CAMBRIDGE SYSTEMATICS

Metropolitan Council Travel Behavior Inventory

Transit Onboard Survey

Final Report

prepared for

Metropolitan Council

prepared by

Cambridge Systematics, Inc.

November 18, 2011

www.camsys.com

report

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Table of Contents

List of Tables

List of Figures

1.0 Background

This report summarizes the 2010 onboard survey for the Metropolitan Council that was conducted in the Twin Cities metropolitan area. The Metropolitan Council (MetCouncil) operates the largest transit system in the Twin Cities metropolitan area - Metro Transit. About a dozen cities within the Council's transit taxing district operate their own regular-route services. The Council contracts with private companies to provide several regular commuter services. The University of Minnesota operates service between its campuses in St. Paul and Minneapolis.

This combined system includes over 200 bus routes, one light rail line and one commuter rail line. Total daily boardings on the entire system are in excess of 275,000. As part of regional planning and modeling efforts, it is critical to understand the travel and usage patterns of these riders to support transit planning and to improve the sensitivity of the regional travel demand model to the transit market segment.

A systemwide transit onboard survey was administered between September and November, 2010 as part of the **2010 Travel Behavior Inventory** to provide detailed transit usage patterns and rider information to support modeling and planning efforts. The survey team consisted of:

- **Cambridge Systematics**, who were responsible for the oversight of the process and for the development of the questionnaire and sampling plan and to tie the survey results to support modeling;
- **Dikita Enterprises**, who were responsible for printing the questionnaires, monitoring the field implementation, transcribing the questionnaires, and ensuring quality control over data; and
- **NexPro Personnel Services** and **Alternative Staffing Incorporate**, who provided fieldworkers for the survey effort and provided a strong local presence.

Since these survey data are expected to influence transit policy over the next decade in the Twin Cities region, a careful overview of existing and required data was carried out. Three key points were critical to finalizing the approach of the onboard survey effort:

- First, with a tight budget amid a shrinking economy, the focus of the study was to capture only the **most current and reliable data** necessary to determine future public transportation needs in the Minneapolis region.
- Second, the study was structured to collect detailed transit ridership data for different routes during different times of day to support the development of a disaggregate transit trip table that will **support advanced travel demand modeling**.

- Third, the study was designed to **leverage existing data sources** such as the 2005 onboard survey, to provide the best quality data to update the Travel Behavior Inventory in the Minneapolis/ St. Paul metropolitan region.

The report is structured as follows. **Section 2** presents an outline of the sampling plan. **Section 3** outlines the questionnaire design and describes how the 2010 design was adjusted to match the 2005 questionnaire. **Section 4** describes the field implementation effort including the pretest. **Section 5** outlines the data entry and analysis efforts while **Section 6** describes the expansion process. **Appendices A through C** provide additional detail by documenting the 2005 and 2010 surveys and summarizing key survey results.

2.0 Sampling Plan

Metro Transit operates over 125 bus routes, the Hiawatha light-rail line, and the Northstar commuter rail line. An additional 90 bus routes are operated by various regional transit partners. All 217 routes in the region were analyzed during the sampling plan development.

The main goal of the 2010 onboard survey was to collect surveys from at least five percent of riders on the most relevant routes to support detailed disaggregate analysis. A custom stratified sampling plan was developed to support a focused survey approach and to maximize the use of existing survey data from the 2005 onboard survey. This section outlines the approach and key features of this sampling plan.

2.1 2005 ONBOARD DATA

A detailed onboard survey was administered in 2005 to transit riders on all regular transit routes. In this study, a concerted effort was made to improve the precision of the data by maximizing the number of surveys collected on different combinations of route type (local, express, rail) and time period (peak and off-peak). In total, over 24,000 completed surveys were collected of which 18,522 surveys had valid origin-destination information needed to support travel forecasting applications.

A three step approach was designed to maximize the use of this extensive dataset (2005) to supplement the 2010 onboard survey:

- First, the study team identified routes with virtually **unchanged operating characteristics and ridership** between 2005 and 2010.
- Second, routes **that were <u>not</u> central to future transit improvement studies** were included in this list.
- Third, care was taken to ensure that **enough survey records were available from the 2005 survey** for each route identified using these two conditions.

Routes that met all these criteria listed above were not surveyed during the 2010 onboard survey. The 2005 data were expanded to the new 2010 ridership and were used to analyze these routes. This targeted sampling approach allowed the survey team to develop a targeted approach to obtain good quality data during the 2010 onboard survey for routes that

(a) experienced high growth or decreases in ridership between 2005 and 2010;

(b) were critical to support detailed transit planning; or

(c) were "new" or improved transit services that need to be better understood.

2.2 2010 PRIORITY GROUPS

Among the routes that were included in the 2010 sampling plan, a hierarchical scheme was designed to support stratification and to identify high volume routes such as the Hiawatha light rail line and new routes such as the Northstar commuter rail line. Routes were stratified into four key priority groups:

- **Priority 1.** The Northstar commuter rail corridor including connecting bus service;
- **Priority 2.** Routes serving current and upcoming New Starts corridors;
- **Priority 3.** Routes with substantially different ridership from 2005 including the Hiawatha light rail corridor; and
- **Priority 4.** Arterial transitway corridors.

Priority 1

This group includes the Northstar commuter rail line (888), and connecting bus routes such as the St. Cloud express link (887), the Ramsey express bus (856), and the Anoka express (889). These routes were surveyed for the first time as part of the 2010 effort and as such, the new data provide a first insight into the riders that use this extended rail system designed to connect the northwest suburban regions with downtown Minneapolis.

Priority 2

The Priority 2 group includes routes serving several key corridors in the region that may need evaluation for New Start or other Federal applications. The corridors and associated routes are listed below:

- **Central Corridor** that connects Downtown Minneapolis to Downtown St. Paul served by routes 16, 50, 94, 21, and 53.
- **Southwest Corridor** that connects Eden Prairie to Downtown Minneapolis and includes routes 6, 9, 12, 17, 25, 114, 604, 615, 664, 665, 667, 668, 603, 680, 684, 685, 690, 691, 695, 697, 698, and 699.
- **Bottineau Corridor** that connects Brooklyn Park/Maple Grove to Downtown Minneapolis and includes routes 5, 7, 9, 14, 19, 22, 32, 705, 714, 716, 721, 722, 723, 724, 742, 755, 756, 758, 760, 761, 762, 763, 764, 765, 766, 767, 780, 781, 782, 783, 784, and 788.
- **Gateway Corridor** from Woodbury to Downtown St. Paul that includes routes 351, 353, 355, 375, 294, 70, 74, 64, and 63.
- **Red Rock Corridor** that includes routes 361, 364, and 365.
- **Rush Line Corridor** that includes routes 265 and 275.
- **I-35W North Corridor** that includes routes 288, 250, 252, 260, and 264.

Priority 3

This group includes routes with significant changes in ridership between 2005 and 2010. Some of the growth markers used to gauge the inclusion of routes into this priority group are discussed below:

- **High Volume Growth.** Routes whose ridership grew by over 150 percent such as routes 10, 61, 270, 724, and 781 were included.
- **High Volume Decrease.** Routes whose ridership fell by 5 percent or more such as routes 53 and 260 were included.
- **New Routes.** Several new routes in the system were introduced in the system, but most have limited ridership. However, routes 288, 856, 261, 784, and 692 have daily ridership in excess of 250 riders on an average weekday and were included in priority group 3.
- **Hiawatha LRT (55) Route.** The light rail system added stations and matured in ridership since 2005 with a growth in ridership of about 19 percent.

Priority 4

This includes high-volume arterial corridors that could be upgraded to Bus Rapid Transit. Routes are further classified by the corridor they serve:

- **West Broadway Corridor** including routes 5, 19, 7 and 14.
- **Central Avenue Corridor** including routes 10 and 59.
- **Snelling Corridor** including route 84.
- **West 7th Corridor** served by route 54.
- **East 7th Corridor** served by routes 61, 64, and 80.
- **Robert Street Corridor** served by routes 71, 68, 65 and 67.
- **Chicago Avenue Corridor** served by routes 5, 133, 553 and 111.
- **Nicollet Avenue Corridor** served by routes 18, 11, and 554.
- **I-494/American Boulevard Corridor** served by routes 4, 5, 542, and 589.
- **Midtown Corridor** served by routes 21, 53, and 27.

Priority 5

All other routes that did not belong to either of the two four priority groups were assigned to a lower priority group. It was established that sufficient information from riders on these routes existed from the 2005 onboard survey. In addition, the operating characteristics and ridership on these

routes had not changed significantly since 2005. Therefore, these routes were not included in the sampling plan for 2010[1].

2.3 PRELIMINARY TARGETS

The main goal of study was to collect surveys from about five percent of daily ridership on the high priority routes listed above. Preliminary targets were developed based on estimates of route-level ridership. These targets are discussed in **Table 2.1**.

- In total, the four priority groups account for over 80 percent of the system-wide ridership.
- The light rail line accounts for nearly 30,000 riders in total and is clearly an important part of the urban transit system.
- However, the majority of ridership is still onboard local buses, indicating their relevance to the system in providing connectivity and improving mobility.
- The 109 routes (out of 211 total) not included in the four priority groups were included in a lower priority group 5. These routes account for only 20 percent of the systemwide boardings. Surveys collected during 2005 were used in the analysis of these routes and as such no target was set for responses in this group.

[1] Routes under this priority group include routes 2, 3, 8, 20, 23, 39, 46, 56, 62, 75, 87, 113, 115, 118, 121, 122, 123, 124, 134, 135, 141,144, 146, 152, 156, 219, 223, 225, 227, 262, 272, 350, 415,417, 420, 421, 426, 436, 437, 438, 440, 444, 445, 446, 452, 460, 464, 467, 470, 472, 475, 476, 477, 478, 479, 480, 489, 490, 491, 496, 498, 515, 538, 539, 540,552, 568, 576, 578, 579, 587, 589, 643, 649, 652, 663, 670, 671, 672, 673, 674, 675, 677, 679,717, 740, 741, 747, 771, 772, 774, 776, 777, 787, 789, 790, 791, 793, 795, 801, 805, 811, 824, 825, 831, 850, 852, 854, and 860.

Table 2.1 Targeted Responses

Priority	Type	Ridership Estimates	Targeted Responses
Group 1	Express	4,573	229
	Commuter Rail	2,091	105
Group 2	Local	115,053	5,753
	Express	21,746	1,087
Group 3	Local	10,396	520
	Express	1,433	72
	Light Rail	28,397	1,420
Group 4	Local	38,127	1,906
	Express	2,310	115
Group 5	Local	54,826	N/A
Total		**278,950**	**11,206**

Source: CS Analysis of Metro Transit and Opt-Out Suburban Operator Ridership Databases.

2.4 INTERLINED SYSTEM

The transit system in Minneapolis is designed to be an interlined system where one vehicle serves several different routes during the day to minimize wait times and to improve system-wide efficiency. Each garage-to-garage vehicle run is called a "block". This system-wide interlining was incorporated in the stratified sampling approach as follows:

- Only blocks where the transit vehicle operates as a high priority transit route for the majority of the time were selected for inclusion.
- Selective assignments that targeted high ridership blocks were used to improve response rates.
- Blocks that operate for at least 2 to 4 hours and that minimize wait times for crews were given a higher priority to improve crew efficiency.
- Although routes belonging to priority 5 were not explicitly included in the sampling plan, they may have been surveyed on blocks where these routes were served along with other higher priority routes. A total of 22 routes belonging to priority group 5 were surveyed for at least one itinerary under this block-based approach.
- In total, the final sampling plan consisted of 1,895 blocks operating at different times of a day.

2.5 DATA USAGE

The principle behind targeting the high priority routes during the 2010 onboard survey was to utilize responses from the 2005 onboard data for low priority routes where ridership had not changed over the past five years and for routes that served the same geographic market as before. To do so, we developed a framework to support the utilization and integration of these two disparate survey sources. This section outlines the rule-based hierarchical approach framework designed to support the integration.

- **High Priority – High Response Rate**. For those routes that were included in the priority groups 1-4 and for which the five percent survey target was met, the 2010 onboard data were used for survey expansion and modeling.
- **Low Priority Routes.** Data from the 2005 transit onboard survey were used for routes that were not surveyed during 2010.
- **High Priority – Low Response Rate.** The most complicated scenario involves high priority routes with lower than anticipated response rates. The following rules were established:
    - 2005 data would supersede the 2010 data for routes where there were substantially higher responses (50% or more) in the 2005 survey than in the 2010 survey.
    - For routes where there was only a marginally greater number of responses in 2005, the 2010 onboard data were used as they provide more recent socio-demographic and ridership patterns.
- However, a careful analysis of the 2010 onboard survey revealed that all survey records collected on routes belonging to the high priority routes were usable. Additionally, 218 surveys collected from low priority routes were used in the final database since they provided a larger sample size on these routes when compared to the existing database from 2005.

3.0 Questionnaire Design

The survey questionnaire was designed to meet two complementary objectives. First, the questions were scripted to collect the most relevant information required to support the development of a fine-grained travel demand forecasting model for the region. Second, the unique multi-year integration approach being adopted meant that the 2010 survey had to be consistent with the 2005 survey questionnaire.

This section discusses the development of a questionnaire that met both objectives. Specifically, this section discusses the 2005 and 2010 versions of the questionnaires and documents both similarities and differences between the two questionnaires with a brief commentary about the possible implications in travel forecasting.

3.1 TRAVEL BEHAVIOR FOCUS

Several transportation-focused surveys are being administered in the Twin Cities region to obtain a comprehensive repository of travel behavior. The largest of these efforts is the household survey which captures travel patterns, mode usage, travel times, origins and destinations and socio-demographics of respondents. This survey provides a snapshot of travel in the region and will serve as the primary database for the updated travel forecasting model.

The transit onboard survey serves as a complementary effort to the household survey with a primary focus on transit users and their riding patterns. Given that these data will be used to estimate (or support the estimation of) disaggregate travel demand models, it is critical that the survey captures all the elements necessary for such an effort.

Further, the questionnaire was designed to capture all the information relevant to support any future New Starts (Small Starts or Very Small Starts) studies that require detailed transit rider information.

