2017 MAG Establishment Survey Report

MARICOPA ASSOCIATION of GOVERNMENTS

CAMBRIDGE SYSTEMATICS | ETC INSTITUTE | WestGroup RESEARCH | redhillgroup | TRA

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The project team would like to acknowledge the contribution and guidance provided by the project's Technical Advisory Group members and thank them for sacrificing their time to make our project a success.

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Table of Contents

1. Background 1-1

2. Questionnaire Design 2-1

2.1 Establishment Recruitment Questionnaire 2-1

2.2 Visitor and Employee Questionnaires 2-2

Visitor Survey 2-2

Employee Survey 2-3

2.3 Commercial Vehicle GPS Questionnaire 2-4

2.4 Commercial Vehicle Survey Questionnaire 2-5

3. Survey 3-1

3.1 Establishment Recruitment Survey 3-1

3.2 Employee and Visitor Surveys 3-2

Pretest 3-2

Data Collection 3-4

3.3 Commercial Vehicle Survey 3-4

4. Sampling Plan 4-1

4.1 Universe of Establishments 4-1

4.2 Sampling Plan Development 4-2

Commercial Vehicle Survey 4-3

Employee/Visitor Survey 4-4

4.3 Calling Lists 4-7

5. Field Data Collection 5-1

5.1 Establishment Recruitment 5-1

Initial Training 5-1

Ongoing Briefings 5-1

Survey Schedule 5-3

Sample Management 5-4

Disposition Matrix 5-6

5.2 Field Implementation – Establishment Survey 5-6

Pre-Survey Preparation 5-7

Survey Administration 5-9

Partial Surveys 5-10

Full Surveys 5-10

5.3 Implementation – Commercial Vehicle Surveys 5-12

Sampling Frame and Random Digit Dialing 5-12
Surveyor Training 5-12
Survey Methodology 5-14
5.4 Key Takeaways 5-14

6. Quality Control and Data Processing 6-1
6.1 Survey Administration Quality Control 6-1
Commercial Vehicle Survey 6-1
Employee and Visitor Surveys 6-2
6.2 Survey Tracking 6-4
Employee/Visitor survey 6-4
Commercial vehicle survey 6-4
6.3 Data Processing of Survey Records 6-5
Person Counts 6-5
Employee and Visitor Surveys 6-6
Geocoding 6-7
Truck GPS 6-7
6.4 Survey Summaries 6-8
Employee Survey 6-8
Visitor Survey 6-11
6.5 Back-End Quality Assurance Checks 6-14

7. Survey Expansion 7-1
7.1 Commercial Vehicle Survey Expansion 7-1
7.2 Employee/Visitor Survey Expansion 7-3
Employee Survey Expansion 7-3
Visitor Survey Expansion 7-6

Appendix A. Commercial Vehicle Telephone Survey A-1

Appendix B. Employee In-Person/Web-Based Survey B-1

Appendix C. Visitor Intercept Survey C-1

Appendix D. Truck Log Diary Survey D-1

Appendix E. Establishment Recruit Survey E-1

List of Tables

Table 1.1 Technical Advisory Group Members ... 1-3
Table 4.1 Establishments by Number of Employees ... 4-1
Table 4.2 Establishments by NAICS Industry ... 4-2
Table 4.3 Commercial Vehicle Survey Targets and Rates ... 4-4
Table 4.4 Proportional Shares of Targets by Segment for the Worker/Visitor Survey ... 4-6
Table 4.5 Final Survey Targets for the Worker/Visitor Survey ... 4-6
Table 4.6 Sample draws from the InfoGroup database ... 4-7
Table 5.1 Scheduling Report Exchanged between ETC Institute and WGR ... 5-2
Table 5.2 Interviewer Conversion Report ... 5-3
Table 5.3 Sample Weekly Recruiting Status Report ... 5-5
Table 5.4 Recruitment Disposition Matrix ... 5-6
Table 5.5 Example of Survey Schedules ... 5-9
Table 6.1 Sampling Plan Adherence for Employee/Visitor Survey ... 6-5
Table 6.2 Sampling Plan Adherence for the Commercial Vehicle Survey ... 6-5
Table 6.3 Socio-Demographic Summary of Surveyed Employees ... 6-9
Table 6.4 Socio-Demographic Summary of Surveyed Visitors' ... 6-12
Table 6.5 Employee Survey QA/QC Checks ... 6-15
Table 6.6 Visitor Survey QA/QC Checks ... 6-16
Table 7.1 Commercial Vehicle Survey Targets and Rates ... 7-1
Table 7.2 Commercial Vehicle Survey Targets and Actual Completions ... 7-2
Table 7.3 Commercial Vehicle Survey Targets and Actual Completions ... 7-2
Table 7.4 Average Weight for Each Cell in the Sampling Table ... 7-3
Table 7.5 Total Number of Valid Employee Surveys by Sampling Segment ... 7-5
Table 7.6 Total Number of Employees in Surveyed Establishments by Sampling Segment ... 7-5
Table 7.7 Average Weight to Account for Completion Rate ... 7-5
Table 7.8 Total Employees in the InfoGroup Database by Sampling Segment ... 7-6
Table 7.9 Average Weight by Sampling Segment to Account for Non-Surveyed Establishments ... 7-6
Table 7.10 Visitor Survey Expansion Segments ... 7-8
Table 7.11 Visitor Counts by Segment ... 7-9
Table 7.12 Surveyed Establishments and Total Establishments by Segment ... 7-10
Table 7.13 Valid Visitor Surveys by Sampling Segment ... 7-11
Table 7.14 Weighted Visitor Surveys by Sampling Segment ... 7-11

List of Figures

Figure 1.1 Organizational Structure and Roles 1-2
Figure 1.2 Establishment Survey Effort 1-2
Figure 3.1 IR Person Counters 3-2
Figure 3.2 Counting Application 3-3
Figure 3.3 Establishment Survey Districts 3-3
Figure 4.1 Spatial Stratification for the Worker/Visitor Survey 4-5
Figure 5.1 Example of Geographic Recruitment 5-5
Figure 5.2 Real-time Geocoding Using the Tablet-based Survey Program 5-11
Figure 5.3 GPS Device Used for Commercial Vehicle Tracking 5-12
Figure 6.1 Different Ways to Review Trips in the Supervisor Dashboard 6-3
Figure 6.2 Person Count Database 6-6
Figure 6.3 Master Survey Database in Microsoft Access 6-7
Figure 6.4 Secure Shared Directory for Truck GPS Data 6-8
Figure 6.5 Modal Choices and Travel Behavior 6-10
Figure 6.6 Visitor Travel Behavior and Modal Choices 6-13

1. Background

The primary purpose of an establishment survey is to better quantify the trip attraction characteristics of different types of establishments, including office, retail, service and educational institutions. The establishment survey collects data at the destination end of daily travel and such surveys have been commonly used to estimate the trip attraction rates for travel demand models. As MAG is moving away from a trip-based model to an activity-based model (ABM), the establishment survey data will also be used in updating the tour and trip destination, time-of-day, and mode choice models at the destination end.

While traditional establishment surveys focus purely on collecting data from visitors and employees at establishments, MAG also desired to understand commercial vehicle movements. Therefore two separate surveys – one focusing on conducting an inventory of truck movements at the establishment site and another that captured travel diary data of the sampled establishment's commercial vehicles – were conducted for this study from early 2016 through early 2017. The study team also invested in the purchase and licensing of commercial GPS databases for tracking commercial vehicle movements to supplement primary data collection. To further supplement these efforts, counts of vehicles and people associate with the surveyed establishment were collect and used in expansion of the data.

Figure 1.1 presents an overview of the various steps and survey techniques that were used in the project. Techniques varied by recruitment method and the type of establishment. A more detailed description of each step and technique is provided in the subsequent chapters.

This effort serves to complement a household travel survey (HTS) data effort that was collected in parallel. This is the first time that the HTS and establishment surveys have been conducted at the same time for any agency in the US.

The establishment survey effort was conducted by a large consultant team (See Figure 1.1):

- Cambridge Systematics ("CS") led the consulting team and were responsible for questionnaire design, design of the sampling plan, oversight of the survey, data assurance, and survey expansion.
- ETC Institute ("ETC") managed the field data collection, including establishment and visitor surveys, passenger and vehicle counts in most locations, and truck GPS diaries and data collection.
- WestGroup Research ("WGR") conducted the recruit surveys for the establishment portion of the survey and handed information of recruited establishments over to ETC Institute.
- Redhill Group ("RHG") conducted the telephone-based interviews to collect commercial vehicle information.
- Traffic Research and Analysis ("TRA") managed vehicle counts at sites that had considerable vehicular traffic.

Figure 1.1 Organizational Structure and Roles

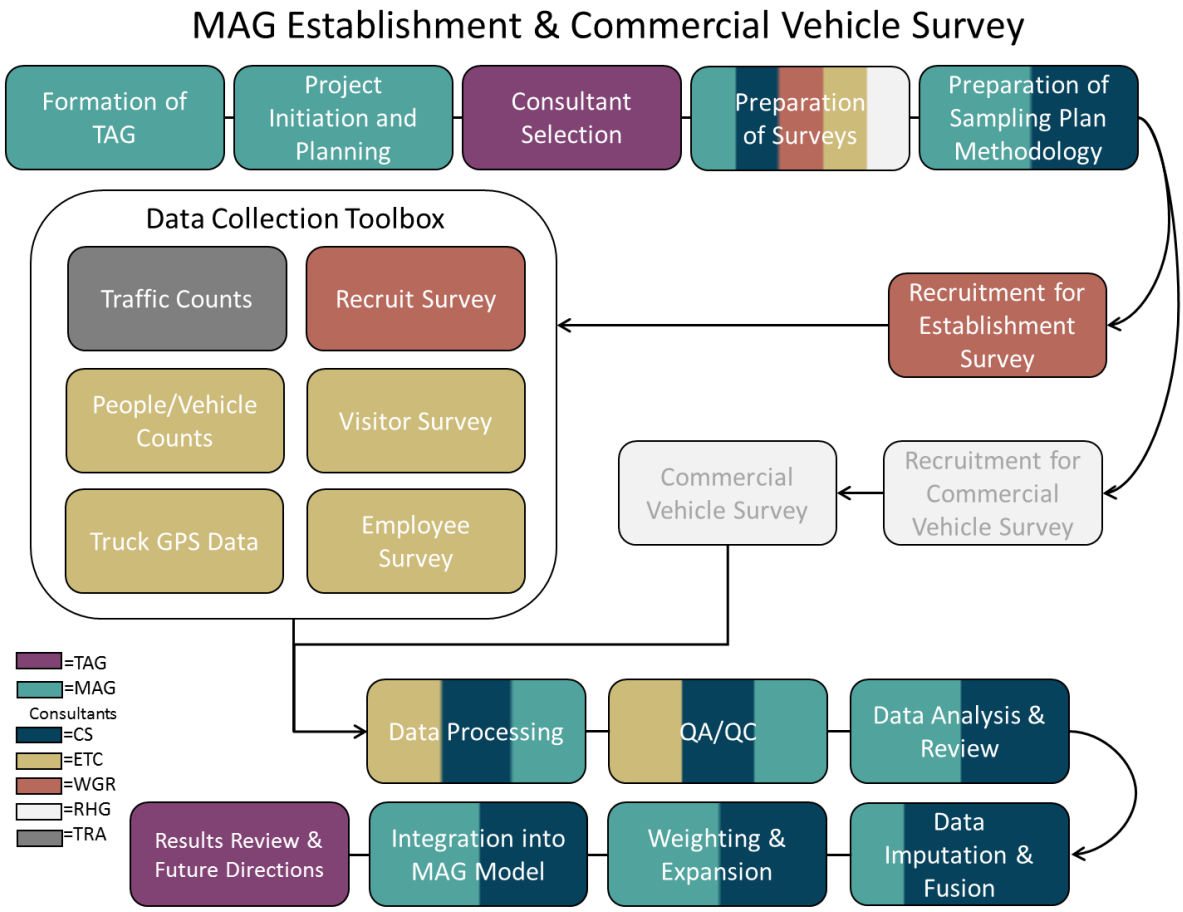


Figure 1.2 Establishment Survey Effort

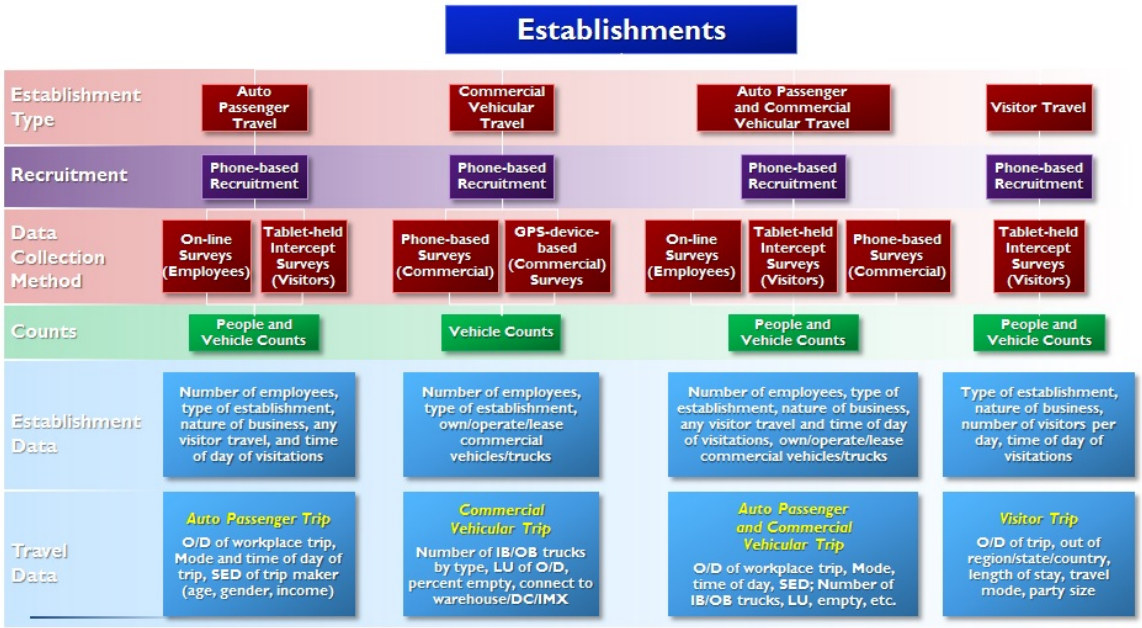


Figure 1.2 lays out all the different data collection tasks conducted as part of this study. MAG staff was involved in every aspect of the project from initial planning to data integration into the MAG models. A technical advisory group (TAG) was formed in anticipation of the project and was consulted repeatedly during the project period. The TAG played an important role in the selection of the consulting firm, provided feedback during the project and provided future direction at its conclusion. TAG members are listed below in Table 1.1.

Table 1.1 Technical Advisory Group Members

TAG Member	Organization
Anubhav Bagley	Maricopa Association of Governments
Arash Mirzaei	North Central Texas Council of Governments
Darlanne Hoctor Mulmat	San Diego Association of Governments
Cory Whittaker	Valley Metro
Denise Lacey	Maricopa County Department of Transportation
Keith Killough	Arizona Department of Transportation
Ratna Korepella	City of Scottsdale
Tim Strow	Maricopa Association of Governments
Vladimir Livshits	Maricopa Association of Governments

The consultant team chose a technology-driven methodology that included conducting the surveys using GPS-based technologies, computer-assisted web interview surveys (CAWI) and computer-assisted telephone interview surveys (CATI). The goal was to leverage technology to collect good quality data with high fidelity, completeness and representativeness, while minimizing respondent burden and encouraging respondent participation.

Given the historically inherent difficulty in recruiting and retaining business establishments for these types of surveys, adequate resources were budgeted for follow-up procedures (e.g., through telephone calls) to ensure completion of surveys by recruited establishments and to address any problematic responses with the surveys or with the data. The use of paper logs or trip diaries for commercial vehicle drivers was instituted to provide quality control on the collected GPS data.

The rest of this report is organized as follows:

- Chapter 2 describes the design of the survey questionnaires. This includes questionnaires for establishment and commercial vehicle surveys, for recruitment and field surveys, as well as GPS device based surveys.
- Chapter 3 describes the findings of the survey pretest conducted in advance of the main field implementation.
- Chapter 4 provides details about the sampling plan and how it was developed. Separate sampling plans for workers and visitors, commercial vehicles and GPS surveys were developed using population control totals.

- Chapter 5 describes the field implementation process. This also includes findings from various stages of the surveys and lessons learned.
- Chapter 6 describes our approach to processing the data and doing thorough QA/QC checks.
- Chapter 7 details the expansion procedures by various survey types.

2. Questionnaire Design

The data collected from the establishment survey will be used to update MAG's activity-based model for personal travel and their advanced freight behavioral model. The questionnaires for each of the individual survey components were designed with this ultimate goal in mind.

Two large survey efforts were conducted as part of the MAG Establishment Survey with several underlying data collection efforts. The two survey efforts included: a telephone-based commercial vehicle survey; and an establishment survey comprising of recruit, employee, visitor, and truck GPS surveys supplemented with counts.

- For recruiting establishments, the surveys collected information about the number of employees and visitors, establishment location and industry, and operating hours;
- For employees of the establishment, the surveys captured travel information to and from work, and employee socio-demographics;
- For visitors to the establishment, the surveys had to capture half-tour information, along with visitor socio-demographics.
- For truck GPS surveys, the diaries had to collect information about truck attributes and trip behavior along with passively collected routing information through the GPS.
- For commercial vehicles surveys, the questionnaires had to effectively capture truck size, truck movements, and loads being carried;

The most critical questions were identified beforehand. This aided us in establishing a completion criterion for the different types of surveys. This section outlines the final questions that were retained in the surveys after the discussions and some of the key elements of each questionnaire. The survey instruments are included as appendices to this report.

2.1 Establishment Recruitment Questionnaire

WestGroup Research (WGR) successfully completed recruitment for the establishment survey. CS and MAG staff provided oversight and technical help in designing the recruitment questionnaire. A preliminary recruit survey was developed using similar questionnaires from around the country. The study team then worked with MAG staff to refine and finalize a recruitment survey that would not only provide the information needed to profile each business contacted, but also provide on-site schedulers with the information needed to efficiently schedule the follow-up data collection activities.

The recruitment survey was approximately 8 to 10 minutes in length and was used to gather the following information:

- Number of full and part time employees;
- Hours of operation;

- Average number of commercial vehicle deliveries/shipments per day;
- Type of business;
- Average number of visitors at facility;
- Busiest hours in terms of vehicular and passenger traffic;
- Type of structure (free standing or non-freestanding); and
- Willingness to participate in an employee-only or employee and visitor survey;
- Willingness to share the routes of commercial vehicles using GPS devices; Contact information for person completing basic survey as well as contact information for on-site contact if different;
- Preferred day/time for scheduling call;
- Preferred day of the week for on-site data collection; and
- Study notes to communicate/document unique site information.

The questionnaire programming was designed to incorporate the establishment information from the purchased study sample discussed in Section 4.1. This provided an opportunity to both confirm data and create a natural feeling conversation rather than an interrogation. The layout of the final survey data output was agreed upon by all team members so that a consistent file layout would be created and utilized across all users.

The survey software (Optimum Enterprise Survey Platform or OESP) collected complete call dispositions to identify all phone call results such as disconnects, voice mail messages, callbacks, refusals, and complete status.

In addition, trigger rules were assigned so an interviewer would be able to flag an establishment that needed additional attention such as needing corporate approval, request for a contact from MAG, request for email to be sent with more study information, or a special “urgent” or “hot” lead that needed prompt attention from the ETC Institute team.

2.2 Visitor and Employee Questionnaires

Separate surveys were designed for the employee and the visitor portion of the field surveys.

Visitor Survey

Prior to the start of the pilot, the consultant team worked extensively with MAG to develop the instrument for the field surveys. Using a survey template developed during MAG’s previous intercept studies, two approaches were tested during the pilot.

- The first approach, focused on the collection of the survey respondent's one way trip, where the origin was the last place the respondent had been prior to arriving at the survey site and the destination was the next place the respondent was going to.
- A more detailed "half-tour" approach was also tested during the pilot. Under this approach, a respondent was asked where the last place they came from was, prior to arriving at the survey location. If the answer was not "home", "work", or "school", the respondent was asked where the last place they came from was prior to that, until an answer of "home", "work", or "school" was given. The same approach was applied to the destination portion of the trip. This resulted in collecting information about both half-tours from each survey respondent.

From the data collected during the pilot, it was found that there was no difference in the number of survey refusals using either approach. The only real difference was that the complete trip approach had a slightly higher incomplete ratio, which was to be expected from a longer survey. However, since a half-tour approach is more suited to support the design and development of an activity-based model, it was determined that this approach would be adopted despite negligibly higher incompletion rates.

The final version of the visitor survey was designed to be more streamlined, user friendly, and worded efficiently to encourage participation. The consultant team conducted extensive internal research for debugging programing issues. The final intercept survey collected the following elements:

- Survey Start and End Times
- Respondent Arrival and Departure time
- Trip Origin and Destination
- Mode of Transportation
- Total Passengers in Vehicle
- Trip Purpose
- Trip Frequency
- Demographics

Employee Survey

In addition to the visitor survey, an employee survey was also designed to capture employee travel and demographic information. Prior to the pilot, the original employee survey was fairly similar to the visitor intercept survey. After several meetings to discuss what needed to be captured, a final revised version tailored specifically to employees was created.

Not only were there more employee specific questions, but the instrument itself was designed for online self-administration. This allowed for the successful collection of a majority of employees while allowing the surveyor to focus their intercepts towards visitors. The employee survey captured the same origin to

destination information as the visitor intercept survey, with the addition of the following work-related questions:

- Employment Status
- Primary Work Activity
- Weekly Work Schedule
- Telework Schedule
- Specific Days of the Week Working
- Primary Mode of Transportation by Day of Week

2.3 Commercial Vehicle GPS Questionnaire

The commercial vehicle GPS component of the study was also administered by ETC Institute staff and was originally designed as a stand-alone 7-day data collection approach using GPS devices transmitting data at 5-second intervals. A vehicle diary component was included in the pre-pilot phase of the study to test response rates and measure the effectiveness of such an approach. A diary design from a previous ETC Institute commercial vehicle project was used as a template and for the pilot.

After the conclusion of the pilot, it was determined that several collection aspects of the diary were either poorly reported, or irrelevant to the study, including information such as Gross Vehicle Weight Rating (GVWR), fuel economy, cargo weight, cargo classifications, and odometer readings. The recommendation was to make it simpler and easier to fill out diary for the participant, while collecting only the needed information. The final diary design was restructured to only collect the following information:

- Vehicle Information (year, make, model)
- Travel Date and Day
- Base Address
- Stop Addresses
- Stop Activity (from a list of options)
- Stop Type of Cargo (if cargo)
- Stop Type of load (full/partial/empty)

The simplified diary approach was retested in the field and was found to have a higher completion ratio as compared to previous studies with a more detailed approach. The accuracy of information provided by the drivers was also noticeably higher. Overall, the diary provided detailed stop information that GPS data collection alone could not have accomplished. It also provided relevant information about the type of

goods being shipped, the primary reason for the trip stop, and any intermediate handling location type for the goods. The survey instrument can be found in Appendix D.

2.4 Commercial Vehicle Survey Questionnaire

The commercial vehicle survey was administered by Redhill Group (RHG) over the telephone. The design of the questionnaire was driven primarily by MAG's needs for their behavioral freight models. The key questions included in the survey were:

- Information about the establishment, including but not limited to number of employees, square footage of the establishment, industry codes, and confirmation of location.
- Information of trucks operated by the establishment and the travel undertaken by these trucks including: total trip departures per day, type of commodities being carried, typical payload, trip lengths, and travel across county borders.
- Information about other trucks that travel to and from the establishment to move commodities.
- Information from commercial postal trucks such as those operated by UPS, FedEx, and the USPS.

The survey questionnaire was preloaded with some data from the sampling frame. However, several questions were asked to validate the data, and where answers were different from the frame, answers from the survey were used to update the information in the sampling frame. CS staff generated a broad outline using guidance and objectives provided by MAG. RHG then converted this information into an initial draft survey for review. After multiple rounds of edits to streamline the survey, strengthen the language, and remove any ambiguity in question wording, the survey was forwarded to MAG project management staff for final review and comments. Upon receipt of comments, revisions were implemented and the survey questionnaires were programmed into a computer-aided telephone interview (CATI) system for a pilot test. The questionnaire programming was aligned to incorporate the establishment information uploaded from the study sample. The layout of the final survey data output was agreed upon by all team members so that a consistent file layout would be created and utilized across all users. The survey instrument can be found in Appendix A.

3. Survey

Once the survey instruments were drafted, detailed pilot studies were conducted to test all the system processes including sample management, recruitment, questionnaire design, and data collection procedures. The findings from the pilot surveys helped finalize the data collection procedures prior to full field implementation. Some of the key finding from the pretest are discussed in this chapter.

3.1 Establishment Recruitment Survey

The establishment recruitment survey served as the first contact with establishments and, in a way, the success of the survey effort relied heavily on the success of the recruit surveys. During the pretest, the survey team evaluated multiple procedures to streamline the survey process. Some of the key findings include:

- Interviewers needed to go "off script" as they tried to identify the right person to survey. They needed to be able to establish a rapport with the individual before getting into the script.
- Based on feedback from the interviewers, MAG helped create a more user-friendly, less official, description of who MAG is and what they do for the region, particularly related to air quality and transportation. The interviewers also requested an "elevator speech" regarding the purpose of the survey that was easy to recall and understand, friendly and informal.
- The interviewing team suggested edits to reduce the amount of words spoken to describe project tasks. During the pilot, when the interviewers followed the script, respondents were hanging up while the interviewer was talking. The request was for quick bullet points and then the interviewer could reference the detailed description to answer questions.
- Potential trouble spots were identified:
  - A strategy to reach corporate offices when the franchise manager refuses a survey was needed.
  - Schools, not surprisingly, were quick to refuse the surveys since they cannot have unauthorized people approaching parents or cameras in the parking lots for safety reasons.
  - In both the Commerce and Personal services groups, the employee survey proved to be a challenge. Companies did not want to ask their employees to do an online survey, or they did not think their employees would be willing to do a survey. The interviewer needed to understand what options were available to offer employers who did not want to administer a web survey.
  - Many respondents wanted to know and/or dictate the timing for the on-site visit and other study tasks. Interviewers requested a mechanism or script to either record preferences or provide answers.
- "Warm leads" were very helpful – such as the transportation coordinators, or a call from a business card after an in-office visit.
- After the pilot study, several changes were made to the survey instrument and recruiting process. These changes included:

- The survey introduction was made quick and direct so that the interviewers could quickly reach the decision maker.
- The description of the study elements were shortened into one or two sentences to assist the interviewers to quickly and accurately gain agreement to participation to a full or partial survey.
- A notes section was created with special instructions or information for the ETC scheduler that could be used to more effectively and efficiently "close" the survey and gain participation.
- Ongoing training and brainstorming regarding best practices were shared among the interviewing team, supervisors and project director on a weekly basis.

