HONOLULU HIGH-CAPACITY TRANSIT CORRIDOR PROJECT
ALTERNATIVES ANALYSIS / DRAFT ENVIRONMENTAL IMPACT STATEMENT

prepared for:
City and County of Honolulu

prepared by:
Parsons Brinckerhoff Quade & Douglas, Inc.

6 February 2006
Introduction

The on-board survey of TheBus is being conducted to capture accurate and reliable travel patterns and socio-economic patterns of passengers. In developing the methods for the on-board survey, we have focused on increasing data accuracy while at the same time maximizing coverage of the population of transit passengers. The information resulting from the on-board survey will be used to inform an alternatives analysis (AA) that is currently being conducted as the next step toward a rail system for Honolulu. Past experience has shown that on-board survey outcomes have suffered from unit non-response, item non-response, and bad data (passengers providing inaccurate answers). We feel that most passengers who provide bad data do so because they have misunderstood our request for information. To control for these data quality issues, we propose to keep the questionnaire as short as possible by identifying required data elements that we can obtain automatically and to leverage GPS technology for capturing location data. In addition, we propose to use survey technologies to collect accurate passenger count and other information that will make data processing more efficient and, at the same time, will free up the surveyors to interact more with passengers during the sampled bus trips, thus increasing the response rate. Finally, we propose to use web technology to manage the exchange of information between personnel on-site in Honolulu and managers in Austin to enable real-time quality assurance. The execution of the on-board survey can be expressed as three processes:

- **Collection**: Hire and Train Field Staff, Pilot Test, Conduct Survey, and Status Reporting.
- **Processing**: Questionnaire Scanning and Validation, Data Processing and Quality Control, Geocoding and Quality Control, Data Imputation, Weighting and Expansion, Analysis and Reporting.

Management Plan

Quality assurance will be administered through a management plan that takes into account the specialized requirements of on-board surveys as well as the unique characteristics of the Honolulu context. Overall project direction will be provided by Johanna Zmud, who has nearly 20 years of transportation survey experience. She will ensure that work is done on schedule and on budget. In addition, she will be ultimately responsible for the quality of all deliverables. The majority of her oversight will be based in Austin; however, she will be on-site during the pilot test. Two senior staff will work directly with her – both of whom have over 10 years of transportation survey experience. As data manager, Sandra Rodriguez is responsible for set-up and management of the web-based field management system as well as for the quality assurance of the final database. During data collection, the web-based management system will provide real-time status reports on survey progress, response rates, and field staff performance. She will train and then manage the field data editors. These locally hired, Honolulu-based editors will review completed questionnaires to clean and correct addresses (using printed and/or electronic mapping references) and other respondent-provided information and then determine whether questionnaires qualify as completes or not prior to the...
questionnaires being sent to Austin for scanning and verification. During scanning and verification, a quality check will be performed on the questionnaires to verify and validate all field-edited corrections. Sandra will also manage the work of the questionnaire scanning and verification team, Danny Smith who is responsible for geocoding and Quality Control (QC) and Ramon Dickerson who is responsible for data processing and QC. The majority of Sandra’s oversight will be based in Austin; however, she will be on-site during the pilot test as well as during the start-up of the full survey. As surveyor manager, Deborah Edrington-Gomez will be responsible for training and managing the performance of the on-bus data collectors (surveyors and counters). The majority of her oversight will be on-site. Fred G’Sell is the statistician assigned to this project. With experience on nearly 10 on-board surveys, he will effectively draw the survey sample, create surveyor assignments, execute necessary weighting and expansion\(^1\), and support the analysis of the survey results.

\(^1\) The weighting and expansion will be documented in detail so that it can be reproduced (or recomputed) by PB staff using various criteria for inclusion or exclusion of samples.

Honolulu High-Capacity Transit Corridor Project
Transit On-Board Survey Methodology
1.0 Preparation

Preparation activities include: Finalize Survey Design, Set-Up Web Field Management System, Instrument Development, Sample Design, and Assignment Generation. We have assumed that the activities required to prepare for field work will take about three weeks to complete.

1.1 Finalize Survey Design

The on-board survey will capture a representative, probability sample of bus trips, covering weekday service. The survey will rely on a self-administered questionnaire. Consistent with the 1991 survey, the questionnaire will contain English and Japanese versions (perhaps Ilocano). Since we know that TheBus is regularly used by grade school students as their primary transport to school, the questionnaire will be distributed to every boarding passenger above age six (6). All boarding and alighting passengers above age 6 will also be counted. Boarding counts will be done by age categories (to increase the reliability of the weighting and expansion) by a different on-board surveyor than the one passing out questionnaires. The “counters” will use the RideCount System developed by GeoStats that uses Palm/ GPS equipment (see Figure 2). NuStats has used this system effectively in two prior on-board transit survey efforts, in Louisville (750,000 service area population) and Atlanta (1,350,000 service area population). The Palm device with GPS records the location and time (arrive and departure) at each bus stop, and counters can enter the number of passengers boarding and the number of passengers alighting. By entering the a questionnaire number into the unit prior to arrival at a bus stop, this process will also tie a sequence of questionnaires directly to a bus stop. We would like to ship one unit to PB Honolulu staff soon after the Notice to Proceed for a “dry run”. We would ask PB to use the unit according to our proposed procedures for the passenger count and bus stop ID so that glitches unique to the Honolulu context can be identified soon; we will also download data to test the accuracy of TheBus’ digitized bus stop list.

Figure 2: Palm / GPS Unit for On-Board Counts

Schedule: October 21, 2005

Deliverable: Revised Scope of Work

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2 I am trying to verify the percent of Ilocano speakers in Honolulu. It may be too small a population to concern ourselves with.
3 This age cut-off matches the 1991 on-board survey methods. We expect parents to complete the questionnaires of children between the ages of 6 and 9 or 10.
4 GeoStats is an affiliate firm located in Atlanta, Georgia (www.geostats.com).
1.2 Set-Up Web Field Management System

NuStats will use a web-based field management system developed by GeoStats to manage surveyor assignments, provide progress reports, data summary tables, and monitor field staff performance. This system has been successfully applied in a recent on-board survey and boarding & alighting study conducted in the Atlanta region. Ms. Rodriguez will work with GeoStats staff to customize the management system to the requirements of this survey.

Schedule: September 19 – October 21, 2005

1.3 Data Items and Instrument Development

The set of proposed data items is presented in Table 1. We propose developing one questionnaire form that accommodates all three languages (English, Japanese, and Ilocano). This will be done in an efficient and attractive format that will not "turn-off" respondents but at the same time, ensure that the bar-coding and numbering sequence is consistent across the surveyed bus trips for QC purposes. The final questionnaire will be approved by PB.