A survey questionnaire was designed to capture information from four key categories:

- **Trip end** questions that provide information about trip purpose, network connectivity, and boarding and alighting information
- **Transit trip information** that provides an in-depth understanding of how riders use the system to navigate between origin and destination.
- **Socio-demographic** information which will strengthen the explanatory power of any model estimation procedure.

- **Transit usage patterns** that describe familiarity with transit and are primarily used to support marketing and transit planning efforts.

Table 3.1 describes all the questions included in the 2010 survey questionnaire and how these questions relate to the four categories described above:

Table 3.1 Survey Questionnaire and Travel Behavior

Question	Information Captured	Importance to Travel Forecasting
Origin & Destination Activity	Trip End	Helps understand Trip Purpose. Can support fine-grained activity–based analysis
Origin & Destination Address	Trip End	Critical to develop trip tables, understand where transit usage is common and to model average trip lengths.
Access & Egress Mode	Trip End	Critical to understand transit accessibility.
Boarding & Alighting Location	Transit Trip	Important to understand how riders use the system and to model the transit-only leg of the trips.
Transit Routes Used	Transit Trip	Critical to segment database across different geographic regions to support spatial analysis. Also, provides information about transferring patterns.
Routes Accessed before being handed Survey		
Routes to be Accessed after Surveyed Route		
Number of Transfers		
Transit Usage History	Transit Usage	These variables will be primarily used for marketing and planning purposes.
Frequency of Transit Use		
Income, Age, Gender, Race, HH Size and #Workers	Socio-Demographics	Provide an understanding of "who uses transit" and will be used to improve the explanatory power of travel forecasting models.
# Vehicles, Auto Availability, Driver License	Socio-Demographics	Provide an understanding of "captive" vs. "choice" riders which is critical to understand the importance of transit in providing mobility in the region.
Resident vs. Visitor	Socio-Demographics	Provide an understanding of transit's ability to serve visitors and to identify any routes that are critical to serve visitors.

3.2 QUESTIONNAIRE CONSISTENCY FOCUS

It is important to understand both the differences and similarities between the 2005 and 2010 questionnaires in the context of policy analysis and model updates. Minor modifications were made to the 2010 questionnaire, but these changes were made mostly to collect detailed information that was not captured during the 2005 effort.

Pre and Post-Transit Leg

The survey questionnaire includes detailed information about the access and egress portions of the transit trip that captures origin and destination locations, modes of access, and modes of egress. This section compares the structuring of these questions in both surveys.

Trip End Location Questions

The two key questions in the context of developing a transit trip table are trip origin and destination location. Both of these questions have been asked in an identical fashion in both survey questionnaires. The 2010 questionnaire includes additional detail about "place names" to support geocoding of popular landmarks.

Similarly, the boarding and alighting location questions have been asked in a similar fashion in both the 2005 and 2010 surveys.

Trip End Activity Questions

The structure of the questions in 2005 and 2010 is similar with one exception. Visiting/recreation is treated as a separate activity in the 2010 survey while it is assumed to be included in the broader "other type of place" category in the 2005 version.

At the time of modeling, it will be important to evaluate the 2010 transit onboard data to check for the number of responses pertaining to this activity. One of two methods may be employed to modify the two databases so that they are consistent.

- If there are few responses for the visiting/recreational category in 2010, the responses can be combined with the "other type of place" category such that the two databases now have exactly the same six activity types.
- If there are many responses in the visiting/recreational category in 2010, the ratio of responses to this category and "other type of place" category in 2010 may be generated and the same ratio may be applied to the 2005 data. These ratios may be generated separately for different types of routes (local and express or high, medium and low volume) to support more detailed analysis. While this is not a perfect solution, it will help retain and utilize data in the most efficient way possible.
- Other approaches may be considered at the time of modeling to improve the quality of the data and to provide a seamless integration of the two databases.

Mode of Access and Egress Questions

Two questions, one for each trip end, capture the mode of access (egress) that respondents used to get on the first (from the last) transit vehicle on this trip.

While both sets of questions are comparable, there are three differences in these questions across the two surveys:

- There is more detail asked about the number of blocks walked or bicycled in the 2010 survey. This information can support capping walk and bike access distance (if needed) using real transit user data.
- The 2010 survey captures the location of the park-and-ride lot for drive access trips. This information may be used during future disaggregate survey expansions to validate park-and-ride lot counts.
- The 2005 survey captures three types of drive access information – park-and-ride driver, park-and-ride passenger and kiss-and-ride. The 2010 survey questionnaire focuses primarily on park-and-ride driver and a passenger mode that may include both park-and-ride passenger and kiss-and-ride passenger. Depending on the level of detail in the mode of access that will be included in the model, some adjustments will need to be made to account for this difference in survey questionnaires.

Transit Trip

All the questions pertaining to the transit leg of the trip are consistent across the two survey years with a few minor exceptions discussed below:

Current Route Question

The 2005 survey explicitly asks for information about the transit route being used by the respondent. The 2010 survey does not ask this (See **Appendix A**). However, the sampling and logistics plan captures the survey ID information for all surveys and each record in the 2010 survey is assigned to the appropriate bus or rail route.

Transfer Pattern Questions

The 2010 onboard survey includes three questions about routes used in the one-way trip. The information collected in these questions is consistent with the 2005 onboard survey with the exception of a reference to the Northstar Commuter Rail which did not exist in 2005.

Transit Usage

The transit usage and familiarity questions are expected to support the marketing and planning elements rather than travel demand modeling.

- One of these questions captures the length of time respondents have been using transit. This question was not asked in 2005, but this difference is expected to have no impact on the estimation of forecasting models.
- The 2005 survey had one question regarding "how many times a week the respondent uses the **current route** on which he/she was

surveyed". This is slightly different from the 2010 survey which asks about transit use in total on all routes.

Socio-Demographics

A series of socio-demographic questions are asked of respondents in both the 2005 and the 2010 transit onboard surveys. Questions describing respondent age, gender, driving status, and resident status are identical across both questionnaires. Minor differences include the following:

- Household Income. This top two income categories are slightly different for the two questionnaires. In 2005, they are $60,000-$94,999 and $95,000 or more. In 2010, they are $60,000-$99,999 and $100,000 or more. However, these options are roughly equivalent and extensive adjustments to combine data across the two surveys will not be required.
- Household Size and Workers. The 2005 survey asked respondents to record the total number of household members and workers. In 2010, respondents are asked to check one of the distinct categories. This may affect the distribution of larger household sizes (4+), but is not expected to impact the modeling step to any great degree.
- Ethnicity. The 2005 survey does not capture any information about the racial or ethnic background of the respondent. However, ethnicity is seldom used as an explanatory variable in travel demand models and as such, this difference is not expected to significantly impact the analysis.

3.3 FINAL DESIGN

The final layout out of the 2010 questionnaire improved the readability of the survey and incorporated a new **barcode technology** to improve data quality related to boarding and alighting information.

- The survey was printed on 11X17 tri-folded white card stock paper, with eye-catching blue background containing both reversed white and black lettering. It included a small introduction of the survey and instructions to help respondents complete the survey. A total of 23 questions were presented to respondents in the questionnaire.
- The surveys were printed in multiple languages. One version had Spanish and English on either sides of the paper and a second version had Somali and Hmong. These two versions allowed us to reach out to the multi-ethnic population in Minneapolis/St. Paul. In early September, 40,000 copies of the final bilingual surveys in English/Spanish and 1,200 copies of the bilingual Somali/Hmong were printed.

- Each survey carried with it a **unique 5 digit serial number barcode**. Surveyors had a **barcode scanner** with a **GPS unit** that recorded boarding and alighting locations using these serial numbers. The boarding location was recorded when a passenger accepted to complete the survey and the alighting location was scanned when the passenger was alighting. The barcode mechanism helped improve the quality of boarding and alighting data.
- Each survey had a postage paid mail back option allowing passengers to return the completed form by mail, if needed.
- The survey instrument was reviewed by the FTA whose insightful feedback influenced a number of questions to be re-framed. We expanded the income categories and changed an open ended age response to a category question. FTA also asked the study team to refine the trip purpose options by including a "student only" category with the college/university and school trip purposes.

4.0 Field Implementation

The field implementation effort began with the recruitment and interview of surveyors and ended with the completion of the survey and the collection of supplementary passenger count information. In total, the field implementation process was carried out in four phases. Each of the key steps is described in this section.

- Survey Pretest;
- Surveyor recruitment and training;
- Field implementation; and
- Supplementary data collection and compilation.

4.1 PRETEST

A pilot survey was conducted on August 12th and 13th, 2010, well over a month before the actual field implementation. Dikita employed four trained supervisors to distribute the English version of the survey to passengers on carefully preselected routes and times. The main goals and objectives were to:

- Test the questionnaire for clarity and ease of understanding. Key items included:
  - Evaluation of the accuracy of geography-related responses,
  - Identify any round trip responses,
  - Calculate time taken to complete the survey, and
  - Peruse responses to questions that contained "other" for possible response additions/deletions in categorical variables.
- Check for response rates and identify reasons for incomplete or poorly filled out surveys.
- Examine the ease of locating boarding and alighting stops using the barcode methodology.
- Make field observations about how the Hiawatha and Northstar rail services operate to develop an effective methodology of counting passengers at each door for each stop, and optimizing the distribution of surveys.
- Finalize the survey instrument and logistics procedures.

The trips selected during the pretest and the results of the distribution and collection activity are listed below in **Table 4.1**. In general, high volume

routes were selected to fine-tune the operational logistics. Overall, **no issues were encountered** during the pretest and the survey team was able to obtain **high quality data** from the pretest. Some key takeaways from the pretest are described below:

- The unique naming convention of streets in Minnesota made it critical to collect detailed information during the survey.
- Response rate was the highest on the Northstar commuter rail line at eighty seven percent. Relatively high response rates were also noticed on the express buses.
- Overall, the response rate was about 66 percent. Response rates increased when respondents were informed about the duration of time it would take to complete the survey.
- Two administrators were assigned to most buses to man both the front and rear doors.
    - Boarding and alighting counts were carried out efficiently using this approach.
    - Survey administrators were able to remind respondents to hand over the survey when alighting.
    - On express buses, only one administrator was used as there are clear patterns of boardings in suburban locations and alightings in downtown areas in the morning and vice-versa during the afternoon/evening trips.

Table 4.1 Pretest Results

Route	Date	Trip Time	Origin Location	Destination Location	Total Attempts	Collected	Refused	Refused Percentage
5E	12-Aug	8:44am	8th & Nicollet	Mall of America	56	25	31	55%
5L	12-Aug	9:41am	Mall of America	7th & Nicollet				
16	12-Aug	10:51am	4th & Nicollet	Minnesota & 4th	107	48	59	55%
16	12-Aug	12:30pm	Minnesota & 4th	St Paul				
94C	13-Aug	8:38am	5th ST Garage TC	Cedar St & 5 St S	41	33	8	20%
94B	13-Aug	9:49am	Minnesota ST & 4th St E	4th St S & Snelling Ave				
260C	13-Aug	7:03AM	2nd Ave S & 11th St S	Rosedale Park & Ride	63	55	8	13%
260	13-Aug	7:38AM	Rosedale Park & Ride	Marquette Ave S & 11 St S				
55	12-Aug	1:52PM	5th & Nicollet	Mall of America	129	66	63	49%
55	12-Aug	2:23PM	Mall of America	Target Station				
888	12-Aug	6:13am	Downtown Station	Big Lake	153	133	20	13%
888	12-Aug	7:21am	Big Lake	Downtown Station				
			Total		549	360	189	34%

Source: Dikita Pretest Information.

Some changes were made to the survey questionnaire based on the findings from the pretest. These changes are listed below:

Access Mode

A key question in the survey addressed the access mode used by the respondent to get to transit. The pilot survey instrument did not distinguish between drivers and passengers among those who used auto to access transit. This question was restructured to incorporate this key change (**Figures 4.1 & 4.2)**.

Figure 4.1 Access Mode Question – Pretest Version

Source: Preliminary Survey Questionnaire Designed by Dikita, CS and MetCouncil.

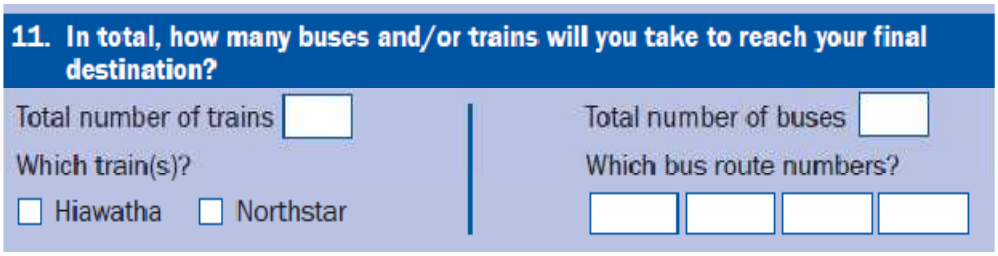
Figure 4.2 Access Mode Question – Final Version

Source: Final Survey Questionnaire Designed by Dikita, CS and MetCouncil.

Transfers

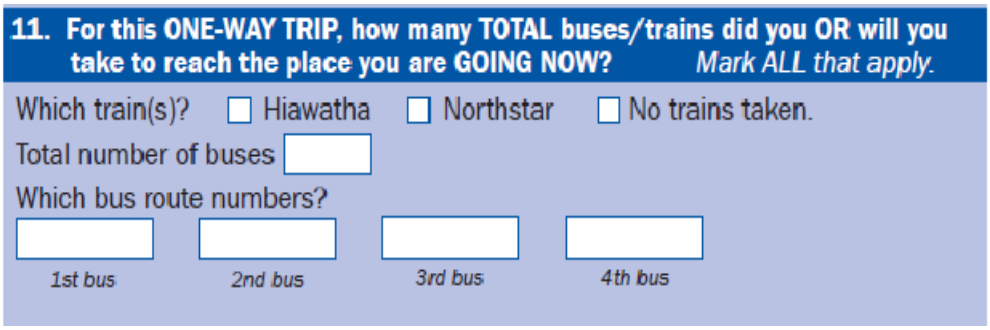
The "transfers" question caused some confusion among respondents about whether the question relates to a one-way or a round trip (**Figure 4.3**). The language was changed to emphasize the relevance of a linked one-way trip (**Figure 4.4**).

