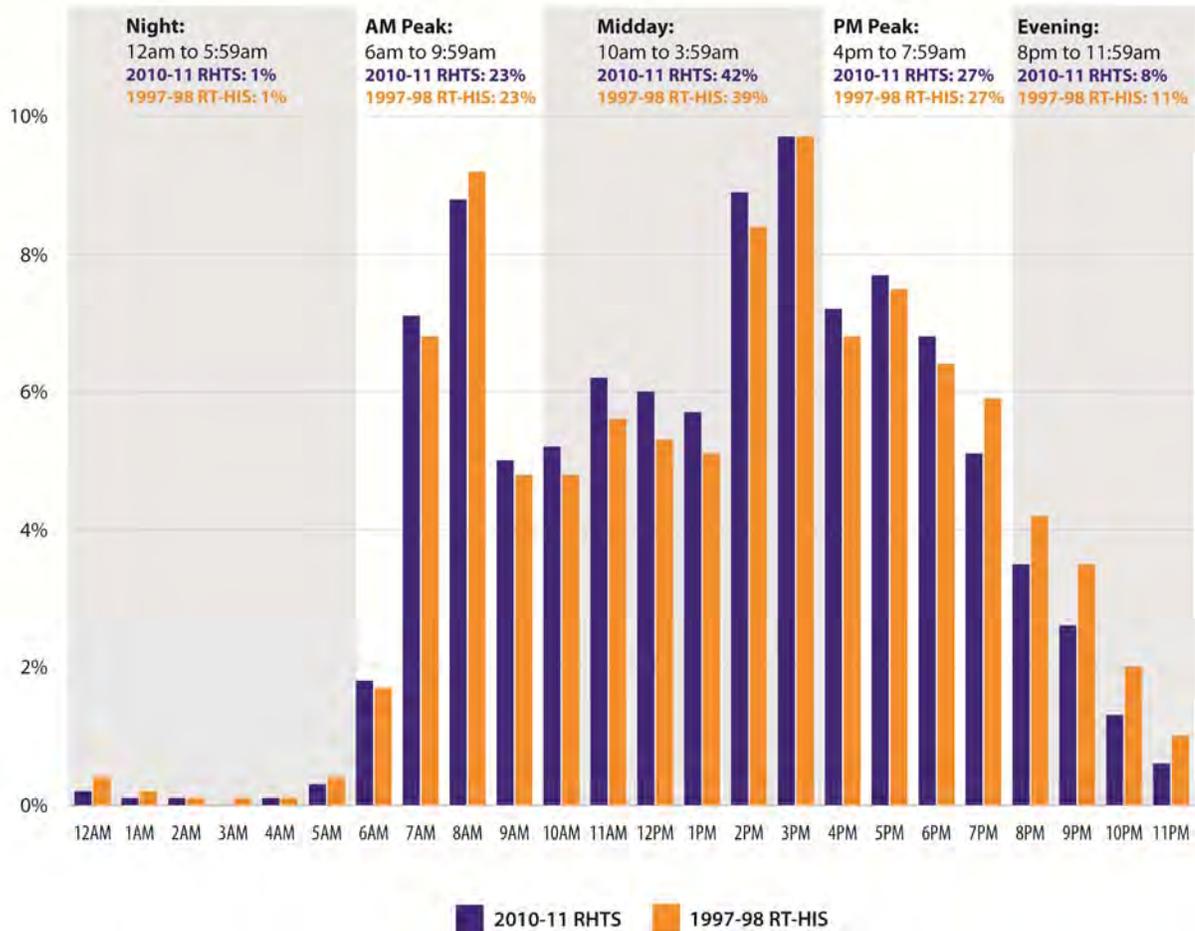


Figure 9: Distribution of Trips by Time Period (Non-Work Trips)



The average number of trips made by each person in a household during the 2010/2011 survey period did not vary substantially across days of the week (between 3.9 and 4.2 trips per person, with an average of 4.0). In 2010-2012 RHTS, there were slightly fewer work trips on Mondays and Fridays, while non-work trips were similar regardless of the day of the week.

Table 7: Person Trip Rates by Day of Week

Day of Week	Work Trip	Non-Work Trip	Total Weekday
Monday	0.9	3.0	4.0
Tuesday	1.0	3.2	4.2
Wednesday	1.0	3.0	4.0
Thursday	1.0	3.0	4.0
Friday	0.8	3.1	3.9
Overall	1.0	3.1	4.0

- **WORK TRIPS IN THE REGION NORMALLY TOOK BETWEEN 32 AND 35 MINUTES, WITH WORK TRIPS FROM MANHATTAN AVERAGING 30 MINUTES, WHILE WORK TRIPS FROM THE OTHER NYC BOROUGHES AVERAGED 42 MINUTES (THE HIGH IN THE REGION)**

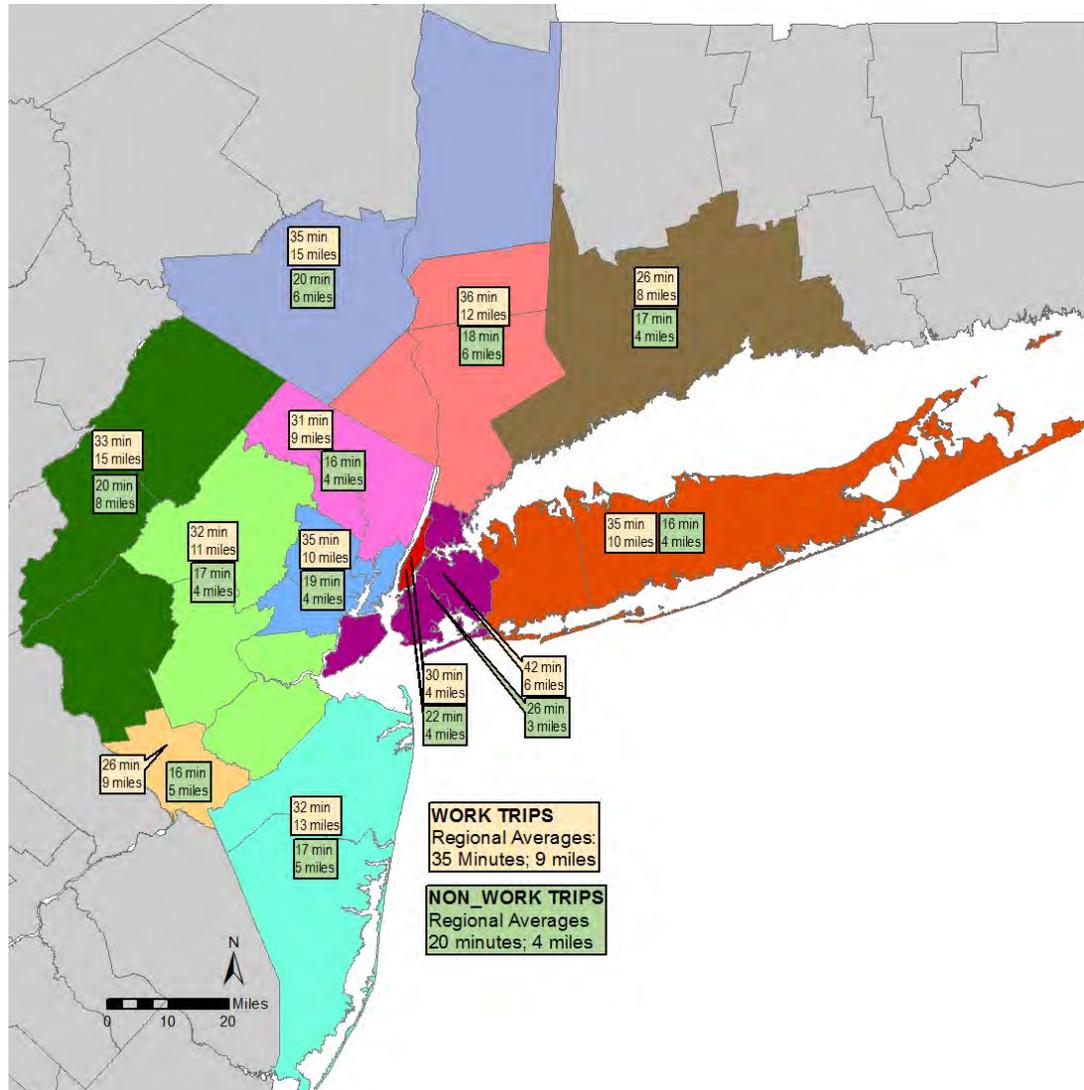
There was minimal difference in travel times between the 1997/1998 survey and the 2010/2011 survey, as shown in Table 8. The mean work travel times reported in the 2010/2011 survey are slightly longer; however, the median work travel times are equal, which implies a minor increase in the travel times of longer commutes. There is also very little change in the travel time for non-work trips; the decrease in the median travel time appears to be mostly due to the increased reporting of shorter trips.

Table 8: Mean and Median Travel Times

	1997/1998 Survey	2010/2011 Survey
	Mean (median)	Mean (median)
Trip Times (all trips)	24 min (15 min)	23 min (15 min)
Work Related	33 min (25 min)	35 min (25 min)
Non-Work Related	20 min (14 min)	20 min (12 min)

Most work trips in the region normally took between 32 and 35 minutes, with work trips from Manhattan averaging 30 minutes, while work trips from the other NYC boroughs averaged 42 minutes (the high in the region). Average trip distances tended to be less (especially for work trips) in the urban areas, while travel times were similar or slightly longer, probably due to the greater usage of slower modes (e.g., walking, local buses).

Figure 10: How far and how long do we travel by origin location of trip



The RHTS data will serve as a rich source of data for further analyses and understanding of travel in the NYMTC and NJTPA region for years to come. The full report, including the public dataset, is available for download on both the NYMTC and NJTPA websites (www.nymtc.org and www.njtpa.org)

1.0 Objectives of the Survey

1.1 Background of the Survey

The Regional Household Travel Survey (RHTS) is a comprehensive study of the demographic and travel behavior characteristics of residents in the New York Metropolitan Area. Sponsored by NYMTC and the NJTPA, the survey data obtained through this effort will support the development and update of travel demand models and assist public decision-makers in better understanding how well the transportation system is functioning under the demands placed upon this system.

The RHTS had three phases: design, pre-test, and main survey data collection. The design phase took place from late 2009 to early 2010, and it included the development of the work plan and sampling plan, the identification of data elements, materials design and database programming. The Pre-test effort took place between March and August 2010 and served as a dress rehearsal for all processes required for the main survey. The main survey data collection effort took place from September 2010 and concluded in November 2011.

The project design called for a traditional household travel survey with a subsample of households equipped with global positioning system (GPS) equipment to provide an independent measure of travel. Sampled households were contacted by telephone and/or mail to secure their participation in the survey and complete the recruitment questionnaire; they were then mailed personalized diaries to report their travel for an assigned 24-hour period. Travel details were retrieved by telephone, mail, or online, processed, and then subjected to rigorous quality control checks. This protocol was followed for both the non GPS sample and the GPS subsample.

**Table 1-1:
Overall Completed Survey Summary**

County of Household	Project Target	Overall Completed Surveys
Fairfield	456	462
New Haven	467	465
Bergen	989	972
Essex	758	787
Hudson	1,042	993
Hunterdon	287	326
Mercer	282	328
Middlesex	749	757
Monmouth	704	679
Morris	488	540
Ocean	602	573
Passaic	432	439
Somerset	297	332
Sussex	326	340
Union	548	546
Warren	271	290
Bronx	1,094	1,090
Dutchess	458	463
Brooklyn (Kings)	1,323	1,350

County of Household	Project Target	Overall Completed Surveys
Nassau	1,062	1,050
Manhattan (New York)	1,511	1,575
Orange	349	338
Putnam	271	272
Queens	1,292	1,297
Staten Island (Richmond)	448	454
Rockland	312	315
Suffolk	1,211	1,173
Westchester	770	759
Total	18,799	18,965

1.2 Regional Best Practice Model: Travel Forecasting

The RHTS is an essential element for estimation, calibration and validation of NYMTC's travel demand model, the New York Best Practice Model (NYBPM). In addition to supporting NYMTC model updates, the RHTS will provide data necessary for the updates and validation of NJTPA's North Jersey Regional Transportation Model – Enhanced (NJRTME). Along with supporting travel demand modeling projects, the RHTS will provide a wealth of information that can be used to support other planning analyses across the region by helping transportation professionals understand travel behavior in the New York/New Jersey/Connecticut metropolitan area.

1.3 The RHTS and Other Travel Surveys and Databases

The RHTS data set is a rich source of information about the travel patterns of residents in the 28-county study area. As a supplement to this report, the Data User's Manual provides information about how the contents of the RHTS data set compare with those of the 2010 Census, the 2009 National Household Travel Survey (NHTS) and the 1997/1998 Regional Travel-Household Interview Survey (RT-HIS). These comparisons are arranged in the order of the 2010/2011 RHTS data file and include three elements: 2010/2011 RHTS variable, an indication of comparability with the 2010 Census variable, an indication of comparability with the 2009 NHTS variable, and an indication of comparability with the 1997/1998 RT-HIS variable. Please see the **Data User's Manual** for comparability of the RHTS data set with the content of other travel surveys and databases.

1.4 Availability of RHTS Data Products

In addition to this report, the data collected and processed during the RHTS survey effort and the Data User's Manual are available at the NYMTC and NJTPA websites for download, www.nymtc.org and www.njtpa.org.

1.4.1 Data Files

The data collected under the RHTS resides in eight relational database data files:

Household – Basic demographic information about each of the 18,965 households participating in the travel survey;

Person – Demographic information about each of the 43,558 participants in the survey effort;

Vehicle – Vehicle information for each of the 29,043 household vehicles reported during the RHTS;

Place – Information about each of the 231,715 unique places visited during assigned respondent weekday travel days.

UnLinkedTrips – Unlinked trip or trip-segment information, where either the From or To place may include a Change in Mode of travel (e.g. bus stop, train station, Park N' Ride facility, etc.) for 188,199 trip segments.

LinkedTrips – Information for 143,925 linked trips, where the From place represents a trip Origin and the To place represents a trip Destination. The linked trips may or may not have stops. For trips involving multiple modes, an “aggregate” Trip Mode is defined, based on a prescribed hierarchy of modes (the decreasing order of hierarchy of modes is as follows: (1) School Bus, (2) Taxi, (3) Commuter Rail, (4) Express Bus, (5) Subway, LRT, Tram, PATH, Ferry, (6) Other Bus, (7) HOV, (8) Local Bus, SOV, (9) SOV, (10) Bike, (11) Walk, (12) Air Train or Other.

Tour – File specifically developed for NYBPM. This file includes 53,611 tours. A tour is defined as travel from home to a principal location. The principal location can be work, school, university or location/destination. A tour may or may not have stops. Each record is a full Tour (Home-based), and the file is structured according to the logic of tour-based model estimation files, including information about each segment and leg of the tour delineated by tour Destination and Stops.

Subtour – File specifically developed for NYBPM. **Subtours** are special tours that are anchored on a Primary Destination (e.g. lunch or business meeting while at work) at one end and work on the other end. These are also defined as ‘at work’ trips. Each record is a full Subtour (non-Home-based), and the file is structured according to the logic of tour-based model estimation files, including information about each segment and leg of the subtour delineated by tour Destination and Stops. This file includes 2,400 subtours.

2.0 Survey Planning and Approach

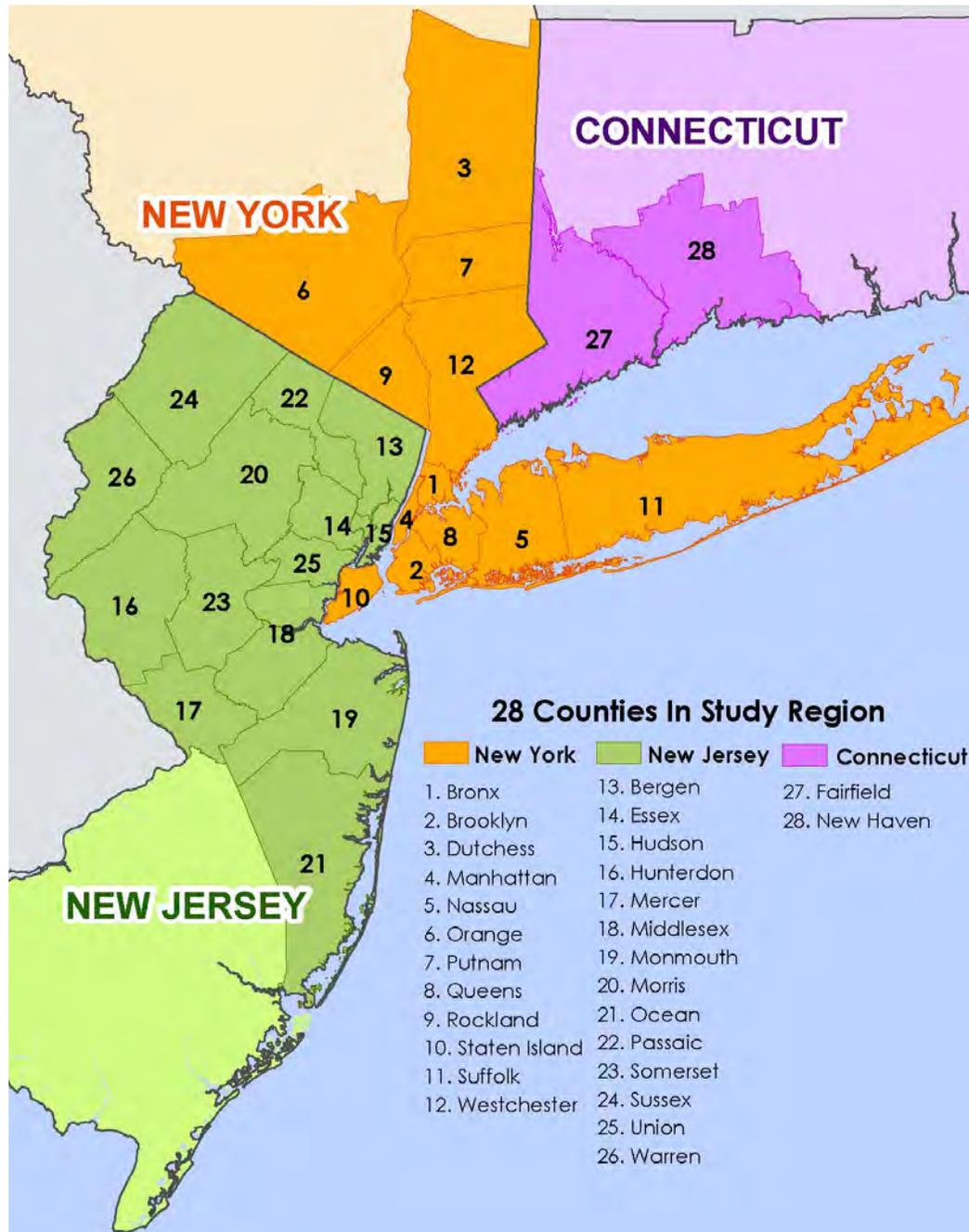
2.1 Metropolitan Study Area

Consistent with the objectives of the survey, the RHTS sampling plan was developed considering the composition of the planned sample along two dimensions: (1) by jurisdiction (specifically, counties) and (2) by subareas (i.e., groups of NYBPM Transportation Analysis Zones (TAZs)) within counties that have distinct selected travel characteristics for which it was useful to obtain more observations than would result from proportional sampling of counties.

There are 28 counties in the metropolitan study area, which can be logically grouped into five sub-regions as follows and as shown in Figure 2-1:

1. New York City (NYC) – five boroughs comprised of Manhattan (New York), Queens, Bronx, Brooklyn (Kings), and Staten Island (Richmond) counties;
2. Long Island – Nassau and Suffolk counties;
3. Mid-Hudson Valley – Westchester, Dutchess, Putnam, Rockland and Orange counties;
4. New Jersey – Bergen, Passaic, Hudson, Essex, Union, Morris, Somerset, Middlesex, Monmouth, Ocean, Hunterdon, Warren, Sussex, and Mercer counties;
5. Connecticut – Fairfield and New Haven counties.

Figure 2-1:
Regional Household Travel Survey Study Area



Note: Task 2.2.2 Final Sample Plan 11/15/2010

2.2 Data Requirements and Survey Content

The specific items to be collected were determined by NYMTC, NJTPA and NuStats over the course of planning for the RHTS, and based on three key considerations:

1. Review of the adequacy and limitations of available data on current household travel in the study area;

2. Identification of the full range of data items required to be collected for the NYBPM and the NJRTME;
3. Consideration for “respondent burden” associated with traditional household travel surveys, with the aim to minimize the potential burden associated with the amount of information each participant is asked to report. This included consideration of sensitive data items (e.g. household income or respondent ethnicity), and the length of the survey interview.

The final list of data items collected for the main survey is shown in Table 2–1, below. A data dictionary, complete with variable names, descriptions, and code lists, is included and can be found in the **Data User’s Manual**.

(TABLE 2-1 follows – for demonstration purposes, will be formatted appropriately for final report)

Table 2-1
Data Items in Household, Person, Vehicle and Place Files

Household		
• Mode of Recruitment	• Date of Assigned Travel	• Political Boundaries: Level 3
• Mode of Retrieval	• # Household Vehicles	• Home TAZ (NYMTC)
• County of Residence	• # Household Students	• Home Census Tract 2010
• Sampling Bin (Geographic Flag)	• # Household Workers	• Flag for Partially Completed Households
• GPS Sub-Sample Flag	• # Household Drivers' Licenses	• Level 2 Weights
• Sample Type	• # Household Children	• Household Structure
• Language of Interview	• # Household Trips (Computed)	• # Household Trip by different modes
• Residence Type	• Willingness to Participate in Future Surveys	• # Household Trip by Work/Non-Work Purpose
• Household Size	• Home State	
• Land-Based Telephone Service	• Home Zip Code	
• Household Language	• County Group: Level 1	
• Household Income	• Regional Boundaries: Level 2	
• Day of Week of Travel		
Person		
• Gender	• Work Location TAZ (NYMTC)	• Mode of Transport to School
• Age	• Work Location Census Tract (2010)	• Frequency of Bike Travel to School
• Driver's License Status	• Work Location County	• Typical Travel Time to School
• Availability of Cellular Phone	• Mode of Transport to Work	• Travel Diary Completed
• Relationship to Head of Household	• Frequency of Bike Travel to Work	• Have Completed Diary
• Hispanic Origin	• Typical Travel Time to Work	• Proxy Reporting Flag
• Race/Ethnicity	• Commercial Driving	• # Person Trips (Computed)
• Disability Status	• Household Vehicle Number Commercially Driven	• Reason for No Travel
• Type of Disability	• Employer Transportation Benefits Offered	• Flag for Partially Completed Persons
• Employment Status	• Employer Transportation Benefits Offered	• Level 2 Weights
• Volunteer Status	• Work Start/End Times	• County Group: Level 1
• Work Status (computed)	• Flexible Work Schedule	• Regional Boundaries: Level 2
• Unemployment Status	• Work Start/End Time Variation	• Political Boundaries: Level 3
• Job Hours	• Student Status	• Life Cycle Status
• Telecommute Hours	• Grade Level Attending	• # Person Trip by different modes
• Compressed Work Week	• School Location (Home/Other)	• # Person Trip by Work/Non-Work Purpose
• Industry	• School State	
• Occupation	• School Zip Code	
• Employer Type	• School Location TAZ (NYMTC)	
• Work Location (fixed/varies)	• School Location Census Tract (2010)	
• Work State	• School Location County	
• Work Zip Code		

Vehicle

- Year of Vehicle
- Body of Vehicle
- Type of Fuel
- E-Z Pass Tag
- Vehicle Used on Travel Day
- Reason Vehicle Not Used
- Level 2 Weights

Place

- Place Name
- Primary Trip Purpose
- Secondary Trip Purpose
- Transportation Mode
- Total People Traveling
- Household Members on Trip
- Person Number on Trip
- Non-Household Members on Trip
- Vehicle Number
- Exit Vehicle at Place
- Parking Location
- Parking Description
- Pay to Park
- Amount Paid to Park
- Pay to Park Unit
- Paid Fee for Toll Road/Bridge/Tunnel
- Toll Road or Bridge/Tunnel
- # of Toll Facilities Used
- Name of Toll Facilities
- Interchange Used to Enter Toll Facility
- Interchange Used to Exit Toll Facility
- Toll Payment Method
- Route/Line # for Transit Trips
- Transit Service Used
- Transit Fare Type
- Transit Fare Cash Amount
- Transit Pass Type Used
- Type of Unlimited Ride Metrocard
- Transit Pass Cost/Unit
- Arrival Time
- Departure Time
- Activity Duration (calculated)
- Trip Duration (calculated)
- Trip Distance (straight-line)
- State
- Zip Code
- Speed Check Flag
- Flag for Long Trip Duration
- Location Imputed by NYMTC/NJTPA
- Missing Transit Information
- Note from NYMTC/NJTPA Data Review
- Flag Indicating Record was changed during data QC
- Level 2 Weights
- County Group: Level 1
- Regional Boundaries: Level 2
- Political Boundaries: Level 3
- County FIPS
- TAZ (NYMTC)
- Census Tract 2010

2.3 Sampling Plan

The preparation of the sampling plan made extensive use of the data collected in the first major regional travel survey conducted by NYMTC and NJTPA in 1997/1998 (RT-HIS), and lessons learned from the use of those survey data for model development. Like that survey did for the original development of the NYBPM, the RHTS provides critical data to support its future update and improvement, as well as for other travel demand models in the region including NJTPA's NJRTME and the New York Metropolitan Transportation Authority's (MTA) Regional Transit Forecasting Model (RTFM). The RHTS sampling plan covered the entire 28 county three state region that is modeled in the NYBPM, and its design attempted to account for the very large size of the region (7.9M households) and the unique diversity of its demographics, transportation systems, travel choices and behavior. The plan was successful in producing a robust and rich sample dataset for effective use by NYMTC, NJTPA and other agencies in the region for ongoing travel forecasting and model development activities.

2.3.1 Sampling Plan Goals

The development of the RHTS sampling plan was based on a methodology that would find the optimal yield of sampled trips to support future regional updates and improvements of the NYBPM. There are two essential and distinct aspects of how the sample of survey trip and tour data will be used for model development:

1. Model Calibration and Validation: The survey data, when expanded, need to provide reliable estimates of the aggregate travel measures for important selected outputs of the model when applied in the base year, segmented by mode, purpose, time of day and origin-to-destination patterns. For this modeling objective, the larger the overall sample, the less sampling error there is and more reliable are the "calibration targets" that the survey can yield — both overall and for important travel market segments (or "cells") which will grow proportionately to the overall sample. This is true whether targets are expressed as absolute numbers or, as more often is the case in model calibration, as shares (e.g., mode shares). There are, however, continuously diminishing returns in the improvement of sample reliability with increased sample size. The marginal costs also increase almost linearly, with a fixed cost per household added. Balancing resources and survey costs, the overall sample size for the RHTS was established as 18,800 households. This is a substantial increase of about 70 percent over the prior survey, the RT-HIS. Despite its relatively large size, however, the sample can be "thin" for certain travel segments important to modeling in this large and diverse region.
2. Statistical Estimation of Choice Models: New survey data will also allow NYMTC to revise the behavioral relationships that comprise the core choice models of the NYBPM (auto availability, tour frequency, and destination, mode and stop choice). It is expected that the new survey will support statistical testing and estimation of both extended model structures for existing choice models (an expanded mode choice set), and new models (e.g. as integrated behavioral time of day or activity scheduling components).¹ Statistical efficiency and accuracy in the estimation of

1 The existing and anticipated choice models in the NYBPM are logit-based models that give the probability of the selection of each available travel choice, based on the overall utility of each choice, as calculated using equations that are linear (additive) combinations of the utility of the various possible factors affecting the choice — typically measures of travel times, costs, traveler attributes, and other factors. Model estimation is the statistical process by which factors in the applied models are selected, and the value of the coefficients (i.e. sensitivities) applied to each of them are derived, based on the statistical effectiveness in explaining the observed behavior (choices made from choices available) of the survey respondents.

these models come from obtaining adequate sample sizes for each of the observed choices, including low incidence cases, such as choice of Ferry in the mode choice model. While such “rare” behaviors are important, they represent a relatively small share of overall regional travel and are hard to capture in useful numbers within a strictly proportional sample, and so need to be oversampled instead.

The RHTS sampling plan was developed in four stages, reflecting a progressive consideration of the survey sampling objectives and constraints discussed in Section 2 of the final Sample Plan.

1. *Preliminary Sample (Stage 1)* County-based, with sample sizes first estimated for a hypothetical plan in which a single uniform sampling rate (2.04 per 1000 = 16,100 sample / 7,893,000 estimated households) would be used everywhere in the region, and consequently the obtained samples in each county would be strictly proportional to each county’s share of the total households in the region.
2. *Preliminary Sample (Stage 2)* County-based, but with established minimum and maximum county sample sizes imposed. The minimum sample size adopted in the RHTS for county-level statistical reliability relating to sampling error was based on the same criteria (+/- 5 percent at the 90% confidence limit for a proportional measure) as in the RT-HIS, corresponding to a target minimum of 271 sample households per county. Maximum county sample sizes were also established and applied in order to improve the overall efficiency of the sample, since only relatively small increases in sampling error stem from decreases in large samples, while fairly big sample error reductions are gained when increasing the sample size in smaller counties by using the “released” sample from the large counties.
3. *Pre-Final (Stage 3)* Area Type, Transit Accessibility, and TAZ-based analyses of differential sampling rates, with targeted over-samples developed to enrich the expected travel data needed for future updates and extensions of the NYBPM, and with final overall balancing to county controls.
4. *Final Sample (Stage 4)* To achieve both the county sampling goals from Stage 2 and the targeted over-sampling goals from Stage 3, a matrix was created with two sets of final sampling rates for survey implementation, 1) by Census tract-based Sampling Bins, each with a planned uniform rate of sampling, ranging from a low of 0.871 to a high of 12.08 households per 1,000 households, and 2) County-based average sampling rates as rebalanced, ranging from 1.38 to 6.47 per 1,000 households.

The targeted allocation of the 18,800 completed samples by County and by Sampling Bin is shown in Table 2-2. Since final sampling rates were balanced across both dimensions, however, the actual allocation of the obtained sample was expected to vary from the cell values in this table (County by Sample Bin) for several reasons:

- The actual geographic distribution of households in 2010 was expected to vary from the SED small area data used to develop the sampling frame,
- Completion rates would not be uniform as is implied by the numbers in this table, but were expected to differ due to varying response rates across the subareas, even with tracking and ongoing adjustment done in the recruitment of households for participation.

Consequently, it was not intended that the final obtained sample would exactly match the individual sampling cells in Table 2-2, but would instead closely approximate the row and column totals, namely the County and Sample Bin size values. As such, it was proposed that sample quotas for completed household samples be established as plus or minus 2% of the County values shown in Table 2-2, and within 5% of the Sample Bin values. Based on these criteria, the minimum and maximum sample sizes are also shown for each in the table. For additional detail on the sampling methodology employed and

the sampling plan, please see Technical Memorandum 2.2.2: Final Survey Sample Plan (available on www.nymtc.org).

Table 2-2:
Final Sampling Plan: Sample Targets by County and Sample Bin

NYM_CO	HHS_SAMPLE_FFF																					Acceptable Sample per County Households					
	SAMPLE_BIN SAMPLE_RATE_1000 (Binned)																					Min	Max				
1 MANHATTAN						309					586	266		15			92	56		186			1,511	8.0%	1,480	1,541	
2 QUEENS				424					252				523				32	61						1,292	6.9%	1,266	1,317
3 BRONX							530							147		168			0	173		76	1,094	5.8%	1,072	1,116	
4 BROOKLYN			424					673						172			14	28		13			1,323	7.0%	1,296	1,349	
5 STATEN ISLAND	13	6		34										100		69	148	78					448	2.4%	439	457	
6 NASSAU					255												419	75	22	34			1,062	5.6%	1,041	1,083	
7 SUFFOLK			220									165				710	16			19	80		1,211	6.4%	1,187	1,235	
8 WESTCHESTER		75									266				179		189			10	51		770	4.1%	755	786	
9 ROCKLAND			24								22					149		15	11			91	312	1.7%	306	319	
10 PUTNAM																			231		40		271	1.4%	266	276	
11 ORANGE									151							52		65	82				349	1.9%	342	356	
12 DUTCHESS															234				82		117	25	458	2.4%	449	467	
13 FAIRFIELD	172									135			119			32							456	2.4%	447	466	
14 BERGEN			128									107			154		368	10		179	42		989	5.3%	969	1,009	
15 PASSAIC				74									47			104	207						432	2.3%	424	441	
16 HUDSON																498		321	147		75		1,042	5.5%	1,021	1,062	
17 ESSEX					184	26								206			154	39		29	120		758	4.0%	743	773	
18 UNION			53									68			122		248				58		548	2.9%	537	559	
19 MORRIS			85									43			125		43	32		160			488	2.6%	479	498	
20 SOMERSET					84								16				157	44					300	1.6%	294	306	
21 MIDDLESEX				60								278				177	122		112				749	4.0%	734	764	
22 MONMOUTH	47	40								32				104		183			26		272		704	3.7%	690	718	
23 OCEAN	98						3						102		105					293			602	3.2%	590	614	
24 HUNTERDON																73			53		11	147	284	1.5%	278	290	
25 WARREN																	171			40	60		271	1.4%	266	276	
26 SUSSEX														116							210		326	1.7%	320	333	
27 NEW HAVEN		207									69				181			10					467	2.5%	458	477	
28 MERCER									171							59		51					282	1.5%	276	287	
Total	330	328	934	592	255	577	560	673	573	822	554	1,356	803	1,020	895	1,931	2,450	916	806	1,079	1,347	18,800					

1.8% 1.7% 5.0% 3.1% 1.4% 3.1% 3.0% 3.6% 3.0% 4.4% 2.9% 7.2% 4.3% 5.4% 4.8% 10.3% 13.0% 4.9% 4.3% 5.7% 7.2% 100.0%

Per Stage 3 Sample Bin

Minimum	314	312	887	562	242	548	532	639	545	781	526	1,288	763	969	851	1,835	2,328	870	766	1,025	1,279
Maximum	347	344	980	621	267	606	588	706	602	863	582	1,424	843	1,071	940	2,028	2,573	962	846	1,133	1,414

5% Tolerance Factor - Sample Bins

Tolerance Factor - Counties

2%

2.3.2 Survey Universe

The survey universe includes all residential addresses within the RHTS tri-state metropolitan study area.

2.3.3 Sampling Frame

Before every survey quarter, a systematic random sample of addresses for each county in the study area was purchased, ensuring that the new sample was purged of duplicate addresses from preceding quarters. Sufficient sample records were purchased to obtain the target number of completed households each quarter as specified in the interviewing plan for the main survey. During main survey data collection, a monthly sample analysis was conducted by county to identify patterns of non-response across counties and within county by area type, so that adjustments could be made in the required number of sample records for the subsequent quarter to account for non-response patterns.

A sampling frame was used, consisting of a current listing of city and rural route residential postal addresses for the study area as contained in the delivery sequence file (DSF) of the U.S. Postal Service.

This file is a computerized database that contains all delivery point addresses; as point of fact, the Census Bureau's Master Address File is updated by using the DSF. The second generation of this database was purchased from Marketing Systems Group (MSG).

The frame was stratified to obtain reliable data for estimating NYBPM mode choice model and travel measures at the county level. To do this, the modeled area was divided into five geographic areas defined by major jurisdiction and area type. These geographic areas are defined in Section 2.1 of this report.

Using the address-based frame, addresses were matched to landline telephone numbers for proactive contacting of prospective respondents. This preliminary matching process resulted in two types of sample households: (1) households that could be matched to a landline telephone number and (2) households that could not be matched. The latter samples that could not be matched to a landline telephone number are called "Unmatched Households," which includes non-telephone and cellphone-only households. Households in the latter category were offered a monetary incentive of \$50 to participate – paid upon verification that data from the household was complete and accurate. GPS households were also offered a monetary incentive of \$25 (payable upon completion verification) to encourage participation and prompt return of the GPS equipment. The monetary incentive was additive, and thus, Unmatched GPS households were offered \$75; an increase in value proportionate to the increase in respondent burden. These initial incentives were later revised. Final incentive structure employed for the main study is discussed later in this report.

Once samples were reviewed to ensure that there were no duplicate addresses or unmatched telephone numbers, the records were replicated. A replicate is a systematically selected subsample that is geographically representative of the entire county sample. The main benefit in using replicated samples is that the interviewers do not need to contact the entire sample in order to ensure proper representation of the county.

The sample records were managed in a centralized manner using Voxco Interviewer™ – off-the-shelf Computer Assisted Telephone Interviewing (CATI) software with a very powerful sample management component. Sample management tracked the results of contacts in two key ways: (1) Dispositions and (2) Stages. Dispositions were either "final," "non-final current," or "dominant." Final dispositions were permanent and closed the record from further contacts. The other two disposition types could change during sample management. Non-final current dispositions represented the outcome of the most recent contact attempt. Dominant dispositions described the most relevant contact outcome for each sample record. Stage was associated with the dominant disposition and determined the protocol that was used until a final disposition was reached. The stages were hierarchical. Sample records could only progress through these stages – they could never go back to a lower stage.

Expected Survey Participation Rates

The original project budget and production planning were based on the assumption that 71% of all recruited households would be retrieved; this estimation was based on the contractor's previous experience. There was a known possibility that participation rates for the RHTS might differ due to many localized factors, including the number and performance of mail-back and online survey participation. During data collection, the actual participation rates were monitored daily and necessary steps taken in terms of sampling and interviewing strategies to ensure that overall project goals were met. Final participation rates are discussed in detail in section 3.5 of this report.

2.4 Survey Pre-Test

The purpose of the Pre-test phase was to test survey instruments and materials planned for the main survey in order to assess respondent reaction, data collection processes and budget assumptions. The main objectives of the Pre-test phase were:

- 1) To test respondent materials to ensure they were applicable and understood by all respondent groups, despite differences in geography and demographics;
- 2) To program and test the core programs and processes;
- 3) To program and test the GPS processes and to ensure that the GPS component was properly designed to yield the desired data; and
- 4) To evaluate project team performance and respondent participation rates in light of original cost assumptions.

The RHTS Pre-test consisted of all necessary data collection activities required to produce a dataset. These activities included sample generation; advance notification; recruitment; placement of respondent materials; reminder calls; retrieval; quality assurance; and data delivery. The Pre-test focused on all counties within the study area. In total, 1,187 households were recruited into the Pre-test survey, of which 173 were flagged as GPS; complete and usable data were obtained from 714 households, of which 115 participated in the GPS sub-sample.

Throughout all Pre-test activities, the focus was to target areas for improvement prior to the start of the main survey. Its role was critical in the survey—it was not designed to make everyone “comfortable,” as that approach would have resulted in inadequate and insufficient evaluation of the process, but rather was referred to as a “dress rehearsal” specifically for this reason; it was a road test of all systems and respondent materials to ensure everything was in place and ready for main survey implementation. As such, the Pre-test households were not included as part of the final dataset.

2.4.1 Methods and Design

A two-phase, multi-modal survey design was used for the survey. This consisted of a recruitment interview, assigning a travel day for a household, mailing the diary packets, and a retrieval interview or online survey. Respondents had the option to participate in both phases (recruitment and retrieval) by mail, phone and web².

The main elements of the Pre-test were:

- Materials Development
- Advance Letter Mailout (with Contact Card for unmatched sample)
- Survey Instrument Design
- Computer Assisted Telephone Interviewing (CATI) / Computer Assisted Self Interviewing (CASI) software programming
- Reminder Postcard
- Development of Public Website
- Interviewer Training

² CASI/Web retrieval was available in English and Spanish.

- Data Collection
- Diary Packet Mailout
- Data Cleaning and Quality Checks

The Pre-test also included a GPS component for a small portion of the sample. The Pre-test was conducted in English and Spanish³.

Using an address-based sample frame, addresses were matched to landline telephone numbers where possible. This preliminary matching process yielded two types of sample: (1) a sample that could be matched to a landline telephone number and (2) a sample that could not be matched. The latter sample that could not be matched to a landline telephone number represents non-telephone and cell-only households. Households in the latter condition were offered a monetary incentive of \$50 to participate – paid upon verification that data from the household was complete and accurate. GPS households were also offered a monetary incentive of \$25 (payable upon completion verification and return of the GPS equipment) to encourage participation.

The Pre-test mailout was sent via U.S.P.S. in a 6 ½” by 9 ½” envelope that had the project logo. For matched samples, the mailing contained only the advance letter on project-specific letterhead. Unmatched sample households received the letter and a Contact Card encouraging their participation by phone, web or mail. Both letters were signed by the Executive Directors of the respective agency sponsors.

2.4.2 Evaluation

Mail out consisted of 32,472 advance packets to potential respondents from the sample in the study area. The advance packets were mailed from Panther Graphics in Rochester, NY. Sending the packets from New York allowed recruitment phone calls to begin on a faster timeframe (in approximately five days) than would be possible if the packets were mailed from the contractor’s headquarters in Texas (approximately 7 to 8 days), of particular importance given the tight schedule of the Pre-test.

The remainder of the fulfillment testing was to verify that all processing steps were followed and there was ample time to mail diary packets to respondents once they completed the recruitment survey and selected a travel assignment date.

Ninety-two percent of recruitment for the Pre-test was initialized by phone. Eight percent of the 1,187 recruited households completed retrieval using the web survey. Table 2-3 shows recruitment and retrieval outcomes for the Pre-test by completion mode.

**Table 2-3:
Pre-test Outcomes for Recruitment and Retrieval**

		Total	
		Count	Percent
Recruitment Mode	Phone	1,092	92.0%
	Web	95	8.0%
	Total	1,187	100.0%
Retrieval Mode	Phone	418	58.6%
	Web	56	7.8%

³ For the main survey, telephone and mail-back options were available in English, Spanish, Chinese, and Russian.

		Total	
		Count	Percent
	Mail	240	33.6%
	Total	714	100.0%

Recruitment productivity was 56% below the budgeted completes per hour for the Pre-test. Completes per hour budgeted for the pilot was at .88 with the actual being .50. Table 2-4 depicts completes per hour (CPH) which is the number of completes per hour based on interviewers time spent during the recruitment process.

**Table 2-4:
Pre-test Recruitment Productivity**

Recruitment Productivity	Mean
Budgeted Completes per Hour (CPH)	.88
Actual CPH	.50

Retrieval productivity during the Pre-test was opposite to what was experienced during recruitment. Retrieval completes per hour was 26% higher than the budgeted .95. This is likely due to the length of the Pre-test recruitment questionnaire, which was very long; the recruitment questionnaire was ultimately shortened for the Main Survey. Table 2-5 shows completes per hour (CPH) during Pre-test retrieval.

**Table 2-5:
Pre-test Retrieval Productivity**

Retrieval Productivity	Mean
Budgeted Completes per Hour (CPH)	0.95
Actual CPH	1.2

Connecticut had the highest retrieval rate, just below 69 percent, due to the significantly fewer number of recruits than those from New Jersey and New York. Warren County, New Jersey had the highest refusal rate at 41 percent. Table 2–6 shows Pre–test completion and refusal rates by state and county.

Table 2–6: Pre–test Completion and Refusal Rates by County

County	Total Recruits (count)	Total Retrievals (count)	Retrieval Rate (percent)	Refusal Rate (percent)*
Connecticut	48	35	68.6%	12.8
New Haven	24	15	62.5%	10.4
Fairfield	24	20	83.3%	16.7
New Jersey	443	251	56.7%	16.6
Bergen	55	33	60.0%	20.8
Essex	43	21	48.8%	13.2
Hudson	47	24	51.1%	16.7
Hunterdon	28	16	57.1%	3.7
Mercer	15	5	33.3%	26.7
Middlesex	45	28	62.2%	10.8
Monmouth	25	15	60.0%	18.2
Morris	27	20	74.1%	8.0
Ocean	42	29	69.0%	20.0
Passaic	20	9	45.0%	17.7
Somerset	10	5	50.0%	22.2
Sussex	31	19	61.3%	17.9
Union	30	19	63.3%	7.7
Warren	25	8	32.0%	40.9
New York	693	428	61.8%	12.6
Bronx	62	34	54.8%	10.4
Dutchess	26	16	61.5%	16.7
Kings	104	58	55.8%	9.3
Nassau	43	28	65.1%	7.7
New York	138	82	59.4%	12.3
Orange	22	15	68.2%	11.8
Putnam	25	16	64.0%	17.4
Queens	97	57	58.8%	16.3
Richmond	39	27	69.2%	18.9
Rockland	19	11	57.9%	12.5
Suffolk	56	41	73.2%	10.0
Westchester	62	43	69.4%	12.7
Total	1,184	714	60.3%	14.2

*Refusal Rate: Calculated as percent of recruited households that refused to complete the retrieval interview

Table 2–7, below, presents distribution by county and GPS vs. Diary participation for all recruited households in the Pre–test.

**Table 2–7:
Pre–test Recruitment Geographic Distribution by County and GPS vs. Diary Status**

County Name	GPS		Diary		Total	
	Count	Percent	Count	Percent	Count	Percent
Connecticut						
Fairfield	3	2.6%	17	2.8%	20	2.8%
New Haven	2	1.7%	13	2.2%	15	2.1%
New Jersey						
Bergen	4	3.5%	29	4.8%	33	4.6%
Essex	3	2.6%	18	3.0%	21	2.9%
Hudson	4	3.5%	20	3.3%	24	3.4%
Hunterdon	3	2.6%	13	2.2%	16	2.2%
Mercer	0	0.0%	5	0.8%	5	0.7%
Middlesex	6	5.2%	22	3.7%	28	3.9%
Monmouth	3	2.6%	12	2.0%	15	2.1%
Morris	1	0.9%	19	3.2%	20	2.8%
Ocean	5	4.3%	24	4.0%	29	4.1%
Passaic	0	0.0%	9	1.5%	9	1.3%
Somerset	0	0.0%	5	0.8%	5	0.7%
Sussex	3	2.6%	16	2.7%	19	2.7%
Union	7	6.1%	12	2.0%	19	2.7%
Warren	1	0.9%	7	1.2%	8	1.1%
New York						
Bronx	6	5.2%	28	4.7%	34	4.8%
Dutchess	1	0.9%	15	2.5%	16	2.2%
Kings	12	10.4%	46	7.7%	58	8.1%
Nassau	7	6.1%	21	3.5%	28	3.9%
New York	9	7.8%	73	12.2%	82	11.5%
Orange	3	2.6%	12	2.0%	15	2.1%
Putnam	4	3.5%	12	2.0%	16	2.2%
Queens	10	8.7%	47	7.8%	57	8.0%
Richmond	3	2.6%	24	4.0%	27	3.8%
Rockland	0	0.0%	11	1.8%	11	1.5%
Suffolk	10	8.7%	31	5.2%	41	5.7%
Westchester	5	4.3%	38	6.3%	43	6.0%
Total	115	100.0%	599	100.0%	714	100.0%

Results from the Pre-test showed that the average household size was close to two persons per household. The average household income was between the ranges of \$50,000.00 to \$74,999.00. The average age in households retrieved was 51 years of age. Table 2-8 shows the average statistics of the universe during the Pre-test.

**Table 2-8:
Summary Statistics on Pre-test Data (Universe = Total Pre-test Retrievals)**

	Mail	CATI	CASI	Total
Avg. Household Size	2.1	1.8	1.9	1.9
Avg. Income	\$75,000 to \$99,999	\$50,000 to \$74,999	\$75,000 to \$99,999	\$50,000 to \$74,999
Avg. Household Trips	8.7	6.3	8.1	7.3
Avg. Person Trips	4.2	3.6	4.2	3.9
Avg. Age	47.8	54.3	35.5	50.5

2.4.3 Impact of Pre-test on Final Survey Design

Following the evaluation of the Pre-test, several changes were recommended and implemented prior to the start of the Main Survey. These are summarized below.

Sampling

- Special Population Coverage

The Pre-test identified a disproportionate shortage in Hispanic participation. As an outcome of the Pre-test, the sampling strategy was modified to oversample known census tracts with a high proportion of Hispanic households in order to gain greater representation. This population group received additional monitoring and reporting during the main survey.

- Age Distribution

As expected, the age distribution was skewed during the Pre-test toward older persons who tend to participate with higher proportion in survey research. In order to combat the skewed age distribution, an age screener was recommended and implemented in order to include in the main survey every 3rd household with a person over age 65.

Survey Materials

- Study Logo

There was concern that the study logo did not convey the geographic region of the study so the logo was updated to list the participating states (i.e. New York, New Jersey, and Connecticut).

- Advance Letter and Envelope

The advance letter was edited, shortened, and made easier to read following feedback that the letter was too long. Envelopes were re-designed (colored text on a white envelope) so as to better grab the attention of potential respondents.

Recruitment

- Data Collection Issues

No households returned the printed household questionnaire during the Pre-test. This material was mailed as part of the advance materials packet and was a printed version of the recruitment questionnaire. Following the Pre-test, household questionnaires were not mailed out and recruitment modes were limited to phone and web. Additionally, the data elements list was revisited and ultimately the recruitment questionnaire was shortened to decrease the interview length and ultimately decrease respondent burden in order to increase participation rates.

- High Non-Contact Rates / Sample Management Techniques

The RHTS Pre-test experienced high non-contact rates, where households were unable to be contacted. The Main Survey sampling strategy was modified to implement strict “rest and recycle” rules for managing the sample starting three months into the main survey.

GPS Sub-Sample

- Increased Communication

During the Pre-test, representatives at the data collection facility noted that GPS participants were unclear on survey participation requirements. For the main survey, communications were improved by providing a “memory jogger” to assist these respondents in tracking their travel, and using more personalized reminder messages (mail, text, and e-mail).

Postcards

- Reminder Postcard

It was noted that advance reminder postcards (reminding households to participate by completing the recruitment interview) weren’t as helpful as initially anticipated for increasing participation. The planned number of advance reminder postcards for the main survey was limited to one and further efforts were shifted to retrieval reminder postcards.

Retrieval

- TripBuilder™

The TripBuilder software did not match the hard-copy travel diaries during the Pre-test, causing respondents to find it challenging to enter survey data on the web survey. Layout and design tools were used to update TripBuilder such that it better matched the travel diary for the main survey.

2.5 Description of Survey Interview Process

The sections below describe the survey interview process each household undertook in order to be considered a completed household included in the final main survey database.

2.5.1 Interviewer Selection and Training

Requirements for interviewing staff included a pleasant and coherent speaking voice, the ability to build rapport quickly with respondents, to gain trust and cooperation, and to overcome respondents’ arguments for refusing to participate.

Once selected, interviewers underwent project training to understand specifics about the survey including: details about the survey including project purpose, objectives, and goals; any specific interviewing quotas (e.g., demographic items, residence location); detailed geographic information about

the study area (which typically includes road and transit maps, as well as key points of interest in the region); and, a detailed project schedule.

Interviewers also underwent in-depth training on the CATI recruitment program. Training protocol covered the introductory script and each interviewer spent time familiarizing him/herself with the types of questions asked in the survey, along with how to record the outcome results. Interviewers went through each question along with choices and acceptable responses. Special attention to ensuring bias was not introduced in the interviewing process was a critical component of the training. Clarification of any question was discussed thoroughly with the team along with specific probing techniques, particularly for open-ended questions. Bilingual interviewers were trained in English and the other language they speak so as to be familiar with both scripts.

The final portion of the training was focused on mock interviews and additional practice with the program. At this stage, training included role-playing to ensure the interviewer could answer questions and offer professional rationales, reasons and answers to encourage continued participation in the survey. A comprehensive training on trip capture software was offered, allowing interviewers to become very familiar with the system as well as the geographic layout of the study area.

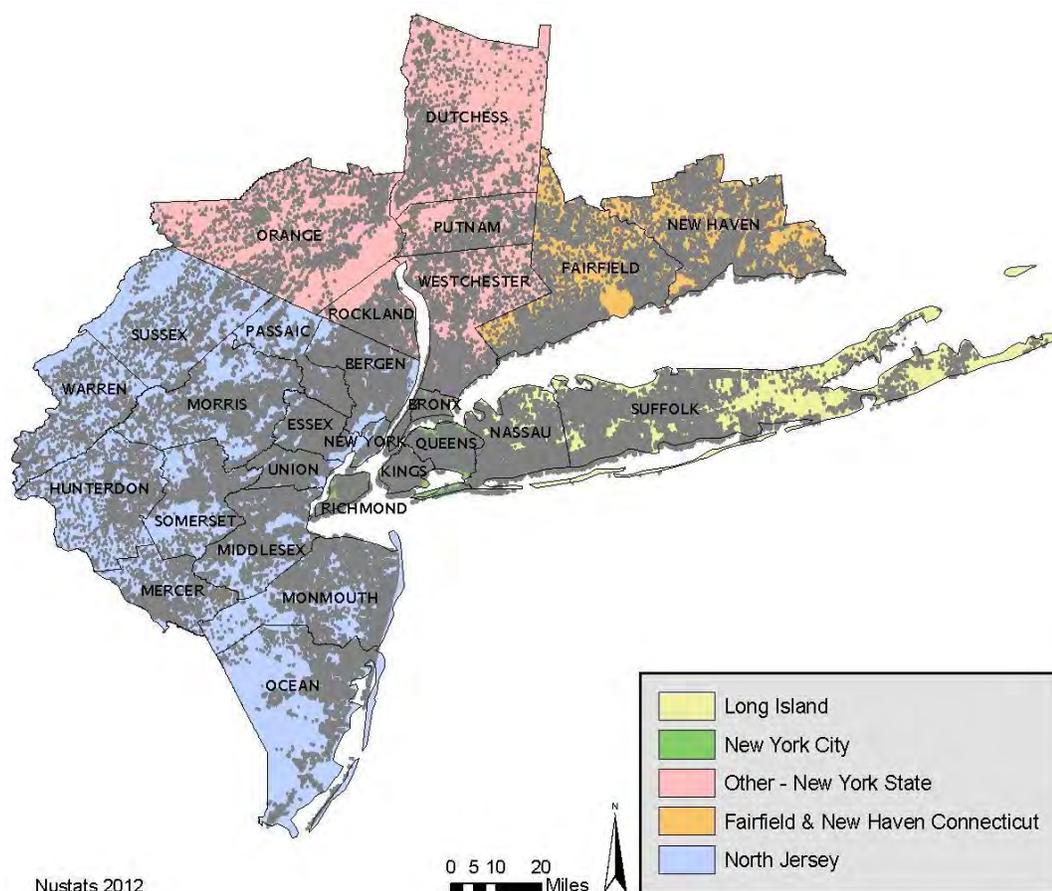
2.5.2 Advance Notification Mailing

All sampled households were sent an advance letter that introduced the survey and its objectives, specified the importance and implications of participation, identified the sponsors of the survey and provided contact information for anyone wanting further information. There were three versions of the advance letter each of which was double-sided: English and Spanish; English and Chinese; and English and Russian. There were two versions of the advance letters: one version for households that had been matched to a landline telephone number (“matched”); and the other for households not matched to a landline telephone number (“unmatched”).