3.2 Employee and Visitor Surveys

Once the recruit survey was completed, the data was sent to the field data collection team at ETC institute. Before full scale data collection for the project began pre-testing of data collection procedures and techniques were conducted.

Pretest

Several preparatory steps were undertaken to ensure the success of the pretest.

- Field Supervisors for the project were made personally responsible for the telephone coordination with establishments recruited for the pilot survey after scheduling. This was done so that supervisors would be intimately familiar with the entire process of the project.
- Vests displaying "SURVEY TEAM" with accompanying photo ID badges displaying the MAG and ETC Institute logos were worn at the test sites. This was done in an attempt to create high visibility for the surveyors so they could easily be identified by employees of the participating businesses, visitors to the participating businesses, and other individuals in the area.
- Infrared person counters (as shown on the right), were used to collect the number of individuals entering and exiting all of the doorways. An additional survey team member also kept track of the number of people entering and exiting all of the doorways during the entire duration of the surveying period, which began one hour before and ended one hour after normal operating business hours. This was done via a tablet counter application to verify the data collected by the infrared counters.

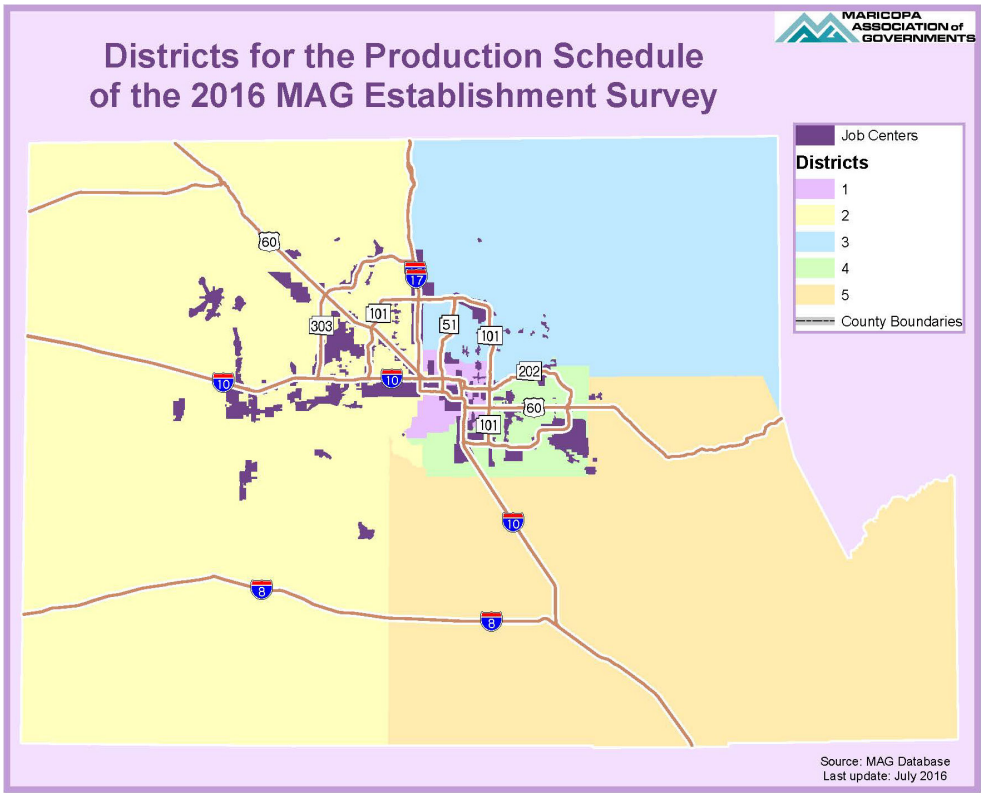
Figure 3.1 IR Person Counters

As a result of the pretest the project team updated the way person counts were collected. The person count is a function of how many times an individual arrives and departs a participating location. However, an employee may exit and reenter the location multiple times during the course of a work day. This results in an inflated count of individuals that could be surveyed. To help keep track of locations with inflated counts, surveyors were asked to keep a separate count of the number of visitors that visited the location. Surveyors also had to submit an End Field Report for each survey location with comments and specifics on their workday. For each location, they were asked to document the number of visitors observed and if they witnessed extensive employee traffic. By keeping track of the visitor total, locations with inflated counts were easily identified.

Figure 3.2 Counting Application

After the pilot it was also determined that, due to the size of our region, the study area was too large to efficiently study simultaneously. Prior to fully launching the study, the consultant team divided the study area by zones (districts) to minimize driving time for the field supervisor and allow better on-site supervision as described in Chapter 5. During the main surveys, establishments were recruited and surveyed by district which helped ETC to efficiently manage the survey.

Figure 3.3 Establishment Survey Districts



Data Collection

Scheduling

During the scheduling process, establishments were called in the same order as they appeared on the provided lists. The entire scheduling process was tracked in an electronic call log. The documentation included: 1) the number of establishments called, 2) the number of establishments successfully contacted, 3) the name of the establishment and the business telephone number, and 4) the number of attempts made to contact the business. Businesses contacted were considered non-responsive if they could not be reached after five attempts.

Day Prior to First Day of Surveying

Prior to the first day of data collection supervisors visited each of the participating establishments to ensure that owners and managers felt comfortable with the data collection process. Although the process and procedures had already been explained during scheduling, a face-to-face visit was conducted to ensure the actual data collection would go as smoothly as possible. Business cards with cell phone numbers were left with the establishment, in case there were additional questions or concerns.

During these visits, in-person site reconnaissance was conducted to verify the type of approach used by the survey administration team at each participating location. Initial web-based reconnaissance of the site was conducted by using either Google "Street View" ground-level imagery or Bing Maps "Bird's Eye" aerial imagery. On-site reconnaissance was used to determine the best placement positions for the cameras and individuals doing manual counts.

3.3 Commercial Vehicle Survey

The commercial vehicle pretest was conducted over the telephone and so had limited methodologies and implementation strategies to test.

- The original survey questionnaire did not include any information about shipment commodities. A decision was made mid-pretest to switch to a revised version of the survey that included the commodity questions to test the burden on the respondents and then retained for the main survey.
- At the same time, questions were added to the beginning of the survey to screen out any respondents who indicated that no qualified trucks are based at their facility or come to their facility. This simplified the survey process.

The pretest was also evaluated by the survey team to understand the best way to reach the most knowledgeable person at the organization. Off-script questions were again used to locate and target such individuals to improve the quality of the survey.

4. Sampling Plan

Detailed sampling plans and survey targets were developed for each of the individual surveys. Based on available resources and pre-test findings, a goal was set to complete 400 phone surveys of establishments with commercial vehicles. Additionally it was planned to conduct 550 partial surveys and 550 full surveys of establishments as well as 500 GPS-based surveys of trucks. This chapter describes how these targets were distributed across various strata.

4.1 Universe of Establishments

The 2015 InfoGroup database was selected to provide the sampling frame for the MAG region. In addition to providing the largest coverage of MAG area establishments, InfoGroup provided extensive information on establishment parameters relevant to conducting telephone surveys.

The data also contained information on the vast majority of the establishments in the MAG region, including location, characteristics, and contact phone number. The InfoGroup database consisted of 142,029 records. Of these, 5,911 were unclassified and/or had a missing number of employees requiring them to be dropped from the dataset. Leaving 136,118 viable records. Other key variables in the dataset include:

- Address;
- Number of employees at the location;
- Company North American Industry Classification System (NAICS) code
- Floor area in square feet.

This sampling frame included a large number of small firms – 65% had fewer than 6 employees and 82% had no more than 10 employees. However, 33% of workers were employed by firms larger than 150 employees. The distribution of employees (Table 4.1) was taken into consideration for sampling plan design.

Table 4.1 Establishments by Number of Employees

Number of Employees	Total Establishments	Percentage	% of Employment
1-5	89,139	65%	14%
6-10	22,867	17%	10%
11-25	13,805	10%	13%
26-75	6,855	5%	17%
76-150	2,227	2%	13%
151-500	1,027	1%	15%
501-1000	120	0%	5%
1001+	78	0%	13%

Total	136,118	100%	100%

The establishments were also analyzed by NAICS code. Services, such as healthcare, profession, scientific, technical, financial, and other, as well as retail and construction dominated the database. Industries involving natural resources accounted for only a very small share. These are shown in Table 4.2.

Table 4.2 Establishments by NAICS Industry

NAICS, 2-digit	Total
Agriculture	435
Mining/Quarrying/Extraction	99
Utilities	188
Construction	11,730
Manufacturing (31)	475
Manufacturing (32)	1,104
Manufacturing (33)	2,967
Wholesale Trade	4,863
Retail Trade (44)	13,229
Retail Trade (45)	5,469
Transportation/Warehousing (48)	2,474
Transportation/Warehousing (49)	306
Information	2,877
Finance/Insurance	7,967
Real Estate/Rental/Leasing	9,251
Professional/Scientific/Technical	14,829
Management (55)	192
Administrative (56)	6,785
Educational Services	3,476
Health Care/Social Assistance	16,158
Arts/Entertainment/Recreation	2,699
Accommodation	8,937
Other Services (92)	15,453
Public Administration	2,474
Other	1,681
Total	136,118

4.2 Sampling Plan Development

Separate sampling plans were produced to fit the Commercial Vehicle survey and the Establishment survey. These plans set targets by industry segment to ensure that different types of establishments were

represented in the final sample. Targets were generated based on the share of establishments in each segment as well as minimums for number of responses.

- First, tabulations and cross tabulations were made to understand the makeup of the data. From these the target variables were selected to create segments.
- Next, these variables were transformed into discrete categories, such as grouping industries into sectors by size – small, medium, and large. Cross tabulations were used to calculate the share of establishments in each segment, such as the percentage of firms which were medium-sized professional service firms in the central region. The proportional segment targets could be calculated by multiplying the predetermined total survey targets with the segment shares.
- The final survey targets were designed to meet a minimum number of samples per cell and also to suit the particular needs of each survey.

The primary goal was to obtain sufficient representation of various segments, with a secondary consideration of even representation. Expansion of collected data was expected to correct for disproportionate numbers of surveys from any group.

Commercial Vehicle Survey

The commercial vehicle survey was designed to gather information about trucks, so the focus was primarily on industries associated with trucks and those that are included in MAG's commercial vehicle and freight models. Other industries were also included, but at a lower rate. Given the relatively small target size of this survey (400 completed surveys), only segments that generated medium and heavy truck traffic were targeted.

The establishment's industry sector was considered essential, as it would largely dictate the type and number of trucks moving in and out of the facilities.

- Construction (NAICS 23) was isolated in its own sector, while wholesale trade was grouped with both transportation and warehousing (NAICS 48-49).
- There were categories for agriculture, natural resources, and utilities (NAICS 11-22); for manufacturing (31-33); and for retail (44-45).
- The last category, referred to as "services", included the remaining industries which are not part of MAG's freight model.
- Employment size was considered as an additional sampling variable. However, square footage was used instead as it is more closely correlated with commercial vehicle activity. Two square footage segments were considered in the final sampling plan.

The results of this process are shown in Table 4.3. The average sampling rate is just under one percent for all establishments, but this varies widely by cell. The agriculture, mining, and utilities sector has the smallest target but by far the highest sampling rate, due to the low number of firms in that cell (in the sampling frame). While services establishments are not removed from the survey they are sampled at only

0.05%, reflecting their high share in the employment database as well as their relatively lower importance for the commercial vehicle activity.

Table 4.3 Commercial Vehicle Survey Targets and Rates

	Target			Target Rate		
	<20,000 sq. ft.	> 20,000 sq. ft.	All	<20,000 sq. ft.	>20,000 sq. ft.	All
Agriculture/Mining/Utility	20	4	24	3.40%	3.20%	3.30%
Construction	82	15	97	0.70%	2.70%	0.80%
Manufacturing	36	7	43	1.10%	0.50%	1.00%
Retail trade	82	15	97	0.50%	0.40%	0.50%
Services	36	7	43	0.05%	0.05%	0.05%
Wholesale and Transportation/Warehousing	81	15	96	1.30%	1.10%	1.30%
Total	337	63	400	0.29%	0.30%	0.29%
Total, without Services				**0.92%**	**0.92%**	**0.92%**

Employee/Visitor Survey

These surveys targeted the movement of people to and from establishments. It differed from the commercial vehicle sampling plan in several ways.

- The target was much higher at 2,000 recruited establishments.
- The sampling plan did not elevate certain industries over others since nearly all establishments attract employees and visitors. Thus, sampling rates were similar for many industries.
- Greater segmentation was possible because of the large sample size leading to the inclusion of geographic considerations in the sampling plan.
- Establishment size was determined by employment rather than square footage since that is a more reasonable measure of visitor activity among establishments of the same industry.

The industry sector specification went through a series of iterations that varied from as few as 3 categories to as many as 14 categories. The higher number of categories was reduced to allow for more segmentation across the other variables. Industry sectors were combined based the types of visitors that they were expected to attract and the types of work places they offer. As a result of this logic-based aggregation, professional services was separated from personal services, while accommodation was combined with food service. The final sampling plan included four industrial sectors – Commerce, Education & Personal, Industrial/Heavy/Construction, and Professional services.

The number of employees determined the establishment size. Initially a minimum of 250 or 500 employees was suggested for large establishments, but this was lowered to 150 due to the limited

number of establishments with such a high number of employees. The small establishment threshold was set at 10 employees.

For the geographic component, two methods were considered.

- The first divided the region into three categories:
  - Southeast, which included roughly the area east of I-10 and south of Loop 202 in Maricopa County as well as all of Pinal;
  - Northeast, which included the rest of the area east of I-17; and
  - West which included the portion west of I-17 and I-10 in Maricopa and Yavapai Counties.
- However, behavioral variation among travelers are more likely to occur along the lines of employment density and transportation infrastructure. Therefore, the region was divided into "High Job Density" (over 2,500 workers per square miles and access to transit), "Medium Job Density" (from 751 to 2,500 workers per square miles), and "Low Job Density" (up to 750 workers per square miles), as illustrated in Figure 4.1.

Figure 4.1 Spatial Stratification for the Worker/Visitor Survey

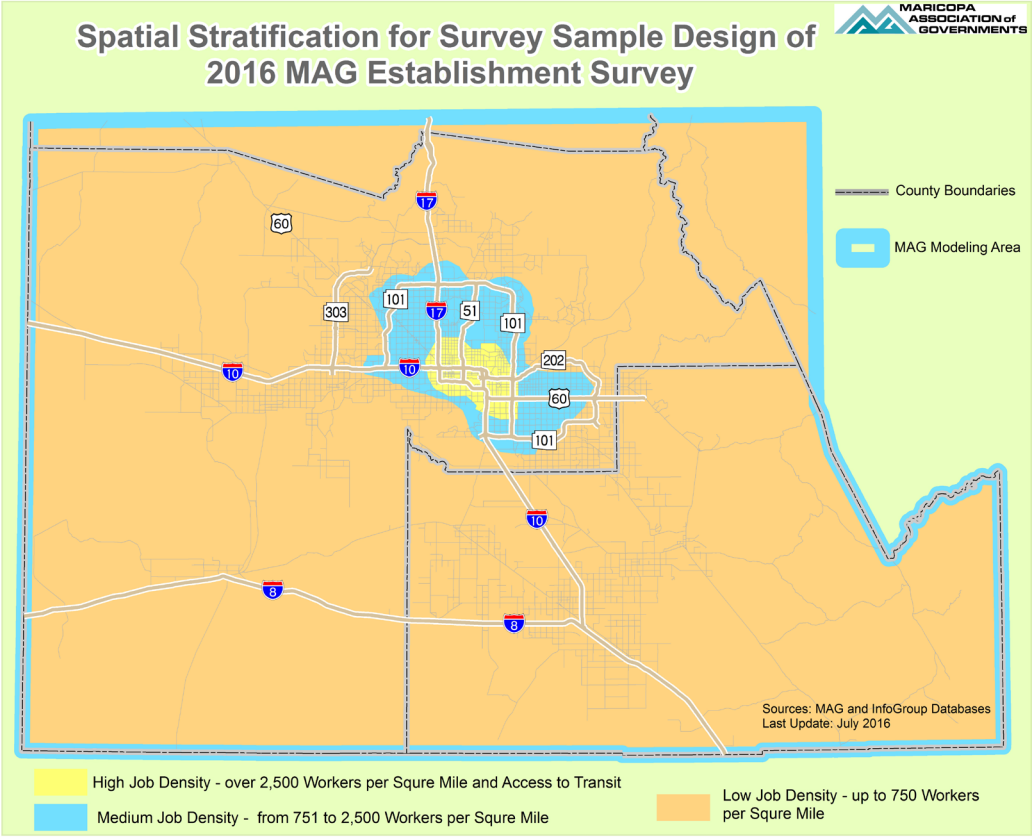


Table 4.4 shows the preliminary targets based purely on the population shares in each segment. The result is cells which have values well below the minimum of 40. These proportional segment values were then adjusted in two ways. Primarily, small, similar segments were combined. Sectors were further aggregated and, in some cases sizes, were combined. A single target was used for large firms of any industry because of low incidence in the population. In cells which were still somewhat low, the target was increased to 40 (Table 4.5). These adjustments created variances in the target rate between 1.2% and 2.1% for small to medium firms and 3.4% for large firms.

From the 1,998 firms to be recruited for the establishment survey, it was expected that about 900 would drop out and not follow through with on-site interviews. Among the remaining 1,100 establishments, 550 would complete a full survey (comprising of counts, employee surveys, and visitor surveys); while the remaining 550 would complete a partial survey (comprising of counts and employee surveys). For each survey type, the relative shares of every cell were kept constant (compared to Table 4.5), but overall totals were scaled down.

GPS-monitoring and travel diaries were administered to trucks belonging to willing establishments recruited for the establishment survey. However, no specific targets were assigned to trucks by market segment. Rather, it was determined that trucks would be accepted irrespective of which industry or geography they belonged to.

Table 4.4 Proportional Shares of Targets by Segment for the Worker/Visitor Survey

	High Job Density		Medium Job Density		Low Job Density			
Number of Employees	**0-9**	**10-149**	**0-9**	**10-149**	**0-9**	**10-149**	**150+**	**Total**
Commerce	94	47	189	96	78	38	13	542
Edu & Personal	145	45	311	75	124	31	19	731
Industrial/Heavy/Construction	59	30	123	37	65	11	12	325
Professional services	87	24	148	24	61	6	6	350
Total	**385**	**146**	**771**	**232**	**328**	**86**	**50**	**1,998**

Table 4.5 Final Survey Targets for the Worker/Visitor Survey

	High Job Density		Medium Job Density		Low Job Density			
Number of Employees	**0-9**	**10-149**	**0-9**	**10-149**	**0-9**	**10-149**	**150+**	**Total**
Commerce	94	47	189	96	76	40		542
Edu & Personal	145	45	311	75	115	40		731
Industrial/Heavy/Construction		89	120	40		76		325
Professional services		111		172		67		350
Total		**531**		**1,003**		**414**	**50**	**1,998**

4.3 Calling Lists

When the surveyors went into the field they were provided a list of establishments to contact. These calling lists were developed using InfoGroup sampling frame data. For each phase (pretest, spring, summer, fall) samples were randomly drawn for each segment based on survey targets. For two special cases, establishments were removed from the general pool and drawn differently.

- The large establishments (by employment) were removed and split between the commercial vehicle and establishment surveys. It was clear from the beginning that all the large establishments would be contacted due to their small number. Since it was a targeted segment for the establishment survey, around 90% of samples were earmarked for that survey.

- Agriculture establishments received similar treatment, but in this case 85% were diverted to the commercial vehicle survey to ensure their representation in capturing truck movements.

Table 4.6 shows the progression of draws for each phase. First, for the pilot 500 establishments were drawn for the worker/visitor survey, then 1,250 for the commercial vehicle survey. The spring draw was the last to include the commercial vehicle survey, as it was completed during this phase. In the last draw, WGR was provided with all remaining establishments as well as some which had been in the commercial vehicle survey draws but were never contacted.

Table 4.6 Sample draws from the InfoGroup database

Survey Period	Commercial Vehicle Survey	Establishment Survey
Pre-test 2016	1,250	500
Spring 2016	20,392	50,389
Summer 2016	0	20,000
Fall 2016	0	60,859

It should be noted that while the InfoGroup database is a thorough and up-to-date option, there are still limitations of the database. For instance, multiple establishments with different locations owned by the same individual or entity can be listed at the same address. This happens in less than 1% of all contact attempts.

A more frequent case was for respondents to provide different industry identification categories, facility size, or number of employees than what was listed in the InfoGroup database. In this instance, the new information provided by respondents was considered to be correct and was used to establish the industry facility size and number of employees in order to categorize the firm for sampling quotas.

5. Field Data Collection

The field data collection started in early 2016 with the commercial vehicle telephone survey and continued all the way through to early 2017. This chapter focuses on the key aspects of the field data collection process.

5.1 Establishment Recruitment

Several strategies were utilized and implemented with the objective to maximize not only the successful completion of the initial recruiting survey, but also to make sure the commitment from the recruited establishment was genuine so that the conversion rate of recruit to successful completion of the on-site study elements remained high.

Initial Training

Business-to-business (B2B) surveys require well-informed interviewers who have ability to work "off script" as they make their way through gatekeepers; this training helped to provide that foundation. The training was recorded and all interviewers newly assigned to the project viewed the video as part of their initial study orientation. At the start of the study, MAG staff came to WestGroup Research facilities for a sit-down briefing and discussion with project interviewers. The purpose of this training was twofold: a) provide understanding of the project and its purpose and b) answer interviewer questions regarding potential rebuttal responses that could be asked by potential study participants.

Ongoing Briefings

Supervisors routinely monitored interviewers or reviewed recorded interviews to assess interviewer capabilities and productivity. Supervisors would meet with interviewers, as needed, to coach and remediate the approach used to find the decision maker and complete a successful recruit survey.

The project team would meet weekly to discuss:

- Best practices among interviewers,
- Strategies for getting past the establishment gatekeeper,
- Strategies for gathering full cooperation,
- Answer interviewer questions regarding sample priorities and any other issues encountered during the course of the project.

ETC Institute sent a weekly progress report to WGR showing the percent of sites successfully scheduled by day as well as additional notes for each site. WGR used this information to monitor interviewer effectiveness, train interviewers to increase productivity and decrease the number of refusals encountered by ETC Institute when scheduling.

The recruiting supervisors performed a weekly review of completion data from ETC Institute to determine conversion rate for each interviewer. This information was used to identify the best interviewers, remove unproductive interviewers, and/or retrain them to improve the rate of conversion from recruited to completed site.

Table 5.1 Scheduling Report Exchanged between ETC Institute and WGR

RECRUITED DATE	Recruited	Scheduled	% Scheduled
10/3/2016	6	5	83%
10/4/2016	10	7	70%
10/5/2016	9	8	89%
10/6/2016	20	9	45%
10/7/2016	6	6	100%
10/10/2016	9	8	89%
10/11/2016	9	6	67%
10/12/2016	8	6	75%
10/13/2016	4	3	75%
10/14/2016	5	5	100%
10/17/2016	10	7	70%
10/18/2016	8	4	50%
10/19/2016	6	6	100%
10/20/2016	9	2	22%
10/21/2016	1	1	100%
10/24/2016	7	6	86%
10/25/2016	10	9	90%
10/26/2016	5	2	40%
10/27/2016	4	2	50%
10/28/2016	4	4	100%
10/31/2016	5	3	60%
11/1/2016	9	8	89%
11/2/2016	5	4	80%
11/3/2016	5	5	100%
11/4/2016	3	3	100%
11/7/2016	4	2	50%
11/8/2016	5	5	100%
11/10/2016	2	0	0%
11/11/2016	1	1	100%
11/14/2016	4	0	0%
Totals	**1751**	**1076**	**61%**

Interviewer efficiency scores and overall conversion scores were also monitored weekly. Below is an example of the conversion report that was reviewed on a weekly basis.

Interviewers were added or removed from the project based on the performance evaluations mentioned above. Only those interviewers with the highest quality interviews and highest recruit-complete conversion ratios were kept on the study. Typically 6 to 8 interviewers were assigned to and actively working on the project.

Table 5.2 Interviewer Conversion Report

OVERALL			
Interviewer	Converted	Recruited	Conversion Rate Overall
901	98	147	66.67%
732	162	244	66.39%
701	100	154	64.94%
763	126	198	63.64%
849	103	163	63.19%
538	188	367	51.23%
Grand Total	1040	1722	60.39%
		Current Rate of Active Int.	61.04%

Prior Week to This Week Rankings		
Interviewer	Prior Weeks Ranking	This Weeks Ranking
901	1	1
732	2	2
701	3	3
763	4	4
849	5	5
538	9	6

Prior Week to This Week Conversion Rate Rankings			
Interviewer	Last weeks Overall Conversion Rate	Conversion Rate Overall	Change
901	65.87%	66.67%	0.79%
732	65.00%	66.39%	1.39%
701	64.79%	64.94%	0.15%
763	62.03%	63.64%	1.60%
849	58.39%	63.19%	4.80%
538	48.68%	51.23%	2.55%
Grand Total	57.71%	60.39%	2.68%
Current Rate of Active Int.	57.74%	61.04%	3.30%

Survey Schedule

Hours of calling on the study were 9 a.m. to 4 p.m., Monday through Thursday and 9 a.m. to 1 p.m. on Friday. Early in the study, the team evaluated early start times between 8 a.m. and 9 a.m. as well as later afternoon calling between 4 p.m. and 6 p.m. It was determined that the completion rate per hour during these early and late time slots was not high enough to warrant the hourly expenses for the extra staff.