Figure 4.3 Transfers Question – Pretest Version



Source: Preliminary Survey Questionnaire Designed by Dikita, CS and MetCouncil.

Figure 4.4 Transfers Question – Final Version



Source: Final Survey Questionnaire Designed by Dikita, CS and MetCouncil.

4.2 SURVEYOR RECRUITMENT & TRAINING

The field survey officially began on September 27th, 2010. In the week before the survey began, field workers were interviewed, hired and trained, and their assignments were finalized. The handheld equipment that was part of the field implementation effort was loaded with the required data and application software.

Dikita worked with two temporary staffing companies in the Twin Cities area, NexPro and Alternative Staffing, Inc., to recruit the surveyors. Candidates were pre-screened by the agencies and interviewed by Dikita staff based to identify the most suitable candidates. The key criteria used during recruitment included the following:

- Employees must be 18 or over and hold a diploma or GED.
- They must have a car available or have other means of reliable transport.
- Employees must be reliable and have a flexible schedule.
- Fieldworkers must have a good work ethic and must be familiar with streets in the Minneapolis/St. Paul area.
- They must be able to observe and record information legibly and operate a hand held computer similar to a smart phone.
- They must be outgoing, positive and persuasive and must be able to communicate and present a positive image [?].

Around 45 potential candidates were interviewed and were scored based on their answers to eighteen questions, with a maximum of 53 points. An additional 10 additional points could be added to the score based on the interviewer's assessment of the assertiveness and personality of the respondents. The best 25 candidates among these participants were selected to be the surveyors.

Selected fieldworkers attended a 4-hour classroom training and a 2-3 hour field training. The classroom training included an introduction to: (a) the project and

the expectations, (b) transit terminology and language, (c) operator duty sheets, (d) critical logistical issues, (e) handheld usage, (f) an interpretation of the survey questionnaire, (g) record keeping tasks, and (h) personal safety. Additionally, fieldworkers were taught to approach passengers gently but firmly to maximize response rates in a pleasant manner. As part of the field training, fieldworkers were taken on a bus trip to reinforce the classroom training.

4.3 FIELD IMPLEMENTATION

During the first week of September, 2010, 40,000 copies of the final bilingual surveys in English/Spanish and 1,200 copies of the bilingual Somali/Hmong were printed for use. The week prior to the beginning the actual survey, field personnel were interviewed, hired and trained; the assignments were finalized, and the handheld equipment were loaded with all the required data and application software. Route and bus stop data from Metro Transit's Hastus scheduling system were integrated into the origin-destination information system of the survey team.

Sampling

Most Metro vehicles run a combination of bus routes during the course of the day called "blocks". The sampling plan was designed using this block system as opposed to a route-based approach.

- This approach eliminated layover time for surveyors who did not need to change buses.
- This sampling frame also allowed crew members to accurately describe the reason for low ridership on a specific itinerary by accounting for mechanical failures, delays due to congestion and other sources of service disruptions faced by riders.
- Further, this method also eliminated the possibility of missed connections for crew members.
- Focusing on blocks of trips was more efficient in terms of surveyor deployment logistics.

The objective was to target selected blocks of high performing transit trips, distribute the surveys to as many passengers as possible and collect as many survey returns as possible. Although the team expected a certain number of responses from each route, the primary focus was not on setting specific targets per route. Instead, the primary goal was to survey as many high volume blocks as possible to yield a large number of responses.

In total, over 1,500 unique bus and train trips were sampled as part of the survey effort. These trips were uniquely distributed across the most relevant time periods. Nearly 400 trips each were sampled during the morning peak (6-9 AM) and evening peak hours (4-8 PM). An additional 650 trips were sampled during

the mid-day off peak period (9 AM–4 PM). An additional 80 trips were sampled during the early AM (4-6 AM) and late evening (after 8 PM) periods.

Scheduling

Surveys were distributed and collected between September 27, 2010 and November 12, 2010 between 6 AM and 8 PM.

- The survey schedule was designed to ensure the simplest and least expensive way to complete the necessary assignments.
- An assignment was a schedule of consecutive trips that was allotted to a surveyor for collecting data.
- Each day, the assignments were scheduled out of one garage to improve efficiency. The first garage surveyed was Heywood. Trips beginning from other garages were covered in a systematic manner.
- Further, assignments which required hand-offs to other crews were scheduled at relief points commonly used by drivers to minimize delays and to avoid missed assignments.

Fieldworker Supervision

Supervisors with experience in transit data collection and administrative staff visited key locations and boarded buses and/or trains to ensure that survey administrators were completing their work assignments. The field staff included an editor and three supervisors.

- The editor reviewed the surveys in detail to determine: (a) the survey's completeness and, (b) to record the number of "good" surveys from each block (or route). Surveys that passed this screening were entered into the survey database. The field editors discarded surveys that had responses to multiple questions missing. In addition, surveys that were filled with intelligible responses and/or clearly erroneous responses were also dropped. This served as the first step in the quality assurance and quality control process and helped Dikita to enter only records with most useful information.
- The field supervisors managed the scheduling of personnel, handheld equipment performance, data transfer, survey packaging and shipping, assignment completion verification, communications, and weekly payroll.

Technological Advances

It is critical to obtain boarding and alighting location information for every respondent to support model improvements. To support this effort, every survey had a barcode that contained three unique codes: (a) a 5-digit serial

number, (b) a boarding code and (c) an alighting code. Each surveyor carried a GPS-enabled barcode scanner that could read these barcodes.

- Surveyors scanned the survey number and boarding barcodes when handing out surveys to boarding passengers. If the respondent accepted the survey, this scan provided the team with geographic coordinates of the boarding locations. If the respondent turned down the survey, an additional marker that indicates "refusal" was activated.
- Most passengers handed back the survey just prior to alighting from the vehicle. The fieldworkers scanned the survey number and alighting barcode to provide geographic coordinates for the alighting location.
- Even for respondents that chose to complete the survey at home, the surveyor scanned the alighting barcode when the respondent alighted the bus to capture the true alighting location.

These scanned data provided a valuable repository of information regarding boarding and alighting locations of passengers and were used to supplement the information provided by respondents when filling out the survey.

Boarding and Alighting Counts

In addition to obtaining boarding and alighting information from participants, it is also critical to measure the activity at each stop. These data serve as control totals for survey expansion. The survey team was tasked with collecting detailed boarding and alighting counts for each stop on their assigned block.

- Surveyors carried a hand-held computer which had pre-loaded information on all the bus stops on their assignment.
- This hand-held computer was also loaded with Ridecheck Plus, a software tool developed by RSM Service Corporation, to process boardings and alightings.
- The number of surveyors on each route was determined by analyzing in advance the average route ridership. However, on a handful of routes where one surveyor was deemed enough (low volume and express routes), there were some route segments with significant activity. At these bus stops, surveyors had a difficult time noting the boarding and alighting counts, handing out the surveys, and scanning the barcodes for boarding and alighting. This may have resulted in under-counting of boarding and alighting passengers at a few bus stops. However, this problem was extremely rare, and therefore, was not deemed a systemic problem.
- The surveyor noted the boardings and alightings at each stop using the hand-held computer. The scanner device did not work in some route segments on streets with tall skyscrapers particularly in downtown Minneapolis and St. Paul. There were also satellite blind spots in selected

outlying areas. On such route segments where the hand-held did not work, paper forms were used to write down the numbers of boardings and alightings. These were later merged with the electronic database of boardings and alightings obtained from the hand-held device.

- The boarding counts were compared against the boarding and refusal scanner data. As expected, boarding counts were significantly higher than the number of passengers who were offered the surveys. This is primarily due to the fact that some passengers boarded the bus while the surveyor was scanning surveys or interacting with already engaged respondents.

4.4 SUPPLEMENTARY DATA

The field implementation effort yields three detailed datasets: (a) completed surveys from participating riders (b) boarding and alighting information of these participating respondents from the hand-held devices and (c) boarding and alighting counts at a bus-stop level for all sampled blocks. However, these databases do not account for overall ridership on the system, which is critical to support survey expansion.

These ridership data are regularly collected and monitored by Metro Transit and the various suburban transit providers. The survey team contacted each of the transit agencies to obtain ridership information for every run for the month of October 2010. **Table 4.2** describes sample information of the detailed ridership that was obtained to support expansion.

Table 4.2 Trip-Level Ridership Records

Route	Direction	Service Provider	Start Time	End Time	Rides
2	East	Metro Transit	5:54 AM	6:31 AM	16
2	East	Metro Transit	6:24 AM	7:02 AM	29
2	East	Metro Transit	6:44 AM	7:24 AM	34

Source: Cambridge Systematics Analysis of Ridership Database (October 2010).

These trip-level data were compiled to produce aggregate route-level daily ridership estimates (**Tables 4.3** and **4.4)**.

Table 4.3 Metro Transit Routes and Ridership

Route	Operator	Ridership	Route	Operator	Ridership
2	Metro Transit	7,673	351	Metro Transit	209
3	Metro Transit	10,138	353	Metro Transit	91
4	Metro Transit	6,514	355	Metro Transit	791
5	Metro Transit	15,601	361	Metro Transit	255
6	Metro Transit	9,088	364	Metro Transit	40
7	Metro Transit	2,082	365	Metro Transit	499
8	Metro Transit	202	375	Metro Transit	724
9	Metro Transit	2,656	415	Metro Transit	15
10	Metro Transit	7,863	417	Metro Transit	13
11	Metro Transit	3,783	452	Metro Transit	141
12	Metro Transit	2,341	467	Metro Transit	512
14	Metro Transit	5,817	515	Metro Transit	1,716
16	Metro Transit	16,337	535	Metro Transit	832
17	Metro Transit	6,133	538	Metro Transit	446
18	Metro Transit	10,957	539	Metro Transit	1,075
19	Metro Transit	5,438	540	Metro Transit	752
20	Metro Transit	109	542	Metro Transit	205
21	Metro Transit	12,372	552	Metro Transit	130
22	Metro Transit	5,673	553	Metro Transit	207
23	Metro Transit	1,698	554	Metro Transit	266
25	Metro Transit	1,149	558	Metro Transit	145
27	Metro Transit	253	568	Metro Transit	56
32	Metro Transit	481	576	Metro Transit	298
39	Metro Transit	152	578	Metro Transit	333
46	Metro Transit	964	579	Metro Transit	89
50	Metro Transit	7,112	587	Metro Transit	249
53	Metro Transit	1,023	589	Metro Transit	179
54	Metro Transit	3,977	597	Metro Transit	383
55	Metro Transit	28,397	604	Metro Transit	71
59	Metro Transit	672	615	Metro Transit	140
61	Metro Transit	2,534	643	Metro Transit	99
62	Metro Transit	1,452	649	Metro Transit	225
63	Metro Transit	3,896	652	Metro Transit	292
64	Metro Transit	4,540	663	Metro Transit	351
65	Metro Transit	1,226	664	Metro Transit	156
67	Metro Transit	1,618	665	Metro Transit	111
68	Metro Transit	2,996	667	Metro Transit	507
70	Metro Transit	976	668	Metro Transit	252
71	Metro Transit	1,863	670	Metro Transit	90
74	Metro Transit	4,738	671	Metro Transit	131
75	Metro Transit	864	672	Metro Transit	268
80	Metro Transit	420	673	Metro Transit	535
84	Metro Transit	3,763	674	Metro Transit	125
87	Metro Transit	705	675	Metro Transit	1,435
94	Metro Transit	4,188	677	Metro Transit	209
111	Metro Transit	128	679	Metro Transit	102
113	Metro Transit	818	705	Metro Transit	230
114	Metro Transit	1,125	716	Metro Transit	258
115	Metro Transit	234	717	Metro Transit	259
118	Metro Transit	122	721	Metro Transit	583
133	Metro Transit	204	722	Metro Transit	279

134	Metro Transit	525	723	Metro Transit	521
135	Metro Transit	213	724	Metro Transit	1,968
141	Metro Transit	282	755	Metro Transit	431
144	Metro Transit	392	756	Metro Transit	177
146	Metro Transit	481	758	Metro Transit	345
152	Metro Transit	107	760	Metro Transit	470
156	Metro Transit	390	761	Metro Transit	216
219	Metro Transit	610	762	Metro Transit	71
223	Metro Transit	89	763	Metro Transit	260
225	Metro Transit	90	764	Metro Transit	223
227	Metro Transit	95	765	Metro Transit	47
250	Metro Transit	1,835	766	Metro Transit	2,011
252	Metro Transit	103	767	Metro Transit	173
260	Metro Transit	489	801	Metro Transit	204
261	Metro Transit	255	805	Metro Transit	242
262	Metro Transit	103	811	Metro Transit	6
264	Metro Transit	244	824	Metro Transit	125
265	Metro Transit	318	825	Metro Transit	532
270	Metro Transit	1,178	831	Metro Transit	138
272	Metro Transit	149	850	Metro Transit	2,241
275	Metro Transit	175	852	Metro Transit	1,046
288	Metro Transit	315	854	Metro Transit	599
294	Metro Transit	298	860	Metro Transit	376
350	Metro Transit	111	888	Metro Transit	2,091
			889	Metro Transit	4

Source: Cambridge Systematics Analysis of Metro Transit Ridership Database (October 2010).