For the **matched** group, the letter identified the project details and purpose and let residents know to expect a phone call asking for their participation in the next few days. The field production schedule was designed to allow a standard window of approximately 7–10 days between mailing of advance letters and the start of phone recruitment to provide adequate time for households to receive and review this key informative material. Therefore, the sample schedule included anticipated dates for advance letter mailings and for the actual release of sample for dialing.

Letters to the **unmatched** category also identified project details and purpose and asked respondents for their participation. Because these records were not matched to a phone line, the only way these respondents could participate is if they initiate contact. As a way of encouraging participation, a \$50 incentive was offered to these respondents after their travel information was obtained. Households for which a landline telephone number was not available were passively recruited (i.e., these households were encouraged in the advance mailing to contact the survey center by phone, mail or web). Figure 2–2 below maps all households contacted for participation in the survey.

Figure 2–2: Locations of Households Invited to Participate (Map of Region)



Note: Locations of all households, invited to participate in the 2010/2011 RHTS main survey, are represented in gray.

2.5.3 Recruitment Interview

Telephone recruitment was attempted for all matched sample records that had not previously responded to passive recruitment modes of internet or mail, including samples pre-assigned for GPS participation. Attempts were also made to any unmatched sample records for which phone numbers had been obtained (mostly through toll-free hotline calls and online inquiries). The call was to:

1. Collect all recruitment demographic data, or verify self-provided information when necessary, to ensure full recruitment had occurred;
 - Demographic data included address collection to ensure diary packets could be successfully mailed.
2. Ensure the household fully understood the survey commitments; and
3. Communicate a travel day assignment.

Calls took place seven days a week (Mon – Fri from approximately 5 p.m. to 9 p.m. local time and Sat – Sun 11 a.m. to 8 p.m.) Specific call back appointments were set as needed for respondents at a time convenient for them if they were not available at the time of the initial call.

The primary purpose of the recruitment questionnaire was to get a male or female “head of household” to agree to participate in the survey. For this purpose, project interviewers were trained to explain the importance of the project, educate respondents on how the project would help their community, what their participation would involve and to answer any questions the respondents had about the project,

the survey process, or how retrieved data would be used. The other objectives of the recruitment interview were to collect information on the characteristics of the household and those of the individual people in the household.

During the recruitment call, demographic characteristics were obtained for all household members. Home address information was verified (or obtained if not available prior to the call), and habitual work and school addresses were also collected.

Representatives were trained to gain a respondent's cooperation from the interview's introductory statement. At this crucial moment of the interview, interviewers knew they had roughly 15 seconds to present a good reason for respondents to stay on the phone and consequently agree to participate in the survey. Therefore, interviewers were trained to be quick and specific in explaining the project and in answering respondents concerns. Supervisory staff was on stand-by in the event respondents requested to speak to one of them or if representatives need help answering any questions. The supervisory staff was also tasked with ensuring that all representatives followed proper contact procedures at the introduction. These included asking for an adult head of the household, reading the introduction verbatim, answering questions, and coding call outcomes correctly. They also made sure representatives recruited eligible households by following the proper steps outlined in the program. This included ensuring the household was within the target geography and also met the specific demographic criteria for the project, when applicable.

Supervisory staff also worked with representatives to stress the need for recruiting households that were committed to participation through the entire survey process up to the retrieval interview. Supervisors ensured that the interviewing team made certain the main respondent (the person who answered the phone and completed the recruitment interview for the household) understood the need for all persons in the household to record and report their trip information. Representatives were expected to ask the main respondent to persuade the rest of the household to do the survey. Supervisors also ensured that representatives kept their survey materials at their interviewing stations at all times so that they were able to quickly access information respondents may have requested, such as client contact information or standard responses to commonly asked questions.

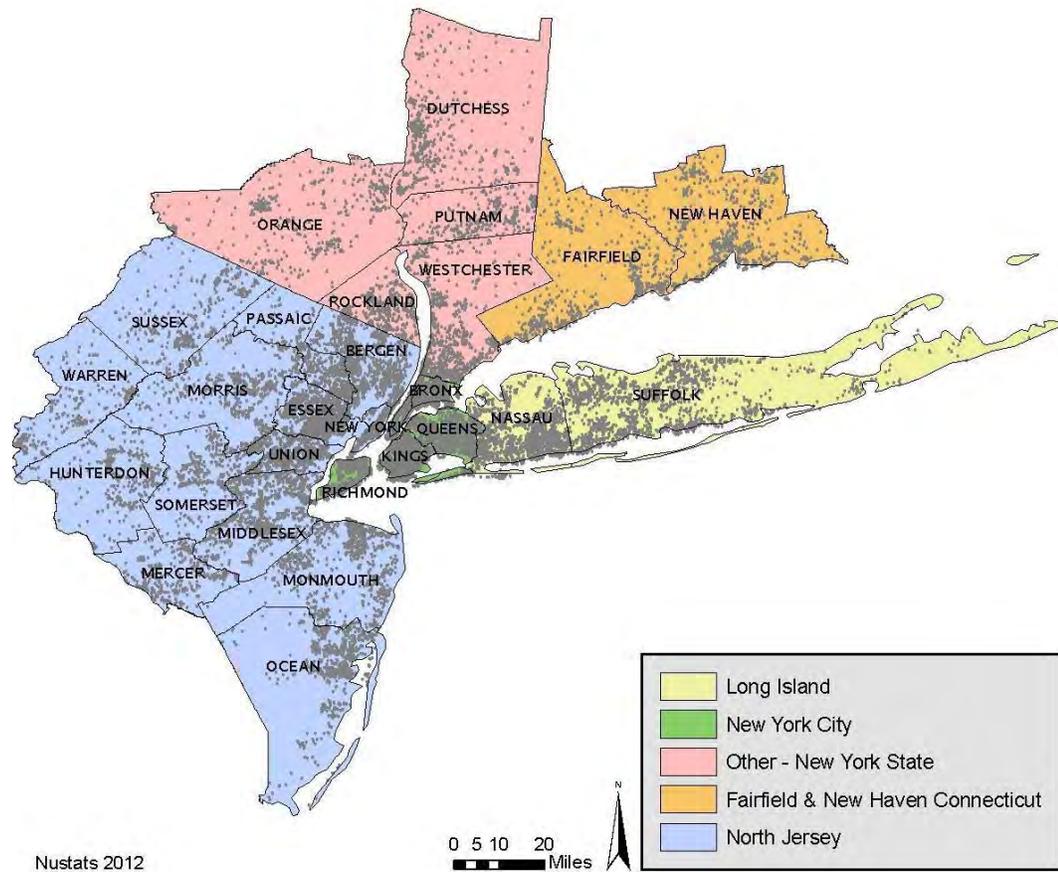
As part of the recruitment interview, respondents were asked to provide specific addresses for home, work and school locations. Interviewers were trained to be sensitive to any respondent security or privacy concerns and assure them that obtained information would remain confidential and used only for research purposes. Supervisors were always on standby in case they needed to provide further validation of security of all provided information.

The recruitment interview was not considered completed until a specific 24-hour period was selected for the household to record their travel information. Finally, respondents were assigned a travel day that corresponded to the Master Production Schedule.

The Master Production Schedule included all possible valid travel dates for the project and was designed to meet specific weekly and monthly goals, as well as to ensure that households were scheduled for valid travel dates (Monday through Friday, non-holiday). This list also showed the number of interviews needed for each date and when the interviews were needed by. Once a date was filled, Supervisors were asked to close field for those particular dates, meaning that it was no longer an option for representatives to use for scheduling (i.e. this option was physically not selectable in the program anymore).

The Master Production Schedule informed supervisors exactly when to close any specific travel dates listed (this happened when the deadline was met or when the desired number of interviews was obtained – whichever happened first), it told the fulfillment department when to mail respondents' materials, and it helped ensure that households were scheduled evenly across all days of the week. In turn, the Master Production Schedule ensured the final data set represents weekday travel across the region. Figure 2-3 shows the locations of all households that completed the recruitment portion of the RHTS main survey.

Figure 2-3: Recruitment Household Locations (Map of Region)



Note: Home Locations of all households completing the recruitment interview portion of the 2010/2011 RHTS are shown in gray.

2.5.4 Placement of Materials

Following recruitment, the information collected was used to prepare customized travel diaries to send to each member of each household. A personalized letter was also prepared for each household and included in the packet, along with an example of how to complete the diaries.

2.5.5 Reminder Call

Reminder/support calls were placed to all households within two days before their assigned travel date, or at a date requested by the household during the recruitment interview. Scripted messages were left on answering machines and cell phone voicemails when household members could not be reached. During the reminder call, respondents were asked if they received the materials (including GPS units for the GPS participants) and if they had any questions about the materials or the project. The representative then attempted to set up a specific day and time to collect travel information (viewed and treated as an “appointment”).

Supervisors were tasked with ensuring that all reminder calls were made on time and that non-contacted households received a detailed voice mail message with key information. The goal was to maximize the chances of speaking with someone in the household. Supervisors were also available to assist representatives with any concerns respondents may have had prior to recording their travel information.

2.5.6 Travel Data Retrieval Interview

Telephone (CATI) retrieval of travel information for diary households began the day after the travel day and for approximately 10 days afterward (depending primarily on specific callback requests from respondents).

When calling households for data retrieval, representatives asked to speak to the person listed on the introductory screen. This was the person that committed the household to participate during recruitment. If this person was not available, another available adult in the household was requested, or a call back time was requested. If no contact was made at that time, the representative left a voicemail message advising the respondent they would be called back to collect their trip information, along with the alternative of a toll-free hotline number for them to call if it was more convenient.

Once the main respondent or an adult member of the household was on the phone, the retrieval interview began. The first step was to verify all household information and make any modifications needed. Household information was displayed in summary tables describing vehicle and person information. The protocol was for the representative to read off of these tables and ask for each item to be confirmed by the respondent on the phone. The representative had the ability to add or delete information contained in the tables as needed. All activity was completed under the supervision of management staff.

Representatives asked each respondent to report travel for one day (3:00 a.m. beginning on the assigned travel day to 2:59 a.m. at the end of that day). They were trained to ask for all trips no matter how short in time or distance. This helped respondents remember to provide information on short or side trips to the gas station, grocery store, etc. Representatives also inquired about any stops made “along the way,” And supervisory staff ensured that representatives did this consistently. After collecting trip information from the head of the household, representatives attempted to interview each person in the household so that missed trips could be identified and the travel information for those missed trips recalled by the individual respondent. The act of minimizing proxy interviewing had the result of increased data accuracy.

The telephone interview focused on the efficient retrieval of travel details from the household through the use of interactive web-based mapping software integrated within the Voxco program TripBuilder. Address collection was facilitated through this real-time online geocoding tool. The supervisory team ensured that representatives were proficient at this tool and followed proper protocol when mapping specific addresses.

Sometimes respondents would report they had no travel as a way of opting out of the survey and other times they truly stayed at home all day for a specific reason. Representatives were required to follow protocols when it came to respondents reporting no travel on the assigned travel day. If a person truly did not make any trips during the scheduled travel day, the representative was required to obtain a valid reason for not traveling. The CATI program had pre-set questions to help probe for travel to work, school or for other reasons. Supervisors ensured that representatives obtained a valid reason for non-travel for all respondents reporting no travel.

A “freshness” window of 10 days was maintained, allowing for exceptions due to factors such as large household sizes, respondent callbacks, mail backs, unmatched sample participation, and return of GPS units.

Multi-Modal Data Collection

In addition to traditional telephone recruitment and retrieval participation options, mail back and online data collection options were also offered.

2.6 Data Processing

Data processing took place on a daily basis throughout the survey, from release of sample for recruitment, to processing recruitment data for the respondent mail-out, to appending retrieval data to master tables and performing data quality control measures. A master control file tracked the progress of each household through the various survey stages, with codes to allow immediate identification of problem cases that were not progressing according to schedule, as well as confirmation that cleared cases were flagged appropriately. Routine data checks included the following:

- Data range checks to ensure data were inside the expected ranges for each variable and that there was agreement across data files (for example, if the household had four persons and two vehicles, there should be four records in the person file and two records in the vehicle file).
- If a person reported no travel, the household was flagged for manual review to confirm the reason for non-travel was appropriate based on the demographic characteristics of the household member. Those cases for which the reason for non-travel was suspect or did not make sense within the context of the available demographic information were flagged and returned to the Research Team for confirmation or replacement.
- Within the travel data itself, several items were checked. The following are examples of conditions researched within the trip data:
 1. Did each trip begin and end at a different location? Loop trips (those that have the same origin and destination) might be neighborhood walks, and were manually reviewed.
 2. Did each person return home at the end of the travel day? If not, did the final recorded destination make sense within the context of the household and person characteristics?
 3. For all instances where a respondent reported traveling with other household members, was the shared trip reported for all other household members?
 4. For all trips with “auto-driver” as the reported mode, was the respondent a licensed driver?
 5. For all trips reported as “auto-passenger,” did another household member report the same trip as an auto-driver? If not, did the passenger report riding in a non-household vehicle with at least one other person making the trip?

Physical research was used to correct data inconsistencies. All households included in the final data set passed both an electronic edit check, and physical research process. During data review some additional data inconsistencies were identified, resulting in the creation of a series of Data Usage flags. These data usage flags are explained and documented in the **Data User’s Manual**.

2.6.1 Sample Management Procedures

During the course of data collection, the sample was managed daily so that replicates were rested and recycled to ensure the highest sample productivity possible. The sample was managed within the Voxco software, allowing the survey operations coordinators to quickly and easily open or close sample replicates for dialing based on most recent call outcomes (“dispositions”), progress toward geographic goals, and scheduled call-back appointments.

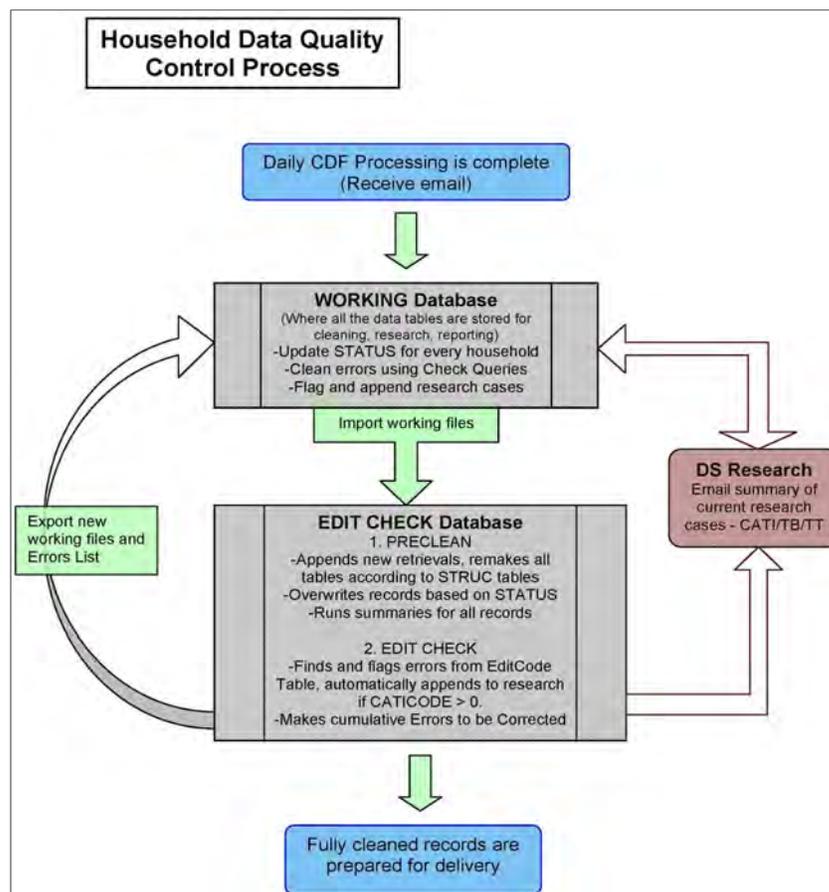
2.6.2 Recruitment Data Processing

The Voxco software stored all recruitment data. Data were processed each night during daily continuous data flow (CDF) processing and separated into easily viewable Household, Person, and Vehicle-level data tables. These data tables were reviewed to ensure adequacy of data collected, as well as used the morning after a household was recruited to prepare the customized travel diary packets for that household.

2.6.3 Retrieval Data Processing

The VOXCO software stored all retrieval data. Data for completed households were processed each night during daily CDF (Continuous Data Flow) processing and data were separated into easily viewable Household, Person, Vehicle and Place-level data tables. Following CDF processing, the data proceeded through a series of rigorous quality control measures, shown in Figure 2-4 below.

Figure 2-4: Data Processing Flow Chart



2.6.4 Geocoding

All trip-ends and habitual addresses were geocoded and confirmed during the retrieval telephone interview with TripBuilder software. TripBuilder was designed to provide interviewers and online respondents with study area details (e.g. road names and landmark references). Interviewers used this additional detail to confirm respondent-reported locations in real time. An additional benefit of the use of TripBuilder was that once an interview was completed, full address information with matching X/Y coordinates for 100% of locations was immediately available.

2.7 Public Outreach

For a large-scale Household Travel Survey such as the RHTS, thoughtful and appropriate public outreach efforts are critical for increasing awareness of the survey and gaining public buy-in of the survey efforts. The goals of the RHTS public outreach effort were four-fold:

1. Address any public concerns about the survey or how the data would be collected, processed, and handled by informing government officials and public information departments
2. Gain the public's confidence that the survey was legitimate, valid and critical
3. Inform the public that the data collected would be used to inform travel demand models
4. Educate target audiences on the consumer-level benefits of the survey, such as easier and safer travel, less congestion, and a better integrated transportation system.

2.7.1 Public Outreach Plan

The communication outreach plan was led by the Public Information Officer (PIO) at NYMTC with support and assistance from the PIO from NJTPA, other MPOs, and member agencies. All outreach materials were translated into Spanish, Chinese and Russian. The sections below summarize key outreach efforts taken to achieve the goals set forth above. With these efforts, the goal of the public outreach effort was achieved.

Project Branding

In order to communicate a branded survey effort, the following project materials were developed:

- Project name and logo



- Informational letters to target audiences in languages implemented in the survey (English, Spanish, Russian and Chinese). These letters can be found in the Survey Instruments section of accompanying **Task 7.5: Survey Data File Documentation**.

Project Communication

- Public project website that provided information about the project translated in languages implemented in the survey (English, Spanish, Russian and Chinese). This project website was available through the duration of the survey.
- A 1-877 toll-free number and project email address that was staffed to provide information to the public.

Media Outreach

- Both NYMTC and NJTPA issued press releases. NYMTC representatives met with local media groups to inform them about the survey, and sent email notifications, posted website, newsletter and Facebook items; NJTPA distributed information to interested parties electronically using email lists.
- Several articles about the survey were published in various local newspapers.

2.7.2 External Website

A public website, www.regionaltravelsurvey.org, was created to facilitate communication about the survey. The public website served as a participant's 'home base' where information about the survey effort was provided, questions answered, and a sense of the scale and importance of the survey could be communicated. Instructions for registering for the survey and completing the ensuing steps were also provided. Digital copies of important materials (e.g. the paper travel diaries) were also posted on the website and a 'Contact Us' page was created to collect feedback via email on a selection of topics. The following additional features were available:

- A section for public information about the survey that was not password protected. This area was visible to anyone on the Internet.
- A password protected section for participants in the survey.
- A section for participants to input diary retrieval results or GPS-based prompted recall information.
- Compliance with the federal government's Section 508 regulations regarding accessibility.
- The website was available in English, Spanish, Chinese and Russian languages.

The website was designed in parallel with the survey logo and other survey materials including the advance letter and brochure. The color scheme, formatting, and aesthetics of the pages on the website were meant to appear cohesive with all other materials developed for the survey.

The website included the following pages:

1. Welcome – General information about the survey and the region
2. Join – The page for a participant to enter their assigned PIN and register for the survey
3. Log In – The page for entering the final, online retrieval step
4. FAQs – Frequently Asked Questions
5. Materials – Digital versions of important documents
6. Contact Us – Means for contacting the survey administrators
7. Privacy Statement – A statement of the survey sponsors policy on data privacy as well as non-discrimination and environmental justice.

Careful attention was given to the means by which participants would register for the survey and later, complete the final retrieval interview. Therefore, many links providing access to data entry pages on the website were available throughout, via links in the top menu, links embedded in explanatory and FAQ text, and with links placed on the welcome page within large, brightly colored boxes labeled "Invited to join the survey? – Start Here" and "Finished your travel day? – Report Travel." All links all led to one of two entry pages.

The "Join" page took participants to the recruitment questionnaire. The second entry page took participants to the retrieval questionnaire. If a participant navigated to either page in error, they would be redirected to the correct link.

One strategy for lending credibility to the survey was to create and post short video interviews with various members of the region speaking in one of the four supported languages about what the survey is, who conducted it, why it was conducted, and the importance of the survey to planning for future travel needs. The videos also covered the ways in which a person would be invited to participate and the means by which participation could occur (i.e. by telephone, web or mail).

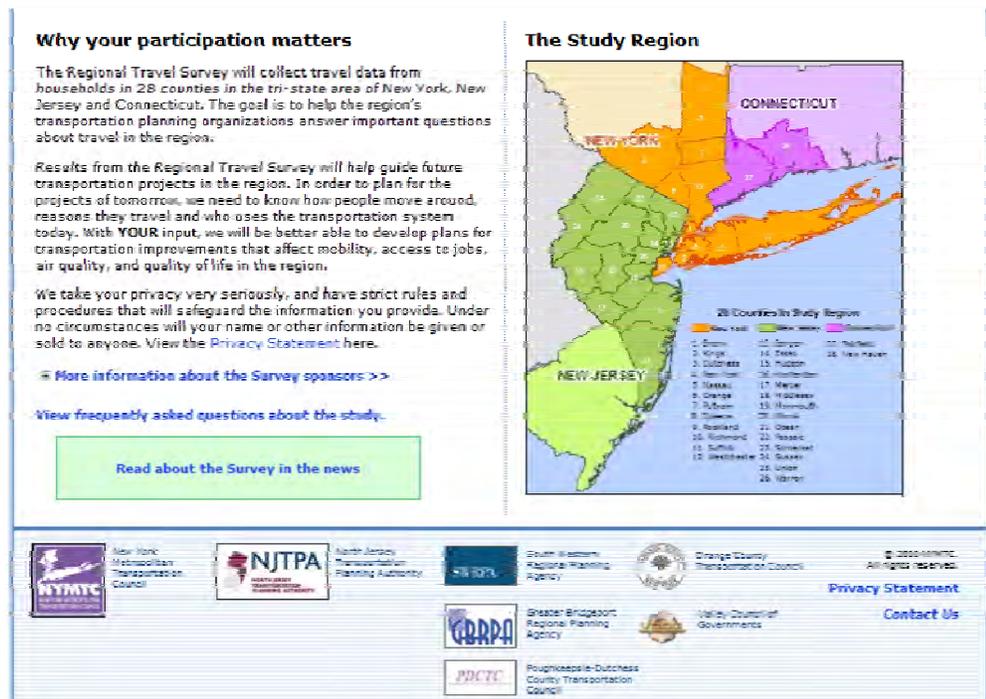
Finally, a footer section for the website was designed to hold the names and logos of the various supporting agencies for the survey with links to those agency websites and a link to the survey privacy statement. Concluding the page with these elements brought into focus the credibility and trustworthiness of the survey. Figure 2–6 shows the top 'fold' of the website – what the average web

user saw upon visiting the site for the first time; Figure 2–7 shows the below the fold content of the final version of the site’s home page as it appeared during survey administration.

Figure 2–6: Regional Travel Survey Public Website – Above the Fold



Figure 2–7: Regional Travel Survey Public Website – Below the Fold



Once the data collection effort was concluded, the website was revised to reflect the fact that the survey was no longer a live effort. To that end, entry points for registration and travel reporting which were active during the survey were removed. Most of the materials were removed and the frequently asked questions (FAQs) section was pared down to only address general questions. Figure 2–8 shows the amended version of the home page.

Figure 2-8: Post Survey Public Website



3.0 Survey Data Collection

3.1 Data Collection Schedule

The Main survey data collection began in September 2010 and continued through November 2011, with a break in data collection during July and August 2011. Generally, travel data were collected when school was in session. Valid travel days were 24-hour weekdays, which were assigned during the recruitment interview. Travel days falling on federal, state and other regional holidays were considered “blackout days” and households were not assigned to these days. In total, recruitment and retrieval data was collected for 18,965 households.

3.2 Data Collection Resources and Management

NuStats was the prime consultant on the project, collaborating with GeoStats and Parsons Brinkerhoff (PB). GeoStats provided expertise with GPS equipment procurement, software development and utilization, and field deployment and troubleshooting. They also led the development of the Data Visualizer website application. With expertise with the NYBPM and familiarity with regional conditions, PB sorted data priorities for the maintenance, updating, and possible extensions of the NYBPM and promoted sampling objectives and data validation measures to support future modeling activities. They also led the data weighting procedures.

During the course of the project, NuStats subcontracted with Panther Graphics, a printing firm in Rochester, NY to complete the advance packet mailings.

3.3 Adjustments to Survey Procedures

In order to increase participation for matched sample non-GPS households, a monthly \$250 incentive drawing was added to the main survey starting October 2010. This drawing was described in the survey materials. Included in each month’s raffle were all matched non-GPS households completing retrieval in the month of the drawing. Additionally, all matched, non-GPS households were offered \$20 to complete the survey by phone or mail, and \$40 for completion via the web survey. Without the incentives to participate, the project goals would most likely not have been achieved.

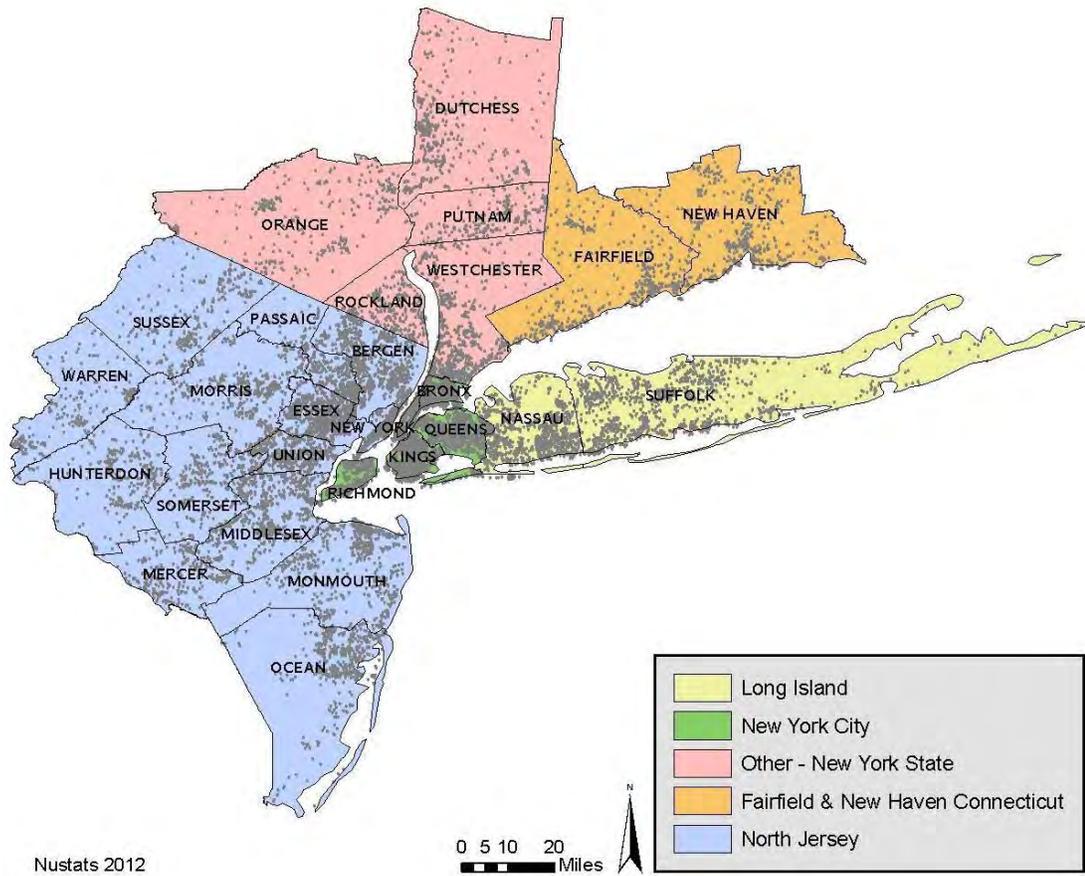
3.4 Achieved Sample

The final data file contains demographic and 24-hour weekday travel behavior data for 18,965 households residing in the tri-state metropolitan study area. Table 3-1 contains the distribution of all retrieved households by county and sampling bin. Figure 3-1 maps the participating households’ home addresses that are contained in the final data file.

Table 3-1: Distribution of Retrieved Households by County and Sampling Bin

County	Bin																					Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
Fairfield	197									102			129			34						462
New Haven		214								70				175			6					465
Bergen			98									95			163		383	10		176	47	972
Essex						197	22							187			181	55		30	115	787
Hudson																500		286	136		71	993
Hunterdon															67			69		11	179	326
Mercer										184						90		54				328
Middlesex				56								295				175	79		152			757
Monmouth	46	40								18				116		183			26		250	679
Morris			106									71			126		53	47		137		540
Ocean	90						5						111		118					250		574
Passaic				70									44			106	219					439
Somerset						109							16				156	51				332
Sussex														148							192	340
Union			52									67			131		239				57	546
Warren																	190			50	50	290
Bronx							556						131		189			5	169		40	1,090
Dutchess														237				81		120	25	463
Kings			447			295		680				173				10	28		12			1,350
Nassau					265								228				424	77	24	32		1,050
New York										671	315		18				93	47		136		1,575
Orange									156							54		65	63			338
Putnam																			229		43	272
Queens				433						266		506				29	63					1,297
Richmond	17	8		47									103			64	142	73				454
Rockland			26								23				153		14	9			90	315
Suffolk			187										175			717	16			19	59	1,173
Westchester		87									270			184			173				45	759
Total Completed	350	349	916	606	265	601	583	680	606	861	608	1,382	780	1,047	947	1,962	2,459	929	811	961	1,263	18,965

Figure 3-1: Participating (Retrieved) Household Locations (Map of Region)



Note: Locations of all households contained in the final 2010/2011 RHTS data file in gray

3.5 Response Rates

In total, 711,551 households were invited to participate in the main survey. The disposition of these households is categorized in Table 3–2. Of all households selected, 4.2% – or 31,156 households – completed the recruitment interview and ultimately participated in the survey. Approximately 44% that were determined to be eligible samples (they were a residential address within the metropolitan study area) did not complete the recruitment interview. Another 2.3% of the contacted sample were immediately determined to be ineligible due to the fact that they were either a fax/modem line, had a language barrier, or were a government address. The remaining 49.8% of sample resulted in an “unknown” disposition as specified in Table 3-2.

Table 3–2: RHTS Sample Dispositions

Disposition	Count	Percent
Recruited Sample	31,156	4.2%
Eligible Sample: Not Recruited	324,382	43.7%
Partial Web Complete	3,814	0.5%
Partial CATI Complete	3,554	0.5%
Callback	25,818	3.5%
Respondent will go online	173	0.0%
Respondent not available	39,013	5.3%
Spanish Partial Complete	61	0.0%
Russian Partial Complete	2	0.0%
Disqualified	11,922	1.6%
Soft Refusal	112,137	15.1%
Hard Refusal	124,464	16.8%
Language Callback	3,424	0.5%
Ineligible Sample	17,028	2.3%
Government	2631	0.4%
Language Barrier (deaf, other language)	8932	1.2%
Fax/Modem	5465	0.7%
Unknown Sample	370,141	49.8%
Caller ID Blocked	41,533	5.6%
Answering Machine	115,827	15.6%
Busy Signal	3,307	0.4%
Unmatched Sample No Response Received	209,474	28.2%
Total	711,551	100.0%

Table 3–3 displays the survey response rates by state and county. The response rate equals the number of retrieved households divided by the number of recruited households. The RHTS experienced a 60.9% overall response rate. Connecticut showed the highest participation levels, at 65.1%, while New Yorkers exhibited the lowest with 59.1%.

Table 3–3: Response Rates by State and County

County	Total Recruited Households (Count)	Total Retrieved Households (Count)	Retrieval Response Rate*
Connecticut	1,425	927	65.1%
New Haven	750	465	62.0%
Fairfield	675	462	68.4%
New Jersey	12,591	7,902	62.8%
Bergen	1,485	972	65.5%
Essex	1,387	787	56.7%
Hudson	1,713	993	58.0%
Hunterdon	458	326	71.2%
Mercer	456	328	71.9%
Middlesex	1,205	757	62.8%
Monmouth	1,058	679	64.2%
Morris	777	540	69.5%
Ocean	962	573	59.6%
Passaic	758	439	57.9%
Somerset	484	332	68.6%
Sussex	501	340	67.9%
Union	922	546	59.2%
Warren	425	290	68.2%
New York	17,140	10,136	59.1%
Bronx	2,154	1,090	50.6%
Dutchess	725	463	63.9%
Kings	2,409	1,350	56.0%
Nassau	1,784	1,050	58.9%
New York	2,369	1,575	66.5%
Orange	568	338	59.5%
Putnam	443	272	61.4%
Queens	2,320	1,297	55.9%
Richmond	842	454	53.9%
Rockland	518	315	60.8%
Suffolk	1,808	1,173	64.9%
Westchester	1,200	759	63.3%
Total	31,156	18,965	60.9%

*Response Rate: (# of Retrievals) / (# of Recruits)

Twelve percent of all recruited households completed recruitment using the web survey. As summarized in Table 3-4, households completing recruitment using the web survey participated with a 72% retrieval response rate as compared with households completing recruitment over the telephone, which exhibited a 59.3% retrieval response rate.

Table 3-4: Response Rates by Recruitment Mode

Recruitment Mode	Total Recruited Households (count)	Total Retrieved Households (count)	Retrieval Response Rate*
Phone (CATI)	27,386	16,253	59.3%
Web (CASI)	3,768	2,713	72.0%
Total	31,154	18,965	60.9%

**Response Rate: (# of Retrievals) / (# of Recruits)*

3.6 Data Quality Standards

This section documents the definition for completed households, acceptable tolerances for partial records, proxy person reports, and location geocoding.

3.6.1 Completed Household

A household was determined to be completed when all members of the household had completed the recruitment interview and all members of the household provided travel information.

3.6.2 Completed Person Record

A person was determined to be a completed person when the recruitment interview had been completed and when travel information had been provided for the assigned travel day.

3.6.3 Acceptable Partial Household

An acceptable partial record included complete household, person, vehicle recruitment information for all (n) household members, and complete travel/activity information (retrieval information) for (n-1) members. The purpose of this definition was to provide a mechanism for retaining data from larger households in which a single person may not report travel/activity data. Thus, partial trip records were accepted only for those households with four or more household members.

3.6.4 Acceptable Partial Person Record

Partial person records were only accepted for households with four or more household members. In cases where all but one household member had reported travel/activity information, and travel/activity information could not be obtained for the final household member, that person's record was determined to be an acceptable partial record.

3.6.5 Tolerance for Proxy Person Reports

Proxy person reports were accepted for children age 16 or under. For adults, three attempts at contact were required before proxy reporting was permitted.

3.6.6 Tolerance for Location Geocoding

All locations including home, work, school, and travel, were required to have coordinates in order for the household to be included in the final data file. Records without coordinates were sent back to the data collection facility in order to re-contact households and obtain the missing location information.

3.6.7 Data Post-Processing and Imputation

Refer to the **Data User's Manual** for information on data post-processing and data imputation.

3.7 Survey Sample Representativeness: Validation and Weighting

3.7.1 Overview of the Expansion and Travel Adjustment Factors

This section of the final report describes methodology and supplemental data that were used to expand and weight the final achieved sample data of the completed 2010/2011 RHTS. Expansion of the data is needed to provide critical data to support future updates and improvements to the NYBPM, as well as for other travel demand models in the region, including the models maintained by NJTPA (NJRTME) and the MTA (RTFM). The plan developed for the implementation of the survey data expansion and the correction for under-reporting of travel plan, and the details of the implementation of these procedures have been documented in two accompanying technical memoranda: Task 6.3 **Survey Expansion Weighting and Final Weights** and Task 6.6 **Tour Coding and GPS Tour-Based Correction Factors and Estimation Data**.

For model development purposes, data expansion and weighting methods (e.g. sampling plan), were designed to support two distinct aspects of travel model development: 1) the need for disaggregate statistical estimation of parameters of choice models components, and 2) the calibration and validation of applied models with respect to survey-derived aggregate target measures. This second aspect is essentially the same as the general need for reliable and unbiased survey sample based estimates of overall magnitude and pattern of travel for analytical planning and general reporting.

For the RHTS, the American Community Survey (ACS) PUMS 2010 data of household and person demographics were used as the source of controls for both selected household and person attributes. Data weighting and expansion represents the process by which factors are calculated with respect to multi-dimensional controls established for specific segments or measures that can then be attached to each survey record in the sample. When applied in the statistical tabulation of the sample data, the results will closely match the proportions (percentages) found in the control data. "Expansion" means the final scaling of these weights so that the tabulations match the magnitude (absolute numbers) of the full population or the universe of measures of interest.

3.7.2 Multi-Stage Process for Weighting and Adjustment of Survey Data

A three stage method to expand the RHTS survey data was developed in light of the adopted sampling strategy, a probability sampling of households drawn from a list of residential addresses in the study area as describe in Section 2.3. The sampling frame consisted of a current listing of city and rural route residential postal addresses in the 28-county regional area, with the corresponding Census Tract of each residence included. An important feature of this location-based approach, with households as the sampling unit and all members of the household sampled, is that it is possible to reliably know the rate of sampling (number of final sample households/total or "universe of" households) that has been achieved in the survey. Since the rates of sampling are known, the data can be expanded to yield reliable estimates of the entire population and the weekday travel of the region's residents, even if the rate of sampling is not uniform. The estimated rates of sampling developed for the sampling plan (in 2009) used to obtain the desired number of household samples, were calculated based on what were then estimates of 2010 households by NYBPM Transportation Analysis Zones (TAZs).

As discussed in more detail in Section 3.7.3, the *first stage* of the data expansion process computed preliminary expansion rates calculated by the proportion of the 2010 decennial Census counts of households, and the actual RHTS final sample of households in the Census Tract level.

While the primary sampling unit in the RHTS is a household, the overall survey data sample also consists of a sample of persons (members of households), household vehicles, and all their reported

travel (i.e. tours, trips, and trip segments). This mixed structure of survey data leads to the need for additional steps in the weighting and correcting of the data. As described in Section 3.7.4, the adjustment of possible bias with respect to possible differential rates of sampling by type of households, as determined by the characteristics of its members, requires a *second stage* set of adjustments, that is performed by multi-dimensional balancing methods, and are applied in the reporting and aggregate analysis of the RHTS data to the sample households and all their travel records.

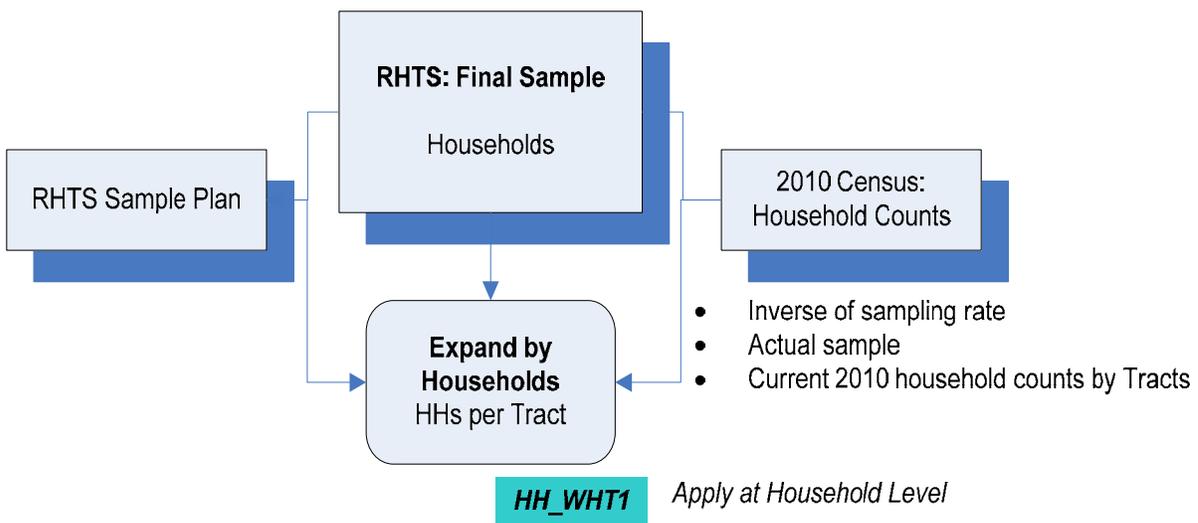
Finally, a *third stage* of RHTS data validation and adjustment is described in Section 3.7.5 in which correction factors have been developed to account for under-reporting of travel, as determined by comparison of the travel data collected from 10% GPS subsample compared to that of the 90% non-GPS subsample. Like the data weights from the first two stages, these estimated correction travel factors can be applied to the survey data in analysis of the data, but directly to tour and trip records, rather than at the household level.

3.7.3 Level 1: Simple Expansion – Preliminary Stage

In this first stage of the weighting process, an initial weight was computed that is the ratio of Census household count to the RHTS sample household count for each census tract. This first weight directly accounts for the differential rates of sampling achieved in the RHTS according to the sampling plan design. The purpose of the method at this stage, as illustrated in Figure 3.2, is to compare the final sample households to the best count of total actual households, as taken from:

- Actual sample of useable RHTS households
- Current 2010 household counts by Census Tracts

Figure 3-2: Level 1 (Preliminary) Expansion Process



The resulting weight (or HH_WHT1 in the data file) is retained in the RHTS data as the “Domain” variable that can be used for statistical estimation of the reliability of specific survey tabulations based on the sample size of the segments used. This weight is also carried over as the starting point for the second stage of data balancing.

Table 3–5 shows the comparison between the RHTS sample households with the preliminary Level weight applied and the Census 2010 tract level 100% count data.

Table 3-5: Level 1 Expansion – with Census Tract–Level Household Count

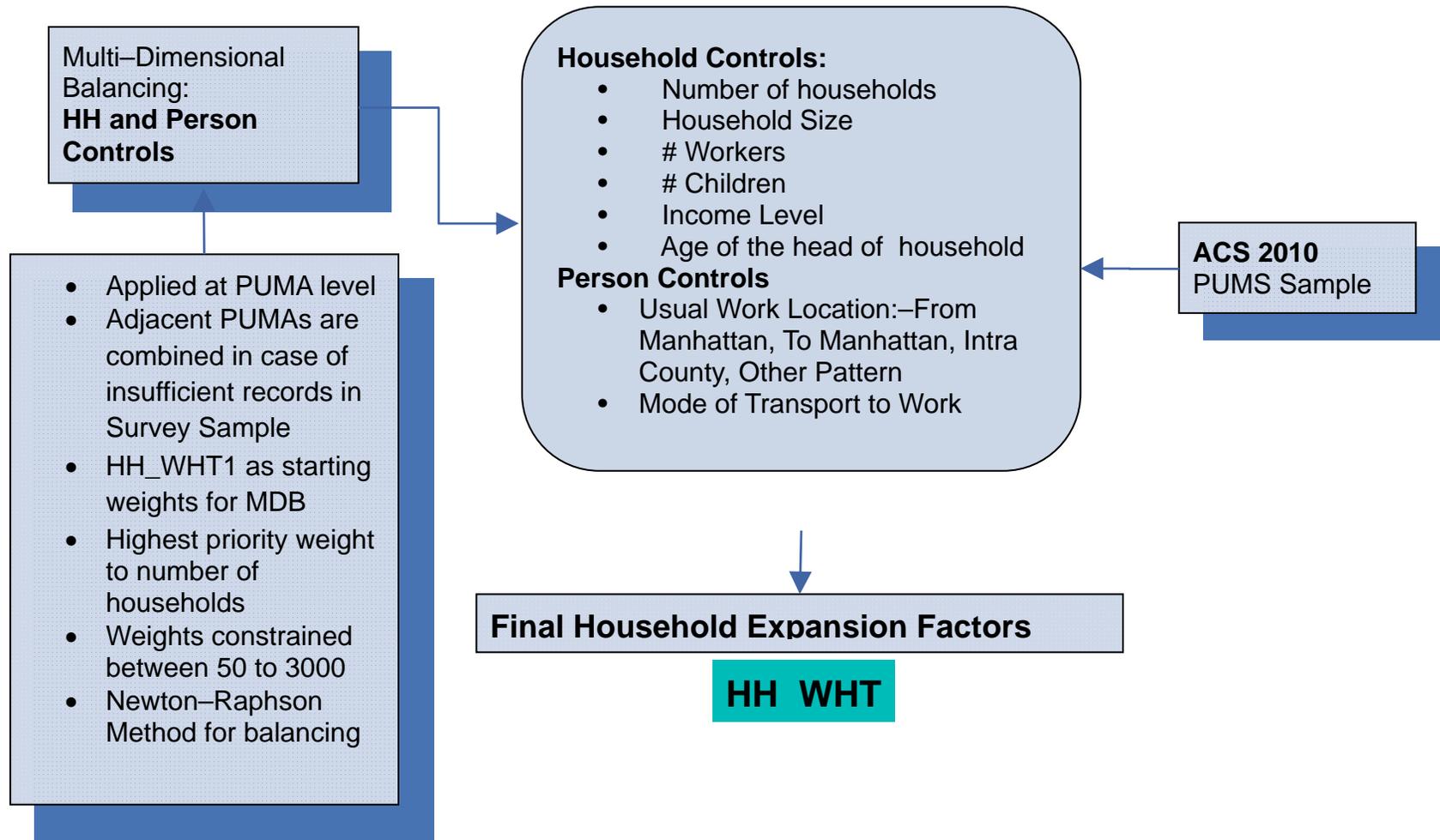
COUNTY	Total Households (Projected)	Total Households (CENSUS 2010)	Obtained Sample		
	2010 (a)	2010 (b)	Stage 1 (Expansion)		
			Based on Over-Sample of Selected Subareas, by Area Type and Transit Accessibility and Incidence of Rare Modes		
HHs Universe	HHs Universe	HH Sample	Exp Factor	Sampling Rate	
1 MANHATTAN	745,719	726,090	1,575	461.0	0.211%
2 QUEENS	780,410	772,334	1,297	595.5	0.166%
3 BRONX	474,660	471,910	1,090	432.9	0.230%
4 BROOKLYN	893,035	905,317	1,350	670.6	0.151%
5 STATEN ISLAND	165,055	163,815	454	360.8	0.275%
6 NASSAU	441,598	442,726	1,050	421.6	0.238%
7 SUFFOLK	503,133	496,264	1,173	423.1	0.233%
8 WESTCHESTER	335,001	341,847	759	450.4	0.227%
9 ROCKLAND	94,457	98,207	315	311.8	0.333%
10 PUTNAM	36,010	37,355	272	137.3	0.755%
11 ORANGE	128,887	124,628	338	368.7	0.262%
12 DUTCHESS	106,898	106,934	463	231.0	0.433%
13 FAIRFIELD	334,817	329,092	462	712.3	0.138%
27 NEW HAVEN	327,613	329,595	465	708.8	0.142%
14 BERGEN	336,113	332,999	972	342.6	0.289%
15 PASSAIC	167,161	161,528	439	367.9	0.263%
16 HUDSON	238,236	238,692	993	240.4	0.417%
17 ESSEX	287,836	275,416	787	350.0	0.273%
18 UNION	185,036	183,881	546	336.8	0.295%
19 MORRIS	175,214	177,785	540	329.2	0.308%
20 SOMERSET	116,405	115,913	332	349.1	0.285%
21 MIDDLESEX	277,201	278,768	757	368.3	0.273%
22 MONMOUTH	233,937	234,691	679	345.6	0.290%
23 OCEAN	230,724	220,974	573	385.6	0.248%
24 HUNTERDON	46,914	47,549	326	145.9	0.695%
25 WARREN	44,425	41,207	290	142.1	0.653%
26 SUSSEX	58,162	54,881	340	161.4	0.585%
28 MERCER	128,283	131,499	328	400.9	0.256%
Total	7,892,940	7,841,897	18,965	413.5	0.240%

- a) Estimated at the TAZ level in 2009 with NYMTC’s forecasted socio–economic and demographic (SED) forecast for the 28 county regional areas.
- b) 2010 Census 100% Counts – Households by Census Tracts

3.7.4 Level 2: Balancing by Household Type and Person Characteristics

In the second stage, also applied at the household level, a multi-dimensional balancing (MDB) method was developed and applied to account and adjust for possible bias with respect to the type of households, as determined by the characteristics of its members. The overall process and data used for the Level 2 balancing is shown in Figure 3.3.

Figure 3-3:
Level 2 (Final) Expansion Process



The first step involves meta-balancing, which reconciles the controls amongst themselves to the extent possible. Meta-balancing is followed by a balancing procedure that works with disaggregate units in the survey sample (households, persons, or trips) and calculates a weight (or expansion factor) for each unit. In general, whenever a full consistency among all controls cannot be achieved when applied to a single sampled household, the balancing procedure requires that a hierarchy be established for the control data items based on the importance and perceived reliability of each. This hierarchy is then used to determine which control distributions are matched the most closely, and which are allowed to vary if a close match cannot be achieved for all simultaneously. Both meta-balancing and balancing procedures are based on the sound theoretical principle of entropy-maximization, well discussed in literature.

For the RHTS, MDB procedures were applied to balance household characteristics and minimize possible bias with respect to key household characteristics that affect actual travel or the reporting of travel. The application of MDB for development of the Level 2 Expansion Factors was done using the following methods:

- Priority weights were assigned to different households and person control variables. A higher priority weight resulted in a stronger match of the control variable to the target data. Highest priority weight is set for the number of households in the geographical area (*i.e.* the maximum priority is given to match the expanded number of households in the geographical area to the target data – ACS 2010). Household level control variables are assigned higher priority weights than person level control variables.
- The average value HH_WHT1 for each county was observed to be in the range of 138–710. Keeping this in mind, to get the reasonable values for HH_WHT2, stage 2 weights were constrained to be between 50 and 3000. Reasonable values were based on the county average of Level 1 weight. This range is chosen so that a household in the sample neither over-represents nor under-represents the geography. However, the range can be easily changed based on the general consensus of the reasonable values.
- The Newton–Raphson Method – an iterative numerical method to approximate roots of equations – was used for balancing. Balancing was achieved by adopting 100 iterations.

In the following discussion, some important details regarding the data used and specifics of the methodology are described.

The most recent ACS Public Use Microdata Sample (PUMS) 2010 data of household and person demographics were used as the source of controls for both the selected household and person attributes. They were applied separately for each Public Use Microdata Area (PUMA) subsample or the combination of PUMAs in case of lower number of households in the survey data. Various attributes were considered to define households of different types known to account for variations in travel behavior. The following household level controls were used:

- Size (Persons)
- # Workers
- # Children
- Income Level (Imputed where missing)
- Age of Head of Household

In order to apply the ACS data in a manner consistent with the RHTS, some data processing was required. The number of workers in each household was calculated in both ACS PUMA 2010 data and the survey data with a consistent definition of workers. The number of working days or hours per week was considered as the criteria to define a worker in the households. The hours worked per week from ACS data were used to tag the person as a worker, if the hours worked were more than 16 per

week. In the survey data, if the number of working days for a member in the household is more than 2, that member is classified as a worker.

Income was imputed for the household records for which income was reported as “don’t know” or “prefer not to say.”

The imputation was applied with a multinomial logit model estimated on the survey sample records with known incomes, and household characteristics of number of workers, Home County, number of children, household head age, dwelling type and number of vehicles as the explanatory variables. This model was then applied to the sample with unknown income to impute income categories.

Age of head of household was used as an indicator of household life cycle stage. To determine which member to consider as the head of household, the following rules were applied: The oldest full time worker, or oldest part-time worker in the case of no full time worker in the household, or the oldest member in the case of no full-time or part-time worker in the household was considered as the head of the household.

In addition to household variables, two important person level measures were incorporated in the MDB process. Both relate to the usual work travel patterns of workers in the household, so that the survey is representative of general commuting patterns that are known to correlate with many aspects of household activities and other travel patterns. The first measure was the usual place of work, using the following aggregated geographic control.

- Intra-County
- To Manhattan
- From Manhattan
- Other pattern. *i.e.* neither the home county nor work county is Manhattan nor Work County is same as the home county

The second measure used as a person-level control, was the general mode of travel to work, generalized as follows:

- Auto
- Transit
- Non-Motorized (walk and bike)
- All other modes

A comparison of the distribution of control variables at different expansion stages is shown in Table 3–6. Table 3–7 shows the final expanded number of households in each county and deviation from ACS 2010 data. Note that the Priority Weights shown in the table relate to the importance of the control as explained above; not to initial Level 1 Weight from Stage 1.