As is noted in Table 1, we propose to capture some of the required data elements by means other than as a question on the questionnaire. There are multiple benefits of this approach: (1) the questionnaire will be shorter to enhance response and also to better accommodate three language versions, and (2) data quality will improve by circumventing respondent-provided information. In addition, by removing the bus on / bus off questions, we expect that respondents will be more willing to provide accurate origin and destination address information. Boarding counts will be collected for weighting and expansion purposes. The counts will be entered into Palm/GPS devices. Before coming to each stop, a "counter" will enter the top questionnaire number into the device. Thus, questionnaires will be tied to specific bus stops (and specific bus routes and trips). NuStats proposes that a raffle (i.e., drawing to win a one month pass) be conducted in conjunction with the on-board survey. Language on the questionnaire will invite passengers to register to win by giving us their name, telephone and home address. Because most transit trips either start or end at home, we collect very accurate information for this data element.

Table 1: Proposed Data Elements and Capture Method

<table>
<thead>
<tr>
<th>Data Element</th>
<th>Capture Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day of Travel</td>
<td>Assignment File / Bar Code on Questionnaire</td>
</tr>
<tr>
<td>Time of Travel</td>
<td>Assignment File / Bar Code on Questionnaire</td>
</tr>
<tr>
<td>Route</td>
<td>Assignment File / Bar Code on Questionnaire</td>
</tr>
<tr>
<td>Questionnaire Language</td>
<td>Field Edit Code</td>
</tr>
<tr>
<td>Home Address</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Origin</td>
<td>Questionnaire (Type and Address) with qualifying language that this is unnecessary if respondent started trip at home and has registered to win drawing (subject to pre-test results)</td>
</tr>
<tr>
<td>Destination</td>
<td>Questionnaire (Type and Address) with language that this is unnecessary if respondent will end trip at home and has registered to win drawing (subject to pre-test results)</td>
</tr>
<tr>
<td>Data Element</td>
<td>Capture Method</td>
</tr>
<tr>
<td>------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Bus Stop On</td>
<td>Hand-Held Palm with GPS(^5)</td>
</tr>
<tr>
<td>Bus Stop Off</td>
<td>Imputed using information from other sources: Destination, Egress Mode, Distance, and GPS data on bus stops for the sampled trip.</td>
</tr>
<tr>
<td>Trip Purpose</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Access Mode</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Egress Mode</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Fare Type</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Fare Paid</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Transfer Information</td>
<td>Questionnaire (2 questions)</td>
</tr>
<tr>
<td>Vehicles Available</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Could use HH Vehicle for Trip</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Household Size</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Household Workers</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Household Income</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Passenger Age</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>City of Residence</td>
<td>Questionnaire (to identify residents / tourists) with language that this is unnecessary if respondent has registered to win drawing</td>
</tr>
</tbody>
</table>

The questionnaires will be sequentially numbered, bar coded for QC during data collection, and will have business-reply postage (BRM). Questionnaires will also be packaged in groups of 25. These specialized questionnaires will take approximately 3 weeks to print. So to meet a November data collection start, the English version of the questionnaire will need to be finalized and approved by September 26. The pilot will be conducted soon after this – and quick printing will be used for the pilot questionnaires.

Schedule: September 19 – October 21, 2005

Deliverables: Draft and Final Questionnaires

1.4 Selecting the Sample

All passengers above the age of six boarding each sampled bus trip will receive a questionnaire. A stratified sampling approach will be used to select the sample of bus trips. The universe of bus trips will be stratified by service type, route, direction, service period, and service day. As shown on Table 2, there are seven service types and 82 routes, as defined by TheBus (in some cases separate route numbers are considered as a single route; in addition

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\(^5\) GPS collected coordinates can be linked to TheBus' digitized bus stop file.
several of the routes include sub-routes). Nine routes comprise 66% of total boardings on TheBus system’s routes. Based on information in the Trailing Twelve Month GFI Route Cost-Effectiveness Report (July 2005) provided by TheBus, we were able to estimate the following:

- **Urban Trunk Routes (8 total)** – comprise about 49% of total passengers. Four of these routes 1, 2/13, 19/20, and 3 comprise 39% of total passengers.

- **Suburban Trunk Routes (11 total)** – comprise about 29% of total passengers. The Circle Island route (52/62/55/65) comprised 8% of total passengers. Routes 42 and 40 comprise another 5% and 5%, respectively. So three of these routes comprise 18% of total passengers.

- **Rapid Bus Routes (3 total)** – comprise about 11% of total passengers. The two CityExpress Routes comprise 9% of total passengers.

- **Urban Feeder Routes (10 total)** – comprise about 4% of total passengers.

- **Peak Express Routes (31 total)** – comprise about 4% of total passengers.

- **Community Circulators (12 total)** – comprise about 3% of total passengers.

- **Suburban Feeder Routes (7 total)** – comprise about 1% of total passengers.