Table 4.4 Other Operator Routes and Ridership

Route	Operator	Ridership	Route	Operator	Ridership
780	Maple Grove	114	437	MVTA	20
781	Maple Grove	1,832	438	MVTA	9
782	Maple Grove	188	440	MVTA	58
783	Maple Grove	230	442	MVTA	579
784	Maple Grove	390	444	MVTA	959
788	Maple Grove	23	445	MVTA	306
789	Maple Grove	102	446	MVTA	311
740	Plymouth	41	460	MVTA	2,055
741	Plymouth	66	464	MVTA	184
742	Plymouth	40	465	MVTA	1,103
743	Plymouth	4	470	MVTA	522
747	Plymouth	128	472	MVTA	397
771	Plymouth	38	475	MVTA	89
772	Plymouth	281	476	MVTA	518
774	Plymouth	10	477	MVTA	1,478
776	Plymouth	338	478	MVTA	54
777	Plymouth	223	479	MVTA	40
790	Plymouth	391	480	MVTA	558
791	Plymouth	38	484	MVTA	205
793	Plymouth	72	489	MVTA	89
795	Plymouth	29	603	Southwest Transit	38
490	Prior Lake	585	680	Southwest Transit	55

491	Prior Lake	5	684	Southwest Transit	74
856	Ramsey Express	4,569	685	Southwest Transit	97
496	Shakopee	73	690	Southwest Transit	1,306
887	St. Cloud	110	691	Southwest Transit	53
420	MVTA	61	695	Southwest Transit	333
421	MVTA	20	697	Southwest Transit	90
426	MVTA	38	698	Southwest Transit	832
436	MVTA	120	699	Southwest Transit	592

Source: Cambridge Systematics Analysis of STP Operator Ridership Databases (October 2010).

5.0 Data Retrieval & Expansion

Surveys were collected at a block level in accordance with the sampling plan. Each envelope and box containing a number of completed surveys was numbered with additional identifying features such as assignment and route number. A database that associated each survey with a specific block and with boarding and alighting characteristics from the hand-held devices was built. This database structure also supported the tracking and proper assignment of mail-back surveys to the appropriate block and route combination.

Quality check for the data entered involved the use of a visual data checking procedure based on a continuous sampling method. Under this procedure, QA staff compared the onscreen form against the original paper survey for data entry accuracy and corrected for input errors as required. Data records were checked 100 percent until *5* consecutive records were found to be error free. At this time, every 5th record was checked. This process was followed until an error was found. In case of an additional error being found, 100 percent checking was restored and the cycle started over.

After all the records were entered into the database, it was checked for inconsistencies in answers to survey questions. For instance, if a respondent had no automobiles available and had no license, and if he/she also answered access mode as driving alone, the record would be checked for transcription errors and ultimately discarded, if needed. Other checks, such as comparing the total number of persons in the household against both the number of children in the household and the number of adults were carried out to ensure that the information provided was meaningful.

Data entry personnel received weekly reviews on data accuracy and productivity. In particular, each person was informed of her error rate and productivity index, and the average of her peers. Surveyor personnel also received reviews on productivity. In particular, each surveyor was informed of his/her productivity index (surveys returned/surveys distributed), and the averages of his/her peers. Summary statistics from the final weighted database using the combined 2005 and 2010 database are included in Appendix A.

5.1 2010 Survey Records

In total, 26,000 surveys were distributed to passengers during the survey process of which 21,078 surveys were handed back.

- Among these completed surveys, 2,088 surveys had no reported boarding and alighting information and had no scanner information

either at boarding or alighting locations. These records were dropped.

- 3,722 surveys were refusals (surveys that were handed back and boarding location was scanned) while 794 surveys had a lot of missing information and were considered invalid. All of these records were dropped.
- The non-English survey questionnaires had very low response rates with only 151 surveys being completed in Spanish, three in Hmong and twelve in Somali.
- The mail back was considerably more successful with a total of 969 surveys returned using this option.

In total, 16,562 records were entered into the database. **Table 5.1** describes the distribution of completed records by route.

Table 5.1 Valid Records from the 2010 Onboard Survey

Route	Type of Route	Surveys	Route	Type of Route	Surveys
3	Local	166	484	Local	108
4	Local	311	535	Local	68
5	Local	477	542	Local	50
6	Local	268	553	Express	75
7	Local	80	554	Express	25
9	Local	140	558	Express	40
10	Local	387	587	Express	38
11	Local	98	589	Express	17
12	Local	199	597	Express	84
14	Local	312	603	Local	16
16	Local	605	604	Local	22
17	Local	302	615	Local	33
18	Local	255	652	Express	13
19	Local	362	663	Express	21
20	Local	26	664	Express	50
21	Local	338	665	Express	36
22	Local	320	667	Express	124
25	Local	11	668	Express	76
27	Local	62	673	Express	112
32	Local	22	674	Express	22
50	Local	165	675	Express	102
53	Local	97	677	Express	23
54	Local	234	680	Express	43
55	Rail	3003	684	Express	62
59	Local	10	685	Express	51
61	Local	57	690	Express	250
62	Local	18	691	Express	36
63	Local	249	695	Express	115
64	Local	130	697	Express	32
65	Local	89	698	Express	160
67	Local	56	699	Express	128
68	Local	89	705	Local	78
70	Local	25	716	Local	14
71	Local	46	721	Local	54

74	Local	170	722	Local	4
80	Local	104	723	Local	67
84	Local	138	724	Local	58
94	Express	115	742	Express	17
111	Local	77	755	Local	60
113	Local	18	756	Local	42
114	Local	265	758	Express	47
118	Local	14	760	Express	114
133	Local	65	761	Local	42
134	Local	45	762	Express	6
144	Local	18	763	Express	74
152	Local	20	764	Express	46
250	Express	216	765	Express	19
252	Express	66	766	Express	233
260	Express	53	767	Express	64
261	Express	92	780	Express	59
264	Express	65	781	Express	426
265	Express	13	782	Express	52
270	Express	188	783	Express	76
275	Express	77	784	Express	150
288	Express	116	787	Local	2
294	Express	15	788	Express	15
350	Local	41	790	Express	57
351	Express	55	824	Local	31
353	Express	44	825	Local	11
355	Express	139	850	Express	74
361	Express	65	852	Express	17
364	Express	21	854	Local	45
365	Express	125	856	Express	96
375	Express	125	860	Express	18
442	Local	97	887	Express	7
465	Express	105	888	Rail	579

Source: Analysis of Retrieved 2010 Survey Data by Cambridge Systematics.

The retrieved surveys far surpassed the original target of 11,200 surveys established during field implementation. The resulting surveys are compared against the targets for each of the priority groups in **Table 5.2**.

- The 5 percent response rate target was met on several route groups as can be seen below in **Table 5.2**.
- In fact, the response rates for express bus (except the priority 1 routes) exceeded 18 percent and were as high as 28 percent for commuter rail.

Table 5.2 Survey Responses by Priority Group

Priority	Type	Ridership Estimates	Actual Responses	Response Rates
1	Express	4,573	103	2.3%
	Commuter Rail	2,091	579	27.7%
2	Local	115,053	5,010	4.4%
	Express	21,746	3,934	18.1%
3	Local	10,396	444	4.3%
	Express	1,433	280	19.5%
	Light Rail	28,397	3,003	10.6%
4	Local	38,127	1,803	4.7%
	Express	2,310	437	18.9%
5	Local	54,826	969	1.8%
Total		**278,950**	**16,562**	**6.0%**

Source: Analysis of Retrieved 2010 Survey Data by Cambridge Systematics.

- The low response rate for express bus in priority group 1 is explained primarily by the fact that respondents who use these buses do so to connect to and from the commuter rail. As such, several respondents refused to complete the survey twice. The travel behavior and patterns of these riders will be analyzed using the Northstar surveys.
- Several surveys were collected on routes belonging to priority group 5. Some of these records were discarded because more in-depth information was available from the 2005 surveys.

5.2 PASSENGER COUNT DATA

There were a total of 47,714 boardings and 47,678 alightings reported by fieldworkers. These boardings were reported at a bus stop level and were clearly attributed to a specific block and itinerary.

- The small difference in boardings and alightings may be attributed to the fact that most routes are interlined and the crews stopped administering the survey before all runs of the vehicle were complete in cases where the runs ran late into the night.
- These data indicate that the survey was presented on a substantial number of trips that account for nearly 20 percent of the system-wide ridership.
- Further, the overall response rate, measured by the number of respondents as a percentage of total ridership on the sampled routes is nearly 35 percent.

- This comprehensive database was aggregated to measure boarding activity at an itinerary level to support geocoding.

5.3 2005 SURVEY RECORDS

5,782 records from the 2005 survey were appended to the 2010 database. The 2010 survey effort was extremely successful in exceeding survey targets both at an aggregate route priority level as well as at an individual route level. Therefore, the 2005 survey records were obtained only for routes belonging to priority group 5. **Table 5.3** presents the distribution of the 2005 survey records across different routes.

In total, the combined on-board survey database contains 22,349 records. Some of these records have incomplete information such as missing origin or destination locations or unknown origin or destination locations. These records are often discarded as they do not support modeling efforts. In this case, they have been retained because they provide information on socio-demographic variables to support planning efforts.

Table 5.3 Records from the 2005 Onboard Survey

Route	Surveys	Route	Surveys
2	423	489	9
3	691	490	16
8	13	496	3
23	33	515	80
39	9	535	59
46	52	538	24
62	69	539	9
75	51	540	7
87	36	552	61
113	178	568	5
115	15	576	92
134	47	578	89
135	16	589	53
144	77	643	63
146	108	649	42
152	54	652	72
156	77	663	83
219	24	670	20
223	13	671	38
225	21	672	86
227	8	674	54
262	29	675	413
272	33	677	126
415	8	717	8
417	7	740	10
420	7	741	3
421	3	771	4

426	5	772	168
436	18	774	11
440	4	776	52
444	20	777	21
445	21	789	15
446	4	791	12
452	94	793	65
460	456	795	15
464	22	801	20
465	123	805	25
470	63	831	16
472	36	850	548
476	26	852	130
477	91	860	32
480	43		

Source: Analysis of Retrieved 2010 Survey Data by Cambridge Systematics.

5.4 GEOCODING

Geocoding began right after data entry was completed. Several stages of extensive geocoding were carried out to ensure that the information was transcribed efficiently and that the most accurate geographic information was coded into the survey database.

Stage 1 Geocoding

- The first geocoding process utilized ArcView 3.2 and used the base map given by MetCouncil for geocoding purposes.
- Records that could not be geocoded were analyzed using ArcView 10.0, which resulted in the geocoding of additional locations.
- Manual geocoding was later performed on all records that could not be geocoded. To geocode locations which were not geocoded using ArcView, publicly available solutions such as MapQuest.com, Geocoder.us, and iTouchMap.com were used.
- Every geocoded record was then compared to a perimeter latitude and longitude for the Twin Cities area. Records that fell outside the perimeter of the service area were identified, investigated and re-geocoded.

Stage 2 Geocoding

All the records were then geocoded for a second time using a proprietary web-based tool developed by Cambridge Systematics. The results of both geocoding processes were then compared against each other to test for accuracy. Records with differences in geocoding across the two methods were re-analyzed manually to ascertain the exact locations.

Boarding and Alighting Geocoding

Boarding and alighting location information mainly came from the scanners that recorded bus stop data on all surveyed routes. These scanners self-reported latitude and longitude data for most of the completed surveys and provided an enriched database that required minimal editing or cleaning.

Minor edits were required for records where the scanner did not work properly – such as urban canyons (streets with tall skyscrapers) in downtown Minneapolis and St. Paul. There were also a few satellite blind spots in some outlying areas.

6.0 Survey Expansion

The extensive supplementary data collection, including passenger counts and system-wide ridership supported a detailed survey expansion framework. Of the 22,349 records in the combined 2005 and 2010 database, 751 records from the 2010 database were not included in the survey expansion as they were from routes in the priority 5 category which were better represented by the 2005 survey data.

Four expansion factors were developed to grow the survey responses to match the system-wide ridership.

- **Factor 1**. This expansion factor is used to grow the surveyed records to the ***manual counts*** reported during survey data collection. Unique factors are developed at a trip level by route, direction, and time.
- **Factor 2**. This expansion factor is designed to match survey records to ridership at a route, direction and time period. This expansion factor accounts for ***non-sampled trips during different times-of-day*** for every unique route and direction combination.
- **Factor 3**. This expansion factor is used to account for ***non-sampled time periods*** (usually late night) at either the route level or the route and direction level.
- **Factor 4**. There were a handful of low volume routes that were neither sampled during the 2005 survey nor during the 2010 survey. This expansion factor accounts for these ***non-surveyed routes*** by adjusting the missing ridership across all the other routes in proportion to the route ridership. It must be noted that this factor is very close to 1 indicating that a majority of transit ridership on the system was captured either by the 2005 survey or by the 2010 survey.
- **Combined Boarding Weight**. Each of the factors described above are then multiplied together to generate one unique expansion factor. This factor must be used for all planning and modeling purposes.
- **Trip Factor**. The expanded surveys match up to represent transit ridership. However, several riders use multiple routes to travel between their origin and destination. Since one of the key goals of the transit onboard survey is to develop a detailed transit trip table for model calibration and estimation, it is critical to convert the boardings into trips. Trip weights for every respondent is generated by dividing the combined boarding weight with the number of unique routes (total boardings) made on the trip in question.

Additionally, three separate survey expansion procedures were applied to the transit onboard data.

- **Planning Weights.** The first procedure incorporates all records including those with missing trip location and trip purpose information. The expanded results using these data are useful to generate a profile of transit users. However, they must not be used for modeling as critical trip level information such as origins and destinations and/or trip purpose information may be missing from certain records.
- **Trip Table Weights.** The second procedure assigns a zero weight to all records with missing origin or destination location information. This is to ensure that only geocoded records which help generate transit trip tables are included in the expanded survey database. These expanded records can support extensive travel demand modeling provided that the trip purpose information missing for some records are imputed using heuristic rules. In total, nearly 23 percent of the observations (5,033 records) have either piece of information missing and have been assigned a null weight in this procedure.
- **Travel Demand Modeling Weights.** The third procedure further tightens the inclusion criteria by assigning a zero weight to all records that have missing trip location or trip purpose information. This allows the modeling team to uniquely assign every trip to the appropriate trip purpose bucket during model estimation. An additional 758 observations with missing trip purpose information were assigned null weights using this more constricted approach. However, the records with weights have detailed trip level information critical to support travel demand modeling.

The four expansion factors, described above, were calculated for each of the three procedures for a total of twelve expansion weights. **Table 6.1** presents the distribution of the combined boarding weight for each methodology.