Supervisors kept a close watch on interviewer productivity and morale throughout the project. Recruiting is demanding work and this study was in the field for nearly 10 months. It was important to monitor interviewer status to provide breaks from this study and work on other studies or to make a decision to close down a shift early if production was unusually low due to various reasons such as issues with the sample, or reduced staff number.

Sample Management

Limited sample and multiple quota groups combined with low response rates meant that daily sample management was necessary to successfully complete the project. WGR worked closely with MAG and the consultant team to strategize the best way to maximize the ratio of sample contacted to completed sites.

- At the start of the study, with all quotas open, the region was the driver for sample usage with the exception of larger organizations that were relatively small in number. It was also deemed important to maximize the ability of the interviewer to reach the decision maker. Therefore, sample records for all companies with 150+ employees were put on hold so MAG could review and potentially identify contacts within the organization or make initial calls to "pave the way" for the WGR interviewers.

- Additionally, MAG staff assisted by reviewing the list of companies with 50+ employees and attempting to match companies with known transportation coordinators as the first "warm" lead within an organization rather than strictly cold calls. Interviewers reported increased success when a "warm lead" was available.

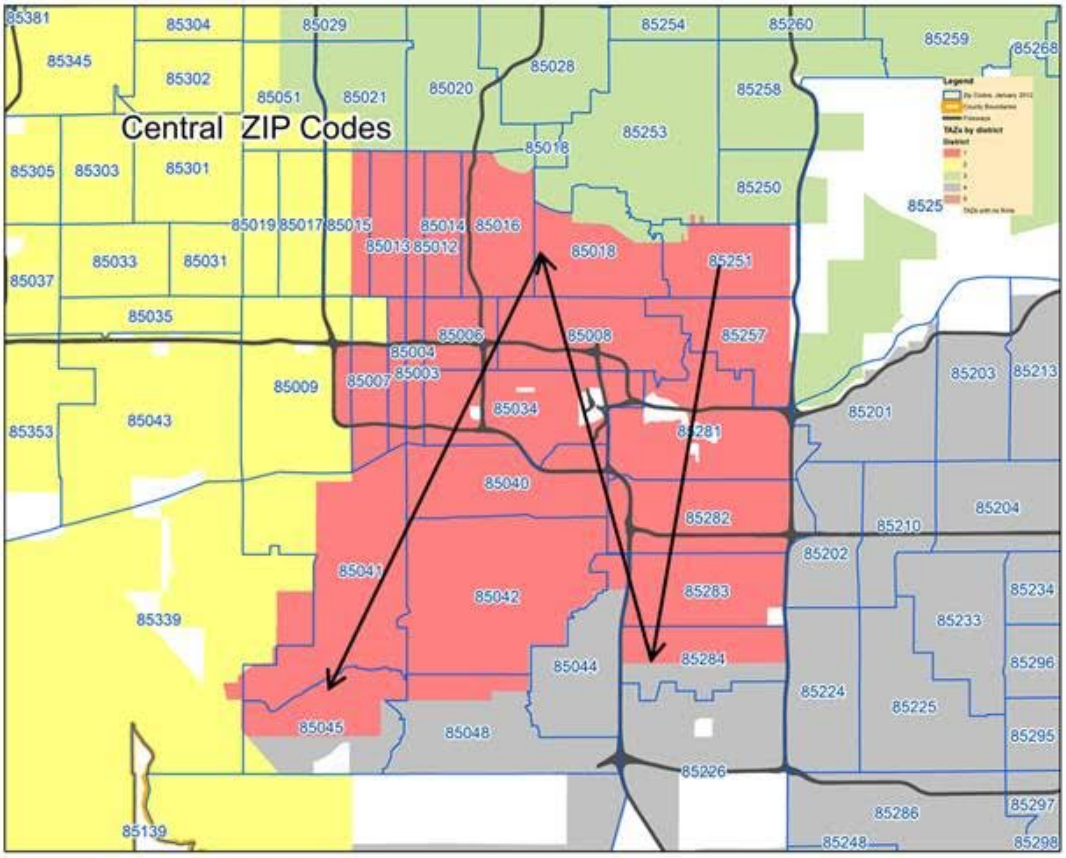
- A modified sample was used for summer data collection (June to August). Sample records for three NAICS categories – education, entertainment, and food services/hotels – were put on hold because these types of businesses do not operate during regular hours in the summer.

- For the fall, recruitment was opened to all industries and sizes, however, it was necessary to prioritize industry types and number of employees over spatial strata. Focus was placed on quota cells with lower level of representation in the database of completed sites.

Table 5.3 Sample Weekly Recruiting Status Report

Quota Category	# Completes	Total	# Remaining	% Complete	Sample Status and Amount Left
162070 - Commerce - Central - 0-9 Employees	64	94	30	68%	1364
162075 - Commerce - Central - 10-149 Employees	39	47	8	82%	468
162072 - Commerce - Near - 0-9 Employees	126	189	63	66%	2990
162077 - Commerce - Near - 10-149 Employees	59	96	37	61%	1255
162078 - Commerce - Periphery - 0-9 Employees	62	76	14	81%	1309
162068 - Commerce - Periphery - 10-149 Employees	34	40	6	85%	488
162080 - Edu & Personal - Central - 0-9 Employees	145	145	0	100%	Closed
162071 - Edu & Personal - Central - 10-149 Employees	45	45	0	100%	Closed
162082 - Edu & Personal - Near - 0-9 Employees	303	311	8	97%	Closed
162073 - Edu & Personal - Near - 10-149 Employees	75	75	0	100%	Closed
162084 - Edu & Personal - Periphery - 0-9 Employees	115	115	0	100%	Closed
162069 - Edu & Personal - Periphery - 10-149 Employees	114	115	1	99%	Closed
162074 - Indust./Heavy/Const. - Central - 0-9 & 10-149 Emp.	70	89	19	78%	2637
162087 - Indust./Heavy/Const. - Near - 0-9 Emp.	80	120	40	66%	1729
162088 - Indust./Heavy/Const. - Near - 10-149 Emp.	30	40	10	75%	895
162089 - Indust./Heavy/Const. - Periphery - 0-9 & 10-149 Emp.	32	76	44	42%	1113
162086 - Professional services - Central - 0-9 & 10-149 Emp.	112	112	0	100%	Closed
162083 - Professional services - Near - 0-9 & 10-149 Emp.	139	172	33	80%	5422
162085 - Professional services. - Periphery - 0-9 & 10-149 Emp.	60	67	7	89%	1153
162090 - 150+ Employees	10	50	40	20%	579

Figure 5.1 Example of Geographic Recruitment



Disposition Matrix

The disposition matrix below shows that 1.4% of the businesses available in the total sample participated in the study at some level. The participation rate was highest among Commerce (1.6%) and lowest among the Industrial/Construction segment (1.2%). In total, nearly 1,700 establishments were recruited. Of these, over 1,100 establishments completed either partial or full surveys thereby meeting overall survey goals. The conversion rate was higher than anticipated and was a reflection of the care taken by the recruitment and data collection teams to ensure that the concerns of the recruited establishments were handled effectively at every stage of the process.

Table 5.4 Recruitment Disposition Matrix

Last Disposition	Commerce	Education & Personal Svs	Indust./Heavy /Const.	Professional services	Total Sample
ADD TO DO NOT CALL LIST	162	264	143	183	752
Answering machine	3376	9944	3639	4345	21304
Blocked Calls	35	34	18	30	117
Business	6	10	3	7	26
Busy	129	325	104	126	684
Callback	692	1580	352	460	3084
Cell Phone	2	11	12	6	31
Complete - Non-Participant	92	217	75	99	483
Complete - Participant	317	544	176	256	1293
Disconnect	3237	3273	2392	2305	11207
Fax/modem	549	594	452	365	1960
General Callback	3948	7084	2164	2359	15555
Hard refusal	1042	1659	876	848	4425
Hearing Impaired	7	6	3	4	20
Homebased Business - Terminate	442	739	855	1033	3069
Language Barrier	442	290	100	113	945
Need Corporate Approval Before Proceeding	3761	2031	559	606	6957
No Answer	2386	4811	1623	1857	10677
No Attempt	691	15863	2795	6331	25680
Refusal to Any Participation	1200	1966	948	969	5083
Research Worker		3	1	27	31
Soft Refusal	659	963	553	494	2669
Terminate	3104	4012	3017	2932	13065
Grand Total	26279	56223	20860	25755	129117

5.2 Field Implementation – Establishment Survey

ETC Institute scheduled and surveyed a total of 1,105 workplace locations in the MAG study area to either participate in a full survey (550 workplaces) or a partial survey (555 workplaces). In addition, 503 weeklong truck GPS logs were collected, along with diaries from nearly all of the trucks (502). The data collection portion of the survey was conducted in three separate tasks by ETC Institute

- Pre-Survey Preparation
- Survey Scheduling

- Survey Administration

Pre-Survey Preparation

Orientation Session

ETC Institute conducted an orientation session with the approximately 20 employees who were assigned to the project on December 30th, 2015. The orientation session included an explanation of the survey goals, an overview of the objectives for the project, guidelines for conducting the survey, and safety procedures for staff who would be working in the field.

Assign Survey Supervisors

ETC Institute assigned a field operating supervisor prior to survey administration. The survey supervisor moved to the Phoenix area in January 2016 and lived there until all data collection activities were completed.

Business Cards

All ETC Institute staff who were assigned to this project were provided with business cards with the employee's name and contact information (address, e-mail, and phone number) to ease establishment operator concerns during field surveys.

Toll-Free Phone Number

ETC Institute established a toll-free number that directly connected the caller with ETC Institute's project manager. The toll-free number did not receive any phone calls during the MAG Establishment and Commercial Vehicle Survey project.

Hardware and Software

Each surveyor was issued a tablet to conduct intercept surveys along with a battery backup charger. The tablets used to collect the survey data contained an on-screen mapping feature that allowed for real-time geocoding of locations based off of: address, intersection, or place searches gathered from feedback of respondents. The respondents then confirmed the geocoded location based on the on-screen map that showed the searched address/location via a Google Map indicator icon.

In addition to using the mapping feature to collect the GPS coordinates of major survey locations (home address, origin address, destination address), the tablet program also allowed the interviewer to walk through each question with the respondent to ensure accurate interpretation of the survey questions. While a survey was being administered, each answer was simultaneously uploaded to the online database for immediate review and to avoid data loss.

Survey Scheduling

After the pre-survey preparation process was completed, ETC Institute's call center began scheduling individual workplaces in the MAG area. The recruitment process incorporated the following steps:

- ETC Institute used the script provided when contacting workplaces.
- ETC Institute verified the phone number of each establishment, agency or private operator to be contacted.
- ETC Institute contacted and recruited workplaces in the order listed in the electronic data file provided by WGR.
- ETC Institute considered a workplace non-responsive and continued with the next workplace on the list if contact was not made after five attempts.

Each morning WGR would upload the scheduling file to the OneDrive for ETC Institute. The scheduling team called all recruited sites prioritizing the newest recruited businesses. Businesses that agreed to participate in the workplace study were then scheduled for a one-day on-site data collection study. Companies participated in either a full or partial study and if the business had commercial vehicles, they were also scheduled for GPS deployment. Overall the scheduled studies previously recruited by WGR fully supported the study. Of the over 1,700 sites recruited by WGR, 1,105 were scheduled to either participate in a full survey (550 workplaces) or a partial survey (555 workplaces) to meet survey targets.

- During the scheduling processes, it was determined that locations with fewer than 5 visitors were not worth including as a full location due to low intercept rates. These sites were usually treated as a partial site, unless they had commercial vehicles, in which case they qualified as full sites provided they completed the GPS survey.
- The scheduling team also discovered that sites with multiple businesses per suite would not qualify for any intercept surveys since the survey team could not distinguish which businesses visitors were going to, thereby complicating both the count and survey process immensely.
- Once the initial scheduling of the workplace occurred, a consolidated list of that week's scheduling efforts containing the establishment information was then sent electronically to the survey supervisor who was responsible for contacting the scheduled workplaces in order to:
  - Establish a relationship with the contact of the workplace.
  - Explain the workplace study process in further detail.
  - Answer any questions/concerns from the workplace location.
  - Verify the scheduled study date.
  - Record any special notes or instructions from the workplace.
  - Ask questions about the workplace to better understand the number of ETC Institute Staff that would be necessary to conduct the survey at the workplace.
  - Ask the workplace to notify employees of the agreed upon survey date and that surveyors would be at the location from one hour before to one hour after normal operating hours.

- Double-check certain information that was recorded in the establishment data in order to improve the success of the survey on the survey date.

- Exchange contact information for any future questions.

Weekly survey staffing levels were then created based on conversations with the workplace contact, the information regarding the average number of employees and visitors to the workplace, and satellite maps of the workplace location. Typically, one surveyor was assigned per 100 expected visitors. Survey site overall size also was taken into consideration by the survey supervisor when assigning staffing levels

Schedules were created for the surveyors so that all relevant information was available on one place. An example of a surveyor's schedule is shown in Table 5.5 below.

Table 5.5 Example of Survey Schedules

Surveyor Name				
Date	Monday, 3/4	Tuesday, 3/5	Wednesday, 3/6	Thursday, 3,7
Interviewer	Surveyor Name (s)	Surveyor Name (s)	Surveyor Name (s)	OFF
Full or Partial	Full	Full	Full	
Site Number	[redacted]			
Business Name				
Street Address				
Phone Number				
Number of Employees	210	33	6	
Minimum Number of Employee Surveys	53	8	2	
Estimated Number of Visitors	200	30	0	
Minimum Number of Visitor Surveys	50	8	0	
Be there at...	600	600	745	
You can leave at...	1400	1400	1700	
Free Standing or Non Free Standing	Free Standing	Free Standing	Free Standing	
Contact	[redacted]			
Title of Contact				
Total Business Vehicles	0	0	2	0
Cars/SUVS	0	0	0	0
Pickup Trucks	0	0	2	0
Vehicles	0	0	0	0
Service Vans	0	0	0	0
Cargo Vans	0	0	0	0
Commercial Service Vehicles	0	0	0	0
Please double check everything above with your contact at the business location and write any corrections in the appropriate place in the End Field Report				

Survey Administration

ETC Institute coordinated and conducted all surveys during a typical weekday (Monday through Friday) during the local area school year and during the summer.

Partial Surveys

Each partial survey consisted of the following data collection efforts:

- Employee Survey
- Person Count

Surveyor(s) conducting a partial survey would arrive one hour prior to the workplace location's normal operating hours. The surveyor(s) focused on counting the number of people entering and exiting the workplace building using ETC Institute's in-out counter app program. The program automatically synchronized the counts via an online cloud and processed them in 15 minute intervals. A supervisor would review the counts from the online cloud the following day and upload the XML file to the secure data storage location for review.

Infrared person sensors were typically deployed to collect counts for partial survey locations. A supervisor would deploy and set up the sensors prior to the site beginning normal businesses hours and retrieve the sensors after business close. For a 24-hour site, sensors would be deployed prior to 12:00 AM and retrieved after 12:00 AM the following day. After retrieval, a supervisor would download the data from the sensors and upload them to the secure data storage drive.

Once employees began to arrive in the morning, one of the surveyors would enter the workplace location and ask for the contact person listed on their work schedule. They would quickly double check the number of employees expected for the day, the average number of visitors, and the number of commercial vehicles owned by the location. After they double-checked the information provided, the surveyor would return outside to continue counting people.

At the end of the day (one hour after normal operating hours), one of the surveyors, would provide detailed notes on their work day.

In most cases, employee surveys were conducted online and prior to the field survey effort. However, in some establishments employee surveys were conducted in the field using tablets as part of the partial survey.

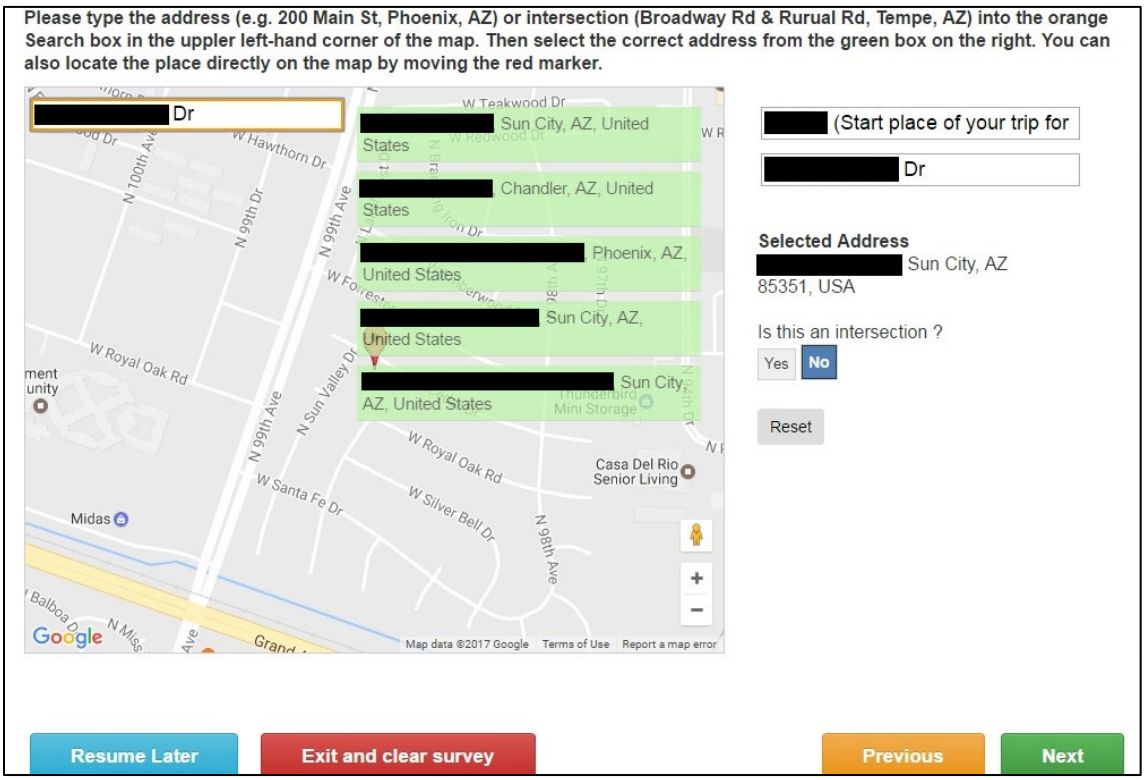
Full Surveys

The process and coordination for full surveys was the same as it was for the partial surveys. Each full survey consisted of the following data collection efforts:

- General Information Survey
- Person Count
- Intercept Interview Surveys (Employees and Visitors)
- Commercial Vehicle Diary and GPS Collection

The survey instrument, being web based, was able to capture the coordinates of the locations in real time while the survey was being administered, as well as offered unparalleled live QA/QC of survey respondent addresses and trips. Surveyors were instructed to ask individuals to participate in the survey as they exited the location and were also to approach individual. In general, delivery drivers were the least responsive to the survey, usually citing that they were on a schedule and could not take the time to fill out the survey.

Figure 5.2 Real-time Geocoding Using the Tablet-based Survey Program



If an Establishment also had commercial vehicles that qualified and were willing to participate, the supervisor would issue Commercial Vehicle Travel Diaries for each vehicle along with installing a GPS data logger in the vehicle (Figure 5.3). After retrieval, the supervisor would download the data directly from the GPS logger and upload the file to the secure shared directory for data team review. Diaries were mailed back to ETC Institute's data entry department by the supervisor for database entry and subsequent upload to the secure shared folder.

The information collected as part of the travel diary included:

- Destination address for each place visited on the designated travel day
- Departure Time
- Arrival type
- Type of cargo carried

- Weight of Cargo
- Type of place visited

Figure 5.3 GPS Device Used for Commercial Vehicle Tracking

5.3 Implementation – Commercial Vehicle Surveys

During the data collection period, a few minor adjustments were implemented to the survey instrument, such as additional skip patterns and screening questions in order to increase response productivity.

Sampling Frame and Random Digit Dialing

The 2015 InfoGroup database was screened to eliminate all but the desired six establishment categories relevant to the commercial vehicle surveys to use as the calling list for the project. Prior to loading the InfoGroup database into the computer-aided calling system, the calling list was randomized to eliminate any bias in the order in which the establishments were organized.

All potential respondents were contacted using a random dialing procedure with the following exceptions.

- First, to ensure a sufficient number of larger facilities was completed, the small facilities (less than 20,000 square feet) were periodically blocked so that only larger firms would be contacted until we were confident that the larger firms were adequately represented in the final data set.
- The second exception was that some establishment categories were blocked out from time to time to balance the number of completed surveys by industry.
- Finally, for selected industries such as Agriculture/Mining/Utility, where the sample was limited, the industry category was blocked for all but selected senior surveyors who were more successful in converting these potential respondents into completed surveys.

Surveyor Training

The Redhill Group employed telephone interviewers with demonstrated experience in surveying for transportation projects. Every interviewer participated in a three hour project-specific training session

prior to working on the project and was required to demonstrate both a thorough understanding of the project and proficiency with the survey instrument.

The training included:

- A project briefing on the background and purpose of the survey.
- An explanation of each of the five establishment segments:
  - Agriculture/Mining/Utility
  - Construction
  - Manufacturing
  - Retail
  - Services
  - Wholesale/Transportation/Warehousing
- A review of the surveyor's responsibilities:
  - Effective screening to reach the most knowledgeable person in the organization
  - Accurate and unbiased data collection
  - Recording of responses
  - Tracking participation
  - Scheduling appointments and placing follow-up calls
  - Respondent screening requirements and an explanation of the requirements of reaching the appropriate decision maker prior to beginning the survey.
  - Surveyor courtesy and techniques to encourage participation from respondents and maintain participation throughout the survey.
- Effective ways to schedule follow-up appointments with respondents.
- A review of the telephone survey instrument and opportunity to administer several training surveys in a test environment.
- A review of all ancillary materials such as information letters and any other background materials.

Periodically, telephone interviewers were silently monitored in combination with a review of their completed surveys to ensure that survey protocols were consistently observed.

Survey Methodology

Potential survey respondents were contacted by telephone using Redhill Group's CATI system. When the telephone was answered, interviewers provided a brief standardized introduction explaining that the survey was being conducted on behalf of MAG and asked to speak to the person at the location that would be most knowledgeable about shipping and receiving.

If that person was not available, the interviewer attempted to get a name, direct phone number, and time and date on which to make a return call. This information was noted as a callback and the follow-up call was placed at the appointment time. If the respondent refused to participate, the contact was marked as a refusal and the record was blocked for future call attempts.

Once the potential respondent was reached, the interviewer provided a more detailed explanation of the project explaining that the survey would help plan roadway improvements and reduce congestion. They were also told that their individual responses would remain confidential and were offered $20 to thank them for their participation. The interviewer also screened the potential respondents to ensure they were knowledgeable about shipping and receiving at their location.

If a potential respondent indicated that he or she was unable to participate in the phone interview at the time of original contact, a subsequent callback was scheduled to meet their requirements.

In the full survey, 392 surveys were completed for each sample quota based on industry and facility size bringing the total number of completion up to 423 surveys. The data collection process ran between March and April 2016.

5.4 Key Takeaways

There were several key takeaways identified by the team over the course of the project.

- Interviewers needed to be highly monitored and continually trained on best practices for continued success. Surveyors were encouraged to continually talk with each other and were monitored/coached by supervisors.
- Multiple levels of management reviewing the interviewers operations was crucial to survey success. The team occasionally brought in a project manager from outside the MAG establishment survey project to provide a fresh, unbiased review of interviewer efforts.
- It was important to be proactive in adjusting and removing unproductive interviewers in a timely manner. Establishment survey samples are very limited and should not be wasted by unproductive or ineffective interviewers.
- Advanced notification from MAG improved participation. In addition, it was helpful to have a reference to the study on the MAG web site so if the respondent searched online, they found a reference to the study.
- Introductions and study descriptions needed to be concise. Interviewers need to be trained on the study purpose and should be able to articulate "off script" when asked questions by respondents.

- Open communication between all members of the consulting team was critical to making adjustments to recruiting, in-person surveys, and to sample utilization.
- Supervisors needed to work with interviewers to find the right pace of making sure the business contacts understand what they are asked to do while ensuring their positive response.
- Survey fatigue was a challenge so it was helpful to rotate the sample in order to maximize longevity. To avoid quickly burning through the sample the interviewers had to be professional and strive to maximize the use of data for each establishment
- Large geographical areas were challenging to work through effectively, districting is the best approach but even that has some limits.
- Communication between the recruiting manager and scheduler was critical. Questions need to flow in both directions – problems the scheduler is having with the recruiting records and key requests or unique information about businesses need to be clearly communicated to the scheduler.
- The closer the scheduling call came to recruitment, the greater the likelihood of a successful survey.
- It was virtually impossible to get approvals if a franchisee insisted that out-of-state corporate approval was needed before they agreed to participate. If the corporate offices were local there was some chance of leveraging benefits to community.
- Contact information needs to be carefully documented to ensure project success.
- Accommodating short or specific timelines requested by a business goes a long way in ensuring a recruit converts to a complete.

6. Quality Control and Data Processing

Once data collection was underway, the consulting team undertook several QA/QC, data processing, and survey monitoring steps to ensure that the final dataset met the sampling plan requirements. Great care was taken to ensure that the data was of the highest quality to support future analysis. Each of the steps undertaken by the team is described below.

6.1 Survey Administration Quality Control

Commercial Vehicle Survey

In addition to extensive surveyor training, Redhill Group employed a series of quality control checks designed to ensure the highest possible data quality. The quality control protocols include:

- A visual review of each completed survey was conducted by an analyst to ensure that all skip patterns functioned correctly. In addition, all open-ended and "other" responses were checked to ensure that they were logical and sufficiently met the needs of the survey.
- If a respondent indicated that there are trucks located at their facility, but then subsequently indicated that no trucks leave the facility, the survey was flagged and called back to confirm and clarify or correct their responses to these two questions.
- Respondents were asked to indicate what percent of all trucks leaving the facility leave full, empty or partially full. The same questions were asked about arriving trucks. The automated program added the results for each of these series of questions to ensure that the total was 100 percent. If the percentages of trucks that are full, partially full, or empty do not add up to 100 percent, the survey was flagged and called back to get more logical responses for these questions.
- When applicable, respondents were asked about the weight (lbs.) of their less than truckload (LTL) shipments. If the response is less than 2,000 pounds, the respondents were called back to ensure that such response was indeed logical.
- If the respondent indicated that more than 50% of all trucks go outside the MAG region, then respondents were asked to tell us about their product and destination, providing a logical reason for this travel pattern.
- Similarly, if more than 50% of all trucks came from outside the MAG region, respondents were asked to describe their business, providing a logical reason for this travel pattern.
- Establishments that were within a predetermined list of NAICS codes were asked to provide the type and percentage of each commodity type that they ship out or deliver. The automated program ensured that the percentage of the primary product were larger or equal to the percentage of the secondary product. Otherwise, the primary and secondary product categories and percentages were reversed.