Table 3–6: Comparison of Expansion at Different Stages

Priority Weight	Household Variables	HIS			Target (ACS), weighted
		Level 0 (Unweighted)	Level 1 (Weighted)	Level 2 (Weighted)	
10000	Number of households				
1000	Household Size				
	One	30.45%	31.03%	27.64%	27.63%
	Two	35.37%	34.94%	29.14%	29.12%
	Three	15.77%	15.84%	16.76%	16.76%
	More than 4	18.41%	18.19%	26.46%	26.48%
	Total	100.00%	100.00%	100.00%	100.00%
1000	Household income				
	Less than \$30,000	20.78%	22.06%	25.56%	25.55%
	\$30,000–\$49,999	14.52%	14.89%	15.65%	15.64%
	\$50,000–\$74,999	17.15%	17.02%	16.22%	16.21%
	\$75,000–\$99,999	13.15%	13.44%	11.88%	11.88%
	\$100,000–\$149,999	19.02%	18.51%	15.19%	15.18%
	More than \$149,999	15.37%	14.08%	15.50%	15.54%
	Total	100.00%	100.00%	100.00%	100.00%
1000	Number of Workers				
	Zero	24.97%	25.75%	22.71%	22.69%
	One	42.83%	42.19%	39.55%	39.54%
	More than one	32.21%	32.05%	37.74%	37.77%
	Total	100.00%	100.00%	100.00%	100.00%
1000	Number of Children				
	Zero	76.52%	76.60%	69.19%	69.18%
	One	10.90%	11.22%	13.62%	13.63%
	More than one	12.58%	12.18%	17.19%	17.19%
	Total	100.00%	100.00%	100.00%	100.00%
1000	Age of Head of Household (computed)				
	Less Than 45 years	29.08%	28.99%	39.59%	40.12%
	45–64 years	56.77%	56.87%	42.54%	40.34%
	More than 64 years	14.15%	14.13%	17.87%	19.54%
	Total	100.00%	100.00%	100.00%	100.00%
Priority Weight	Person Variables	HIS			Target (ACS), weighted
		Level 0 (Unweighted)	Level 1 (Weighted)	Level 2 (Weighted)	
100	Usual Work Pattern				
	Intra County	54.08%	56.69%	58.16%	58.24%
	To Manhattan	16.32%	15.72%	16.52%	16.44%
	From Manhattan	1.24%	1.05%	1.22%	1.22%
	Other	28.36%	26.55%	24.10%	24.10%
	Total	100.00%	100.00%	100.00%	100.00%
100	Mode of Transport to Work				
	Auto Mode	68.88%	70.95%	61.09%	61.96%
	Transit Mode	23.61%	22.04%	28.45%	27.42%
	Non-Motorized Mode	4.75%	4.28%	5.84%	5.73%
	Other Mode	2.76%	2.73%	4.62%	4.89%
	Total	100.00%	100.00%	100.00%	100.00%

Table 3-7: Comparison of Number of Households at County Level

County	Target (ACS)	Level 2 (PUMA level MDB)	
		Number of households	Deviation from target
New York NY	726,090	726,190	0.014%
Queens NY	772,334	772,362	0.004%
Bronx NY	471,910	471,938	0.006%
Kings NY	905,317	905,334	0.002%
Richmond NY	163,815	163,805	0.006%
Nassau NY	442,726	442,729	0.001%
Suffolk NY	496,264	495,835	0.086%
Westchester NY	341,847	341,883	0.011%
Rockland NY	98,207	98,209	0.002%
Putnam NY	37,355	37,357	0.005%
Orange NY	124,628	124,632	0.003%
Dutchess NY	106,934	106,937	0.003%
Fairfield CT	329,092	329,105	0.004%
Bergen NJ	332,999	333,022	0.007%
Passaic NJ	161,528	161,535	0.004%
Hudson NJ	238,692	238,726	0.014%
Essex NJ	275,416	275,437	0.008%
Union NJ	183,881	183,891	0.005%
Morris NJ	177,785	177,793	0.004%
Somerset NJ	115,913	115,916	0.003%
Middlesex NJ	278,768	278,783	0.005%
Monmouth NJ	234,691	234,707	0.007%
Ocean NJ	220,974	220,981	0.003%
Hunterdon NJ	47,549	47,549	0.000%
Warren NJ	41,207	41,207	0.000%
Sussex NJ	54,881	54,880	0.002%
New Haven CT	329,595	329,603	0.002%
Mercer NJ	131,499	131,502	0.002%
Total	7,841,897	7,841,848	0.001%

3.7.5 Summary of Trip Adjustment Factors – Using the GPS Sample

Several types of trips are intrinsically under-reported because of factors such as duration, type of activity, mode etc. For instance, a trip of very short duration may not be included in the diary-based survey. In order to account for such possible under-reporting of travel in the RHTS, the survey included a GPS-assisted logging of travel with prompted recall retrieval for approximately 10 percent of the overall sample. Since this method is most likely to capture all actual travel movements of respondents on the travel day, it is used to assess the magnitude and pattern of under-reporting of travel in the diary-based portion of the survey, and estimate correction factors that can be applied to more fully account for the travel of the full sample.

To accomplish this, the travel analysis files, weighted with the Level 2 Expansion factors described in RHTS Technical Memorandum 6.3 (available on www.nymtc.org), were used to compare the tour rates by different segments for GPS-assisted and diary-based portion of the survey. The resulting Level 3 correction factors are then defined as the ratio of the tour rates for GPS-assisted to diary-

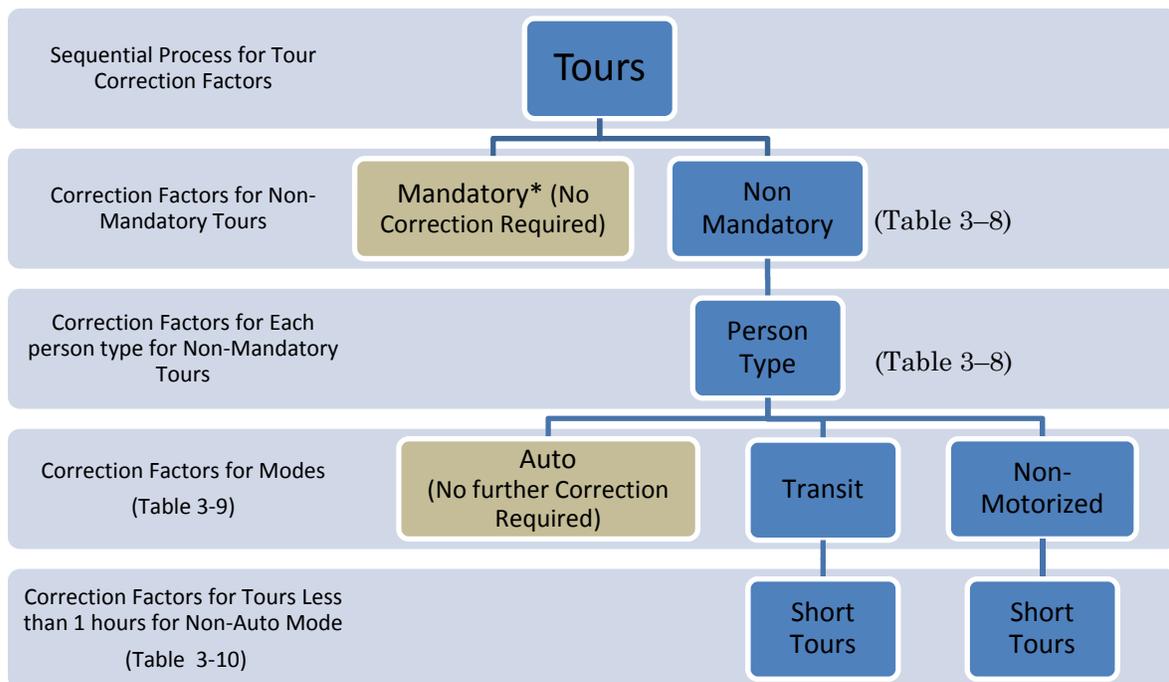
based portion of the survey. The following section describes the two stage methodology for correction first for the under-reporting of Tours and subsequently for the under-reporting of Stops.

Level 3.1 - Correction for Under-Reporting of Tours: Tours are file specifically developed for the NYBPM. Tours rates are calculated for both GPS and non-GPS sample by segments. The tour correction factor (TourFreqFAC) is the ratio of tour rates for GPS to non-GPS (minimum ratio is constrained to one). These ratios are initially developed by tabulating tours with HH samples, but finally weighted with Household Expansion factor obtained at Stage 2 of the data weighting plan. The segmentations found to best explain the differences between the GPS and non-GPS were tour purpose, tour mode, and tour duration, when each are stratified by person type. Other segmentations that were analyzed but found to be insignificant were by household size, Home County, and presence of children in household.

The first set of correction factors were developed using each of these segmentations, applied sequentially as shown in **Figure 3-4**, resulting in the correction factors shown in **Tables 3-8, 3-9, and 3-10** which are the values applied to the non-GPS sample.

It was found that mandatory tours (tours with purpose as work, school, or university) are not under-reported. So in the first stage, correction factors were only derived for non-mandatory tours (tours with purpose as escort, shopping, visiting, maintenance, eating out or discretionary) and person type, and then applied to the non-GPS data. After correcting for tour purpose, it was observed that tours with auto mode were not under-reported (no further correction required), that transit tours were somewhat under-reported and non-motorized mode were highly under-reported. So in this stage, the non-auto mode tours non-GPS data were then further corrected. In the final stage of Level 3.1, transit and non-motorized non-GPS tours with duration less than 1 hour were further corrected.

Figure 3-4: Methodology used for tour frequency correction factors – Level 3.1



* *Mandatory includes work, school, and university tours*

Table 3-8: Tour Correction Factor by Tour Purpose – Level 3.1

Person type	Non Mandatory	Mandatory
Full time Worker	1.28	1.00
Part time Worker	1.41	1.00
University Student	1.36	1.00
Non-Working Adult	1.34	1.00
Retiree	1.19	1.00
Driving Age School Child	1.92	1.00
Pre-driving age School Child	1.52	1.00
Preschool Child	1.13	1.00

Table 3-9: Tour Correction Factor by Tour Mode – Level 3.1

Person Type	Auto	Transit	Non-Motorized
Full time Worker	1.00	1.13	1.07
Part time Worker	1.00	1.07	1.00
University Student	1.00	1.07	1.22
Non-Working Adult	1.00	1.00	1.52
Retiree	1.00	1.00	1.40
Driving Age School Child	1.00	1.00	1.00
Pre-driving age School Child	1.00	1.04	1.00
Preschool Child	1.00	1.05	1.00

Table 3-10: Tour Correction Factor by Tour Duration – Level 3.1

Person type	Long Tour (more than 1 hr)	Short Tour (Less than 1 hr)
Full time Worker	1.00	1.00
Part time Worker	1.00	1.58
University Student	1.00	1.58
Non-Working Adult	1.00	1.03
Retiree	1.00	1.19
Driving Age School Child	1.00	1.00
Pre-driving age School Child	1.00	1.00
Preschool Child	1.00	1.00

Note:



Person Types combined due to insufficient tours in the segment

Level 3.2 – Correction for Under-Reporting of Stops: After tour correction factors were developed, the tours were corrected with a different set of factors for the number of stops. It was found that tours with a higher number of stops were under-reported in the non-GPS sample. Table 3-11a and Table 3-11b illustrate that the tour rates for higher number of stops were higher for the GPS portion of the survey than non-GPS portion. Several thresholds for the duration of stops (such as 15 minutes, 30 minutes) were attempted and it is found that a stop correction factor was only significant for the tours with stops of less than 15 minutes duration. For these tours, the ratio of tour rates (StopFreqFac), segmented by number of stops and mode, for GPS to non-GPS was calculated by tabulating tours weighted by using the Household Expansion Factor multiplied by the TourFreqFAC. The methodology is illustrated in Figure 3-5 and final factors calculated by tour mode are shown in Table 3-c12c. The final factors applied to the RHTS data are shown in Table 3-11d, which incorporate normalization factors that ensure that the number of tours by mode and purpose resulting from the application of the level 3.2 factors did not change the number of tours corrected by TourFreqFAC in the previous stage. While the factor was applied on a tour basis based on number and duration of stops, it was found that the underreporting of these trips tended to be correlated with stop purpose, so that some linked trip purposes were more affected than others, such as short escorting and minor shopping trips which were most likely to be under-reported.

**Table 3-11a:
Tour rates by number of stops for GPS portion of the survey – Level 3.2**

Mode	0 stops	1 stops	2 stops	3+ stops
SOV	0.58	0.27	0.09	0.06
HOV	0.51	0.25	0.14	0.10
Transit	0.67	0.22	0.06	0.05
Non-Motorized	0.67	0.25	0.04	0.04

**Table 3-11b:
Tour rates by number of stops for Non-GPS portion of the survey – Level 3.2**

Mode	0 stops	1 stops	2 stops	3+ stops
SOV	0.75	0.18	0.05	0.02
HOV	0.67	0.20	0.08	0.05
Transit	0.79	0.15	0.04	0.02
Non-Motorized	0.80	0.15	0.03	0.01

Figure 3–5: Methodology used for stop correction factor

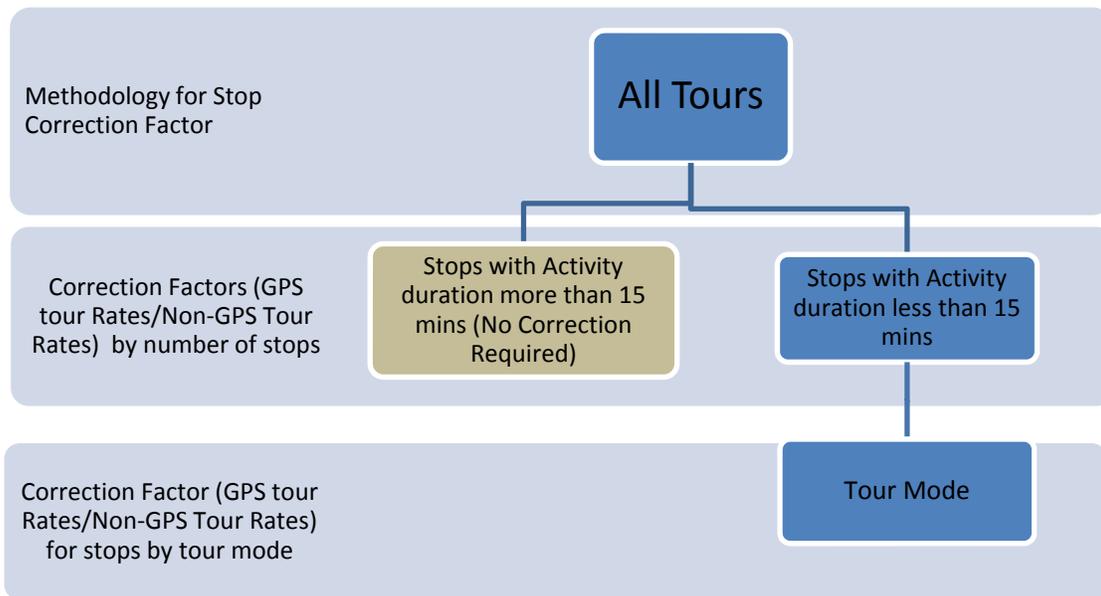


Table 3–11c: Stop Correction factor for tours with number of stops – After Normalization for number of tours with activity duration less than 15 minutes. – Level 3.2

Mode	0 stops	1 stops	2 stops	3+ stops
SOV	0.78	1.48	1.85	2.45
HOV	0.76	1.27	1.73	1.96
Transit	0.85	1.49	1.75	1.75
Non-Motorized	0.83	1.67	1.72	1.72

Table 3–11d:
Tour rates by number of stops for Non-GPS portion of the survey – Level 3.2

Mode	0 stops	1 stops	2 stops	3+ stops
SOV	0.79	1.44	1.78	2.35
HOV	0.79	1.29	1.72	1.93
Transit	0.86	1.46	1.71	1.68
Non-Motorized	0.84	1.67	1.68	1.67

Note:

Number of stop segmentation is combined due to insufficient tours in the segment

Figure 3-6: Average Level 3 Weights

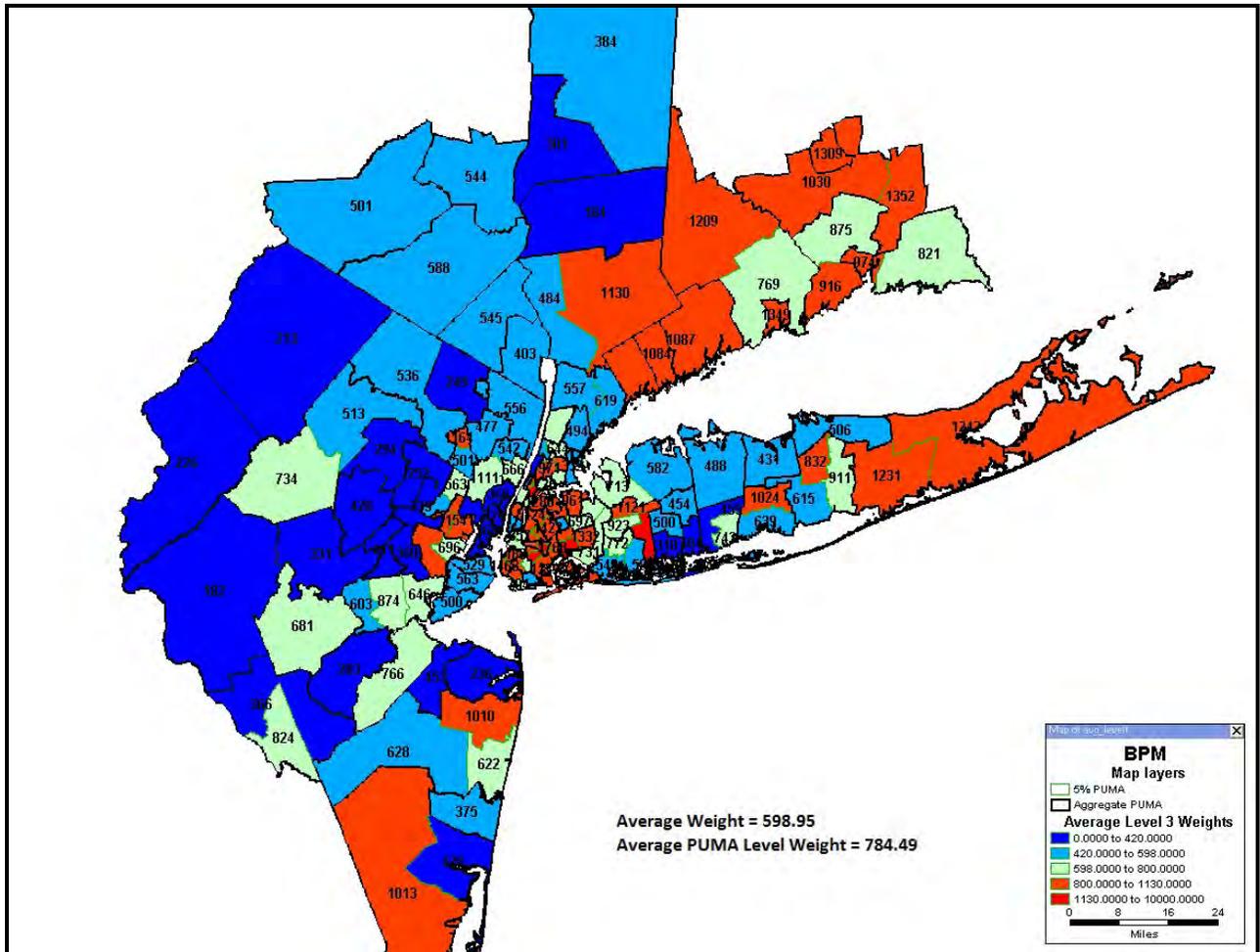
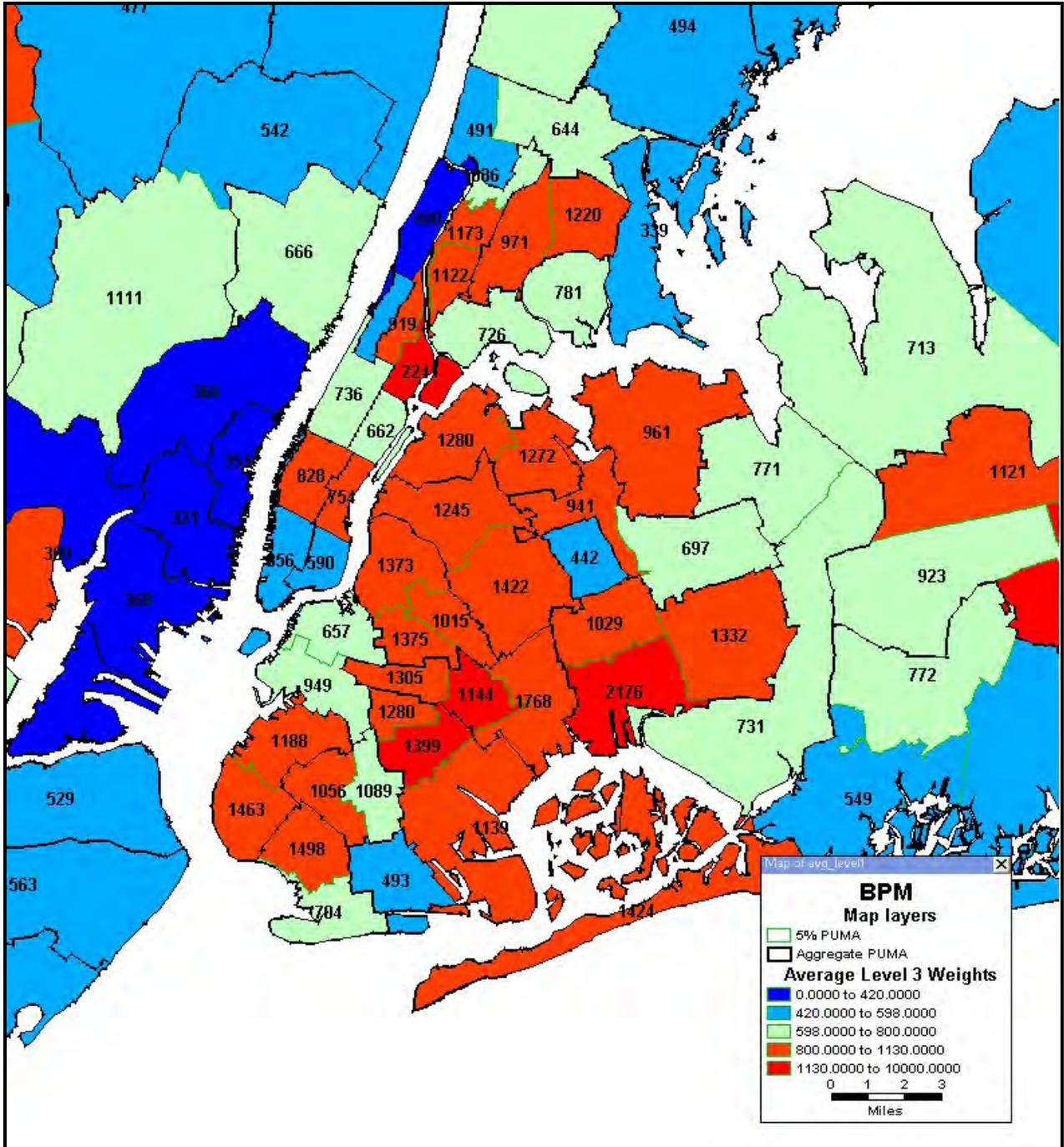


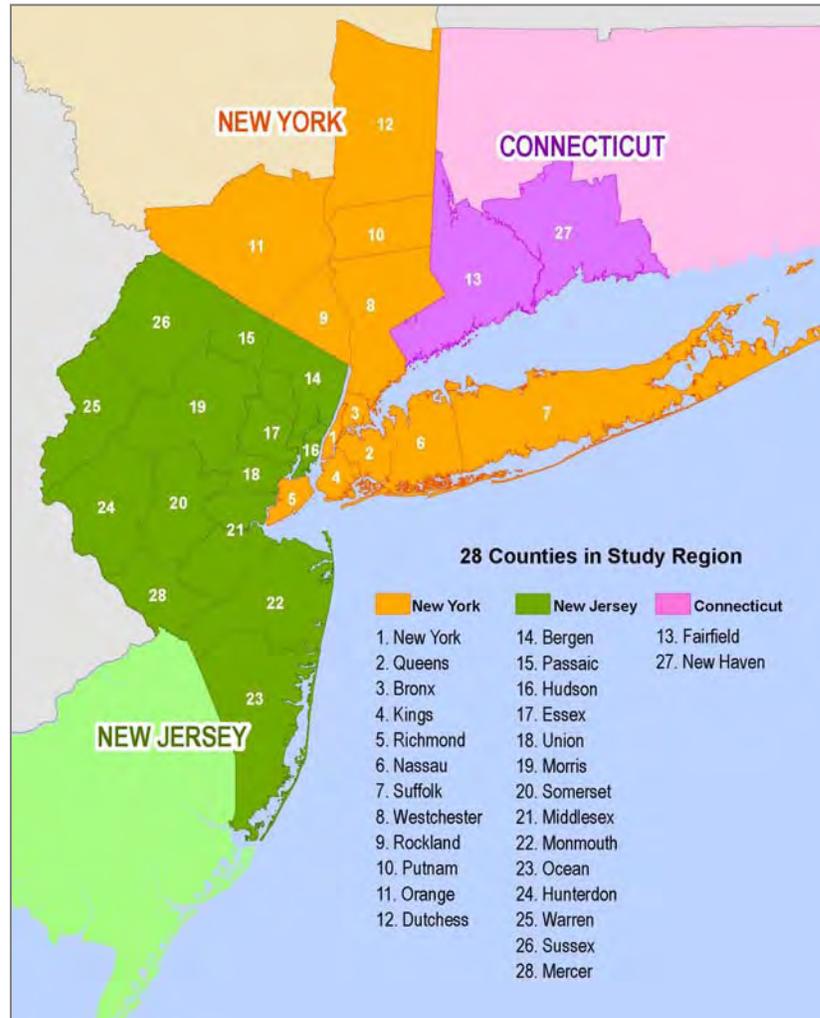
Figure 3-7: Distribution of final weights (with correction factors) – Manhattan and Brooklyn



3.8 GPS Sub-Sample

The 28-county RHTS metropolitan study area is shown again in Figure 3-8. A 10% sub-sample used wearable Global Positioning System (GPS) devices to record their travel and then participate in a follow-up GPS-based prompted recall (PR) survey.

Figure 3-8: Map of the RHTS Region



The design of the survey called for a total of 18,800 complete households with a subset of 1,880 households being assigned wearable GPS devices for each household member between 16 and 75 years of age. Those household members under 16 or over 75 were assigned paper travel diaries. Participants were asked to carry devices for two days unless travel began on a Friday in which case, they were asked to carry the devices for four consecutive days.

The purpose of the GPS component was to collect detailed information about all trips made by households in the GPS subsample. This detailed information was used to generate trip rates for estimating levels of trip underreporting in the larger, non-GPS sample.

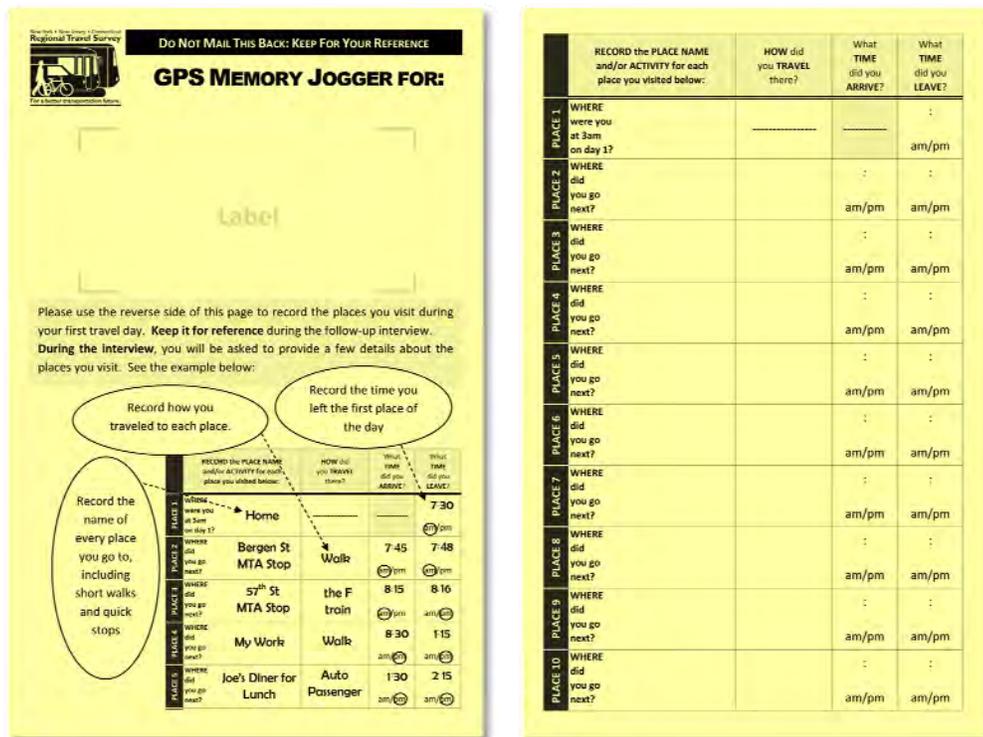
The design also called for the use of Prompted Recall (PR) interviews wherein a participant was able to view their recorded GPS data while responding to questions about their trips via a web interface.

Participants who confirmed their travel via a Computer Assisted Telephone Interview (CATI) were prompted by a CATI operator viewing the participant’s GPS trips on a computer screen.

Equipment deployments (both outbound shipments and returns) were handled via a team of three deployment members; a management website was used to assign households to deployment team members, and to track the return of devices, the uploading of data from the devices and the progress towards completion of the survey.

As noted previously, methods and systems to be used in the main survey effort were tested during the Pre-test in the spring of 2010. There were two key findings from the Pre-test. The first was that the TripBuilder layout would be friendlier for users transposing data collected from a diary if it was made to closely match the paper diary format. As such, TripBuilder was adjusted to accommodate the form of diary used for this survey. Secondly, the need for a memory jogger for GPS prompted recall participants (particularly those who were reporting or confirming GPS trip details by telephone interview) was identified after it became clear from feedback that participants were having a hard time remembering details of travel they had completed a few days prior. Figure 3-9 shows the format of the half sheet, front/back card sent to participants to use for noting general details about their travel day.

Figure 3-9: GPS Memory Jogger Example (front and back)



This section of the report documents the GPS data collection and processing methods used in the main survey.

3.8.1 Recruitment Methods and Results

The GPS goal for the Regional Household Travel Survey main survey was to successfully recruit and retrieve at least 1,880 households from the tri-state area. These households were to be distributed by county to match overall county-level distribution goals, which were based on NYMTC’s 2007 TAZ-level forecast of 2010 households, small area (and county total) estimates of the universe of

households in the region. Using a 65% assumed response rate, it was determined that 2,890 households would need to be recruited to achieve 1,880 complete households.

In order to obtain at least 2,890 GPS recruits, a system was developed for pre-flagging batches of sample for the two GPS groups (matched and unmatched). Households were selected from random addresses within the survey area and then mailed an advance letter. The letter introduced the survey and described details about it as well as what would be expected of those who chose to participate. The letter also mentioned the use of GPS and the provision of an incentive for participating in the survey.

Households from the matched group were called after advance letters were sent. If a household stated that they did not want to participate in the GPS component of the survey, but still wanted to participate in the diary-only portion of the survey, they were allowed to opt out of the GPS component. This 'opt out' approach was designed to minimize potential self-selection biases and to provide better information about the types of households that refuse to participate in this subcomponent.

Households selected for the GPS component were informed of this during the recruit interview. Figure 3-10 contains the recruit script text that was used to explain a household's role in the GPS component when they were first contacted.

Figure 3-10: Recruit Script GPS Text – Introduction

Introductory Stage of the Interview:

INTRO: Hi, this is _____. I am calling on behalf of the [SAY AGENCY BASED ON HSTATE: *New York Metropolitan Transportation Council/ North Jersey Transportation Planning Authority/ transportation planning agencies in Connecticut*] about improving transportation in your area. You may have received a letter from us recently about the Regional Travel Survey.

May I please speak with an adult age 18 or older in the household?

PREVIEW: We recently sent a letter to your home to tell you about this very important project. *The New York Metropolitan Transportation Council is/ the North Jersey Transportation Planning Authority is/ transportation planning agencies in Connecticut* are one of the survey sponsors [PROGRAMMER: DISPLAY AGENCY BASED ON HSTATE]. This agency is one of several that are responsible for planning and improving transportation in the region. Did you receive the letter?

Matched Sample:

The letter informs area residents about a very important study of travel patterns and transportation needs. This study will update data from 1998; transportation agencies in our region use this data to make decisions about how to improve the region's transportation system. As a participating study household, everyone age 16 and older who lives in your household will wear a compact GPS device for two consecutive weekdays. Those under 16 and over 75 will complete travel diaries. Wearing this small GPS unit is an easy way for you to provide accurate travel data. If qualified for the study, your household will receive \$25 for carrying these devices. All data is strictly confidential and used only for research purposes.

READ TO ALL WHO ASK QUESTIONS, SEEM HESITANT, OR WHO ATTEMPT TO REFUSE; EXPLAIN GPS UNITS IN MORE DETAIL: The GPS units are small and easy to carry – they clip to your clothing just like a cell phone or pager – and they only need to be carried when you are outdoors. By using them, you will not need to record your travel in a paper diary. These GPS units are not tracking devices; they collect additional travel details including travel routes and congestion levels experienced on the transportation system. It is very important that households like yours participate so we can compile travel data from all types of area residents.

Unmatched Sample:

The letter informs area residents about a very important study of travel patterns and transportation needs. This study will update data from 1998; transportation agencies in our region use this data to make decisions about how to improve the region's transportation system. As a participating study household, everyone age 16 and older who lives in your household will wear a compact GPS device for two consecutive weekdays. Those under 16 and over 75 will complete travel diaries. Wearing this small GPS unit is an easy way for you to provide accurate travel data. If qualified for the study, your household will receive \$75 for carrying these devices. All data is strictly confidential and used only for research purposes.

READ TO ALL WHO ASK QUESTIONS, SEEM HESITANT, OR WHO ATTEMPT TO REFUSE; EXPLAIN GPS UNITS IN MORE DETAIL: The GPS units are small and easy to carry – they clip to your clothing just like a cell phone or pager – and they only need to be carried when you are outdoors. By using them, you will not need to record your travel in a paper diary. These GPS units are not tracking devices; they collect additional travel details including travel routes and congestion levels experienced on the transportation system. It is very important that households like yours participate so we can compile travel data from all types of area residents.

Figure 3-11 contains the text read to participants who agreed to do the survey and to carry the GPS device(s). It contains additional information on incentives and the participation process.

Figure 3-11: Recruit Script GPS Text Post Opt-in

Once a Household Agrees to Participate:

Thank you for participating in this important study. Understanding your household's travel and activities is very important for improving transportation in your area. We will send you a GPS Device for each member of your household age 16+ to keep track of your travel and activities for two consecutive days starting on [DAY AND DATE]. Persons under age 16 will be assigned diaries.

Matched Sample:

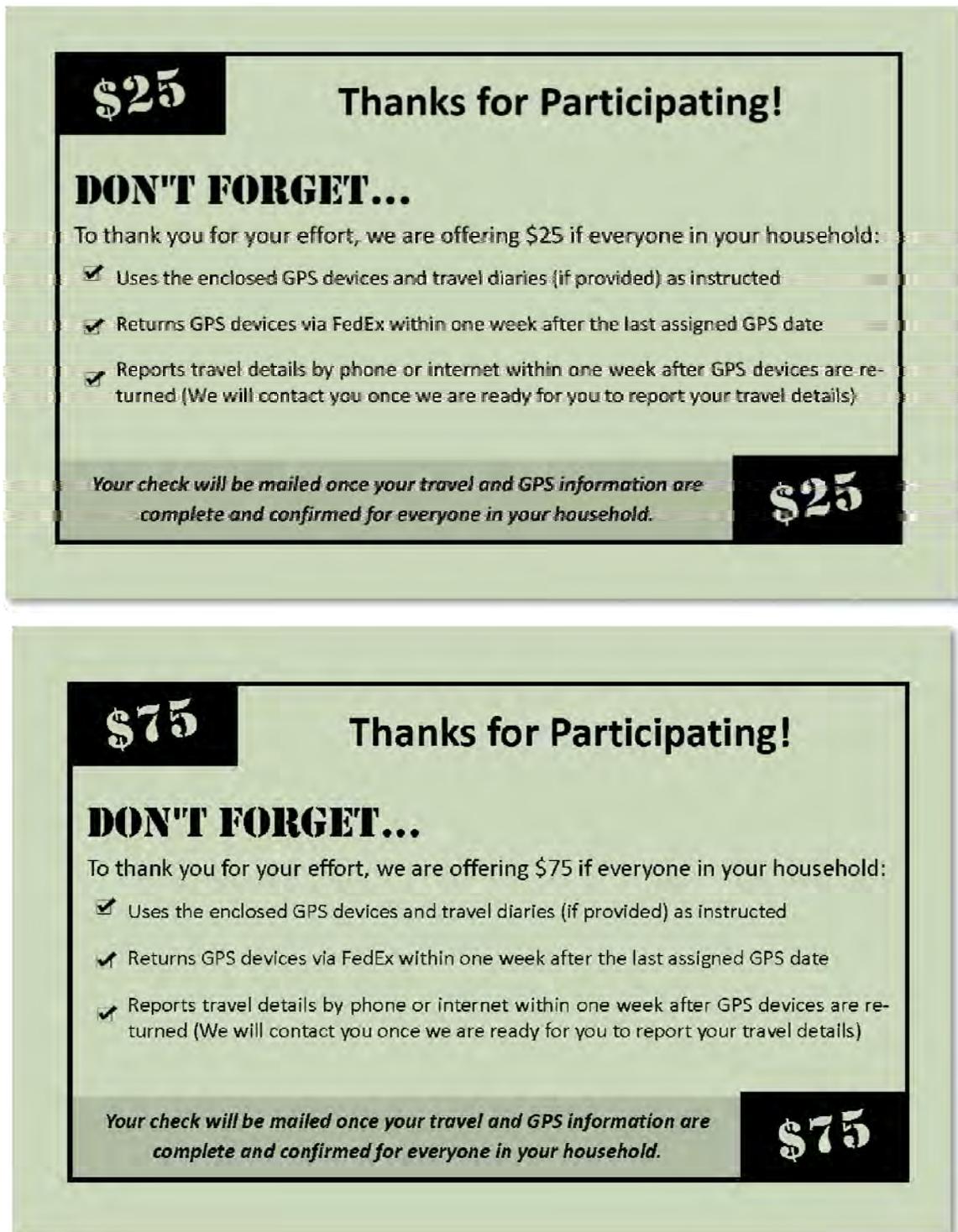
We are offering \$25 in appreciation of your efforts, but only if EVERYONE in your household carries the GPS device or completes a paper diary so that we have good travel information by [10 days after the assigned travel day]. Once all your travel information is complete and confirmed for EVERYONE in your household, we will mail you a check.

Unmatched Sample:

We are offering \$75 in appreciation of your efforts, but only if EVERYONE in your household carries the GPS device or completes a paper diary so that we have good travel information by [10 days after the assigned travel day]. Once all your travel information is complete and confirmed for EVERYONE in your household, we will mail you a check.

Incentives for GPS Households were offered in two variations to motivate both the use and timely return of GPS devices. If a household was in the matched sample, they were offered an incentive of \$25. If the household was in the unmatched sample, the household was offered \$75 (\$50 for being an unmatched household, plus \$25 for participating the GPS component). The offer was mentioned during the recruitment call and in incentive inserts accompanying the GPS devices and memory joggers (which were delivered via FedEx). An example of the incentive insert appears below.

Figure 3-12: Incentive Insert Examples



Wherever appropriate, the GPS survey methodology was integrated with the main survey methodology to minimize respondent burden. For example, the recruitment calls introduced the GPS survey component, the GPS deployment team members shipped custom-labeled travel diaries and memory joggers with the GPS equipment, and reminder calls were made on the evening prior to the

assigned travel date also reminded participants about GPS equipment use. In addition, participants were given the option to receive text or email reminders throughout the course of their participation that included instructions about using and returning the equipment before, during, and after the travel period, as well as reminders to complete the final retrieval steps.

The distribution of GPS households recruited by GPS type and by week was monitored throughout the survey period. As the survey reached the middle months, it became apparent that the initial retrieval rate of 65% was not being achieved and a new goal for recruits was calculated based on the newly identified rate of retrieval of 62%, resulting in a new recruit goal of 3,033. The goal was adjusted again by the end of the survey, with a total of 3,225 households recruited to provide sufficient coverage for all 28 counties. Results by county are shown in Table 3-12.

Table 3-12: GPS Households – Recruitment Results by County

Description	Recruited	Recruit Goal	% of Goal
Manhattan (New York)	346	246	140.7%
Queens	179	209	85.6%
Bronx	208	176	118.2%
Brooklyn (Kings)	279	214	130.4%
Staten Island (Richmond)	56	72	77.8%
Nassau	160	171	93.6%
Suffolk	190	195	97.4%
Westchester	119	124	96.0%
Rockland	52	50	104.0%
Putnam	46	44	104.5%
Orange	58	57	101.8%
Dutchess	74	73	101.4%
Fairfield	79	73	108.2%
Bergen	161	159	101.3%
Passaic	74	69	107.2%
Hudson	189	168	112.5%
Essex	135	123	109.8%
Union	108	88	122.7%
Morris	71	79	89.9%
Somerset	41	48	85.4%
Middlesex	114	121	94.2%
Monmouth	115	113	101.8%
Ocean	110	98	112.2%
Hunterdon	47	46	102.2%
Warren	38	44	86.4%
Sussex	52	52	100.0%
New Haven	75	76	98.7%
Mercer	49	45	108.9%
Total	3225	3033	106.3%

Table 3-13 shows a breakdown of recruits by recruitment mode and sample type for the GPS component of the survey.

Table 3-13: GPS Recruits by Mode and Sample Type*

Recruitment Mode	Sample Type					
	Matched	Matched Percent	Unmatched	Unmatched Percent	Total	Total Percent
CATI	1,501	46.5%	249	7.7%	1,785	55.4%
WEB	196	6.1%	1,244	38.6%	1,440	44.7%
Total Count	1,697	52.6%	1,493	46.3%	3,225	100.0%

*All percentages use 3,225 as the basis in this table

There are a few notable aspects about the mix of sample that was recruited to participate in the GPS component of the survey. First, the percentage of sample that came from unmatched addresses accounts for close to half of the records, which was partially attributable to the high GPS flagging rate used for the unmatched sample. Second, 83.3% of the unmatched sample and 44.7% of the overall GPS sample self-recruited via web, indicating that the availability of the web survey was crucial in attracting participants to the GPS component.

3.8.2 Wearable GPS Equipment

Households recruited into the GPS portion of the survey received battery-powered GPS devices for all household members between the ages of 16 and 75 (as reported during the recruitment call). The GlobalSat™ GPS Data Logger is a rugged yet simple GPS data logging device (see Figure 3-13) that has been deployed in numerous household travel studies and physical activity studies conducted since 2007. The GlobalSat device is lightweight (6 oz) and small (2.75”x3.15”x.7”). It can be worn on the waist, clipped to a purse or backpack, or dropped in a suit jacket pocket.

Figure 3-13: The GlobalSat GPS Data Logger



This device can log at various time intervals from once per second to once every five seconds or more. It can log all valid GPS points or only those valid points for which the speed is greater than one mile per hour (MPH) (to screen out non-movement events), and has a 60,000 GPS point storage capacity. For the purpose of this survey, the logging frequency was set at 4-second intervals with the speed screener activated. Standard GPS data stream elements recorded by the GlobalSat include date, time, latitude, longitude and speed. These elements were stored in the logger in standard National Marine Electronics Association (NMEA) units and converted into user-specified units and formats upon download. At the start of the survey, 1,025 GlobalSat devices were provided to support deployment of

the initial 2,890 households over the planned main survey data collection period. An additional 125 devices were sent in the last months of the survey to assist with the final deployment phase and the higher number of recruits (3,225).

3.8.3 Deployment Procedures

Households were recruited into the travel survey at least 10 days prior to their assigned travel date. As GPS households were recruited, recruit details (including names, addresses, phone numbers, and person rosters) were pulled daily and imported into a local database. This recruit information was then available on the GPS Survey Management website for use by the deployment team.

The deployment team members signed onto the password-protected website on a daily basis to review upcoming deployments. The lead time between the posting of recruited households to the website and the assigned travel date was typically five to seven days, allowing sufficient time to prepare the necessary documents, diaries, GPS memory joggers, and equipment, and to ship them to arrive prior to the assigned travel date.

Simple printed instructions were shipped with the devices; these instructions also listed the assignment of each logger to each household member based on the logger identification number. A sticker was affixed to each GPS device with the first name of the household member printed on it. The instructions also emphasized the need to use the memory joggers to record travel on the assigned travel date.

A return device sheet was also provided on which the household members were asked to record if they used the devices, and if not, to list the reason(s) why. Examples of the GPS device instructions and return sheets are below in Figure 3-14. These three pages were sent as a set with the equipment, memory joggers, and travel diaries (when applicable).

Figure 3-14: GPS Cover Letter and Instructions



New York • New Jersey • Connecticut
Regional Travel Survey

For a better transportation future.

Sponsored by:




[PROJECT] [SAMPLE] [ASSN] | YFH

[FIRSTNAME] [LASTNAME] [DATE NOW]
 [ADDRESS]
 [CITY], [STATE] [ZIP]

Dear [FIRSTNAME],

Thank you for participating in the Regional Travel Survey! *Your input is important, no matter how much or how little you travel.* Your travel information will be combined with information from others in your area to help plan transportation projects in your community. We invite you to visit www.regionaltravelsurvey.org for more information about the survey.

The survey is being conducted for the New York Metropolitan Transportation Council (NYMTC), the North Jersey Transportation Planning Authority (NJTPA), and other regional transportation planning agencies.

How do you participate? Follow these easy steps:

- 1) **Each household member has been provided with either a GPS device (with a memory jogger) or a travel diary.**
 - **If you received a GPS device,** please read the first page of the "GPS Device Instructions for Use" and carry or wear the assigned device as instructed. We are also including a Memory Jogger for you to jot down the places you go on [FIRSTTRAVELDAY]. Please return the GPS equipment (postage paid) immediately after [LASTTRAVELDAY]. *Keep your Memory Joggers to complete step 2.*
 - **If you received a travel diary,** please record your travel for 24 hours on [FIRSTTRAVELDAY]. This package contains personalized travel diaries for persons under age 16 and those over age 75. Parents/guardians should help fill out the travel diaries for children under age 16. *Keep your travel diaries to complete step 2.*
- 2) **Confirm your travel information using your preferred method.** *Have your Memory Joggers and travel diaries handy to help you remember the details of your travel.*
 - **Online:** After you return the GPS devices, we will let you know by email, phone, or text when you can log on to confirm or complete your travel information. At that point, log on to www.regionaltravelsurvey.org. Click "Report Travel" and enter PIN#: [PINNO]. Each household member age 16 and older can then confirm or complete his/her own travel data. An adult can enter information for children under age 16.
 - **By phone:** We will call you after receiving your GPS equipment.

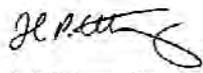
Questions about the survey? Call the project hotline toll-free at 1-888-223-6234 (10am-9pm ET Mon-Fri and 11am-6pm ET on weekends). **Questions about the GPS devices?** Call the GPS technical support hotline toll-free at 1-866-436-7828 (9am-6pm ET Mon-Fri).

Once we confirm travel information for all household members, your \$[INCENTIVE] gift for participating in the survey will be sent to you within 8-10 weeks.

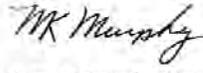
All information collected in this study will be held strictly confidential and will only be used in combination with others so that no individual can be identified.

Thank you again for joining us as we plan our region's transportation future.

Sincerely,



Joel Ettinger, *Executive Director*
New York Metropolitan Transportation Council



Mary K. Murphy, *Executive Director*
North Jersey Transportation Planning Authority

Survey conducted by NuStats on behalf of NYMTC and NJTPA
in conjunction with Greater Bridgeport Planning Agency, Valley Council of Governments and the South Western Regional Planning Agency

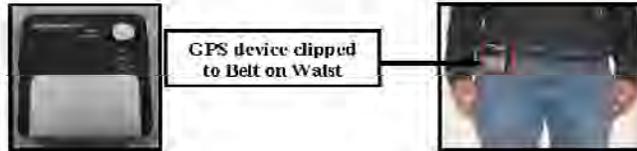
GPS Device Instructions for Use

Travel Diary Date: [FIRSTTRAVELDAY]

GPS Study Dates: [FIRSTTRAVELDAY] through [LASTTRAVELDAY] ([TRAVELDAYS] full days)

Welcome to the GPS component of the Regional Travel Survey. As mentioned when we first contacted you, the GPS portion of this survey will collect additional travel-related details needed for this study. We greatly appreciate your willingness to help us with this component.

This package contains one GPS logging device and memory jogger for each person between the ages of 16 and 75 in your household and travel diaries for all others. The following pictures show the GPS device and how it can be worn.



GPS Device / Diary Assignment

The GPS devices / memory joggers or diaries should be provided to each person as shown in the table below. The GPS Unit ID appears on the back of each GPS logger. The name of each person and a unique color have also been placed on each GPS device.

Person	Name	Age	GPS Unit ID	Color Code
[PERSON1]	[NAME1]	[AGE1]	[GPSUNITID1]	
[PERSON2]	[NAME2]	[AGE2]	[GPSUNITID2]	
[PERSON3]	[NAME3]	[AGE3]	[GPSUNITID3]	
[PERSON4]	[NAME4]	[AGE4]	[GPSUNITID4]	
[PERSON5]	[NAME5]	[AGE5]	[GPSUNITID5]	
[PERSON6]	[NAME6]	[AGE6]	[GPSUNITID6]	
[PERSON7]	[NAME7]	[AGE7]	[GPSUNITID7]	
[PERSON8]	[NAME8]	[AGE8]	[GPSUNITID8]	
[PERSON9]	[NAME9]	[AGE9]	[GPSUNITID9]	
[PERSON10]	[NAME10]	[AGE10]	[GPSUNITID10]	

When and How to Wear GPS Device

- You should wear the GPS device whenever you travel outside of your home starting on your assigned travel date and continuing through all days of your GPS study period (as listed above).
- When walking, biking or riding public transportation, you should wear the GPS device on your waist or clipped to your bag or purse. If you are riding inside a vehicle such as a car or truck, you can continue to wear the GPS device on your waist or place your bag or purse on the seat.

Charge the GPS Device Battery Daily, Including the Day or Night before your Travel Diary Date

- **Charge the device.** Plug one end of the enclosed cable (the end with the larger connector) into the cable on the side of the GPS device. Connect the opposite end of the cable into the wall plug adaptor and plug the adaptor into the wall. If the connection is right, the bottom light on the GPS device will light up in amber/yellow indicating that it is charging.
- **Confirm device is on.** Unplug the GPS device in the morning and make sure the green light (the top light nearest the large silver power button) is illuminated. If it is not, press the power button for four to five seconds until all lights appear. If they do not appear, please try again by first releasing and then pressing and holding the power button for four to five seconds until all lights appear. Once all lights appear, you can release the button. The green and red lights should remain illuminated, meaning the device is ready to collect data. The green light will flash when data is being collected. The mode switch on the side of the device is not used and can be set to a, b or c.

If you have any questions regarding the GPS equipment, please call GeoStats toll-free at 1-866-436-7828 between 9am and 6pm (ET) Monday - Friday. GeoStats is our contractor for the GPS component of the Regional Travel Survey.

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{PECF00UH\$AMPN\$HASN\$HTYPE}

GPS Device Return Instructions

Please return all GPS devices, along with this page, immediately after your participation is complete.

Please **KEEP** your memory joggers and travel diaries - you will need these to confirm or report travel in the last part of this survey.

As soon as possible after [LASTTRAVELDAY] collect all GPS devices, cables, and AC adapters provided for your household, place them in the packaging material and box in which they arrived, and place the box inside the pre-paid FedEx Pak (and seal the Pak). You may drop the FedEx package at any FedEx store or drop box, or you can call 1-800-GoFedEx for a pick-up at your home.

Please complete this table and return this page with your equipment in the box and FedEx Pak provided.

Person	Name	Used GPS Device (Yes/No)	Reason if GPS device not used
[P_GPS1]	[NAMEGPS1]		
[P_GPS2]	[NAMEGPS2]		
[P_GPS3]	[NAMEGPS3]		
[P_GPS4]	[NAMEGPS4]		
[P_GPS5]	[NAMEGPS5]		
[P_GPS6]	[NAMEGPS6]		
[P_GPS7]	[NAMEGPS7]		
[P_GPS8]	[NAMEGPS8]		
[P_GPS9]	[NAMEGPS9]		
[P_GPS10]	[NAMEGPS10]		

Return Checklist

- ✓ All GPS Devices, power cables, and AC adapters
- ✓ Packing materials / Original Box
- ✓ This page

Remember, in order to receive your participation award, you must:

- ✓ Use the enclosed GPS devices and memory joggers
- ✓ Return GPS devices via FedEx
- ✓ Use the travel diaries (if provided)
- ✓ Report or confirm your travel details:
 - o After your devices have been returned and your data has been processed, you will receive either a reminder message or a phone call to report travel details.
 - o You previously indicated that you prefer to complete the survey [CATSI]. Once notified, you can log on to www.regionaltravelsurvey.org to complete the survey by web (using the PIN provided) or wait for a phone call to complete your follow-up interview by telephone.

Please provide any additional comments here:

Thanks for your participation!

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 in conjunction with Greater Bridgeport Planning Agency, Valley Council of Governments and the South Western Regional Planning Agency

Shipping of participant instructions, equipment, diaries, and a pre-paid return package was conducted via FedEx. The equipment was scheduled for shipment so that it would be delivered to the household two business days prior to the assigned travel day. Participants were instructed to retain the memory joggers (and diaries when assigned) for reference during the final survey step of confirming travel over the phone or confirming travel on the website.

The deployment team was instructed to prepare and ship equipment packages for each household listed on the deployment website and to update the household deployment status when appropriate. The default status for deployment when recruit information was first loaded was 'Recruited,' which then permitted status changes as appropriate. Following is a list of all household deployment status codes:

- Recruited
- Shipped
- Deployed
- Returned–Deployed
- Invalid Address
- Returned Refused (elected not to participate)
- Not Returned / Lost
- Over–recruit

The first four statuses reflect the natural progression of a successful deployment, whereas the final four statuses reflect GPS recruits that did not result in a useful deployment. The last status was used if a deployment team member has no equipment remaining to deploy or when a household was recruited without enough lead time for the equipment to be shipped to a household.

After receiving the returned equipment, deployment staff downloaded the GPS data from the loggers and then cleared the device memory for redeployment. The downloaded, zipped GPS file was then posted to the project website and imported into the project database for further processing. Deployment personnel were also responsible for updating the person–level equipment usage status fields as reported by each household and for recording any household or person–level comments on the website.