In general, the majority of the expansion weights are between 0 and 20, which is reasonable given that the stated goal of the survey was to collect responses from about 5 percent of riders. Larger weights exist for some undersampled itineraries belonging to a specific combination of direction and time period segments on some routes. In addition, larger weights were also noticed for routes that had low ridership on the dates of the survey when compared to average route ridership.

Table 6.1 Expansion Weights Distribution

Combined Boarding Weight	All Records	Records with O-D information	Records with O-D and Trip Purpose Information
0	753	5,033	5,791
0-5	8,368	5,267	5,025
5-10	4,887	4,139	3,710
10-20	4,913	4,267	4,248
20-30	1,555	1,577	1,477
30-40	753	733	740
40-50	406	425	418
50-100	494	640	646
Over 100	220	268	294
Total	**22,349**	**22,349**	**22,349**

Source: Analysis of the combined 2005 and 2010 onboard dataset by Cambridge Systematics.

7.0 Geography-based Expansion

The expansion procedures discussed in Section 6 provide a variety of options for transit planners and model analysts to utilize the onboard survey in meaningful ways. However, each of these methodologies treats "a bus trip" as the smallest unit of expansion. The premise of these trip-level survey expansions is that participation and response rates are more or less uniform on different segments of an individual trip. However, field experience suggests that response rates vary based on

(a) how crowded the bus is, and

(b) how long the targeted rider is expected to ride on the bus.

Therefore, it is critical to break down the trip into smaller geographic segments and to develop expansion weights using trip segments defined by geography as the frame of reference.

Based on discussions with the Metropolitan Council, a refined expansion procedure that matches boarding and alighting patterns observed in the field at a route segment level were developed. This section outlines the key steps involved in this methodology.

Choosing an Incremental Framework

The geography-based weights are expected to provide refined weights that better represent actual travel patterns observed in the field. Trip tables generated from these weighted records will serve as calibration/validation inputs for the transit module in the proposed activity-based model framework.

These geography-based weights were developed as an incremental improvement to the "travel demand modeling" weights discussed in **Section 6**. Since there were no detailed counts available for the 2005 surveys, these geographic adjustments were limited to the routes surveyed as part of the 2010 effort.

Selecting the Appropriate Geography

While it would be ideal to treat each individual bus stop as a separate entity for expansion, it is virtually impossible to collect survey information at this level of detail. Therefore, a two-stage aggregation methodology was implemented to select the most relevant geography for expansion.

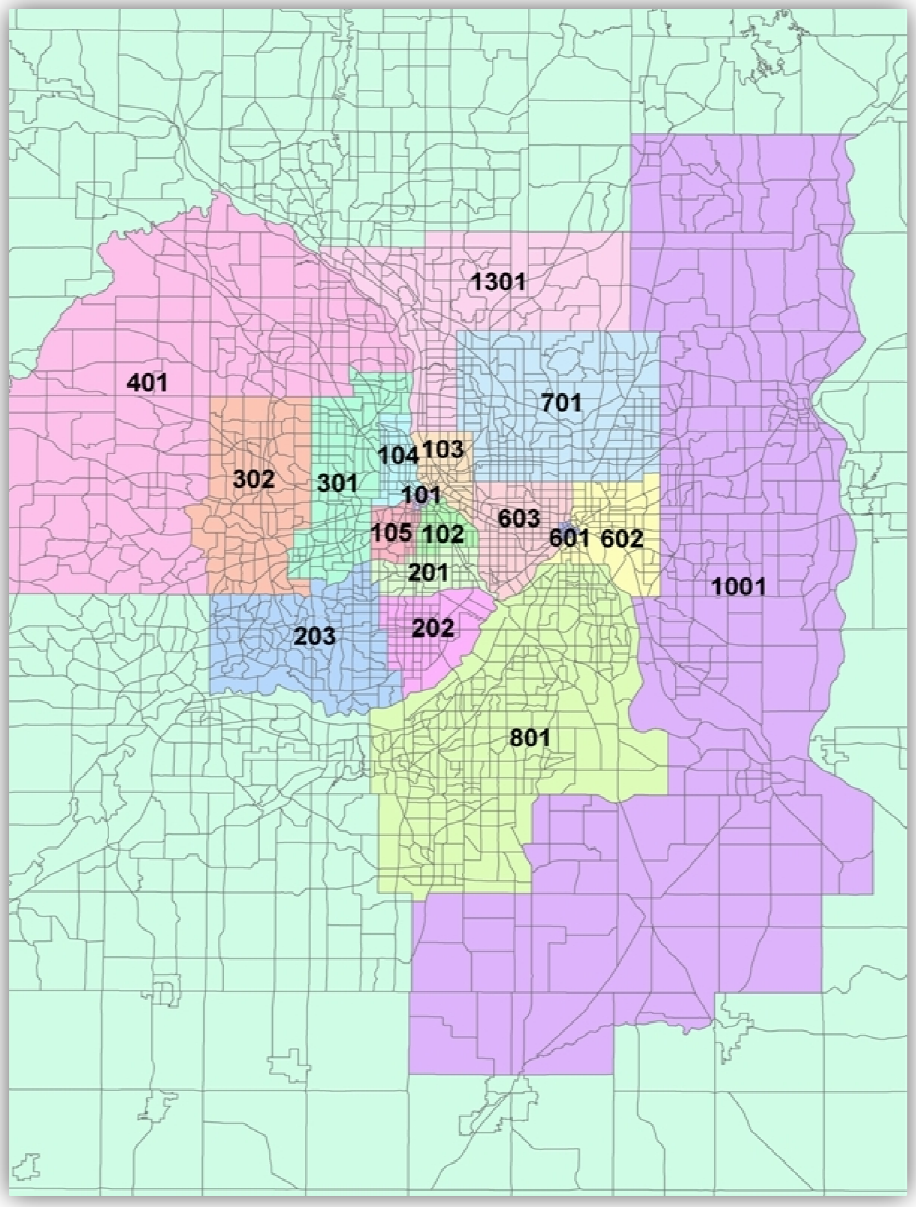
- In the first stage, route-level boardings were aggregated to "superdistricts". These superdistricts were created to study travel behavior and patterns across distinct sub-areas within the study region. In total, the entire study region was broken down into 19

unique superdistricts for the purposes of survey expansion (**Figure 7.1**).

- Transit riders often interchange between multiple routes based on which bus arrives first. Therefore, when making geography-based adjustments, the study team aggregated route-level activity based on the service area for each route. In total, 18 corridor-based route groupings were introduced during expansion. Some routes were grouped separately based on the type of service provided (e.g. LRT and commuter rail).

A full list of selected route-corridors is provided in **Table 7.1**:

Figure 7.1 Superdistrict Geography



Source: Analysis of Metropolitan Council TAZ System by Cambridge Systematics.

Table 7.1 Groupings of Routes by Corridor

Route	Corridor	Route	Corridor
4	I-494 Corridor	361	RedRock Corridor
5	Bottineau Corridor	364	RedRock Corridor
6	Southwest Corridor	365	RedRock Corridor
7	Bottineau Corridor	375	Gateway Corridor
9	Southwest Corridor	542	I-494 Corridor
10	VolGrow Corridor	553	Nicollet Ave Corridor
11	Nicollet Ave Corridor	554	Nicollet Ave Corridor
12	Southwest Corridor	603	Southwest Corridor
14	Bottineau Corridor	604	Southwest Corridor
16	Central Corridor	615	Southwest Corridor
17	Southwest Corridor	664	Southwest Corridor
18	Nicollet Ave Corridor	665	Southwest Corridor
19	Bottineau Corridor	667	Southwest Corridor
21	Central Corridor	668	Southwest Corridor
22	Bottineau Corridor	680	Southwest Corridor
25	Southwest Corridor	684	Southwest Corridor
32	Bottineau Corridor	685	Southwest Corridor
50	Central Corridor	690	Southwest Corridor
53	Central Corridor	691	Southwest Corridor
54	W7th Corridor	695	Southwest Corridor
55	LRT Corridor	697	Southwest Corridor
59	Central Corridor	698	Southwest Corridor
61	VolGrow Corridor	699	Southwest Corridor
63	Gateway Corridor	705	Bottineau Corridor
64	Gateway Corridor	716	Bottineau Corridor
65	Robert St Corridor	721	Bottineau Corridor
67	Robert St Corridor	722	Bottineau Corridor
68	Robert St Corridor	723	Bottineau Corridor
70	Gateway Corridor	724	Bottineau Corridor
71	Robert St Corridor	742	Bottineau Corridor
74	Gateway Corridor	755	Bottineau Corridor
80	E7th Corridor	756	Bottineau Corridor
84	Snelling Corridor	758	Bottineau Corridor
94	Central Corridor	760	Bottineau Corridor

111	Chicago Ave Corridor	761	Bottineau Corridor
114	Southwest Corridor	762	Bottineau Corridor
133	Chicago Ave Corridor	763	Bottineau Corridor
250	I-35 West Corridor	764	Bottineau Corridor
252	I-35 West Corridor	765	Bottineau Corridor
260	I-35 West Corridor	766	Bottineau Corridor
261	New Route Corridor	767	Bottineau Corridor
264	I-35 West Corridor	780	Bottineau Corridor
265	Rush Corridor	781	Bottineau Corridor
270	VolGrow Corridor	782	Bottineau Corridor
275	Rush Corridor	783	Bottineau Corridor
288	I-35 West Corridor	784	Bottineau Corridor
294	Gateway Corridor	788	Bottineau Corridor
351	Gateway Corridor	856	Commuter Corridor
353	Gateway Corridor	887	Commuter Corridor
355	Gateway Corridor	888	Commuter Corridor

Source: Analysis of Route and Corridor Groupings by Cambridge Systematics.

Control Totals for Expansion

Boarding and alighting counts collected at the bus-stop level as part of the 2010 onboard survey effort were aggregated using three variables – corridor grouping, superdistricts and time-of-day.

- Since not all the transit trips were sampled during the survey, the passenger counts add up to a fraction of total system ridership.
- Since the geography-based expansions are built off "travel demand modeling" weights that add up to the entire system, reported passenger counts would not suffice for the geography-based adjustments.
- Therefore, boarding and alighting percentages by corridor grouping, time-of-day and superdistrict were developed for the expansion process.
- In total, 397 unique combinations of corridor groupings, time-of-day and superdistrict were identified in the boarding and alighting counts. These unique combinations are the basic units for geography-based survey expansion.
- **Table 7.2** presents a small sample of the boarding and alighting counts database that was developed for the expansion.

Table 7.2 Boarding Counts Used in Geography-based Expansion

Corridor	Time of Day	Superdistrict	Counts	Percentage
Bottineau	AM	101	216	10.27%
Bottineau	AM	102	247	11.75%
Bottineau	AM	103	15	0.71%
Bottineau	AM	104	378	17.97%
Bottineau	AM	201	79	3.76%
Bottineau	AM	202	17	0.81%
Bottineau	AM	301	391	18.59%
Bottineau	AM	302	1	0.05%
Bottineau	AM	401	750	35.66%
Bottineau	AM	701	9	0.43%
Bottineau	**AM**	**Total**	**2,103**	**100.00%**
Bottineau	Midday	101	688	21.19%
Bottineau	Midday	102	655	20.17%
Bottineau	Midday	103	12	0.37%
Bottineau	Midday	104	954	29.38%
Bottineau	Midday	201	162	4.99%
Bottineau	Midday	202	89	2.74%
Bottineau	Midday	301	468	14.41%
Bottineau	Midday	401	211	6.50%
Bottineau	Midday	701	6	0.18%
Bottineau	Midday	1301	2	0.06%
Bottineau	**Midday**	**Total**	**3,247**	**100.00%**
Bottineau	PM	101	1,528	58.86%
Bottineau	PM	102	248	9.55%
Bottineau	PM	104	240	9.24%
Bottineau	PM	105	7	0.27%
Bottineau	PM	201	125	4.82%
Bottineau	PM	202	42	1.62%
Bottineau	PM	301	251	9.67%
Bottineau	PM	302	21	0.81%
Bottineau	PM	401	134	5.16%
Bottineau	**PM**	**Total**	**2,596**	**100.00%**

Source: Analysis of 2010 Onboard Survey Passenger Count Data by Cambridge Systematics.

Preparing the Data Set for Expansion

The geography-based expansion methodology may only be applied to records with geocoded boarding and alighting location information. Using the scanner technology, a majority of these locations were geocoded. However, locations were not geocoded in some cases due to either interference from large buildings and/or malfunctioning equipment. In total, about 100 records were dropped from the geography-based survey expansion compared to the "travel demand modeling" round of expansion.

Based on the route, time-of-day and boarding/alighting locations, each survey record was uniquely matched with one of the 397 unique expansions units identified in the passenger count data.

Iterative Proportional Fitting (IPF) Framework

The goal of the geography-based expansion was to adjust the survey database to meet three distinct goals:

- Match the boarding patterns observed in the field at a corridor grouping, time-of-day and superdistrict level;
- Match the alighting patterns observed in the field at a corridor grouping, time-of-day and superdistrict level; and
- Ensure the expanded records match system reported counts by route, direction and time-of-day which were the basis for the "travel demand modeling" expansion weights.

A three-stage IPF was designed to meet each of the three key goals. At each stage, the IPF would match one of boarding, alighting or route-level patterns against the count data perfectly. Once all three stages were completed, one iteration of the IPF would be deemed complete. Multiple iterations were developed to ensure that the data converged to the overall counts across all three dimensions.

Testing the IPF Results

Many transit routes in the Metro system are part of multiple corridors. To simplify the expansion procedure, each route was uniquely assigned to one corridor and geography-based weights were developed. To test the effectiveness of the IPF procedures, boarding and alighting patterns for both counts and reweighted surveys were developed at a corridor level. However, routes that were part of multiple corridors were assigned to all of them to see how the expansion performed. Overall, the adjusted expansion procedure results matched up very well against count data. A set of results are provided in **Table 7.3** for routes belonging to the Bottineau corridor. The table clearly indicates the improved performance of the expansion data in matching ridership count trends for most geographic districts. A detailed spreadsheet outlining these results is included as an independent appendix to this report.