- "Other" establishment category responses that did not clearly fit into one of the pre-determined categories in the survey were reviewed through a combination of internet searches and callbacks to determine the appropriate category for the survey. If the business fell under an ineligible category, (e.g. government services) the survey was removed from the data file.

Employee and Visitor Surveys

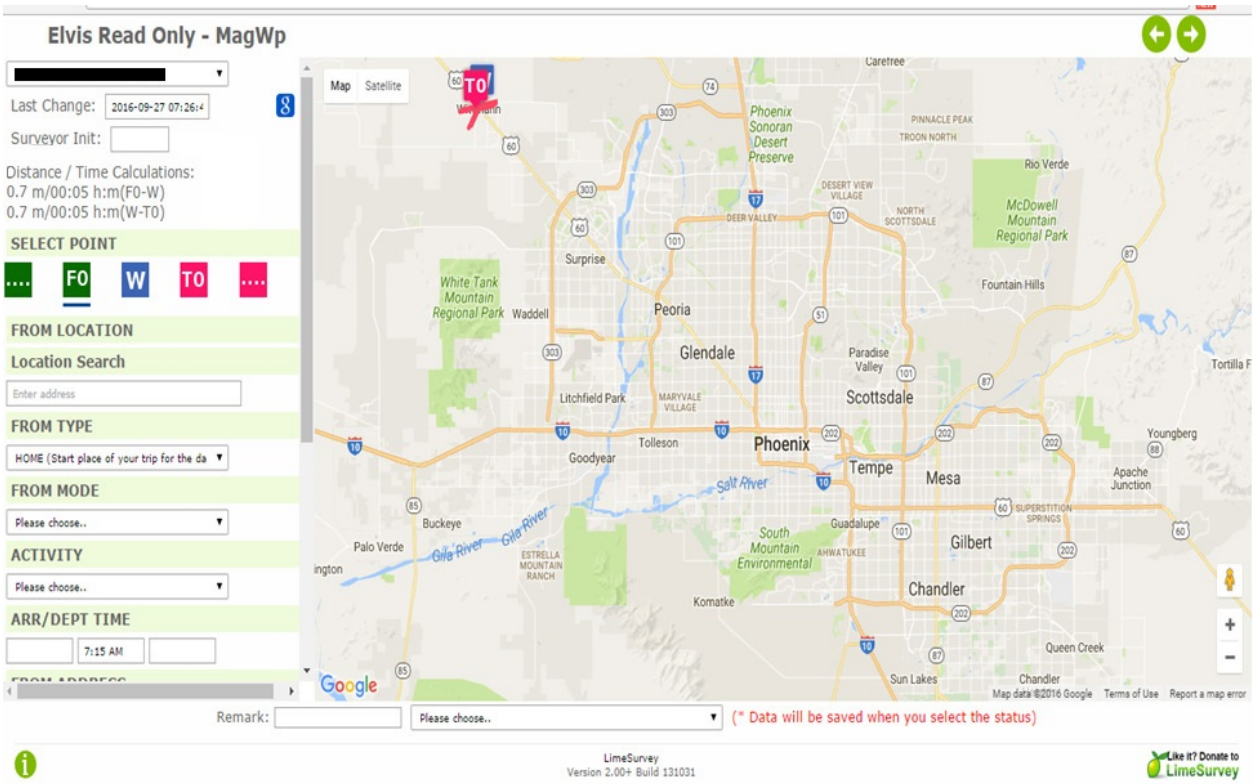
ETC Institute employed full-time supervisors who were solely responsible for training, scheduling, and managing field data collection efforts. Field supervisors used a project specific online dashboard to manage their staff and instantly see the data collected in the field in a variety of different ways.

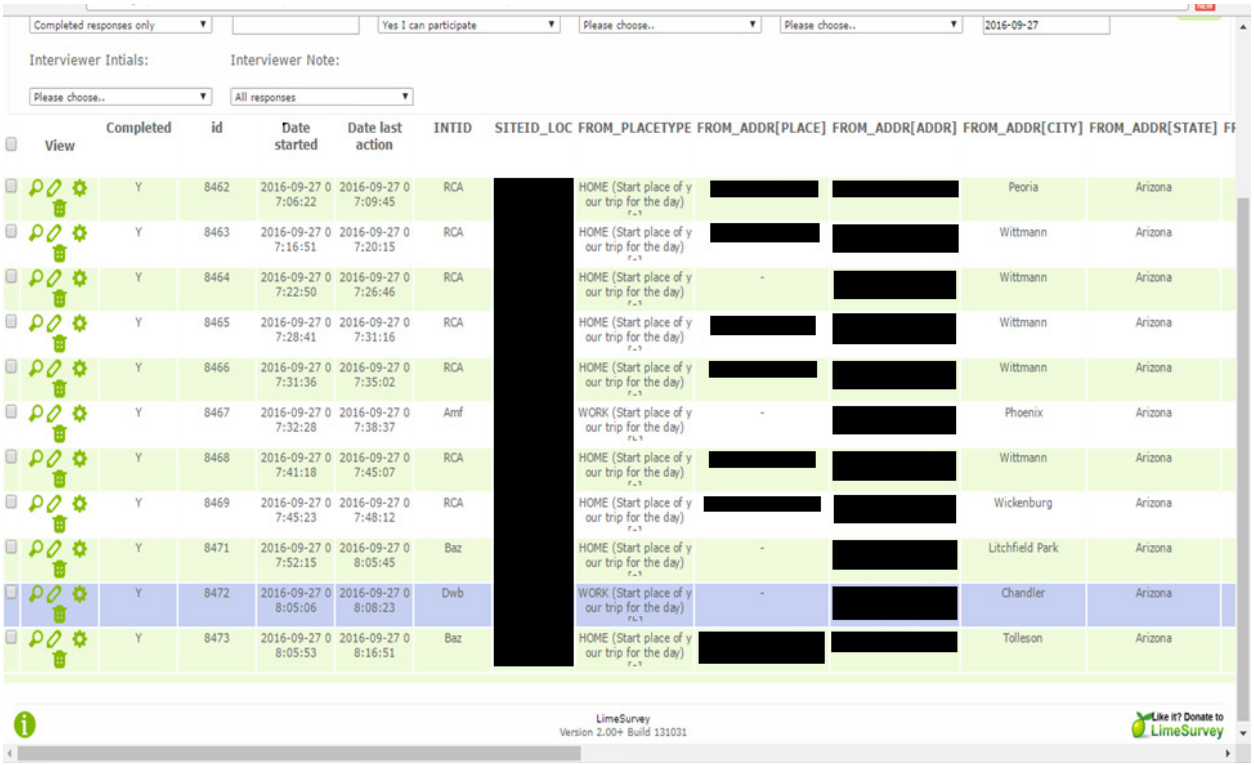
- Supervisors were instantly able to view the number of records completed by site, time period, and survey type (employee/visitor), which supports effective management of sampling goals.
- The dashboard also displayed a breakdown of the overall trip information and demographics that were collected.
- The dashboard then went one step further by providing a breakdown of that same information for each individual surveyor. Individual surveyor data reviews were typically completed while the interviewer was working on the site and the findings were discussed with that surveyor when they checked in with the supervisor. This allowed the research team to provide immediate feedback to surveyors to improve their overall performance.
- These instant data breakdowns allowed supervisors to ensure that sampling procedures were being followed appropriately.

Field Supervisor Online Review Tool

In addition to being able to review various breakdowns of data, supervisors were also able to review each individual survey record. This was typically done in the field as a way to make sure that trip data was being collected accurately by individual surveyors. Another benefit of supervisors being able to look up individual records by surveyor in database/spreadsheet form, is that it allowed them to monitor survey collection throughout the day, as well as the job performance of the surveyor. Supervisors were also able to visually review individual records by using the non-editable version of the online visual review tool. Example screenshots of the Field Supervisor's version of this online tool are shown below.

Figure 6.1 Different Ways to Review Trips in the Supervisor Dashboard





View	Completed	id	Date started	Date last action	INTID	SITEID_LOC	FROM_PLACETYPE	FROM_ADDR[PLACE]	FROM_ADDR[ADDR]	FROM_ADDR[CITY]	FROM_ADDR[STATE]	FF
	Y	8462	2016-09-27 07:06:22	2016-09-27 07:09:45	RCA	[redacted]	HOME (Start place of your trip for the day)	[redacted]	[redacted]	Peoria	Arizona	
	Y	8463	2016-09-27 07:16:51	2016-09-27 07:20:15	RCA	[redacted]	HOME (Start place of your trip for the day)	[redacted]	[redacted]	Wittmann	Arizona	
	Y	8464	2016-09-27 07:22:50	2016-09-27 07:26:46	RCA	[redacted]	HOME (Start place of your trip for the day)	-	[redacted]	Wittmann	Arizona	
	Y	8465	2016-09-27 07:28:41	2016-09-27 07:31:16	RCA	[redacted]	HOME (Start place of your trip for the day)	[redacted]	[redacted]	Wittmann	Arizona	
	Y	8466	2016-09-27 07:31:36	2016-09-27 07:35:02	RCA	[redacted]	HOME (Start place of your trip for the day)	[redacted]	[redacted]	Wittmann	Arizona	
	Y	8467	2016-09-27 07:32:28	2016-09-27 07:38:37	Amf	[redacted]	WORK (Start place of your trip for the day)	-	[redacted]	Phoenix	Arizona	
	Y	8468	2016-09-27 07:41:18	2016-09-27 07:45:07	RCA	[redacted]	HOME (Start place of your trip for the day)	[redacted]	[redacted]	Wittmann	Arizona	
	Y	8469	2016-09-27 07:45:23	2016-09-27 07:48:12	RCA	[redacted]	HOME (Start place of your trip for the day)	[redacted]	[redacted]	Wickenburg	Arizona	
	Y	8471	2016-09-27 07:52:15	2016-09-27 08:05:45	Baz	[redacted]	HOME (Start place of your trip for the day)	-	[redacted]	Litchfield Park	Arizona	
	Y	8472	2016-09-27 08:05:06	2016-09-27 08:08:23	Dwb	[redacted]	WORK (Start place of your trip for the day)	-	[redacted]	Chandler	Arizona	
	Y	8473	2016-09-27 08:05:53	2016-09-27 08:16:51	Baz	[redacted]	HOME (Start place of your trip for the day)	[redacted]	[redacted]	Tolleson	Arizona	

Additionally, supervisors or secret shoppers would also stop by worksites during survey administration to gauge surveyors' demeanor, overall behavior, and adherence to protocols during interviews. Site monitoring would be conducted a discreet distance away from the job site to visually observe surveyors' demeanor, overall behavior, and adherence to protocols. Changes were made as necessary to improve surveyor performance.

6.2 Survey Tracking

Throughout the course of the survey, reports on data collection were generated on a regular basis to provide MAG with updates on survey progress. These reports contained summaries of establishments that had been contacted, recruited, and surveyed as well as the number of surveys and person counts where applicable.

Employee/Visitor survey

The recruitment information was provided by WGR while the field data was provided by ETC Institute and TRA. CS staff compiled the summaries to provide a single, more comprehensive source for survey monitoring.

Tables comparing the sampling targets to the number of establishments recruited and completed were the most important since they monitored progress as compared to the sampling plan. The final sampling adherence table can be seen in Table 6.1.

- Establishments with over 150 employees proved the most difficult for two reasons.
  - First, the target rates were higher because there were very few in the population. To get a minimum of 50 recruits, almost 3.5% of the population would need to participate as opposed to less than 1.5% for the smaller firms.
  - Second, surveying larger firms required approval from several employees, which often raised the chances of a denial to participate.
- The other segments that proved the most difficult to recruit were in the industrial, heavy, and construction sectors. Surveyors found that in addition to lack of participation, many of the construction firms, which made up a large portion, had very little visitor activity at the establishment location. Their work and transportation activity tended to be focused at work sites.
- Overall, the survey effort was extremely successful in meeting sampling plan requirements.

Commercial vehicle survey

The commercial vehicle survey had lower overall targets required. As a result, its process and timeline were much shorter. Monitoring this survey involved only getting updates on the number of surveys in each target segment. Table 6.2 shows that each of the targets was met for every cell in the sampling plan.

Table 6.1 Sampling Plan Adherence for Employee/Visitor Survey

	High Job Density		Medium Job Density		Low Job Density			
Number of Employees	**0-9**	**10-149**	**0-9**	**10-149**	**0-9**	**10-149**	**150+**	**Total**
Commerce	87%	101%	98%	83%	108%	145%		99%
Edu & Personal	94%	101%	102%	145%	98%	123%		105%
Industrial/Heavy/Construction	110%		82%	105%	60%			87%
Professional services	108%		116%		122%			115%
Total	**100%**		**103%**		**104%**		**40%**	**101%**

Table 6.2 Sampling Plan Adherence for the Commercial Vehicle Survey

	Collected		Percentage of Target	
Industry Category	**< 20,000 sq. ft.**	**> 20,000 sq. ft.**	**< 20,000 sq. ft.**	**> 20,000 sq. ft.**
Agriculture/Mining/Utility	20	4	100%	100%
Construction	82	15	100%	100%
Manufacturing	41	8	114%	114%
Retail trade	82	21	100%	140%
Services	38	7	106%	100%
Wholesale and Transportation/Warehousing	85	20	105%	133%
Total	348	75	103%	119%

6.3 Data Processing of Survey Records

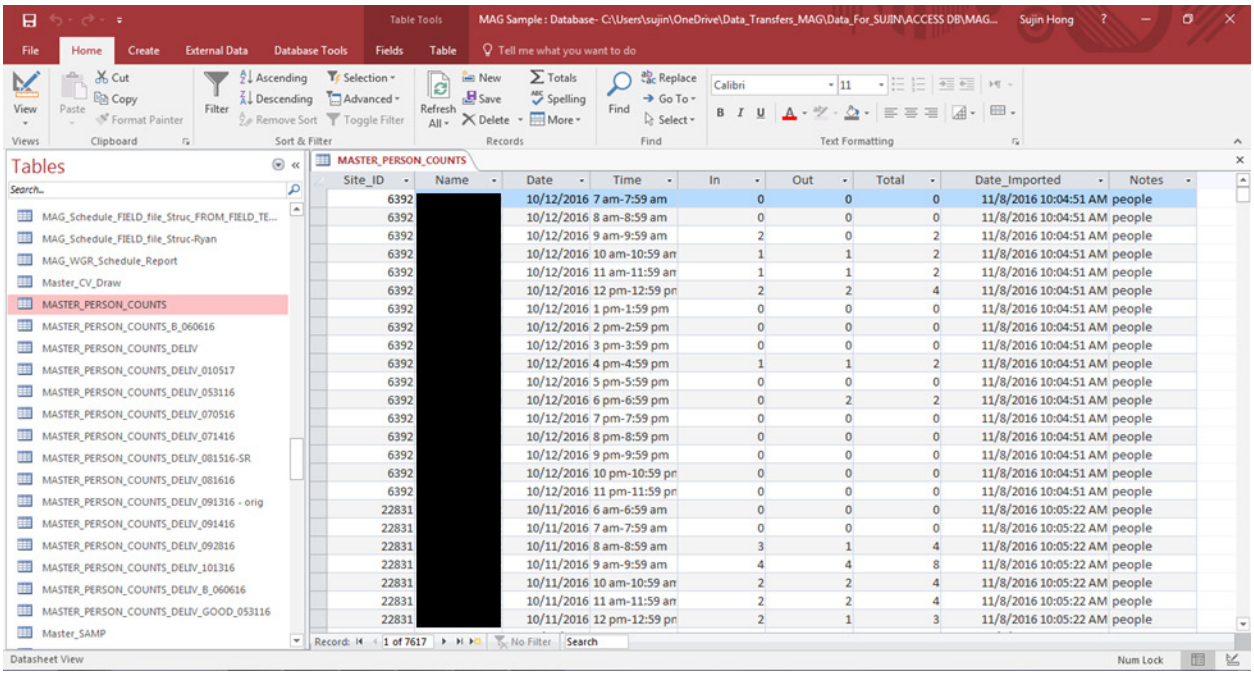
The establishment surveys collected count data, in-person surveys, web surveys, and recruit surveys. These databases came through various platforms and were extracted and imported into a master access database for verification and status update for each workplace sample. It was important that various data elements were verified in one database so that completion status of the site was confirmed and properly flagged for 'ready for delivery' records.

Person Counts

Person counts were collected in two ways: by sensor or by tablet. Person count data in excel format were uploaded by supervisors into the shared directory and a data analyst retrieved data and reviewed loadings of each time interval.

Once a person count file was reviewed, a person count data log in excel was updated to reflect this. Reviewed person count files were then imported into an access database. As files came in each day, they were appended into a cumulative master person count data table.

Figure 6.2 Person Count Database



Employee and Visitor Surveys

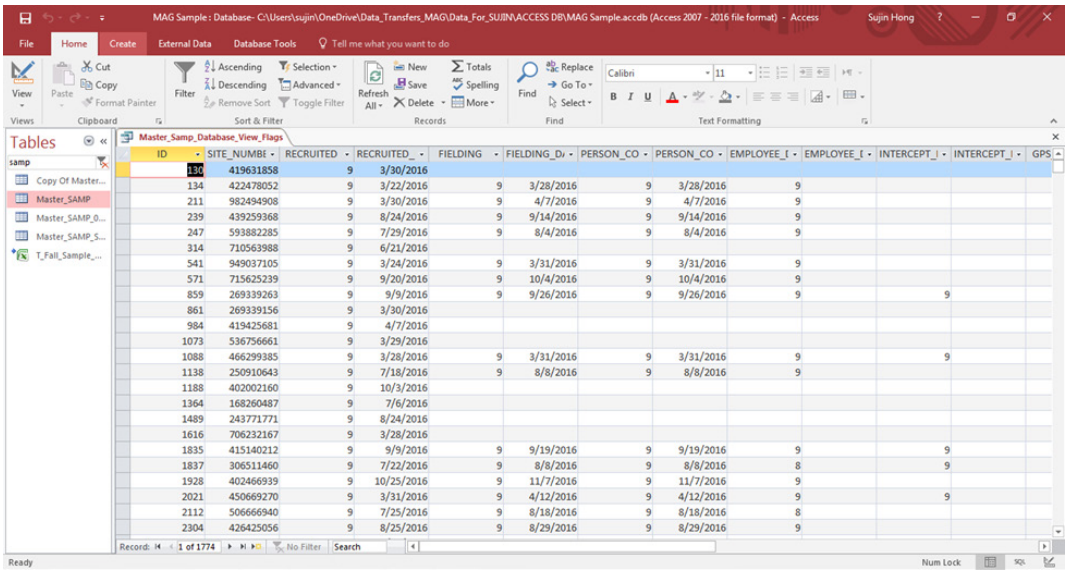
Both surveys were administered via LimeSurvey and the resulting data was stored in a SQL server. Raw data in the SQL server was copied into a local data table for processing and formatting.

In addition to creating a survey database, the survey team also created counters that tracked whether or not all the data elements were obtained from a particular establishment. Once all the elements were included, the establishment was considered to be "ready for delivery" and data were then transferred into the master access database.

Prior to final delivery, the following checks were performed. Any notable inconsistency or missing information were noted for further view.

- Alphabetical codes were recoded into numeric codes.
- Time formats were reviewed and corrected for a consistency.
- Interview duration was computed and flagged for illogical duration.
- Column header labels and orders were crosschecked with data dictionary.
- Time-logic checks were performed between arrival time and departure time.
- Location data were reviewed for any missing or incomplete data (e.g. missing city, missing zip code, incomplete address, etc.)

Figure 6.3 Master Survey Database in Microsoft Access



ID	SITE_NUMBE	RECRUITED	RECRUITED_	FIELDING	FIELDING_D/	PERSON_CO	PERSON_CO	EMPLOYEE_[	EMPLOYEE_[	INTERCEPT_I	INTERCEPT_I	GPS
130	419631858	9	3/30/2016									
134	422478052	9	3/22/2016	9	3/28/2016	9	3/28/2016	9				
211	982494908	9	3/30/2016	9	4/7/2016	9	4/7/2016	9				
239	439259368	9	8/24/2016	9	9/14/2016	9	9/14/2016	9				
247	593882285	9	7/29/2016	9	8/4/2016	9	8/4/2016	9				
314	710563988	9	6/21/2016									
541	949037105	9	3/24/2016	9	3/31/2016	9	3/31/2016	9				
571	715625239	9	9/20/2016	9	10/4/2016	9	10/4/2016	9				
859	269339263	9	9/9/2016	9	9/26/2016	9	9/26/2016	9		9		
861	269339156	9	3/30/2016									
984	419425681	9	4/7/2016									
1073	536756661	9	3/29/2016									
1088	466299385	9	3/28/2016	9	3/31/2016	9	3/31/2016	9		9		
1138	250910643	9	7/18/2016	9	8/8/2016	9	8/8/2016	9				
1188	402002160	9	10/3/2016									
1364	168260487	9	7/6/2016									
1489	243771771	9	8/24/2016									
1616	706232167	9	3/28/2016									
1835	415140212	9	9/9/2016	9	9/19/2016	9	9/19/2016	9		9		
1837	306511460	9	7/22/2016	9	8/8/2016	9	8/8/2016	8		9		
1928	402466939	9	10/25/2016	9	11/7/2016	9	11/7/2016	9				
2021	450669270	9	3/31/2016	9	4/12/2016	9	4/12/2016	9		9		
2112	506666940	9	7/25/2016	9	8/18/2016	9	8/18/2016	8				
2304	426425056	9	8/25/2016	9	8/29/2016	9	8/29/2016	9				

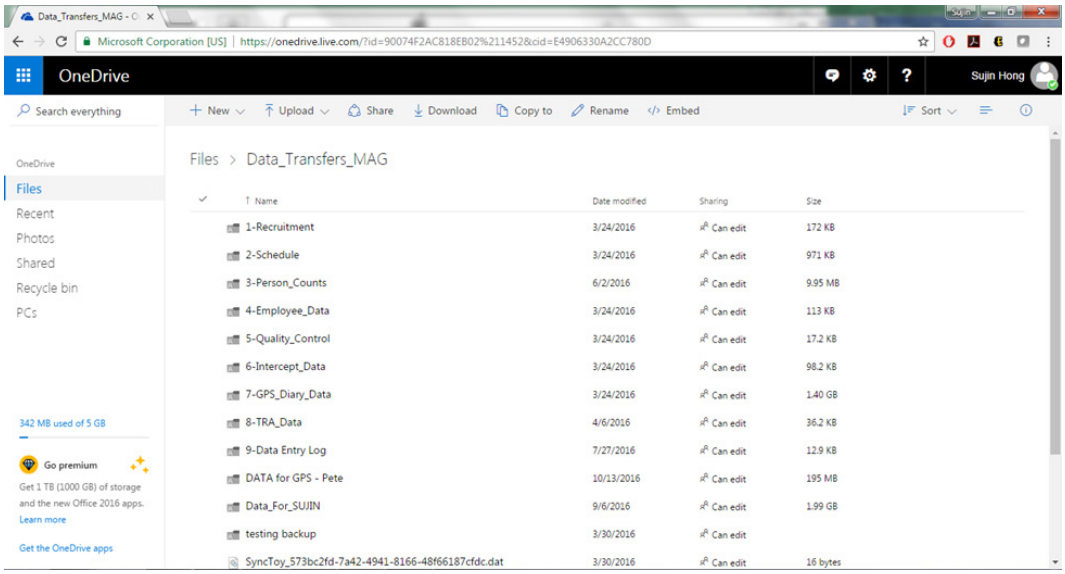
Geocoding

Geocoding of locations was performed real-time on the tablet as the locational data were entered. Matched addresses along with longitude and latitude for each location were stored in the LimeSurvey program. This is a primary advantage of doing surveys using tablets that do real-time geocoding.

Truck GPS

A supervisor retrieved the data from GPS unit and uploaded them to the shared secure shared project directory. A data analyst updated the GPS data log and updated GPS completion status in the master access database. Completed GPS diaries were mailed to ETC and entered in excel. As part of GPS post-data processing, simple verification steps were performed to ensure that both a GPS data log and a matching diary existed for each GPS vehicle.

Figure 6.4 Secure Shared Directory for Truck GPS Data



6.4 Survey Summaries

After the field checks were compiled and the survey records were assigned to the right format, CS developed preliminary data summaries to ensure that the data collected produced reasonable results. This was especially important for the employee and visitor surveys where data were collected under a non-curated field data collection environment.

Employee Survey

The employee survey was checked across several dimensions to check for reasonableness including: socio-demographics, modal choices, and travel behavior. Survey data were compared against ACS 2012-2016 data. Key summaries are discussed below:

- The employee surveys show variation across different socio-demographic strata:
  - Respondents were under-sampled from 1-person households when compared to the ACS, and over-sampled from 3 and 4+ households. The effect of this selection cascades down to subsequent variables as well.
  - A very small number of respondents reporting belonging to zero auto households as compared to the ACS. Since larger households are over-sampled, there are greater than observed shares of households with 2 or more vehicles.
  - The age distribution matched reasonably well with the ACS, with the exception of adults aged 65+, who tend to have a larger share of non-workers.
  - There was reasonable representation of part-time workers in the survey database, which will likely allow analysts to test partial or full segmentation during model development.

- Income was the only question that a significant number of respondents chose not to answer. Among respondents that did answer, the income distributions tended to match the distributions of the ACS with the exception of the lowest income category.

- A majority of respondents reported traveling to work by car, which is reasonable for the MAG region. A vast majority of respondents also reported traveling directly to and from home to reach their workplace, which is consistent with household survey data from across the country.

Overall, the survey data looked reasonably well distributed across a wide range of choices and did not appear to be unduly biased towards any particular choices.