3.8.4 Deployment Results

Equipment was successfully deployed to 3,189 households, with 2,699 of those returning the devices without any indication of a refusal to participate. An equipment retrieval management system was developed in Microsoft Access and used to coordinate follow up with all GPS households that did not immediately return their GPS equipment as instructed. First, a phone call was placed to the home telephone number for all households that did not return their GPS devices within one week after the last GPS travel date. When a person answered or an answering machine picked up, a message was delivered thanking the household for their participation and requesting that the GPS equipment be returned in the pre–paid FedEx envelope. A toll–free call back number was left if the household had any questions. If no person or answering machine was reached, additional calls were attempted.

If equipment still had not been returned by three weeks after the last GPS travel day, a letter was sent to the home. A second equipment retrieval letter was mailed to the household if equipment was still outstanding after five weeks. During the final week of the survey, phone calls were made and letters were mailed simultaneously in an attempt to retrieve as much equipment as possible. An example of the letter sent as a reminder to households that did not return equipment after phone calls is below in Figure 3-15.

Figure 3-15: Equipment Retrieval Letter



At the completion of the survey, 187 households had not returned the GPS devices sent to them. Table 3-14: GPS Deployment by Final Status shows the final totals by survey month and year for each deployment disposition category. The counts for Returned Refused are included in the Total Returned

numbers. The 30 households that were not deployed due to recruitment issues are not included in these tables.

Table 3-14: GPS Deployment by Final Status

Month	Total Deployed	Total Returned	Still Deployed/ Not returned	% Not returned
Oct-10	185	178	7	3.8%
Nov-10	418	404	14	3.3%
Dec-10	157	151	6	3.8%
Jan-11	320	301	19	5.9%
Feb-11	461	435	26	5.6%
Mar-11	432	412	20	4.6%
Apr-11	298	287	11	3.7%
May-11	461	426	35	7.6%
Jun-11	375	338	37	9.9%
Sep-11	10	9	1	10.0%
Oct-11	72	61	11	15.3%
Total	3189	3002	187	5.9%

After the GPS devices were received from participants and the GPS data were downloaded and transferred to the data server, the GPS points in these files were processed via a web-based online travel reporting system, TripBuilder Web (TBW), which automatically identified and tagged each trip in the GPS data stream. Data analysts used TBW to review, edit, and/or confirm trip end locations using a map interface that displayed suspicious delays and provided validation of details such as whether a calculated speed was reasonable for the assigned mode. After all GPS trip processing was complete for a given household, the household was released for retrieval and notified that they were now able to complete the prompted recall survey. This section provides details on each of these methods.

GPS Data Processing

As the GPS data collected by the participants were imported into the project database, the UTC (Universal Time Coordinate) date and time stamps in the GPS point data were translated to local date and time. As mentioned previously, the speed filter settings on the wearable GPS Data Loggers deployed to survey participants were set to screen out all zero point speeds, with non-zero speed points recorded at a four-second frequency.

Next, each GPS file was processed using TripBuilder Web (Figure 3-16) to identify potential trip ends based on time intervals between consecutively logged points. (For this survey, all initial dwell times of 120 seconds or more were flagged as potential trip stops.) The GPS trip data were then visually reviewed by analysts to screen out traffic delays and other falsely identified stops with dwell times of 120 seconds or more, as well as to add stops that had dwell times of less than 120 seconds but had clear stop characteristics. If geocoded addresses were available from the recruit call (i.e., habitual destinations such as home, work and school locations), the analyst used these locations to assist in the trip end identification and/or confirmation process.

Figure 3-16: TripBuilder Web Software

Report Your Travel

Household: 9900010
 Person: JEAN DOE (p 1)
 Travel on: Friday, December 17 2010

Total Places: 5
 Places with missing information: 0

Return to Select Person Page

Place 3 Where Did You Go Next?

WHAT is this PLACE?

Home (Home)
 H & E Tool Rental Corporation (Work - JEAN)
 O (Work - JAMES)

Specify a Different Location

A previously visited location?

What is the NAME and ADDRESS of this place?

Name of place OR transit stop: Tottenville Public library
 Address OR nearest cross streets: Anthony Rd + Yonkers Ave, Staten Island, NY 10310, USA

Type of place: Other Place

What TIME did you ARRIVE at this place? 8:15 PM Sat 12/18/10

HOW did you TRAVEL to this place? 08 Auto (car or small truck) DRIVER

Which vehicle did you use? DODGE 2005 (VIPER)

How many other travellers with you? 0 number of other people

Check household members who traveled with you: JEAN DOE, JAMES DOE

What TIME did you LEAVE? 7:30 PM Sat 12/18/10

Save Changes

Your Online Travel Diary

The list of places you visited on your travel day from morning until night:

View	#	Place	Mode	Arrival Time	Departure Time	Duration (Approx)
1	1	Home		5:00 AM	7:00 AM	2:00
2	2	H & E Tool Rental Corporation	Auto (car o...	8:30 AM	9:00 PM	8:30
3	3	Tottenville Public library	Auto (car o...	8:15 PM	7:30 PM	45:00
4	4	Pk's under the Bridge Cafe	Auto (car o...	7:45 PM	9:05 PM	1:20
5	5	Home	Auto (car o...	9:30 PM	2:59 AM	5:29

Add New Place, Remove Place, Insert Place Before, Insert Place After

Google Map of Your Travel

The routes shown between places on the map may not reflect how you traveled. They are here for illustrative purposes only.

Zoom to All, Zoom to Place, Set Location, Zoom to Trip

Don't forget short stops, such as stopping for gas or picking someone up. If you made any stops before your next destination, please report these as separate places.

Reported all of your travel for the day? If so, click Done.

Done

To complete your reporting later, click Done and then close this window. Your information is saved and you can log in again to finish reporting your travel.

New York Metropolitan Transportation Council | North Jersey Transportation Planning Authority | Privacy Statement
 South Western Regional Planning Agency | Orange County Transportation Council | State of New Jersey Regional Planning Agency | Valley Council of Governments | Passaic County Transportation Council | Contact Us
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3.8.5 Prompted Recall Methodology

The prompted recall methodology for the RHTS was supported in two different reporting modes: by CATI (telephone) and web-based (self-complete) interviews. The original design of TBW accommodated both modes with no changes to the layout or design of the interface. This dual mode principle was maintained in the final implementation for this survey with minor differences in text (so that both a self-complete participant and a CATI operator could be presented with contextual, coherent text) and more complex validation for CATI environments being the only exceptions. Examples of additional elements shown to CATI operators include validation checks on speed/distance/time, notes to operators to probe for transit legs or stops, and notes to include trips for short errands.

3.8.6 Participation Results

The preliminary number of households that used and returned the GPS equipment and then completed the final steps of the travel survey exceeded the original goal of 1,880 by 88 households. However, of the 1,968 cases initially marked as complete, 38 households were later determined to be

out of compliance for one or more reasons, leaving 1,930 (unweighted) deliverable GPS households (as seen in Table 3-15). This table shows the retrieval splits by retrieval mode and sample type.

Table 3-15: GPS Retrievals by Mode and Sample Type

Retrieval Mode	Sample Type					
	Matched	Matched Percent	Unmatched	Unmatched Percent	Total	Total Percent
CATI	703	36.4%	441	22.8%	1,144	59.3%
WEB	197	10.2%	589	30.5%	786	40.7%
Total Count	900	46.6%	1,030	53.4%	1,930	100.0%

Table 3-16 shows the final unweighted count of deliverable GPS households by county with sub-totals for each state agency, and a grand total. While the range of percent complete by county spans 76% to 154%, as mentioned previously, the number of participating households by county was deemed sufficient for the purpose of generating the trip rate correction factors used in the weighting and expansion process.

Table 3-16: GPS Recruits and Retrievals by County

County	# Recruited	GPS Recruit Goal	% Recruit Goal	# Retrieved	GPS Retrieval Goal	% Retrieval Goal
Manhattan (New York)	346	246	141%	230	151	154%
Queens	179	209	86%	108	129	84%
Bronx	208	176	118%	97	109	90%
Brooklyn (Kings)	279	214	130%	163	132	126%
Staten Island (Richmond)	56	72	78%	33	45	76%
Nassau	160	171	94%	93	106	88%
Suffolk	190	195	97%	138	121	115%
Westchester	119	124	96%	73	77	95%
Rockland	52	50	104%	31	31	100%
Putnam	46	44	105%	25	27	96%
Orange	58	57	102%	30	35	86%
Dutchess	74	73	101%	47	46	104%
NYMTC	1767	1631	108%	1068	1009	106%
Bergen	161	159	101%	101	99	102%
Passaic	74	69	107%	40	43	93%
Hudson	189	168	113%	102	104	98%
Essex	135	123	110%	71	76	93%
Union	108	88	123%	54	55	98%
Morris	71	79	90%	54	49	110%
Somerset	41	48	85%	31	30	103%
Middlesex	114	121	94%	63	75	85%
Monmouth	115	113	102%	72	70	103%
Ocean	110	98	112%	58	60	98%
Hunterdon	47	46	102%	29	28	104%
Warren	38	44	86%	25	27	96%
Sussex	52	52	100%	32	33	97%
NJTPA	1255	1208	104%	732	749	98%
Fairfield	79	73	108%	50	46	109%
New Haven	75	76	99%	42	47	89%
Connecticut	154	149	103%	92	93	99%
Mercer New Jersey (not NJTPA county)	49	45	109%	38	28	136%
Grand Total	3225	3033	106%	1930	1879	102%

The data in Table 3-17 shows that the average number of trips recorded at the household level by GPS participants exceeded the numbers of trips reported by diary participants by 2.3 trips per participating household.

Table 3-17: GPS Trip Rates – Household (Unweighted)

Survey Type	Mean	N
GPS	12.0	1,930
Diary	9.7	17,036
Total	9.9	18,965

The data in Table 3-18 shows that the average number of trips recorded at the person level by GPS participants exceeded the number of trips reported by diary participants by 1.8 trips per participating person.

Table 3-18: GPS Trip Rates – Persons

Survey Type	All Respondents	
	Mean	N
GPS	6.0	3,386
Diary	4.2	40,173
Total	4.3	43,558

The data in Table 3-19 shows a more detailed analysis of trip rates for each retrieval mode (CATI, CASI, Mail-back) and sample type (GPS, Diary) at the person and household level.

**Table 3-19:
Average Person & Household Trip Rates by GPS Type and by Retrieval Mode
(unweighted)**

Retrieval Mode	Persons				Households			
	GPS		Diary		GPS		Diary	
	Mean	N	Mean	N	Mean	N	Mean	N
Phone (CATI)	6.2	1,347	4.3	15,106	12.0	777	10.7	6,105
Web (CASI)	5.9	2,000	4.0	15,314	11.9	1,134	8.8	7,059
Mail	5.4	39	4.2	8,937	15.3	19	9.7	3,872
Total	6.0	3,386	4.2	39,357	12.0	1,930	9.7	17,036

3.8.7 GPS Final Conclusions

The GPS component of the RHTS obtained the desired 10% sample required for calculating trip rate correction factors for the larger 90% diary sample. This was the first large-scale travel survey ever conducted to use this approach for a GPS subsample and proved to be a successful method (based on both person-based and household-based trip rate differentials) in one of the most challenging GPS environments in the United States. The online GPS-based prompted recall method (which allowed participants to wear a passive logger and to confirm details online in a self-complete reporting mode) also proved to bring some hard-to-reach socio-demographic groups into the RHTS who may otherwise not have participated.

4.0 Summary of Survey Results

4.1 Travel Analysis and Reporting: Introduction

The results of the RHTS are presented in this section of the Final Report, with the survey data presented in the following tables and charts. For the purposes of analysis in this report, the Linked Trip table is used. The general topics of interest presented in this section are:

- ✓ General Travel and Trip Rates
- ✓ Travel by Different Types of Households
- ✓ Variation in Travel by Person Characteristics
- ✓ Focus on Auto Vehicle Trips
- ✓ Focus on Transit Trips
- ✓ Focus on Walk and Other Non-Motorized Trips

The topics above have been selected for the spotlight of this report, examining these dimensions of weekday travel by residents of the region.

Travel Measures:

- Units of Travel – Trips
- Geography
- Origin-Destination Markets
- Trip Travel Times and Distance
- Time of Day
- Activity Type and Travel Purpose
- Modes of Travel

Trip Maker Characteristics:

- Personal Characteristics
- Household Structure

Units of Travel – Trips:

- Three units of travel analysis were used for the Regional Household Travel Survey: Tours; Trips or Linked Trips; and Trip Segments or Unlinked Trips. Linked Trips was the unit used for the results presented in this report since they are the actual trips made every day and account for intermediate stops and transfers between modes. It is critical to account for those when analyzing travel patterns.

Geography: The 28-county New York-New Jersey-Connecticut metropolitan study area was grouped into three different geographic areas by county. These geographic groups, along with their Federal information processing standards (FIPS) codes, are presented in Table 4-0, below. FIPS codes are a standardized set of numeric or alphabetic codes issued by the National Institute of Standards and Technology (NIST) to ensure uniform identification of geographic units throughout all federal government agencies.

Table 4-0: Geographic Groups

County Group – Level 1 Label	Counties (FIPS code)
Manhattan	Manhattan – New York (36061)
Other New York City	Bronx (36005), Staten Island –Richmond (36085), Queens (36081), Brooklyn – Kings (36047)
Long Island	Suffolk (36103), Nassau (36059)
Mid-Hudson (NYMTC)	Westchester (36119), Rockland (36087), Putnam (36079)
Mid-Hudson (Other)	Dutchess (36027), Orange (36071)
Connecticut	Fairfield (9001), New Haven (9009)
Bergen-Passaic	Bergen (34003), Passaic (34031)
Essex-Hudson-Union	Essex (34013), Hudson (34017), Union (34039)
Middlesex-Morris-Somerset	Middlesex (34023), Morris (34027), Somerset (34035)
Monmouth-Ocean	Monmouth (34025), Ocean (34029)
Hunterdon-Sussex-Warren	Hunterdon (34019), Sussex (34037), Warren (34041)
Mercer	Mercer (34021)
Out of Metro Area	Other
Regional Boundaries – Level 2 Label	Counties (FIPS code)
New York City	Manhattan – New York (36061), Bronx (36005), Staten Island –Richmond (36085), Queens (36081), Brooklyn – Kings (36047)
Long Island	Suffolk (36103), Nassau (36059)
Mid-Hudson (All)	Westchester (36119), Rockland (36087), Putnam (36079), Dutchess (36027), Orange (36071)
Connecticut Counties	Fairfield (9001), New Haven (9009)
NJTPA Counties	Bergen (34003), Passaic (34031), Essex (34013), Hudson (34017), Union (34039), Middlesex (34023), Morris (34027), Somerset (34035), Monmouth (34025), Ocean (34029), Hunterdon (34019), Sussex (34037), Warren (34041)
Mercer	Mercer (34021)
Out of Metro Area	Other
Political Boundaries – Level 3 Label	Counties (FIPS code)
NYMTC Counties	Manhattan – New York (36061), Bronx (36005), Staten Island –Richmond (36085), Queens (36081), Brooklyn – Kings (36047), Suffolk (36103), Nassau (36059), Westchester (36119), Rockland (36087), Putnam (36079)
Other NY Counties	Dutchess (36027), Orange (36071)
Connecticut Counties	Fairfield (9001), New Haven (9009)
NJTPA Counties	Bergen (34003), Passaic (34031), Essex (34013), Hudson (34017), Union (34039), Middlesex (34023), Morris (34027), Somerset (34035), Monmouth (34025), Ocean (34029), Hunterdon (34019), Sussex (34037), Warren (34041)
Mercer	Mercer (34021)
Out of Metro Area	Other

Origin-Destination Markets: Useful classification of the travel in the RHTS by general origin-destination markets is possible, but it should be noted that the data do not provide a large enough sample to support reliable estimates of origin-to-destination flows on anything but a large geographical basis.

For this report, trips have been classified for analysis according to the following general pattern with respect to the “linked” origin and destination trip:

- ✓ Within County
- ✓ To Adjoining County (Not in NYC, but in New York State)

- ✓ To Manhattan
- ✓ To Other NYC
- ✓ To Other NYMTC Counties
- ✓ To Other in area
- ✓ Out of Metro Area

Trip Travel Times and Distance: Travel time in the RHTS was derived by calculating the time in minutes between reported times of departing from one place and arriving at the next. It should be noted that trip time estimates, particularly for short trips, are subject to error due in part to a tendency for respondents to round off to the nearest 5 or even 15 minutes of clock time.

Trip distances are calculated in the RHTS as a straight-line (sometimes referred to as “bird’s flight”) estimate of distance in miles.

Time of Day: Travel time in the RHTS is reported by clock time. For data analysis it is sometimes helpful and useful to look at data by hour of departure. The following five departure time periods were used:

- ✓ AM Peak Period: 6 – 10 a.m.
- ✓ Mid-Day: 10 a.m. – 4 p.m.
- ✓ PM Peak Period: 4 – 8 p.m.
- ✓ Evening: 8 p.m. – 12 a.m.
- ✓ Late Night: 12 a.m. (midnight) – 6 a.m. for consistency purposes with NYBPM periods, this period should be called Late Night or Night Period

Activity Type and Travel Purpose: For varying level of analysis, activity type and travel purpose in the RHTS is categorized by one-way (linked) trip purpose (i.e., the purpose of the trip at the origin and at the destination) or two-way (linked) trip purpose (i.e., the overall purpose of the trip based on a hierarchy of the trip at the origin and at the destination).

One way linked trip purpose is categorized as:

- ✓ Home to Work
- ✓ Home to School
- ✓ Home to Social/Rec (Social/Recreational)
- ✓ Home to Personal Business
- ✓ Home to Shopping
- ✓ Home to Serving Passengers
- ✓ Home to Other
- ✓ Work to Home
- ✓ School to Home
- ✓ Social/Rec to Home
- ✓ Personal Business to Home
- ✓ Shopping to Home
- ✓ Serving Passengers to Home
- ✓ Other to Home

- ✓ Work Related
- ✓ Between Work and Non-Work
- ✓ Other Non-Home/Non-Work

Detailed two-way linked trip purpose is categorized as:

- ✓ Work
- ✓ School
- ✓ Social/Rec
- ✓ Shopping
- ✓ Other

In addition, detailed two-way linked trip purpose is further categorized into:

- ✓ Work
- ✓ Non-Work

Modes of Travel: Analysis in this report is based on the primary trip mode. For trips involving multiple modes, the Primary Mode is defined based on a prescribed hierarchy of modes as shown below:

- 1 School Bus
- 2 Paratransit Service (Access-A-Ride, Dial-A-Ride, etc.)
- 3 Black Car Service/Limo
- 4 For-Hire Van/Jitney/Gypsy Cab
- 5 Taxi (Yellow, Medallion Cab)
- 6 Railroad (LIRR, Metro North, NJ Transit, AMTRAK)
- 7 Express Bus (Suburban, Commuter, Inter-city)
- 8 Roosevelt Island Tram
- 9 Ferry (Staten Island, NY Waterway, Water Taxi, Seastreak)
- 10 Light Rail/LRT (Newark, Hudson-Bergen, River Line)
- 11 PATH Train
- 12 Subway (NYTCT, Staten Island Railway)
- 13 Charter Bus (Employer-provided or Other Contracted)
- 14 Shuttle Bus (Public or Employer-provided)
- 15 Local Bus (Regular, Standard, City)
- 16 Carpool/Vanpool/Other Group Ride
- 17 Auto Passenger (Car or Small Truck)
- 18 Motorcycle/Moped/Motorized Scooter
- 19 Auto Driver (Car or Small Truck)
- 20 Wheelchair/Mobility Scooter
- 21 Skates/Skateboard/Kick Scooter/Segway
- 22 Bike

- 23 Walk
- 24 AIRTRAIN or Airport Bus
- 25 Airplane
- 97 Other/Don't Know/Refuse

For some analysis in this report, modes of travel are categorized into the following modal groups based on the primary linked trip mode:

- ✓ Auto includes auto (driver and passenger), motorcycle, moped, motorized scooter
- ✓ Rail or Ferry includes ferry, railroad, commuter rail, PATH, subway, and LRT
- ✓ Bus includes local, express, charter, and school buses
- ✓ Shared Ride/Taxi includes taxi, carpool/vanpool group ride, for-hire van, jitney, gypsy cab, black car, Roosevelt Island Tram, airport service, shuttle bus, paratransit, and group ride
- ✓ Walk/Non-Motorized includes walking, bicycle, wheelchair, mobility scooter, skates, skateboard, kick scooter, Segway, and other

Personal Characteristics: For the purposes of reporting, the ages of each person have been categorized into standard age cohorts, comparable to the American Community Survey (ACS) and other demographic reports. In addition, to support an understanding of variations in personal travel, the general “lifecycle” status (or Person Profile) for each person has been classified by a combination of their occupational status and/or age.

- ✓ Full-time employed
- ✓ Part-time employed
- ✓ Unemployed
- ✓ Homemaker
- ✓ Adult Student (>16 years of age)
- ✓ Retired
- ✓ School-aged (<16 years)
- ✓ Under 5 years
- ✓ Other

Household Characteristics: Households in the RHTS data can be described in terms of important dimensions needed for analysis of travel patterns – residential location, household size (number of persons), income, vehicle ownership, ethnicity, etc. Of these, household size, vehicle ownership, and income are especially important for travel demand analysis and typically used as the key “stratification” variables for travel forecast modeling.

Consistent with the 1999 RT-HIS, a set of Household Structure variables was calculated for tabulations contained within this report.

Presence of Workers:

- ✓ 2+ Full-time workers
- ✓ 1 Full-time worker + 1 Part-time worker
- ✓ 1 Full-time worker
- ✓ Retired or Unemployed only

Presence of Children:

- ✓ 3+ Children
- ✓ 2 Children
- ✓ 1 Child
- ✓ No Children

All analysis tables and figures in the rest of Chapter 4 are weighted and expanded to the study area population unless otherwise noted.

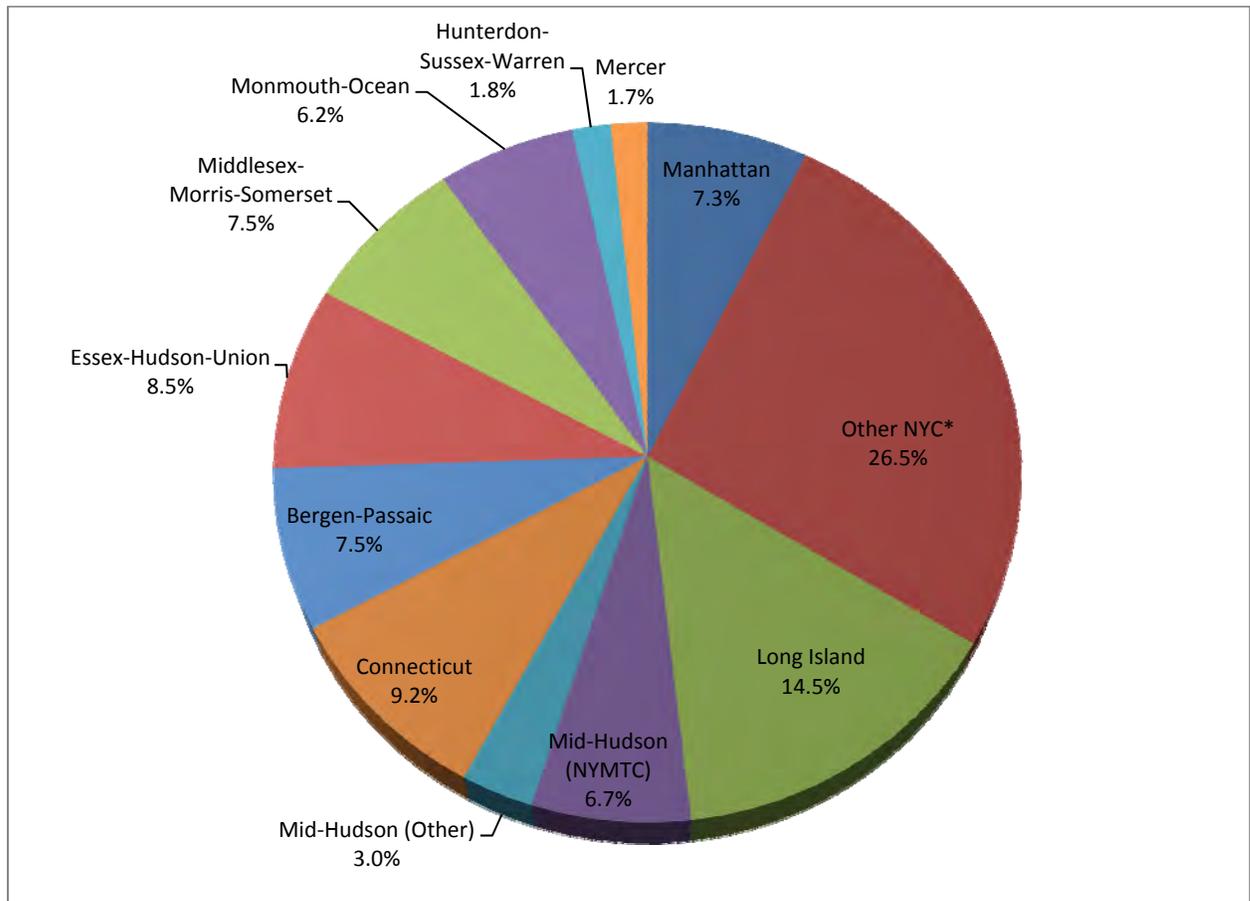
4.2 General Description of Travel and Trip Rates

This section of the report explores general travel and trip rates, O-D patterns, modes of travel, trip purpose, travel times, and other variations in travel.

4.2.1 General Travel

The final weighted RHTS data file represents 143,925 linked trips reported during the assigned travel days. Figure 4-1 presents the geographic distribution of linked trips reported in the survey.

Figure 4-1: Distribution of Weekday Trips by Residence - County Group (Level 1)

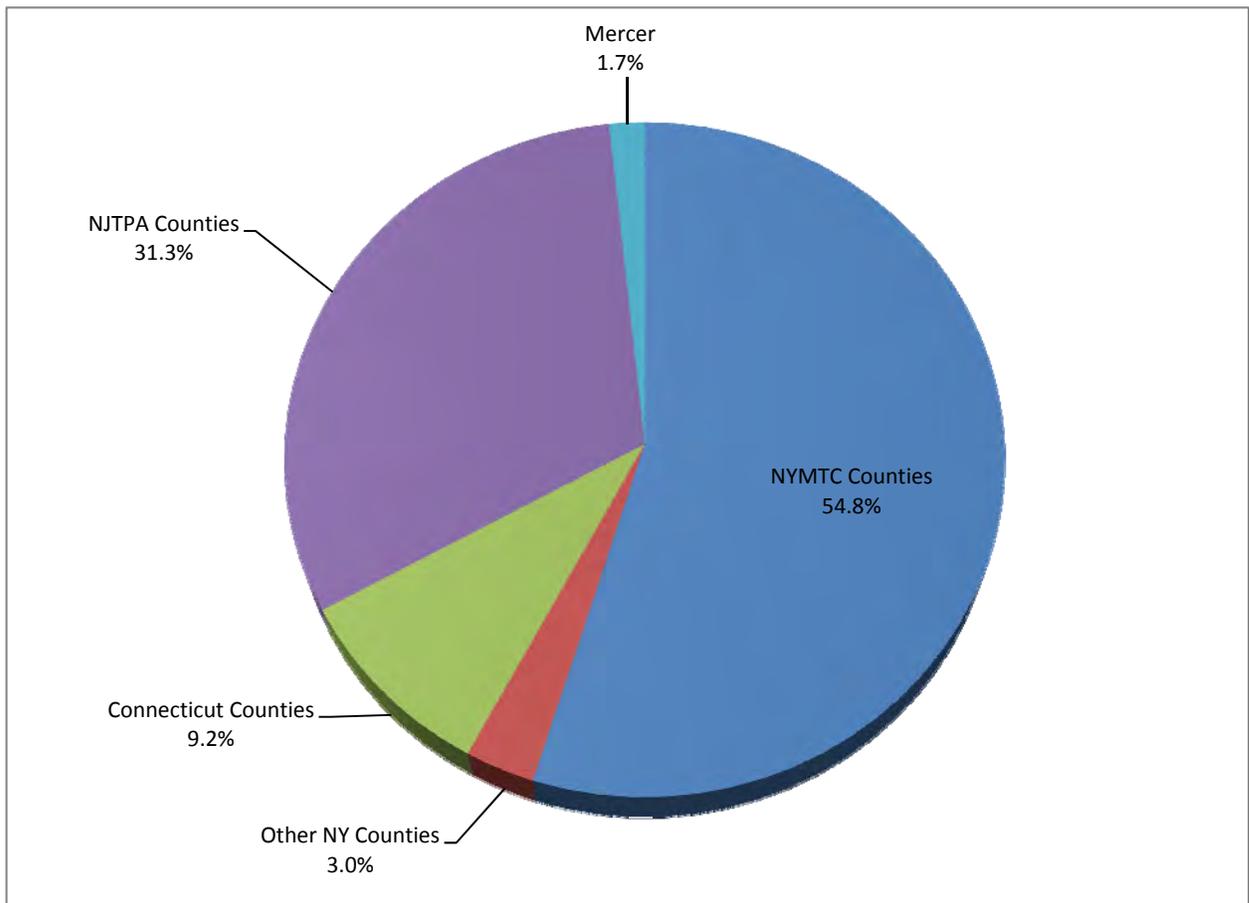


Note: Linked trip table, WHT_FAC3; GEO_GROUP1

* Brooklyn, Queens, The Bronx and Staten Island, excluding Manhattan

Just under 55% of all linked trips were made by residents from the NYMTC planning area, while just over 31% are made by residents of the NJTPA planning area. See Figure 4-2 for additional detail.

Figure 4-2: Distribution of Weekday Trips by Residence - Political Boundaries (Level 3)



Note: Linked trip table, WHT_FAC3; GEO_GROUP3

Overall, participating households averaged 10.1 trips per weekday and household members averaged 4.0 trips per weekday, as shown in Table 4-1. At first glance, these trip rates were much higher than the 1997/1998 survey (household trip rate 8.3; person trip rate 3.2); however, this survey had the benefit of being able to adjust for under-reporting of trips based on findings from the GPS portion of the survey. Without that adjustment, the trip rates would have been 8.0 (for households) and 3.2 (for persons), similar to the 1997/1998 survey. Therefore, people and households are not making more trips; rather under-reporting of trips was better accounted for in the 2010/2011 survey.

Table 4-1: Mean Household and Person Trip Rates by Residence County Group (Level 1)

County Group (Level 1): Residence	Mean Household Trip Rate	Mean Person Trip Rate*
Manhattan	8.1	4.3
Other New York City	9.0	3.5
Long Island	12.3	4.5
Mid-Hudson (NYMTC)	10.9	4.2
Mid-Hudson (Other)	10.3	4.0
Connecticut	11.1	4.5
Bergen-Passaic	11.8	4.5
Essex-Hudson-Union	9.7	3.9
Middlesex-Morris-Somerset	10.4	4.0
Monmouth-Ocean	10.9	4.3
Hunterdon-Sussex-Warren	9.7	3.7
Mercer	10.7	4.3
Overall	10.1	4.0

Note:

- HH/Per tables, HH_WHT2; HTRIPS_GPS and PTRIPS_GPS by GEO_GROUP1 (mean)
- Calculation of Mean Person Trip Rates excludes valid partial persons that did not provide travel data

4.2.2 General Origin/Destination (O/D) Patterns

General origin/destination markets of weekday travel in the RHTS are shown in Table 4-2. A significant majority of weekday trips are within county (82.2% of all travel). Of travel originating in Manhattan, 17.7% of trips end in another New York City location. As compared with other county groups origins, trips originating in Middlesex-Morris-Somerset counties were most likely to be destined to an adjoining, non-New York City, county (15.8% as compared to 6.3% overall). See Table 4-2 for more detailed information.

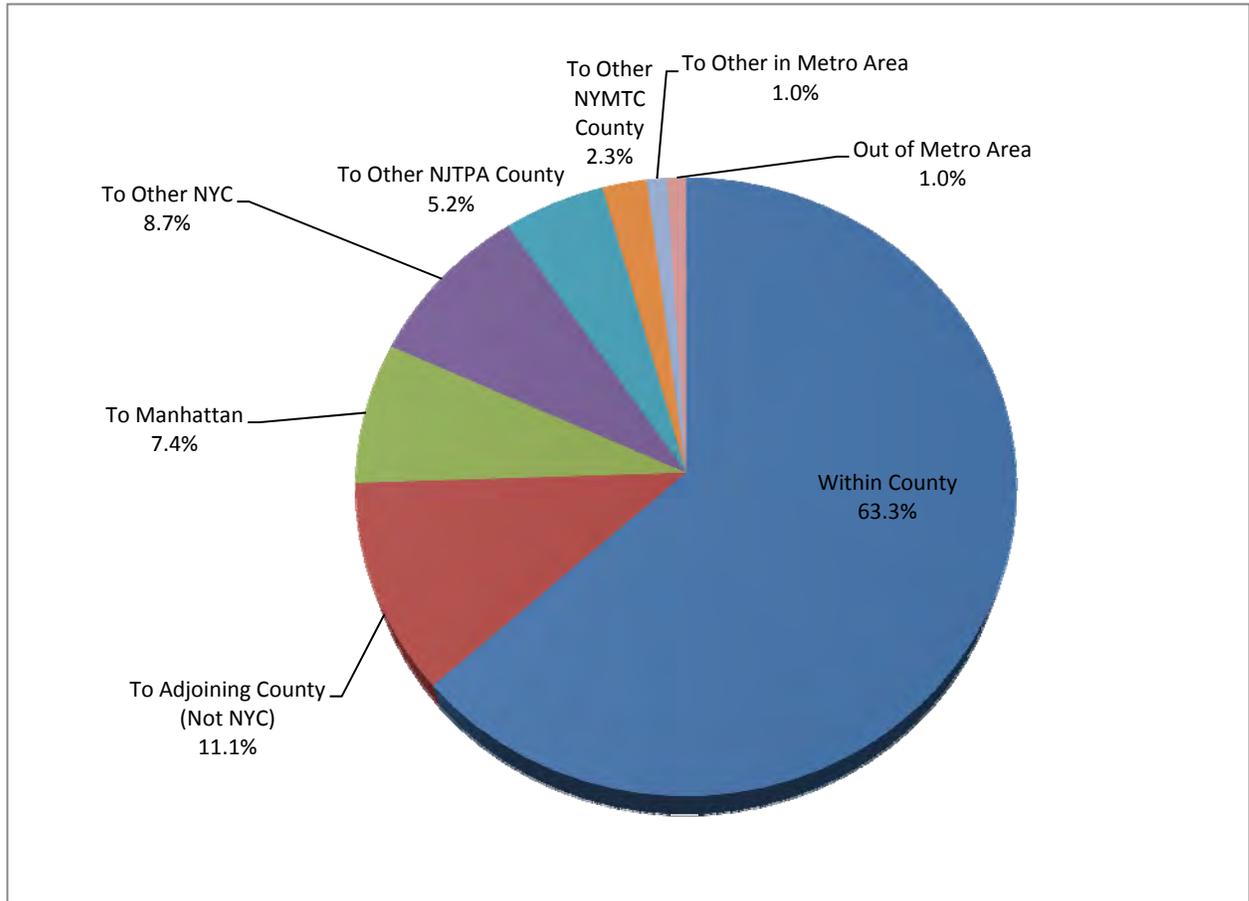
Table 4-2: General Origin/Destination (O/D) Patterns by County Group (Level 1) of Trip Origin – All Weekday Trips – Row Percent

County Group: Level 1 of Trip Origin	Within County	To Adjoining County (not NYC)	To Manhattan	To Other NYC	To Other NJTPA County	To Other NYMTC County	To Other Metro County	Out of Metro Area
Manhattan	74.0%	**	**	17.4%	4.2%	3.6%	0.7%	0.1%*
Other New York City	81.8%	2.4%	8.3%	4.9%	1.0%	1.1%	0.1%	0.3%
Long Island	89.1%	4.6%	1.6%	4.3%	0.2%	0.1%	0.0%*	0.1%*
Mid-Hudson (NYMTC)	83.5%	7.4%	2.7%	3.7%	1.0%	0.5%	0.9%	0.3%
Mid-Hudson (Other)	87.6%	5.2%	0.7%	1.2%*	0.9%	2.0%	0.0%*	2.5%
Connecticut	92.1%	5.6%	0.5%	0.2%*	0.2%*	0.1%*	0.0%*	1.3%
Bergen-Passaic	80.5%	13.8%	1.6%	0.8%	2.1%	0.4%	0.5%	0.3%
Essex-Hudson-Union	76.4%	12.7%	3.0%	1.0%	6.1%	0.4%	0.2%	0.1%
Middlesex-Morris-Somerset	78.6%	15.8%	0.9%	0.8%	3.3%	0.2%	0.1%*	0.3%
Monmouth-Ocean	88.9%	7.0%	0.6%	0.4%	1.9%	0.0%*	0.3%	0.8%
Hunterdon-Sussex-Warren	77.5%	13.2%	0.6%*	0.1%*	5.9%	0.1%*	0.1%*	2.6%
Mercer	86.5%	8.5%	0.7%	0.1%*	1.8%	0.0%*	0.0%*	2.4%
Out of Metro Area	0.0%	0.0%	0.1%*	3.8%	16.3%	1.7%	27.3%	50.8%
Total	82.2%	6.3%	2.9%	4.3%	2.1%	0.9%	0.5%	0.8%

Note: Linked trip table, WHT_FAC3; GEO_GROUP1_O by ADJ_COUNTY (* not enough cases to support a useful observation)

Overall, over 63% of all linked work trips are intra-county, a slight increase from 62% in 1997/1998. Trips to an adjoining county (not NYC) (11 %) and to an Other New York City county (9%) are also common origin-destination markets for work-related travel. The 7%, of all work trips are destined to Manhattan (slightly lower than 8% from 1997/1998) does not include those trips which originate in Manhattan (these are recorded in the “Within County” category).

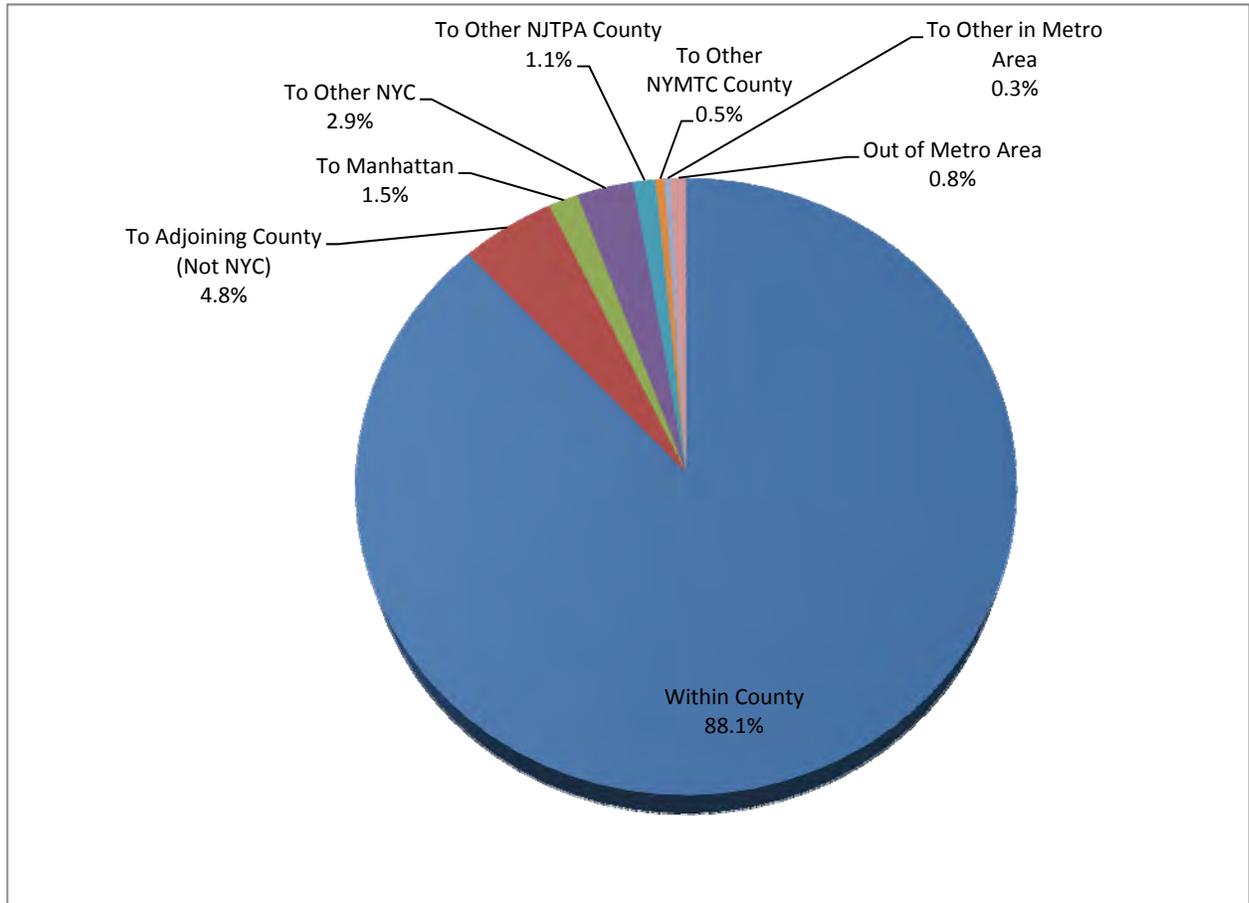
Figure 4-3: General Origin-Destination Markets: Metro Area, Weekday Trips, Work



Note: Linked trip table, WHT_FAC3, ADJ_COUNTY, WORKTRIP=1

As shown in Figure 4-4 below, within-county travel represents an even higher percentage of non-work travel (88%) and is also a slight increase from the 1997/1998 survey (84%).

Figure 4-4: General Origin-Destination Markets: Metro Area, Weekday Trips, Non-work



Note: Linked trip table, WHT_FAC3; ADJ_COUNTY, WORKTRIP=2

While most work trips in New York City are within county, Travel among the other NYC counties (besides Manhattan) has decreased from 97/98 when 27% of trips went to Manhattan (now it's 21%). Overall, most work trips in the region are either within the county or to an adjoining county with some counties (e.g., LI, and Monmouth-Ocean) retaining work trips closer to their home county better than other locales (e.g., Hunterdon-Sussex-Warren).

Table 4-3: General Origin/Destination (O/D) Patterns by County Group (Level 1) of Trip Origin – Work Trips

Trip Origin	Within County	To Adjoining County (Not NYC)	To Manhattan	To Other NYC	To Other NJTPA County	To Other NYMTC County	To Other Metro Area	Out of Metro Area
Manhattan	63.2%	--	--	22.6%	6.9%	5.9%	1.4%	0.1%*
Other New York City	58.1%	4.3%	20.8%	10.6%	2.6%	3.0%	0.4%*	0.0%*
Long Island	72.0%	11.6%	6.3%	8.8%	0.7%*	0.4%*	0.1%*	0.1%*
Mid-Hudson (NYMTC)	62.9%	13.2%	8.2%	9.3%	2.7%	0.9%*	2.5%	0.3%*
Mid-Hudson (Other)	75.2%	9.6%	2.3%	2.3%*	2.7%	5.5%	0.0%	2.3%
Connecticut	81.3%	13.0%	1.5%	0.6%*	0.9%*	0.3%*	0.0%*	2.3%
Bergen-Passaic	59.2%	24.6%	4.7%	2.0%	6.5%	1.0%	1.7%	0.3%*
Essex-Hudson-Union	50.5%	22.8%	8.5%	2.6%	13.3%	1.4%	0.7%*	0.2%*
Middlesex-Morris-Somerset	58.7%	26.3%	2.9%	1.7%	9.1%	0.5%*	0.3%*	0.5%*
Monmouth-Ocean	73.7%	14.2%	2.8%	1.1%*	6.2%	0.0%*	0.8%*	1.1%*
Hunterdon-Sussex-Warren	55.0%	23.3%	1.9%*	0.3%*	16.1%	0.2%*	0.3%*	2.9%
Mercer	75.1%	14.3%	2.5%*	0.0%*	3.4%	0.1%*	0.0%*	4.6%
Out of Metro Area	--	--	0.1%*	3.8%*	14.2%	1.9%*	33.6%	46.3%
Total	63.3%	11.1%	7.4%	8.7%	5.2%	2.3%	1.0%	1.0%

Note: Linked trip table, WHT_FAC3; GEO_GROUP1_O by ADJ_COUNTY, WORKTRIP=1 (* not enough cases to support a useful observation)

Table 4-4 illustrates origin/destination patterns for non-work trips by different trip origins. As expected, non-work trips (e.g., shopping, personal business) tend to be shorter and are mostly within the same county regardless of the trip origin.

**Table 4-4: General Origin/Destination (O/D) Patterns
by County Group (Level 1) of Trip Origin – Non-Work Trips**

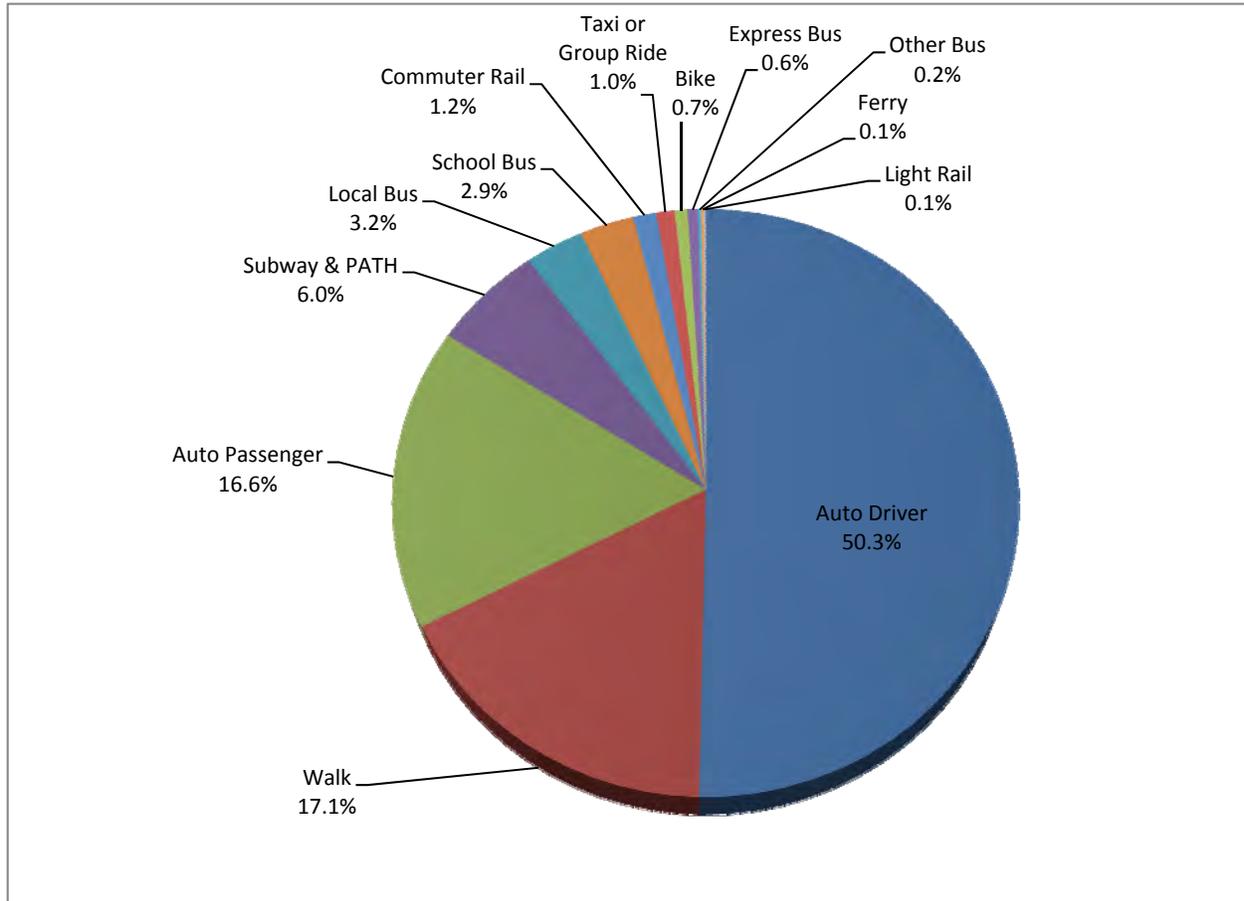
Trip Origin	Within County	To Adjoining County (Not NYC)	To Manhattan	To Other NYC	To Other NJTPA County	To Other NYMTC County	To Other Metro Area	Out of Metro Area
Manhattan	81.0%	--	--	14.1%	2.4%	2.2%	0.2%	0.1%*
Other New York City	88.4%	1.9%	4.8%	3.3%	0.5%	0.6%	0.1%*	0.3%
Long Island	93.0%	3.1%	0.5%	3.3%	0.0%*	0.1%*	0.0%*	0.1%*
Mid-Hudson (NYMTC)	89.1%	5.9%	1.2%	2.2%	0.5%	0.4%	0.5%	0.3%*
Mid-Hudson (Other)	91.1%	3.9%	0.2%*	0.9%*	0.4%*	1.0%*	0.0%*	2.6%
Connecticut	95.5%	3.3%	0.1%*	0.0%*	0.0%*	0.0%*	0.0%*	0.9%
Bergen-Passaic	86.0%	11.0%	0.8%	0.5%	1.0%	0.3%*	0.1%*	0.3%*
Essex-Hudson-Union	84.7%	9.5%	1.2%	0.5%	3.8%	0.1%*	0.1%*	0.1%*
Middlesex-Morris-Somerset	85.2%	12.3%	0.3%*	0.5%	1.4%	0.1%*	0.0%*	0.2%
Monmouth-Ocean	92.4%	5.3%	0.0%*	0.3%*	0.9%	0.0%*	0.2%*	0.7%
Hunterdon-Sussex-Warren	83.8%	10.4%	0.2%*	0.0%*	3.0%	0.1%*	0.0%*	2.5%
Mercer	90.3%	6.6%	0.1%*	0.1%*	1.3%	0.0%*	0.0%	1.6%
Out of Metro Area	--	--	0.1%*	3.8%*	17.1%	1.6%*	24.8%	52.6%
Total	88.1%	4.8%	1.5%	2.9%	1.1%	0.5%	0.3%	0.8%

Note: Linked trip table, WHT_FAC3; GEO_GROUP1_O by ADJ_COUNTY, WORKTRIP=2 (not enough cases to support a useful observation)*

4.2.3 Modes of Travel

Overall, approximately 67% of trips were made by auto (50.3% driver, 16.6% passenger), followed by walking (17 %) as depicted in Figure 4-5. Walk trips increased from 15% in 1997/1998; however, this might be due to the better trip account in the 2010/2011 survey (increase in short trips) rather than an actual increase in walk trips.

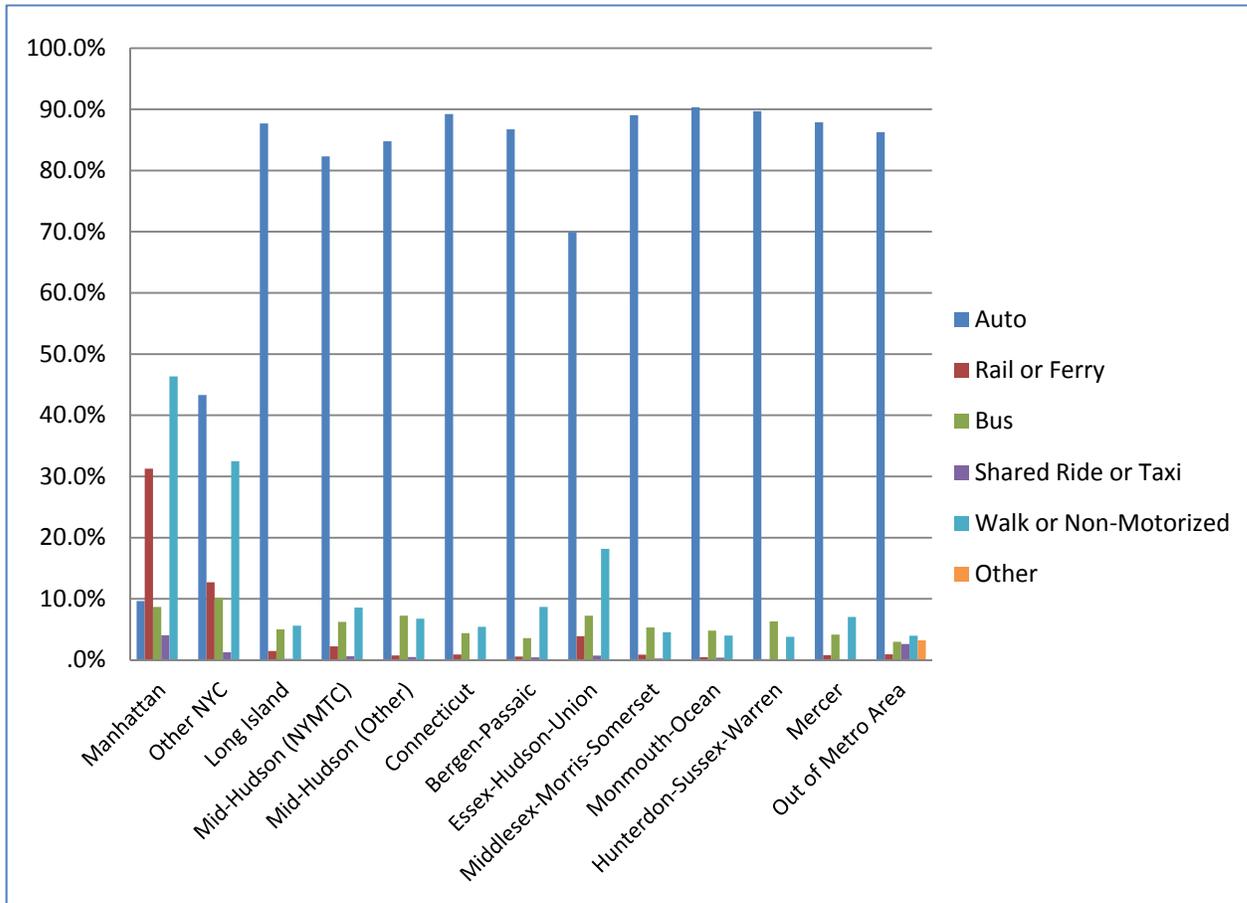
Figure 4-5: Percentage of Travel by Travel Mode (All Study Area)



Note: Linked trip table, WHT_FAC3; PMODE1

Auto (driver, passenger, motorcycle, moped, or motorized scooter) was the largest share of travel mode within each county group, with the exception of Manhattan, where trips were mostly made by either walking or by rail. This information is presented in Figure 4-6.