Table 7.3 Impact of Geographic Expansion on Bottineau Corridor Routes

Time of Day	Boarding Superdistrict	Count Distribution	Pre-Geo. Expansion Distribution	Post-Geo. Expansion Distribution
AM Peak Period (6–9 AM)	101	10.79%	12.24%	12.36%
	102	13.15%	17.67%	12.97%
	103	0.68%	0.22%	0.51%
	104	18.10%	21.36%	17.87%
	201	4.08%	6.17%	3.92%
	202	0.77%	0.83%	0.79%
	301	17.96%	18.37%	18.18%
	401	34.01%	22.44%	32.86%
	701	0.41%	0.70%	0.40%
Mid-day Period (9AM–3 PM)	101	21.40%	19.26%	21.28%
	102	20.39%	22.15%	20.61%
	103	0.36%	0.13%	0.35%
	104	28.84%	20.69%	27.85%
	201	5.25%	7.28%	5.28%
	202	2.66%	9.82%	2.57%
	301	14.48%	14.76%	14.82%
	401	6.30%	5.04%	6.09%
	701	0.18%	0.75%	0.71%
	1301	0.06%	0.03%	0.06%
PM Peak Period (3–7PM)	101	58.60%	49.86%	55.82%
	102	9.85%	14.13%	9.93%
	104	9.26%	8.30%	8.55%
	105	0.26%	0.10%	0.25%
	201	5.04%	7.12%	4.34%
	202	1.57%	7.80%	1.46%
	301	9.63%	9.46%	8.77%
	302	0.78%	0.14%	0.15%
	401	5.00%	3.09%	4.61%

Source: Results of Geography-based Expansion Implemented by Cambridge Systematics

A. Weighted Survey Data

The tables included here contain all "travel demand model" weighted percentages for every question in the 2005 and 2010 questionnaires. The combined data base of the 2005 and 2010 surveys was expanded to a total number of 278,950 transit riders. The 2010 survey alone comprises 226,528 transit riders clearly indicating that the majority of Twin Cities transit ridership is represented by the 2010 survey.

Table A.1 Weighted Response to Origin Purpose

Purpose	Percentage (Combined dataset 2005 and 2010)	Percentage (2010 Only)
Home	86%	83%
Work	7%	8%
College	2%	2%
School	1%	1%
Recreation	1%	2%
Shopping	1%	2%
Other Errands	2%	3%
No Response	0%	0%
Total	100%	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

Table A.2 Weighted Response to Access Mode

Mode	Percentage (Combined dataset 2005 and 2010)	Percentage (2010 Only)
Drive	15%	15%
Dropped off	0%	0%
Shared Ride	3%	3%
Bike	1%	2%
Walk	76%	76%
Other	2%	2%
No Response	2%	2%
Total	100%	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

Table A.3 Weighted Response to Transfer Mode at Access

Access Transfer	Percentage (Combined dataset 2005 and 2010)	Percentage (2010 Only)
Transfer Via Bus	29%	31%
Transfer Via CR	0%	0%
Transfer Via LRT	3%	3%
No Transfer	66%	64%
No Response	1%	2%
Total	100%	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

Table A.4 Weighted Response to Transfer Mode at Egress

Egress Transfer	Percentage (Combined dataset 2005 and 2010)	Percentage (2010 Only)
Transfer Via Bus	27%	29%
Transfer Via CR	0%	0%
Transfer Via LRT	3%	2%
No Transfer	69%	67%
No Response	1%	1%
Total	100%	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

Table A.5 Weighted Response to Origin Purpose

Purpose	Percentage (Combined dataset 2005 and 2010)	Percentage (2010 Only)
Home	2%	1%
Work	59%	58%
College	14%	10%
School	3%	3%
Recreation	5%	6%
Shopping	6%	7%
Other_Errands	11%	12%
No Response	0%	0%
Total	100%	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

Table A.6 Weighted Response to Egress Mode

Egress Mode	Percentage (Combined dataset 2005 and 2010)	Percentage (2010 Only)
Drive	2%	1%
Dropped off	0%	0%
Shared Ride	2%	2%
Bike	1%	1%
Walk	87%	87%
Other	3%	4%
No Response	4%	4%
Total	100%	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

Table A.7 Weighted Response to Number of Vehicles in a Household

Number of Vehicles	Percentage (Combined dataset 2005 and 2010)	Percentage (2010 Only)
0	32%	35%
1	31%	31%
2	24%	22%
3	7%	7%
4+	3%	2%
No Response	3%	4%
Total	100%	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

Table A.8 Weighted Response to Vehicle Availability

Vehicle Availability	Percentage (Combined dataset 2005 and 2010)	Percentage (2010 Only)
Yes	43%	38%
No	53%	57%
No Response	4%	4%
Total	100%	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

Table A.9 Weighted Response to Holding Driver's License

Driver's License	Percentage (Combined dataset 2005 and 2010)	Percentage (2010 Only)
Yes	66%	62%
No	30%	33%
No Response	4%	4%
Total	100%	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

Table A.10 Weighted Response to Number of Workers in a Household

Number of Workers	Percentage (Combined dataset 2005 and 2010)	Percentage (2010 Only)
0	6%	6%
1	37%	38%
2	39%	37%
3	9%	10%
4+	4%	5%
No Response	5%	5%
Total	100%	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

Table A.11 Weighted Response to Number of Members in a Household

Household Size	Percentage (Combined dataset 2005 and 2010)	Percentage (2010 Only)
1	24%	24%
2	30%	28%
3	18%	17%
4+	24%	24%
No Response	5%	6%
Total	100%	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

Table A.12 Weighted Response to Income Category

Income Category	Percentage (Combined dataset 2005 and 2010)	Percentage (2010 Only)
Less Than $15,000	19%	20%
$15,000-$24,999	11%	14%
$25,000-$34,999	9%	9%
$35,000-$59,999	19%	18%
$60,000-$94,999	5%	0%
$60,000-$99,999	14%	17%
$95,000 or More	6%	0%
$100,000 or More	10%	12%
No Response	8%	10%
Total	100%	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

Table A.13 Weighted Response to Gender of the Respondent

Gender	Percentage (Combined dataset 2005 and 2010)	Percentage (2010 Only)
Female	55%	55%
Male	39%	40%
No Response	6%	5%
Total	100%	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

Table A.14 Weighted Response to Age of the Respondent

Age	Percentage (Combined dataset 2005 and 2010)	Percentage (2010 Only)
Under 18	2%	3%
18-24	21%	21%
25-34	24%	23%
35-44	16%	15%
45-54	18%	19%
55-64	12%	13%
65-74	3%	3%
75 and Over	1%	1%
No Response	3%	4%
Total	100%	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

Table A.15 Weighted Response to Resident Status

Resident Status	Percentage (Combined dataset 2005 and 2010)	Percentage (2010 Only)
Live in Twin Cities Area	93%	92%
Visiting Twin Cities Area	3%	3%
No Response	4%	5%
Total	100%	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

Table A.16 Weighted Response to Transit Tenure

Transit Tenure	Percentage (2010 Only)
Less Than 6 Months	10%
6 to 12 Months	7%
1 to 2 Years	10%
2 to 5 Years	21%
More Than 5 Years	47%
No Response	3%
Total	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

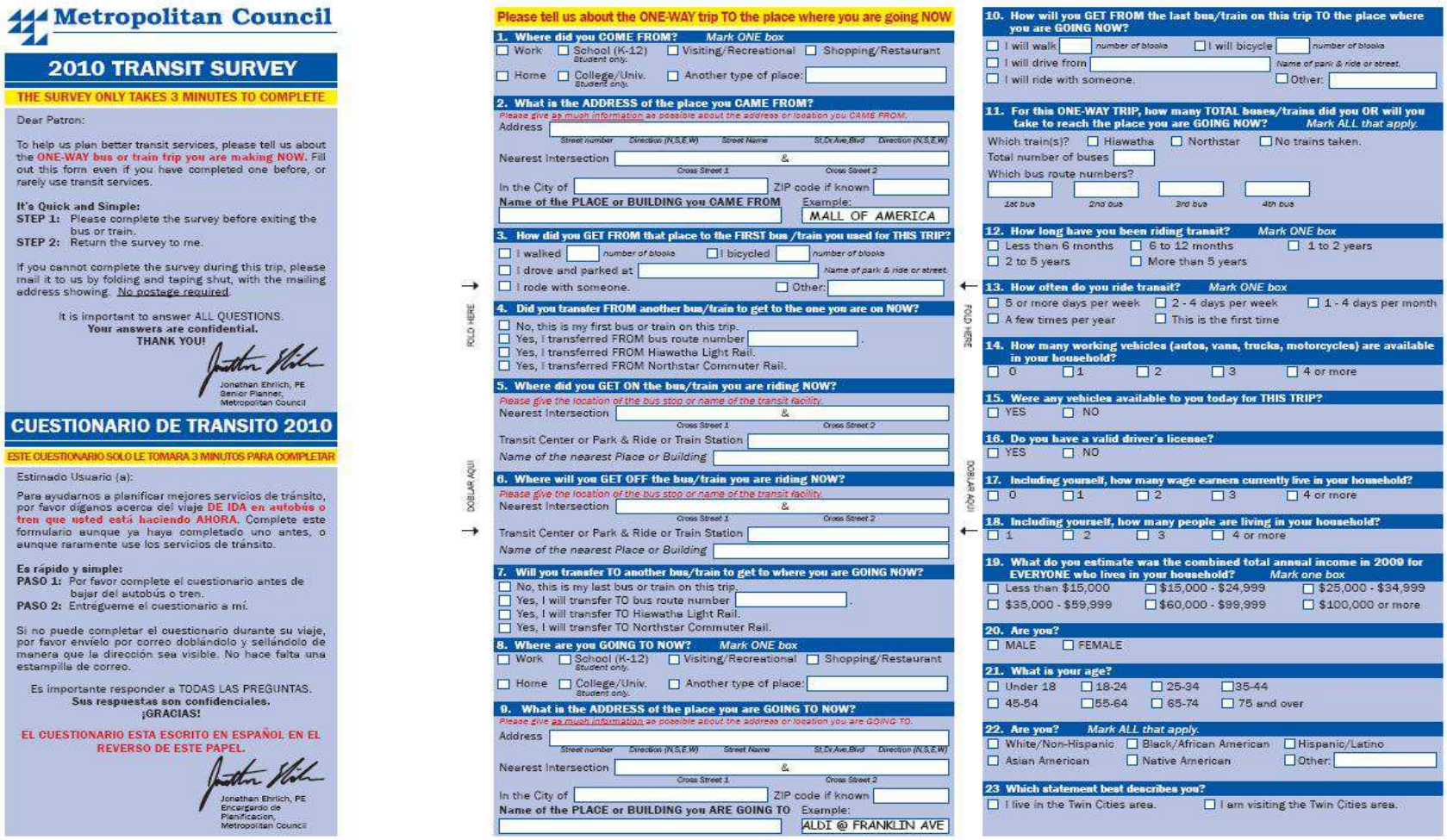
Table A.17 Weighted Response to Transit Frequency

Transit Frequency	Percentage (2010 Only)
This is the First Time	1%
1-4 Days Per Month	3%
2-4 Days Per Week	22%
5+ Days Per Week	69%
A Few Times Per Year	2%
No Response	4%
Total	100%

Source: CS Analysis of 2005 and 2010 combined dataset.

B. 2010 Survey Questionnaire

Figure B.1 English Version



Metropolitan Council

2010 TRANSIT SURVEY

THE SURVEY ONLY TAKES 3 MINUTES TO COMPLETE

Dear Patron:

To help us plan better transit services, please tell us about the **ONE-WAY bus or train trip you are making NOW.** Fill out this form even if you have completed one before, or rarely use transit services.

It's Quick and Simple:
STEP 1: Please complete the survey before exiting the bus or train.
STEP 2: Return the survey to me.

If you cannot complete the survey during this trip, please mail it to us by folding and taping shut, with the mailing address showing. No postage required.

It is important to answer ALL QUESTIONS.
Your answers are confidential.
THANK YOU!

Jonathan Ehrlich, PE
Senior Planner,
Metropolitan Council

CUESTIONARIO DE TRANSITO 2010

ESTE CUESTIONARIO SOLO LE TOMARA 3 MINUTOS PARA COMPLETAR

Estimado Usuario (a):

Para ayudarnos a planificar mejores servicios de tránsito, por favor díganos acerca del viaje **DE IDA en autobús o tren que usted está haciendo AHORA.** Complete este formulario aunque ya haya completado uno antes, o aunque raramente use los servicios de tránsito.

Es rápido y simple:
PASO 1: Por favor complete el cuestionario antes de bajar del autobús o tren.
PASO 2: Entréguemе el cuestionario a mí.

Si no puede completar el cuestionario durante su viaje, por favor envíelo por correo doblándolo y sellándolo de manera que la dirección sea visible. No hace falta una estampilla de correo.

Es importante responder a TODAS LAS PREGUNTAS.
Sus respuestas son confidenciales.
¡GRACIAS!

EL CUESTIONARIO ESTA ESCRITO EN ESPAÑOL EN EL REVERSO DE ESTE PAPEL.

Jonathan Ehrlich, PE
Encargado de Planificacion,
Metropolitan Council

Please tell us about the ONE-WAY trip TO the place where you are going NOW

1. Where did you COME FROM? *Mark ONE box*
☐ Work ☐ School (K-12) Student only. ☐ Visiting/Recreational ☐ Shopping/Restaurant
☐ Home ☐ College/Univ. Student only. ☐ Another type of place:

2. What is the ADDRESS of the place you CAME FROM?
Please give as much information as possible about the address or location you CAME FROM.
Address (Street number / Direction (N,S,E,W) / Street Name / St,Dr,Ave,Blvd / Direction (N,S,E,W))
Nearest Intersection & (Cross Street 1 / Cross Street 2)
In the City of ZIP code if known
Name of the PLACE or BUILDING you CAME FROM Example: MALL OF AMERICA

3. How did you GET FROM that place to the FIRST bus /train you used for THIS TRIP?
☐ I walked ☐ number of blocks ☐ I bicycled ☐ number of blocks
☐ I drove and parked at ☐ Name of park & ride or street
☐ I rode with someone. ☐ Other:

FOLD HERE →

4. Did you transfer FROM another bus/train to get to the one you are on NOW?
☐ No, this is my first bus or train on this trip.
☐ Yes, I transferred FROM bus route number .
☐ Yes, I transferred FROM Hiawatha Light Rail.
☐ Yes, I transferred FROM Northstar Commuter Rail.