**Table 2. Categorization of Routes by Service Type**

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid Bus</td>
<td>A – CityExpress</td>
</tr>
<tr>
<td></td>
<td>B – CityExpress</td>
</tr>
<tr>
<td></td>
<td>C – CountryExpress</td>
</tr>
<tr>
<td>Urban Trunk</td>
<td>1 – Hawaii Kai–Kaimuki–Kalihi</td>
</tr>
<tr>
<td></td>
<td>2/13 – School/Liliha–Waikiki/Kapiolani</td>
</tr>
<tr>
<td></td>
<td>3 – Salt Lake–Downtown–Kaimuki</td>
</tr>
<tr>
<td></td>
<td>4 – Nuuanu–Downtown–UH–Waikiki</td>
</tr>
<tr>
<td></td>
<td>5 – Manoa–Ala Moana</td>
</tr>
<tr>
<td></td>
<td>6 – Woodlawn–Pauoa</td>
</tr>
<tr>
<td></td>
<td>9 – Palolo–Pearl Harbor</td>
</tr>
<tr>
<td></td>
<td>19/20 – Waikiki–Airport–Hickam AFB</td>
</tr>
<tr>
<td>Urban Feeder</td>
<td>7 – Kalihi Valley</td>
</tr>
<tr>
<td></td>
<td>10 – Alewa Heights</td>
</tr>
<tr>
<td></td>
<td>14 – St. Louis–Waikiki–Maunalani via Diamond Head</td>
</tr>
<tr>
<td></td>
<td>15 – Pacific Heights</td>
</tr>
<tr>
<td></td>
<td>16 – Moanalua Valley</td>
</tr>
<tr>
<td></td>
<td>17 – Makiki–Ala Moana Center</td>
</tr>
<tr>
<td></td>
<td>18 – Ala Moana Center–UH via Dole</td>
</tr>
<tr>
<td></td>
<td>21 – Walalae Iki–Walalae Nui</td>
</tr>
<tr>
<td></td>
<td>31 – Tripler–Kalihi–Mapunapuna</td>
</tr>
<tr>
<td></td>
<td>32 – Kalihi–Salt Lake–Foster Village–Pearlridge</td>
</tr>
<tr>
<td>Service Type</td>
<td>Route</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Suburban Trunk</td>
<td>11 – Aiea Heights</td>
</tr>
<tr>
<td></td>
<td>22 – Beach Bus</td>
</tr>
<tr>
<td></td>
<td>40 – Honolulu–Makaha</td>
</tr>
<tr>
<td></td>
<td>41 – Kapolei–Ewa Beach</td>
</tr>
<tr>
<td></td>
<td>42 – Ewa Beach – Waikiki</td>
</tr>
<tr>
<td></td>
<td>43 – Waipahu–Honolulu–Ala Moana</td>
</tr>
<tr>
<td></td>
<td>52/62/55/65 – Circle Island</td>
</tr>
<tr>
<td></td>
<td>53 – Pacific Palisades</td>
</tr>
<tr>
<td></td>
<td>54 – Pearl City</td>
</tr>
<tr>
<td></td>
<td>56 – Kailua–Kaneohe</td>
</tr>
<tr>
<td></td>
<td>57/58 – Kailua–Sea Life Park</td>
</tr>
<tr>
<td>Suburban Feeder</td>
<td>70 – Lanikai–Maunawili–Kaneohe Marine Corps Base</td>
</tr>
<tr>
<td></td>
<td>71 – Upper Pearlridge–Newtown</td>
</tr>
<tr>
<td></td>
<td>72 – Whitmore–Wahiawa–Schofield</td>
</tr>
<tr>
<td></td>
<td>73 – Leeward Community College</td>
</tr>
<tr>
<td></td>
<td>74 – Aiea Heights</td>
</tr>
<tr>
<td></td>
<td>76 – Waialua–Haleiwa</td>
</tr>
<tr>
<td></td>
<td>77 – Waimanalo–Kaneohe</td>
</tr>
<tr>
<td>Community Circulator</td>
<td>401 – Waianae Valley</td>
</tr>
<tr>
<td></td>
<td>402 – Lualualei Homestead</td>
</tr>
<tr>
<td></td>
<td>403 – Nanakuli–Maili–Waianae</td>
</tr>
<tr>
<td></td>
<td>411 – Makakilo Heights</td>
</tr>
<tr>
<td></td>
<td>412 – Panana–Palahia</td>
</tr>
<tr>
<td></td>
<td>413 – Campbell Industrial Park</td>
</tr>
<tr>
<td></td>
<td>415 – Kapolei TC–Ewa Beach Park</td>
</tr>
<tr>
<td></td>
<td>421 – Ewa Beach</td>
</tr>
<tr>
<td></td>
<td>431 – Ewa Mill–Ewa Villages</td>
</tr>
<tr>
<td></td>
<td>432 – East/West Waipahu</td>
</tr>
<tr>
<td></td>
<td>433 – Waikale</td>
</tr>
<tr>
<td></td>
<td>434 – Villages Park</td>
</tr>
<tr>
<td>Peak Express</td>
<td>80/82 – Hawaii Kai–Kalama Valley</td>
</tr>
<tr>
<td></td>
<td>80A – Hawaii Kai–UH</td>
</tr>
<tr>
<td></td>
<td>80B – Aina Haina–CBD</td>
</tr>
<tr>
<td></td>
<td>81 – Waipahu</td>
</tr>
<tr>
<td></td>
<td>83 – Wahiawa</td>
</tr>
<tr>
<td></td>
<td>83A – Wahiawa–Milihani–Pearl Harbor</td>
</tr>
<tr>
<td></td>
<td>84 – Milihani</td>
</tr>
<tr>
<td></td>
<td>84A – Milihani–Downtown–UH</td>
</tr>
<tr>
<td></td>
<td>85 – Windward</td>
</tr>
<tr>
<td></td>
<td>85A – Windward</td>
</tr>
<tr>
<td></td>
<td>86 – Windward–Pearl Harbor</td>
</tr>
<tr>
<td></td>
<td>86A – Kaneohe–Kahalu–Pearl Harbor</td>
</tr>
<tr>
<td></td>
<td>87 – Aloha Stadium</td>
</tr>
<tr>
<td></td>
<td>88 – Kahalu</td>
</tr>
<tr>
<td></td>
<td>88A – North Shore</td>
</tr>
</tbody>
</table>
Service Type | Route
--- | ---
89 | Waimanalo
90 | Pearl City
91 | Ewa Beach
92 | Makakilo
93 | Waianae Coast
93A | Waianae Coast—Pearl Harbor
95 | Hawaii Kai—Pearl Harbor
96 | Waipio Gentry
97 | Village Park
98 | Wahiawa—Millilani Park and Ride
101 | Ewa Gentry
102 | Villages of Kapolei
103 | Piau—Waikele
201 | Waipahu via Farrington
202 | Waipahu via Piau
203 | Kalihi via School Street

We propose to survey all Urban Trunk, Suburban Trunk, and Rapid Bus routes (see Table 3). These three service types comprised nearly 90% of all boarding passengers but only 27% of all bus routes. Bus trips would be sampled throughout the AM and PM peak hours of service, as well as during the midday and evening hours of service.

Table 3: Proposed Sample Distribution on Urban Trunk, Suburban Trunk, and Rapid Bus Routes Based on Ridership

<table>
<thead>
<tr>
<th>AVERAGE DAILY BOARDINGS</th>
<th>SIGNIFICANCE LEVEL</th>
<th>MINIMUM SAMPLE SIZE PER ROUTE</th>
<th>NUMBER OF ROUTES AFFECTED</th>
<th>COMPLETED QUESTIONNAIRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,000+</td>
<td>95% ± 5%</td>
<td>384</td>
<td>12</td>
<td>4,608</td>
</tr>
<tr>
<td>4,999 or fewer⁶</td>
<td>95% ± 8%</td>
<td>150</td>
<td>10</td>
<td>1,500</td>
</tr>
<tr>
<td>Overall</td>
<td>95% ± 1.3%</td>
<td></td>
<td>22</td>
<td>6,108</td>
</tr>
</tbody>
</table>

Urban Feeder, Suburban Feeder, Community Circulator, and Express routes comprised about 11% of total boardings and 73% of all routes. But because the feeder, circulator, and express route ridership are important to the alternatives analysis, we proposed to sample them in the following manner:

1. Routes with 1,000+ average daily boardings will be sampled at 95% ± 5% (384 questionnaires each route).
2. Routes between 500 to 999 daily boardings will be sampled at the 95% ± 8 (150 questionnaires each).
3. Routes between 200 or fewer daily boardings will be sampled as a single cluster at 95% ± 8 (150 questionnaires in the cluster).

⁶ According to the 2000 observed boarding figures there were no routes with fewer than 1,000 boardings.
Table 4: Proposed Sample Distribution on Urban Feeder, Suburban Feeder, Community Circulator, and Express Routes Based on Ridership

<table>
<thead>
<tr>
<th>AVERAGE DAILY BOARDINGS</th>
<th>SIGNIFICANCE LEVEL</th>
<th>MINIMUM SAMPLE SIZE PER ROUTE</th>
<th>NUMBER OF ROUTES AFFECTED</th>
<th>COMPLETED QUESTIONNAIRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000+</td>
<td>95% ± 5%</td>
<td>384</td>
<td>15</td>
<td>5,760</td>
</tr>
<tr>
<td>500-999</td>
<td>95% ± 8%</td>
<td>150</td>
<td>13</td>
<td>1,950</td>
</tr>
<tr>
<td>499 or fewer</td>
<td>95% ± 8%</td>
<td>384 total</td>
<td>32</td>
<td>384</td>
</tr>
<tr>
<td>Overall</td>
<td>95% ± 1.1%</td>
<td>384 total</td>
<td>60</td>
<td>8,094</td>
</tr>
</tbody>
</table>

The proposed sample size is 14,202 (± 0.8%) completed and usable questionnaires, of which Urban Trunk, Suburban Trunk, and Rapid Bus would comprise 43% of the total. The final sample size and distribution by route will be finalized in the sample plan. The final sample plan will be based on more recent daily ridership figures by current routes, if available. It will also take into account the statistical concepts of variability, response estimation, and trip clustering. We will work closely with PB Consult to ensure the final sample has the breadth and depth necessary to support the analysis.