Figure 4-6: Percentage of Travel Mode by County Group (Level 1) of Trip Origin



Note: Linked trip table, WHT_FAC3; GEO_GROUP1_O by PMODE_R

As compared to Figure 4-6, which represents the mode split by trip origin, Table 4-5 is by Home County. As expected, the percentage of all trips by walking and non-motorized modes was highest in urbanized counties such as all New York City counties, Hudson County, and Essex County. By comparison, rural counties, such as Warren and Sussex, have the highest percentage of all trips using auto.

Table 4-5: Distribution of Trips by Travel Mode Group and Residence (All Trip Purposes)

Residence		% Auto	% Rail or Ferry	% Bus	% Shared Ride/ Taxi	% Walk/ Non-Motorized	% Others
County	Fairfield	90.0%	2.0%	3.3%	0.1%*	4.5%	0.1%*
	New Haven	85.9%	0.9%	5.4%	0.1%*	6.9%	0.8%*
	Bergen	86.6%	1.3%	4.2%	0.2%*	7.6%	0.0%*
	Essex	71.2%	2.1%	9.0%	0.4%	17.1%	0.2%*
	Hudson	46.9%	10.8%	9.3%	1.7%	30.7%	0.6%*
	Hunterdon	88.0%	0.7%*	6.8%	0.0%*	4.4%	0.1%*
	Mercer	86.2%	1.6%	4.2%	0.2%*	7.7%	0.2%*
	Middlesex	85.6%	1.9%	6.3%	0.4%*	5.7%	0.1%*
	Monmouth	90.5%	1.3%	5.0%	0.3%*	2.8%	0.2%*
	Morris	90.7%	0.6%	4.1%	0.1%*	4.4%	0.1%*
	Ocean	88.3%	0.5%*	4.8%	0.5%*	5.9%	0.1%*
	Passaic	82.8%	0.3%	4.1%	1.0%*	11.7%	0.0%*
	Somerset	87.6%	1.1%	6.3%	0.4%*	4.5%	0.1%*
	Sussex	91.1%	0.3%*	5.2%	0.0%*	3.2%	0.2%*
	Union	81.5%	3.0%	4.4%	0.3%*	10.4%	0.3%*
	Warren	92.5%	0.0%*	4.2%	0.0%*	3.2%	0.1%*
	Bronx	31.6%	16.4%	14.6%	2.7%	34.3%	0.4%*
	Dutchess	84.5%	2.1%	6.1%	0.4%*	6.1%	0.7%*
	Brooklyn (Kings)	29.6%	19.5%	10.0%	1.2%	39.4%	0.3%*
	Nassau	83.9%	4.1%	4.6%	0.3%	7.0%	0.0%*
	Manhattan (New York)	8.2%	22.0%	8.6%	5.0%	56.1%	0.1%*
	Orange	82.8%	1.1%	8.3%	0.5%	7.2%	0.1%*
	Putnam	88.4%	1.1%	6.5%	0.7%*	3.0%	0.4%*
	Queens	50.1%	15.3%	7.4%	0.9%	26.2%	0.1%*
	Staten Island (Richmond)	72.0%	4.9%	8.8%	0.9%	13.2%	0.2%*
	Rockland	84.4%	0.8%	8.2%	0.8%*	5.7%	0.1%*
Suffolk	86.7%	2.1%	5.1%	0.4%	5.6%	0.1%*	
Westchester	78.2%	4.7%	5.2%	0.8%	10.9%	0.2%*	
County Group (Level 1)	Manhattan	8.2%	22.0%	8.6%	5.0%	56.1%	0.1%*
	Other NYC	40.5%	16.3%	9.8%	1.3%	31.8%	0.2%*
	Long Island	85.5%	3.0%	4.9%	0.4%	6.2%	0.0%*
	Mid-Hudson (NYMTC)	80.7%	3.4%	6.1%	0.8%	8.9%	0.2%*
	Mid-Hudson (Other)	83.6%	1.6%	7.4%	0.5%	6.7%	0.3%*
	Connecticut	88.1%	1.5%	4.3%	0.1%*	5.7%	0.4%*
	Bergen-Passaic	85.4%	1.0%	4.2%	0.5%	8.9%	0.0%*
	Essex-Hudson-Union	67.8%	4.8%	7.6%	0.7%	18.7%	0.3%*

Residence		% Auto	% Rail or Ferry	% Bus	% Shared Ride/ Taxi	% Walk/ Non-Motorized	% Others
	Middlesex-Morris-Somerset	87.5%	1.4%	5.6%	0.3%	5.1%	0.1%*
	Monmouth-Ocean	89.5%	0.9%	4.9%	0.4%*	4.2%	0.1%*
	Hunterdon-Sussex-Warren	90.6%	0.4%	5.4%	0.0%*	3.5%	0.1%*
	Mercer	86.2%	1.6%	4.2%	0.2%*	7.7%	0.2%*
Regional Boundaries (Level 2)	New York City	33.5%	17.6%	9.6%	2.1%	37.0%	0.2%*
	Long Island	85.5%	3.0%	4.9%	0.4%	6.2%	0.0%*
	Mid-Hudson (All)	81.6%	2.8%	6.5%	0.7%	8.2%	0.2%*
	Connecticut Counties	88.1%	1.5%	4.3%	0.1%*	5.7%	0.4%*
	NJTPA Counties	82.2%	2.1%	5.7%	0.5%	9.4%	0.2%
	Mercer	86.2%	1.6%	4.2%	0.2%*	7.7%	0.2%*
Political Boundaries (Level 3)	NYMTC Counties	52.9%	12.0%	7.9%	1.5%	25.5%	0.2%*
	Other NY Counties	83.6%	1.6%	7.4%	0.5%	6.7%	0.3%*
	Connecticut Counties	88.1%	1.5%	4.3%	0.1%*	5.7%	0.4%*
	NJTPA Counties	82.2%	2.1%	5.7%	0.5%	9.4%	0.2%
	Mercer	86.2%	1.6%	4.2%	0.2%*	7.7%	0.2%*
Overall		66.8%	7.4%	6.8%	1.0%	17.8%	0.2%

Note: Linked trip table, WHT_FAC3; HCOUNTY, GEO_GROUP1, 2 & 3 by PMODE_R (* not enough cases to support a useful observation)

While auto trips often dominated overall trip making, walk trips made up a significant percentage of within county trips. Rail trips were also important throughout the region but especially for trips to Manhattan and among the other NYC counties. The bus mode also played an important supporting role for trips to Manhattan and in other places in the region.

Table 4-6: Distribution of Trips by Origin/Destination (O/D) Market and Travel Mode Group

General Mode	Within County	To Adjoining County	To Manhattan	To Other NYC	To Other NJTPA County	To Other NYMTC County	To Other In-Metro Area	Out of Metro Area
Auto	67.0%	95.2%	19.6%	46.1%	73.7%	61.1%	77.2%	83.9%
Rail	3.6%	1.3%	66.0%	42.0%	14.8%	31.7%	17.1%	1.5%*
Bus	7.0%	2.5%	10.9%	7.4%	9.3%	2.8%	4.1%*	3.0%
Shared Ride/Taxi	0.9%	0.3%	2.3%	2.4%	1.2%	4.1%	0.6%*	1.8%*
Walk/Non-Motorized	21.4%	0.6%	1.1%	1.6%	0.2%*	0.2%*	0.0%*	3.5%
Others	0.1%*	0.2%*	0.2%*	0.4%*	0.8%*	0.1%*	0.9%*	6.3%
All Modes	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Linked trip table, WHT_FAC3; PMODE_R by ADJ_COUNTY (* not enough cases to support a useful observation)

Table 4-7 shows that work trips were dominated by the auto and rail modes, while school trips heavily used the bus (school buses) and walk/non-motorized modes. Social/Recreational and shopping trips also relied heavily on walking.

Table 4-7: Trip Purpose by General Travel Mode

Trip Purpose	General Mode						Total
	Auto	Rail	Bus	Shared Ride/Taxi	Walk/ Non-Motorized	Others	
Home to Work	62.6%	22.8%	7.6%	1.3%	5.7%	0.1%*	100.0%
Home to School	41.2%	7.4%	34.5%	0.2%*	16.6%	0.1%*	100.0%
Home to Social/Rec	67.5%	4.4%	4.3%	1.0%	22.6%	0.2%*	100.0%
Home to Personal Business	66.7%	7.3%	5.7%	2.6%	17.4%	0.3%*	100.0%
Home to Shopping	64.7%	5.4%	4.8%	0.4%	24.7%	0.0%*	100.0%
Home to Serving Passengers	89.5%	0.5%*	0.6%*	0.3%*	9.1%	0.0%*	100.0%
Home to Other	36.5%	5.6%	6.7%	1.1%	50.1%	0.0%*	100.0%
Work to Home	62.2%	22.5%	7.3%	1.5%	6.3%	0.1%*	100.0%
School to Home	34.3%	7.9%	36.1%	0.3%*	21.2%	0.1%*	100.0%
Social/Rec to Home	67.4%	5.5%	3.9%	1.5%	21.5%	0.2%*	100.0%
Personal Business to Home	68.8%	6.5%	5.5%	2.1%	16.8%	0.4%*	100.0%
Shopping to Home	68.5%	3.8%	3.3%	1.1%	23.3%	0.0%*	100.0%
Serving Passengers to Home	88.0%	0.7%*	0.9%*	0.3%*	10.1%	0.0%*	100.0%
Other to Home	28.2%	5.1%	5.6%	1.8%*	59.2%	0.0%*	100.0%
Work Related	73.6%	6.6%	4.0%	2.4%	11.4%	2.0%*	100.0%
Between Work and NW	64.7%	11.6%	2.7%	0.7%	20.0%	0.3%*	100.0%
Other Non-Home/Non-Work	74.0%	3.0%	3.8%	0.6%	18.4%	0.2%	100.0%
Overall Metro Area	66.8%	7.4%	6.8%	1.0%	17.8%	0.2%	100.0%

Note: Linked trip table, WHT_FAC3; ODTPURP1 by PMODE_R (* not enough cases to support a useful observation)

Most AM Peak travel was made by automobile (64.1%) followed by walk and non-motorized modes (15.3%). Similar distributions are seen across time periods as shown in Table 4-8. Walk trips were much more popular than transit trips during Midday, possibly due to people walking to lunch. Compared with other time periods, the “Late Night” period had the highest proportion of rail travel (12.6%, compared with 7.4% overall).

Table 4-8: Time Period of Travel by General Travel Mode

General Mode	Time Period of Travel					Total
	AM Peak 6 a.m. – 10 a.m.	Midday 10 a.m. – 4 p.m.	PM Peak 4 p.m. – 8 p.m.	Evening 8 p.m. – 12 a.m.	Late Night 12 a.m. – 6 a.m.	
Auto	63.6%	65.1%	71.1%	71.7%	65.0%	66.8%
Rail	9.5%	4.9%	8.8%	7.4%	12.7%	7.4%
Bus	10.4%	7.1%	4.1%	2.6%	8.0%	6.8%
Shared Ride/Taxi	0.8%	0.9%	0.8%	2.3%	3.5%	1.0%
Walk/Non-Motorized	15.5%	21.7%	15.1%	15.9%	10.0%	17.8%
Others	0.2%*	0.2%*	0.1%*	0.1%*	0.7%*	0.2%
All Modes	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Linked trip table, WHT_FAC3; PMODE_R by TOD_R (* not enough cases to support a useful observation)

Table 4-9 expands upon distribution of travel mode by destination location geography. As expected, highly urbanized areas such as NYC and, Hudson County had a high percentage of travel by walk/non-motorized trip mode. Places with good rail and bus access such as NYC, Hudson and Essex had high transit percentages.

Table 4-9: Travel Mode by Trip Destination

Trip Destination		% Auto	% Rail or Ferry	% Bus	% Shared Ride/ Taxi	% Walk/ Non-Motorized	Others
County	Fairfield	91.3%	1.1%*	3.4%	0.1%*	4.0%	0.2%*
	New Haven	86.7%	0.6%	5.5%	0.1%*	7.0%	0.0%*
	Bergen	88.2%	0.7%*	3.5%	0.2%*	7.3%	0.1%*
	Essex	72.2%	1.9%	8.6%	0.7%*	16.4%	0.2%*
	Hudson	49.6%	9.2%	8.8%	1.4%	30.4%	0.5%*
	Hunterdon	87.9%	0.2%*	7.0%	0.0%*	4.8%	0.0%*
	Mercer	87.7%	0.8%	4.1%	0.1%*	7.0%	0.1%*
	Middlesex	86.9%	1.4%	6.2%	0.4%*	5.0%	0.0%*
	Monmouth	91.9%	0.7%	4.6%	0.3%*	2.3%	0.2%*
	Morris	91.2%	0.3%*	3.8%	0.0%*	4.5%	0.1%*
	Ocean	88.1%	0.3%*	5.0%	0.4%*	6.1%	0.0%*
	Passaic	83.6%	0.2%*	3.6%	1.0%*	11.7%	0.0%*
	Somerset	89.9%	0.6%*	5.7%	0.4%*	3.4%	0.0%*
	Sussex	90.0%	0.1%*	6.5%	0.1%*	3.2%	0.1%*
	Union	83.8%	1.6%	4.1%	0.3%*	10.0%	0.2%*
	Warren	91.4%	0.0%*	5.3%	0.0%*	3.3%	0.0%*
	Bronx	34.5%	12.5%	14.5%	3.0%	35.1%	0.4%*
	Dutchess	85.5%	1.2%*	6.4%	0.3%*	6.1%	0.5%*
	Brooklyn (Kings)	32.7%	15.1%	10.5%	1.0%	40.4%	0.2%*
	Nassau	86.8%	2.2%	4.4%	0.2%	6.3%	0.0%*
	Manhattan (New York)	9.4%	31.9%	8.7%	3.7%	46.3%	0.1%*
	Orange	83.7%	0.5%*	7.9%	0.5%*	7.2%	0.2%*
	Putnam	87.6%	0.5%*	8.4%	0.5%*	3.1%	0.0%*
	Queens	52.2%	11.6%	8.1%	1.0%	26.8%	0.2%*
	Staten Island (Richmond)	76.1%	3.1%	7.7%	0.8%*	12.2%	0.2%*
	Rockland	84.0%	0.4%*	8.0%	0.9%*	6.6%	0.0%*
Suffolk	88.4%	0.9%	5.4%	0.2%	5.0%	0.0%*	
Westchester	81.4%	2.5%	5.4%	0.7%	9.8%	0.1%*	
County Group (Level 1)	Manhattan	9.4%	31.9%	8.7%	3.7%	46.3%	0.1%*
	Other NYC	43.2%	12.5%	10.2%	1.4%	32.5%	0.3%*
	Long Island	87.7%	1.5%	5.0%	0.2%	5.6%	0.0%*
	Mid-Hudson (NYMTC)	82.5%	1.9%	6.3%	0.7%	8.6%	0.1%*
	Mid-Hudson (Other)	84.5%	0.8%	7.2%	0.4%	6.7%	0.3%*
	Connecticut	89.1%	0.9%	4.4%	0.1%*	5.4%	0.1%*
	Bergen-Passaic	86.7%	0.6%	3.5%	0.4%	8.7%	0.0%*
	Essex-Hudson-Union	69.8%	3.8%	7.3%	0.7%	18.1%	0.3%*
	Middlesex-Morris-Somerset	88.9%	0.9%	5.3%	0.3%	4.5%	0.0%*

Trip Destination		% Auto	% Rail or Ferry	% Bus	% Shared Ride/ Taxi	% Walk/ Non-Motorized	Others
	Monmouth-Ocean	90.2%	0.5%	4.8%	0.4%*	4.0%	0.1%*
	Hunterdon-Sussex-Warren	89.7%	0.1%*	6.3%	0.1%*	3.8%	0.0%*
	Mercer	87.7%	0.8%	4.1%	0.1%*	7.0%	0.1%*
Regional Boundaries (Level 2)	New York City	32.3%	18.7%	9.7%	2.1%	36.9%	0.2%*
	Long Island	87.7%	1.5%	5.0%	0.2%	5.6%	0.0%*
	Mid-Hudson (All)	83.1%	1.5%	6.6%	0.7%	8.0%	0.2%*
	Connecticut Counties	89.1%	0.9%	4.4%	0.1%*	5.4%	0.1%*
	NJTPA Counties	83.6%	1.5%	5.3%	0.5%	9.0%	0.1%*
	Mercer	87.7%	0.8%	4.1%	0.1%*	7.0%	0.1%*
Political Boundaries (Level 3)	NYMTC Counties	52.3%	12.4%	8.1%	1.5%	25.6%	0.1%*
	Other NY Counties	84.5%	0.8%	7.2%	0.4%	6.7%	0.3%*
	Connecticut Counties	89.2%	0.9%	4.4%	0.1%*	5.4%	0.1%*
	NJTPA Counties	83.6%	1.5%	5.3%	0.5%	9.0%	0.1%*
	Mercer	87.7%	0.8%	4.1%	0.1%*	7.0%	0.1%*
	Out of metro Area	83.9%	1.5%*	3.0%	1.8%*	3.5%	6.3%
Overall		66.8%	7.4%	6.8%	1.0%	17.8%	0.2%

Note: Linked trip table, WHT_FAC3; DCOUNTY, GEO_GROUP1, 2 & 3_D by PMODE_R (* not enough cases to support a useful observation)

4.2.4 Reasons for Travel: Trip Purpose

Section 4.2.4 examines the reasons that travel is made through an analysis of reported trip purpose. Table 4-10 offers trip distribution by purpose by residence. While the percentages across purpose were similar across the counties, there were exceptions such as the large percentage of work trips involving Manhattan (40.5%). There were other subtler differences as well; for example, the low percentage of work trips for Ocean County might have been partially due to higher amounts of non-work trips within the county by the large retiree population and the slightly higher school percentage for Middlesex might have been due to the presence of Rutgers University.

Table 4-10: Trip Purpose by Residence

Residence		Work	School	Social	Shopping	Other
County	Fairfield	23.2%	6.4%	13.8%	9.0%	47.5%
	New Haven	26.0%	6.6%	12.0%	9.9%	45.6%
	Bergen	22.1%	7.8%	14.3%	10.1%	45.7%
	Essex	21.9%	8.0%	15.0%	8.3%	46.7%
	Hudson	29.0%	8.5%	12.9%	9.1%	40.5%
	Hunterdon	21.9%	8.9%	18.3%	8.6%	42.3%
	Mercer	25.5%	7.2%	14.4%	10.0%	43.0%
	Middlesex	24.8%	9.4%	13.9%	9.4%	42.6%
	Monmouth	20.9%	7.1%	16.2%	9.5%	46.3%
	Morris	23.1%	8.0%	15.5%	8.1%	45.2%
	Ocean	20.8%	7.6%	16.9%	10.2%	44.4%
	Passaic	19.7%	5.7%	15.8%	10.7%	48.0%
	Somerset	27.3%	9.5%	14.9%	10.5%	37.8%
	Sussex	31.6%	6.8%	11.8%	7.3%	42.5%
	Union	23.7%	8.7%	16.2%	7.7%	43.7%
	Warren	20.8%	8.8%	12.6%	11.1%	46.7%
	Bronx	22.4%	11.4%	11.9%	10.2%	44.0%
	Dutchess	26.9%	7.2%	13.7%	9.0%	43.2%
	Brooklyn (Kings)	24.7%	10.4%	14.7%	10.7%	39.5%
	Nassau	22.0%	9.0%	14.9%	8.5%	45.6%
	Manhattan (New York)	29.4%	4.8%	17.1%	12.2%	36.5%
	Orange	22.2%	9.8%	17.3%	8.5%	42.2%
	Putnam	24.1%	10.2%	15.5%	8.3%	41.9%
	Queens	26.0%	8.5%	13.6%	9.7%	42.2%
	Staten Island (Richmond)	21.4%	9.1%	13.1%	9.8%	46.7%
	Rockland	21.5%	8.9%	18.6%	8.9%	42.1%
Suffolk	19.0%	8.0%	15.9%	10.6%	46.4%	
Westchester	23.3%	7.9%	14.8%	7.1%	46.9%	
County Group (Level 1)	Manhattan	29.4%	4.8%	17.1%	12.2%	36.5%
	Other NYC	24.5%	9.8%	13.7%	10.2%	41.8%
	Long Island	20.3%	8.4%	15.5%	9.7%	46.1%
	Mid-Hudson (NYMTC)	22.9%	8.4%	15.8%	7.6%	45.3%
	Mid-Hudson (Other)	24.3%	8.6%	15.8%	8.7%	42.6%
	Connecticut	24.5%	6.5%	12.9%	9.5%	46.6%

Residence		Work	School	Social	Shopping	Other
	Bergen-Passaic	21.3%	7.1%	14.8%	10.3%	46.5%
	Essex-Hudson-Union	24.4%	8.4%	14.8%	8.3%	44.1%
	Middlesex-Morris-Somerset	24.7%	9.0%	14.6%	9.2%	42.5%
	Monmouth-Ocean	20.9%	7.3%	16.5%	9.8%	45.5%
	Hunterdon-Sussex-Warren	25.6%	8.0%	14.0%	8.8%	43.6%
	Mercer	25.5%	7.2%	14.4%	10.0%	43.0%
Regional Boundaries (Level 2)	New York City	25.5%	8.8%	14.4%	10.6%	40.7%
	Long Island	20.3%	8.4%	15.5%	9.7%	46.1%
	Mid-Hudson (All)	23.3%	8.4%	15.8%	8.0%	44.4%
	Connecticut Counties	24.5%	6.5%	12.9%	9.5%	46.6%
	NJTPA Counties	23.1%	8.0%	15.0%	9.3%	44.5%
	Mercer	25.5%	7.2%	14.4%	10.0%	43.0%
Political Boundaries (Level 3)	NYMTC Counties	23.8%	8.6%	14.9%	10.0%	42.7%
	Other NY Counties	24.3%	8.6%	15.8%	8.7%	42.6%
	Connecticut Counties	24.5%	6.5%	12.9%	9.5%	46.6%
	NJTPA Counties	23.1%	8.0%	15.0%	9.3%	44.5%
	Mercer	25.5%	7.2%	14.4%	10.0%	43.0%
Overall		23.7%	8.2%	14.8%	9.7%	43.6%

Note: Linked trip table, WHT_FAC3; HCOUNTY, GEO_GROUP1, 2 & 3 by ODTPURP2_R; (not enough cases to support a useful observation)*

Most trips into Manhattan (44.8%) were home-to-work trips. See Table 4-11.

Table 4-11: Trip Purpose by Trip Origin/Destination

Trip Purpose	Within County	To Adjoining County (Not NYC)	To Manhattan	To Other NYC	To Other NJTPA County	To Other NYMTC County	To Other in Metro Area	Out of Metro Area
Home to Work	4.8%	13.7%	44.8%	11.7%	16.5%	11.4%	6.5%	9.1%
Home to School	4.9%	2.1%	5.0%	1.8%	0.7%	1.7%*	0.7%*	0.9%*
Home to Social/Rec	7.3%	6.4%	7.7%	3.6%	4.9%	2.1%	0.5%*	13.1%
Home to Personal Business	5.0%	4.5%	7.9%	2.3%	2.8%	1.6%	1.8%*	3.6%
Home to Shopping	4.0%	3.4%	3.7%	1.1%	1.6%	1.8%*	0.4%*	2.1%
Home to Serving Passengers	5.8%	2.7%	3.2%	1.4%	1.1%	2.2%*	0.3%*	3.8%*
Home to Other	2.1%	1.1%	1.0%	0.8%	0.8%	1.3%*	0.7%*	2.7%
Work to Home	4.2%	11.9%	2.7%	23.4%	25.0%	34.6%	25.0%	0.2%*
School to Home	4.2%	1.6%	0.4%*	4.4%	1.2%	1.6%*	2.9%*	0.1%*
Social/Rec to Home	8.0%	6.9%	2.0%	8.2%	9.3%	10.1%	11.9%	0.3%*
Personal Business to Home	4.5%	3.8%	0.7%*	5.2%	2.6%	4.9%	4.9%	0.7%*
Shopping to Home	6.5%	5.1%	0.6%*	5.3%	2.1%	0.5%*	4.2%	0.0%*
Serving Passengers to Home	4.8%	2.2%	0.4%*	2.2%	1.3%	1.6%*	5.5%	0.1%*
Other to Home	0.9%	0.2%	0.3%*	0.7%*	0.5%*	0.9%*	0.7%*	0.0%*
Work Related	2.0%	3.4%	2.1%	2.0%	2.9%	2.7%	2.7%*	6.3%
Between Work and NW	7.2%	12.7%	10.3%	11.3%	14.4%	11.7%	18.4%	11.8%
Other Non-Home/Non-Work	23.8%	18.2%	7.3%	14.6%	12.3%	9.3%	13.0%	45.2%
Overall Metro Area	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: WHT_FAC3 in Linked trip table, ODTPURP1 by ADJ_COUNTY (not enough cases to support a useful observation)*

4.2.5 Travel Distance and Travel Times

Generally, trip durations were higher for work-related trips, with the median trip duration being 25.0 minutes for work related trips, as compared with 15.0 minutes for all trips). Highly urbanized areas such as New York City and Hudson County had high trip durations, probably because they attracted trips from a wider area within the region and because many trips used transit and involve transfers. Additional information is contained in Table 4-12.

Table 4-12: Trip Duration (minutes) by Trip Purpose and Residence

Residence		Work	School	Social/Rec	Shopping	Other	Overall	
County	Fairfield	18	15	15	11	10	14	
	New Haven	16	20	15	10	10	13	
	Bergen	22	10	11	11	10	12	
	Essex	25	14	11	15	12	15	
	Hudson	35	15	15	12	15	15	
	Hunterdon	27	20	15	12	10	15	
	Mercer	19	16	15	12	8	12	
	Middlesex	24	15	11	13	10	13	
	Monmouth	20	15	15	10	10	13	
	Morris	22	15	10	10	10	11	
	Ocean	20	15	10	10	9	11	
	Passaic	23	15	10	13	11	13	
	Somerset	20	15	12	10	10	14	
	Sussex	22	22	15	15	12	15	
	Union	25	14	12	12	10	13	
	Warren	29	16	13	11	10	14	
	Bronx	40	30	24	15	15	20	
	Dutchess	20	25	17	13	13	15	
	Brooklyn (Kings)	35	25	15	15	15	16	
	Nassau	25	15	11	10	10	11	
	Manhattan (New York)	25	30	15	10	15	15	
	Orange	22	20	10	13	10	14	
	Putnam	21	17	12	15	12	15	
	Queens	38	20	16	10	12	16	
	Staten Island (Richmond)	30	15	15	11	12	15	
	Rockland	20	20	9	12	8	10	
	Suffolk	21	15	13	10	10	13	
	Westchester	29	15	12	12	10	14	
	County Group (Level 1)	Manhattan	25	30	15	10	15	15
		Other NYC	35	23	15	13	14	17
Long Island		25	15	12	10	10	12	
Mid-Hudson (NYMTC)		25	15	11	12	10	13	
Mid-Hudson (Other)		20	21	15	13	11	15	
Connecticut		17	16	15	10	10	13	
Bergen-Passaic		22	11	10	12	10	12	
Essex-Hudson-Union		30	14	14	13	10	15	

Residence		Work	School	Social/Rec	Shopping	Other	Overall
	Middlesex-Morris-Somerset	22	15	11	10	10	13
	Monmouth-Ocean	20	15	13	10	10	12
	Hunterdon-Sussex-Warren	25	20	15	12	10	15
	Mercer	19	16	15	12	8	12
Regional Boundaries (Level 2)	New York City	30	25	15	12	14	17
	Long Island	25	15	12	10	10	12
	Mid-Hudson (All)	24	19	12	13	10	14
	Connecticut Counties	17	16	15	10	10	13
	NJTPA Counties	24	15	12	11	10	14
	Mercer	19	16	15	12	8	12
Political Boundaries (Level 3)	NYMTC Counties	30	20	15	11	11	15
	Other NY Counties	20	21	15	13	11	15
	Connecticut Counties	17	16	15	10	10	13
	NJTPA Counties	24	15	12	11	10	14
	Mercer	19	16	15	12	8	12
Overall		25	16	15	11	10	15

*Note: Linked trip table, WHT_FAC3; TRPDUR by ODTPURP2_R by HCOUNTY, GEO_GROUP1, 2 & 3 (median)
(* not enough cases to support a useful observation)*

As depicted in Table 4-13, the median trip distance was 1.7 miles. Trips made to work were the longest of all trip purposes, with the median distance being 4.3 miles. Table 4-13 also shows that trip distances by purpose varied widely by county. For example, the average work trip distance for Manhattan residence was very low (1.6 miles), probably due the high amount of people that work and live in Manhattan. In New Jersey, some outskirt counties (e.g., Hunterdon and Warren counties) showed long trips, while others – such as Ocean and Monmouth counties – were closer to the average, probably due to more work opportunities closer to those counties. Some of the wide variation might have to do with jobs/housing balances but definitive conclusions are allusive.

Table 4-13: Median Trip Distance (in miles)⁴ by Trip Purpose and Home Residence

Residence		Work	School	Social/Rec	Shopping	Other	Overall
County	Fairfield	4.9	1.8	2.5	1.8	1.6	2.1
	New Haven	3.6	1.5	1.8	1.8	1.6	2.0
	Bergen	5.4	1.0	1.6	1.5	1.3	1.7
	Essex	4.7	0.9	1.3	1.5	1.1	1.4
	Hudson	3.4	0.4	0.8	0.6	0.7	1.1
	Hunterdon	9.2	2.5	4.3	2.7	2.5	3.2
	Mercer	4.6	1.6	2.2	2.0	1.3	2.2
	Middlesex	6.4	1.2	2.0	2.0	1.7	2.1
	Monmouth	5.7	1.9	3.3	2.1	2.0	2.5
	Morris	6.4	1.3	1.9	1.8	1.4	2.0
	Ocean	6.0	1.8	1.9	2.0	1.7	2.2
	Passaic	4.8	0.9	1.5	1.8	1.4	1.7
	Somerset	6.4	1.9	2.4	2.1	1.9	2.7
	Sussex	7.9	2.7	4.3	4.1	2.8	4.1
	Union	5.1	0.9	1.4	1.3	1.1	1.5
	Warren	10.9	1.3	4.0	2.6	2.0	2.6
	Bronx	4.3	0.9	1.3	0.6	0.7	1.1
	Dutchess	6.4	2.5	4.9	2.8	2.2	3.3
	Brooklyn (Kings)	3.4	1.1	0.6	0.4	0.6	0.9
	Nassau	5.7	1.1	1.7	1.2	1.1	1.5
	Manhattan (New York)	1.6	1.3	0.6	0.2	0.4	0.6
	Orange	7.9	1.5	1.5	2.8	1.9	2.3
	Putnam	5.5	2.5	2.4	3.4	2.8	3.2
	Queens	5.1	1.2	1.4	0.6	0.9	1.5
	Staten Island (Richmond)	4.9	1.3	2.3	1.6	1.2	1.7
	Rockland	5.9	1.7	1.3	2.3	1.3	1.9
	Suffolk	6.2	1.3	2.0	1.6	1.9	2.1
Westchester	6.5	1.0	1.4	1.5	1.1	1.6	
County Group (Level 1)	Manhattan	1.6	1.3	0.6	0.2	0.4	0.6
	Other NYC	4.1	1.1	1.0	0.5	0.8	1.2
	Long Island	5.9	1.2	1.9	1.4	1.5	1.8

⁴ Trip Distance calculated as Euclidean distance (also referred to as “bird’s flight” or “straight line” distance)

Residence		Work	School	Social/Rec	Shopping	Other	Overall
	Mid-Hudson (NYMTC)	6.2	1.4	1.4	1.8	1.3	1.8
	Mid-Hudson (Other)	6.8	2.1	2.2	2.8	2.1	2.7
	Connecticut	4.0	1.6	2.3	1.8	1.6	2.1
	Bergen-Passaic	5.2	1.0	1.6	1.5	1.3	1.7
	Essex-Hudson-Union	4.2	0.8	1.3	1.2	1.0	1.4
	Middlesex-Morris-Somerset	6.4	1.3	2.0	2.0	1.7	2.1
	Monmouth-Ocean	5.8	1.8	2.6	2.1	1.9	2.3
	Hunterdon-Sussex-Warren	8.6	2.4	4.1	2.8	2.2	3.4
	Mercer	4.6	1.6	2.2	2.0	1.3	2.2
Regional Boundaries (Level 2)	New York City	3.2	1.2	0.9	0.5	0.7	1.0
	Long Island	5.9	1.2	1.9	1.4	1.5	1.8
	Mid-Hudson (All)	6.4	1.4	1.7	2.1	1.5	2.0
	Connecticut Counties	4.0	1.6	2.3	1.8	1.6	2.1
	NJTPA Counties	5.3	1.2	1.9	1.7	1.4	1.9
	Mercer	4.6	1.6	2.2	2.0	1.3	2.2
Political Boundaries (Level 3)	NYMTC Counties	3.9	1.2	1.3	0.8	1.0	1.4
	Other NY Counties	6.8	2.1	2.2	2.8	2.1	2.7
	Connecticut Counties	4.0	1.6	2.3	1.8	1.6	2.1
	NJTPA Counties	5.3	1.2	1.9	1.7	1.4	1.9
	Mercer	4.6	1.6	2.2	2.0	1.3	2.2
Overall		4.3	1.3	1.6	1.3	1.3	1.7

Note: Linked trip table, WHT_FAC3; TRIPDIST by ODTPURP2_R by HCOUNTY, GEO_GROUP1, 2, & 3 (median) (* not enough cases to support a useful observation)

4.2.6 Time of Day and Other Variations in Travel

Table 4-14 shows the average person trip rate (all persons – regardless of work status) by day of week, corresponding to the “assigned travel day” for respondents in the RHTS. Variations across weekdays were minimal; Tuesday trip rates were slightly higher than average travel, although the 1997/1998 survey showed Tuesday with the lowest trip rates, so the variation could be within the margin of error. Fridays had slightly lower work trip rates, followed by Mondays.

Table 4-14: Person Trip Rates** by Day of Week

Day of Week	Work Trip	Non-Work Trip	Total Weekday
Monday	0.9	3.0	4.0
Tuesday	1.0	3.2	4.2
Wednesday	1.0	3.0	4.0
Thursday	1.0	3.0	4.0
Friday	0.8	3.1	3.9
Overall	1.0	3.1	4.0

Note:

- PER table, HH_WHT2; PTRIPS_GPS_WP & NWP by DOW (mean) (* not enough cases to support a useful observation)
- Calculation of Mean Person Trip Rates excludes valid partial persons that did not provide travel data

Work trips tended to be spread out throughout the day from 6 a.m. to 8 p.m. with AM having the highest percentage of trips. Non-Work trips were also spread throughout the day; however there was a clear hump during the midday hours. These patterns are very similar to the 1997/1998 survey. See Table 4-15 for more detail.

Table 4-15: Distribution of Trips by Time of Departure, Trip Purpose and Trip Origin

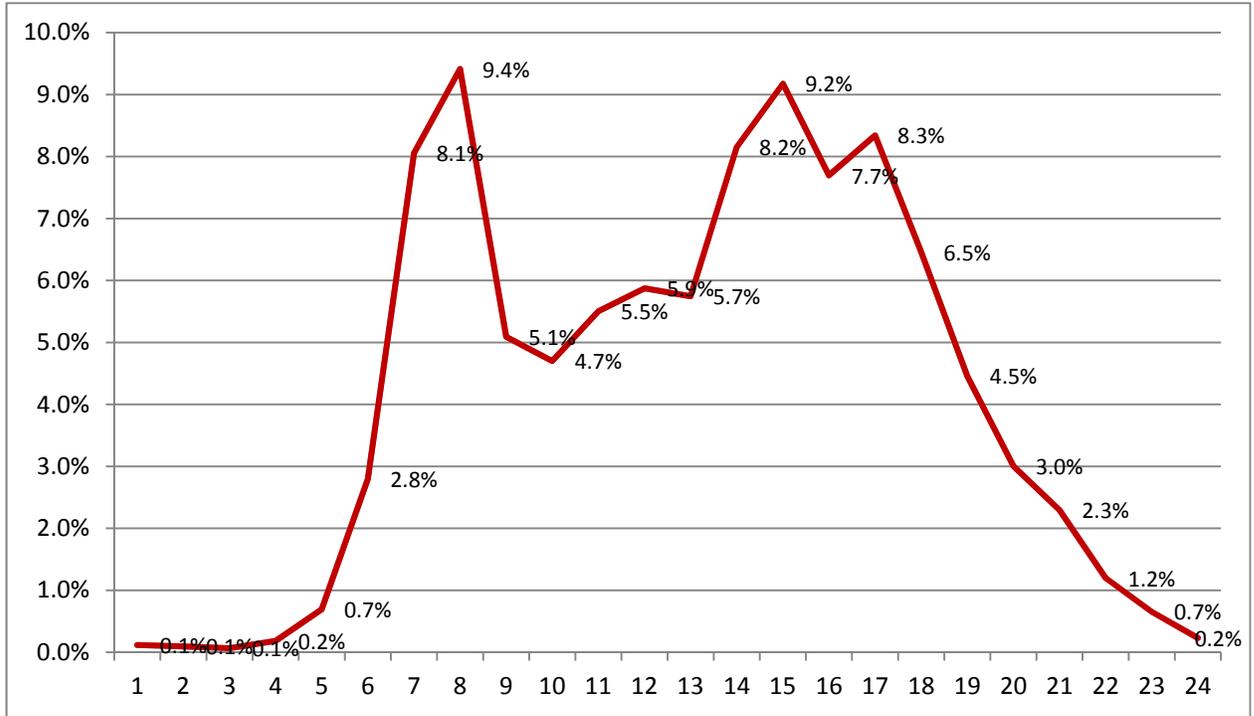
Trip Origin		Work Trips (Categories total to 100%)				Non-Work Trips (Categories total to 100%)			
		6-10 a.m.	10 a.m.-4 p.m.	4-8 p.m.	8 p.m.-6 a.m.	6-10 a.m.	10 a.m.-4 p.m.	4-8 p.m.	8 p.m.-6 a.m.
County	Fairfield	35.8%	28.8%	28.9%	6.5%	22.0%	40.2%	29.0%	8.7%
	New Haven	31.3%	39.8%	21.9%	7.0%	27.5%	39.8%	25.9%	6.9%
	Bergen	37.3%	32.5%	23.9%	6.4%	23.9%	40.4%	27.2%	8.6%
	Essex	34.2%	29.8%	29.4%	6.6%	24.4%	40.2%	28.3%	7.1%
	Hudson	37.4%	24.0%	29.4%	9.1%	24.2%	39.8%	26.3%	9.6%
	Hunterdon	37.3%	24.2%	34.6%	3.9%	20.0%	43.0%	31.2%	5.8%
	Mercer	37.9%	25.3%	31.4%	5.5%	20.8%	39.3%	31.1%	8.8%
	Middlesex	37.0%	28.8%	25.6%	8.5%	22.6%	40.2%	26.4%	10.8%
	Monmouth	33.9%	34.5%	21.7%	9.8%	22.3%	45.5%	24.0%	8.2%
	Morris	32.9%	32.9%	28.7%	5.5%	20.1%	43.8%	27.7%	8.4%
	Ocean	35.2%	33.3%	21.3%	10.1%	23.6%	43.3%	25.8%	7.4%
	Passaic	33.9%	32.9%	27.5%	5.7%	21.0%	47.9%	23.6%	7.5%
	Somerset	35.6%	28.6%	30.0%	5.9%	20.7%	37.6%	32.5%	9.2%
	Sussex	43.6%	28.5%	15.7%	12.3%	23.8%	43.7%	24.3%	8.2%
	Union	41.7%	25.5%	25.5%	7.3%	24.4%	36.9%	30.9%	7.9%
	Warren	43.1%	26.7%	20.1%	10.1%	26.5%	44.2%	23.6%	5.7%
	Bronx	41.1%	25.2%	26.2%	7.5%	30.2%	40.2%	23.0%	6.5%
	Dutchess	39.8%	31.4%	21.8%	7.0%	19.7%	43.6%	28.3%	8.4%
	Brooklyn (Kings)	39.9%	30.4%	21.8%	7.9%	23.3%	42.6%	25.2%	8.9%
	Nassau	36.0%	31.3%	24.7%	7.9%	21.9%	42.4%	26.9%	8.8%
	Manhattan (New York)	18.3%	33.0%	41.5%	7.2%	16.3%	41.9%	29.0%	12.8%
	Orange	37.3%	32.3%	19.0%	11.5%	20.9%	40.0%	31.0%	8.1%
	Putnam	42.8%	30.5%	17.2%	9.5%	25.1%	41.0%	29.5%	4.5%
	Queens	44.4%	26.6%	21.3%	7.8%	27.4%	40.5%	23.2%	8.9%
Staten Island (Richmond)	40.1%	27.9%	18.4%	13.5%	24.6%	46.4%	21.9%	7.1%	
Rockland	36.6%	32.0%	24.0%	7.4%	21.9%	36.0%	30.0%	12.2%	
Suffolk	37.0%	35.3%	20.1%	7.6%	19.9%	42.4%	29.1%	8.6%	
Westchester	36.8%	31.2%	26.1%	5.9%	23.1%	42.5%	25.9%	8.4%	
County Group (Level 1)	Manhattan	18.3%	33.0%	41.5%	7.2%	16.3%	41.9%	29.0%	12.8%
	Other NYC	41.8%	27.9%	22.2%	8.1%	26.2%	41.7%	23.8%	8.3%
	Long Island	36.5%	33.3%	22.5%	7.7%	20.8%	42.4%	28.1%	8.7%
	Mid-Hudson (NYMTC)	37.1%	31.3%	25.1%	6.5%	23.0%	40.8%	27.2%	9.0%
	Mid-Hudson (Other)	38.5%	31.8%	20.4%	9.3%	20.4%	41.5%	29.9%	8.2%
	Connecticut	33.5%	34.6%	25.2%	6.8%	24.5%	40.0%	27.6%	7.9%
	Bergen-Passaic	36.3%	32.6%	25.0%	6.2%	22.9%	42.8%	26.0%	8.2%
	Essex-Hudson-Union	37.4%	26.7%	28.3%	7.6%	24.4%	39.0%	28.6%	8.0%

Trip Origin		Work Trips (Categories total to 100%)				Non-Work Trips (Categories total to 100%)			
		6-10 a.m.	10 a.m.- 4 p.m.	4-8 p.m.	8 p.m.- 6 a.m.	6-10 a.m.	10 a.m.- 4 p.m.	4-8 p.m.	8 p.m.- 6 a.m.
	Middlesex-Morris-Somerset	35.3%	30.1%	27.6%	7.0%	21.4%	40.9%	27.9%	9.7%
	Monmouth-Ocean	34.5%	34.0%	21.6%	9.9%	22.8%	44.5%	24.8%	7.8%
	Hunterdon-Sussex-Warren	41.3%	26.6%	23.2%	8.9%	23.3%	43.7%	26.3%	6.7%
	Mercer	37.9%	25.3%	31.4%	5.5%	20.8%	39.3%	31.1%	8.8%
Regional Boundaries (Level 2)	New York City	31.0%	30.2%	31.0%	7.7%	23.5%	41.8%	25.2%	9.5%
	Long Island	36.5%	33.3%	22.5%	7.7%	20.8%	42.4%	28.1%	8.7%
	Mid-Hudson (All)	37.6%	31.5%	23.6%	7.3%	22.2%	41.0%	28.0%	8.8%
	Connecticut Counties	33.5%	34.6%	25.2%	6.8%	24.5%	40.0%	27.6%	7.9%
	NJTPA Counties	36.3%	30.2%	26.0%	7.6%	22.9%	41.8%	26.9%	8.4%
	Mercer	37.9%	25.3%	31.4%	5.5%	20.8%	39.3%	31.1%	8.8%
Political Boundaries (Level 3)	NYMTC Counties	32.7%	30.9%	28.8%	7.6%	22.7%	41.8%	26.3%	9.2%
	Other NY Counties	38.5%	31.8%	20.4%	9.3%	20.4%	41.5%	29.9%	8.2%
	Connecticut Counties	33.5%	34.6%	25.2%	6.8%	24.5%	40.0%	27.6%	7.9%
	NJTPA Counties	36.3%	30.2%	26.0%	7.6%	22.9%	41.8%	26.9%	8.4%
	Mercer	37.9%	25.3%	31.4%	5.5%	20.8%	39.3%	31.1%	8.8%
	Out of Metro Area	12.1%	49.3%	32.5%	6.2%	6.5%	50.1%	26.8%	16.7%
Overall		33.8%	31.1%	27.5%	7.5%	22.7%	41.7%	26.8%	8.9%

Note: Linked trip table, WHT_FAC3; OCOUNTY, GEO_GROUP1, 2 & 3_O by TOD_R1 by WORKTRIP (* not enough cases to support a useful observation)

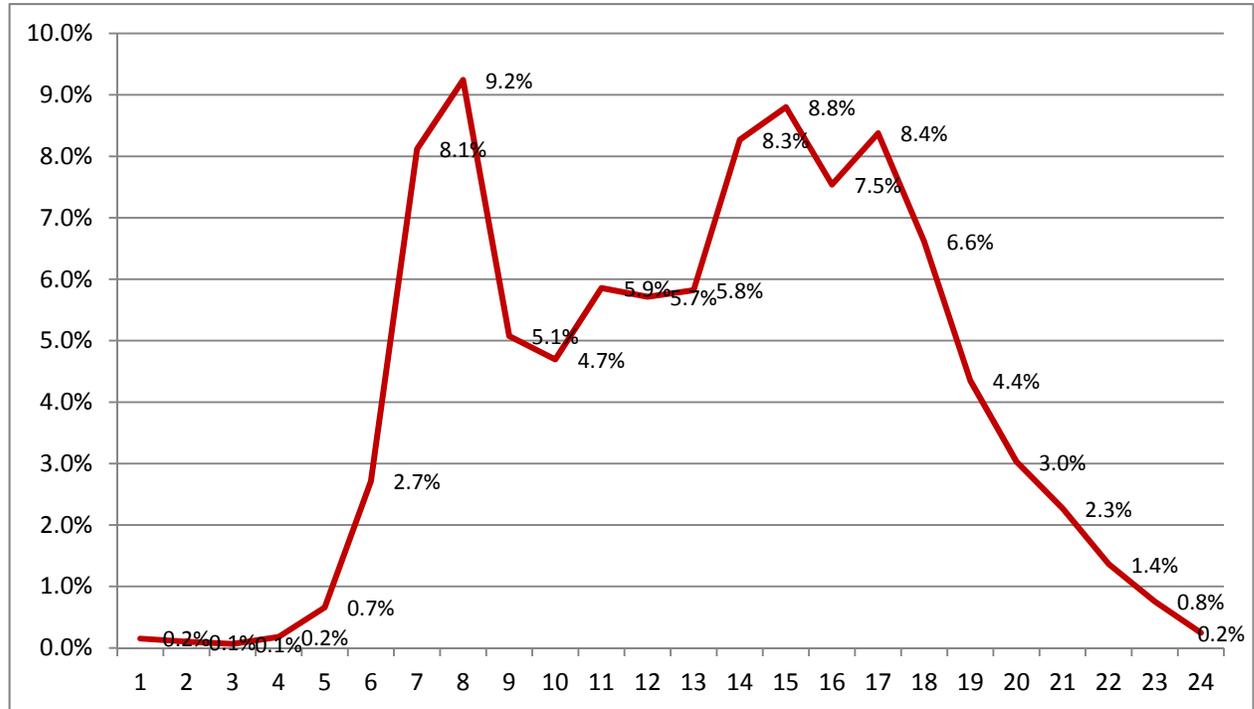
The following three figures (Figure 4-7, Figure 4-8, and Figure 4-9) represent the distribution of trip departure times for all destinations, destinations within NYMTC counties, and destinations within NJTPA counties, respectively. The distributions were similar overall, though NJTPA counties experience a higher proportion of trips during the 8 a.m. hour (10.0%) than NYMTC counties (9.4%). Conversely, NJTPA counties experienced higher proportionate trip rates during the 3 p.m. hour (9.7%) than NYMTC counties (8.8).

Figure 4-7: Distribution of Trips by Time of Departure (Overall)



Note: Linked trip table, WHT_FAC3; TRP_DEP_HR

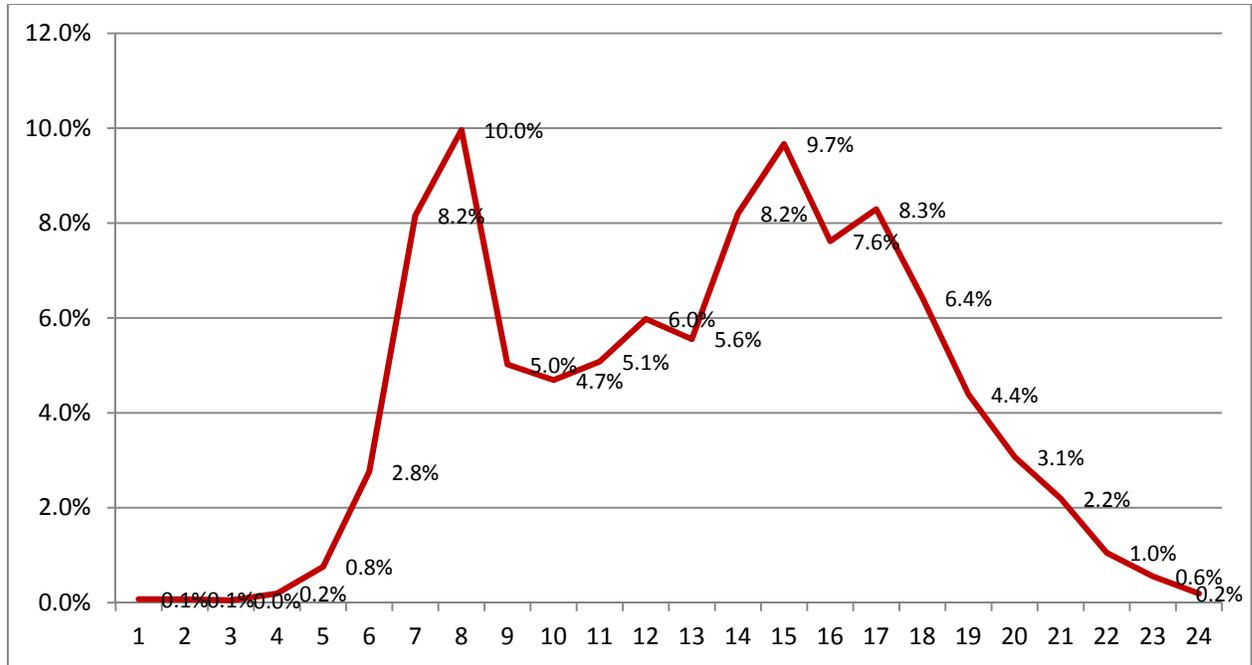
Figure 4-8: Distribution of Trips in NYMTC Counties * by Time of Departure



Note: Linkedtrip table, WHT_FAC3; TRP_DEP_HR, OMPO=1

*Includes Manhattan (New York), The Bronx, Richmond (Staten Island), Queens (36081), Kings (Brooklyn), Suffolk, Nassau, Westchester, Rockland, & Putnam Counties

Figure 4-9: Distribution of Trips in NJTPA Counties** by Time of Departure

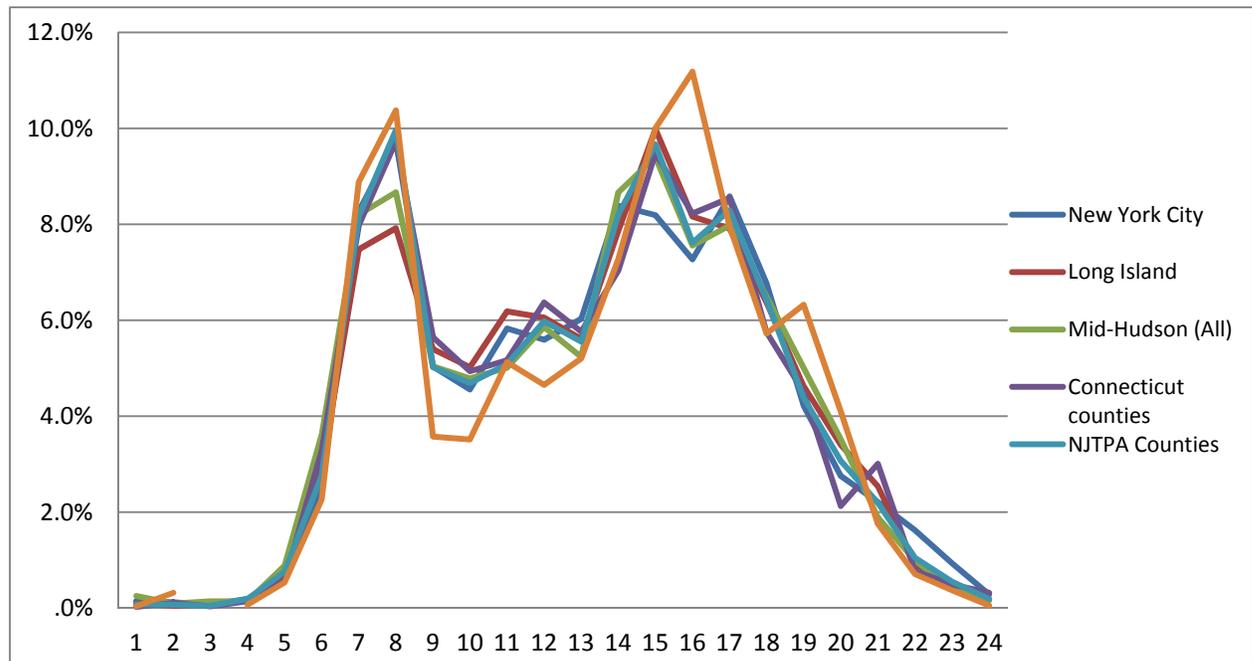


Note: Linked trip table, WHT_FAC3; TRP_DEP_HR, OMPO=2

** Includes Bergen, Passaic, Essex, Hudson, Union, Middlesex, Morris, Somerset, Monmouth, Ocean, Hunterdon, Sussex, and Warren Counties

Depicted in Figure 4-10, below, trips from Mercer had the most defined peak periods, although this might have been due to lower sampling than other regional boundaries. The other geographic areas showed similar trip patterns.