Table 6.3 Socio-Demographic Summary of Surveyed Employees

HOUSEHOLD SIZE	NUMBER OF SURVEYS	SHARE	ACS 2012-2016	SHARE
1	813	14%	427,367	27%
2	1,973	34%	552,156	35%
3	1,152	20%	228,645	14%
4 OR MORE	1,942	33%	388,473	24%
TOTAL	5,880	100%	1,596,641	100%

NUMBER OF VEHICLES	NUMBER OF SURVEYS	SHARE	ACS 2012-2016	SHARE
0	135	2%	102,538	6%
1	1,189	20%	599,283	38%
2	2,609	44%	621,135	39%
3+	1,947	33%	273,685	17%
TOTAL	5,880	100%	1,596,641	100%

GENDER	NUMBER OF SURVEYS	SHARE	ACS 2012-2016	SHARE
MALE	2,698	46%	1,072,875	54%
FEMALE	3,173	54%	909,764	46%
PREFER NOT TO ANSWER	9	--		
GENDER	5,880	100%	1,982,639	100%

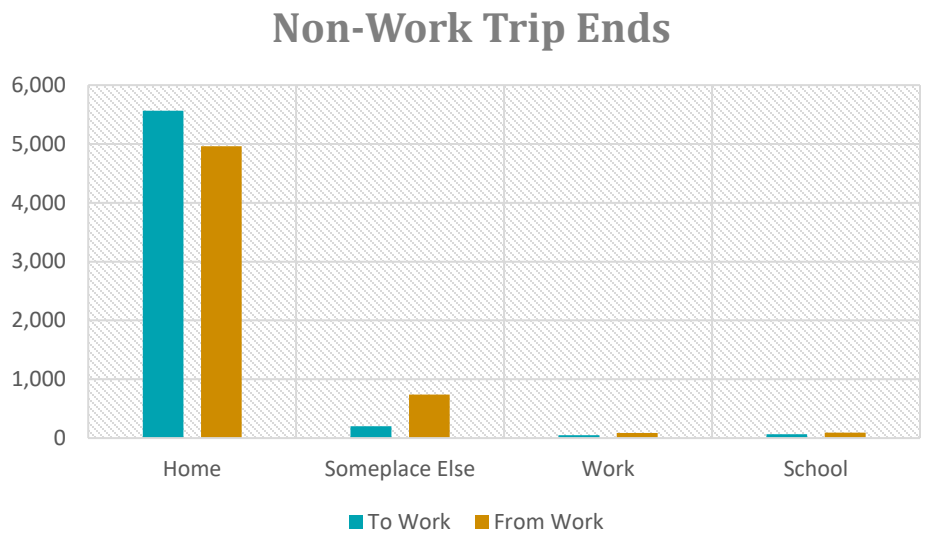
EMPLOYMENT STATUS	NUMBER OF SURVEYS	SHARE	ACS 2012-2016	SHARE
FULL-TIME (>35 HRS PER WEEK)	4,883	83%	1,396,764	67%
PART-TIME (0-34 HRS PER WEEK)	966	17%	696,429	33%
OTHER	31	1%		---
TOTAL	5,880	100%	2,093,193	100%

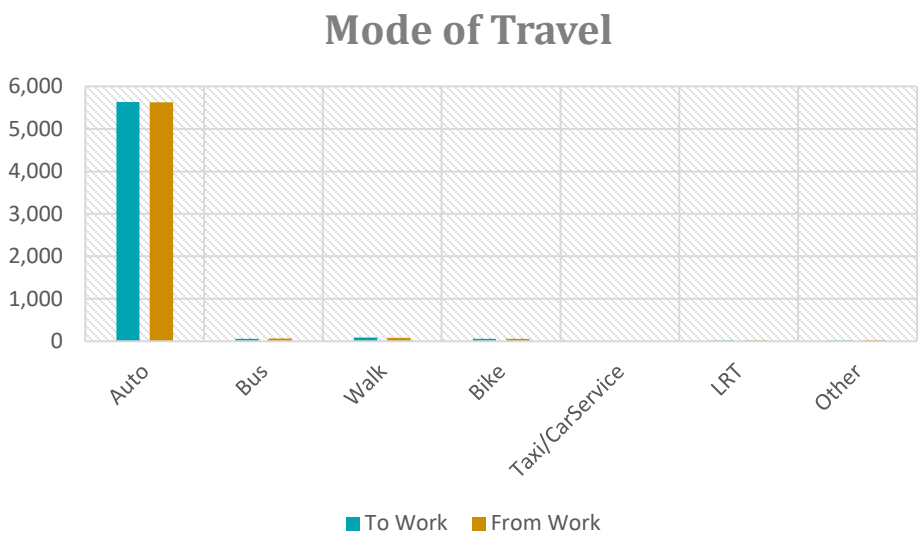
Note: The employment total for 2016 in MAG socio-economic projections is 2,050,412.

HOUSEHOLD INCOME	NUMBER OF SURVEYS	SHARE	ACS 2012-2016	SHARE
LESS THAN $20,000	379	7%	252,394	16%
$20,000 - $50,000	1,681	32%	468,238	29%
$50,000 - $75,000	1,015	19%	298,479	19%
OVER $75,000	2,164	41%	577,530	36%
NOT ANSWERED	641			
TOTAL	5,880	100%	1,596,641	100%

AGE	NUMBER OF SURVEYS	SHARE	ACS 2012-2016	SHARE
16/18-44	3044	52%	1,182,621	63%
45-54	1,302	22%	424,588	23%
55-64	1,069	18%	168,298	9%
65+	370	6%	89,408	5%
PREFER NOT TO ANSWER	95	2%	-	0%
TOTAL	5880	100%	1,864,915	100%

Figure 6.5 Modal Choices and Travel Behavior





Visitor Survey

Similar survey summaries were also generated for the visitor survey to check for the reasonableness of the dataset. The visitor surveys show reasonable variation across different socio-demographic strata:

- Larger households were represented more often in the visitor survey when compared to the ACS. This is expected since larger households tend to make more trips to a variety of establishments.
- The vehicle ownership distribution in the survey is very different from the ACS distribution of vehicle ownership. The visitor survey over-represents two vehicle households, while significantly under-representing households with 3 or more vehicles.
- Respondents reported belonging to a wide variety of age-groups, ranging from 18-24 to over 75 years old and the distribution in the survey is comparable to observed distributions in the ACS.
- Income was the only question that a significant number of respondents chose not to respond to. Among respondents that did report income, the survey-reported shares of income match reasonably well when compared to ACS-reported income shares.
- As in the case of the employee survey, a majority of respondents reported traveling to the establishment where they were interviewed by car. However, there were more walk trips in the visitor survey than in the employee survey. A vast majority of respondents also reported making no stops on either their outbound or inbound trip to the site where they were interviewed. Fewer than 10 percent of respondents reported making 2 or more stops on their entire tour. This distribution is consistent with observations from household surveys across the US.

Overall, the visitor survey data looked reasonably well-distributed across a wide range of choices and did not appear to be unduly biased towards any particular choice.

Table 6.4 Socio-Demographic Summary of Surveyed Visitors'

HOUSEHOLD SIZE	NUMBER OF SURVEYS	SHARE	ACS 2012-2016	SHARE
1	908	16%	427,367	27%
2	1,910	34%	552,156	35%
3	1,008	18%	228,645	14%
4 OR MORE	1,848	32%	388,473	24%
TOTAL	5,674	100%	1,596,641	100%

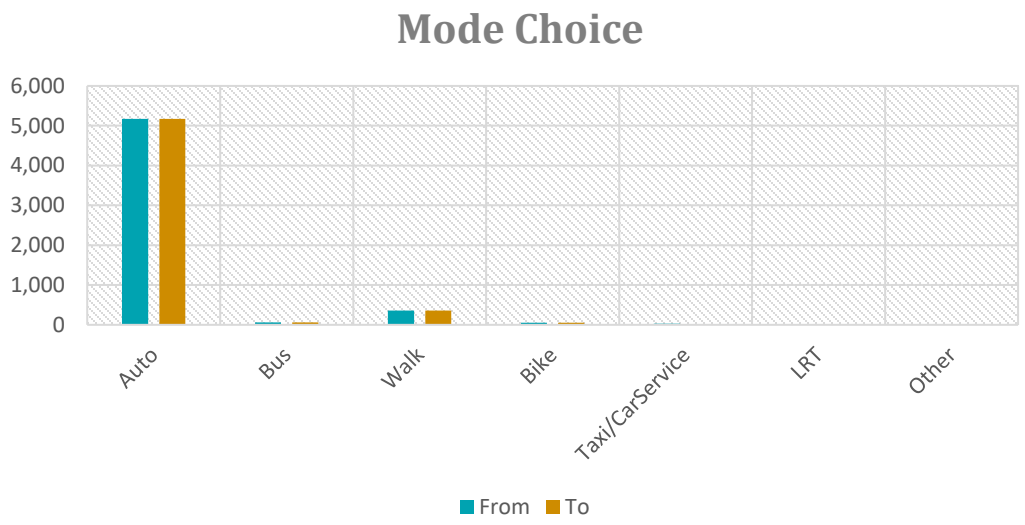
NUMBER OF VEHICLES	NUMBER OF SURVEYS	SHARE	ACS 2012-2016	SHARE
0	234	4%	102,538	6%
1	1,358	24%	599,283	38%
2	2,378	42%	621,135	39%
3+	1,704	30%	273,685	17%
TOTAL	5,674	100%	1,596,641	100%

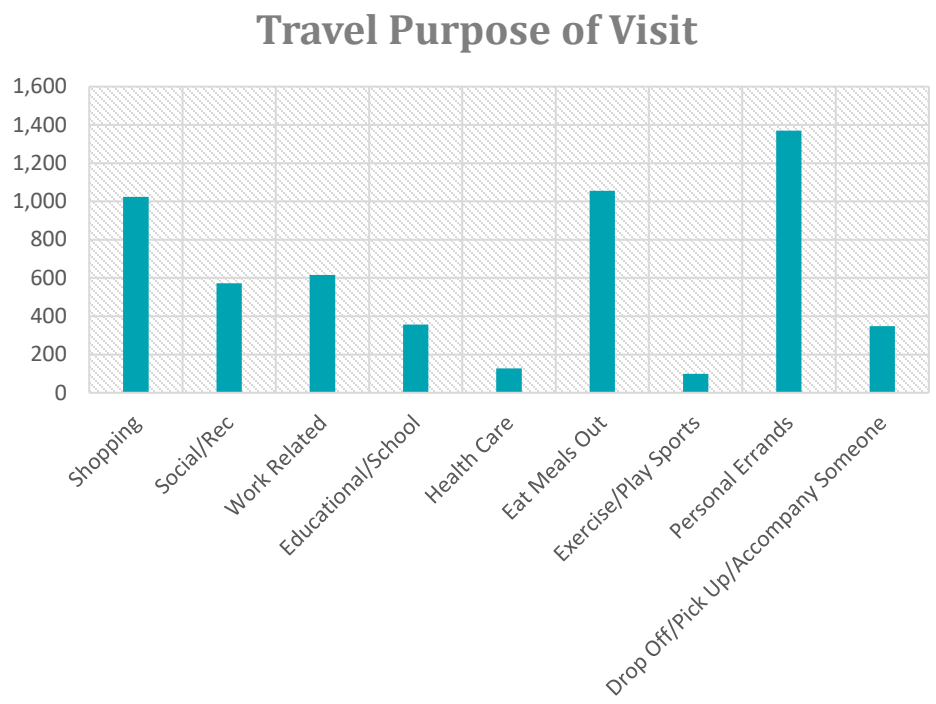
GENDER	NUMBER OF SURVEYS	SHARE	ACS 2012-2016	SHARE
MALE	3,085	54%	1,072,875	54%
FEMALE	2,601	46%	909,764	46%
GENDER	5,686	100%	1,982,639	100%

HOUSEHOLD INCOME	NUMBER OF SURVEYS	SHARE	ACS 2012-2016	SHARE
LESS THAN $20,000	509	10%	252,394	16%
$20,000 - $50,000	1,567	33%	468,238	29%
$50,000 - $75,000	900	18%	298,479	19%
OVER $75,000	1,953	40%	577,530	36%
NOT ANSWERED	764			
TOTAL	5,693	100%	1,596,641	100%

AGE	NUMBER OF SURVEYS	SHARE	ACS 2012-2016	SHARE
16/18-44	2,667	47%	1,182,621	63%
45-54	1,029	18%	424,588	23%
55-64	922	16%	168,298	9%
65+	1,027	18%	89,408	5%
PREFER NOT TO ANSWER	48	1%	-	5%
TOTAL	5,693	100%	1,864,915	105%

Figure 6.6 Visitor Travel Behavior and Modal Choices





		# of Inbound Stops			
		0	**1**	**2**	**3**
# of Outbound Stops	**0**	67.90%	11.10%	1.70%	0.20%
	1	12.60%	2.70%	0.30%	0.00%
	2	2.20%	0.50%	0.00%	0.10%
	3	0.50%	0.10%	0.00%	0.00%

6.5 Back-End Quality Assurance Checks

In addition to the processing and cleaning performed by the surveyors, CS compiled the data and developed a series of automated QA/QC checks. This process tests the databases for several types of potential issues:

- The most obvious is missing information or entries in the databases that do not have responses for questions. This is not relevant to all questions since some questions are not relevant for certain individuals.
- The second is illogical or incorrect data, such as the arrival time for a trip appearing to be earlier than its departure time. This effort will help identify cases in which the survey respondent made mistakes or misinterpreted questions. In the extreme case of large numbers of respondents are not properly answering a question, it could identify issues on the survey.
- The third is errors in entering and processing the data. This can take the form of offset columns or mislabeled data. Such errors can be fixed by going back to the raw responses and reprocessing to produce new output. Other related issues include incorrect geocoding of locations.
- The last type of error is misinterpretation. The coding of variables could either be misunderstood or read in the wrong format. It can be as simple as a time stamp being read as 24 hour format rather than 12 hour format or the expectation of an answer for an inapplicable question. This does not require corrections, but it is important as it affects the use of the data in the future.

A formal procedure was coded into a script to run a series of checks on the worker and visitor datasets. These checks were classified into two tiers – regular flags and critical flags – with the critical marking issues in the most important variables. The regular flags marked cases where more peripheral information was missing as well as non-errors of note were recorded (i.e. "survey took longer than 15 minutes")

Table 6.5 shows the results from the employee survey.

- Notably, neither the mode nor the location in latitude/longitude coordinates were missing from any surveys.
- 11% of respondents refused to give their income. This is in-line with missing income in other transportation surveys and, in fact, lower than in some recent surveys. Since there were still over 85% of valid records, the team made a decision to drop all records that had missing income from future analysis.

- The second largest set of critical errors occurred in the missing destination type or activity. For modeling purposes many of these records can still be used as they have the other information from which the activity can be inferred.
- In total, only 875 employee survey records were dropped from the final database for additional analysis. The remaining 5,000 or so surveys were included in expansion and weighting procedures and will also likely be retained for modeling purposes.

Table 6.5 Employee Survey QA/QC Checks

#	DESCRIPTION	CRITICAL	FREQUENCY	PERCENT
1	Employee has NO critical errors	1	5,011	85%
2	Missing origin type/activity	1	0	0%
3	Missing origin lat/long	1	0	0%
4	Missing prior origin type/activity	1	2	0%
5	Missing prior origin lat/long	1	0	0%
6	Missing mode to work	1	0	0%
7	Missing destination origin type/activity	1	199	3%
8	Missing destination lat/long	1	0	0%
9	Missing mode from work	1	0	0%
10	Missing home lat/long	1	0	0%
11	Missing age	1	95	2%
12	Missing household size	1	9	0%
13	Missing income	1	641	11%
14	Started time after completed time	0	1	0%
15	Survey took longer than 15 minutes	0	820	14%
16	Missing employer name	0	0	0%
17	Missing work arrival or departure time	0	56	1%
18	Arrival time after departure time	0	163	3%
19	Missing origin name	0	32	1%
20	Missing origin address	0	0	0%
21	Missing prior origin name	0	2	0%
22	Missing prior origin address	0	0	0%
23	Missing auto trip party size	0	8	0%
24	Auto trip party size is 0	0	0	0%
25	Missing transit access	0	4	0%
26	Missing destination name	0	0	0%
27	Missing destination address	0	0	0%
28	Missing return auto trip party size	0	91	2%
29	Auto trip party size is 0	0	0	0%
30	Missing transit access	0	77	1%
31	Missing home address	0	0	0%
32	Missing daily mode	0	6	0%
33	Missing household vehicles	0	4	0%

#	DESCRIPTION	CRITICAL	FREQUENCY	PERCENT
34	Missing gender	0	9	0%

Due to the structure of the survey questionnaire, there were many more checks for the visitor survey as shown in Table 6.6. As in the case of the employee survey, most of the survey records passed all critical tests and were deemed usable in future analyses.

- A small number of records were missing location or time for one of their trips.
- Nearly 13 percent of respondents refused to give income information and these records were dropped from the final dataset.
- In total, nearly 4,900 visitor surveys passed all checks and were deemed usable in future analysis.

Table 6.6 Visitor Survey QA/QC Checks

SL. NO.	DESCRIPTION	CRITICAL	FREQUENCY	PERCENT
1	Survey has NO critical errors	1	4,893	86%
2	Missing activity	1	0	0%
3	Missing to mode	1	0	0%
4	Missing prior origin lat/long	1	14	0%
5	Missing age	1	48	1%
6	Missing household size	1	19	0%
7	Missing income	1	764	13%
8	Started time after completed time	0	0	0%
9	Survey took longer than 15 minutes	0	359	6%
10	Missing gender	0	7	0%
11	Missing work arrival or departure time	0	23	0%
12	Arrival time after departure time	0	15	0%
13	Missing frequency	0	5	0%
14	Missing to auto trip party size	0	2	0%
15	Missing prior origin type/activity	0	0	0%
16	Missing prior origin name	0	42	1%
17	Missing prior origin address	0	0	0%
18	Missing prior arrival or departure time	0	14	0%
19	Prior arrival time after departure time	0	23	0%
20	Missing to auto trip party size	0	0	0%
21	Missing prior2 origin type/activity	0	0	0%
22	Missing prior2 origin name	0	18	0%
23	Missing prior2 origin address	0	0	0%
24	Missing prior2 origin lat/long	0	0	0%
25	Missing prior2 arrival or departure time	0	11	0%
26	Prior2 arrival time after departure time	0	1	0%
27	Missing prior2 auto trip party size	0	0	0%
28	Missing prior3 origin type/activity	0	0	0%

SL. NO.	DESCRIPTION	CRITICAL	FREQUENCY	PERCENT
29	Missing prior3 origin name	0	1	0%
30	Missing prior3 origin address	0	0	0%
31	Missing prior3 origin lat/long	0	0	0%
32	Missing prior3 arrival or departure time	0	7	0%
33	Prior3 arrival time after departure time	0	0	0%
34	Missing prior3 auto trip party size	0	0	0%
35	Missing prior3 origin type/activity	0	0	0%
36	Missing prior4 origin name	0	0	0%
37	Missing prior4 origin address	0	0	0%
38	Missing prior4 origin lat/long	0	0	0%
39	Missing prior4 arrival or departure time	0	1	0%
40	Prior4 arrival time after departure time	0	0	0%
41	Missing prior4 auto trip party size	0	0	0%
42	Missing destination origin type/activity	0	5	0%
43	Missing destination origin name	0	187	3%
44	Missing destination origin address	0	0	0%
45	Missing destination origin lat/long	0	0	0%
46	Missing destination arrival or departure time	0	48	1%
47	Destination arrival time after departure time	0	7	0%
48	Missing destination auto trip party size	0	0	0%
49	Missing destination2 origin type/activity	0	2	0%
50	Missing destination2 origin name	0	6	0%
51	Missing destination2 origin address	0	0	0%
52	Missing destination2 origin lat/long	0	0	0%
53	Missing destination2 arrival or departure time	0	18	0%
54	Destination2 arrival time after departure time	0	1	0%
55	Missing destination2 auto trip party size	0	0	0%
56	Missing destination3 origin type/activity	0	0	0%
57	Missing destination3 origin name	0	0	0%
58	Missing destination3 origin address	0	0	0%
59	Missing destination3 origin lat/long	0	2	0%
60	Missing destination3 arrival or departure time	0	116	2%
61	Destination3 arrival time after departure time	0	0	0%
62	Missing destination3 auto trip party size	0	0	0%
63	Missing destination3 origin type/activity	0	0	0%
64	Missing destination3 origin name	0	0	0%
65	Missing destination3 origin address	0	0	0%
66	Missing destination3 origin lat/long	0	0	0%
67	Missing destination3 arrival or departure time	0	0	0%
68	Destination3 arrival time after departure time	0	0	0%
69	Missing destination3 auto trip party size	0	0	0%
70	Missing household vehicles	0	18	0%

7. Survey Expansion

As described in previous chapters, the MAG establishment survey process comprises of several different surveys – establishment recruitment surveys, employee surveys, visitor surveys, commercial vehicle telephone surveys, and truck GPS data collection. Among these, the employee and visitor surveys, and the commercial vehicle telephone surveys were expanded to population controls. In this chapter, survey results are described for each of the three surveys, followed by expansion procedures and the results from the expansions.

7.1 Commercial Vehicle Survey Expansion

The commercial vehicle survey targeted freight-focused industries that are central to the development and enhancement of the MAG freight model. The sample size comprised of 400 establishments and the sample was segmented into 12 categories. As a result, the number of establishments targeted in each cell of the sampling table was relatively small. Table 7.1 describes the sampling plan targets for this commercial vehicle establishment survey. As can be seen in the table, expected response rates vary by industry sector as well as establishment square footage. The highest sampling rate is over 3 percent for the agriculture/mining/utility industry sector; while the lowest sampling rate is 0.05 percent for the services industry. It should be noted that the services industry is not a core sector in the MAG freight model; rather it is a catch-all for all other industry segments that are expected to have some commercial vehicle activity.

Table 7.1 Commercial Vehicle Survey Targets and Rates

INDUSTRY SEGMENT	TARGET			TARGET RATE		
	Less than 20,000 sq. ft.	Over 20,000 sq. ft.	All	Less than 20,000 sq. Ft.	Over 20,000 sq. ft.	All
AGRICULTURE/MINING/UTILITY	20	4	24	3.4%	3.2%	3.3%
CONSTRUCTION	82	15	97	0.7%	2.7%	0.8%
MANUFACTURING	36	7	43	1.1%	0.5%	1.0%
RETAIL TRADE	82	15	97	0.5%	0.4%	0.5%
SERVICES	36	7	43	0.05%	0.05%	0.05%
WHOLESALE AND TRANSPORTATION/ WAREHOUSING	81	15	96	1.3%	1.1%	1.3%
TOTAL	337	63	400	0.29%	0.30%	0.29%
TOTAL, WITHOUT SERVICES				**0.92%**	**0.92%**	**0.92%**

The expansion procedures for this survey were designed to scale the surveyed establishments to match the universe of all establishments belonging to each segment of industry group and size by floor area. The InfoGroup database, which was used as the sampling frame, was used to estimate the population of establishments within each segment. Table 7.2 shows a comparison of the sampling frame to the actual number of surveyed establishments. The survey met or exceeded sampling requirements in all the cells of the table.

Table 7.2 Commercial Vehicle Survey Targets and Actual Completions

INDUSTRY SEGMENT	TARGET			COMPLETES		
	Less than 20,000 sq. ft.	Over 20,000 sq. ft.	All	Less than 20,000 sq. Ft.	Over 20,000 sq. ft.	All
AGRICULTURE/MINING/UTILITY	20	4	24	20	4	24
CONSTRUCTION	82	15	97	82	15	97
MANUFACTURING	36	7	43	41	8	49
RETAIL TRADE	82	15	97	82	21	103
SERVICES	36	7	43	38	7	45
WHOLESALE AND TRANSPORTATION/WAREHOUSING	81	15	96	85	20	105
TOTAL	**337**	**63**	**400**	**348**	**75**	**423**

Table 7.3 compares the number of surveyed establishments against the universe of establishments in the sampling frame. The completed surveys were ultimately expanded to match the totals in the sample population.

Table 7.3 Commercial Vehicle Survey Targets and Actual Completions

INDUSTRY SEGMENT	SAMPLE POPULATION			COMPLETES		
	Less than 20,000 sq. ft.	Over 20,000 sq. ft.	All	Less than 20,000 sq. ft.	Over 20,000 sq. ft.	All
AGRICULTURE/MINING/UTILITY	595	127	722	20	4	24
CONSTRUCTION	11,174	556	11,730	82	15	97
MANUFACTURING	3,219	1,327	4,546	41	8	49
RETAIL TRADE	15,247	3,451	18,698	82	21	103
SERVICES	78,785	13,994	92,779	38	7	45
WHOLESALE AND TRANSPORTATION/WAREHOUSING	6,284	1,359	7,643	85	20	105
TOTAL	**115,304**	**20,814**	**136,118**	**348**	**75**	**423**

Table 7.4 outlines the weight assigned to each cell in the table. As the table shows, this results in a very reasonable range of 30 to 186, for establishments not in the services sector. The factors for the service industry are considerably higher since this industry sector was sampled at a much lower rate owing to its low importance to freight movement and modeling.

Table 7.4 Average Weight for Each Cell in the Sampling Table

INDUSTRY SEGMENT	AVERAGE EXPANSION WEIGHT		
	Less than 20,000 sq. ft.	Over 20,000 sq. ft.	All
AGRICULTURE/MINING/UTILITY	30	32	30
CONSTRUCTION	136	37	121
MANUFACTURING	79	166	93
RETAIL TRADE	186	164	182
SERVICES	2,073	1,999	2,062
WHOLESALE AND TRANSPORTATION/WAREHOUSING	74	68	73

7.2 Employee/Visitor Survey Expansion

Surveys were received from workers, visitors, or both from surveyed establishments. Workers and visitors were treated as mutually-exclusive groups with distinct questionnaires presented to each segment. Within the ethos of activity-based modeling, their activity at the surveyed location is very different and their trip choices are often driven by different constraints. For these reasons, the expansion of these surveys was done using separate frameworks.

To properly weight and expand the employee and visitor survey responses, one needs to calculate the population and how the completed surveys relate to the overall population.