Schedule: September 19 — October 21, 2005

Deliverable: Technical Memorandum on Sampling

1.5 Drawing Assignments

Following this step, NuStats will use an automated assignment production program that randomly selects clusters of trips based on the following parameters:

- Trips must be consecutive and within the same block/run,
- The cluster of trips must start and end at the same location,
- Trips within the cluster must be unique to the cluster.

Through an iterative process, the assignment management program generates several lists of optimum, randomly selected consecutive trips. The program will also generate a report that provides a comparison of desired trips and generated trips. NuStats then reviews the report for shortfalls and manually creates the missing clusters of trips, if needed. Given the parameters above, the program will typically generate 80% to 90% of the desired trips. The missing 10% to 20% of trips are generally associated with express routes, which do not meet one or more of the parameters above. In order to use this timesaving program, NuStats will upload bus run information directly from TheBus’ scheduling program.

Schedule: October 3 — November 18, 2005

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7 The number of routes affected is a loosely estimated number because the route configuration from November 2000 varies from the current route configuration.

8 The definition of a usable questionnaire will be defined in cooperation with PB staff prior to the start of the data collection.
2.0 Data Collection

2.1 Hire and Train Field Staff

Upon receiving a notice to proceed, NuStats will coordinate with a local temporary employment agency (or local field service) to secure necessary staff: surveyors (about 20), counters (about 20) supervisors (2), and editors (6). Minimum requirements are:

1. Be current or former users of the transit system(s),
2. Reside in the service area a minimum of two years,
3. Be personable and outgoing,
4. Have some college education or be at least 21 years of age,
5. Have flexible schedules to work any hour including early morning and late night, and
6. Have access to personal transportation in order to preclude transportation logistic difficulties for survey assignments that begin prior to service pullout or end when vehicles return to the garage.

7. For some not all: Have specialized language capabilities (Japanese or Ilocano).

Maximizing participation among riders is dependent on the public image of the surveyors, themselves. To enhance this image, NuStats proposes to impose strict dress code standards requiring surveyors to wear clean, jeans or khakis and a solid color button shirt and cap identifying them as official surveyors. NuStats will subsidize the purchase of these items. These dress standards promote professional appearance and reinforce survey legitimacy, which increases respondent trust.

Training. Two days prior to training all field staff will be screened on-site by the Data Manager and Surveyors Manager to ensure that staff meets the attributes identified above. The Surveyor Manager will train the surveyors, counters, and supervisors. The Data Manager will train the data editors. At the end of this training, field staff will be required to run through a mock assignment and correctly perform all procedures.

Schedule: October 3 – December 5 (prescreening on October 6; data editor and counter training on October 7; surveyor training by December 5)

2.2 Survey Pilot Test

On October 8, we will pilot the counter procedures, technology, data downloads, and field management program. The Project Director and Data Manager will conduct an assessment of this part of the pilot on October 10 while the surveyor manager is conducting surveyor training. Then on October 11 we will pilot the entire process (questionnaire distribution, passenger count, data editing, downloads, and field management program). To pretest the survey questionnaire, we will hold "debriefing" interviews with pretest respondents. The Project Director will "roam" sampled trips and spot-check completed questionnaires and note where an item was not completed at all or was not completed accurately. When inconsistencies or omissions are found, she will follow-up with the respondent to ascertain why this was done (e.g., didn't understand the question, the response categories didn't make sense or didn't pertain, the order of the questions didn't make sense, or didn't have time or didn't want to answer, etc.). In addition, she will conduct non-response interviews. She will approach persons who refused a questionnaire or those who took a questionnaire but obviously do not complete it on-board the Honolulu High-Capacity Transit Corridor Project
Transit On-Board Survey Methodology
bus and conduct a short interview. This information will be used to modify and refine our procedures and questionnaire. The Project Director, Data Manager, and Surveyor Manager will conduct debriefing of the entire process for PB and other stakeholders on October 13.

All completed questionnaires will be returned to Austin for the remainder of pilot test activities. Questionnaires will be scanned and verified. Geocoding of addresses will be done. Data will be imputed as described herein. A survey database will be created and the electronic data will be edit-checked.

Schedule: October 8 – 21, 2005

Deliverable: Technical Memorandum on Pilot Results

2.3 Conducting the Survey

We estimate that the actual field data collection will be done over a 5-week period (from about November 2 to December 14, with a one week hiatus around the Thanksgiving Holiday). The Surveyor Manager will be on-site for the field period. The Data Manager will be on-site for the start of the field period. After this initial period, the Data Manager will operate the web-based field management system remotely from Austin. It is expected that the fieldwork will be managed from a series of “control centers” that are associated with the routes/ bus trips to be sampled during a particular day/week. These centers will include the two TheBus garages as well as select transit centers. At any given time, the field staff at the “control center” will include the Surveyor Manager (or a supervisor-proxy), a supervisor, and a data editor. It will be important that the “control center” have a telephone connection for data downloads.9

On-board data collection will be done in teams of two: a surveyor and a counter10. The surveyor will hand out questionnaires, persuade passengers to complete the questionnaires, help passengers complete the questionnaire, and collect questionnaires. The counter will enter the questionnaire numbers into the hand-held unit to tie questionnaires to a bus stop, count the passengers boarding and alighting, ensure the unit has picked up accurate GPS location coordinates, help / persuade passengers to complete questionnaires, collect questionnaires, and validate passenger loads after each stop. There are multiple benefits to a two-person team:

1. Response rates will increase because the surveyors passing out questionnaire can focus on questionnaire completion because they are not concerned with counting boarding passengers,
   • higher response means that fewer questionnaires will need to be printed,
   • higher response means fewer “make-up” trips – shortening the field period,
2. The challenges of heavy passenger loads can better be anticipated and managed, and
3. With the GPS (providing location and time information) and two people on the bus, we expect fewer incidents of surveyors shirking their responsibilities.

Also using the RideCount System, the questionnaires themselves will no longer be used to conduct the count of passengers. So surveyors will not need to “hold” refused questionnaires

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9 NuStats will pay for the telephone connection if not currently available.
10 On really low ridership routes, one person will be assigned. But the threshold for putting two persons on a bus will be quite low.
enabling fewer questionnaires to be printed and fewer questionnaires to be provided to
surveyors per assignment.

Daily surveying assignments will be distributed by the Surveyor Manager (or a
supervisor-proxy). As assignments are handed out, information is updated in the
web-based field management system (i.e., from unassigned to assigned). See Figure 3
for a sample of web-based assignment screen.