Figure 4-10: Distribution of Trips by Time of Departure by Regional Boundaries*** (Level 2)



Note: Linked trip table, WHT_FAC3; TRP_DEP_HR by GEO_GROUP2_O

*** Long Island Includes Nassau and Suffolk Counties

Mid-Hudson Includes Westchester, Rockland, Putnam, Dutchess, and Orange Counties

4.3 Travel by Different Types of Households

The RHTS provides many opportunities to explore how travel patterns vary with respect to household characteristics and structure. Some of these are observed in this section.

4.3.1 Household Size

Households participating in the RHTS averaged 2.5 household members. Compared with other counties, Manhattan had the highest proportion of one-person households (46.2%), while Rockland County had the highest proportion of households with four or more members, (36.5%). Households in Manhattan averaged less than the overall survey area average of 2.5 (slightly lower than 1997/1998 average of 2.6), with just 1.9 household members. Participating households residing in an NJTPA county were slightly larger than the overall average, at 2.6, as shown below in Table 4-16.

Table 4-16: Household Size by Residence

Residence		Household Size				Overall Mean
		1	2	3	4+	
County	Fairfield	27.4%	28.2%	17.5%	27.0%	2.5
	New Haven	29.4%	33.0%	16.3%	21.3%	2.4
	Bergen	25.7%	28.8%	17.5%	28.0%	2.6
	Essex	29.9%	27.1%	17.9%	25.2%	2.5
	Hudson	30.8%	29.0%	19.1%	21.0%	2.4
	Hunterdon	23.3%	32.1%	19.8%	24.8%	2.6
	Mercer	26.3%	30.8%	16.7%	26.2%	2.5
	Middlesex	22.0%	29.9%	19.7%	28.4%	2.7
	Monmouth	26.4%	30.6%	15.1%	27.9%	2.6
	Morris	23.6%	30.8%	17.5%	28.1%	2.6
	Ocean	28.4%	35.9%	13.1%	22.7%	2.5
	Passaic	27.8%	26.5%	16.5%	29.3%	2.7
	Somerset	22.8%	29.1%	19.0%	29.1%	2.6
	Sussex	17.8%	38.3%	17.0%	26.9%	2.6
	Union	23.7%	27.7%	17.9%	30.7%	2.7
	Warren	23.4%	34.0%	16.0%	26.6%	2.6
	Bronx	30.2%	25.3%	17.5%	27.1%	2.5
	Dutchess	25.2%	34.3%	17.3%	23.2%	2.5
	Brooklyn (Kings)	28.2%	28.7%	17.2%	25.9%	2.6
	Nassau	19.9%	28.5%	18.4%	33.2%	2.8
	Manhattan (New York)	46.2%	31.3%	11.1%	11.5%	1.9
	Orange	24.8%	28.5%	16.9%	29.8%	2.7
	Putnam	19.8%	32.8%	20.1%	27.3%	2.6
	Queens	26.1%	26.9%	17.0%	30.1%	2.6
	Staten Island (Richmond)	21.6%	27.0%	19.7%	31.6%	2.7
	Rockland	19.9%	27.5%	16.2%	36.5%	2.9
	Suffolk	20.0%	29.9%	17.4%	32.7%	2.8
	Westchester	27.3%	27.4%	16.7%	28.6%	2.5

Residence		Household Size				Overall Mean
		1	2	3	4+	
County Group (Level 1)	Manhattan	46.2%	31.3%	11.1%	11.5%	1.9
	Other NYC	27.4%	27.3%	17.4%	28.0%	2.6
	Long Island	19.9%	29.3%	17.9%	32.9%	2.8
	Mid-Hudson (NYMTC)	25.0%	27.9%	16.9%	30.2%	2.6
	Mid-Hudson (Other)	25.0%	31.2%	17.1%	26.7%	2.6
	Connecticut	28.4%	30.6%	16.9%	24.1%	2.5
	Bergen-Passaic	26.3%	28.1%	17.2%	28.4%	2.6
	Essex-Hudson-Union	28.5%	27.9%	18.3%	25.3%	2.5
	Middlesex-Morris-Somerset	22.6%	30.0%	18.9%	28.4%	2.6
	Monmouth-Ocean	27.3%	33.1%	14.1%	25.4%	2.5
	Hunterdon-Sussex-Warren	21.3%	35.0%	17.6%	26.1%	2.6
Mercer	26.3%	30.8%	16.7%	26.2%	2.5	
Regional Boundaries (Level 2)	New York City	31.8%	28.2%	15.9%	24.1%	2.4
	Long Island	19.9%	29.3%	17.9%	32.9%	2.8
	Mid-Hudson (All)	25.0%	29.0%	17.0%	29.0%	2.6
	Connecticut Counties	28.4%	30.6%	16.9%	24.1%	2.5
	NJTPA Counties	26.0%	29.9%	17.4%	26.8%	2.6
	Mercer	26.3%	30.8%	16.7%	26.2%	2.5
Political Boundaries (Level 3)	NYMTC Counties	28.6%	28.4%	16.4%	26.6%	2.5
	Other NY Counties	25.0%	31.2%	17.1%	26.7%	2.6
	Connecticut Counties	28.4%	30.6%	16.9%	24.1%	2.5
	NJTPA Counties	26.0%	29.9%	17.4%	26.8%	2.6
	Mercer	26.3%	30.8%	16.7%	26.2%	2.5
Overall		27.6%	29.1%	16.8%	26.4%	2.5

Note: HH table, HH_WHT2; CTFIP, GEO_GROUP1, 2 & 3 by HHSIZ_R (not enough cases to support a useful observation)*

The overall mean trip rate was 10.1. As shown in Table 4-17, trip rates appeared to be lower in urban counties (e.g., Manhattan and Hudson counties) than in more suburban counties (Rockland and Suffolk counties), perhaps due to more walkable communities that provide ready access to desired destinations, making trip chaining easier. Another factor might be demographics; for example, Ocean County had low trip rates, likely due to its high percentage of retired households. See below for additional detail.

Table 4-17: Household Trip Rates by Household Size and Residence

Residence		Household Size				Overall Mean	
		1	2	3	4+		
County	Fairfield	4.6	7.1	13.3	22.9	11.7	
	New Haven	6.1	9.3	12.2	16.9	10.5	
	Bergen	5.3	7.9	12.4	21.1	11.7	
	Essex	4.9	8.9	11.7	15.6	9.9	
	Hudson	4.4	7.9	8.5	13.4	8.1	
	Hunterdon	3.4	6.2	11.0	15.4	8.8	
	Mercer	5.3	8.2	11.0	18.8	10.7	
	Middlesex	5.0	8.3	10.0	17.3	10.5	
	Monmouth	5.2	9.2	13.7	18.9	11.5	
	Morris	4.8	8.6	11.4	17.8	10.8	
	Ocean	3.4	10.0	10.5	18.7	10.2	
	Passaic	6.0	10.9	11.8	19.1	12.1	
	Somerset	4.6	7.4	11.9	14.8	9.8	
	Sussex	6.2	8.6	10.7	16.4	10.6	
	Union	5.1	8.4	11.7	18.5	11.3	
	Warren	3.0	8.8	8.7	17.1	9.6	
	Bronx	3.9	7.3	9.0	13.4	8.2	
	Dutchess	5.4	7.1	12.2	17.0	9.8	
	Brooklyn (Kings)	4.3	7.5	11.4	13.8	8.9	
	Nassau	4.3	8.3	12.7	18.1	11.6	
	Manhattan (New York)	5.2	8.3	11.0	16.5	8.1	
	Orange	5.1	7.7	13.6	16.7	10.7	
	Putnam	5.2	7.5	11.0	17.7	10.5	
	Queens	4.1	8.0	10.3	15.4	9.6	
	Staten Island (Richmond)	4.4	7.6	10.9	13.6	9.4	
	Rockland	5.3	7.2	10.7	20.7	12.3	
	Suffolk	5.0	9.3	13.6	20.9	13.0	
	Westchester	5.6	8.2	11.2	17.2	10.6	
	County Group (Level 1)	Manhattan	5.2	8.3	11.0	16.5	8.1
		Other NYC	4.1	7.7	10.5	14.3	9.0
Long Island		4.6	8.9	13.2	19.6	12.3	
Mid-Hudson (NYMTC)		5.5	7.9	11.1	18.2	10.9	
Mid-Hudson (Other)		5.2	7.4	12.9	16.8	10.3	
Connecticut		5.3	8.3	12.8	20.2	11.1	
Bergen-Passaic		5.5	8.8	12.2	20.5	11.8	

Residence		Household Size				
		1	2	3	4+	Overall Mean
	Essex-Hudson-Union	4.8	8.4	10.6	15.9	9.7
	Middlesex-Morris-Somerset	4.8	8.2	10.8	17.0	10.4
	Monmouth-Ocean	4.3	9.6	12.2	18.8	10.9
	Hunterdon-Sussex-Warren	4.2	7.9	10.3	16.3	9.7
	Mercer	5.3	8.2	11.0	18.8	10.7
Regional Boundaries (Level 2)	New York City	4.5	7.8	10.6	14.5	8.8
	Long Island	4.6	8.9	13.2	19.6	12.3
	Mid-Hudson (All)	5.4	7.7	11.7	17.8	10.7
	Connecticut Counties	5.3	8.3	12.8	20.2	11.1
	NJTPA Counties	4.8	8.7	11.2	17.8	10.5
	Mercer	5.3	8.2	11.0	18.8	10.7
Political Boundaries (Level 3)	NYMTC Counties	4.6	8.1	11.2	16.3	9.8
	Other NY Counties	5.2	7.4	12.9	16.8	10.3
	Connecticut Counties	5.3	8.3	12.8	20.2	11.1
	NJTPA Counties	4.8	8.7	11.2	17.8	10.5
	Mercer	5.3	8.2	11.0	18.8	10.7
Overall		4.8	8.2	11.4	17.1	10.1

Note: HH table, HH_WHT2; HTRIPS_GPS by HHSIZ_R by CTFIP, GEO_GROUP1, 2 & 3 (mean) (* not enough cases to support a useful observation)

Similar to the table above, Table 4-18 shows that trip rates increase as household size increases. One aberration is that an increase in household size from 1 to 2 more than doubles the vehicle trip rate. This aberration would seem to be within the margin of error, except that it also occurred in the 1997/1998 survey. The best guess for this aberration is that the one-person vehicle trip rate is more apt to be suppressed by inactive/retiree households than the two-person household.

Table 4-18: Household Trip Rates by Trip Purpose (Work/Non-work), Travel Mode (Vehicle/Transit) and Household Size

Household Size	Work Trip Rate	Non-Work Trip Rate	Vehicle Trip Rate	Transit Trip Rate	Walk/Non-Motorized	Total Trip Rate
1	1.2	3.6	2.7	.8	1.2	4.8
2	2.4	5.9	5.7	1.1	1.4	8.2
3	3.0	8.4	7.7	1.6	2.0	11.4
4+	3.3	14.1	12.0	2.3	2.7	17.1
Overall	2.8	9.9	6.9	1.4	1.8	10.1

Note:

- Work/Non-Work: HH table, HH_WHT2; HTRIPS_GPS_WP & NWP by HHSIZ_R (mean)

- Vehicle/Transit: HH table, HH_WHT2; HHSIZ_R; HTRIPS_GPS_V, _T & _NM by HHSIZ_R (mean); (* not enough cases to support a useful observation)

4.3.2 Household Income

Household income is generally a good indicator of household travel, as households with higher income tend to make more discretionary trips on an average weekday. The RHTS data shows this trend, (see Table 4-19 below). Urbanized areas such as NYC and Hudson County tended to have lower trip rates. Within the counties, there were some deviations; drilling down on the data would be required to understand the statistical significance of these deviations.

Table 4-19: Household Trip Rates by Household Income and Residence

Residence		Below \$30k	\$30k-\$74,9k	\$75k-\$99.9k	\$100+	Did not Provide	Overall Mean	
County	Fairfield	10.8	10.4	14.3	12.8	10.5	11.7	
	New Haven	8.4	10.0	14.0	12.7	6.1*	10.5	
	Bergen	7.2	9.9	13.1	15.7	6.6	11.7	
	Essex	7.2	8.3	12.1	14.6	10.3	9.9	
	Hudson	7.4	7.8	8.7	9.5	6.3	8.1	
	Hunterdon	3.1*	9.4	8.7	10.6	6.7	8.8	
	Mercer	6.2	9.8	11.3	14.8	7.1*	10.7	
	Middlesex	6.6	10.6	11.4	12.3	8.4	10.5	
	Monmouth	5.6	9.7	14.7	14.3	12.0	11.5	
	Morris	7.1	8.6	10.2	13.3	11.3	10.8	
	Ocean	8.3	11.4	9.0	11.7	7.4*	10.2	
	Passaic	10.3	10.0	20.3	14.6	5.1*	12.1	
	Somerset	8.5*	8.4	9.3	11.8	5.8*	9.8	
	Sussex	7.8	10.8	12.8	11.0	7.8*	10.6	
	Union	6.5	9.5	15.0	14.7	9.9	11.3	
	Warren	4.6	8.5	14.8	11.8	6.2*	9.6	
	Bronx	7.9	7.9	11.1	9.7	5.7	8.2	
	Dutchess	6.8	9.2	12.1	12.2	6.8	9.8	
	Brooklyn (Kings)	7.4	9.8	8.3	10.5	8.3	8.9	
	Nassau	6.0	9.8	15.3	14.1	8.1	11.6	
	Manhattan (New York)	5.9	7.1	7.3	10.9	7.5	8.1	
	Orange	10.1	9.4	10.6	13.6	9.8*	10.7	
	Putnam	11.3*	10.7	8.0	12.3	5.6*	10.5	
	Queens	8.0	9.6	10.4	12.3	5.3	9.6	
	Staten Island (Richmond)	7.0	9.1	10.4	11.8	5.8*	9.4	
	Rockland	8.7	9.0	7.7	17.1	16.0*	12.3	
	Suffolk	6.6	11.8	13.6	15.6	16.6	13.0	
	Westchester	8.0	10.7	11.8	11.9	8.3	10.6	
	County Group (Level 1)	Manhattan	5.9	7.1	7.3	10.9	7.5	8.1
		Other NYC	7.7	9.3	9.8	11.3	6.5	9.0
Long Island		6.3	11.0	14.3	14.8	11.8	12.3	
Mid-Hudson (NYMTC)		8.3	10.3	10.5	13.2	8.8	10.9	
Mid-Hudson (Other)		8.6	9.3	11.3	12.9	8.3	10.3	
Connecticut		9.4	10.2	14.1	12.8	8.6	11.1	
Bergen-Passaic		8.6	10.0	15.1	15.4	6.3	11.8	

Residence		Below \$30k	\$30k-\$74,9k	\$75k-\$99.9k	\$100+	Did not Provide	Overall Mean
	Essex-Hudson-Union	7.1	8.4	11.9	13.1	8.9	9.7
	Middlesex-Morris-Somerset	6.9	9.7	10.7	12.5	8.8	10.4
	Monmouth-Ocean	7.1	10.7	11.8	13.4	10.4	10.9
	Hunterdon-Sussex-Warren	5.1	9.7	12.3	11.0	7.0	9.7
	Mercer	6.2	9.8	11.3	14.8	7.1*	10.7
Regional Boundaries (Level 2)	New York City	7.3	8.9	9.2	11.2	6.8	8.8
	Long Island	6.3	11.0	14.3	14.8	11.8	12.3
	Mid-Hudson (All)	8.4	9.9	10.8	13.1	8.6	10.7
	Connecticut Counties	9.4	10.2	14.1	12.8	8.6	11.1
	NJTPA Counties	7.3	9.5	12.2	13.4	8.6	10.5
	Mercer	6.2	9.8	11.3	14.8	7.1*	10.7
Political Boundaries (Level 3)	NYMTC Counties	7.3	9.4	10.7	12.6	8.3	9.8
	Other NY Counties	8.6	9.3	11.3	12.9	8.3	10.3
	Connecticut Counties	9.4	10.2	14.1	12.8	8.6	11.1
	NJTPA Counties	7.3	9.5	12.2	13.4	8.6	10.5
	Mercer	6.2	9.8	11.3	14.8	7.1*	10.7
Overall		7.5	9.5	11.5	12.9	8.4	10.1

Note: HH_WHT2 in HH table, HTRIPS_GPS by INCOM_R by CTFIP, GEO_GROUP1, 2 & 3; (* not enough cases to support a useful observation)

On the following page, Table 4-20 presents distribution of travel mode by household income and home location. Vehicle ownership increases with income, resulting in a higher number of trips being made. Thus, a greater percentage of all auto trips, for example, were made by households with higher income than by households that reported a lower income.

Table 4-20: Distribution of Trips by Travel Mode, Household Income and Residence

Residence		Auto					Transit					Other				
		% Below \$30k	% \$30k-\$74,999	% \$75k-&99.9k	% \$100k+	DK/RF ¹	% Below \$30k	% \$30k-\$74,999	% \$75k-&99.9k	% \$100k+	DK/RF ¹	% Below \$30k	% \$30k-\$74,999	% \$75k-&99.9k	% \$100k+	DK/RF ¹
County	Fairfield	15.4%	25.0%	12.5%	39.1%	8.0%	14.9%*	10.9%*	16.8%	42.9%	14.4%*	36.5%	25.1%	5.8%*	28.2%	4.4%*
	New Haven	19.4%	31.6%	16.6%	27.8%	4.6%	24.5%	29.4%	12.9%	31.8%	1.4%*	28.0%	17.4%	26.5%	27.5%	0.6%*
	Bergen	9.6%	22.7%	14.0%	49.9%	3.8%	13.6%	23.4%	11.3%	46.5%	5.1%	30.6%	19.5%	7.7%	39.7%	2.5%*
	Essex	12.3%	25.2%	15.4%	38.7%	8.5%	48.3%	18.7%	4.5%	22.4%	6.1%	39.5%	34.4%	4.8%	18.7%	2.6%
	Hudson	17.0%	35.2%	14.6%	28.6%	4.6%	28.0%	24.3%	8.4%	33.1%	6.3%	35.3%	29.6%	7.0%	22.5%	5.6%
	Hunterdon	3.8%	22.2%	11.3%	54.7%	8.1%	4.6%*	10.8%*	17.5%*	61.5%	5.7%*	16.0%*	50.0%*	8.6%*	25.4%	0.0%*
	Mercer	11.0%	28.9%	12.8%	43.4%	3.9%	17.0%*	14.9%*	10.5%*	51.9%	5.6%*	21.5%	16.1%	7.7%*	50.8%	4.0%*
	Middlesex	9.5%	29.1%	16.1%	39.8%	5.5%	13.4%	33.7%	14.6%	35.0%	3.2%	22.8%	29.6%	10.1%	30.5%	7.0%
	Monmouth	7.9%	20.4%	13.8%	47.7%	10.1%	6.7%*	15.0%	20.2%	50.1%	8.0%	29.6%	20.6%	22.9%	25.1%	1.7%*
	Morris	8.4%	20.5%	12.0%	51.2%	7.9%	10.4%*	15.2%	12.8%	56.4%	5.2%*	11.6%*	16.5%	11.2%*	54.2%	6.5%*
	Ocean	18.5%	40.0%	11.5%	26.0%	3.9%	17.3%	28.2%	14.6%	38.2%	1.6%*	45.8%	40.1%	1.0%*	9.4%	3.7%*
	Passaic	20.5%	26.0%	19.3%	32.3%	1.8%	40.9%	24.1%	3.2%*	31.7%	0.0%*	58.0%	25.8%	1.4%*	13.8%	1.0%*
	Somerset	9.1%	21.4%	13.4%	51.4%	4.6%	0.0%*	37.0%	16.8%	43.7%	2.5%*	4.9%*	25.7%*	18.6%*	48.9%	1.8%*
	Sussex	7.5%	33.6%	18.7%	34.9%	5.2%	6.9%*	23.0%	13.1%	48.5%	8.5%*	34.0%*	15.8%*	26.6%*	23.6%*	0.0%*
	Union	6.5%	28.1%	17.8%	41.4%	6.2%	14.7%	18.4%	7.9%	51.1%	7.9%	35.3%	17.2%	7.9%	31.2%	8.3%*
	Warren	7.3%	27.3%	23.1%	39.3%	3.0%	10.6%*	15.8%*	24.9%*	46.5%	2.2%*	52.5%*	22.0%*	4.3%*	20.6%*	0.6%*
	Bronx	20.7%	46.2%	13.9%	16.9%	2.2%	54.4%	29.4%	7.0%	6.0%	3.2%	55.4%	24.9%	8.7%	7.9%	3.1%
	Dutchess	9.2%	28.0%	18.8%	36.9%	7.1%	11.2%	27.7%	24.4%	35.5%	1.2%*	53.3%	15.4%*	2.2%*	28.9%	0.2%*
	Brooklyn (Kings)	21.3%	34.6%	10.0%	27.1%	7.0%	31.3%	35.7%	8.5%	20.4%	4.2%	34.6%	36.5%	6.6%	18.4%	4.0%
	Nassau	6.3%	20.7%	14.7%	51.4%	6.9%	6.8%	13.7%	11.2%	63.3%	5.0%	10.4%	25.5%	13.2%	45.8%	5.0%*
	Manhattan (New York)	17.5%	14.7%	8.9%	47.2%	11.7%	21.9%	26.2%	8.7%	37.7%	5.6%	17.3%	20.6%	7.7%	46.7%	7.7%
	Orange	15.0%	31.9%	14.8%	32.0%	6.4%	22.4%	21.0%	11.5%	26.8%	18.3%*	56.5%	23.5%	9.7%*	10.2%*	0.1%*
	Putnam	12.0%	34.8%	10.5%	38.2%	4.4%	7.0%*	20.9%	19.5%	52.2%	0.3%*	11.4%*	53.8%*	10.7%*	23.0%	1.0%*
	Queens	14.7%	40.0%	10.9%	32.1%	2.3%	22.5%	39.5%	10.9%	22.5%	4.7%	31.6%	24.9%	19.9%	20.0%	3.6%
	Staten Island (Richmond)	10.3%	26.0%	13.6%	45.2%	4.9%	31.6%	19.1%	16.5%	29.8%	3.1%*	35.5%	20.5%	10.0%	30.5%	3.5%*
	Rockland	11.1%	18.1%	7.2%	59.0%	4.6%	6.1%*	28.2%	5.2%	55.7%	4.7%*	51.6%	22.8%*	0.5%*	22.7%*	2.4%*
Suffolk	6.7%	27.5%	15.1%	42.8%	7.9%	5.6%	17.4%	13.8%	53.0%	10.2%	16.5%	26.5%	17.0%	32.5%	7.5%	
Westchester	11.6%	26.2%	12.9%	41.4%	7.8%	16.8%	17.5%	9.6%	48.5%	7.7%	22.2%	14.1%	15.0%	39.8%	8.9%	
County Group (Level 1)	Manhattan	17.5%	14.7%	8.9%	47.2%	11.7%	21.9%	26.2%	8.7%	37.7%	5.6%	17.3%	20.6%	7.7%	46.7%	7.7%
	Other NYC	16.9%	37.6%	11.5%	30.1%	3.9%	33.7%	34.8%	9.2%	18.2%	4.1%	37.9%	30.2%	11.1%	17.1%	3.7%

New York Metropolitan Transportation Council & North Jersey Transportation Planning Authority

Residence		Auto					Transit					Other				
		% Below \$30k	% \$30k-\$74,999	% \$75k-&99.9k	% \$100k+	DK/RF ¹	% Below \$30k	% \$30k-\$74,999	% \$75k-&99.9k	% \$100k+	DK/RF ¹	% Below \$30k	% \$30k-\$74,999	% \$75k-&99.9k	% \$100k+	DK/RF ¹
	Long Island	6.6%	24.6%	14.9%	46.5%	7.5%	6.2%	15.6%	12.5%	58.0%	7.7%	13.5%	26.0%	15.1%	39.1%	6.3%
	Mid-Hudson (NYMTC)	11.6%	25.0%	11.2%	45.6%	6.7%	13.6%	20.2%	9.3%	50.4%	6.5%	26.4%	16.8%	12.6%	36.5%	7.6%
	Mid-Hudson (Other)	12.4%	30.1%	16.5%	34.2%	6.7%	17.8%	23.7%	16.8%	30.3%	11.3%	55.2%	20.0%*	6.5%	18.1%*	0.1%
	Connecticut	17.3%	28.1%	14.4%	33.9%	6.5%	19.9%	20.5%	14.8%	37.2%	7.7%	31.4%	20.5%	18.2%	27.8%*	2.1%
	Bergen-Passaic	13.0%	23.7%	15.7%	44.5%	3.2%	21.0%	23.6%	9.1%	42.5%	3.7%	42.0%	22.1%	5.1%	28.9%	1.9%
	Essex-Hudson-Union	11.0%	28.2%	16.2%	37.7%	6.9%	32.8%	21.1%	6.9%	32.6%	6.5%	36.8%	29.1%	6.4%	22.7%	5.0%
	Middlesex-Morris-Somerset	9.1%	24.9%	14.3%	45.6%	6.1%	10.2%	30.5%	14.7%	41.2%	3.5%	16.9%	25.4%	11.8%	39.9%	6.0%
	Monmouth-Ocean	12.6%	29.1%	12.8%	38.1%	7.4%	11.1%	20.4%	17.9%	45.3%	5.4%	39.7%	32.7%	9.3%	15.3%*	3.0%
	Hunterdon-Sussex-Warren	6.4%	28.4%	17.8%	42.0%	5.4%	6.8%	16.6%	17.4%	53.2%	6.0%	32.2%	29.9%	14.3%	23.5%*	0.2%
	Mercer	11.0%	28.9%	12.8%	43.4%	3.9%	17.0%*	14.9%*	10.5%*	51.9%	5.6%*	21.5%	16.1%*	7.7%	50.8%*	4.0%
Regional Boundaries (Level 2)	New York City	16.9%	35.8%	11.3%	31.4%	4.6%	30.8%	32.7%	9.1%	22.9%	4.5%	31.2%	27.1%	10.0%	26.7%	5.0%
	Long Island	6.6%	24.6%	14.9%	46.5%	7.5%	6.2%	15.6%	12.5%	58.0%	7.7%	13.5%	26.0%	15.1%	39.1%	6.3%
	Mid-Hudson (All)	11.8%	26.6%	12.9%	41.9%	6.7%	14.9%	21.3%	11.5%	44.4%	8.0%	34.0%	17.7%	11.0%	31.7%	5.7%
	Connecticut Counties	17.3%	28.1%	14.4%	33.9%	6.5%	19.9%	20.5%	14.8%	37.2%	7.7%	31.4%	20.5%	18.2%	27.8%*	2.1%
	NJTPA Counties	11.1%	26.5%	14.9%	41.7%	5.8%	21.7%	23.2%	11.0%	38.8%	5.2%	35.6%	27.4%	7.2%	25.7%	4.1%
	Mercer	11.0%	28.9%	12.8%	43.4%	3.9%	17.0%*	14.9%*	10.5%*	51.9%	5.6%*	21.5%	16.1%*	7.7%	50.8%*	4.0%
Political Boundaries (Level 3)	NYMTC Counties	11.6%	29.2%	12.8%	40.2%	6.2%	27.3%	30.2%	9.4%	28.2%	4.9%	29.9%	26.6%	10.4%	27.9%	5.2%
	Other NY Counties	12.4%	30.1%	16.5%	34.2%	6.7%	17.8%	23.7%	16.8%	30.3%	11.3%	55.2%	20.0%	6.5%	18.1%*	0.1%
	Connecticut Counties	17.3%	28.1%	14.4%	33.9%	6.5%	19.9%	20.5%	14.8%	37.2%	7.7%	31.4%	20.5%	18.2%	27.8%*	2.1%
	NJTPA Counties	11.1%	26.5%	14.9%	41.7%	5.8%	21.7%	23.2%	11.0%	38.8%	5.2%	35.6%	27.4%	7.2%	25.7%	4.1%
	Mercer	11.0%	28.9%	12.8%	43.4%	3.9%	17.0%*	14.9%*	10.5%*	51.9%	5.6%*	21.5%	16.1%*	7.7%	50.8%*	4.0%
Overall	12.1%	28.0%	13.9%	39.9%	6.0%	25.8%	28.4%	10.1%	30.5%	5.2%	31.1%	26.4%	10.1%	27.6%	4.8%	

Note:

- Linked trip table, *WHT_FAC3; INCOM_R and PMODE_R3* by *HCOUNTY, GEO_GROUP1, 2 & 3*; (* not enough cases to support a useful observation)

¹ *DK/RF*: Don't Know/Refused - respondent did not answer the question or refused to answer the question.

4.3.3 Vehicle Ownership

This section provides summary statistics of different variables cross-tabulated against household vehicle ownership. Table 4-21 presents the average number of vehicles per household, stratified by income and household size. Larger households and households with higher income have a higher vehicle ownership on the average. In general, vehicle ownership increases with both income and household size. However, this is not apparent in smaller households, where the average number of vehicles remains similar and low, regardless of the household income. These numbers are similar to the 1997/1998 survey.

Table 4-21: Number of Vehicles by Household Size and Income

Household Income	Household Size				Total
	1	2	3	4+	
Less than \$15,000	0.3	0.5	0.4	0.7	0.4
\$15,000-\$29,999	0.6	0.9	0.9	1.0	0.8
\$30,000-\$49,999	0.7	1.3	1.5	1.5	1.2
\$50,000-\$74,999	0.9	1.6	1.8	1.9	1.5
\$75,000-\$99,999	0.9	1.6	2.1	2.3	1.8
\$100,000-\$149,999	1.0	1.8	2.1	2.4	2.0
\$150,000-\$199,999	1.0	1.9	2.3	2.4	2.1
\$200,000 or more	0.9	1.8	2.3	2.4	2.0
Did not Provide Income	0.8	1.7	1.8	1.9	1.4
Overall	0.7	1.5	1.8	1.9	1.4

Note: HH table, HH_WHT2; HHVEH by HHSIZ_R by INCOM (mean) (not enough cases to support a useful observation)*

Table 4-22 shows vehicle ownership by regional county groups (residence), again stratified by household size. Long Island had the highest average vehicle ownership per household, while New York City had the lowest. These numbers are similar to the 1997/1998 survey.

**Table 4-22: Number of Vehicles by Household Size and Residence
- Regional Boundaries (Level 2)**

Regional Boundaries (Level 2)	Household Size				Total
	1	2	3	4+	
New York City	0.3	0.8	1.0	1.1	0.7
Long Island	1.1	1.9	2.4	2.5	2.0
Mid-Hudson (All)	1.1	2.0	2.2	2.3	1.9
Connecticut Counties	1.0	1.9	2.4	2.4	1.9
NJTPA Counties	0.9	1.9	2.1	2.4	1.8
Mercer	0.8	1.7	2.2	2.4	1.7
Overall	0.7	1.5	1.8	1.9	1.4

Note: HH table, HH_WHT2; HHVEH by HHSIZ_R by GEO_GROUP2 (mean) (not enough cases to support a useful observation)*

As shown in Table 4-23, large households (4+) had the highest trip rate regardless of vehicle ownership. The number of trips tended to increase in households with more vehicles, although the rate of increase slowed when a household had more vehicles than members. The odd decrease in

trip rates for household sizes of 4+ from 2 vehicles to 3+ vehicles is difficult to explain but was also present in the 1997/1998 survey. .

Table 4-23: Household Trip Rates by Household Size and Number of Vehicles

Household Vehicles	Household Size				Total
	1	2	3	4+	
0	4.1	7.2	10.4	12.0	6.7
1	5.2	7.9	10.7	16.6	8.6
2	5.3	8.8	11.9	18.6	12.7
3+	5.7	9.1	12.0	17.6	13.7
Overall	4.8	8.2	11.4	17.1	10.1

Note: HH table, HH_WHT2; HTRIPS_GPS by HHSIZ_R by HHVEH_R (mean); (* not enough cases to support a useful observation)

The distribution of mode of travel by vehicle ownership for all travel segments is displayed in Table 4-24. Walking is the mode of travel used most amongst households with zero vehicles, while the MTA New York City transit subway system – which includes the Staten Island Railway – was the second most used mode. Auto was the mode most commonly used in households with vehicles, as expected.

Table 4-24: Distribution of Trips by Number of Household Vehicles and Travel Mode

Travel Mode	Household Vehicles				All Households
	0	1	2	3+	
School Bus	1.6%	1.8%	4.2%	3.1%	2.9%
Paratransit Service (Access-a-ride, Dial-a-ride, etc.)	0.8%	0.1%	0.0%*	0.0%*	0.2%
Black Car Service/Limo	0.5%	0.2%	0.1%	0.1%*	0.1%
For-Hire Van/Jitney/Gypsy Cab	0.3%	0.1%	0.0%*	0.0%*	0.1%
Taxi (Yellow, Medallion Cab)	2.3%	0.7%	0.1%	0.1%*	0.6%
Railroad (LIRR, Metro North, NJ Transit, AMTRAK)	0.8%	1.3%	1.4%	1.2%	1.2%
Express Bus (Suburban, Commuter, Inter-city)	0.9%	0.7%	0.5%	0.3%	0.6%
Roosevelt Island Tram	0.0%*	0.0%*	0.0%*	0.0%*	0.0%
Ferry (Staten Island, NY Waterway, Water Taxi, Seastreak)	0.2%	0.2%	0.1%	0.1%*	0.1%
Light Rail/LRT (Newark, Hudson-Bergen, River line)	0.2%	0.1%	0.0%*	0.0%*	0.1%
PATH Train	0.5%	0.4%	0.1%	0.0%*	0.2%
Subway (NYTCT, Staten Island Railway)	19.9%	7.7%	1.2%	0.7%	5.8%
Charter Bus (Employer-provided or Other Contracted)	0.1%*	0.1%	0.0%*	0.1%*	0.1%
Shuttle Bus (Public or Employer-provided)	0.3%	0.1%	0.0%*	0.1%*	0.1%
Local Bus (Regular, Standard, City)	12.8%	3.2%	0.6%	0.3%	3.2%
Carpool/Vanpool/Other Group Ride	0.7%	0.7%	0.6%	0.5%	0.6%
Auto (Car or Small Truck) Passenger	3.9%	14.0%	21.6%	17.1%	15.9%
Motorcycle/Moped/Motorized Scooter	0.0%*	0.0%*	0.0%	0.5%	0.1%
Auto (Car or Small Truck) Driver	1.5%	45.9%	62.1%	71.0%	50.1%
Wheelchair/Mobility Scooter	0.1%	0.1%*	0.0%*	0.0%*	0.0%
Skates/Skateboard/Kick Scooter/Segway	0.1%*	0.0%*	0.0%*	0.0%*	0.0%
Bike	1.8%	0.7%	0.3%	0.1%	0.6%
Walk	50.4%	21.9%	6.9%	4.2%	17.1%

Travel Mode	Household Vehicles				All Households
	0	1	2	3+	
Air Plane	0.1%*	0.0%*	0.0%*	0.1%*	0.0%
Other (Specify)	0.3%	0.1%	0.0%	0.3%	0.1%
Overall	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Linked trip table, WHT_FAC3; PMODE by HHVEH_R (* not enough cases to support a useful observation)

4.3.4 Household Structure

This section presents cross-tabulations of key household demographic statistics by household worker and child “structure.” Table 4-25 shows the joint distribution of RHTS households by income and the worker/child classification of household structure. There was an increase in the representation of households with either 1 or 2+ workers with no children, as compared to 1997/1998.

Table 4-25: Household Structure by Income

Income	Household Structure						Total
	2+ Workers with Child(s)	2+ Workers no Children	1 Worker with Child(s)	1 Worker no Children	No Workers with Child(s)	No Workers no Children	
Less than \$15,000	0.4%*	0.3%	0.9%	2.4%	0.7%	4.2%	9.0%
\$15,000-\$29,999	1.1%	1.5%	2.0%	4.3%	0.8%	5.1%	14.7%
\$30,000-\$49,999	1.3%	2.7%	1.9%	5.5%	0.2%	2.8%	14.3%
\$50,000-\$74,999	2.8%	3.8%	1.6%	5.2%	0.1%*	1.7%	15.3%
\$75,000-\$99,999	2.5%	3.8%	1.1%	2.9%	0.1%*	0.8%	11.2%
\$100,000-\$149,999	4.1%	5.4%	1.2%	2.8%	0.1%*	0.7%	14.2%
\$150,000-\$199,999	2.5%	2.9%	0.5%	1.1%	0.0%*	0.2%	7.2%
\$200,000 or more	2.2%	2.8%	0.8%	1.1%	0.0%*	0.3%	7.1%
Did not Provide Income	0.8%	1.4%	0.5%	2.4%	0.1%	1.7%	6.9%
Overall	17.6%	24.6%	10.6%	27.8%	2.0%	17.5%	100.0%

Note: HH table, HH_WHT2; INCOM by HHSTRUC (* not enough cases to support a useful observation)

Table 4-26 displays linked weekday trip rates by home location and household structure. Home location was compared by county group, regional boundaries and political boundaries. There was not a great deal of difference in trip rates between 1 worker households with children and 2+ worker households with children, demonstrating the increased trip making when children were present in families.

Table 4-26: Household Trip Rates by Household Structure and Residence

Residence		2+ Workers with Child(s)	2+ Workers no Children	1 Worker with Child(s)	1 Worker no Children	No Workers with Child(s)	No Workers no Children	Total
County	Fairfield	18.8	11.9	19.8	5.8	18.4*	5.4	11.7
	New Haven	14.9	11.8	17.0	7.4	8.0*	7.2	10.5
	Bergen	19.0	11.4	20.9	6.9	11.0*	5.7	11.7
	Essex	15.7	10.0	11.6	6.0	20.6*	6.9	9.9
	Hudson	12.4	8.1	11.8	5.1	18.1*	6.4	8.1
	Hunterdon	14.8	8.2	13.9	5.2	19.3*	3.8	8.8
	Mercer	19.6	10.4	13.1	6.5	16.2*	5.6	10.7
	Middlesex	15.1	10.2	15.5	6.8	12.7*	5.5	10.5
	Monmouth	18.5	10.5	18.5	6.8	37.1*	6.7	11.5
	Morris	16.3	10.7	18.7	6.4	14.9*	5.6	10.8
	Ocean	17.3	9.0	21.6	7.6	16.4*	5.9	10.2
	Passaic	20.1	11.5	18.9	7.1	9.5*	7.7	12.1
	Somerset	13.3	9.0	14.5	7.2	15.1*	5.5	9.8
	Sussex	15.8	10.3	13.6	7.0	23.4*	6.2	10.6
	Union	17.2	11.0	18.7	6.4	7.4*	6.4	11.3
	Warren	14.1	10.2	17.1*	4.9	15.1*	4.1	9.6
	Bronx	14.5	7.6	12.2	5.0	10.6	5.1	8.2
	Dutchess	16.8	9.6	16.0	6.3	8.0*	5.8	9.8
	Brooklyn (Kings)	14.3	9.5	14.2	5.6	12.6	5.2	8.9
	Nassau	17.0	11.4	21.6	6.8	10.9*	5.8	11.6
	Manhattan (New York)	15.9	9.3	16.1	5.8	7.2*	5.5	8.1
	Orange	16.9	10.8	13.8	5.9	13.9*	6.9	10.7
	Putnam	16.1	10.0	12.5*	7.1	28.4*	4.6	10.5
	Queens	16.4	10.2	13.0	5.7	11.6*	5.3	9.6
	Staten Island (Richmond)	13.8	9.5	12.5	7.9	5.5*	5.3	9.4
	Rockland	21.1	11.9	13.5*	6.8	22.0*	5.2	12.3
	Suffolk	20.1	12.1	18.6	9.8	9.8*	6.4	13.0
	Westchester	16.6	10.1	15.6	6.5	11.0*	6.4	10.6
County Group (Level 1)	Manhattan	15.9	9.3	16.1	5.8	7.2*	5.5	8.1
	Other NYC	15.1	9.5	13.2	5.7	11.4	5.2	9.0
	Long Island	18.7	11.8	20.1	8.5	10.3*	6.1	12.3
	Mid-Hudson (NYMTC)	17.8	10.4	15.0	6.7	13.8*	6.0	10.9
	Mid-Hudson (Other)	16.8	10.2	14.4	6.1	12.6*	6.3	10.3
	Connecticut	16.9	11.9	18.7	6.7	13.3*	6.4	11.1
	Bergen-Passaic	19.3	11.4	20.2	7.0	10.0*	6.3	11.8
	Essex-Hudson-Union	15.4	9.5	13.5	5.8	18.9	6.6	9.7
	Middlesex-Morris-Somerset	15.2	10.1	16.0	6.7	13.8*	5.6	10.4

Residence		2+ Workers with Child(s)	2+ Workers no Children	1 Worker with Child(s)	1 Worker no Children	No Workers with Child(s)	No Workers no Children	Total
	Monmouth-Ocean	18.1	9.8	20.1	7.2	24.1*	6.2	10.9
	Hunterdon-Sussex-Warren	15.0	9.6	14.7	5.7	18.3*	4.8	9.7
	Mercer	19.6	10.4	13.1	6.5	16.2*	5.6	10.7
Regional Boundaries (Level 2)	New York City	15.2	9.5	13.6	5.7	11.0	5.3	8.8
	Long Island	18.7	11.8	20.1	8.5	10.3*	6.1	12.3
	Mid-Hudson (All)	17.5	10.4	14.9	6.5	13.2	6.1	10.7
	Connecticut Counties	16.9	11.9	18.7	6.7	13.3*	6.4	11.1
	NJTPA Counties	16.7	10.1	16.6	6.5	15.9	6.1	10.5
	Mercer	19.6	10.4	13.1	6.5	16.2*	5.6	10.7
Political Boundaries (Level 3)	NYMTC Counties	16.6	10.1	14.8	6.3	11.1	5.5	9.8
	Other NY Counties	16.8	10.2	14.4	6.1	12.6*	6.3	10.3
	Connecticut Counties	16.9	11.9	18.7	6.7	13.3*	6.4	11.1
	NJTPA Counties	16.7	10.1	16.6	6.5	15.9	6.1	10.5
	Mercer	19.6	10.4	13.1	6.5	16.2*	5.6	10.7
Overall		16.7	10.2	15.6	6.4	12.5	5.8	10.1

Note: HH table, HH_WHT2; HTRIPS_GPS by HHSTRUC by CTFIP, GEO_GROUP1, 2 & 3 (mean) (* not enough cases to support a useful observation)

4.4 Variation in Travel by Person Characteristics

In this section, the influence of individual or personal characteristics on travel patterns is examined with the RHTS data.

4.4.1 Age

The rate of making work trips and other weekday trips varied substantially by the age of the trip-maker, as shown in Table 4-27. While as a whole the region averaged 1.5 work trips per person, work trip rates were the highest in the 35-54 year old cohort (2.5 per weekday). Non-work person trip rates were much more uniform across age groups, with the highest rate in the 65 years and older cohort (3.6 compared with 3.1 overall).

Table 4-27: Trip Rates by Purpose (Work/Non-Work) and Age Group

Age Group	Work Trips	Non-Work Trips	Total
Younger than 16 years	0.0	3.1	3.1
16-18 years	0.1	3.4	3.5
19-24 years	0.9	2.4	3.3
25-34 years	1.5	2.5	4.0
35-54 years	1.6	3.2	4.7
55-64 years	1.3	3.3	4.6
65 years or older	0.4	3.3	3.7
Age not Provided	0.9	3.0	3.9
Total	1.0	3.1	4.0

Note:

- HH table, HH_WHT2; PTRIPS_GPS_WP & NWP by AGE_R (mean) (* not enough cases to support a useful observation)
- Calculation of Mean Person Trip Rates excludes valid partial persons that did not provide travel data

Table 4-28 displays weekday person trips by age grouped by home location. Home location was split by county group, regional boundaries and political boundaries. There were minor fluctuations across the age groups, but trip rates tended to peak at age 35-54 or 55-64.

Table 4-28: Average Person Trip Rates by Age Group and Residence

Home Location		Younger than 16 years	16-18 years	19-24 years	25-34 years	35-54 years	55-64 years	65 years and older	Did not Provide	Total
County	Fairfield	4.2	4.5	4.5	5.3	5.9	4.7	3.6	2.8*	4.7
	New Haven	2.9	3.5*	3.6	4.8	4.0	5.5	4.8	6.6*	4.4
	Bergen	3.5	3.4	4.9	5.5	3.9	4.8	4.5	2.6*	4.6
	Essex	3.0	3.2	3.6	4.6	4.9	4.4	3.7	2.8	4.0
	Hudson	2.5	2.3	2.4	3.7	3.8	4.2	3.4	4.9	3.4
	Hunterdon	2.9	3.8	2.8*	3.8	4.3	4.0	2.2	2.2*	3.4
	Mercer	3.0	3.2*	3.3*	4.8	5.3	5.7	3.1	2.2*	4.3
	Middlesex	3.2	3.4	3.9	4.4	3.8	4.6	3.5	3.1*	3.9
	Monmouth	3.8	3.7	2.5	5.2	4.1	5.2	4.2	5.7*	4.5
	Morris	3.1	3.9	3.4	5.1	3.6	4.5	3.5	4.4	4.1
	Ocean	3.1	2.9	4.3	5.3	5.9	4.0	3.5	2.1*	4.1
	Passaic	2.8	3.0	5.2	5.0	4.9	5.4	4.9	0.8*	4.5
	Somerset	2.8	5.8	2.3*	4.2	3.6	3.9	3.3	3.6*	3.7
	Sussex	2.7	4.5	4.0*	4.9	4.0	4.5	3.9	1.6*	4.1
	Union	3.5	3.5	3.5	5.3	3.6	4.3	4.1	3.8*	4.3
	Warren	3.1	4.8*	3.3*	4.2	3.6	3.4	4.0	0.5*	3.8
	Bronx	2.5	2.2	2.4	3.8	3.7	3.9	2.9	4.8	3.2
	Dutchess	3.2	3.8	3.8	4.6	3.3	3.9	3.6	5.7*	3.9
	Brooklyn (Kings)	2.5	3.1	3.8	3.9	3.8	4.0	3.2	3.3	3.5
	Nassau	3.3	4.0	2.7	5.2	2.7	5.0	3.7	2.7	4.2
	Manhattan (New York)	2.9	2.7	2.4	5.2	4.2	4.3	4.0	7.1	4.3
	Orange	3.1	5.3*	4.9	4.2	3.3	4.8	4.4	2.8*	4.0
	Putnam	3.5	2.8*	2.8*	4.6	4.7	4.0	3.5	3.4*	4.0
	Queens	2.6	3.5	2.7	4.6	3.8	4.4	2.8	2.8	3.6
	Staten Island (Richmond)	2.4	3.3	2.2	4.3	3.8	3.7	3.2	3.2*	3.4
	Rockland	3.9	3.3*	4.5	5.0	3.1	4.5	3.7	6.1*	4.3
Suffolk	3.9	4.6	3.5	5.3	3.4	6.0	4.2	4.3	4.7	
Westchester	3.2	3.2	2.9	5.2	3.5	4.5	4.1	4.1	4.2	
County Group (Level 1)	Manhattan	2.9	2.7	2.4	4.2	5.2	4.3	4.0	7.1	4.3
	Other NYC	2.5	3.0	3.0	3.8	4.2	4.1	3.0	3.3	3.5
	Long Island	3.6	4.4	3.1	3.1	5.3	5.6	4.0	3.4	4.5
	Mid-Hudson (NYMTC)	3.4	3.2	3.5	3.5	5.1	4.4	4.0	4.4	4.2
	Mid-Hudson (Other)	3.2	4.7	4.5	3.3	4.4	4.3	4.0	4.2	4.0
	Connecticut	3.6	4.1	4.0	4.9	5.1	5.0	4.2	4.9	4.5
	Bergen-Passaic	3.3	3.3	5.0	4.3	5.4	5.0	4.6	2.6	4.5
	Essex-Hudson-Union	3.0	3.0	3.1	4.2	4.5	4.3	3.7	3.9	3.9

Home Location		Younger than 16 years	16-18 years	19-24 years	25-34 years	35-54 years	55-64 years	65 years and older	Did not Provide	Total
	Middlesex-Morris-Somerset	3.1	4.4	3.6	3.7	4.6	4.5	3.4	3.7	4.0
	Monmouth-Ocean	3.5	3.4	3.4	5.1	5.2	4.6	3.8	3.5	4.3
	Hunterdon-Sussex-Warren	2.9	4.3	3.4	4.0	4.4	4.1	3.4	1.9*	3.7
	Mercer	3.0	3.2*	3.3*	5.3	4.8	5.7	3.1	2.2*	4.3
Regional Boundaries (Level 2)	New York City	2.6	3.0	2.9	3.9	4.4	4.1	3.2	4.0	3.6
	Long Island	3.6	4.4	3.1	3.1	5.3	5.6	4.0	3.4	4.5
	Mid-Hudson (All)	3.3	3.7	3.8	3.4	4.8	4.4	4.0	4.4	4.1
	Connecticut Counties	3.6	4.1	4.0	4.9	5.1	5.0	4.2	4.9	4.5
	NJTPA Counties	3.2	3.5	3.7	4.3	4.8	4.5	3.9	3.5	4.1
	Mercer	3.0	3.2*	3.3*	5.3	4.8	5.7	3.1	2.2*	4.3
Political Boundaries (Level 3)	NYMTC Counties	2.9	3.4	3.0	3.7	4.7	4.5	3.5	3.9	3.9
	Other NY Counties	3.2	4.7	4.5	3.3	4.4	4.3	4.0	4.2	4.0
	Connecticut Counties	3.6	4.1	4.0	4.9	5.1	5.0	4.2	4.9	4.5
	NJTPA Counties	3.2	3.5	3.7	4.3	4.8	4.5	3.9	3.5	4.1
	Mercer	3.0	3.2*	3.3*	5.3	4.8	5.7	3.1	2.2*	4.3
Overall		3.1	3.5	3.3	4.0	4.7	4.6	3.7	3.9	4.0

Note: PER table, HH_WHT; PTRIPS_GPS by AGE_R by CTFIP, GEO_GROUP1, 2 & 3 (mean) (* not enough cases to support a useful observation)

The distribution of travel by time of day for each age cohort is displayed in Table 4-29. Overall, over half of all trips occurred during either the morning or evening peak period (similar to the 1997/1998 survey). Retirees were the exception: for those age 65+ more than half of their trips were during the midday hours.

Table 4-29: Distribution of Trips by Age Group and Time of Day

Time of Day	Age Group								Total
	Younger than 16 years	16-18 years	19-24 years	25-34 years	35-54 years	55-64 years	65 years and older	Did not provide	
AM Peak 6 a.m. - 10 a.m.	30.7%	25.1%	19.1%	26.3%	27.5%	22.5%	17.6%	21.6%	25.4%
Midday 10 a.m. - 4 p.m.	35.4%	34.2%	37.7%	31.9%	35.1%	44.5%	57.4%	43.2%	39.2%
PM Peak 4 p.m. - 8 p.m.	28.0%	28.1%	26.4%	29.5%	28.9%	25.1%	19.8%	26.8%	27.0%
Evening 8 p.m. - 12 a.m.	5.8%	12.0%	14.2%	10.4%	6.9%	6.1%	4.6%	7.0%	7.1%
Late Night 12 a.m. - 6 a.m.	0.2%*	0.6%	2.6%	2.0%	1.7%	1.8%	0.7%	1.4%*	1.4%
Overall	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Linked trip table, WHT_FAC3; TOD_R by AGE_R (* not enough cases to support a useful observation)

Table 4-30 below displays the percentage of linked trips for each age cohort by linked trip purpose.

Table 4-30: Distribution of Trips by Age Group and Trip Purpose

Trip Purpose	Age Group								Total
	Younger than 16 years	16-18 years	19-24 years	25-34 years	35-54 years	55-64 years	65 years and older	Did not provide	
Home to Work	0.1%*	1.2%	9.6%	11.8%	9.7%	8.8%	3.4%	7.2%	7.2%
Home to School	19.8%	19.7%	6.9%	1.0%	0.3%	0.1%	0.1%*	4.7%	4.4%
Home to Social/Rec	8.9%	10.9%	8.5%	5.8%	5.2%	6.7%	9.8%	6.7%	7.0%
Home to Personal Business	2.2%	3.1%	3.8%	3.7%	4.5%	6.3%	9.1%	5.8%	4.8%
Home to Shopping	1.8%	1.7%	3.6%	3.3%	3.3%	5.1%	6.5%	4.1%	3.7%
Home to Serving Passengers	4.4%	2.4%	2.9%	5.5%	7.6%	3.2%	2.5%	3.5%	5.1%
Home to Other	2.1%	1.0%	1.9%	2.4%	2.1%	1.6%	1.2%	0.7%	1.9%
Work to Home	0.0%*	1.2%	8.9%	9.9%	8.7%	7.2%	2.8%*	5.7%	6.2%
School to Home	17.1%	17.3%	5.9%	1.0%	0.3%	0.1%	0.0%	4.0%	3.8%
Social/Rec to Home	10.5%	12.2%	9.4%	7.3%	5.9%	7.1%	9.0%	8.5%	7.7%
Personal Business to Home	2.6%	3.0%	3.2%	3.4%	4.3%	5.2%	7.4%	3.8%	4.3%
Shopping to Home	3.2%	2.1%	5.2%	4.7%	5.7%	8.1%	9.9%	8.2%	6.0%
Serving Passengers to Home	3.7%	2.0%	2.6%	5.3%	6.1%	2.7%	2.0%	1.8%	4.2%
Other to Home	1.4%	0.6%*	0.7%*	1.1%	1.0%	0.4%	0.2%	0.3%*	0.8%
Work Related	0.0%*	0.1%*	1.4%	3.9%	2.7%	3.3%	1.2%	2.2%	2.2%
Between Work and NW	0.1%*	1.0%	6.4%	12.7%	12.1%	9.3%	3.3%	9.0%	8.1%
Other Non-Home/Non-Work	22.2%	20.3%	19.1%	17.3%	20.4%	24.6%	31.6%	23.8%	22.4%
Overall	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Linked trip table, WHT_FAC3; ODTPURP1 by AGE_R (* not enough cases to support a useful observation)

The distribution of weekday travel by travel mode for all linked trip by age group is displayed in Table 4-31. In general, the age group of persons 35-54 years of age used the highest percentages of all modes of travel, minus the younger than 16 years of age persons going to and from school.