- Workers surveyed are primarily assumed to represent employees at their location; and secondarily, represent other establishments similar to the surveyed site. As such, employee survey weights for each establishment must account for the two sets of population totals.
- While the expansion of the employee survey is fairly clear-cut, expansion of the visitor survey is slightly more complex. First, the number of visitors at the surveyed sites must be calculated after accounting for the number of employees and must then be expanded to account for non-surveyed sites.

Employee Survey Expansion

The employee surveys were expanded to represent all employees in the MAG region. The segments for the expansion are the same as the ones used in the sampling plan – establishments by employment size, area type, and industry group.

- In step one, at each establishment, surveys are given a weight equal to the ratio of (self-reported) employees to the number of surveys.
- In step two, for each segment, a factor equal to the ratio of total (InfoGroup) employees to weighted surveys is calculated.

The factor for step one is calculated by this equation:

$$F_i = \frac{e_i}{s_i}$$

Where

F_i = expansion factor at establishment i

s_i = number of surveys from establishment i

e_i = number of employees at establishment i

The factor for step two is calculated by this equation:

$$F_m = \frac{E_m}{WS_m}$$

Where

F_m = expansion factor to universe of core establishments for segment m

m = segment of establishments (defined by size, location and industry type)

E_m = total number of employees in segment m

WS_m = weighted sum of surveys from establishments in segment m

Table 7.5 describes the total number of valid surveys in the employee survey, while Table 7.6 shows the total number of employees in the surveyed establishments at sampling cell level. As can be seen, nearly 50 percent of all employees in the surveyed establishments provided valid survey information. Table 7.7 describes the average weight assigned to each segment to account for response rates by sampling segment. It must be noted that the weights were calculated at an establishment level, but are shown at a segment level in the report to simplify the table structure.

Table 7.8 shows the total number of employees in the InfoGroup database by sampling segment and Table 7.9 shows the average weight assigned to each cell in the sampling segment database to account for non-surveyed establishments. The weights in Table 7.7 and Table 7.9 are multiplied together to calculate the final expansion weight for the employee surveys.

Table 7.5 Total Number of Valid Employee Surveys by Sampling Segment

	High Job Density		Medium Job Density		Low Job Density			
Number of Employees	**0-9**	**10-149**	**0-9**	**10-149**	**0-9**	**10-149**	**150+**	**Total**
Commerce	98	63	239	138	111	90	583	**821**
Edu & Personal	183	300	340	665	133	185		**2,307**
Industrial/Heavy/Construction	78	106	104	166	38	35	108	**635**
Professional services	89	548	173	291	84	63		**1,248**
Total	**448**	**1,017**	**856**	**1,260**	**366**	**373**	**691**	**5,011**

Table 7.6 Total Number of Employees in Surveyed Establishments by Sampling Segment

	High Job Density		Medium Job Density		Low Job Density			
Number of Employees	**0-9**	**10-149**	**0-9**	**10-149**	**0-9**	**10-149**	**150+**	**Total**
Commerce	176	433	384	415	213	257	1,300	**1,879**
Edu & Personal	282	755	566	1,368	229	657		**5,157**
Industrial/Heavy/Construction	138	323	173	537	58	176	595	**2,000**
Professional services	137	976	265	511	121	120		**2,130**
Total	**733**	**2,487**	**1,388**	**2,832**	**621**	**1,210**	**1,895**	**11,166**

Table 7.7 Average Weight to Account for Completion Rate

	High Job Density		Medium Job Density		Low Job Density			
Number of Employees	**0-9**	**10-149**	**0-9**	**10-149**	**0-9**	**10-149**	**150+**	**Total**
Commerce	1.80	6.87	1.61	3.01	1.92	2.86	2.23	**2.29**
Edu & Personal	1.54	2.52	1.66	2.06	1.72	3.55		**2.24**
Industrial/Heavy/Construction	1.77	3.05	1.66	3.23	1.53	5.03	5.51	**3.15**
Professional services	1.54	1.78	1.53	1.76	1.44	1.90		**1.71**
Total	**1.64**	**2.45**	**1.62**	**2.25**	**1.70**	**3.24**	**2.74**	**2.23**

Table 7.8 Total Employees in the InfoGroup Database by Sampling Segment

	High Job Density		Medium Job Density		Low Job Density			
Number of Employees	**0-9**	**10-149**	**0-9**	**10-149**	**0-9**	**10-149**	**150+**	**Total**
Commerce	21,531	64,137	41,507	142,001	15,897	54,899	107,583	**447,555**
Edu & Personal	39,249	83,094	81,107	138,487	31,154	59,966	262,932	**695,989**
Industrial/Heavy/Const.	18,910	59,310	32,568	71,318	15,150	19,815	166,183	**383,254**
Professional services	22,651	43,568	35,327	36,527	13,187	8,491	76,797	**236,548**
Total	**102,341**	**250,109**	**190,509**	**388,333**	**75,388**	**143,171**	**613,495**	**1,763,346**

Table 7.9 Average Weight by Sampling Segment to Account for Non-Surveyed Establishments

	High Job Density		Medium Job Density		Low Job Density		
Number of Employees	**0-9**	**10-149**	**0-9**	**10-149**	**0-9**	**10-149**	**150+**
Commerce	122	216	108	489	75	279	
Edu & Personal	139	110	143	101	136	91	202
Industrial/Heavy/Construction	137	184	188	133	261	113	279
Professional services	165	79	133	150	109	102	

Visitor Survey Expansion

All people who entered the establishment were counted along with a time of entry. People would be counted as many times as they entered the establishment during the survey period, and employees were also included in the counts. In the expansion and analysis however, employees and visitors of establishments are viewed as mutually-exclusive groups. While visitors were unlikely to visit more than once during a day (surveys confirm this), employees' entries had to be subtracted to generate an accurate measure of visitor activity.

Given that not every employee would be in attendance every day, and some employees may make multiple entries to the establishments, the weighted trip files from the regional HTS were used to derive the number of arrivals per employee by time-of-day. These numbers were subtracted from the total person counts to generate visitor counts. The number of trip ends per employee at their workplace was calculated to be: 1.22 (daily), 0.80 (AM), 0.29 (MD), 0.09 (PM), and 0.01 (night).

The expansion was implemented using the same segments used in the sampling plan comprising of four industry segments, three employee size categories, and three area type categories.

In addition, time-of-day segments were incorporated to derive expansion factors for each time period: AM (6-10am), MD (10am-3pm), PM (3-7pm), and NT (7pm-6am). The expansion followed a two-step process:

Expanding collected surveys to time-of-day counts for each establishment. An iterative proportional fitting (IPF) procedure was employed, as illustrated below. (Note the oscillating subscripts on sigma).

$$F^1_{i,t,m} = \frac{\sum_t (C_{i,t,m} - W_{i,m} \cdot a_{t,m})}{\sum_t S_{i,t,m}} \cdot F^0_{i,t,m} \text{ (scale by establishment)} \quad (1)$$

$$F^2_{i,t,m} = \frac{\sum_i (C_{i,t,m} - W_{i,m} \cdot a_{t,m})}{\sum_i S_{i,t,m}} \cdot F^1_{i,t,m} \text{ (scale by time of day)} \quad (2)$$

$$F^3_{i,t,m} = \frac{\sum_t (C_{i,t,m} - W_{i,m} \cdot a_{t,m})}{\sum_t S_{i,t,m}} \cdot F^2_{i,t,m} \text{ (scale by establishment)} \quad (3)$$

$$F^4_{i,t,m} = \frac{\sum_i (C_{i,t,m} - W_{i,m} \cdot a_{t,m})}{\sum_i S_{i,t,m}} \cdot F^3_{i,t,m} \text{ (scale by time of day)} \quad (4)$$

$$F^k_{i,t,m} = \frac{\sum_{\{i,t\}} (C_{i,t,m} - W_{i,m} \cdot a_{t,m})}{\sum_{\{i,t\}} S_{i,t,m}} \cdot F^{k-1}_{i,t,m} \quad (5)$$

where:

$F^k_{i,t,m}$ = Expansion factor for establishment *i* and time of day *t* after calculation of equation *k*; $F^0_{i,t,m}$=1

m = establishment segment (area type, size, and industry type)

t = Time-of-day period

i = Establishment ID

$C_{i,t,m}$= Person counts at establishment *i* and during time of day *t*

$W_{i,m}$ = Actual location employment size (from Infogroup data)

$a_{t,m}$ = Number of employee arrivals by time of day *t* per worker

$S_{i,t,m}$ = Total number of surveyed visitors during time-of-day period *t* at establishment *i*

The IPF procedure scales the surveys to total visits (minus worker entries) by establishment and by time of day separately. It was necessary because segmenting by establishment and time of day at the same time leads to very small sample sizes and often results in extreme factors. By considering the variables individually and iteratively, both targets can be matched while maintaining robustness. The procedure starts by scaling valid surveys to the counts at each establishment for the full day. Then, this is adjusted by scaling the expanded surveys to match counts by the four time of day periods for all establishments in the segment. A full iteration consists of 2 calculations, such as equations 1 and 2 or 3 and 4, scaling by each variable. This process is repeated until no more adjustment is necessary, i.e. $F^k_{i,t,m}$ is close to 1 (within 1%). Ten iterations were necessary to stabilize the weights and to achieve consistency with the count data.

Expanding each establishment to the universe of establishments for each segment based on employment size. The formula is given below.

$$F_m = \frac{E_m}{e_m} \quad (6)$$

where

F_m = expansion factor to universe of core establishments for segment *m*

j = segment of establishments (defined by size, location and industry type from Core Data)

E_m = total number of employees in segment *m*

e_m = number of employees from the surveyed establishments in segment *m*

Table 7.10shows the various sampling segments used in the visitor survey expansion. In total, there are 36 sampling segments, but they were aggregated into 28 segments for the purposes of survey expansion. Table 7.10 also shows the number of valid surveys in each segment that were used in the expansion procedure.

Table 7.10 Visitor Survey Expansion Segments

INDUSTRY	GEOGRAPHY	EMPLOYEE SIZE	SEGMENT	VISITOR SURVEYS
COMMERCE	High Job Density	0-9	1	273
EDU & PERSONAL	High Job Density	0-9	2	308
HEAVY INDUSTRIES	High Job Density	0-9	3	32
PROFESSIONAL SERVICES	High Job Density	0-9	4	50
COMMERCE	High Job Density	10-149	5	190
EDU & PERSONAL	High Job Density	10-149	6	138
HEAVY INDUSTRIES	High Job Density	10-149	7	24
PROFESSIONAL SERVICES	High Job Density	10-149	8	52
COMMERCE	Medium Job Density	0-9	9	508
EDU & PERSONAL	Medium Job Density	0-9	10	490
HEAVY INDUSTRIES	Medium Job Density	0-9	11	54
PROFESSIONAL SERVICES	Medium Job Density	0-9	12	226
COMMERCE	Medium Job Density	10-149	13	344
EDU & PERSONAL	Medium Job Density	10-149	14	128
HEAVY INDUSTRIES	Medium Job Density	10-149	15	59
PROFESSIONAL SERVICES	Medium Job Density	10-149	16	260
COMMERCE	Low Job Density	0-9	17	351
EDU & PERSONAL	Low Job Density	0-9	18	149
HEAVY INDUSTRIES	Low Job Density	0-9	19	17
PROFESSIONAL SERVICES	Low Job Density	0-9	20	286
COMMERCE	Low Job Density	10-149	21	642
EDU & PERSONAL	Low Job Density	10-149	22	104
HEAVY INDUSTRIES	Low Job Density	10-149	23	12
PROFESSIONAL SERVICES	Low Job Density	10-149	24	142
COMMERCE	High Job Density	150+	25	
COMMERCE	Medium Job Density	150+	25	22
COMMERCE	Low Job Density	150+	25	

INDUSTRY	GEOGRAPHY	EMPLOYEE SIZE	SEGMENT	VISITOR SURVEYS
EDU & PERSONAL	High Job Density	150+	26	0
EDU & PERSONAL	Medium Job Density	150+	26	
EDU & PERSONAL	Low Job Density	150+	26	
HEAVY INDUSTRIES	High Job Density	150+	27	5
HEAVY INDUSTRIES	Medium Job Density	150+	27	
HEAVY INDUSTRIES	Low Job Density	150+	27	
PROFESSIONAL SERVICES	High Job Density	150+	28	27
PROFESSIONAL SERVICES	Medium Job Density	150+	28	
PROFESSIONAL SERVICES	Low Job Density	150+	28	

Table 7.11 shows visitor counts by the 28 segments. On average, only about 5 percent of all visitors participated in the survey. This response rate is significantly lower than the response rate for employee surveys, but not wholly unexpected.

Table 7.11 Visitor Counts by Segment

SEGMENT	AM PEAK	MIDDAY	PM PEAK	OTHER	TOTAL
1	233	864	259	129	1,484
2	208	672	201	21	1,103
3	38	164	62	3	267
4	16	75	28	0	118
5	152	1,636	759	553	3,100
6	929	546	129	43	1,647
7	60	136	10	0	206
8	33	107	9	1	150
9	193	2,046	855	317	3,411
10	845	1,643	669	135	3,293
11	86	220	21	20	347
12	627	1,917	465	61	3,070
13	180	1,700	955	547	3,382
14	1,897	917	359	67	3,239
15	61	258	41	7	367
16	420	2,663	1,762	79	4,924
17	375	1,310	712	201	2,598
18	178	416	208	18	819
19	19	24	0	0	43
20	681	2,538	508	1	3,727
21	1,033	4,198	2,131	880	8,242
22	1,409	1,103	284	73	2,870
23	12	103	16	0	131
24	31	956	333	7	1,327
25	17	68	31	2	118
26	0	0	0	0	0

SEGMENT	AM PEAK	MIDDAY	PM PEAK	OTHER	TOTAL
27	2	15	0	0	17
28	348	784	281	135	1,549
TOTAL	**10,083**	**27,077**	**11,090**	**3,298**	**51,548**

Table 7.12 shows the number of establishments in the InfoGroup database within each survey expansion segment contrasted against surveyed establishments. Visitor surveys were expanded under Step 2 of the process to account for non-surveyed establishments in the region. As expected, this adjustment assigns a large average weight to each of the visitor surveys.

Table 7.12 Surveyed Establishments and Total Establishments by Segment

SEGMENT	SURVEYED ESTABLISHMENTS	REGIONAL ESTABLISHMENTS	NON-SURVEYED WEIGHTS
1	28	5,443	194.39
2	34	11,105	326.62
3	8	4,542	567.75
4	9	6,621	735.67
5	12	2,370	197.50
6	15	2,960	197.33
7	6	2,026	337.67
8	10	1,609	160.90
9	49	10,931	223.08
10	54	23,770	440.19
11	13	9,499	730.69
12	22	11,343	515.59
13	19	4,835	254.47
14	18	4,983	276.83
15	7	2,491	355.86
16	9	1,589	176.56
17	27	4,490	166.30
18	27	9,407	348.41
19	3	4,999	1666.33
20	17	4629	272.29
21	24	1,885	78.54
22	14	1,997	142.64
23	3	735	245.00
24	3	392	130.67
25	1	380	380.00
27	1	349	349.00
28	1	181	181.00

Table 7.13 and Table 7.14 show the total number of valid visitor surveys by sampling segment and weighted visitor surveys respectively. Overall, the visitor surveys expand to a total of about 11 million visitors. The High Job Density area attracts nearly 2 million visitors while the Medium Job Density area

establishments attract almost three times as many visitors. Commerce and professional services establishments attract the most number of visitors.

Table 7.13 Valid Visitor Surveys by Sampling Segment

	High Job Density		Medium Job Density		Low Job Density			
Number of Employees	**0-9**	**10-149**	**0-9**	**10-149**	**0-9**	**10-149**	**150+**	**Total**
Commerce	273	190	508	344	351	642	22	**2,330**
Edu & Personal	308	138	490	128	149	104	0	**1,317**
Industrial/Heavy/Construction	32	24	54	59	17	12	5	**203**
Professional services	50	52	226	260	286	142	27	**1,043**
Total	**663**	**404**	**1,278**	**791**	**803**	**900**	**54**	**4,893**

Table 7.14 Weighted Visitor Surveys by Sampling Segment

	High Job Density		Medium Job Density		Low Job Density			
Number of Employees	**0-9**	**10-149**	**0-9**	**10-149**	**0-9**	**10-149**	**150+**	**Total**
Commerce	282,685	788,888	704,339	960,447	362,228	901,362	42,388	**4,042,337**
Edu & Personal	304,760	310,393	1,181,654	478,102	240,809	365,395	0	**2,881,112**
Industrial/Heavy/ Const.	80,900	62,628	230,668	121,267	72,400	29,237	15,353	**612,453**
Professional services	68,644	14,849	1,095,626	1,215,310	682,640	250,326	421,744	**3,749,138**
Total	**736,989**	**1,176,758**	**3,212,286**	**2,775,126**	**1,358,077**	**1,546,320**	**479,485**	**11,285,040**

Appendix A. Commercial Vehicle Telephone Survey

```
QUESTIONNAIRE WITH SKIP PATTERNS
                        --------------------------------
                            (15:05:35  29 APR 2016)

QUESTIONNAIRE = MAGT2
VERSION : 4.5
                                        ****************************************
                                        *                                      *
*****************************           * _____ APPROVED AS IS                 *
*       CODE BOX            *           *                                      *
*                           *           * _____ APPROVED WITH CHANGES AS NOTED *
*  LT = LESS THAN    ( < )  *           *                                      *
*  GT = GREATER THAN ( > )  *           * _____ SEND ANOTHER DRAFT             *
*  EQ = EQUALS       ( = )  *           *                                      *
*  NE = NOT EQUAL TO ( # )  *           *                                      *
*****************************           * ____________________________________ *
                                        *              SIGNATURE               *
                                        ****************************************

GOOD MORNING/AFTERNOON.  THIS IS _______ CALLING ON BEHALF OF
THE MARICOPA ASSOCIATION OF GOVERNMENTS. I AM TRYING TO REACH
THE PERSON AT YOUR LOCATION THAT MANAGES OR IS MOST FAMILIAR
WITH RECEIVING AND SHIPPING.

AFTER REACHING (POTENTIALLY) CORRECT PERSON:
*****************************************************************

GOOD MORNING/AFTERNOON. THIS IS _______ CALLING ON BEHALF OF
THE MARICOPA ASSOCIATION OF GOVERNMENTS.

WE'RE CONDUCTING A VERY SHORT SURVEY ON TRUCK TRAVEL TO HELP
PLAN ROADWAY IMPROVEMENTS AND REDUCE CONGESTION.

YOUR RESPONSES WILL REMAIN CONFIDENTIAL AND DATA FROM THIS STUDY
WILL NOT BE RELEASED FOR INDIVIDUAL RESPONDENTS.

ALSO, WE KNOW YOUR TIME IS VALUABLE SO THE SURVEY IS ONLY ABOUT
5 MINUTES AND WE WILL SEND YOU $20 TO THANK YOU FOR YOUR HELP.

DO YOU HAVE 5 MINUTES TO DO THE SURVEY NOW ?
*****************************************************************

*******************************************************************************
```

```
1. FIRST, CAN I CONFIRM THAT THIS IS <<CO NAME>> LOCATED AT <<ADDRESS>>

   1. YES
   2. NO
   3. SAME COMPANY NAME / NEW ADDRESS / MISSING ADDRESS

   NOTE: IF 3: PROVIDE FULL MAILING ADDRESS IN "OTHER"

   OTHER LINE = 100

   SKIP AFTER   Q1 IF Q<1> EQ 2 THEN GO END
   SKIP AFTER   Q1 IF Q<1> NE 2 THEN GO 4

******************************************************************************
2. OTHER THAN UPS, FEDEX, AND GARBAGE TRUCKS, ARE THERE ANY
   TRUCKS WITH AT LEAST 6 WHEELS THAT DELIVER GOODS OR PROVIDE
   SERVICE AT YOUR WORKPLACE ?

   SURVEYOR: IF THE RESPONDENT SAID 'NO', PLEASE USE <<BUSINESS>>
             TO VERIFY THAT THE ANSWER IS LOGICAL

   1. YES
   2. NO

   SKIP AFTER   Q2 IF Q<2> EQ 1 THEN GO 4

******************************************************************************
3. DO YOU HAVE ANY TRUCKS OF YOUR OWN WITH AT LEAST 6 WHEELS THAT
   GO OUT FROM YOUR BUSINESS TO DELIVER GOODS OR PROVIDE SERVICE ?

   SURVEYOR: IF THE RESPONDENT SAID 'NO', PLEASE USE <<BUSINESS>>
             TO VERIFY THAT THE ANSWER IS LOGICAL

   1. YES
   2. NO

   SKIP AFTER   Q3 IF Q<3> EQ 2 THEN GO 43

******************************************************************************
4. WE ARE TRYING TO REACH FIRMS IN SELECTED INDUSTRIES.  WOULD YOUR
   COMPANY BE IN THE FIELD OF <<INDUSTRY>>?

   1. YES
   2. NO

   SKIP AFTER   Q4 IF Q<4> EQ 1 THEN GO 39

******************************************************************************
```

```
5. THEN WHICH OF THE FOLLOWING WOULD YOU SAY BEST DESCRIBES YOUR
   COMPANY'S INDUSTRY CATEGORY?

   READ ALL RESPONSES EXCEPT <<INDUSTRY>>

    1. AGRICULTURE
    2. MINING
    3. CONSTRUCTION
    4. RETAIL
    5. MANUFACTURING
    6. TRANSPORTATION
    7. WAREHOUSING
    8. UTILITY
    9. WHOLESALE TRADE
   10. SERVICE
   11. OTHER

   OTHER LINE = 101

(READ PRE-CODED RESPONSES-EXCEPT FOR 'DON'T KNOW', 'REFUSED', ETC)

   SKIP AFTER   Q5 IF Q<5> GE 4
                AND Q<5> LE 7 THEN GO 44
   SKIP AFTER   Q5 IF Q<5> GE 9
                AND Q<5> LE 10 THEN GO 44
   SKIP AFTER  Q5 GO  39

*******************************************************************************
6. AND FINALLY, WHICH OF THE FOLLOWING BEST DESCRIBES HOW MANY PEOPLE ARE
   EMPLOYED AT YOUR LOCATION?

    1. 1-4
    2. 5-9
    3. 10-19
    4. 20-49
    5. 50-99
    6. 100-249
    7. 250-499
    8. 500-999
    9. 1000+
   10. DON'T KNOW/REFUSED

(READ PRE-CODED RESPONSES-EXCEPT FOR 'DON'T KNOW', 'REFUSED', ETC)

   SKIP AFTER  Q6 GO  40

*******************************************************************************
```

7. NOW I AM GOING TO ASK YOU SOME QUESTIONS ABOUT TRUCK ARRIVALS AND DEPARTURES FROM YOUR LOCATION. FOR THESE QUESTIONS, WE ONLY WANT TO KNOW ABOUT TRUCKS THAT HAVE AT LEAST SIX WHEELS AND DO NOT WANT TO INCLUDE PICKUP TRUCKS OR MINIVANS WITH ONLY FOUR WHEELS.

   DO YOU HAVE ANY TRUCKS THAT ARE PRIMARILY BASED AT YOUR LOCATION?

   1. YES
   2. NO

   SKIP AFTER Q7 IF Q<7> EQ 2 THEN GO 23

****

8. THINKING OF TRUCKS PRIMARILY BASED AT YOUR LOCATION, HOW MANY TIMES IN A TYPICAL DAY DOES A TRUCK LEAVE YOUR LOCATION FOR PICK-UPS, DELIVERIES, OR TO PROVIDE SERVICES SOMEWHERE ELSE ?

1. 1	16. 16	31. 31	46. 46
2. 2	17. 17	32. 32	47. 47
3. 3	18. 18	33. 33	48. 48
4. 4	19. 19	34. 34	49. 49
5. 5	20. 20	35. 35	50. 50
6. 6	21. 21	36. 36	51. 51
7. 7	22. 22	37. 37	52. 52
8. 8	23. 23	38. 38	53. 53
9. 9	24. 24	39. 39	54. 54
10. 10	25. 25	40. 40	55. 55
11. 11	26. 26	41. 41	56. 56
12. 12	27. 27	42. 42	57. 57
13. 13	28. 28	43. 43	58. 58
14. 14	29. 29	44. 44	59. 59
15. 15	30. 30	45. 45	60. 60+
			61. < 1/DAY
			62. NONE

   OTHER LINE = 102

(DON'T READ PRECODED RESPONSES)

   SKIP AFTER Q8 IF Q<8> LT 61 THEN GO 10
   SKIP AFTER Q8 IF Q<8> EQ 62 THEN GO 23

****

9. HOW MANY TIMES IN A TYPICAL WEEK DOES A TRUCK LEAVE YOUR LOCATION ?

   1. 1
   2. 2
   3. 3
   4. 4
   5. 5
   6. 6
   7. NONE
   8. OTHER

   OTHER LINE = 109

(DON'T READ PRECODED RESPONSES)

   SKIP AFTER Q9 IF Q<9> EQ 7 THEN GO 23

****

10. WHAT PERCENTAGE OF THE TRUCKS BASED AT YOUR FACILITY ARE
    GOING DIRECTLY WITHOUT ANY STOPS TO A LOCATION OUTSIDE THE
    TWO-COUNTY REGION THAT INCLUDES MARICOPA AND PINAL COUNTIES ?

    1. 1%
    2. 2%
    .
    .
    .
    100. 100%
    101. 0%

 (DON'T READ PRECODED RESPONSES)

    SKIP AFTER Q10 IF Q<10> LT 50 THEN GO 12
    SKIP AFTER Q10 IF Q<10> EQ 101 THEN GO 12

****

11. YOU INDICATED THAT <<ABOVE>> PERCENT OF TRUCKS LEAVING YOUR FACILITY
    GO DIRECTLY OUTSIDE THE TWO-COUNTY REGION WITHOUT ANY
    INTERMEDIATE STOPS.

    SO THAT WE CAN BETTER UNDERSTAND SHIPMENTS THAT ARE LEAVING THE REGION,
    CAN YOU TELL ME A LITTLE MORE ABOUT YOUR PRODUCTS OR SERVICES AND
    THE DESTINATIONS ?