5. Where did you GET ON the bus/train you are riding NOW?
Please give the location of the bus stop or name of the transit facility.
Nearest Intersection & (Cross Street 1 / Cross Street 2)
Transit Center or Park & Ride or Train Station
Name of the nearest Place or Building

DOBLAR AQUI →

6. Where will you GET OFF the bus/train you are riding NOW?
Please give the location of the bus stop or name of the transit facility.
Nearest Intersection & (Cross Street 1 / Cross Street 2)
Transit Center or Park & Ride or Train Station
Name of the nearest Place or Building

7. Will you transfer TO another bus/train to get to where you are GOING NOW?
☐ No, this is my last bus or train on this trip.
☐ Yes, I will transfer TO bus route number .
☐ Yes, I will transfer TO Hiawatha Light Rail.
☐ Yes, I will transfer TO Northstar Commuter Rail.

8. Where are you GOING TO NOW? *Mark ONE box*
☐ Work ☐ School (K-12) Student only. ☐ Visiting/Recreational ☐ Shopping/Restaurant
☐ Home ☐ College/Univ. Student only. ☐ Another type of place:

9. What is the ADDRESS of the place you are GOING TO NOW?
Please give as much information as possible about the address or location you are GOING TO.
Address (Street number / Direction (N,S,E,W) / Street Name / St,Dr,Ave,Blvd / Direction (N,S,E,W))
Nearest Intersection & (Cross Street 1 / Cross Street 2)
In the City of ZIP code if known
Name of the PLACE or BUILDING you ARE GOING TO Example: ALDI @ FRANKLIN AVE

← FOLD HERE

10. How will you GET FROM the last bus/train on this trip TO the place where you are GOING NOW?
☐ I will walk ☐ number of blocks ☐ I will bicycle ☐ number of blocks
☐ I will drive from ☐ Name of park & ride or street.
☐ I will ride with someone. ☐ Other:

11. For this ONE-WAY TRIP, how many TOTAL buses/trains did you OR will you take to reach the place you are GOING NOW? *Mark ALL that apply.*
Which train(s)? ☐ Hiawatha ☐ Northstar ☐ No trains taken.
Total number of buses
Which bus route numbers? (1st bus / 2nd bus / 3rd bus / 4th bus)

12. How long have you been riding transit? *Mark ONE box*
☐ Less than 6 months ☐ 6 to 12 months ☐ 1 to 2 years
☐ 2 to 5 years ☐ More than 5 years

13. How often do you ride transit? *Mark ONE box*
☐ 5 or more days per week ☐ 2 - 4 days per week ☐ 1 - 4 days per month
☐ A few times per year ☐ This is the first time

14. How many working vehicles (autos, vans, trucks, motorcycles) are available in your household?
☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 or more

15. Were any vehicles available to you today for THIS TRIP?
☐ YES ☐ NO

16. Do you have a valid driver's license?
☐ YES ☐ NO

17. Including yourself, how many wage earners currently live in your household?
☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 or more

18. Including yourself, how many people are living in your household?
☐ 1 ☐ 2 ☐ 3 ☐ 4 or more

19. What do you estimate was the combined total annual income in 2009 for EVERYONE who lives in your household? *Mark one box*
☐ Less than $15,000 ☐ $15,000 - $24,999 ☐ $25,000 - $34,999
☐ $35,000 - $59,999 ☐ $60,000 - $99,999 ☐ $100,000 or more

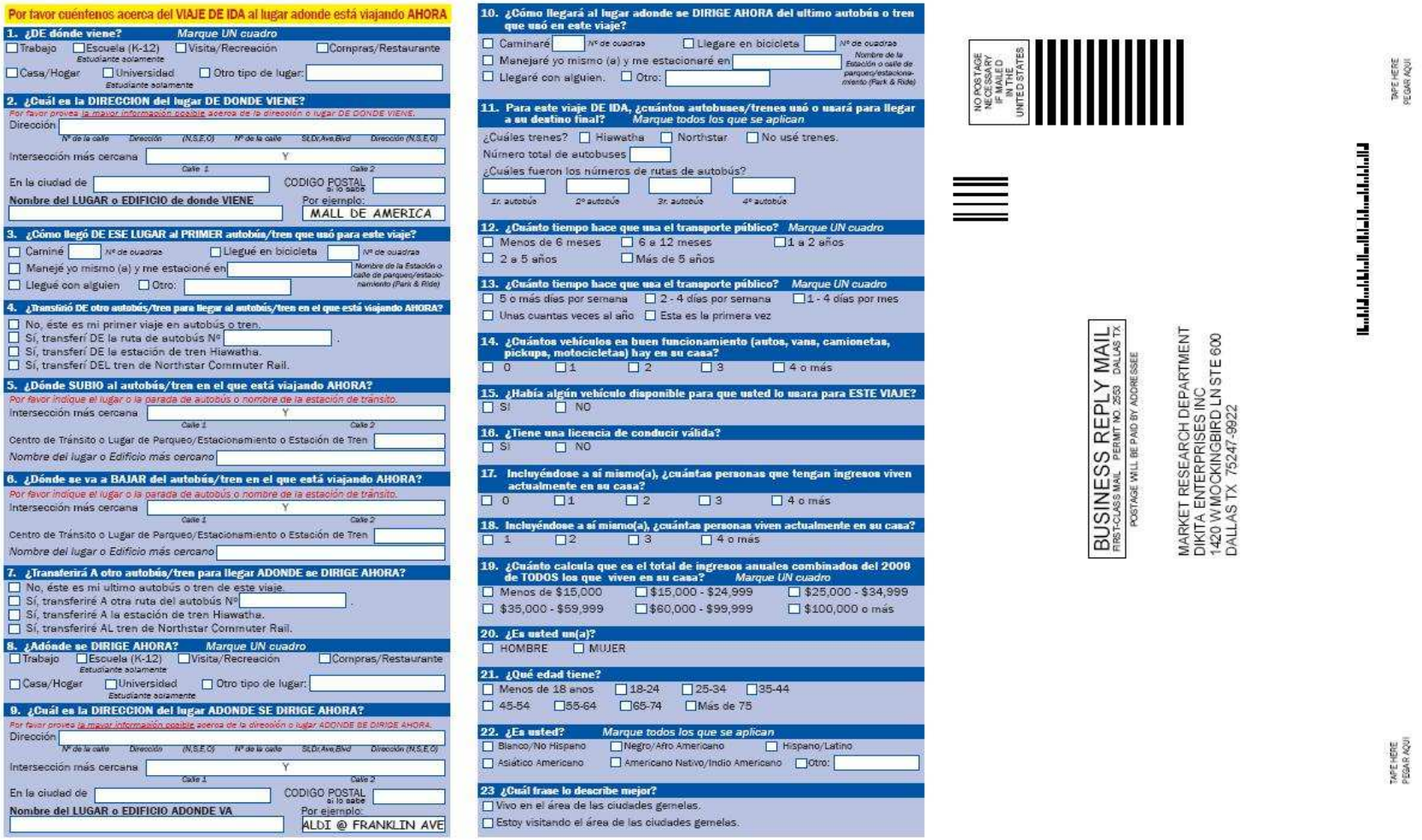
20. Are you?
☐ MALE ☐ FEMALE

21. What is your age?
☐ Under 18 ☐ 18-24 ☐ 25-34 ☐ 35-44
☐ 45-54 ☐ 55-64 ☐ 65-74 ☐ 75 and over

22. Are you? *Mark ALL that apply.*
☐ White/Non-Hispanic ☐ Black/African American ☐ Hispanic/Latino
☐ Asian American ☐ Native American ☐ Other:

23 Which statement best describes you?
☐ I live in the Twin Cities area. ☐ I am visiting the Twin Cities area.

Figure B.2 Spanish Version



Por favor cuéntenos acerca del VIAJE DE IDA al lugar adonde está viajando AHORA

1. ¿DE dónde viene? *Marque UN cuadro*
☐ Trabajo ☐ Escuela (K-12) *Estudiante solamente* ☐ Visita/Recreación ☐ Compras/Restaurante
☐ Casa/Hogar ☐ Universidad *Estudiante solamente* ☐ Otro tipo de lugar:

2. ¿Cuál es la DIRECCION del lugar DE DONDE VIENE?
Por favor provea la mejor información posible acerca de la dirección o lugar DE DONDE VIENE.
Dirección
Nº de la calle Dirección (N,S,E,O) Nº de la calle St,Dr,Ave,Blvd Dirección (N,S,E,O)
Intersección más cercana Y
Calle 1 Calle 2
En la ciudad de CODIGO POSTAL *si lo sabe*
Nombre del LUGAR o EDIFICIO de donde VIENE Por ejemplo: MALL DE AMERICA

3. ¿Cómo llegó DE ESE LUGAR al PRIMER autobús/tren que usó para este viaje?
☐ Caminé *Nº de cuadras* ☐ Llegué en bicicleta *Nº de cuadras*
☐ Manejé yo mismo (a) y me estacioné en *Nombre de la Estación o calle de parques/estacionamiento (Park & Ride)*
☐ Llegué con alguien ☐ Otro:

4. ¿Transfirió DE otro autobús/tren para llegar al autobús/tren en el que está viajando AHORA?
☐ No, éste es mi primer viaje en autobús o tren.
☐ Sí, transferí DE la ruta de autobús Nº .
☐ Sí, transferí DE la estación de tren Hiawatha.
☐ Sí, transferí DEL tren de Northstar Commuter Rail.

5. ¿Dónde SUBIO al autobús/tren en el que está viajando AHORA?
Por favor indique el lugar o la parada de autobús o nombre de la estación de tránsito.
Intersección más cercana Y
Calle 1 Calle 2
Centro de Tránsito o Lugar de Parqueo/Estacionamiento o Estación de Tren
Nombre del lugar o Edificio más cercano

6. ¿Dónde se va a BAJAR del autobús/tren en el que está viajando AHORA?
Por favor indique el lugar o la parada de autobús o nombre de la estación de tránsito.
Intersección más cercana Y
Calle 1 Calle 2
Centro de Tránsito o Lugar de Parqueo/Estacionamiento o Estación de Tren
Nombre del lugar o Edificio más cercano

7. ¿Transferirá A otro autobús/tren para llegar ADONDE se DIRIGE AHORA?
☐ No, éste es mi ultimo autobús o tren de este viaje.
☐ Sí, transferiré A otra ruta del autobús Nº .
☐ Sí, transferiré A la estación de tren Hiawatha.
☐ Sí, transferiré AL tren de Northstar Commuter Rail.

8. ¿Adónde se DIRIGE AHORA? *Marque UN cuadro*
☐ Trabajo ☐ Escuela (K-12) *Estudiante solamente* ☐ Visita/Recreación ☐ Compras/Restaurante
☐ Casa/Hogar ☐ Universidad *Estudiante solamente* ☐ Otro tipo de lugar:

9. ¿Cuál es la DIRECCION del lugar ADONDE SE DIRIGE AHORA?
Por favor provea la mejor información posible acerca de la dirección o lugar ADONDE SE DIRIGE AHORA.
Dirección
Nº de la calle Dirección (N,S,E,O) Nº de la calle St,Dr,Ave,Blvd Dirección (N,S,E,O)
Intersección más cercana Y
Calle 1 Calle 2
En la ciudad de CODIGO POSTAL *si lo sabe*
Nombre del LUGAR o EDIFICIO ADONDE VA Por ejemplo: ALDI @ FRANKLIN AVE

10. ¿Cómo llegará al lugar adonde se DIRIGE AHORA del ultimo autobús o tren que usó en este viaje?
☐ Caminaré *Nº de cuadras* ☐ Llegare en bicicleta *Nº de cuadras*
☐ Manejaré yo mismo (a) y me estacionaré en *Nombre de la Estación o calle de parques/estacionamiento (Park & Ride)*
☐ Llegaré con alguien. ☐ Otro:

11. Para este viaje DE IDA, ¿cuántos autobuses/trenes usó o usará para llegar a su destino final? *Marque todos los que se aplican*
¿Cuáles trenes? ☐ Hiawatha ☐ Northstar ☐ No usé trenes.
Número total de autobuses
¿Cuáles fueron los números de rutas de autobús?
1er. autobús 2º autobús 3er. autobús 4º autobús

12. ¿Cuánto tiempo hace que usa el transporte público? *Marque UN cuadro*
☐ Menos de 6 meses ☐ 6 a 12 meses ☐ 1 a 2 años
☐ 2 a 5 años ☐ Más de 5 años

13. ¿Cuánto tiempo hace que usa el transporte público? *Marque UN cuadro*
☐ 5 o más días por semana ☐ 2 - 4 días por semana ☐ 1 - 4 días por mes
☐ Unas cuantas veces al año ☐ Esta es la primera vez

14. ¿Cuántos vehículos en buen funcionamiento (autos, vans, camionetas, pickups, motocicletas) hay en su casa?
☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 o más

15. ¿Había algún vehículo disponible para que usted lo usara para ESTE VIAJE?
☐ SI ☐ NO

16. ¿Tiene una licencia de conducir válida?
☐ SI ☐ NO

17. Incluyéndose a sí mismo(a), ¿cuántas personas que tengan ingresos viven actualmente en su casa?
☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 o más

18. Incluyéndose a sí mismo(a), ¿cuántas personas viven actualmente en su casa?
☐ 1 ☐ 2 ☐ 3 ☐ 4 o más

19. ¿Cuánto calcula que es el total de ingresos anuales combinados del 2009 de TODOS los que viven en su casa? *Marque UN cuadro*
☐ Menos de $15,000 ☐ $15,000 - $24,999 ☐ $25,000 - $34,999
☐ $35,000 - $59,999 ☐ $60,000 - $99,999 ☐ $100,000 o más

20. ¿Es usted un(a)?
☐ HOMBRE ☐ MUJER

21. ¿Qué edad tiene?
☐ Menos de 18 anos ☐ 18-24 ☐ 25-34 ☐ 35-44
☐ 45-54 ☐ 55-64 ☐ 65-74 ☐ Más de 75

22. ¿Es usted? *Marque todos los que se aplican*
☐ Blanco/No Hispano ☐ Negro/Afro Americano ☐ Hispano/Latino
☐ Asiático Americano ☐ Americano Nativo/Indio Americano ☐ Otro:

23 ¿Cuál frase lo describe mejor?
☐ Vivo en el área de las ciudades gemelas.
☐ Estoy visitando el área de las ciudades gemelas.