Table 4-31: Distribution of Trips by Age Group and Travel Mode

Distribution of Travel Mode	Age Group								Total
	Younger than 16 years	16-18 years	19-24 years	25-34 years	35-54 years	55-64 years	65 years and older	Did not provide	
School Bus	83.3%	9.5%	1.2%	0.3%*	0.7%	0.4%*	1.0%*	3.6%	100.0%
Paratransit Service (Access-a-ride, Dial-a-ride, etc.)	0.2%*	0.4%*	1.2%*	2.5%*	32.4%	23.5%	38.3%	1.3%*	100.0%
Black Car Service/Limo	0.5%*	0.0%*	6.6%*	25.8%*	48.0%	10.6%*	8.5%*	0.0%*	100.0%
For-Hire Van/Jitney/Gypsy Cab	4.4%*	0.0%*	11.3%*	22.3%*	28.1%	16.1%*	17.8%*	0.1%*	100.0%
Taxi (Yellow, Medallion Cab)	7.7%	0.2%*	3.1%	21.1%	37.9%	16.9%	12.0%	1.2%*	100.0%
Railroad (LIRR, Metro North, NJ Transit, AMTRAK)	0.9%*	0.7%*	5.5%	13.3%	52.7%	18.1%	6.5%	2.2%	100.0%
Express Bus (Suburban, Commuter, Inter-city)	2.6%*	0.7%*	5.0%	14.3%	51.3%	15.9%	7.7%	2.4%	100.0%
Roosevelt Island Tram	0.0%*	0.0%*	0.0%*	23.2%*	32.6%*	14.5%*	5.6%*	24.1%*	100.0%
Ferry (Staten Island, NY Waterway, Water Taxi, Seastreak)	6.0%*	5.0%*	0.7%*	12.9%	48.3%	21.7%	4.6%*	0.8%*	100.0%
Light Rail/LRT (Newark, Hudson-Bergen, River line)	7.7%*	2.8%*	11.2%*	15.9%	44.0%	10.9%*	6.3%*	1.2%*	100.0%
PATH Train	0.5%*	0.3%*	3.8%*	20.5%	49.7%	13.0%	5.9%*	6.4%*	100.0%
Subway (NYTCT, Staten Island Railway)	5.4%	3.9%	7.8%	22.0%	39.4%	12.3%	6.3%	2.9%	100.0%
Charter Bus (Employer-provided or Other Contracted)	28.9%*	21.0%*	5.5%*	3.8%*	9.5%*	16.5%*	14.8%*	0.0%*	100.0%
Shuttle Bus (Public or Employer-provided)	3.4%*	0.1%*	10.1%*	18.8%	17.8%	23.7%	24.9%	1.1%*	100.0%
Local Bus (Regular, Standard, City)	13.7%	6.7%	5.1%	9.5%	31.1%	17.5%	14.7%	1.6%	100.0%
Carpool/Vanpool/Other Group Ride	55.0%	3.8%	5.5%*	8.5%	13.5%	7.6%	5.6%	0.4%*	100.0%
Auto (Car or Small Truck) Passenger	57.8%	6.1%	3.8%	4.5%	11.1%	7.2%	7.3%	2.2%	100.0%
Motorcycle/Moped/Motorized Scooter	0.0%*	0.0%*	1.2%*	21.8%*	66.5%	4.1%*	6.3%*	0.0%*	100.0%
Auto (Car or Small Truck) Driver	0.0%*	1.4%	4.1%	10.7%	46.4%	20.4%	14.9%	2.1%	100.0%
Wheelchair/Mobility Scooter	3.4%*	0.0%*	0.0%*	3.6%*	34.7%	33.6%	24.6%*	0.0%*	100.0%
Skates/Skateboard/Kick Scooter/Segway	60.4%	8.4%*	0.9%*	10.3%*	6.0%*	3.0%*	10.9%*	0.0%*	100.0%
Bike	9.0%	4.8%	2.4%*	21.7%	40.9%	17.0%	3.7%	0.4%*	100.0%
Walk	17.6%	2.9%	5.7%	13.9%	33.4%	13.1%	10.7%	2.5%	100.0%
Air Plane	0.0%*	0.5%*	16.9%*	7.7%*	62.4%	9.0%*	3.5%*	0.0%*	100.0%
Other (Specify)	12.7%*	0.0%*	10.4%*	4.9%*	17.1%	34.8%	18.4%*	1.5%*	100.0%
Total	15.9%	3.0%	4.5%	10.8%	36.1%	15.7%	11.8%	2.2%	100.0%

Note: Linked trip table, WHT_FAC3; PMODE by AGE_R (* not enough cases to support a useful observation)

4.4.2 Gender

Overall, more non-work trips than work trips were made per day (3.1 compared with 1.0 work trips). While work trip rates were similar between genders, females tended to make more non-work trips than males, as shown below in Table 4-32.

Table 4-32: Trip Rates by Trip Purpose (Work/Non-Work Types) and Gender

Gender	Trip Types		
	Work	Non-Work	Total
Male	1.0	2.7	3.8
Female	0.9	3.3	4.2
Did not Provide	0.2	2.0	2.2
Overall	1.0	3.1	4.0

Note:

- PER table, HH_WHT2; PTRIPS_GPS_WP & NWP by GENDER (mean) (* not enough cases to support a useful observation)*
 - Calculation of Mean Person Trip Rates excludes valid partial persons that did not provide travel data

The distribution of weekday travel by each travel mode according to gender is displayed in Table 4-33. While males reported slightly more bike and rail travel than females, females reported slightly more bus and van travel. Overall, 55.8% of travel was made by females.

Table 4-33: Distribution of Trips by Gender and Travel Mode

Distribution of Travel Mode	Gender			
	Male	Female	Did not provide	Total
School Bus	55.7%	43.5%	0.7%	100.0%
Paratransit Service (Access-a-ride, Dial-a-ride, etc.)	20.6%	79.4%	0.0%*	100.0%
Black Car Service/Limo	50.7%	49.3%	0.0%*	100.0%
For-Hire Van/Jitney/Gypsy Cab	24.9%	75.1%	0.0%*	100.0%
Taxi (Yellow, Medallion Cab)	40.7%	59.3%	0.0%*	100.0%
Railroad (LIRR, Metro North, NJ Transit, AMTRAK)	59.7%	40.3%	0.0%*	100.0%
Express Bus (Suburban, Commuter, Inter-city)	46.0%	54.0%	0.0%*	100.0%
Roosevelt Island Tram	48.2%*	51.8%*	0.0%*	100.0%
Ferry (Staten Island, NY Waterway, Water Taxi, Seastreak)	65.0%	35.0%	0.0%*	100.0%
Light Rail/LRT (Newark, Hudson-Bergen, River line)	56.9%	43.1%	0.0%*	100.0%
PATH Train	51.3%	48.7%	0.0%*	100.0%
Subway (NYCT, Staten Island Railway)	44.2%	55.6%	0.1%*	100.0%
Charter Bus (Employer-provided or Other Contracted)	64.5%	35.5%	0.0%*	100.0%
Shuttle Bus (Public or Employer-provided)	39.2%	60.1%	0.7%*	100.0%
Local Bus (Regular, Standard, City)	35.2%	64.5%	0.3%*	100.0%
Carpool/Vanpool/Other Group Ride	46.2%	53.8%	0.0%*	100.0%
Auto (Car or Small Truck) Passenger	43.7%	55.9%	0.4%	100.0%
Motorcycle/Moped/Motorized Scooter	74.8%	25.2%*	0.0%*	100.0%
Auto (Car or Small Truck) Driver	43.7%	56.3%	0.0%	100.0%
Wheelchair/Mobility Scooter	59.0%	41.0%	0.0%*	100.0%
Skates/Skateboard/Kick Scooter/Segway	73.0%	25.9%*	1.1%*	100.0%
Bike	62.6%	37.4%	0.0%*	100.0%
Walk	42.5%	57.4%	0.1%	100.0%
Air Plane	52.8%	47.2%*	0.0%*	100.0%
Other (Specify)	67.9%	32.1%	0.0%*	100.0%
Total	44.1%	55.8%	0.1%	100.0%

Note: Linked trip table, WHT_FAC3; PMODE by GENDER (* not enough cases to support a useful observation)

4.4.3 Ethnicity

This section summarizes RHTS findings by respondent ethnicity. Table 4-34 shows the rates of weekday trip-making by work and non-work trip types and ethnicity. The odd difference in trip rates between work and non-work was mainly due to a small sample size. "Other" ethnicity shows the typical pattern of more non-work than work trips.

Table 4-34: Trip Rates by Trip Purpose (Work/Non-Work Types) and Ethnicity Types

Ethnicity	Trip Types		
	Work	Non-Work	Total
Caucasian/White	1.0	3.3	4.3
African American/Black	0.7	2.8	3.6
Asian	1.0	2.2	3.1
American Indian, Alaska Native	0.6	2.8	3.4
Pacific Islander	1.3	1.9	3.3
Multiracial	0.6	3.0	3.6
Hispanic/Mexican	0.7	2.5	3.2
Other	0.9	2.7	3.6
Don't Know	0.8	2.2	3.0
Refused	0.8	3.0	3.9
Overall	1.0	3.1	4.0

Note:

- PER table, HH_WHT2; PTRIPS_GPS_WP & NWP by RACE (mean) (* not enough cases to support a useful observation)

- Calculation of Mean Person Trip Rates excludes valid partial persons that did not provide travel data

The distribution of weekday travel by each travel mode group according to ethnicity is displayed below in Table 4-35. Overall, the Caucasian/White ethnic group had the highest percentage of all modes used. There was a small percentage of the Asian (4.6%) and the Hispanic/Mexican (4.7 %) ethnic groups that used automobiles for weekday trips.

Table 4-35: Distribution of Trips by Ethnicity and Travel Mode Group

General Mode	Ethnicity									Total
	Caucasian/ White	African American/ Black	Asian	American Indian, Alaska Native	Pacific Islander	Multiracial	Hispanic/ Mexican	Other	Did not provide	
Auto	76.2%	9.7%	4.6%	0.1%	0.0%	2.5%	4.7%	0.5%	1.6%	100.0%
Rail	52.3%	19.2%	9.7%	0.5%*	0.0%*	3.9%	12.1%	0.6%	1.8%*	100.0%
Bus	51.9%	24.3%	6.2%	0.9%	0.1%	3.5%	11.3%	0.5%	1.3%*	100.0%
Shared Ride/Taxi	48.1%	21.7%	3.9%	0.8%*	0.3%*	5.7%	18.2%	0.0%*	1.4%*	100.0%
Walk/Non-Motorized	59.1%	16.3%	6.4%	0.4%	0.1%*	3.9%	12.0%	0.4%	1.6%	100.0%
All Modes	69.5%	12.7%	5.4%	0.3%	0.1%	3.0%	7.1%	0.5%	1.6%	100.0%

Note: Linked trip table, WHT_FAC3; PMODE_R by RACE (* not enough cases to support a useful observation)

4.4.4 Work and “Lifecycle” Status

Tables 4-36 through 4-40 explore RHTS results by work and “lifecycle” status. Table 4-36 shows the rates of weekday trip-making by general work or lifecycle status. The most active persons were Part Time workers (5.2), with Homemakers following (5.0 respectively).

Table 4-36: Person Trip Rates by Trip Purpose (Work/Non-Work) and Employment Status**

Status	Work Trip	Non-Work Trip	Total
Full-Time Employed	2.1	2.0	4.1
Part-Time Employed	1.1	4.1	5.2
Unemployed	0.1	4.1	4.2
Homemaker	0.1	5.0	5.0
Adult Student	0.1	3.7	3.7
Retired	0.0	3.7	3.7
School-Aged (5-17 years)	0.0	3.3	3.3
Under 5 years	0.0	2.6	2.7
Other	0.1	3.2	3.3
Overall	1.0	3.1	4.0

Note:

- PER table, HH_WHT2; PTRIPS_GPS_WP & NWP by LIFCYC (mean)

-* not enough cases to support a useful observation

-**Calculation of Mean Person Trip Rates excludes valid partial persons that did not provide travel data

Table 4-37 below displays the rates of weekday trip-making by general work or life cycle status amongst the principal travel modes. As stated previously, the most active persons are the Part-Time workers with a total of (5.2) trip rate, who also had the highest trip rate of Auto Driver (3.7) compared with all other lifecycle statuses. Adult Students and School-Aged Children made the most transit trips (0.8; NOTE: school bus trips are considered transit trips) while Adult Students made the least amount of Vehicle trips (2.0) of all adult travelers.

Table 4-37: Trip Rates by Travel Mode and Employment Status

Status	Person Trip Rates			
	Total	Vehicle	Transit Trips	Walk/Non-Motorized
Full-Time Employed	4.1	2.9	0.6	0.6
Part-Time Employed	5.2	3.7	0.6	0.9
Unemployed	4.2	2.5	0.5	1.2
Homemaker	5.0	3.5	0.3	1.2
Adult Student	3.7	2.0	0.8	0.9
Retired	3.7	2.7	0.3	0.7
School-Aged (5-17 years)	3.3	1.9	0.8	0.6
Under 5 years	2.7	1.8	0.2	0.6
Other	3.3	2.1	0.6	0.6
Overall	4.0	2.7	0.6	0.7

Note:

- PER table, HH_WHT2; PTRIPS_GPS_V, _T & _NM by LIFCYC (mean) (* not enough cases to support a useful observation)

- Calculation of Mean Person Trip Rates excludes valid partial persons that did not provide travel data

Table 4-38 displays the distribution of weekday trip-making by general work or life cycle status according to trip purpose in the overall Metro area.

Table 4-38: Distribution of Trips by Lifecycle Status and Trip Purpose

Trip Purpose	Lifecycle Status								
	Full-Time Employed	Part-Time Employed	Unemployed	Homemaker	Adult Student	Retired	School-Aged (5-17 years)	Under 5 years	Other
Home to Work	15.2%	6.9%	0.5%	0.2%*	0.5%*	0.2%	0.1%	0.2%*	0.6%*
Home to School	0.1%	1.4%	0.4%	0.3%*	12.6%	0.1%*	23.1%	10.0%	9.0%
Home to Social/Rec	4.4%	8.3%	7.9%	7.2%	9.1%	9.2%	8.9%	9.6%	8.9%
Home to Personal Business	3.3%	4.8%	10.6%	6.4%	4.6%	10.5%	2.1%	3.0%	8.1%
Home to Shopping	2.6%	4.0%	6.8%	5.9%	3.0%	7.8%	1.5%	2.5%	4.0%
Home to Serving Passengers	4.8%	5.7%	6.1%	11.3%	5.1%	3.6%	2.9%	8.1%	4.0%
Home to Other	1.4%	2.1%	2.4%	4.0%	2.3%	1.5%	1.3%	4.1%	1.6%
Work to Home	13.2%	5.9%	0.4%	0.2%*	0.3%*	0.2%	0.2%	0.1%*	0.7%*
School to Home	0.2%	1.1%	0.4%	0.3%*	12.2%	0.0%*	19.8%	8.9%	7.5%
Social/Rec to Home	5.5%	8.2%	8.4%	8.1%	9.1%	9.3%	10.5%	11.3%	9.2%
Personal Business to Home	3.3%	4.5%	8.2%	5.2%	3.7%	8.1%	2.5%	3.2%	5.4%
Shopping to Home	4.8%	6.8%	9.6%	8.6%	5.5%	10.8%	2.6%	4.5%	8.4%
Serving Passengers to Home	3.8%	4.9%	5.5%	9.4%	4.2%	2.8%	2.7%	5.9%	3.1%
Other to Home	0.5%	0.8%	1.2%	2.5%	0.7%*	0.4%	0.9%	2.3%	0.5%*
Work Related	4.8%	1.4%	0.2%*	0.3%*	0.1%*	0.0%*	0.0%*	0.1%*	0.8%*
Between Work and NW	17.4%	7.0%	0.8%	0.4%*	0.4%*	0.4%	0.2%	0.2%*	1.4%*
Other Non-Home/Non-Work	14.7%	26.1%	30.5%	29.9%	26.5%	35.0%	20.7%	26.0%	26.6%
Overall Metro Area	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Linked trip table, WHT_FAC3; ODTPURP1 by LIFCYC (* not enough cases to support a useful observation)

Table 4-39 shows how time of day of travel is associated with personal employment or life cycle status.

Table 4-39: Distribution of Trips by Lifecycle Status and Time of Departure

Time Period	Lifecycle Status								
	Full-Time Employed	Part-Time Employed	Unemployed	Homemaker	Adult Student	Retired	School-Aged (5-17 years)	Under 5 years	Other
AM Peak 6 a.m. – 10 a.m.	29.2%	21.0%	18.0%	22.9%	23.4%	16.3%	30.1%	30.4%	25.5%
Midday 10 a.m. – 4 p.m.	27.5%	45.6%	52.2%	53.8%	39.3%	62.1%	33.5%	40.2%	48.2%
PM Peak 4 p.m. – 8 p.m.	32.7%	24.2%	21.4%	18.1%	24.9%	17.5%	28.8%	25.8%	19.7%
Evening 8 p.m. – 12 a.m.	8.2%	8.0%	7.2%	4.8%	11.4%	3.5%	7.4%	3.3%	5.9%
Late Night 12 a.m. – 6 a.m.	2.4%	1.2%	1.3%	0.4%*	1.0%	0.5%	0.2%	0.3%*	0.7%*
Overall	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Linked trip table, WHT_FAC3; TOD_R by LIFCYC (not enough cases to support a useful observation)*

Table 4-40 below shows how the percentage of travel mode is associated with personal employment or life cycle status. Adult students used the Local Bus and the Subway for their trips more than any other group, while a high percent of trips were made by driving an auto by full- and part-time employed persons.

Table 4-40: Distribution of Trips by Lifecycle Status and Travel Mode

Travel Mode	Lifecycle Status								
	Full-Time Employed	Part-Time Employed	Unemployed	Homemaker	Adult Student	Retired	School-Aged (5-17 years)	Under 5 years	Other
School Bus	0.1%	0.3%*	0.2%*	0.0%*	2.2%	0.0%*	18.2%	3.1%	8.7%
Paratransit Service (Access-a-ride, Dial-a-ride, etc.)	0.0%*	0.1%	0.8%	0.2%*	0.0%*	0.7%	0.0%*	0.0%*	0.1%*
Black Car Service/Limo	0.2%	0.1%*	0.0%*	0.4%*	0.1%*	0.1%*	0.0%*	0.0%*	0.0%*
For-Hire Van/Jitney/Gypsy Cab	0.1%	0.1%*	0.3%*	0.0%*	0.0%*	0.1%*	0.0%*	0.0%*	0.0%*
Taxi (Yellow, Medallion Cab)	0.8%	0.5%	0.7%	1.0%	0.4%*	0.5%	0.1%	0.7%*	0.3%*
Railroad (LIRR, Metro North, NJ Transit, AMTRAK)	2.6%	0.6%	0.5%	0.1%*	1.5%	0.4%	0.1%*	0.1%*	0.7%*
Express Bus (Suburban, Commuter, Inter-city)	1.1%	0.5%	0.3%	0.0%*	0.2%*	0.3%	0.1%*	0.1%*	0.2%*
Roosevelt Island Tram	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*
Ferry (Staten Island, NY Waterway, Water Taxi, Seastreak)	0.2%	0.1%*	0.3%*	0.0%*	0.1%*	0.0%*	0.1%*	0.0%*	0.0%*
Light Rail/LRT (Newark, Hudson-Bergen, River line)	0.1%	0.1%*	0.1%*	0.0%*	0.1%*	0.0%*	0.0%*	0.1%*	0.2%*
PATH Train	0.4%	0.2%	0.2%	0.0%*	0.2%*	0.1%*	0.0%*	0.0%*	0.0%*
Subway (NYTCT, Staten Island Railway)	8.3%	5.4%	5.8%	3.5%	11.2%	2.4%	2.7%	2.1%	3.6%
Charter Bus (Employer-provided or Other Contracted)	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.1%*	0.2%	0.0%*	0.0%*
Shuttle Bus (Public or Employer-provided)	0.1%	0.1%*	0.2%*	0.2%*	0.0%*	0.2%	0.0%*	0.0%*	0.0%*
Local Bus (Regular, Standard, City)	2.4%	3.6%	4.6%	2.8%	6.7%	3.7%	3.3%	2.4%	4.1%
Carpool/Vanpool/Other Group Ride	0.3%	0.6%	0.1%*	0.2%*	0.6%*	0.3%	2.2%	1.7%	0.8%*
Auto (Car or Small Truck) Passenger	4.6%	6.6%	10.0%	8.2%	14.9%	11.9%	51.7%	65.9%	27.8%
Motorcycle/Moped/Motorized Scooter	0.3%	0.0%*	0.0%*	0.0%*	0.0%*	0.1%*	0.0%*	0.0%*	0.0%*
Auto (Car or Small Truck) Driver	64.7%	63.1%	46.2%	58.5%	38.8%	60.0%	2.9%	0.0%*	34.8%
Wheelchair/Mobility Scooter	0.0%*	0.1%*	0.1%*	0.0%*	0.0%*	0.2%	0.0%*	0.0%*	0.2%*
Skates/Skateboard/Kick Scooter/Segway	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.1%*	0.4%*	0.0%*
Bike	0.6%	0.6%	1.3%	0.7%*	0.7%*	0.4%	0.4%	0.2%*	1.5%*
Walk	12.9%	17.3%	28.1%	23.9%	22.0%	18.1%	17.6%	22.7%	16.8%
Air Plane	0.1%	0.0%*	0.0%*	0.0%*	0.2%*	0.0%*	0.0%*	0.0%*	0.0%*
Other (Specify)	0.2%	0.1%*	0.2%*	0.1%*	0.0%*	0.2%	0.0%*	0.3%*	0.1%*
Overall	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Linked trip table, WHT_FAC3; PMODE by LIFCYC (* not enough cases to support a useful observation)

4.4.5 Variations in Travel by Licensed Driver Status and Disability Status

Table 4-41 compares the mode shares for persons who hold a driver license, with those that do not. Persons with a license used automobiles for roughly 77% of their weekday trips. Walking (13.3 %) and Rail/Ferry (6.9%) were the next most frequently used methods for this group. For people without a driver license, walking was the most frequently selected travel mode group (43%), followed by relatively equal percentages for Auto (17.9%), Rail (18.2%) and Bus (17.1%).

Table 4-41: Distribution of Trips by Travel Mode Group and Licensed Driver Status

General Mode	Yes	No	Total
Auto	76.5%	17.9%	68.2%
Rail or Ferry	6.9%	18.2%	8.5%
Bus	2.5%	17.1%	4.6%
Shared Ride or Taxi	0.7%	3.5%	1.1%
Walk or Non-Motorized	13.3%	43.2%	17.5%
Other	0.0%	0.0%*	0.0%
Total	100.0%	100.0%	100.0%

Note: Linked trip table, WHT_FAC3; PMODE_R by LIC (not enough cases to support a useful observation)*

Overall, 5.3% of the persons represented in the RHTS report some form of disability; as listed in Table 4-42 below.

Table 4-42: Incidence of Disabilities within Survey Population

Disability	Total Population	Disabled Population
Visually Impaired or Blind	0.4%	8.2%
Hearing Impaired or Deaf	0.1%*	1.8%*
Cane or Walker	2.0%	37.0%
Wheelchair, Non-Transferable	0.2%	3.3%
Wheelchair, Transferable	0.3%	4.8%
Mentally or Emotionally Disabled	0.7%	12.9%
Other	1.6%	29.5%
Don't Know	0.1%	1.2%
Refused to Provide	0.1%	1.3%
Total: Any Disability	5.3%	100.0%
Without Disability*	94.7%	
All Person	100.0%	

Note: Linked trip table, WHT_FAC3; DTYPE1 (not enough cases to support a useful observation)*

Table 4-43 shows the pattern of travel mode usage of persons with disabilities. Auto Driver was the most commonly used travel mode amongst persons with disabilities (25.9% overall), with Walking, Auto Passenger, and Local Bus following in overall trips (24.3%, 21.7%, and 8.6% respectively). Visually Impaired or Blind persons used walking more than any other mode of travel (28%).

Table 4-43: Distribution of Trips for Persons with Disabilities by Type of Disability and Travel Mode

Travel Mode	Type of Disability – Disabled Only									Total
	Visually Impaired or Blind	Hearing Impaired or Deaf	Cane or Walker	Wheelchair, Non-Trans.	Wheelchair, Transferrable	Mentally or Emotionally Disabled	Other	Don't Know	Refused	
School Bus	0.7%*	2.7%*	0.0%*	0.4%*	0.4%*	11.7%	3.9%	0.6%*	0.6%*	3.2%
Paratransit Service (Access-a-ride, Dial-a-ride, etc.)	4.0%*	3.3%*	3.5%	3.1%*	10.6%*	2.5%	3.3%	0.0%*	2.2%*	3.5%
Black Car Service/Limo	0.7%*	0.0%*	0.0%*	0.0%*	0.7%*	0.0%*	0.1%*	0.0%*	0.6%*	0.1%
For-Hire Van/Jitney/Gypsy Cab	0.0%*	0.0%*	0.5%*	0.0%*	4.5%*	0.4%*	0.0%*	0.0%*	0.0%*	0.4%
Taxi (Yellow, Medallion Cab)	3.2%*	0.0%*	1.7%	0.0%*	2.5%*	0.9%*	2.2%	0.6%*	0.6%*	1.8%
Railroad (LIRR, Metro North, NJ Transit, AMTRAK)	0.4%*	0.0%*	0.4%*	0.0%*	0.0%*	0.3%*	0.4%*	0.0%*	0.0%*	0.4%
Express Bus (Suburban, Commuter, Inter-city)	0.8%*	0.0%*	0.9%*	4.9%*	0.0%*	0.1%*	0.1%*	0.3%*	0.0%*	0.5%
Roosevelt Island Tram	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	*0.0%
Ferry (Staten Island, NY Waterway, Water Taxi, Seastreak)	0.0%*	1.6%*	0.0%*	0.0%*	0.0%*	0.0%*	0.1%*	0.0%*	0.0%*	0.1%
Light Rail/LRT (Newark, Hudson-Bergen, River line)	0.3%*	0.0%*	0.1%*	0.0%*	0.0%*	0.0%*	0.2%*	0.0%*	0.0%*	0.1%
PATH Train	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%
Subway (NYTCT, Staten Island Railway)	8.7%	0.3%*	3.6%	0.0%*	0.0%*	2.2%*	5.9%	7.9%*	2.1%*	4.3%
Charter Bus (Employer-provided or Other Contracted)	0.0%*	0.0%*	0.1%*	0.0%*	0.9%*	0.1%*	0.1%*	0.3%*	0.0%*	0.1%
Shuttle Bus (Public or Employer-provided)	0.3%*	0.0%*	0.9%*	0.0%*	0.0%*	0.3%*	0.5%*	0.8%*	4.9%*	0.6%
Local Bus (Regular, Standard, City)	12.0%	1.4%*	9.6%	6.5%*	10.0%*	6.1%	7.5%	30.1%*	2.8%*	8.6%
Carpool/Vanpool/Other Group Ride	2.4%*	0.0%*	0.9%*	1.2%*	0.0%*	4.3%	0.6%*	0.0%*	0.0%*	1.4%
Auto (Car or Small Truck) Passenger	21.5%	41.1%*	16.6%	34.3%	15.5%	46.6%	13.3%	9.8%*	33.1%*	21.7%
Auto (Car or Small Truck) Driver	14.9%	4.2%*	33.1%	16.7%*	32.2%	7.4%	31.5%	9.0%*	36.9%	25.9%
Wheelchair/Mobility Scooter	0.3%*	0.0%*	0.3%*	4.5%*	8.4%*	0.0%*	0.6%*	0.0%*	0.0%*	0.7%
Skates/Skateboard/Kick Scooter/Segway	0.0%*	0.0%*	0.0%*	1.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%
Bike	0.0%*	0.0%*	1.7%*	0.0%*	1.2%*	0.0%*	2.8%*	0.0%*	0.0%*	1.5%
Walk	28.1%	45.4%*	25.3%	20.2%*	11.1%*	16.5%	26.3%	40.5%	16.3%*	24.3%
Air Plane	0.0%*	0.0%*	0.0%*	0.0%*	0.7%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%
Other (Specify)	1.6%*	0.0%*	0.7%*	7.2%*	1.3%*	0.4%*	0.6%*	0.0%*	0.0%*	0.8%
Overall	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Linked trip table, WHT_FAC3; PMODE by DTYPE1 (* not enough cases to support a useful observation)

4.5 Focus on Auto Vehicle Trips

In the following sections of the report, an in-depth profile of three main modal types of travel in the region is provided through series of comparable tables for:

- Auto vehicle trips (Section 4.5)
- Public Transit persons trips (Section 4.6)
- Walk and other non-Motorized trips (Section 4.7)

All tables and figures in these sections present summaries of travel for linked trips.

This sub-section focuses on the weekday travel made by residents of the region using private automobile. The following tables are for those trips which were reported in the RHTS as “Auto”. “Auto” is defined as driver and passenger, motorcycle, moped, and motorized scooter. This differs from the 1997/1998 survey results which only included auto drivers. Due to the probability of selection in the sampling process, this is the appropriate group of trips to study for a profile of all auto vehicle trips made by residents of the region.

4.5.1 Origin-Destination (O/D) Patterns

The general origin-destination pattern of travel for auto vehicle trips by county of trip origin (by County Group: Level 1) is shown in Table 4-44. Most auto trips were either within county or to an adjoining county; this travel pattern increased from 1997/1998 (91% vs. 86%). Across most origins, auto travel to Manhattan decreased as a percentage of overall trips.

Table 4-44: Distribution of Auto Trips by Origin-Destination (O/D) Market and County Group (Level 1) of Trip Origin (row %)

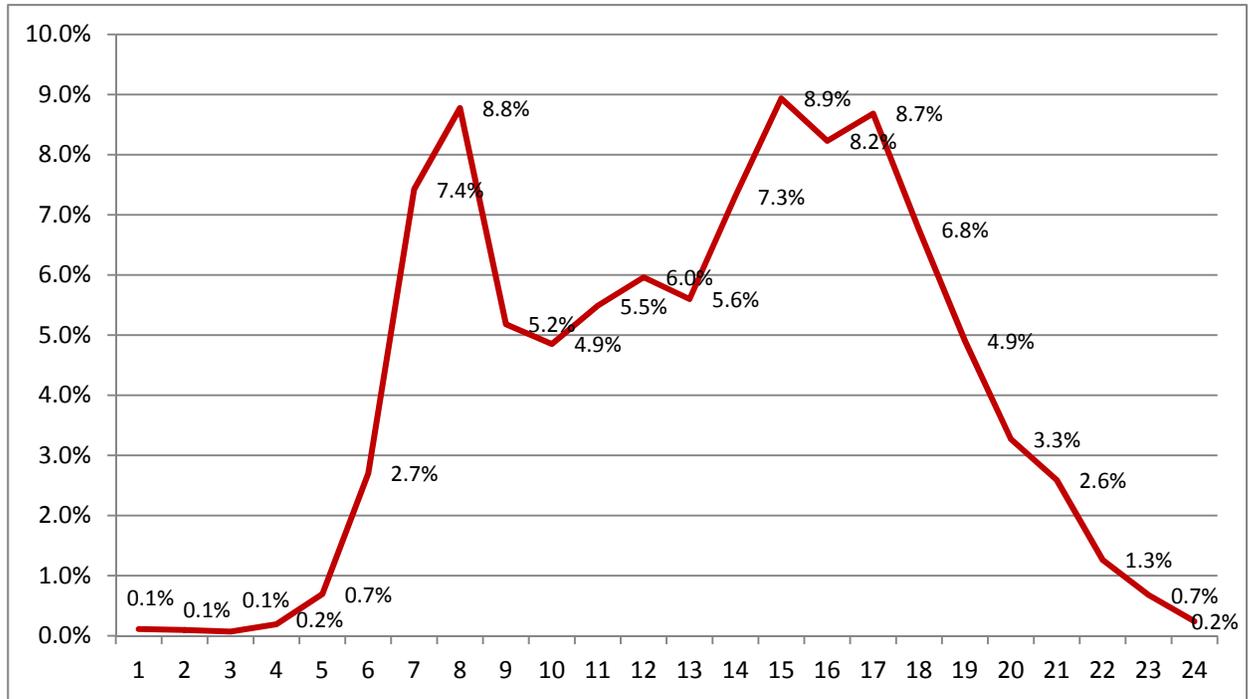
Trip Origin	Within County	To Adjoining County (Not NYC)	To Manhattan	To Other NYC	To Other NJTPA County	To Other NYMTC County	To Other County in Metro Area	Out of Metro Area
Manhattan	53.6%	-	-	26.7%	7.6%	10.5%	1.3%	0.3%*
Other NYC	80.3%	5.0%	3.7%	6.5%	1.7%	2.2%	0.2%	0.5%
Long Island	89.5%	5.2%	0.5%	4.4%	0.1%	0.2%	0.0%*	0.1%*
Mid-Hudson (NYMTC)	83.6%	8.5%	1.3%	4.0%	1.1%	0.6%	0.7%	0.2%*
Mid-Hudson (Other)	87.0%	6.0%	0.3%*	1.0%*	1.1%	1.7%	0.0%*	2.9%
Connecticut	91.9%	6.2%	0.1%*	0.1%*	0.2%*	0.1%*	0.0%*	1.4%
Bergen-Passaic	80.4%	14.7%	0.6%	0.7%	2.4%	0.4%	0.5%	0.3%
Essex-Hudson-Union	73.2%	16.6%	0.8%	0.9%	7.7%	0.5%	0.2%	0.1%*
Middlesex-Morris-Somerset	77.6%	17.3%	0.2%	0.7%	3.6%	0.2%	0.1%*	0.3%
Monmouth-Ocean	88.7%	7.7%	0.0%*	0.5%	1.9%	0.0%*	0.3%	0.9%
Hunterdon-Sussex-Warren	75.6%	14.5%	0.3%*	0.1%*	6.5%	0.1%*	0.1%*	2.8%
Mercer	85.8%	9.3%	0.3%*	0.0%*	2.0%	0.0%*	0.0%*	2.6%
Out of Metro Area	-	-	0.1%*	2.7%*	17.0%	1.8%	31.0%	47.5%
Total	82.3%	8.9%	0.9%	3.1%	2.3%	0.9%	0.5%	1.1%

Note: Linked trip table, WHT_FAC3; GEO_GROUP1_O by ADJ_COUNTY, PMODE_R2=1 (not enough cases to support a useful observation)*

4.5.2 Time of Day

The following Figure 4-11 and Table 4-45 display the distribution of auto vehicle weekday trips in the RHTS, by hour of departure.

Figure 4-11: Distribution of Auto Trips by Departure Hour



Note: Linked trip table, WHT_FAC3; TRP_DEP_HR, PMODE_R2 = 1

The time of day distribution of auto trips by general time period is shown below in Table 4-45. While there were some minor changes in the trip patterns from 1997/1998, the same general pattern of over 50% of work trips during the peak periods and most non-work trips during the midday still holds.

Table 4-45: Distribution of Auto Trips by Trip Purpose (Work/Non-Work), Time of Departure and Trip Origin

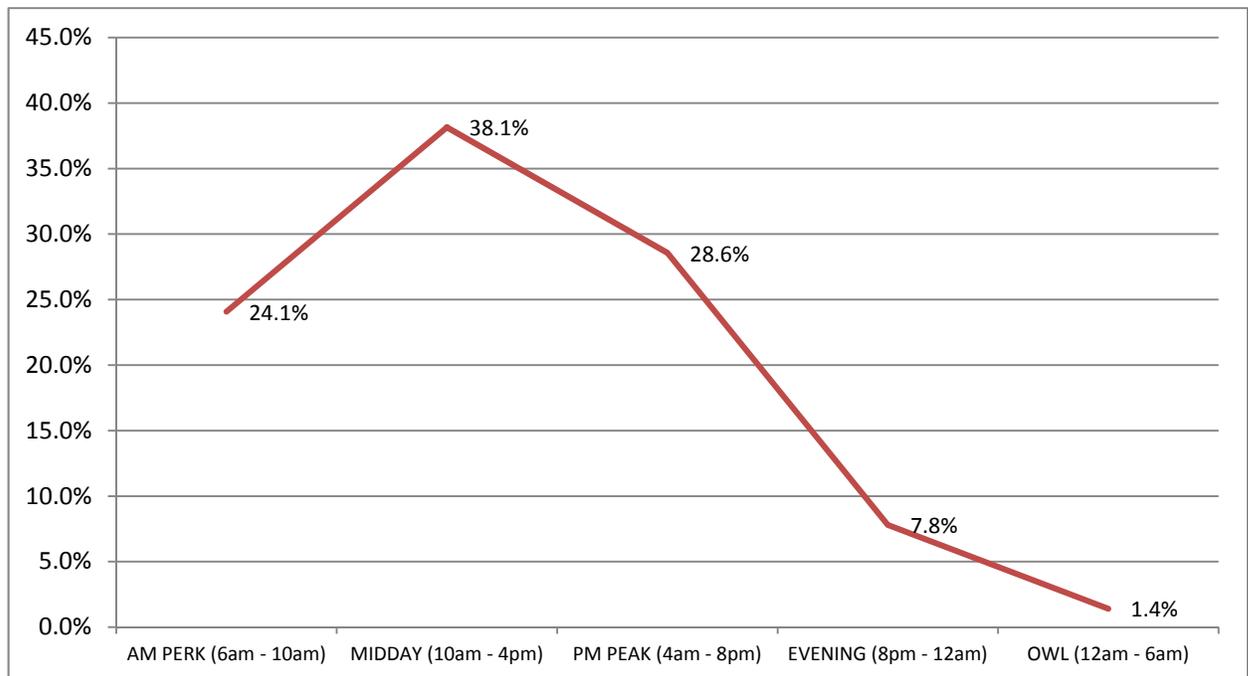
Trip Origin		Work Trips (Categories total to 100%)				Non-Work Trips (Categories total to 100%)			
		6-10 a.m.	10 a.m.-4 p.m.	4-8 p.m.	8 p.m.-6 a.m.	6-10 a.m.	10 a.m.-4 p.m.	4-8 p.m.	8 p.m.-6 a.m.
County	Fairfield	35.3%	29.6%	29.2%	5.8%	20.2%	39.1%	31.2%	9.6%
	New Haven	31.4%	39.3%	22.4%	6.9%	26.5%	38.2%	28.0%	7.3%
	Bergen	35.3%	32.0%	26.1%	6.6%	23.1%	39.9%	28.1%	8.9%
	Essex	33.3%	28.7%	31.7%	6.3%	20.1%	39.7%	32.0%	8.2%
	Hudson	32.7%	26.8%	28.1%	12.4%	18.4%	39.1%	30.3%	12.2%
	Hunterdon	37.7%	22.6%	36.4%	3.4%	16.4%	41.7%	35.2%	6.7%
	Mercer	37.8%	24.8%	32.3%	5.1%*	20.0%	38.6%	31.7%	9.7%
	Middlesex	35.5%	29.7%	26.7%	8.1%	20.9%	38.5%	29.1%	11.5%
	Monmouth	32.0%	36.2%	23.3%	8.4%	21.0%	44.9%	25.3%	8.8%
	Morris	32.6%	32.2%	29.6%	5.6%	18.4%	43.0%	29.4%	9.2%
	Ocean	34.9%	33.4%	21.9%	9.8%	21.3%	43.3%	27.9%	7.4%
	Passaic	33.0%	33.1%	27.9%	6.0%	19.0%	49.2%	23.6%	8.2%
	Somerset	35.1%	28.3%	30.5%	6.0%	18.1%	36.8%	34.9%	10.2%
	Sussex	43.3%	28.8%	15.8%	12.1%	21.6%	42.1%	27.2%	9.1%
	Union	39.3%	26.7%	27.2%	6.8%	22.4%	33.9%	35.3%	8.5%
	Warren	43.1%	27.5%	20.7%	8.8%	25.2%	43.0%	25.7%	6.1%
	Bronx	36.1%	24.2%	31.2%	8.4%	32.3%	34.4%	25.3%	8.0%
	Dutchess	39.2%	33.2%	23.2%	4.4%	17.3%	40.7%	32.2%	9.8%
	Brooklyn (Kings)	33.0%	37.2%	21.0%	8.9%	19.9%	37.9%	30.9%	11.3%
	Nassau	32.3%	33.1%	26.8%	7.8%	19.8%	41.8%	28.5%	9.9%
	Manhattan (New York)	21.3%	33.0%	31.4%	14.2%	18.1%	30.1%	27.1%	24.6%
	Orange	37.5%	33.2%	19.0%	10.3%	17.6%	40.3%	34.1%	8.0%
	Putnam	39.5%	32.3%	18.4%	9.9%*	22.1%	40.2%	32.9%	4.8%
	Queens	37.1%	31.7%	22.0%	9.2%	28.8%	35.3%	25.8%	10.1%
	Staten Island (Richmond)	37.4%	30.1%	22.6%	9.9%	23.2%	43.5%	25.8%	7.6%
	Rockland	35.0%	32.0%	25.1%	7.9%	18.8%	34.7%	34.1%	12.4%
Suffolk	36.4%	36.0%	20.7%	6.9%	17.7%	41.1%	31.9%	9.3%	
Westchester	33.5%	32.0%	28.3%	6.2%	20.9%	40.5%	28.8%	9.7%	
County Group (Level 1)	Manhattan	21.3%	33.0%	31.4%	14.2%	18.1%	30.1%	27.1%	24.6%
	Other NYC	35.7%	32.0%	23.3%	9.1%	26.0%	37.0%	27.2%	9.8%
	Long Island	34.4%	34.6%	23.7%	7.4%	18.7%	41.4%	30.4%	9.6%
	Mid-Hudson (NYMTC)	34.3%	32.0%	26.8%	6.9%	20.5%	39.1%	30.4%	10.0%
	Mid-Hudson (Other)	38.4%	33.2%	21.1%	7.4%	17.5%	40.5%	33.3%	8.7%
	Connecticut	33.3%	34.6%	25.7%	6.4%	23.0%	38.7%	29.8%	8.5%
	Bergen-Passaic	34.6%	32.3%	26.6%	6.4%	21.8%	42.8%	26.7%	8.7%
	Essex-Hudson-Union	35.2%	27.6%	29.3%	7.9%	20.7%	37.3%	33.0%	9.0%
	Middlesex-Morris-Somerset	34.4%	30.3%	28.5%	6.8%	19.5%	39.7%	30.3%	10.5%
	Monmouth-Ocean	33.3%	35.0%	22.7%	9.0%	21.1%	44.3%	26.4%	8.2%
	Hunterdon-Sussex-Warren	41.3%	26.4%	23.9%	8.4%	21.1%	42.2%	29.3%	7.4%
	Mercer	37.8%	24.8%	32.3%	5.1%*	20.0%	38.6%	31.7%	9.7%

Trip Origin		Work Trips (Categories total to 100%)				Non-Work Trips (Categories total to 100%)			
		6-10 a.m.	10 a.m.- 4 p.m.	4-8 p.m.	8 p.m.- 6 a.m.	6-10 a.m.	10 a.m.- 4 p.m.	4-8 p.m.	8 p.m.- 6 a.m.
Regional Boundaries (Level 2)	New York City	33.0%	32.1%	24.8%	10.0%	25.2%	36.3%	27.2%	11.4%
	Long Island	34.4%	34.6%	23.7%	7.4%	18.7%	41.4%	30.4%	9.6%
	Mid-Hudson (All)	35.6%	32.4%	24.9%	7.0%	19.6%	39.5%	31.3%	9.6%
	Connecticut Counties	33.3%	34.6%	25.7%	6.4%	23.0%	38.7%	29.8%	8.5%
	NJTPA Counties	34.8%	30.7%	27.0%	7.5%	20.8%	41.1%	29.0%	9.1%
	Mercer	37.8%	24.8%	32.3%	5.1%*	20.0%	38.6%	31.7%	9.7%
Political Boundaries (Level 3)	NYMTC Counties	33.7%	33.0%	24.8%	8.5%	21.5%	39.0%	29.1%	10.3%
	Other NY Counties	38.4%	33.2%	21.1%	7.4%	17.5%	40.5%	33.3%	8.7%
	Connecticut Counties	33.3%	34.6%	25.7%	6.4%	23.0%	38.7%	29.8%	8.5%
	NJTPA Counties	34.8%	30.7%	27.0%	7.5%	20.8%	41.1%	29.0%	9.1%
	Mercer	37.8%	24.8%	32.3%	5.1%*	20.0%	38.6%	31.7%	9.7%
	Out of metro Area	5.9%	48.2%	39.9%	6.0%	6.8%	49.0%	26.4%	17.8%
Overall		34.1%	32.3%	25.9%	7.7%	21.1%	39.9%	29.3%	9.7%

Note: Linked trip table, WHT_FAC3; OCOUNTY, GEO_GROUP1, 2 & 3_O by TOD_R1 by WORKTRIP, PMODE_R2=1 (* not enough cases to support a useful observation)

The distribution of auto trips by departure time period is displayed below, Figure 4-12. Auto trips peak during the midday period.

Figure 4-12: Distribution of Auto Trips by Time of Departure



Note: Linked trip table, WHT_FAC3; TOD_R, PMODE_R2=1

4.5.3 Purpose of Travel – Auto Trips

The distribution of auto vehicle work and non-work trips by county of origin is presented in Table 4-46. Manhattan showed the highest percentage of Auto work trips (37.1%), while Staten Island showed the highest percentage of Non-Work trips by Auto vehicle (82.3%).

**Table 4-46: Distribution of Auto Trips
by Trip Purpose (Work/Non-Work) and Trip Origin**

Trip Origin		Work Trips	Non-Work Trips
County	Fairfield	21.8%	78.2%
	New Haven	27.1%	72.9%
	Bergen	20.6%	79.4%
	Essex	25.2%	74.8%
	Hudson	31.2%	68.8%
	Hunterdon	25.2%	74.8%
	Mercer	26.5%	73.5%
	Middlesex	25.2%	74.8%
	Monmouth	19.0%	81.0%
	Morris	25.7%	74.3%
	Ocean	20.3%	79.7%
	Passaic	20.3%	79.7%
	Somerset	28.5%	71.5%
	Sussex	27.0%	73.0%
	Union	23.4%	76.6%
	Warren	17.9%	82.1%
	Bronx	25.2%	74.8%
	Dutchess	27.4%	72.6%
	Brooklyn (Kings)	25.0%	75.0%
	Nassau	20.9%	79.1%
	Manhattan (New York)	37.1%	62.9%
	Orange	21.2%	78.8%
	Putnam	19.7%	80.3%
	Queens	23.6%	76.4%
	Staten Island (Richmond)	17.7%	82.3%
	Rockland	20.8%	79.2%
Suffolk	17.9%	82.1%	
Westchester	22.3%	77.7%	
County Group (Level 1)	Manhattan	37.1%	62.9%
	Other NYC	23.5%	76.5%
	Long Island	19.3%	80.7%
	Mid-Hudson (NYMTC)	21.8%	78.2%
	Mid-Hudson (Other)	23.9%	76.1%
	Connecticut	24.2%	75.8%
	Bergen-Passaic	20.5%	79.5%
	Essex-Hudson-Union	25.7%	74.3%
	Middlesex-Morris-Somerset	26.0%	74.0%

Trip Origin		Work Trips	Non-Work Trips
	Monmouth-Ocean	19.6%	80.4%
	Hunterdon-Sussex-Warren	23.8%	76.2%
	Mercer	26.5%	73.5%
Regional Boundaries (Level 2)	New York City	25.2%	74.8%
	Long Island	19.3%	80.7%
	Mid-Hudson (All)	22.4%	77.6%
	Connecticut Counties	24.2%	75.8%
	NJTPA Counties	23.1%	76.9%
	Mercer	26.5%	73.5%
Political Boundaries (Level 3)	NYMTC Counties	22.1%	77.9%
	Other NY Counties	23.9%	76.1%
	Connecticut Counties	24.2%	75.8%
	NJTPA Counties	23.1%	76.9%
	Mercer	26.5%	73.5%
	Out of metro Area	24.8%	75.2%
Overall		22.9%	77.1%

Note: Linked trip table, WHT_FAC3; OCOUNTY, GEO_GROUP1, 2 & 3_O by WORKTRIP, PMODE_R2=1 (* not enough cases to support a useful observation)

4.5.4 Trip Length & Travel Time

Table 4-47 presents the median reported travel times and trip distances for auto vehicle trips, broken down by County Group of trip origin. Trips from urbanized counties such as NYC and Hudson County tended to be shorter in distance but longer in time due to congestion. Trips from rural counties (e.g., Hunterdon and Sussex counties) can be long, based on both distance and time.

Table 4-47: Median Travel Time and Trip Distance by Trip Origin (County) – Auto Trips

Trip Origin		Duration (minutes)	Distance (miles)
County	Fairfield	13	2.2
	New Haven	11	2.1
	Bergen	10	1.8
	Essex	13	1.8
	Hudson	15	1.7
	Hunterdon	15	3.4
	Mercer	12	2.5
	Middlesex	12	2.1
	Monmouth	12	2.5
	Morris	12	2.5
	Ocean	10	2.2
	Passaic	13	2.2
	Somerset	14	3.0
	Sussex	15	3.9
	Union	11	1.6
	Warren	10	2.2
	Bronx	15	1.6

Trip Origin		Duration (minutes)	Distance (miles)
	Dutchess	14	3.4
	Brooklyn (Kings)	16	1.5
	Nassau	10	1.7
	Manhattan (New York)	26	3.0
	Orange	12	2.5
	Putnam	13	3.2
	Queens	15	1.8
	Staten Island (Richmond)	15	1.7
	Rockland	10	2.0
	Suffolk	11	2.2
	Westchester	13	1.9
County Group (Level 1)	Manhattan	26	3.0
	Other NYC	15	1.7
	Long Island	11	1.9
	Mid-Hudson (NYMTC)	12	2.0
	Mid-Hudson (Other)	13	2.9
	Connecticut	12	2.2
	Bergen-Passaic	11	1.9
	Essex-Hudson-Union	14	1.7
	Middlesex-Morris-Somerset	12	2.4
	Monmouth-Ocean	11	2.4
	Hunterdon-Sussex-Warren	13	3.2
	Mercer	12	2.5
Regional Boundaries (Level 2)	New York City	15	1.8
	Long Island	11	1.9
	Mid-Hudson (All)	12	2.2
	Connecticut Counties	12	2.2
	NJTPA Counties	12	2.1
	Mercer	12	2.5
Political Boundaries (Level 3)	NYMTC Counties	15	1.9
	Other NY Counties	13	2.9
	Connecticut Counties	12	2.2
	NJTPA Counties	12	2.1
	Mercer	12	2.5
	Out of Metro Area	40	17.3
Overall		13	2.1

Note:

- Trip Distance computed as straight-line ("bird's flight") distance
- Linked trip table, WHI_FAC3; TRPDUR, TRIPDIST by DCOUNTY, GEO_GROUP1, 2 & 3_D (median), PMODE_R2=1 (* not enough cases to support a useful observation)

The trip length distribution for auto vehicle trips is displayed in Table 4-48, stratified by County Group. New York City counties had the highest percentage of auto trips traveling a distance of less than 1 mile (32.8 %). Over 60% of auto trips in the region were 3 miles or less.

Table 4-48: Distribution of Auto Trips by Trip Origin (Regional Boundaries (Level 2)) and Trip Distance (Ranges)

Trip Distance (miles)	Origin Location						
	New York City	Long Island	Mid-Hudson (all)	Connecticut	NJTPA Counties	Mercer Counties	Out of Metro Area
< 1 mile	32.8%	30.0%	27.2%	23.0%	27.5%	26.3%	11.6%
1-<3 miles	31.5%	33.5%	30.3%	39.4%	32.3%	29.4%	11.4%
3-<5 miles	11.7%	12.0%	14.1%	13.8%	13.5%	15.1%	5.1%
5-<10 miles	13.0%	12.2%	13.5%	12.9%	13.7%	18.2%	14.3%
10-<20 miles	7.2%	8.2%	9.0%	7.9%	8.2%	6.1%	18.1%
20+ miles	3.9%	4.0%	5.9%	3.0%	4.6%	4.8%	39.5%
Overall	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Linked trip table, WHT_FAC3; TRIPDIST_R1 by GEO_GROUP2_O, PMODE_R2=1 (* not enough cases to support a useful observation)

4.5.6 Vehicle Occupancy – Auto Vehicle Trips

In this section, measures of auto occupancy were estimated and reported for the region with the RHTS data.

Vehicle occupancy rates by County Group and by Work/non-Work trip type are found in Table 4-49. Overall vehicle occupancy was mostly unchanged from the 1997/1998 survey for work and non-work trips. There was very little variation across the region, with some minor higher occupancy rates for trips originating from out of the region’s core.

Table 4-49: Mean Vehicle Occupancy by Trip Purpose (Work/Non-Work) and County Group (Level 1) of Trip Origin – Auto Trips

Trip Origin	Trip Type		
	Work	Non-Work	Total
Manhattan	1.4	1.7	1.6
Other NYC	1.3	1.7	1.6
Long Island	1.1	1.6	1.5
Mid-Hudson (NYMTC)	1.2	1.6	1.5
Mid-Hudson (Other)	1.1	1.5	1.4
Connecticut	1.1	1.5	1.4
Bergen-Passaic	1.1	1.6	1.4
Essex-Hudson-Union	1.1	1.6	1.5
Middlesex-Morris-Somerset	1.1	1.6	1.4
Monmouth-Ocean	1.1	1.6	1.5
Hunterdon-Sussex-Warren	1.1	1.6	1.4
Mercer	1.1	1.6	1.5
Out of metro Area	1.2	1.8	1.6
Overall	1.1	1.6	1.5

Note: Linked trip table, WHT_FAC3_VOCC; TOTTR by WORKTRIP by GEO_GROUP1_O (mean), PMODE_R2=1

There were minor upticks in occupancy for peak and off-peak periods as compared to 1997/1998. There was little variation in auto occupancy rates shown in Table 4-50 between Peak and Off-peak travel.