****

12. TRUCKS CAN BE EITHER SINGLE UNIT TRUCKS OR "TRACTOR-TRAILERS"
THAT CAN BE SEPARATED.

NOW THINKING ABOUT THE TRUCKS THAT HAVE THEIR FIRST STOP
INSIDE THE TWO-COUNTY REGION, WHAT PERCENT OF THESE TRUCKS
ARE TRACTOR-TRAILERS ? (BOBTAILS ARE STILL TRACTOR-TRAILERS)

1. 1%
2. 2%
.
.
.
100. 100%
101. 0%

SURVEYOR NOTE: IF ASKED: TRUCKS CAN BE EITHER SINGLE UNIT TRUCKS
OR "TRACTOR-TRAILERS" THAT CAN BE SEPARATED.

(DON'T READ PRECODED RESPONSES)

SKIP BEFORE Q12 IF Q<10> EQ 100 THEN GO 13

****

13. NOW THINKING OF BOTH TRACTOR-TRAILER AND SINGLE-UNIT TRUCKS,
WHEN THESE TRUCKS LEAVE YOUR FACILITY, WHAT PERCENT WOULD YOU
SAY LEAVE, FULL, WHAT PERCENT PARTIALLY FULL (LTL), AND WHAT
PERCENT EMPTY?

FULL PERCENT:

1. 1%
2. 2%
.
.
100. 100%
101. 0%

(DON'T READ PRECODED RESPONSES)

SKIP AFTER Q13 IF Q<13> EQ 100 THEN GO 17

****

```
14. WHAT PERCENT PARTIALLY FULL (LTL):

    1. 1%
    2. 2%
    .
    .
    100. 100%
    101. 0%

 (DON'T READ PRECODED RESPONSES)

    SKIP AFTER   Q14 IF Q<14> EQ 101 THEN GO 16

*******************************************************************************
15. HOW MANY POUNDS (LBS.) WOULD THOSE LTL SHIPMENTS TYPICALLY BE ?

    SKIP AFTER   Q15 IF Q<14> EQ 100 THEN GO 17

*******************************************************************************
16. PERCENT EMPTY:

    1. 1%
    2. 2%
    .
    .
    100. 100%
    101. 0%

 (DON'T READ PRECODED RESPONSES)

*******************************************************************************
17. AND WHICH FACILITY TYPE WOULD YOU SAY MOST OF THESE TRUCKS
    PRIMARILY GO TO ?

    1. WAREHOUSE/DISTRIBUTION CENTER
    2. MANUFACTURING FACILITY
    3. RETAIL OUTLET
    4. SERVICE BUSINESS
    5. PORT/INTERMODAL TERMINAL/TRUCK TERMINAL/AIRPORT
    6. OTHER


     SURVEYOR NOTE:  IF ANSWER IS "TO FUEL" DO NOT ACCEPT AS ANSWER;
     ASK WHERE THEY GO AFTER FUELING.

    OTHER LINE = 105

 (PROMPT ONLY IF NO ANSWER)

*******************************************************************************
```

```
18. AND DO A SIGNIFICANT PROPORTION OF THESE TRUCKS GO TO A
    DIFFERENT TYPE OF FACILITY ?

    1. YES - WAREHOUSE/DISTRIBUTION CENTER
    2. YES - MANUFACTURING FACILITY
    3. YES - RETAIL OUTLET
    4. YES - SERVICE BUSINESS
    5. YES - PORT/INTERMODAL TERMINAL/TRUCK TERMINAL/AIRPORT
    6. YES - OTHER
    7. NO

    OTHER LINE = 108

 (PROMPT ONLY IF NO ANSWER)

*******************************************************************************
19. WHICH OF THE FOLLOWING WOULD YOU SAY BEST DESCRIBE THE PRODUCTS THAT
    YOUR COMPANY SHIPS OUT TO OTHER DESTINATIONS?

    1. AGRICULTURAL & FOOD PRODUCTS
    2. MINING & PETROLEUM PRODUCTS
    3. CHEMICAL & PHARMACEUTICAL PRODUCTS
    4. PLASTICS & WOOD PRODUCTS
    5. PAPER & TEXTILE PRODUCTS
    6. METAL, MACHINERY, & MOTORIZED VEHICLES
    7. ELECTRICAL AND PRECISION EQUIPMENT
    8. DO NOT SHIP PRODUCTS; SERVICE ONLY (DO NOT READ)
    9. OTHER

    NOTE: THIS COMMODITY QUESTION IS ASKED ONLY WHEN THE NAICS CODE IS
          11, 21, 31-33, 42, 44, AND 45

    OTHER LINE = 112

    SKIP AFTER   Q19 IF Q<19> EQ 8 THEN GO 23

*******************************************************************************
20. WHAT PERCENTAGE IS THAT OF ALL PRODUCTS ?

    1. 1%
    2. 2%
    .
    .
    .
    100. 100%
    101. 0%

    SKIP AFTER   Q20 IF Q<20> EQ 100 THEN GO 23

*******************************************************************************
```

21. SINCE THE PERCENTAGE OF YOUR PRODUCTS IS NOT 100 PERCENT,
WHICH OF THE FOLLOWING WOULD YOU SAY BEST DESCRIBE THE OTHER PRODUCTS
THAT YOUR COMPANY SHIPS OUT TO OTHER DESTINATIONS ?

1. AGRICULTURAL & FOOD PRODUCTS
2. MINING & PETROLEUM PRODUCTS
3. CHEMICAL & PHARMACEUTICAL PRODUCTS
4. PLASTICS & WOOD PRODUCTS
5. PAPER & TEXTILE PRODUCTS
6. METAL, MACHINERY, & MOTORIZED VEHICLES
7. ELECTRICAL AND PRECISION EQUIPMENT
8. OTHER

OTHER LINE = 114

****

22. PLEASE SPECIFY AN APPROXIMATE PERCENTAGE FOR YOUR OTHER PRODUCTS

1. 1%
2. 2%
.
.
.
100. 100%
101. 0%

****

23. HOW MANY TIMES IN A TYPICAL DAY DOES A TRUCK COME TO YOUR LOCATION FOR PICK-UPS, DELIVERIES, OR TO PROVIDE SERVICES ?

1. 1	16. 16	31. 31	46. 46
2. 2	17. 17	32. 32	47. 47
3. 3	18. 18	33. 33	48. 48
4. 4	19. 19	34. 34	49. 49
5. 5	20. 20	35. 35	50. 50
6. 6	21. 21	36. 36	51. 51
7. 7	22. 22	37. 37	52. 52
8. 8	23. 23	38. 38	53. 53
9. 9	24. 24	39. 39	54. 54
10. 10	25. 25	40. 40	55. 55
11. 11	26. 26	41. 41	56. 56
12. 12	27. 27	42. 42	57. 57
13. 13	28. 28	43. 43	58. 58
14. 14	29. 29	44. 44	59. 59
15. 15	30. 30	45. 45	60. 60+
			61. < 1/DAY
			62. NONE

OTHER LINE = 104

(DON'T READ PRECODED RESPONSES)

```
SKIP AFTER   Q23 IF Q<23> LT 61 THEN GO 25
SKIP AFTER   Q23 IF Q<7> EQ 2
             AND Q<23> EQ 62 THEN GO 43
SKIP AFTER   Q23 IF Q<8> EQ 62
             AND Q<23> EQ 62 THEN GO 43
SKIP AFTER   Q23 IF Q<9> EQ 7
             AND Q<23> EQ 62 THEN GO 43
SKIP AFTER   Q23 IF Q<23> EQ 62 THEN GO 25
```

****

```
24. HOW MANY TIMES IN A TYPICAL WEEK DOES A TRUCK ARRIVE AT YOUR
    LOCATION ?

    1. 1
    2. 2
    3. 3
    4. 4
    5. 5
    6. 6
    7. NONE
    8. OTHER

    OTHER LINE = 110

 (DON'T READ PRECODED RESPONSES)

    SKIP AFTER   Q24 IF Q<7> EQ 2
                 AND Q<24> EQ 7 THEN GO 43
    SKIP AFTER   Q24 IF Q<8> EQ 62
                 AND Q<24> EQ 7 THEN GO 43
    SKIP AFTER   Q24 IF Q<9> EQ 7
                 AND Q<24> EQ 7 THEN GO 43

******************************************************************************
25. WHEN PROVIDING YOUR ESTIMATE OF THE NUMBER OF TRUCKS COMING
    TO YOUR LOCATION, DID YOU INCLUDE UPS, FEDEX, AND GARBAGE TRUCKS ?

    1. YES
    2. NO

    SKIP AFTER   Q25 IF Q<25> EQ 1
                 AND Q<23> EQ 62 THEN GO 6
    SKIP AFTER   Q25 IF Q<25> EQ 1
                 AND Q<23> EQ 61
                 AND Q<24> EQ 7 THEN GO 6

******************************************************************************
26. HOW MANY TIMES PER WEEK DO UPS, FEDEX, AND GARBAGE TRUCKS COME TO
    YOUR LOCATION ?

    1. 1                    9. 9                    17. 17
    2. 2                   10. 10                   18. 18
    3. 3                   11. 11                   19. 19
    4. 4                   12. 12                   20. 20
    5. 5                   13. 13                   21. 21
    6. 6                   14. 14                   22. 0
    7. 7                   15. 15                   23. DON'T KNOW
    8. 8                   16. 16                   24. OTHER

    OTHER LINE = 111

    SKIP AFTER   Q26 IF Q<23> EQ 62 THEN GO 6
    SKIP AFTER   Q26 IF Q<24> EQ 7 THEN GO 6

******************************************************************************
```

```
27. WHAT PERCENTAGE OF THE TRUCKS COMING TO YOUR FACILITY CAME
    DIRECTLY WITHOUT ANY STOPS FROM A LOCATION OUTSIDE THE
    TWO-COUNTY REGION THAT INCLUDES MARICOPA AND PINAL COUNTIES ?

    1. 1%
    2. 2%
    .
    .
    .
    100. 100%
    101. 0%
    102. DON'T KNOW

 (DON'T READ PRECODED RESPONSES)

    SKIP AFTER   Q27 IF Q<27> LT 50 THEN GO 29
    SKIP AFTER   Q27 IF Q<27> EQ 101 THEN GO 29

******************************************************************************
28. YOU INDICATED THAT <<ABOVE>> PERCENT OF TRUCKS ARRIVING AT YOUR
    FACILITY COME FROM OUTSIDE THE TWO-COUNTY REGION.

    SO THAT WE CAN BETTER UNDERSTAND SHIPMENTS THAT ARRIVE FROM
    OUTSIDE THE REGION, CAN YOU TELL ME A LITTLE MORE ABOUT WHAT
    YOU RECEIVE AND WHERE IT COMES FROM ?

    SKIP BEFORE  Q28 IF Q<27> EQ 102 THEN GO 29

******************************************************************************
29. TRUCKS CAN BE EITHER SINGLE UNIT TRUCKS OR "TRACTOR-TRAILERS"
    THAT CAN BE SEPARATED.

    NOW THINKING ABOUT TRUCKS THAT ARE COMING MOST RECENTLY FROM
    SOMEWHERE INSIDE THE TWO-COUNTY REGION, WHAT PERCENT OF THESE
    TRUCKS ARE TRACTOR-TRAILERS ? (BOBTAILS ARE STILL TRACTOR-TRAILERS)

    1. 1%
    2. 2%
    .
    .
    .
    100. 100%
    101. 0%

    SURVEYOR NOTE:  IF ASKED: TRUCKS CAN BE EITHER SINGLE TRUCKS
    OR "TRACTOR-TRAILERS" THAT CAN BE SEPARATED.

 (DON'T READ PRECODED RESPONSES)

    SKIP BEFORE  Q29 IF Q<27> EQ 100 THEN GO 30

******************************************************************************
```

30. NOW THINKING OF BOTH TRACTOR-TRAILER AND SINGLE-UNIT TRUCKS, WHEN THESE TRUCKS ARRIVE AT YOUR FACILITY, WHAT PERCENT WOULD SAY ARRIVE FULL, WHAT PERCENT PARTIALLY FULL (LTL), AND WHAT PERCENT EMPTY?

    FULL PERCENT:

    1. 1%
    2. 2%
    .
    .
    100. 100%
    101. 0%

 (DON'T READ PRECODED RESPONSES)

    SKIP AFTER Q30 IF Q<30> EQ 100 THEN GO 33

****

31. WHAT PERCENT PARTIALLY FULL (LTL):

    1. 1%
    2. 2%
    .
    .
    100. 100%
    101. 0%

 (DON'T READ PRECODED RESPONSES)

    SKIP AFTER Q31 IF Q<31> EQ 100 THEN GO 33

****

32. PERCENT EMPTY:

    1. 1%
    2. 2%
    .
    .
    100. 100%
    101. 0%

 (DON'T READ PRECODED RESPONSES)

****

```
33. AND WHICH FACILITY TYPE WOULD YOU SAY MOST OF THESE TRUCKS
    PRIMARILY COME FROM ?

    1. WAREHOUSE
    2. MANUFACTURING FACILITY
    3. RETAIL OUTLET
    4. SERVICE BUSINESS
    5. PORT/INTERMODAL TERMINAL/TRUCK TERMINAL/AIRPORT
    6. OTHER

    OTHER LINE = 106

 (PROMPT ONLY IF NO ANSWER)

*******************************************************************************
34. AND DO A SIGNIFICANT PROPORTION OF THESE TRUCKS COME FROM
    A DIFFERENT TYPE OF FACILITY ?

    1. YES - WAREHOUSE
    2. YES - MANUFACTURING FACILITY
    3. YES - RETAIL OUTLET
    4. YES - SERVICE BUSINESS
    5. YES - PORT/INTERMODAL TERMINAL/TRUCK TERMINAL/AIRPORT
    6. YES - OTHER
    7. NO

    OTHER LINE = 107

 (PROMPT ONLY IF NO ANSWER)

*******************************************************************************
35. WHICH OF THE FOLLOWING WOULD YOU SAY BEST DESCRIBE THE PRODUCTS THAT
    YOUR COMPANY RECEIVES FROM OTHER DESTINATIONS?

    1. AGRICULTURAL & FOOD PRODUCTS
    2. MINING & PETROLEUM PRODUCTS
    3. CHEMICAL & PHARMACEUTICAL PRODUCTS
    4. PLASTICS & WOOD PRODUCTS
    5. PAPER & TEXTILE PRODUCTS
    6. METAL, MACHINERY, & MOTORIZED VEHICLES
    7. ELECTRICAL AND PRECISION EQUIPMENT
    8. DO NOT RECEIVE PRODUCTS; SERVICE ONLY (DO NOT READ)
    9. OTHER

    NOTE: THIS COMMODITY QUESTION IS ASKED ONLY WHEN THE NAICS CODE IS
          11, 21, 31-33, 42, 44, AND 45

    OTHER LINE = 113

    SKIP AFTER   Q35 IF Q<35> EQ 8 THEN GO 6

*******************************************************************************
```

```
36. WHAT PERCENTAGE IS THAT OF ALL PRODUCTS ?

    1. 1%
    2. 2%
    .
    .
    .
    100. 100%
    101. 0%

    SKIP AFTER   Q36 IF Q<36> EQ 100 THEN GO 6

*******************************************************************************
37. SINCE THE PERCENTAGE OF YOUR PRODUCTS IS NOT 100 PERCENT,
    WHICH OF THE FOLLOWING WOULD YOU SAY BEST DESCRIBE THE OTHER PRODUCTS
    THAT YOUR COMPANY RECEIVES FROM OTHER DESTINATIONS

    1. AGRICULTURAL & FOOD PRODUCTS
    2. MINING & PETROLEUM PRODUCTS
    3. CHEMICAL & PHARMACEUTICAL PRODUCTS
    4. PLASTICS & WOOD PRODUCTS
    5. PAPER & TEXTILE PRODUCTS
    6. METAL, MACHINERY, & MOTORIZED VEHICLES
    7. ELECTRICAL AND PRECISION EQUIPMENT
    8. OTHER

    OTHER LINE = 115

*******************************************************************************
38. WHAT PERCENTAGE IS THAT OF ALL PRODUCTS ?

    1. 1%
    2. 2%
    .
    .
    .
    100. 100%
    101. 0%

    SKIP AFTER  Q38 GO  6

*******************************************************************************
39. IS YOUR FACILITY UNDER 20,000 SQUARE-FEET OR LARGER ?

    NOTE: ONLY RECODE "DON'T KNOW/REFUSED" IF THE RESPONDENT ASKS FOR IT.

    1. UNDER 20,000
    2. 20,000+
    3. DON'T KNOW/REFUSED

    SKIP AFTER   Q39 IF Q<39> NE 2 THEN GO 7
    SKIP AFTER   Q39 IF Q<39> EQ 2 THEN GO 45

*******************************************************************************
```

40. OK, THAT'S EVERYTHING. THANK YOU FOR YOUR PARTICIPATION TODAY.

    IF YOU CAN GIVE ME YOUR CONTACT INFORMATION WE WILL MAIL YOU THE CHECK TO THANK YOU FOR PARTICIPATING.

    FIRST & LAST NAME:

****

41. TITLE:

****

42. FULL ADDRESS:

    SKIP AFTER Q42 GO END

****

43. I'M SORRY, WE ARE ONLY LOOKING FOR BUSINESSES WITH SOME TYPE OF TRUCK TRAFFIC.

    ENTER: XX

    SKIP AFTER Q43 GO END

****

44. I'M SORRY, WE HAVE ALREADY MET THE QUOTA REQUIREMENT FOR THIS TYPE OF INDUSTRY

    ENTER: XX

    SKIP AFTER Q44 GO END

****

45. I'M SORRY, WE ARE ONLY LOOKING FOR BUSINESSES WITH A FACILITY LESS THAN 20,000 SQUARE-FEET.

    ENTER: XX

    SKIP AFTER Q45 GO END

****

THANK YOU FOR YOUR TIME.

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Appendix B. Employee In-Person/Web-Based Survey

Maricopa Association of Governments Travel Survey

This study is being conducted by the Maricopa Association of Governments, which is the transportation planning agency for the Phoenix metropolitan area. The results will help with transportation planning in the region.

INTRODUCTION

1. Employer Name _____

2. What time did you arrive at work today?_____:_____ AM/PM

ORIGIN INFORMATION

3. Where did you come from? ❍ Home ❍ Work ❍ School ❍Someplace Else (Specify Name) _____

Please provide that Address _____ **City** _____

Or nearest major intersection_____and _____ Circle Quadrant: NE NW SE SW

4. How did you travel here today? (If you used multiple modes of transportation to get here, please select the mode used for the longest portion of the trip):

❍ Auto (Car, Truck, Van, SUV, Motorcycle/Scooter, etc.) **SEE BELOW** ❍ Bus **SEE BELOW** ❍ Light Rail Transit (LRT) **SEE BELOW**
❍ Bike ❍ Taxi/Car Service (includes Taxi, Uber, Lyft, ExecuCar, etc.) ❍ Walk ❍ Other (please specify)_____

If Auto: How many people, including yourself, were in the vehicle?_____
IF LRT or Bus How did you get to the light rail stop? ❍Walk ❍Bike ❍Bus ❍Auto – parked at/near station ❍ Auto – was dropped off
❍Other – SPECIFY_____

5. What were you doing there before you came here?

❍ Primary Home ❍ Work ❍ Work Related ❍ Shopping
❍ Social/Recreational/Entertainment ❍ Change Travel Mode/Transfer ❍ Education/School/Religious ❍ Health Care
❍ Eat Meals Out ❍ Exercise/Play Sports ❍ Personal Errands/Tasks
❍ Drop off/Pickup/ Accompany Someone ❍ Secondary Home ❍ Other (specify) _____

IF Q3 IS NOT "HOME"

6. Where were you prior to that?

❍ Home ❍ Work ❍ School ❍ Someplace Else (Specify Name) _____

Please provide that Address _____ **City** _____

OR nearest major intersection _____and _____ Circle Quadrant: NE NW SE SW

7. What were you doing there?

❍ Primary Home ❍ Work ❍ Work Related ❍ Shopping
❍ Social/Recreational/Entertainment ❍ Change Travel Mode/Transfer ❍ Education/School/Religious ❍ Health Care
❍ Eat Meals Out ❍ Exercise/Play Sports ❍ Personal Errands/Tasks
❍ Drop off/Pickup/ Accompany Someone ❍ Secondary Home ❍ Other (specify) _____

DEPARTURE INFORMATION

8. What time will you leave work today? _____:_____ AM/PM

9. Where will you go when you leave here?

❍ Home ❍ Work ❍ School ❍ Someplace Else (Specify Name) _____

Please provide that Address _____ **City** _____

OR nearest major intersection _____and _____ Circle Quadrant: NE NW SE SW

10. What will you do there?

❍ Primary Home ❍ Work ❍ Work Related ❍ Shopping
❍ Social/Recreational/Entertainment ❍ Change Travel Mode/Transfer ❍ Education/School/Religious ❍ Health Care
❍ Eat Meals Out ❍ Exercise/Play Sports ❍ Personal Errands/Tasks
❍ Drop off/Pickup/ Accompany Someone ❍ Secondary Home ❍ Other (specify)_____

11. Will you travel there the same way you got here? ❍ Yes ❍ No

If NO: How will you travel there?
❍ Auto (Car, Truck, Van, SUV, Motorcycle/Scooter, etc.) **SEE BELOW** ❍ Bus **SEE BELOW** ❍ Light Rail Transit (LTR) **SEE BELOW**

❍ Bike ❍ Taxi/Car Service (includes Taxi, Uber, Lyft, ExecuCar, etc.) ❍ Walk ❍ Other (please specify)_____
If Auto: How many people, including yourself, were in the vehicle? ____
IF LRT or Bus How did you get to the light rail stop? ❍ Walk ❍ Bike ❍ Bus ❍ Auto – parked at/near station ❍ Auto – was dropped off
❍ Other – SPECIFY_____

Employment Information

12. Which of the following best describes your employment status?
❍ Full-Time (35 hours or more each week) ❍ Part-Time (20-34 hours each week)
❍ Part-Time (Less than 20 hours each week) ❍ Other (please specify) _____

13. Which one of the following BEST describes your primary work activity on a regular basis?
❍ Administrative/Clerical/Retail ❍ Production/Construction/Transport
❍ Sales & Marketing ❍ Technical Support
❍ Business/Financial/Professional ❍ Community Support/Teaching
❍ Engineering/Research/Design ❍ Personal Care & Services
❍ Other (please specify)_____

14. Which of the following best describes your work schedule on a weekly basis? Would you say you:
❍ Work 5 Days a week ❍ Work 4 Days a week (4/10s)
❍ Work 3 Days a week ❍ Work 9 Days in 2 weeks (9/80)
❍ Work 7 Days in 2 weeks ❍ Other (please specify)_____

15. How many days do you typically telework?
❍ I do not telework ❍ Occasionally, on an as-needed basis
❍ 1-2 days a month ❍ 1 day a week
❍ 2-4 days a week ❍ I telework every day and do not commute into an office location
❍ Other (please specify) _____

16. How did you travel to work last week? If you used more than one travel mode, please indicate the mode that you used for the longest portion of your commute with an "X" in the appropriate box

TRAVEL MODE USED FOR LONGEST PORTION	SUN	MON	TUE	WED	THU	FRI	SAT
Walked							
Auto (Car, Truck, Van, SUV, Motorcycle/Scooter, etc.)							
Bus							
Light Rail							
Bike							
Taxi/Car Service (includes Taxi, Uber, Lyft, ExecuCar, etc.)							
I DO NOT TYPICALLY WORK THIS DAY							

Demographic Information

17. Please indicate your age:
❍ 18-24 ❍ 25-34 ❍ 35-44 ❍ 45-54
❍ 55-64 ❍ 65-74 ❍ 75+ ❍ Prefer not to answer

18. Including yourself, how many people live in your household?_____

19. How many registered cars, trucks, and motorcycles are in working condition and available to your household? _____

20. What was your estimated total household income for 2015, before taxes?
❍ Less than $20,000 ❍At least $20,000 but less than $30,000
❍ At least $30,000 but less than $40,000 ❍ At least $40,000 but less than $50,000
❍ At least $50,000 but less than $75,000 ❍ At least $75,000 but less than $100,000
❍ At least $100,000 but less than $125,000 ❍ At least $125,000 but less than $150,000
❍ $150,000 or more ❍ Other (please specify) _____
❍ Rather not say

21. Please indicate your gender : ❍ Male ❍ Female

All fully completed employee surveys will be entered into a monthly drawing for one of three prizes: 1st place: $150 / 2nd Place: $100 / 3rd Place: $50 (one entry per person). Winners will have the option of a physical Visa gift card or an online e-gift certificate. To enter into this drawing, the following information must be provided:

1. Employee Name _____
2. Telephone number_____
3. Email address_____

Appendix C. Visitor Intercept Survey

Maricopa Association of Governments Intercept Survey

This study is being conducted by the Maricopa Association of Governments, which is the transportation planning agency for the Phoenix metropolitan area.

Introduction

We are conducting an important survey about how people travel in Maricopa County. The results will help with transportation planning for the region. This will take about 5 minutes of your time.