**Figure 3: Screen Grab for Assignment Management**

Assignments will be in the form of an Assignment Sheet that includes the organized
bus trips to be sampled with necessary information for getting to/from the assignment.
The Assignment Sheet will be bar-coded to link it to the field management system.
Surveyors will also be handed one envelope in which to place completed and collected
questionnaires that has an attached bar-coded label that will tie the envelope to the
assignment. When surveyors and counters return from an assignment, the Surveyor
Manager (or a supervisor-proxy) will check the assignment results (quickly review the
questionnaires to spot any glaring performance issues) and download the RideCheck
(passenger count data) from the Palm devices. The Surveyor Manager will update the
assignment status in the web-based field management system (i.e., from assigned to
completed). Then, the Surveyor Manager will hand out the next assignment
\(^{11}\). Completed and usable questionnaire by route will be monitored closely against
the sampling plan. NuStats will conduct follow-up surveying at selected bus stops for
those routes that do not meet the required number of completed and usable questions.
We anticipate that this may be necessary only for the handful of heavily used routes.

Following the check-in, completed questionnaires will be presented to the on-site
data editors for editing and correction. Data editors will review each completed
questionnaire, use geographic resources to fill in or correct address information, and
otherwise edit questionnaires.

\(^{11}\) Assignments will be managed in the web-based field management system; new
assignments will be generated from this system.
to ensure that they are fully usable or identify them as a non-complete. After each questionnaire has been reviewed as such, the data editor will scan the bar-code on the questionnaire using a procedure that identifies the questionnaire as a complete or non-complete. This information will be uploaded to the field management system as one data input for the status reports. “Complete” questionnaires only will be sent to Austin for scanning and verification.

Schedule: December 5 – January 31, 2006

2.4 Status Reporting

The Data Manager will be responsible for preparing daily status reports from the web-based field management system. Assignment statuses are updated immediately on the project website. The passenger count data and completed questionnaires data will be downloaded (transmitted) daily to the GeoStats server. An automated application loads this data directly into the project database and posts summary information to the website. The automated application conducts consistency checks and flags problem records, cleans and purges flagged records, updates the field management system, and posts daily status, response, and performance reports to the project website (all reports are calculated and available automatically on the website). The Data Manager will review this information double check it for accuracy, draw inferences and insights, and provide summary reports for the Surveyor Manager, the Project Director, and the client. Potential daily reports include: response by route and time period; boarding and alighting counts by route; actual vs. expected surveyor hours; completes per surveyor hour; completes by surveyor; response by surveyor; edited questionnaires per editor hour, actual vs. expected editor hours; and edited questionnaires by editor (see Figures 4).

Figure 4: Sample Status Report: Boardings and Alightings by Stop

<table>
<thead>
<tr>
<th>Trip Data</th>
<th>Summary Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trip Data &gt; Trip Details: Route: 10 Block: 1081A (OUTBOUND, AM Peak, WEEKDAY)</td>
<td>Boardings and Alightings by Stop</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stop</th>
<th>Departure Time</th>
<th>Boarding</th>
<th>Alighting</th>
<th># Passengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>07:46 AM</td>
<td>8</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>07:48 AM</td>
<td>6</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>07:49 AM</td>
<td>1</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>07:50 AM</td>
<td>2</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>5</td>
<td>07:52 AM</td>
<td>1</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>6</td>
<td>07:55 AM</td>
<td>2</td>
<td>1</td>
<td>18</td>
</tr>
<tr>
<td>7</td>
<td>07:57 AM</td>
<td>0</td>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td>8</td>
<td>07:59 AM</td>
<td>1</td>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td>9</td>
<td>08:00 AM</td>
<td>2</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>10</td>
<td>08:03 AM</td>
<td>1</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>11</td>
<td>08:05 AM</td>
<td>1</td>
<td>2</td>
<td>17</td>
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<tr>
<td>12</td>
<td>08:12 AM</td>
<td>10</td>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td>13</td>
<td>08:14 AM</td>
<td>2</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>14</td>
<td>08:16 AM</td>
<td>1</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>15</td>
<td>08:18 AM</td>
<td>2</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>16</td>
<td>08:32 AM</td>
<td>0</td>
<td>29</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>00:46 NA</td>
<td>41</td>
<td>41</td>
<td>NA</td>
</tr>
</tbody>
</table>

Schedule: December 5 – January 31, 2006

Honolulu High-Capacity Transit Corridor Project
Transit On-Board Survey Methodology
3.0 Processing

3.1 Questionnaire Scanning and Verification

Questionnaire scanning and verification will be done simultaneously with field data collection. Completed questionnaires will be shipped to Austin twice weekly. As questionnaires arrive at the surveyor command center from the field, data editors will edit and correct the questionnaires and sort them by completion. The surveys will then be sent to NuStats’ headquarters and scanned into a database for verification. The survey data is scanned and then processed by a “Reader” component of our Teleform software. The Reader runs a series of checks, including checking the quality of the image and confirming the orientation of the survey is correct. The Reader is capable of recognizing handprint, machine print, bar codes, and mark print. The data are then verified. The image of the scanned survey is displayed on the screen and staff confirms or re-enter correct responses. Quality control checks follow. This process begins with reviewing the survey to ensure the proper data was captured. Range and spelling queries are executed on the entire file. The first 5% of all collected questionnaires are scanned and audited to ensure data are being properly captured. The final check is to randomly select 10% of the surveys, compare the responses to the hard copy surveys, and confirm the variables were captured correctly. The questionnaire data is then committed into a database. The images are archived in PDF format.

Schedule: December 5 – February 3, 2006

3.2 Data Processing and Quality Control

Data processing will be done simultaneously with field data collection. After questionnaires have been scanned and verified, these data will be merged with the assignment information (route, time of day, boarding count, alighting count, etc.) to create a master database. This database will then be reviewed, edited, and corrected using both manual and automated edit checks. The results of the data processing will be linked to the field management system so that an accurate accounting of survey progress and status is maintained.

Schedule: December 5 – February 3, 2006

3.3 Geocoding and Quality Control

Geocoding will be done simultaneous with field data collection. Accurate geocoding relies on accurate address information. The accuracy of the address information for the four locations typically geocoded (origin, destination, bus stop on, bus stop off) will be improved through various techniques, as described below.

- The questionnaire will contain only two address items – origin and destination – shortening the questionnaire length and increasing the likelihood that these will be answered accurately and completely.

- All completed questionnaires will be reviewed, edited, and corrected by a team of local data editors (selected for their aptitude for this task) that will be provided with a set of geographic resources to support their work.

- A raffle will be held in which respondents are asked to register by providing their home address (a majority of trip origins and destinations) – increasing the accuracy and completeness of home address information.
• Bus stop on will be captured by the GPS application in the Palm device used by
counters. Upon capture, it is automatically geocoded with a GPS latitude and longitude.
• Bus stop off will be imputed, using destination information, egress mode, distance, the
alighting counts by stop, and also the set of bus stops captured for the route.