Table 4-50: Mean Vehicle Occupancy by Trip Departure Period (Peak/Off-Peak) and Trip Origin (County Group-Level 1) – Auto Trips

Trip Origin	Peak/Off-Peak period*		
	Peak	Off-Peak	Total
Manhattan	1.5	1.6	1.5
Other NYC	1.6	1.6	1.6
Long Island	1.4	1.5	1.5
Mid-Hudson (NYMTC)	1.5	1.5	1.5
Mid-Hudson (Other)	1.4	1.4	1.4
Connecticut	1.4	1.4	1.4
Bergen-Passaic	1.4	1.5	1.4
Essex-Hudson-Union	1.4	1.5	1.5
Middlesex-Morris-Somerset	1.4	1.5	1.4
Monmouth-Ocean	1.4	1.5	1.5
Hunterdon-Sussex-Warren	1.5	1.4	1.4
Mercer	1.5	1.5	1.5
Out of metro Area	1.7	1.5	1.6
Overall	1.5	1.5	1.5

Note:

- *Linked trip table, WHT_FAC3_VOCC; TOTTR by TOD_PEAK by GEO_GROUP1_O (mean), PMODE_R2=1*
- *Peak is defined as 6 a.m. to 10 a.m. and 4 p.m. to 8 p.m., Off-Peak comprises all other hours (* not enough cases to support a useful observation)*

Table 4-51 shows the auto occupancy profile of regional weekday travel by trip origin (County Group-Level 1). New York City locations (Manhattan & Other NYC) had the least single occupancy (63.5% & 61.6%) and the highest 2-person occupancy (25.5% & 25.2 %) among all county groups. 3-person occupancy was fairly evenly distributed across the entire region, with a bit of uptick for New York City locations. Out of metro area presented a higher percentage of trips for 4+ person occupancy (almost twice the regional average), followed by Other NYC and Manhattan.

Table 4-51: Distribution of Auto Trips by Vehicle Occupancy and Trip Origin (County Group-Level 1)

Trip Origin	Vehicle Occupancy				Total
	Single Occupant	2-Person	3-Person	4+ Person	
Manhattan	63.5%	25.5%	7.3%	3.7%	100.0%
Other NYC	61.6%	25.2%	7.7%	5.6%	100.0%
Long Island	68.4%	21.4%	7.1%	3.1%	100.0%
Mid-Hudson (NYMTC)	67.6%	22.4%	6.6%	3.4%	100.0%
Mid-Hudson (Other)	72.2%	19.2%	6.0%	2.6%	100.0%
Connecticut	72.6%	18.8%	5.7%	2.9%	100.0%
Bergen-Passaic	69.5%	21.1%	6.4%	3.0%	100.0%
Essex-Hudson-Union	68.3%	21.9%	6.3%	3.5%	100.0%

Trip Origin	Vehicle Occupancy				
	Single Occupant	2-Person	3-Person	4+ Person	Total
Middlesex-Morris-Somerset	70.4%	20.6%	6.2%	2.8%	100.0%
Monmouth-Ocean	69.8%	21.1%	6.0%	3.0%	100.0%
Hunterdon-Sussex-Warren	69.9%	20.6%	6.9%	2.5%	100.0%
Mercer	69.4%	21.7%	5.9%	3.0%	100.0%
Out of metro Area	61.7%	24.5%	7.3%	6.4%	100.0%
Overall	68.2%	21.7%	6.6%	3.5%	100.0%

Note: Linked trip table, WHT_FAC3_VOCC; GEO_GROUP1_O by TOTTR_R, PMODE_R2=1 (* not enough cases to support a useful observation)

Occupancy rate based on trip purpose is displayed below in the Table 4-52. Work trips had the highest single occupancy vehicle (SOV) percentages, while school trips and, by definition, Serving Passengers (which included escorting children to school as well as university) tended to have the highest high occupancy vehicle (HOV) percentages.

Table 4-52: Distribution of Auto Trips by Vehicle Occupancy and Trip Purpose

Trip Purpose	Vehicle Occupancy				
	Single Occupant	2-Person	3-Person	4+ Person	Total
Home to Work	90.0%	8.6%	0.8%	0.5%	100.0%
Home to School	37.0%	30.3%	18.0%	14.7%	100.0%
Home to Social/Rec	50.1%	27.8%	12.9%	9.2%	100.0%
Home to Personal Business	66.6%	24.4%	6.6%	2.4%	100.0%
Home to Shopping	64.9%	25.4%	6.8%	2.8%	100.0%
Home to Serving Passengers	25.4%	42.3%	21.3%	11.0%	100.0%
Home to Other	47.1%	34.3%	13.6%	5.0%	100.0%
Work to Home	91.6%	6.9%	0.8%	0.7%	100.0%
School to Home	45.0%	25.8%	14.6%	14.6%	100.0%
Social/Rec to Home	47.6%	29.1%	13.4%	9.8%	100.0%
Personal Business to Home	64.7%	23.8%	7.7%	3.8%	100.0%
Shopping to Home	65.5%	23.1%	7.6%	3.8%	100.0%
Serving Passengers to Home	34.3%	36.1%	20.0%	9.6%	100.0%
Other to Home	30.9%	37.7%	20.0%	11.4%	100.0%
Work Related	87.9%	8.7%	1.6%	1.9%	100.0%
Between Work and NW	85.9%	10.4%	1.9%	1.8%	100.0%
Other Non-Home/Non-Work	48.2%	30.6%	12.5%	8.8%	100.0%
Overall Metro Area	58.6%	24.6%	10.1%	6.6%	100.0%

Note: Linked trip table, WHT_FAC3_VOCC; ODPURP1 by TOTTR_R, PMODE_R2=1 (* not enough cases to support a useful observation)

Table 4-53 shows the auto occupancy profile of regional weekday travel by departure time period. The single occupant trips continued to have a larger share across all time periods. Among the 2 or more, person occupancy trips, the PM and Evening presented a higher percentage (many of these trips were shopping and social/recreation trips which tend to have higher occupancies).

Table 4-53: Distribution of Auto Trips by Vehicle Occupancy and Departure Time Period

Time Period	Vehicle Occupancy				Total
	Single Occupant	2-Person	3-Person	4+ Person	
AM Peak 6 a.m. – 10 a.m.	71.4%	19.2%	6.5%	2.9%	100.0%
Midday 10 a.m. – 4 p.m.	70.9%	21.1%	5.3%	2.7%	100.0%
PM Peak 4 a.m. – 8 p.m.	63.2%	24.1%	8.1%	4.6%	100.0%
Evening 8 p.m. – 12 a.m.	58.2%	26.6%	9.2%	6.0%	100.0%
Late Night 12 a.m. – 6 a.m.	81.3%	12.7%	2.9%	3.0%	100.0%
Overall	68.2%	21.7%	6.6%	3.5%	100.0%

Note: Linked trip table, WHT_FAC3_VOCC; TOD_R by TOTTR_R, PMODE_R2=1 (not enough cases to support a useful observation)*

4.6 Public Transportation Trips

This sub-section focuses on the weekday travel in the RHTS using public transportation by any of the many specific modes of travel by transit that are available to residents of the New York metropolitan region – including all rail (railroad, commuter rail, PATH, subway, and LRT), ferry, and buses (local, express, charter, and school buses).

An in-depth profile of transit travel is provided through a series of tables comparable to those provided in the previous section (Section 4.5: Auto Vehicle Trips), and in the following section (Section 4.7: Walk and Other Non-Motorized). Additionally, the aspects of transit travel that are unique and important to describing travel by commuter rail, subway, ferries and express bus are examined here. The focus for this is on “mode of access” and “distribution mode” (or “mode egress”) for these “premium” transit modes, which include Commuter Rail, Light Rail/LRT, Ferries, and Express Bus.

4.6.1 Origin-Destination (O/D) Patterns

The general origin-destination pattern of travel for all transit trips is shown in Table 4-54, grouped by County Group Level 1 of trip origin. The transit travel patterns are similar to the 1997/1998 survey.

Table 4-54: Distribution of Transit Trips by Origin-Destination (O/D) Market and County Group (Level 1) of Trip Origin

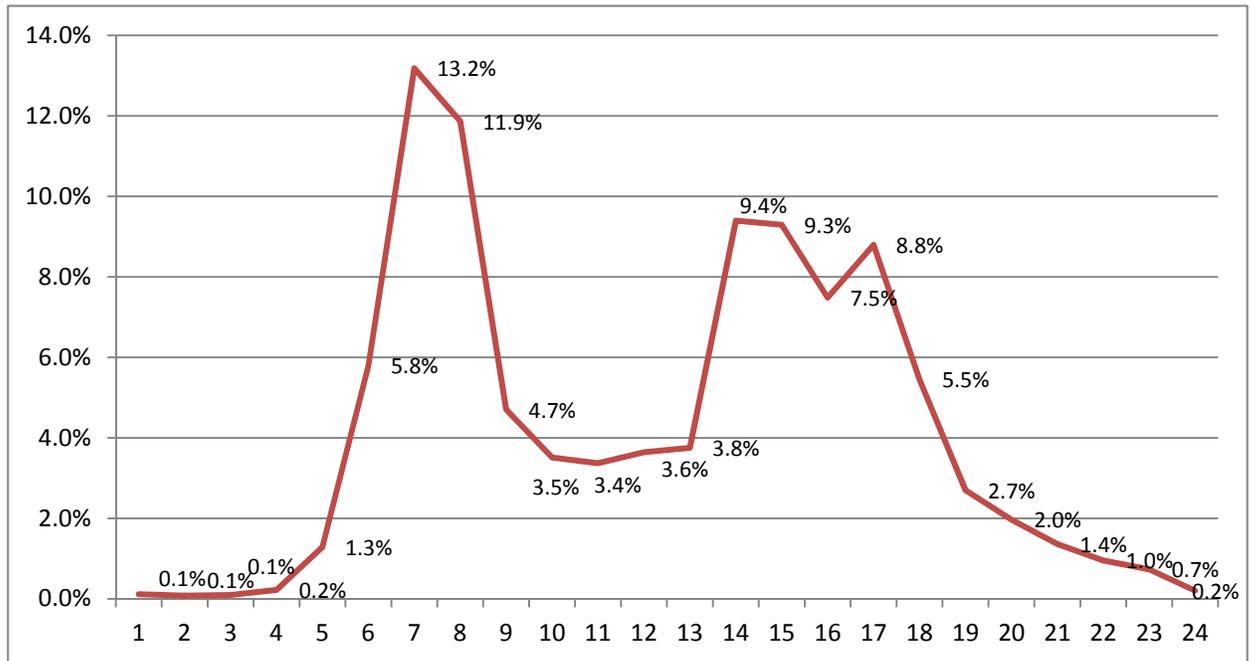
Trip Origin	Within County	To Adjoining County (not NYC)	To Manhattan	To Other NYC	To Other NJTPA County	To Other NYMTC County	To Other Metro County	Out of Metro Area
Manhattan	51.6%	-	-	33.7%	7.9%	5.5%	1.2%	0.1%*
Other New York City	60.1%	0.9%	28.7%	8.3%	1.0%	0.6%	0.3%*	0.0%*
Long Island	74.4%	0.9%*	17.1%	6.4%	1.0%*	0.0%*	0.0%*	0.1%*
Mid-Hudson (NYMTC)	68.1%	3.4%	19.5%	4.4%	1.0%*	0.0%*	3.0%*	0.8%*
Mid-Hudson (Other)	83.7%	0.1%*	5.5%	3.5%*	0.1%*	6.4%*	0.0%*	0.7%*
Connecticut	87.3%	2.2%*	7.6%	1.3%*	0.8%*	0.4%*	0.0%*	0.4%*
Bergen-Passaic	51.4%	15.8%	27.0%	4.2%*	0.3%*	0.8%*	0.0%*	0.5%*
Essex-Hudson-Union	60.1%	8.2%	21.6%	3.0%	5.5%	0.9%*	0.7%*	0.0%*
Middlesex-Morris-Somerset	78.4%	4.8%	11.6%	2.5%*	1.6%*	0.0%*	0.0%*	0.9%*
Monmouth-Ocean	84.9%	0.8%*	10.4%	0.3%*	3.4%*	0.0%*	0.1%*	0.1%*
Hunterdon-Sussex-Warren	91.2%	1.6%*	4.8%*	0.0%*	1.4%*	0.0%*	0.0%*	0.9%*
Mercer	79.1%	6.3%*	9.0%*	1.7%*	1.5%*	0.0%*	0.0%*	2.6%*
Out of Metro Area	0.0%*	0.0%*	0.8%*	3.3%*	24.4%*	4.5%*	16.0%*	58.0%*
Total	61.1%	1.7%	15.7%	14.8%	3.5%	2.2%	0.7%	0.3%

Note: Linked trip table, WHT_FAC3; GEO_GROUP1_O by ADJ_COUNTY, PMODE_R2=2 (* not enough cases to support a useful observation)

4.6.2 Time of Day

Figure 4-13 displays the diurnal distribution of weekday transit trips in the RHTS, by hour of departure. The distribution showed a similar pattern as the 1997/1998 survey, but with a slight spreading of the peak periods. For example, both the 7 a.m. and 8 a.m. hours in 1997/1998 had over 13% of the daily trips.

Figure 4-13: Distribution of Transit Trips by Departure Hour



Note: Linked trip table, WHT_FAC3; TRP_DEP_HR, PMODE_R2=2

The distribution of transit trips by departure time period in relation to work versus non-work trips is found in Table 4-55, broken down by county of trip origin. For work trips, travel during the peak periods was more pronounced than with autos (table 4-45). For non-work trips, more travel was completed during the AM and midday periods as compared to autos.

Table 4-55: Distribution of Transit Trips by Trip Purpose (Work/Non-Work), Time of Departure and Trip Origin

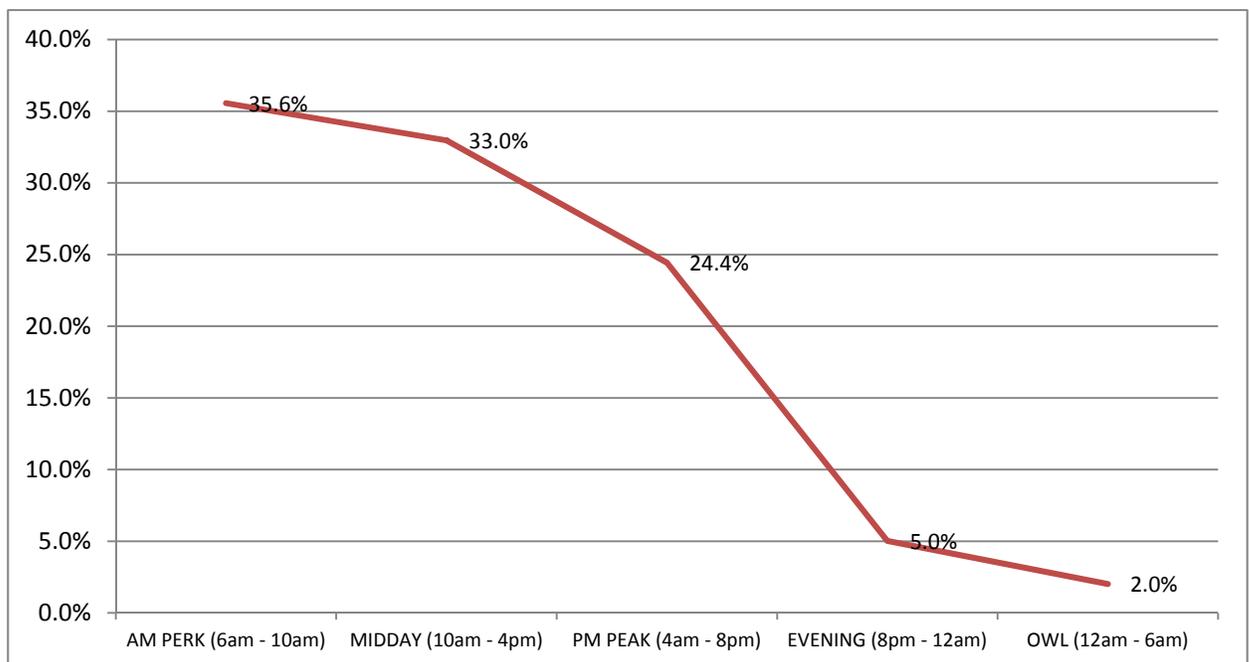
Trip Origin		Work Trips (Categories total to 100%)				Non-Work Trips (Categories total to 100%)			
		6-10 a.m.	10 a.m.- 4 p.m.	4-8 p.m.	8 p.m.- 6 a.m.	6-10 a.m.	10 a.m.- 4 p.m.	4-8 p.m.	8 p.m.- 6 a.m.
County	Fairfield	47.1%	9.3%*	20.8%*	22.8%*	52.7%	46.4%	0.8%*	0.1%*
	New Haven	61.7%*	16.9%*	10.7%*	10.7%*	40.9%	47.2%	9.1%*	2.8%*
	Bergen	68.4%	18.8%*	7.8%*	5.0%*	39.4%	44.8%	12.7%*	3.1%*
	Essex	47.8%	17.6%*	24.8%	9.8%*	37.9%	39.6%	18.2%	4.3%*
	Hudson	46.2%	17.5%	32.9%	3.4%*	31.5%	43.9%	19.0%	5.7%*
	Hunterdon	57.2%*	42.8%*	0.0%*	0.0%*	48.8%	49.8%	1.5%*	0.0%*
	Mercer	65.7%*	15.9%*	10.3%*	8.1%*	43.2%	46.9%	9.8%*	0.0%*
	Middlesex	60.1%	11.4%*	15.0%*	13.6%*	42.4%	49.8%	4.6%*	3.1%*
	Monmouth	66.8%	1.2%*	0.8%*	31.2%*	50.5%	47.5%	2.1%*	0.0%*
	Morris	77.5%	10.3%*	8.0%*	4.2%*	46.2%	47.2%	6.6%*	0.0%**
	Ocean	55.9%*	6.5%*	8.3%*	29.3%*	47.5%	43.8%	6.5%*	2.2%*
	Passaic	58.5%	13.4%*	26.0%*	2.1%*	35.1%	57.0%	6.8%*	1.1%*
	Somerset	68.3%*	0.0%*	26.8%*	4.8%*	53.0%	43.3%	1.6%*	2.1%*
	Sussex	71.4%*	0.0%*	0.0%*	28.6%*	48.3%	49.3%	1.8%*	0.6%*
	Union	79.4%	3.4%*	3.9%*	13.3%*	56.2%	35.5%	3.6%*	4.7%*
	Warren	44.2%*	0.0%*	0.0%*	55.8%*	42.2%	57.8%	0.0%*	0.0%*
	Bronx	51.7%	20.2%	20.7%	7.4%	33.7%	39.0%	18.7%	8.6%
	Dutchess	78.1%*	0.9%*	0.9%*	20.1%*	50.6%	47.3%	2.1%*	0.0%*
	Brooklyn (Kings)	51.1%	17.5%	22.5%	8.9%	33.6%	42.6%	18.8%	5.0%
	Nassau	71.0%	7.9%*	12.1%*	9.0%*	45.1%	41.2%	12.8%	0.8%*
	Manhattan (New York)	17.3%	18.9%	55.7%	8.1%	15.8%	38.6%	32.5%	13.1%
	Orange	43.6%*	7.8%*	8.1%*	40.6%*	52.8%	40.4%	6.3%*	0.6%*
	Putnam	86.7%*	3.7%*	0.0%*	9.7%*	46.6%	45.8%	4.7%*	2.9%*
	Queens	61.3%	13.7%	18.7%	6.3%	31.2%	45.8%	17.6%	5.4%
	Staten Island (Richmond)	56.8%	10.8%*	5.0%*	27.4%*	41.4%	49.2%	5.4%*	4.0%*
	Rockland	66.3%	23.4%*	7.2%*	3.1%*	48.6%	46.4%	4.9%*	0.1%*
Suffolk	58.8%	10.7%*	6.3%*	24.3%*	47.8%	50.1%	1.7%*	0.5%*	
Westchester	69.7%	9.0%*	17.0%	4.4%*	39.5%	48.4%	10.5%	1.7%*	
County Group (Level 1)	Manhattan	17.3%	18.9%	55.7%	8.1%	15.8%	38.6%	32.5%	13.1%
	Other NYC	54.9%	16.5%	20.3%	8.3%	33.2%	42.9%	17.9%	5.9%
	Long Island	67.9%	8.6%*	10.6%*	12.9%	46.7%	46.4%	6.3%	0.6%*
	Mid-Hudson (NYMTC)	69.6%	10.8%*	15.3%	4.3%*	42.7%	47.6%	8.3%	1.4%*
	Mid-Hudson (Other)	60.7%*	4.3%*	4.5%*	30.4%*	52.0%	43.1%	4.6%*	0.3%*
	Connecticut	53.2%	12.5%*	16.6%	17.7%*	45.7%	46.9%	5.7%*	1.7%*
	Bergen-Passaic	66.1%	17.5%	12.1%*	4.3%*	38.0%	48.8%	10.8%	2.4%*
	Essex-Hudson-Union	50.5%	15.9%	27.2%	6.4%	39.4%	40.2%	15.6%	4.8%

Trip Origin		Work Trips (Categories total to 100%)				Non-Work Trips (Categories total to 100%)			
		6-10 a.m.	10 a.m.- 4 p.m.	4-8 p.m.	8 p.m.- 6 a.m.	6-10 a.m.	10 a.m.- 4 p.m.	4-8 p.m.	8 p.m.- 6 a.m.
	Middlesex-Morris-Somerset	63.7%	9.7%*	15.5%*	11.1%*	45.5%	47.9%	4.5%*	2.2%*
	Monmouth-Ocean	64.8%	2.2%*	2.1%*	30.8%*	49.0%	45.7%	4.3%	1.1%*
	Hunterdon-Sussex-Warren	56.7%*	16.9%*	0.0%*	26.5%*	47.2%	51.2%	1.3%*	0.3%*
	Mercer	65.7%*	15.9%*	10.3%*	8.1%*	43.2%	46.9%	9.8%*	0.0%*
Regional Boundaries (Level 2)	New York City	34.2%	17.9%	39.7%	8.2%	26.7%	41.3%	23.4%	8.6%
	Long Island	67.9%	8.6%	10.6%	12.9%	46.7%	46.4%	6.3%	0.6%*
	Mid-Hudson (All)	68.2%	9.8%	13.6%	8.4%	45.7%	46.1%	7.1%	1.0%*
	Connecticut Counties	53.2%	12.5%*	16.6%*	17.7%*	45.7%	46.9%	5.7%*	1.7%*
	NJTPA Counties	56.2%	14.3%	20.8%	8.7%	43.1%	45.0%	9.1%	2.8%
	Mercer	65.7%*	15.9%*	10.3%*	8.1%*	43.2%	46.9%	9.8%*	0.0%*
Political Boundaries (Level 3)	NYMTC Counties	36.6%	17.3%	37.9%	8.3%	29.9%	42.2%	20.6%	7.3%
	Other NY Counties	60.7%*	4.3%*	4.5%*	30.4%*	52.0%	43.1%	4.6%*	0.3%*
	Connecticut Counties	53.2%	12.5%	16.6%	17.7%	45.7%	46.9%	5.7%*	1.7%*
	NJTPA Counties	56.2%	14.3%	20.8%	8.7%	43.1%	45.0%	9.1%	2.8%
	Mercer	65.7%*	15.9%*	10.3%*	8.1%*	43.2%	46.9%	9.8%*	0.0%*
	Out of Metro Area	12.3%*	14.1%*	54.6%*	19.0%*	1.3%*	47.7%*	46.2%*	4.8%*
Overall		39.2%	16.8%	35.4%	8.6%	33.3%	43.0%	17.7%	6.1%

Note: Linked trip table, WHT_FAC3; OCOUNTY, GEO_GROUP1, 2 & 3_O by TOD_R1 by WORKTRIP, PMODE_R2=2; (* not enough cases to support a useful observation)

Figure 4-14 displays the distribution of transit trips general departure time period. While auto trips peaked during the midday period, transit trips peaked during the morning peak period. The 1997/1998 survey presents a similar pattern of transit trips.

Figure 4-14: Distribution of Transit Trips by Time of Departure



Note: Linked trip table, WHT_FAC3; TOD_R, PMODE_R2=2

4.6.3 Purpose of Travel – Transit Trips

The distribution of work versus non work transit trips is presented in Table 4-56 below. The 1997/1998 survey showed similar patterns. Please note that the work trips made by school bus included trips made by working high school teenagers.

Table 4-56: Distribution of Trips by Public Transportation: Travel Mode and Trip Purpose (Work/Non-Work)

Mode	Trip Type		
	Work	Non-Work	Total
School Bus	0.6% *	32.7%	20.4%
Railroad (LIRR, Metro North, NJ Transit, AMTRAK)	17.2%	3.5%	8.8%
Express Bus (Suburban, Commuter, Inter-city)	7.2%	1.9%	4.0%
Roosevelt Island Tram	0.1%*	0.0%*	0.1%
Ferry (Staten Island, NY Waterway, Water Taxi, Seastreak)	1.2%	0.7%	0.9%
Light Rail/LRT (Newark, Hudson-Bergen, River line)	0.7%	0.4%	0.5%
PATH Train	2.8%	0.9%	1.6%
Subway (NYCT, Staten Island Railway)	53.9%	32.1%	40.4%
Charter Bus (Employer-provided or Other Contracted)	0.2%*	0.6%	0.4%
Shuttle Bus (Public or Employer-provided)	0.9%	0.8%	0.8%
Local Bus (Regular, Standard, City)	15.2%	26.5%	22.2%
Overall	100.0%	100.0%	100.0%

Note: Linked trip table, WHT_FAC3; PMODE by WORKTRIP, PMODE_R2=2; (not enough cases to support a useful observation) *includes trips made by working high school teenagers*

The distribution of transit trips in relation to work versus non work trips by county of trip origin is found in Table 4-57. Many counties showed a high percentage of non-work transit trips; however, many of these (especially in rural counties) were school bus trips, which are considered transit trips.

Table 4-57: Distribution of Transit Trips by Trip Purpose (Work/Non-Work) and Trip Origin

Trip Origin		Work Trips	Non-Work Trips
County	Fairfield	23.3%	76.7%
	New Haven	13.1%	86.9%
	Bergen	40.8%	59.2%
	Essex	31.5%	68.5%
	Hudson	56.1%	43.9%
	Hunterdon	6.1%*	93.9%
	Mercer	18.8%	81.2%
	Middlesex	21.8%	78.2%
	Monmouth	22.5%	77.5%
	Morris	11.5%	88.5%
	Ocean	6.1%*	93.9%
	Passaic	30.3%	69.7%

Trip Origin		Work Trips	Non-Work Trips
	Somerset	11.8%	88.2%
	Sussex	3.9%*	96.1%
	Union	29.3%	70.7%
	Warren	9.0%*	91.0%
	Bronx	31.4%	68.6%
	Dutchess	13.8%	86.2%
	Brooklyn (Kings)	36.3%	63.7%
	Nassau	31.0%	69.0%
	Manhattan (New York)	53.6%	46.4%
	Orange	9.3%	90.7%
	Putnam	6.4%	93.6%
	Queens	40.5%	59.5%
	Staten Island (Richmond)	33.0%	67.0%
	Rockland	13.5%	86.5%
	Suffolk	9.6%	90.4%
	Westchester	30.6%	69.4%
County Group (Level 1)	Manhattan	53.6%	46.4%
	Other NYC	36.4%	63.6%
	Long Island	19.9%	80.1%
	Mid-Hudson (NYMTC)	24.5%	75.5%
	Mid-Hudson (Other)	11.1%	88.9%
	Connecticut	17.6%	82.4%
	Bergen-Passaic	37.7%	62.3%
	Essex-Hudson-Union	42.0%	58.0%
	Middlesex-Morris-Somerset	17.6%	82.4%
	Monmouth-Ocean	15.2%	84.8%
	Hunterdon-Sussex-Warren	5.8%	94.2%
Mercer	18.8%	81.2%	
Regional Boundaries (Level 2)	New York City	44.2%	55.8%
	Long Island	19.9%	80.1%
	Mid-Hudson (All)	20.6%	79.4%
	Connecticut Counties	17.6%	82.4%
	NJTPA Counties	30.2%	69.8%
	Mercer	18.8%	81.2%
Political Boundaries (Level 3)	NYMTC Counties	41.3%	58.7%
	Other NY Counties	11.1%	88.9%
	Connecticut Counties	17.6%	82.4%
	NJTPA Counties	30.2%	69.8%
	Mercer	18.8%	81.2%
	Out of metro Area	17.9%	82.1%
Overall		38.2%	61.8%

Note: Linked trip table, WHT_FAC3; OCOUNTY, GEO_GROUP1, 2 & 3_O by WORKTRIP, PMODE_R2=2 (* not enough cases to support a useful observation)

4.6.4 Trip Length

In Table 4-58, the average reported travel times and trip distance for all trips made by transit is displayed by County of trip origin. Trip durations were much higher for transit trips than with auto trips. Many transit trips are associated with accessing the transit facility, changing modes and wait times, which increase the durations when examining trips as linked trips that cover multiple modes and may include stops. Tables 4-58 to 4-61 show travel times based on linked trips. The mix of local activity at intermediate versus express service would also impact the experience between trip duration and trip distance.

Table 4-58: Travel Time and Distance by County of Trip Origin – Transit Trips

Trip Origin		Duration (minutes)	Distance (miles)	
County	Fairfield	32	2.8	
	New Haven	30	2.1	
	Bergen	58	6.9	
	Essex	45	3.1	
	Hudson	51	3.4	
	Hunterdon	25	2.5	
	Mercer	30	2.7	
	Middlesex	30	2.3	
	Monmouth	26	3.4	
	Morris	25	2.2	
	Ocean	25	2.3	
	Passaic	35	3.0	
	Somerset	27	3.3	
	Sussex	25	2.3	
	Union	41	3.0	
	Warren	28	2.2	
	Bronx	51	3.5	
	Dutchess	29	2.7	
	Brooklyn (Kings)	47	4.0	
	Nassau	35	2.7	
	Manhattan (New York)	50	4.7	
	Orange	20	1.3	
	Putnam	30	2.3	
	Queens	55	5.1	
	Staten Island (Richmond)	60	4.9	
	Rockland	20	2.1	
	Suffolk	25	1.6	
	Westchester	51	4.3	
	County Group (Level 1)	Manhattan	50	4.7
		Other NYC	50	4.2
Long Island		27	1.8	
Mid-Hudson (NYMTC)		30	2.8	
Mid-Hudson (Other)		25	2.0	
Connecticut		30	2.3	

Trip Origin		Duration (minutes)	Distance (miles)
	Bergen-Passaic	50	6.1
	Essex-Hudson-Union	47	3.3
	Middlesex-Morris-Somerset	29	2.5
	Monmouth-Ocean	25	2.6
	Hunterdon-Sussex-Warren	25	2.4
	Mercer	30	2.7
Regional Boundaries (Level 2)	New York City	50	4.3
	Long Island	27	1.8
	Mid-Hudson (All)	30	2.5
	Connecticut Counties	30	2.3
	NJTPA Counties	36	3.1
	Mercer	30	2.7
Political Boundaries (Level 3)	NYMTC Counties	49	4.1
	Other NY Counties	25	2.0
	Connecticut Counties	30	2.3
	NJTPA Counties	36	3.1
	Mercer	30	2.7
	Out of Metro Area	75	6.5
Overall		45	3.8

Note:

- Trip Distance computed as straight-line ("bird's flight") distance
- Linked trip table, WHT_FAC3; TRPDIST & TRIPDUR by OCOUNTY, GEO_GROUP1, 2 & 3_O (median), PMODE_R2=2 (* not enough cases to support a useful observation)

Table 4-59 displays the average reported travel times, trip distance and estimated speed for all trips made by transit. The two slowest modes were Roosevelt Island Tram, with a median of 2.8 mph per trip and Local Bus with a median of 3.0 mph per trip, though these were also the modes by which the shortest trips were taken. Trips made by Railroad (24.4) and Charter Bus (31.6) averaged the longest distance as compared with other travel modes. For example, the travel times for railroad will include access time, wait time, egress time and other sub mode times.

Table 4-59: Median Travel Time and Trip Distance by Travel Mode – Transit Trip

Mode of Travel	Reported Travel Time (min)	Trip Distance (mi)	System Speed (mph)**
School Bus	23	1.6	4.2
Railroad (LIRR, Metro North, NJ Transit, AMTRAK)	90	24.4	16.3
Express Bus (Suburban, Commuter, Inter-city)	83	12.5	9.0
Roosevelt Island Tram	30*	1.4*	2.8*
Ferry (Staten Island, NY Waterway, Water Taxi, Seastreak)	87	10.7	7.4
Light Rail/LRT (Newark, Hudson-Bergen, River line)	56	4.1	4.4
PATH Train	60	4.9	4.9
Subway (NYTCT, Staten Island Railway)	50	5.3	6.4
Charter Bus (Employer-provided or Other Contracted)	75	31.6	25.3
Shuttle Bus (Public or Employer-provided)	35	2.8	4.8
Local Bus (Regular, Standard, City)	43	2.2	3.0
Overall	45	3.8	5.1

Notes:

- Trip Distance computed as straight-line (“bird’s flight”) distance,
- Linked trip table, WHT_FAC3; TRIPDUR & TRPDIST by PMODE (median), PMODE_R2=2 (*Not enough cases to support a useful observation)

**Computed as median trip distance divided by median travel time, then divided by 60 min/hr. Median – rather than mean- travel times and trip distances were used because travel times and trip distances do not fall on a normal distribution due to some extremes. It is customary to use the median whenever data is not symmetrical. System speeds represent straight line distances so they differ from actual experienced travel speeds (e.g., on buses, roads, etc.).

Transit trip distance calculated as straight line, or “bird’s flight” distance, is explored by origin location in Table 4-60. Many of the short distance trips included school bus trips. The longer trips such as from the NJTPA planning area are commuter rail and express bus trips.

Table 4-60: Distribution of Transit Trips by Trip Distance (Range) and Trip Origin (Regional Boundaries-Level 2)

Trip Distance (miles)	Origin Location						Total
	New York City	Long Island	Mid-Hudson (all)	Connecticut	NJTPA Counties	Mercer County	
< 1 mile	7.4%	20.0%	18.8%	18.7%	11.7%	13.3%*	9.8%
1-<3 miles	28.1%	38.4%	36.3%	44.7%	36.9%	40.1%	31.0%
3-<5 miles	19.1%	8.7%	10.3%	12.2%	14.7%	21.8%*	17.0%
5-<10 miles	25.4%	6.4%	8.3%	5.2%*	13.5%	7.3%*	20.8%
10-<20 miles	15.1%	9.3%	7.5%	4.0%*	9.9%	1.7%*	13.1%
20+ miles	5.0%	17.2%	18.8%	15.2%	13.3%	15.8%	8.2%
Overall	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note:

-Trip Distance computed as straight-line (“bird’s flight”) distance

-Linked trip table, WHT_FAC3; TRPDIST_R1 by GEO_GROUP2_O, PMODE_R2=2 (* not enough cases to support a useful observation)

As shown in Table 4-61, Long Island has the highest amount of trips under 20 minutes in duration (25.6%). Transit trips originating in New York City were most likely to be longer than those in other county groups, with 45.0 % of transit travel originating in New York City taking 45 to 90 minutes, while the next closest in this time frame were counties within the NJTPA planning area, with 27.3 % taking as long.

Table 4-61: Distribution of Transit Trips by Trip Travel Time (Ranges) and Trip Origin (Regional Boundaries-Level 2)

Travel Time (minutes)	Origin Location						Total
	New York City	Long Island	Mid-Hudson (all)	Connecticut	NJTPA Counties	Mercer County	
< 10 minutes	1.1%	5.3%	6.0%	5.6%	4.0%	0.9%*	2.2%
10-<20 minutes	5.0%	25.6%	21.4%	19.3%	14.3%	19.7%	9.1%
20-<45 minutes	34.5%	36.0%	35.7%	43.7%	38.3%	52.3%	35.6%
45-<90 minutes	45.0%	18.3%	22.8%	18.9%	27.3%	10.7%*	38.5%
90+ minutes	14.3%	14.8%	14.1%	12.6%	16.1%	16.5%	14.6%
Overall	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Linked trip table, WHT_FAC3; TRPDUR_R by GEO_GROUP2_O, PMODE_R2=2 (* not enough cases to support a useful observation)

For purposes of comparability with the 1997/1998 survey, “Premium Transit Modes” have been defined as including Commuter Rail, Light Rail/LRT, Ferries, and Express Bus. As noted in the 1997/1998 RT-HIS General Report, Subway as a fixed route rapid transit system, is classified as a “premium” transit system for the NYBPM. However, since subway is frequently used as an access mode for other premium transit modes (such as commuter rail, ferry or express bus), it is excluded from being defined as a “Premium Transit Mode” for tables 4-62 and 4-63.

People in highly urbanized areas (e.g., NYC and Essex-Hudson-Union) tended to access premium transit by walking. In the suburban areas they tended to drive to access transit.

Table 4-62: Distribution of Transit Trips by Access Mode to Premium Transit Modes (w/o Subway) and Trip Origin (County Group-Level 1)

Trip Origin	Access Mode				Total
	Drive	Auto-Passenger	Local Bus	Walk (or other)	
Manhattan	0.2%*	0.9%	0.1%*	98.7%	100.0%
Other NYC	13.7%	4.6%*	0.4%*	81.3%	100.0%
Long Island	51.7%	11.6%	0.0%*	36.7%	100.0%
Mid-Hudson (NYMTC)	32.2%	19.3%	0.9%*	47.7%	100.0%
Mid-Hudson (Other)	56.5%	35.4%*	0.0%*	8.1%*	100.0%
Connecticut	41.9%	20.2%*	0.0%*	37.9%	100.0%
Bergen-Passaic	30.4%	14.7%*	0.7%*	54.2%	100.0%
Essex-Hudson-Union	10.5%	7.1%	0.1%*	82.3%	100.0%
Middlesex-Morris-Somerset	49.0%	14.7%	1.4%*	34.9%	100.0%
Monmouth-Ocean	83.3%	3.9%*	0.0%*	12.8%*	100.0%
Hunterdon-Sussex-Warren	64.9%*	35.1%*	0.0%*	0.0%*	100.0%
Mercer	44.2%*	16.0%*	0.7%*	39.1%*	100.0%
Out of metro Area	13.4%*	0.0%*	0.0%*	86.6%*	100.0%
Total	19.2%	7.4%	0.3%*	73.1%	100.0%

Note: Linked trip table, WHT_FAC3; GEO_GROUP1_O by PAMODE (* not enough cases to support a useful observation)

Table 4-63 shows the mode of access at trip origin for the destination county or trip end of a transit trip. Premium transit trips ending in Essex-Hudson-Union were likely to be accessed by walking (or other modes) (82.4%), while premium transit trips ending in Hunterdon-Sussex-Warren counties (100%) or Monmouth and Ocean counties (98.4%) were likely to be accessed by driving.

Table 4-63: Distribution of Transit Trips by Access Mode to Premium Transit Modes (w/o Subway) and Trip Destination (County Group-Level 1)

Trip Destination	Access Mode				Total
	Drive	Auto-Passenger	Local Bus	Walk (or other)	
Manhattan	40.0%	11.0%	0.1%*	48.9%	100.0%
Other NYC	5.8%	10.0%*	0.1%*	84.1%	100.0%
Long Island	1.6%*	3.0%*	0.0%*	95.3%	100.0%
Mid-Hudson (NYMTC)	8.1%*	1.8%*	0.0%*	90.1%	100.0%
Mid-Hudson (Other)	0.0%*	13.6%*	0.0%*	86.4%	100.0%
Connecticut	13.3%*	6.9%*	0.0%*	79.8%	100.0%
Bergen-Passaic	0.2%*	1.0%*	0.0%*	98.9%	100.0%
Essex-Hudson-Union	11.7%	4.5%*	1.4%*	82.4%	100.0%
Middlesex-Morris-Somerset	1.2%*	1.3%*	1.5%*	96.0%	100.0%
Monmouth-Ocean	0.0%*	1.6%*	0.0%*	98.4%	100.0%
Hunterdon-Sussex-Warren	0.0%*	0.0%*	0.0%*	100.0%	100.0%
Mercer	2.0%*	8.2%*	0.0%*	89.8%	100.0%
Out of metro Area	36.0%*	6.3%*	0.0%*	57.7%	100.0%
Total	19.2%	7.4%	0.3%*	73.1%	100.0%

Note: Linked trip table, WHT_FAC3; GEO_GROUP1_D by PAMODE (* not enough cases to support a useful observation)

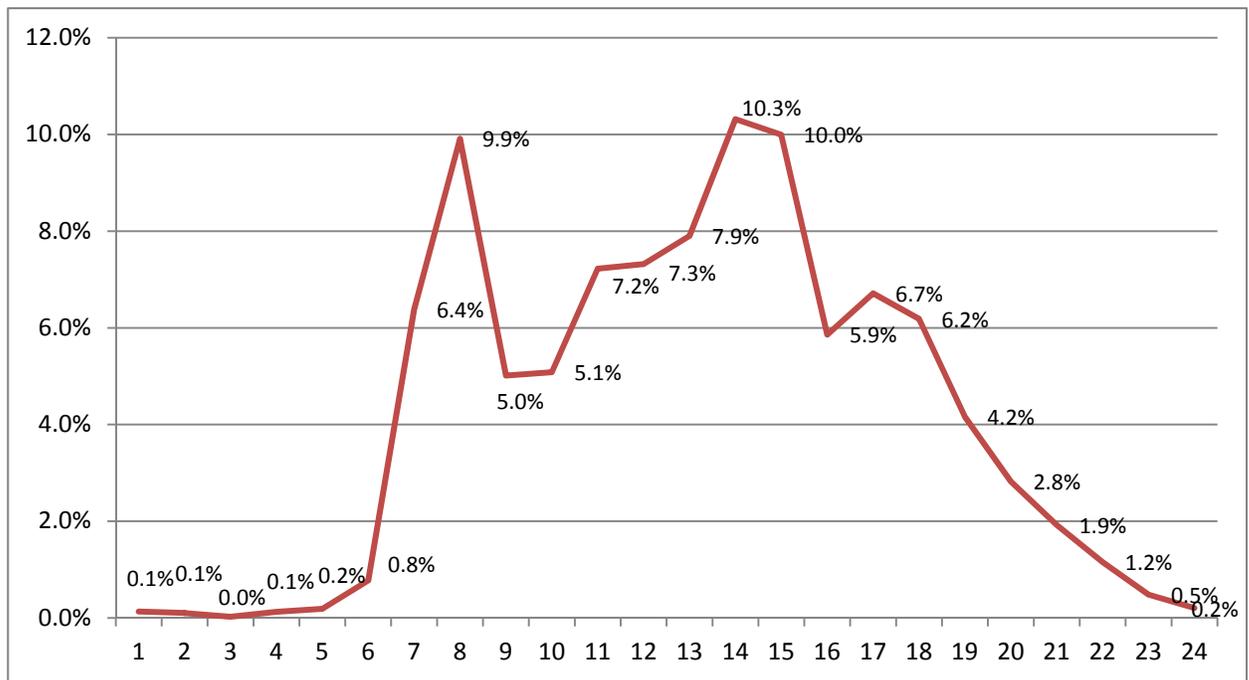
4.7 Walk and Other Non-Motorized Trips

This sub-section focuses on the weekday travel in the RHTS using walking and other non-motorized transportation modes. An in-depth profile of non-motorized travel is provided through a series of tables comparable to those provided in the previous two sections (Section 4.5: Auto Vehicle Trips and Section 4.6: Transit Trips). For the purposes of this section, walk and other non-motorized trip modes include: walking, bicycle, wheelchair, mobility scooter, skates, skateboard, kick scooter, Segway, and other.

4.7.1 Time of Day

This sub-section explores non-motorized travel by time of day. Figure 4-15 shows the diurnal distribution of departure hour for all non-motorized trips.

Figure 4-15: Distribution of Non-Motorized Trips by Departure Hour



Note: Linked trip table, WHT_FAC3; TRP_DEP_HR, PMODE_R2=3

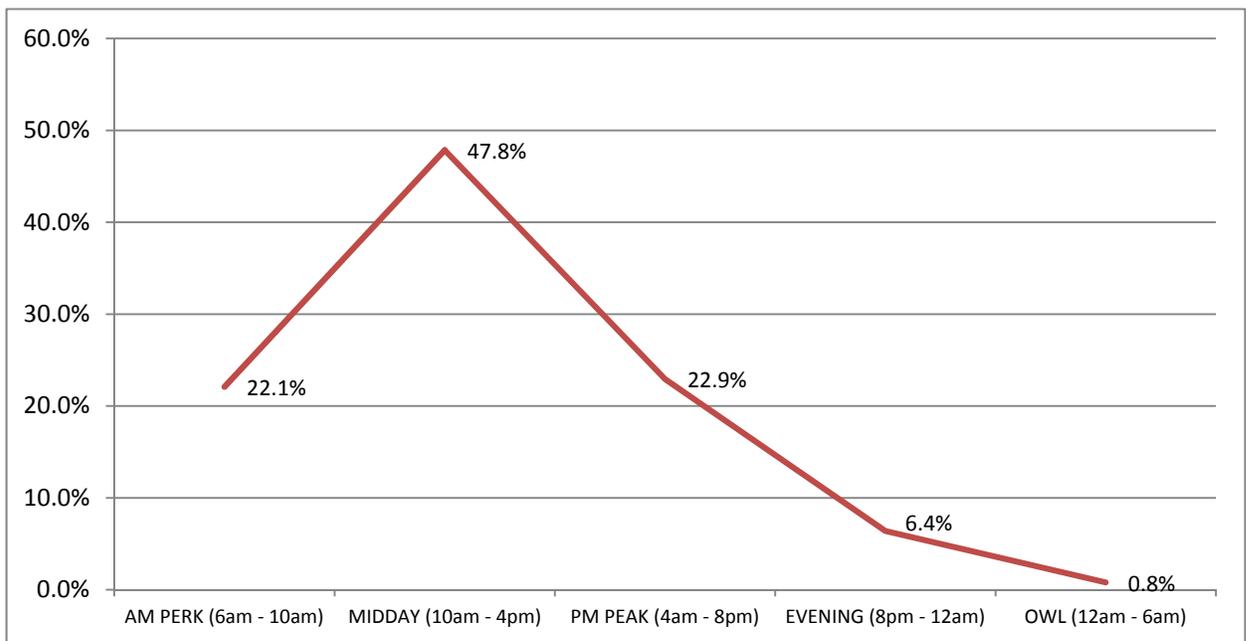
The distribution for non-motorized trips by departure time period and trip origin is summarized in Table 4-64 and Figure 4-16. The largest proportion of non-motorized trips took place during the Midday hours (47.8% overall). Travel patterns were similar across the region and are similar to the 1997/1998 results.

Table 4-64: Distribution of Non-Motorized Trips by Departure Period and Trip Origin (Regional Boundaries-Level 2)

Time Period	Regional Boundaries: Level 2 of Trip Origin						Total
	New York City	Long Island	Mid-Hudson (all)	Connecticut	NJTPA Counties	Mercer County	
AM Peak 6 am – 10 am	20.8%	23.3%*	24.1%*	25.9%*	27.2%	14.4%*	22.1%
Midday 10 am – 4 pm	47.5%	52.9%	50.8%	53.2%	46.1%	42.6%	47.8%
PM Peak 4 pm – 8 pm	24.2%	18.6%	17.1%	17.1%	20.4%	37.3%	22.9%
Evening 8 pm – 12 am	6.8%	5.0%	5.7%	3.7%	5.6%	5.5%	6.4%
Late Night 12 am – 6 am	0.8%	0.1%	2.2%	0.0%*	0.7%	0.2%*	0.8%
Overall	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Linked trip table, WHT_FAC3; TOD_R by GEO_GROUP2_O, PMODE_R2=3 (* not enough cases to support a useful observation)

Figure 4-16: Distribution of Non-Motorized Trips by Departure Period



Note: Linked trip table, WHT_FAC3; TOD_R, PMODE_R2=3

4.7.2 Purpose of Travel – Non-Motorized Trips

Table 4-65 shows the distribution of non-motorized trips between work and non-work purposes. Across the counties, walk/non-motorized trips tended to be for non-work purposes; however NYC (especially Manhattan) was a major exception to this.

Table 4-65: Distribution of Non-Motorized Trips by Trip Purpose (Work/Non-Work) and Trip Origin

Trip Origin		Work Trips	Non-Work Trips
County	Fairfield	4.8%*	95.2%
	New Haven	27.1%	72.9%
	Bergen	14.1%	85.9%
	Essex	8.5%	91.5%
	Hudson	8.5%	91.5%
	Hunterdon	14.9%*	85.1%
	Mercer	12.3%	87.7%
	Middlesex	8.8%	91.2%
	Monmouth	8.9%*	91.1%
	Morris	12.5%	87.5%
	Ocean	5.1%*	94.9%
	Passaic	4.3%*	95.7%
	Somerset	13.3%*	86.7%
	Sussex	0.0%*	100.0%
	Union	6.9%	93.1%
	Warren	1.3%*	98.7%
	Bronx	8.2%	91.8%
	Dutchess	8.5%	91.5%
	Brooklyn (Kings)	10.5%	89.5%
	Nassau	7.6%	92.4%
	Manhattan (New York)	27.7%	72.3%
	Orange	12.9%*	87.1%
	Putnam	23.9%*	76.1%
	Queens	10.1%	89.9%
	Staten Island (Richmond)	4.9%*	95.1%
	Rockland	8.5%*	91.5%
	Suffolk	2.5%	97.5%
	Westchester	12.5%	87.5%
County Group (Level 1)	Manhattan	27.7%	72.3%
	Other NYC	9.8%	90.2%
	Long Island	5.1%	94.9%
	Mid-Hudson (NYMTC)	12.1%	87.9%
	Mid-Hudson (Other)	11.2%	88.8%
	Connecticut	18.5%	81.5%
	Bergen-Passaic	9.9%	90.1%

Trip Origin		Work Trips	Non-Work Trips
	Essex-Hudson-Union	8.2%	91.8%
	Middlesex-Morris-Somerset	10.7%	89.3%
	Monmouth-Ocean	6.4%	93.6%
	Hunterdon-Sussex-Warren	6.6%*	93.4%
	Mercer	12.3%	87.7%
Regional Boundaries (Level 2)	New York City	17.0%	83.0%
	Long Island	5.1%	94.9%
	Mid-Hudson (All)	11.9%	88.1%
	Connecticut Counties	18.5%	81.5%
	NJTPA Counties	8.7%	91.3%
	Mercer	12.3%	87.7%
Political Boundaries (Level 3)	NYMTC Counties	16.2%	83.8%
	Other NY Counties	11.2%	88.8%
	Connecticut Counties	18.5%	81.5%
	NJTPA Counties	8.7%	91.3%
	Mercer	12.3%	87.7%
	Out of metro Area	38.4%*	61.6%
Overall		15.0%	85.0%

Note: Linked trip table, WHT_FAC3; OCOUNTY, GEO_GROUP1, 2 & 3_O by WORKTRIP, PMODE_R2=3 (not enough cases to support a useful observation)*

4.7.3 Trip Length

Trip length and duration of non-motorized trips is displayed by county of trip origin in Table 4-66. Overall, non-motorized trips averaged 0.2 miles and 10.0 minutes. There was minimal variation among the county data.

Table 4-66: Travel Time and Distance by Trip Origin – Non-Motorized Trips

Trip Origin		Duration (minutes)	Distance (miles)	
County	Fairfield	14	0.2	
	New Haven	7	0.2	
	Bergen	9	0.2	
	Essex	10	0.2	
	Hudson	10	0.2	
	Hunterdon	2	0.1	
	Mercer	8	0.2	
	Middlesex	10	0.3	
	Monmouth	10	0.2	
	Morris	10	0.2	
	Ocean	5	0.1	
	Passaic	10	0.3	
	Somerset	10	0.2	
	Sussex	5	0.2	
	Union	10	0.2	
	Warren	5	0.1	
	Bronx	10	0.2	
	Dutchess	15	0.3	
	Brooklyn (Kings)	10	0.2	
	Nassau	8	0.2	
	Manhattan (New York)	10	0.2	
	Orange	10	0.3	
	Putnam	3	0.1	
	Queens	10	0.2	
	Staten Island (Richmond)	7	0.1	
	Rockland	7	0.2	
	Suffolk	10	0.3	
	Westchester	10	0.2	
	County Group (Level 1)	Manhattan	10	0.2
		Other NYC	10	0.2
Long Island		10	0.2	
Mid-Hudson (NYMTC)		8	0.2	
Mid-Hudson (Other)		10	0.3	
Connecticut		10	0.2	
Bergen-Passaic		10	0.2	
Essex-Hudson-Union		10	0.2	
Middlesex-Morris-Somerset		10	0.2	

Trip Origin		Duration (minutes)	Distance (miles)
	Monmouth-Ocean	6	0.2
	Hunterdon-Sussex-Warren	5	0.1
	Mercer	8	0.2
Regional Boundaries (Level 2)	New York City	10	0.2
	Long Island	10	0.2
	Mid-Hudson (All)	10	0.2
	Connecticut Counties	10	0.2
	NJTPA Counties	10	0.2
	Mercer	8	0.2
Political Boundaries (Level 3)	NYMTC Counties	10	0.2
	Other NY Counties	10	0.3
	Connecticut Counties	10	0.2
	NJTPA Counties	10	0.2
	Mercer	8	0.2
	Out of Metro Area	5	0.1
Overall		10	0.2

Notes: - Linked trip table, WHT_FAC3; TRPDU and TRIPDIST by OCOUNTY, GEO_GROUP1, 2, 3_O (median), PMODE_R2=3

- Trip Distance computed as straight-line (“bird’s flight”) distance

Trip distance by trip origin for non-motorized weekday trips is shown in Table 4-67. Most non-motorized trips were less than half a mile in distance (81.2% overall).

Table 4-67: Trip Distance (Range) by Trip Origin – Non-Motorized Trips

Trip Distance (miles)	Trip Origin						Total
	New York City	Long Island	Mid-Hudson (all)	Connecticut	NJTPA Counties	Mercer Counties	
<0.5 mile	81.7%	78.3%	77.0%	84.5%	80.5%	75.0%	81.2%
.5-<1 mile	12.8%	15.9%	15.7%	8.9%	15.0%	18.9%	13.3%
1-<3 miles	4.8%	5.1%	7.3%	6.2%	4.1%	5.7%*	4.8%
3-<5 miles	0.5%	0.6%*	0.0%*	0.4%*	0.3%*	0.4%*	0.4%
5-<10 miles	0.2%*	0.2%*	0.0%*	0.0%*	0.0%*	0.0%*	0.2%
10+ miles	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*	0.0%*
Overall	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

*Note: - Linked trip table, WHT_FAC3; TRIPDIST_R2 by GEO_GROUP2_O, PMODE_R2=3

- Trip Distance computed as straight-line (“bird’s flight”) distance

* Not enough cases to support a useful observation