Information about traveling to THIS site

1. **Do you work at this location:** ❍ **YES(Switch to Employee Survey)** ❍ **NO(Continue with Intercept Survey)**
2. **What time did you arrive here today?** _____:_____ AM/PM
3. **What time will you leave here today?** _____:_____ AM/PM
4. **What is the main reason for coming here today?(Please select from the following)**
   ❍Shopping ❍Eat Meals Out ❍Personal Errands/Tasks
   ❍ Work Related ❍Education/School/Religious ❍Change Travel Mode/Transfer
   ❍Exercise/Play Sports ❍ Drop off/Pickup/Accompany Someone ❍Social/Recreational/Entertainment
   ❍Other(please specify)_____
5. **How often do you travel to this location? (Please select from the following)**
   ❍This is my first time coming here ❍At least once a week ❍Less than once a month ❍1-3 times per month ❍Daily
6. **How did you travel here today? (Please select from the following)**
   ❍Auto (Car, Truck, Van, SUV, Motorcycle/Scooter, etc.)**see below** ❍Light Rail Transit (LRT) **see below** ❍Bus **see below**
   ❍Bike ❍Walk ❍Taxi/Car service (includes Taxi, Uber, Lyft, ExecuCar, etc.)
   ❍OTHER (specify)):_____

If Auto: How many people, including yourself, were in the vehicle? _____
IF LRT or Bus How did you get to the light rail stop? ❍Walk ❍Bike ❍Bus ❍Auto – parked at/near station
❍ Auto – was dropped off ❍Other – SPECIFY _____

Tour Information

Previous Travel	What Time did you Arrive and Depart this location?	How did you travel there today? (Please select from the following)	What activity did you do there?	
PLACE 1 **Where was the last place you were before arriving here**? ❍Work ❍Home ❍School ❍Some Place else **What is the address OR Nearest major intersection** **Circle Quadrant : NE NW SE SW** _____ **What is the name of that place** _____	Arrive: _____ am/pm Depart: _____ am/pm	❍Auto (Car, Truck, Van, SUV, Motorcycle/Scooter, etc.)**see below** ❍Light Rail Transit (LRT) **see below** ❍Bus **see below** ❍Bike ❍Walk ❍Taxi/Car service (includes Taxi, Uber, Lyft, ExecuCar, etc.) ❍OTHER (specify):_____	❍All activities at Home ❍Work ❍Work Related ❍Social/Recreational Entertainment ❍Drop off/Pickup Accompany Someone ❍Exercise/Play Sports	❍Shopping ❍Education/Sch Religious ❍Health Care ❍Eat Meals Out ❍Personal Erra Tasks ❍Change Trave Or Transfer ❍Other (specify

If Auto: How many people, including yourself, were in the vehicle? _____

IF LRT or Bus How did you get to the light rail stop? ❍Walk ❍Bike ❍Bus ❍Auto – parked at/near station ❍ Auto – was dropped off
❍Other – SPECIFY _____

Previous Travel	What Time did you Arrive and Depart this location?	How did you travel there today? (Please select from the following)	What activity did you do there?

PLACE 2 **Where was the last place you were before arriving here**? ❍Work ❍Home ❍School ❍Some Place else **What is the address OR Nearest major intersection** **Circle Quadrant : NE NW SE SW** _____ **What is the name of that place** _____	Arrive: _____ am/pm Depart: _____ am/pm	❍Auto (Car, Truck, Van, SUV, Motorcycle/Scooter, etc.)**see below** ❍Light Rail Transit (LRT) **see below** ❍Bus **see below** ❍Bike ❍Walk ❍Taxi/Car service (includes Taxi, Uber, Lyft, ExecuCar, etc.) ❍OTHER (specify):_____	❍All activities at Home ❍Work ❍Work Related ❍Social/Recreational Entertainment ❍Drop off/Pickup Accompany Someone ❍Exercise/Play Sports	❍Shopping ❍Education/School/ Religious ❍Health Care ❍Eat Meals Out ❍Personal Errands Tasks ❍Change Travel Mode Or Transfer ❍Other (specify below)

If Auto: How many people, including yourself, were in the vehicle? _____

IF LRT or Bus How did you get to the light rail stop? ❍Walk ❍Bike ❍Bus ❍Auto – parked at/near station ❍ Auto – was dropped off
❍Other – SPECIFY _____

Previous Travel	What Time did you Arrive and Depart this location?	How did you travel there today? (Please select from the following)	What activity did you do there?	
PLACE 3 **Where was the last place you were before arriving here**? ❍Work ❍Home ❍School ❍Some Place else **What is the address OR Nearest major intersection** **Circle Quadrant : NE NW SE SW** _____ **What is the name of that place** _____	Arrive: _____ am/pm Depart: _____ am/pm	❍Auto (Car, Truck, Van, SUV, Motorcycle/Scooter, etc.)**see below** ❍Light Rail Transit (LRT) **see below** ❍Bus **see below** ❍Bike ❍Walk ❍Taxi/Car service (includes Taxi, Uber, Lyft, ExecuCar, etc.) ❍OTHER (specify):_____	❍All activities at Home ❍Work ❍Work Related ❍Social/Recreational Entertainment ❍Drop off/Pickup Accompany Someone ❍Exercise/Play Sports	❍Shopping ❍Education/School/ Religious ❍Health Care ❍Eat Meals Out ❍Personal Errands Tasks ❍Change Travel Mode Or Transfer ❍Other (specify below)

If Auto: How many people, including yourself, were in the vehicle? _____

IF LRT or Bus How did you get to the light rail stop? ❍Walk ❍Bike ❍Bus ❍Auto – parked at/near station ❍ Auto – was dropped off
❍Other – SPECIFY _____

Questions? Please call 844-468-2571

Previous Travel	What Time did you Arrive and Depart this location?	How did you travel there today? (Please select from the following)	What activity did you do there?	
PLACE 4 **Where was the last place you were before arriving here**? ❍Work ❍Home ❍School ❍Some Place else **What is the address OR Nearest major intersection** **Circle Quadrant : NE NW SE SW** _____ **What is the name of that place** _____	Arrive: _____ am/pm Depart: _____ am/pm	❍Auto (Car, Truck, Van, SUV, Motorcycle/Scooter, etc.)**see below** ❍Light Rail Transit (LRT) **see below** ❍Bus **see below** ❍Bike ❍Walk ❍Taxi/Car service (includes Taxi, Uber, Lyft, ExecuCar, etc.) ❍OTHER (specify):_____	❍All activities at Home ❍Work ❍Work Related ❍Social/Recreational Entertainment ❍Drop off/Pickup Accompany Someone ❍Exercise/Play Sports	❍Shopping ❍Education/School/ Religious ❍Health Care ❍Eat Meals Out ❍Personal Errands Tasks ❍Change Travel Mode Or Transfer ❍Other (specify below)

If Auto: How many people, including yourself, were in the vehicle? _____
IF LRT or Bus How did you get to the light rail stop? ❍Walk ❍Bike ❍Bus ❍Auto – parked at/near station ❍ Auto – was dropped off
❍Other – SPECIFY _____

Thinking of everything you have planned, where will you go next from here?

FUTURE TRAVEL	What Time will you Arrive and Depart this location?	How will you travel here today? (Please select from the following)	What activity will you be doing here	

PLACE 1				
Where will you go when you leave here? ❍Work ❍Home ❍School ❍Some Place else **What is the address OR Nearest major intersection** **Circle Quadrant : NE NW SE SW** _____ **What is the name of that place** _____	Arrive: _____am/pm Depart: _____ am/pm	❍Auto (Car, Truck, Van, SUV, Motorcycle/Scooter, etc.)**see below** ❍Light Rail Transit (LRT) **see below** ❍Bus **see below** ❍Bike ❍Walk ❍Taxi/Car service (includes Taxi, Uber, Lyft, ExecuCar, etc.) ❍OTHER (specify):_____	❍All activities at Home ❍Work ❍Work Related ❍Social/Recreational Entertainment ❍Drop off/Pickup Accompany Someone ❍Exercise/Play Sports	❍Shopping ❍Education/Sch Religious ❍Health Care ❍Eat Meals Out ❍Personal Erra Tasks ❍Change Trave Or Transfer ❍Other (specify

If Auto: How many people, including yourself, were in the vehicle? _____
IF LRT or Bus How did you get to the light rail stop? ❍Walk ❍Bike ❍Bus ❍Auto – park at/near station ❍ Auto – will be dropped off
❍Other – SPECIFY _____

FUTURE TRAVEL	What Time will you Arrive and Depart this location?	How will you travel here today? (Please select from the following)	What activity will you be doing here	
PLACE 2 **Where will you go after that** ❍Work ❍Home ❍School ❍Some Place else **What is the address OR Nearest major intersection** **Circle Quadrant : NE NW SE SW** _____ **What is the name of that place** _____	Arrive: _____am/pm Depart: _____ am/pm	❍Auto (Car, Truck, Van, SUV, Motorcycle/Scooter, etc.)**see below** ❍Light Rail Transit (LRT) **see below** ❍Bus **see below** ❍Bike ❍Walk ❍Taxi/Car service (includes Taxi, Uber, Lyft, ExecuCar, etc.) ❍OTHER (specify):_____	❍All activities at Home ❍Work ❍Work Related ❍Social/Recreational Entertainment ❍Drop off/Pickup Accompany Someone ❍Exercise/Play Sports	❍Shopping ❍Education/Sch Religious ❍Health Care ❍Eat Meals Out ❍Personal Erra Tasks ❍Change Trave Or Transfer ❍Other (specify

IF Auto: How many people, including yourself, were in the vehicle? _____
IF LRT or Bus How did you get to the light rail stop? ❍Walk ❍Bike ❍Bus ❍Auto – park at/near station ❍ Auto – will be dropped off
❍Other – SPECIFY _____

FUTURE TRAVEL	What Time will you Arrive and Depart this location?	How will you travel here today? (Please select from the following)	What activity will you be doing here	
PLACE 3 **Where will you go after that** ❍Work ❍Home ❍School ❍Some Place else **What is the address OR Nearest major intersection** **Circle Quadrant : NE NW SE SW** _____ **What is the name of that place** _____	Arrive: _____am/pm Depart: _____ am/pm	❍Auto (Car, Truck, Van, SUV, Motorcycle/Scooter, etc.)**see below** ❍Light Rail Transit (LRT) **see below** ❍Bus **see below** ❍Bike ❍Walk ❍Taxi/Car service (includes Taxi, Uber, Lyft, ExecuCar, etc.) ❍OTHER (specify):_____	❍All activities at Home ❍Work ❍Work Related ❍Social/Recreational Entertainment ❍Drop off/Pickup Accompany Someone ❍Exercise/Play Sports	❍Shopping ❍Education/Sch Religious ❍Health Care ❍Eat Meals Out ❍Personal Erra Tasks ❍Change Trave Or Transfer ❍Other (specify

IF Auto: How many people, including yourself, were in the vehicle? _____
IF LRT or Bus How did you get to the light rail stop? ❍Walk ❍Bike ❍Bus ❍Auto – park at/near station ❍ Auto – will be dropped off
❍Other – SPECIFY _____

FUTURE TRAVEL	What Time will you Arrive and Depart this location?	How will you travel here today? (Please select from the following)	What activity will you be doing here	
PLACE 4 **Where will you go after that** ❍Work ❍Home ❍School ❍Some Place else **What is the address OR Nearest major intersection** **Circle Quadrant : NE NW SE SW** _____ **What is the name of that place** _____	Arrive: _____am/pm Depart: _____ am/pm	❍Auto (Car, Truck, Van, SUV, Motorcycle/Scooter, etc.)**see below** ❍Light Rail Transit (LRT) **see below** ❍Bus **see below** ❍Bike ❍Walk ❍Taxi/Car service (includes Taxi, Uber, Lyft, ExecuCar, etc.) ❍OTHER (specify):_____	❍All activities at Home ❍Work ❍Work Related ❍Social/Recreational Entertainment ❍Drop off/Pickup Accompany Someone ❍Exercise/Play Sports	❍Shopping ❍Education/Sch Religious ❍Health Care ❍Eat Meals Out ❍Personal Erra Tasks ❍Change Trave Or Transfer ❍Other (specify

IF Auto: How many people, including yourself, were in the vehicle? _____
IF LRT or Bus How did you get to the light rail stop? ❍Walk ❍Bike ❍Bus ❍Auto - park at/near station ❍ Auto – will be dropped off
❍Other – SPECIFY _____

Demographic information

Please indicate your age:	How many registered cars, trucks, and motorcycles are in working condition and available to your household?	What was your estimated total household income for 2015, before taxes:
❍18-24 ❍25-34 ❍35-44 ❍45-54 ❍55-64 ❍65-74 ❍75+ ❍ Prefer not to answer	❍1 ❍2 ❍3 ❍ 4 ❍5 ❍6 ❍7 ❍8 ❍9 ❍10+ Other(please specify)	❍Less than $20,000 ❍ $20,000 - $30,000❍ $30,000 - $40,000 ❍ $40,000-$50,000 ❍$50,000 -$75,000 ❍$75,000 - $100,00 ❍$100,000 -$125,000 ❍$125,000 - $150,000 ❍ $150,000 or more ❍OTHER (specify):_____
Please indicate your gender : ❍ Male ❍Female		

Questions? Please call 844-468-2571

Appendix D. Truck Log Diary Survey

MARICOPA ASSOCIATION OF GOVERNMENTS COMMERCIAL VEHICLE SURVEY
TRIP INFORMATION WORKSHEET

PART 1: DATE AND VEHICLE INFORMATION

1. **Vehicle Info: Make**: _____ **Model**: _____ **Year**: _____
2. **On which date was travel completed?** _____

   What was the day of week? Mon Tues Wed Thurs Fri
3. **Base Address:**

   _____
   City State Zip Code

PART 2: WHERE THIS VEHICLE WENT DURING THE TRAVEL DAY
RECORD EVERY PLACE YOU GO, INCLUDING BRIEF STOPS

Record the following information about each place beginning with where the vehicle started its travel day. **Check "BASE" IF location is base of operations.** **Check "OTHER" for all non-base locations.** **Please record the name of the location.**	What Activity are you doing at this location? (See Activity Options below)	If transporting cargo, what is the Cargo?	If transporting cargo, were you:
EXAMPLE Base: ☐ Other: ■ Mayo Clinic Hospital(Mayo Blvd, Phoenix)	7	Medical Supplies	☐Fully Loaded ■Partially loaded ☐Empty
PLACE 1 **Where was the vehicle when travel day began?** Base: ☐ Other: ☐			☐Fully Loaded ☐Partially loaded ☐Empty
PLACE 2 Base: ☐ Other: ☐			☐Fully Loaded ☐Partially loaded ☐Empty
PLACE 3 Base: ☐ Other: ☐			☐Fully Loaded ☐Partially loaded ☐Empty
PLACE 4 Base: ☐ Other: ☐			☐Fully Loaded ☐Partially loaded ☐Empty
PLACE 5 Base: ☐ Other: ☐			☐Fully Loaded ☐Partially loaded ☐Empty
Activity Options			

01 Base Location/Return to Base Location	05 Vehicle Maintenance (fuel, oil, etc.)	09 Driver Needs (lunch, restroom, etc.)
02 Deadhead/Drop Trailer/Bobtail	06 Delivery of Cargo	10 Pickup Cargo
03 Deliver and Pick up Cargo	07 Government Related Service	11 Installation/ Maintenance/Repair Service
04 Sales/Professional Service	08 Shopping for Business	12 Other Activity(Please specify)

QUESTIONS? CALL 844-468-2571 or Visit www.magworkplace2016.com

QUESTIONS? CALL 844-468-2571 or Visit www.magworkplace2016.com

Appendix E. Establishment Recruit Survey

Page 1 of 11
var
Survey Time
Qintro1
First Name: __
Last Name: __
Hello my name is _____I am calling from WestGroup research on behalf of MAG, Maricopa association of Governments. Can I speak with the Manager?
WITH MANAGER
Hello my name is _____I am calling from WestGroup research on behalf of MAG, Maricopa association of Governments. We are conducting a traffic study with local businesses in your area to help MAG understand traffic and commuting patterns . By participating in this traffic study your input will help MAG determine where traffics improvements may be needed.
IF NECESSARY:
In appreciation for your participation, the Maricopa Association of Governments will be willing to share any information gathered during this study about your establishment with you when the study is completed.
(DO NOT READ)
IF NOT AVAILABLE, GATHER CONTACT INFORMATION AND ARRANGE CALL BACK:
Contact Name:
Confirm Contact Phone Number:
Arrange good time to call back; And/or get email address and offer to send a one-page FAQ describing the project with a follow up call.
Continue
Transferred
Not Available/Callback
Refused

Qintro1.transferred
Hello my name is _____I am calling from WestGroup research on behalf of MAG, Maricopa association of Governments. We are conducting a traffic study with local businesses in your area to help MAG understand traffic and commuting patterns . By participating in this traffic study your input will help MAG determine where traffics improvements may be needed.
IF NECESSARY: It will take a few minutes.
Your organization’s participation in the study will help planners in your region improve public transportation and reduce congestion
IF NECESSARY:
In appreciation for your participation, the Maricopa Association of Governments will be willing to share any information gathered during this study about your establishment with you when the study is completed.
(DO NOT READ)
Yes
No

Page 2 of 11
Qintro1.callback
Is there a better day and time that I can call back?
(DO NOT READ)
Yes
No/Refused
QCallback.name
Contact name:
__
__
QCallback.phone
Confirm Phone Number:
(NOTE - DO NOT USE DASHES)
__

(CHANGE NUMBER IF DIFFERENT)
QCallback.time
Callback time:
(ENTER DAY AND TIME)
QCallback.email
May I have your email address to send you a one-page FAQ describing the project?
(IF YES, ENTER EMAIL ADDRESS)
Qcallback.term
I appreciate your time. Thank you.
(CLICK NEXT TO SAVE THE INFORMATION BEFORE DISPOSITIONING A CALLBACK)
Page 3 of 11
Qintro
To participate in this travel study we like to count the number of people who come to your business, ask your employees and visitors a few questions about their travel and track company vehicles. To begin I have a 5 min survey to gather some information.
There are 5 components to this:
- A quick 5 minute survey to get specifics about your location
- We will count foot traffic coming and going from your business
- We ask your employees participate in a brief commuting survey
- We would like to conduct a brief commute survey with your customers/visitors
- If your company has company vehicles we like track their travel habits for a 24 hour period.

QIntro2
*******DO NOT READ BUT HAVE AVAILABLE IF RESPONDENT WANTS MORE DETAIL ON THE ITEMS ABOVE*********
We need to have counts of the foot and vehicle traffic to and from your establishment. We use a variety of counting methods. This might include people counting or cameras placed at tire level of vehicles. The method for counting is based on the layout of your facility.
In addition, we have a brief travel survey that we would ask you to distribute to all of your employees. This survey would be available online, on paper or via an in-person interview that should take less than 5 minutes to complete.
Also, for one single day, we would have a person outside of your business, a discreet distance away from your business. After visitors leave your business, we would ask them politely to answer a few questions about where they arrived from and where they are going next. IF R SAYS THEY DO NOT GET VISITORS: That is fine, then we will not have to conduct that part of the study at your establishment
The other part of our research effort involves collecting travel data for commercial vehicles. This part of our study would involve having your organization keep travel logs for up to TEN of your vehicles for a 24-hour period so that we can test the accuracy of new GPS technology. The diaries are simple to complete. The driver just records each of the places that are visited for one 24 hour period and the GPS units don't require any interaction at all.
QSCR1
Can we plan on your participation in this important data collection effort?
Yes
No
QHBBUS
(Read if unsure)
Is this a home based business?
No
Yes - Terminate
Page 4 of 11
QSCR1b
We'll need to coordinate with someone at your workplace to schedule the data collection in the next few weeks. Should we coordinate with you or is there someone else you would like us to coordinate with for the project? Could you please provide me with your/your staff member's contact information:
Self
Someone Else

PRIMECNTCT1.Name
Either way, would you please provide me with your contact information in case we have any further questions:
Capture Name:
__
__
PRIMECNTCT1.Phone
Confirm Phone Number:
(NOTE - DO NOT USE DASHES)
__
(ENTER IN A CONTACT NUMBER - EVEN IF ITS THE SAME NUMBER)
PRIMECNTCT1.Email
Collect Email Address:
PRIMECNTCT1.Email.confirm
Re-Enter Email Address:
PRIMECNTCT2.Name
Could you please provide me with the contact information of this individual:
Capture Name:
PRIMECNTCT2.Phone
Best phone number to reach them:
(NOTE - DO NOT USE DASHES)
__
(ENTER IN A CONTACT NUMBER - EVEN IF ITS THE SAME NUMBER)
PRIMECNTCT2.Email
Best Email Address to reach them:

PRIMECNTCT2.Email.confirm
Re-Enter Email Address:
Page 5 of 11
QSCR2
I understand your reluctance, what I just explained was the longer version of our data collection effort. However, would you be willing to participate by answering a few questions about your establishment, AND also having traffic counters placed at the entrances of your business, As well as asking a few questions of your employees regarding their travel to work? In this case, no one would ask questions of your visitors and we would not collect GPS data from your vehicles.
Yes
No
QSCR2.term
I appreciate your time. Thank you.
Click to end survey.
Page 6 of 11
QSCR2b
We'll need to coordinate with someone at your workplace to schedule the data collection in the next few weeks. Should we coordinate with you or is there someone else you would like us to work with on the project?
Self
Someone Else
PRIMECNTCT3.Name
Either way, would you please provide me with your contact information in case we have any further questions:
Capture Name:
PRIMECNTCT3.Phone
Best phone number to reach you:
(NOTE - DO NOT USE DASHES)
__
(ENTER IN A CONTACT NUMBER - EVEN IF ITS THE SAME NUMBER)
PRIMECNTCT.3.Email

Best Email Address to reach you:
PRIMECNTCT3.Email.confirm
Re-Enter Email Address:
PRIMECNTCT4.Name
Could you please provide me with the contact information of this individual:
Capture Name:
PRIMECNTCT4.Phone
Best phone number to reach them:
(NOTE - DO NOT USE DASHES)
__
(ENTER IN A CONTACT NUMBER - EVEN IF ITS THE SAME NUMBER)
PRIMECNTCT.4.Email
Best Email Address to reach them:
PRIMECNTCT4.Email.confirm
Re-Enter Email Address:
Page 7 of 11
Qintro3
Finally, I just have a few more questions that will provide us with some preliminary information to assist in planning the data collection effort at your establishment
QHDR
Establishment Profile Questions:
Qverify
First, let me confirm your address:
(If PRIMARY ADDRESS is a P.O. Box, confirm secondary address)
(If both PRIMARY ADDRESS AND SECONDARY ADDRESS are P.O. Box, ask for a street address)
Company Name: __
Primary Address: __

Primary City: __
Primary State: __
Primary Zip: __
_____
Secondary Address: __
Secondary City: __
Secondary State: __
Secondary Zip: __
Is this correct?
Yes - Primary
Yes - Secondary
No
QVerify2
What is your correct address?
(TYPE OUT THE COMPLETE ADDRESS, CITY, STATE, ZIP)
QESTEMP
How many full and part time employees are located at your site?
(IF NEEDED) This includes all PAID employees age 16 and older)
(Combined total)
QESTDEMP
On a typical week day, how many employees do you have working at this location?
QEVISIT
On a typical week day, how many persons visit this location (not including employees)?
QVariable
Are your hours of operation the same Monday through Friday?
Yes - hours of operation are the same each day

No - hours of operation vary, depending on the day
QOPEN.Hour
What are your hours of operation?
(Open)
QClose.Hour
(Close)
QOPEN.M
What are your hours of operation on Monday?
(Open)
QClose.M
(Close)
QOPEN.T
What are your hours of operation on Tuesday?
(Open)
QClose.T
(Close)
QOPEN.W
What are your hours of operation on Wednesday?
(Open)
QClose.W
(Close)
QOPEN.TH
What are your hours of operation on Thursday?
(Open)
QClose.TH
(Close)
QOPEN.F
What are your hours of operation on Friday?
(Open)
QClose.F

(Close)
QSITETYPE
Is your business in a Free or Non Free Standing building?
(Note - free standing sites with their own parking lot/garage such that all the vehicles coming in and out of their premises are strictly owned/operated by the employees and/or visitors of this site.)
Free Standing
Non Free standing
QSITEVECH
How many vehicles come and go from your business in a typical business day?
Under 50
50-100
100+
DK/REF
QSITEOTH
Are you in a shopping center or an office building?
Shopping Center or Office Building
Other
QSITEOTHB
Are any other businesses in the shopping center or office building?
Yes
No
QSITEOTHC
Is the business located in a commercial zone or a residential neighborhood?
Commercial
Residential
QPARKING
Does your workplace have its own parking lot?
Yes
No
QCUTTHRU
Do people use your parking lot or driveway as a cut through to access other businesses?
Yes
No
Page 8 of 11
QESTDELIV
How many deliveries are made at this location on an average day?

(IF NONE USE 0)
QDELIVST
What are the delivery hours?
(Start Time)
QDELIVEN
What are the delivery hours?
(End Time)
QSEPCDOOR
As a part of the survey, it is important that we survey persons from all entry and exit points to the building. Do you have a special door for deliveries or for employees?
Yes
No
QFS
How many driveways access your business?
QNFS
How many entrance/exit doors are there?
Page 9 of 11
QFLEET
How many vehicles are owned or leased by your company for business use in this area?
(IF NONE USE 0)
QFLEETLT
How many of these are Light duty trucks?
(Description IF NEEDED: "These are two-axle, four tire vehicles, that are NOT passenger cars. Included in this classification are pickups, panels, vans, and other vehicles such as campers, motor homes, ambulances, hearses, carryalls, and minibuses")
QFLEETMT
How many of these are Medium duty trucks?
(Description IF NEEDED: "These are all vehicles on a single frame, including trucks with more than two axles.)
QFLEETHT
How many of these are Heavy duty trucks?

(Description IF NEEDED: "These are all tractor-trailer trucks")
QFLEETOTH
How many of these are of any other vehicles not captured above, including passenger vehicles (including buses, shuttles, or other vehicles used to transport people).
QEND.1
Thank you very much.
Page 10 of 11
CORPAPR
Are there any other approvals that may be needed for the study to occur (e.g., a corporation or parent company representative that needs to authorize your participation in the study?)
Yes
No
CORPCONTACT.Name
Could you please provide me with the contact information of this individual:
Capture Name:
CORPCONTACT.Phone
Best phone number to reach them:
(NOTE - DO NOT USE DASHES)
__
(ENTER IN A CONTACT NUMBER - EVEN IF ITS THE SAME NUMBER)
CORPCONTACT.Email
Best Email Address to reach them:
CORPCONTACT.Email.con
Best Email Address to reach them:
Page 11 of 11
QDATES
For planning purposes would there be one or two days of the week that would be most convenient for you in planning this data collection project?

Monday
Tuesday
Wednesday
Thursday
Friday
DK/To be determined
QAPPDATE
Thank you again, someone will contact you/your contract within the next few days to schedule an exact date for the data collection.
What would be the best day for that person to call you back?
Monday
Tuesday
Wednesday
Thursday
Friday
No preference
QAPPTIME
What would be the best time to reach you?
6am to 8am
8am to 10am
10am to 12pm
12pm to 2pm
2pm to 4pm
4pm to 6pm
No preference
QEND.2
If you have any questions about the survey, please don't hesitate to call Edward Brown, Transportation Planner at the Maricopa Association of Governments, at (602) 452-5082
ADD.NOTES
(DO NOT READ)
This will include information such as: if the contact can only be reached during specific hours/days; if they have a specific number or left a direct/mobile line; any unique information they offered about the business or any reservations they may have had, and how to speak uncommon names phonetically. Who is the primary contact and secondary contact.