Origin and destination addresses will be geocoded one at a time in interactive mode. At the
conclusion of the geocoding session, addresses receive a status (AV_STATUS) flag of “M” for
matched or “U” for unmatched. After addresses are geocoded, ArcView will calculate and pull
longitude and latitude coordinates for the matched cases the required projection. Then, the
geocoded file is saved and exported to a tabular data file that then is used to update the master
database. Once the actual geocoding task has been completed, records are subjected to a
series of strict quality control checks that take place on a daily basis upon completion of each
geocoding file and on a weekly basis for the cumulative address file. Addresses that are not
matched will be researched and checked against a large array of geographic resources. The
latitude and longitude will represent an exact address or intersection within accuracy of 1,000
feet and output in a format consistent with the project’s file format requirements. The budget
assumes that NuStats will be provided the coverage files.

Schedule: December 5 – February 3, 2006

3.4 Data Imputation and Final Edit Checks

Once the data processing and geocoding tasks have been completed on individual records,
those records will be merged into a cumulative master database and sent through final edit
checks. A pass/ fail determination made on every single record. Failed records will be
discarded. Passed records will be included in the final database. The results of the pass/ fail
check will be linked to the field management system so that an accurate accounting of survey
progress and status is maintained. For records that have passed, the required data elements
for imputing the bus stop off will be sent to GeoStats so that it can be computed within a GIS
system. The results of this imputation process will be linked to the field management system so
that an accurate account of survey progress and status is maintained.

Schedule: December 5 – February 3, 2006

3.5 Weighting and Expansion

After all data records have been passed through the prior data processing steps, data will be
factored at the route level using on-board boarding and alighting count data. NuStats will
develop and apply expansion factors to the data. In order to correct for disproportionate
sampling, weights are attached (factors) to each of the records. The weights are a product of
the following four factors:

1) **Response Factor** - The response factor accounts for the fact that less than 100% of the
distributed questionnaires on a sampled bus are returned completed. In order to calculate
the response factor, we will use the recorded number of questionnaires handed out and the
number of completed questionnaires that we got back (both on-board or through the mail).
The system will be stratified by route, service period, and direction.

2) **Vehicle Factor** - The vehicle factor accounts for the fact that not all of the bus trips in a
stratum were sampled. In order to calculate the vehicle factor, we will use the headway data
to determine the number of scheduled trips by route, day and time. We will compare this
number to the tabulations of actual trips (provided by TheBus) to ensure that there were no
major service disruptions.
3) **Boarding Factor** - The boarding factor raises the sampled boarding to an estimate of the total boardings it represents on an average day. It is the product of the response factor and the vehicle factor.

4) **Linked Trip Factor** - The linked trip factor accounts for the fact that a person who transfers from one bus vehicle to another has two chances of being intercepted. It is equal to the reciprocal of the number of vehicles used.

The resulting weight factor for each trip record will be appended so that the record will be counted as the number of trips represented by the factor. A result of the factoring will be an estimate of the standard error of the estimate for key statistics: trips by purpose, by vehicle availability, and demographic characteristics.

**Schedule:** February 14 – 17, 2006

**Deliverables:** Technical Memorandum on Data Weighting and Expansion, with summary data tables

### 3.6 Final Report Preparation and Data File Delivery and Documentation

The final report will document the processes used in the survey, challenges encountered and accompanying solutions, other anecdotal information to assist in future on-board survey design, and will provide a systematic accounting of survey results. Data results will be in the data table and graph format with appropriate text to describe the results. Both the draft and final reports will be delivered as electronic files.

The structure and format of the final database will be agreed upon at the start of the survey effort. Data documentation will include (at a minimum): Variable name, value labels, and special computational formulas or definitions. It is expected that a draft final report will be provided by mid-January. The final data file will be delivered upon approval of the draft final report. We expect all final deliverables to be provided by February 17, 2006.

**Schedule:** February 3 – February 17, 2006.

**Deliverables:** Draft and Final Report, Final Database and Documentation
Register to Win! / 抽選に応募してください！

As a thank you for FULLY COMPLETING this questionnaire and returning it to the surveyor while you are on this bus, you will be registered for a DRAWING TO WIN $100 (5 winners).

WINNERS WILL BE NOTIFIED BY MAIL.

Please tell us about the ONE-WAY BUS TRIP you are making now. Return the completed survey to the surveyor, OR place it in the special box located near the exit door of this vehicle OR drop it in any mailbox (for postage required).

TheBus 2005 Passenger Survey
TheBus 2005 乗客調査

STEER US IN THE RIGHT DIRECTION! You can help us plan transit services for the Honolulu area by answering each of the following questions.

As a thank you for FULLY COMPLETING the questionnaire and returning it to the surveyor while you are on this bus, you will be registered for a DRAWING TO WIN $100 (5 winners).

Full winners will be notified by mail.

This survey is used to help us plan transit services for the Honolulu area by answering each of the following questions.

Please tell us about the ONE-WAY BUS TRIP you are making now. Return the completed survey to the surveyor, OR place it in the special box located near the exit door of this vehicle OR drop it in any mailbox (for postage required).

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Full winners will be notified by mail.

This survey is used to help us plan transit services for the Honolulu area by answering each of the following questions.

Please tell us about the ONE-WAY BUS TRIP you are making now. Return the completed survey to the surveyor, OR place it in the special box located near the exit door of this vehicle OR drop it in any mailbox (for postage required).
Introduction

A pilot test of the TheBus (Honolulu) On-Board Survey was conducted in early October 2005. The purpose of the pilot test was to hold a “dry-run” of the methods and procedures (from assignment selection to geocoding/data processing to data file delivery). This pilot test is significant in ensuring a successful full on-board survey in December 2005 – January 2006.

Surveyor and Counter Training

Surveyor and Counter training took place on Saturday, October 8. Counter training was in the morning (10:00 am - 1:00 pm) and surveyor training in the afternoon (1:30 pm - 3:00 pm). In the afternoon after their training, Counters went on an actual bus run (Route 13) for hands-on practice using the hand-held RideCount system. On this practice run, Counters encountered difficulty getting a GPS fix in Waikiki – we believed this was because of the urban canyon created by the high rise hotels.

Four counters and three surveyors were trained. A fourth bilingual (English/Japanese) person was trained with the surveyors, but his role was pilot test specific – to conduct debrief interviews about the questionnaire with respondents on-board the bus. Given the low unemployment rate in Honolulu, we went into the pilot test a bit apprehensive about the quality of the surveyor and counter personnel we would get from local temporary agencies. In fact, we had a difficult time finding temporary agencies that were willing to take on our staffing needs assignment. Staffing Solutions agreed to provide labor for the pilot, and the caliber of the individuals provided exceeded our expectations. They were responsible, committed, and quick learners.

Our surveyor training approach and content is well-honed over many years of experience. It is all lecture-style with no “on-the-bus” practice. Because of this, the surveyors were a bit hesitant when they first entered their assigned bus for the pilot runs. On the other hand, our counter training using the RideCount system is in its infant stage and requires some tweaking prior to the full survey. However, the practice bus runs that follow the lecture-style training work well to cement an understanding of how to use the RideCount system. On entering their assigned pilot bus runs, the counters went right to their jobs.