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

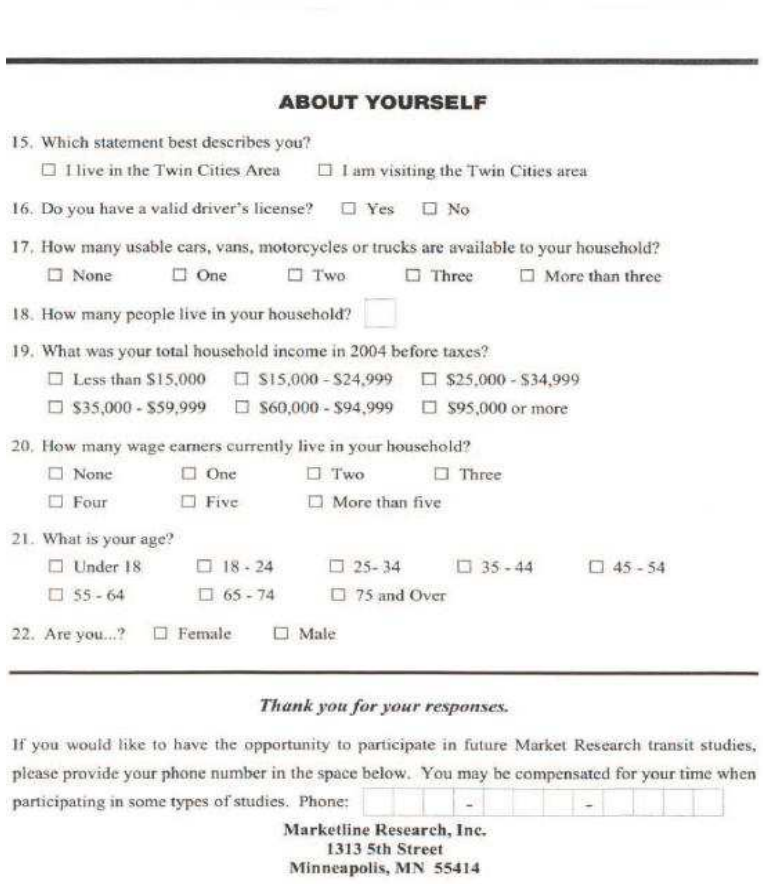
BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO. 2553 DALLAS TX
POSTAGE WILL BE PAID BY ADDRESSEE

MARKET RESEARCH DEPARTMENT
DIKITA ENTERPRISES INC
1420 W MOCKINGBIRD LN STE 600
DALLAS TX 75247-9922

TAPE HERE
PEGAR AQUI

C. 2005 Survey Questionnaire

Figure C.1 English Version – Page 1



ABOUT YOURSELF

15. Which statement best describes you?
☐ I live in the Twin Cities Area ☐ I am visiting the Twin Cities area

16. Do you have a valid driver's license? ☐ Yes ☐ No

17. How many usable cars, vans, motorcycles or trucks are available to your household?
☐ None ☐ One ☐ Two ☐ Three ☐ More than three

18. How many people live in your household? ☐☐

19. What was your total household income in 2004 before taxes?
☐ Less than $15,000 ☐ $15,000 - $24,999 ☐ $25,000 - $34,999
☐ $35,000 - $59,999 ☐ $60,000 - $94,999 ☐ $95,000 or more

20. How many wage earners currently live in your household?
☐ None ☐ One ☐ Two ☐ Three
☐ Four ☐ Five ☐ More than five

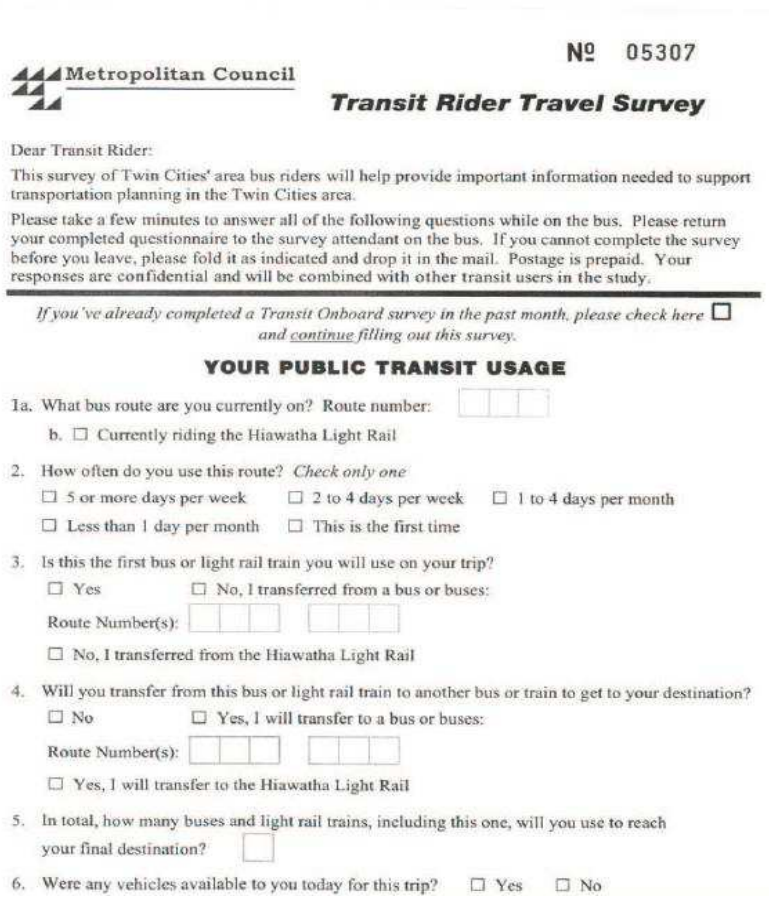
21. What is your age?
☐ Under 18 ☐ 18 - 24 ☐ 25- 34 ☐ 35 - 44 ☐ 45 - 54
☐ 55 - 64 ☐ 65 - 74 ☐ 75 and Over

22. Are you...? ☐ Female ☐ Male

Thank you for your responses.

If you would like to have the opportunity to participate in future Market Research transit studies, please provide your phone number in the space below. You may be compensated for your time when participating in some types of studies. Phone: ☐☐☐-☐☐☐-☐☐☐☐

Marketline Research, Inc.
1313 5th Street
Minneapolis, MN 55414



№ 05307

Metropolitan Council

Transit Rider Travel Survey

Dear Transit Rider:

This survey of Twin Cities' area bus riders will help provide important information needed to support transportation planning in the Twin Cities area.

Please take a few minutes to answer all of the following questions while on the bus. Please return your completed questionnaire to the survey attendant on the bus. If you cannot complete the survey before you leave, please fold it as indicated and drop it in the mail. Postage is prepaid. Your responses are confidential and will be combined with other transit users in the study.

If you've already completed a Transit Onboard survey in the past month, please check here ☐ *and continue filling out this survey.*

YOUR PUBLIC TRANSIT USAGE

1a. What bus route are you currently on? Route number: ☐☐☐
b. ☐ Currently riding the Hiawatha Light Rail

2. How often do you use this route? *Check only one*
☐ 5 or more days per week ☐ 2 to 4 days per week ☐ 1 to 4 days per month
☐ Less than 1 day per month ☐ This is the first time

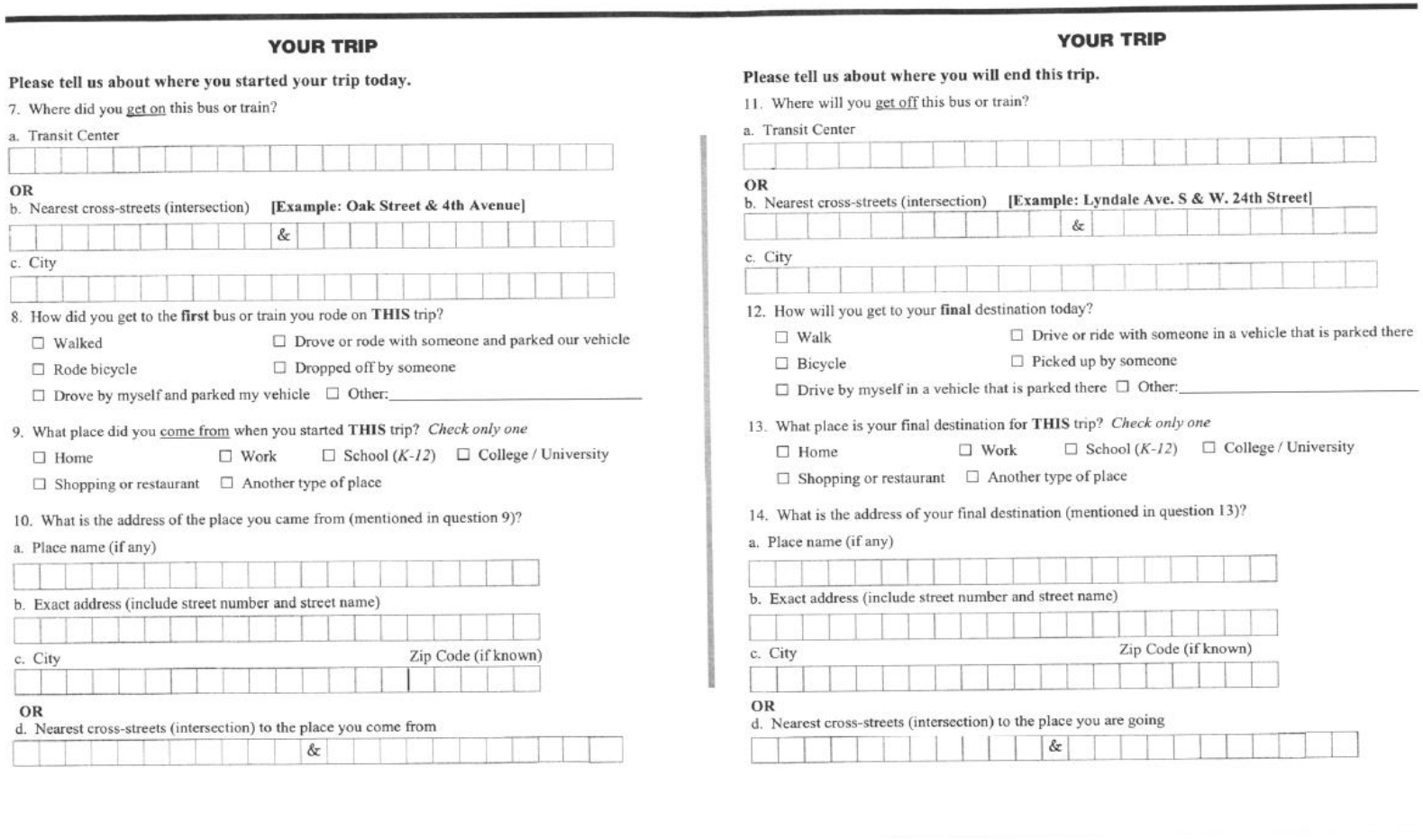
3. Is this the first bus or light rail train you will use on your trip?
☐ Yes ☐ No, I transferred from a bus or buses:
Route Number(s): ☐☐☐ ☐☐☐
☐ No, I transferred from the Hiawatha Light Rail

4. Will you transfer from this bus or light rail train to another bus or train to get to your destination?
☐ No ☐ Yes, I will transfer to a bus or buses:
Route Number(s): ☐☐☐ ☐☐☐
☐ Yes, I will transfer to the Hiawatha Light Rail

5. In total, how many buses and light rail trains, including this one, will you use to reach your final destination? ☐

6. Were any vehicles available to you today for this trip? ☐ Yes ☐ No

Figure C.2 English Version – Page 2



YOUR TRIP

Please tell us about where you started your trip today.

7. Where did you get on this bus or train?

a. Transit Center

OR

b. Nearest cross-streets (intersection) **[Example: Oak Street & 4th Avenue]**

&

c. City

8. How did you get to the **first** bus or train you ride on **THIS** trip?

☐ Walked ☐ Drove or rode with someone and parked our vehicle
☐ Rode bicycle ☐ Dropped off by someone
☐ Drove by myself and parked my vehicle ☐ Other:_____

9. What place did you come from when you started **THIS** trip? *Check only one*

☐ Home ☐ Work ☐ School (*K-12*) ☐ College / University
☐ Shopping or restaurant ☐ Another type of place

10. What is the address of the place you came from (mentioned in question 9)?

a. Place name (if any)

b. Exact address (include street number and street name)

c. City Zip Code (if known)

OR

d. Nearest cross-streets (intersection) to the place you come from

&

YOUR TRIP

Please tell us about where you will end this trip.

11. Where will you get off this bus or train?

a. Transit Center

OR

b. Nearest cross-streets (intersection) **[Example: Lyndale Ave. S & W. 24th Street]**

&

c. City

12. How will you get to your **final** destination today?

☐ Walk ☐ Drive or ride with someone in a vehicle that is parked there
☐ Bicycle ☐ Picked up by someone
☐ Drive by myself in a vehicle that is parked there ☐ Other:_____

13. What place is your final destination for **THIS** trip? *Check only one*

☐ Home ☐ Work ☐ School (*K-12*) ☐ College / University
☐ Shopping or restaurant ☐ Another type of place

14. What is the address of your final destination (mentioned in question 13)?

a. Place name (if any)

b. Exact address (include street number and street name)

c. City Zip Code (if known)

OR

d. Nearest cross-streets (intersection) to the place you are going

&

D. Corridor-Specific Results of Geography-based Expansion

The tables associated with this comparison are included in a separate spreadsheet owing to the size of these tables.