Recommendation for the Full Survey: We are expecting to employ about 15 surveyors and 15 counters for the full survey. We will train them in small groups – of about 7 each – to provide one-on-one (or individualized) training. We will also take both surveyors and counters for a practice bus run as part of their training.

Counters used the System’s pre-loaded bus stop list to link the questionnaires to alighting bus stops when a GPS fix was not available. Bus stop patterns vary by bus run. For each route, there can be as many as five different patterns – each with slight variations. TheBus does not have a way of linking the bus stop patterns to the bus run database because they use these as independent sources of information. For our pilot runs, the patterns were determined manually based on best-
guess, causing some minor challenges for the Counters as they tried to determine where the bus had stopped from a bus stop list that varied slightly from the actual bus run.

Recommendations for the Full Survey: After discussions with TheBus, we have concluded that a way to link bus stop patterns to bus runs does not exist. Therefore, we have concluded that most effective approach will be to load all the bus stops for a particular route regardless of the run. This approach should have minimal impact on the Counter's performance because the variations in patterns from run to run are minimal.

Actual Bus Runs

On Monday, October 10, we completed two mini-assignments (two morning bus trips on two different routes, Route 20 and Route 42). Survey teams were comprised of one Surveyor and one Counter per assignment. The Route 20 team also included the bilingual interviewer conducting respondent debriefings. NuStats' managers accompanied the teams for a short-period to ensure that the RideCount equipment was operating properly, that staff understood their roles and responsibilities, to observe respondents reactions to receiving questionnaires and their subsequent actions, and to debrief respondents on the questionnaire. The pilot questionnaire is attached to this document as Attachment A. Concerns that ridership may have been light on Monday, October 10, prompted us to survey the next day, Tuesday, October 11, on Route 13.

Boardings were heavy on the pilot routes at certain bus stops — primarily in the Waikiki and downtown areas. But surveyors were able to hand each boarding passenger a questionnaire, and Counters were able to effectively capture boardings and alightings in the palm devices. The counting of passengers using the palm devices worked well. The palm devices and RideCount program were easy to use. Counters were able to capture counts by age categories (<12; 12-24; 25-64, 65+) even on heavily boarded buses because that was their only responsibility. Counters were instructed that counting boardings had priority over counting alightings; however, during debriefings, counters mentioned that they experienced no problems counting both.

An important part of our research design was eliminating the bus-on and the bus-off questions from the questionnaire. Bus-on was captured by entering the first questionnaire number distributed at each bus stop into the palm device prior to counting. The two person teams worked well in communicating to each other the first questionnaire number at each bus stop. More often than not, the Counter prompted the Surveyor to provide the necessary questionnaire number. In the RideCount file, there were a couple of instances in which the questionnaire numbers were not sequential (i.e., lower number used after higher number) or a zero was entered, which meant that the Surveyor had gotten the questionnaires out of sequence. Sometimes the Counter caught the error before it was entered into the palm device and sometimes not.

Recommendation for the Full Survey: The RideCount program will be modified to include a check that prohibits questionnaire numbers to be entered out of sequence or the entering of “zero”.

No operational difficulties or challenges were evidenced on these pilot runs. Bus operators were expecting our survey teams and were friendly and helpful to them. Communication between TheBus and the bus operators worked well. Buses appeared to arrive at the survey assignment start locations on-time and so surveyors had no problem identifying and boarding the correct bus for their

3 Routes were specially selected for the pilot to cover routes with heavy boardings, Japanese speakers, tourists, and school kids.
4 Bus-off was an imputed variable that is discussed later in this memo.
assignments. The problems encountered on Saturday, October 8, with getting a GPS fix through the urban canyon of Waikiki were minimized during the pilot runs. We have since learned that the palm devices actually "learn" with repeated use so getting a GPS fix became easier and quicker with repeated use on the same corridor. We did experience problems getting the GPS fix where there were permanent overhead obstructions such as at the airport, but in these rare instances the use pre-loaded bus stop lists were used.

Pilot Outcomes

The outcomes by route are presented in Table 1 and Table 2. These results need to be considered in context --the pilot was purposefully done on three routes (Routes 13, 20, 42) that represented "hard-to-survey" routes. Route 13 goes from Kapiolani Park through Waikiki and Downtown and terminates in Liliha. Route 20 goes from the Waikiki Beach and Hotel area through Downtown and by the Arizona Memorial to the Airport and Pearlridge. Route 42 goes from Waikiki through Downtown and by the Arizona Memorial to Ewa Beach.

Table 1: Pilot Survey Outcomes

| Route | Boardings | Q Distributed | Total Returns | Passed Final QC
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>On Bus</td>
<td>Mail-In</td>
</tr>
<tr>
<td>13</td>
<td>172</td>
<td>138</td>
<td>21</td>
<td>9</td>
</tr>
<tr>
<td>20</td>
<td>75</td>
<td>59</td>
<td>18</td>
<td>7</td>
</tr>
<tr>
<td>42</td>
<td>216</td>
<td>94</td>
<td>79</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>463</td>
<td>291</td>
<td>118</td>
<td>17</td>
</tr>
</tbody>
</table>

The response rates were lower than expected (overall 13%, ranging from 10% to 17% at the route level). The participation rates were also slightly lower than our expectations (overall 29%, ranging from 22% to 37%). The refusal rates for Routes 13 and 20 were well within expectations but the refusal rate for Route 42 was quite unsatisfactory. We will describe pilot issues and recommendations for the full survey that address each of these outcomes in the following sections.

Table 2: Pilot Survey Rates

<table>
<thead>
<tr>
<th>Route</th>
<th>Refusal Rate (Not Distributed / Boardings)</th>
<th>Participation Rate (Returned on Bus + Mail-ins / Distributed)</th>
<th>Response Rate (Completes / Boardings)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>20%</td>
<td>22%</td>
<td>10%</td>
</tr>
<tr>
<td>20</td>
<td>21%</td>
<td>33%</td>
<td>17%</td>
</tr>
<tr>
<td>42</td>
<td>56%</td>
<td>37%</td>
<td>14%</td>
</tr>
<tr>
<td>Total</td>
<td>37%</td>
<td>29%</td>
<td>13%</td>
</tr>
</tbody>
</table>

5 These are confirmed questionnaires that met the pre-identified definition of a complete — valid responses for Questions 1-3, 6-8, and 14.
Refusal Rates: Issues, Solutions, and Recommendations

A 20% refusal rate as evidenced on Routes 13 and 20 is within reason. This outcome meant that the surveyors were able to get about 80% of boarding passengers to accept a questionnaire.

Recommendation for the Full Survey: Our goal for the full survey will be to lower the refusal rate another 5 percentage points or so (refusal rate goal of 15% or lower per route). Performance against this goal will be measured daily and reported in the Web-based field management system.

The refusal rate on Route 42 was well below par. When thinking about why this Route performed so much lower than the other two routes in terms of refusals, the main explanatory factor was that Route 42 uses articulate buses. Other possible variables (e.g., tourists, Japanese speakers, heavy boardings, short rides) were also factors on the other two routes and so do not explain the difference. Also, the surveyor on Route 42 also surveyed Route 13 — so we eliminated surveyor performance from our calculus as well. We believe that it was difficult for the surveyor to interact with passengers on the articulate bus (too large a space to cover) with that many boardings. The surveyor could not walk around and talk to passengers since the surveyor had to stay close to the front door due to heavy boardings at relatively close-together bus stops.

Recommendation for the Full Survey: Based on this experience, we have decided to schedule two (2) Surveyors for this route (and for other heavy routes using articulate buses during peak times) with one Surveyor working one section of the bus and another Surveyor working the other section. We would also need to schedule two Counters as well.

Participation Rates: Issues, Solutions, and Recommendations

Participation rates should range between a high of 45% to a low of 35%. Our pilot experience was below this mark. Observations on the buses as well as debriefing interviews with Surveyors and Counters indicated that several factors were associated with the low participation (i.e., passengers accepting questionnaires but not completing them) – (1) short trips, (2) the length and perceived complexity of the questionnaire, and (3) acquiescence (accepting out of politeness with no intention of completing). Acquiescence is a cultural factor that is challenging to overcome with improved survey methods.

Recommendation for the Full Survey: Our solution is to emphasize during Surveyor and Counter training the importance of roaming the bus to urge and assist passengers in completing the questionnaires.

Our solution for dealing with the other two factors (i.e., short trips and length and perceived complexity of the questionnaire) was to focus on revising the questionnaire. Observations on the buses as well as debriefing interviews with Surveyors and Counters revealed to us that many passengers took a long time just in reading and reviewing the questionnaire on the bus. Some looked it over and decided it was too hard to figure out. We think that the bilingual version (English/Japanese) added to this perception among passengers. Other passengers read it over several times and did begin to complete it but stopped when they reached their alighting bus stop (a short trip in many cases). So, we have been working to reduce the amount of “processing” that passengers need to do to complete the questionnaire. We want passengers to start completing it right away. The quicker that they can fill it out; the more likely that we will reach expected levels of participation. We have attached a revised survey questionnaire to this document (Attachment B). This revised questionnaire has undergone intense in-house testing with persons unfamiliar with on-board surveys. Key elements of the revisions are presented below:
Single-language questionnaires to reduce the perceived length and complexity of the questionnaire. The base questionnaire will be in English. It is sequentially numbered and bar coded using a "peel-off" label. Our Honolulu-based printer can do this. Japanese and Ilocano versions will be printed as well. When the Surveyors pass out one of these other language versions, they will peel off the label from the "next" English language questionnaire and stick it on the other language version. This process will ensure the integrity of our improved survey procedures. Surveyor training will emphasize not only the importance of this process but also allow practice in the physical dexterity required in its execution.

Size and format of the questionnaire changed. So it appears shorter and also so that most questions are seen at one time. There were many pilot questionnaires for which the respondent did not complete all questions (stopped at the page break).

Renamed the questionnaire (TheBus Resident and Visitor Survey). So that visitors easily understand that they are target respondents. Many visitors did not accept a questionnaire because they thought it did not pertain to them; or when prompted to complete one after accepting it, remarked "I'm just a visitor."

Made the incentive offer ($100 raffle) more prominent on the questionnaire. With two languages on the pilot version, the incentive was hard to see among all the text. Now it is quick and easy to spot. And, we numbered the item to make it appear as a required element.

Included an example of a one-way bus trip. As always, there were many home-home trips on the returned questionnaires.

Added Hotel (guest only) to the trip purposes to accommodate visitors. Surveyors and Counters reported that visitors did not know how to answer the coming from or going to questions if these pertained to their hotel – was it home? Or recreational? We clarified it by adding the category Home / Hotel (guest only).

Simplified the bus transfer question. We took the two pilot questions that captured transfer information and combined these into one question (similar to a suggestion made by Jim Ryan for a previous on-board survey). When paired with the example of a one-way bus trip, we feel this will better capture the transfer information.

In general, worked hard to simplify questionnaire wording. We testing and retested question wording among staff that are unfamiliar with on-board surveys to get to a point where no clarifying questions were being asked and no mistakes were made in completing the questionnaire.

Response Rates: Issues, Solutions, and Recommendations

Our budget assumes an overall response rate of 25+. Our pilot results were below this assumed threshold. However, we did pilot hard-to-survey routes so that the pilot results represent the worst-case scenario. The solutions provided up to now to reduce refusal rates and improve participation rates will obviously have a positive impact on the final response rates. Yet, in addition to these proposed recommendations, we plan to improve our in-field editor training to include enhanced address research strategies to salvage as many returned questionnaires as possible. The enhanced address research includes use of system maps, route schedules, and online search tools in addition to area maps and telephone books. We are also working to expand our pre-coded lists of places and landmarks. The pre-coded lists used during the pilot were missing many frequented destinations.
Summary of Recommended Changes based on Pilot

- Surveyors and Counters will be trained in small groups and training for all will include “on bus” practicum.

- Surveyor and Counter training will emphasize the importance of roaming the bus to urge and assist passengers in completing questionnaires.

- Two survey teams (Surveyor and Counter) will be assigned to articulate buses during peak periods.

- Editor training will focus on enhanced research address strategies to salvage as many returned questionnaires as possible.

- The questionnaire has been revised to appear simpler, shorter, and easy to complete.

- RideCount program will not attempt to distinguish bus stop patterns. Better to have all trips on a route rather than risk bringing up the wrong pattern.

- RideCount program will include a check that prohibits questionnaire numbers from being entered out of sequence and will prohibit a 0(zero) from being a valid questionnaire number.

- Explicit performance goals have been established for Refusal Rates, Participation Rates, and Response Rates. These rates will be closely monitored during field data collection and quickly communicated to all involved via the web-based field management system so that issues can be dealt with promptly.
FINAL QUESTIONNAIRES

FINAL ON-BOARD SURVEY DESIGN

HONOLULU HIGH-CAPACITY TRANSIT CORRIDOR PROJECT
ALTERNATIVES ANALYSIS / DRAFT ENVIRONMENTAL IMPACT STATEMENT

6 February 2006
Aloha! Please fill out this form even if you completed one on another bus.

1. Which describes you...
   - Resident of the Island of Oahu
   - Visitor to the Island of Oahu

2. Register to win $100 when you answer all questions!
   (5 winners per week)

   Residents only:
   - Name:
   - Address:
   - City: ____________________________ State: ____________ Zip: ______
   - Telephone: _______________________

   Visitors only:
   - Hotel Name: ______________________
   - What is the best way to reach you if you are a winner?
     ________________________________

3. Could you use a personal vehicle to make this one-way bus trip?
   - Yes
   - No

   Is that vehicle: __________ Rental __________ Owned or leased by your household

   Everyone continue inside ➔

Return the completed survey to the surveyor, OR place it in the special box located near the exit door of this vehicle OR drop it in any mailbox (no postage required).

Please provide any additional comments about TheBus services.
**Questions 4-9 are about the ONE-WAY bus trip you are making NOW!**

**Example One-way Trip:**

```
<table>
<thead>
<tr>
<th>HOME (START)</th>
<th>1st Bus</th>
<th>2nd Bus</th>
<th>3rd Bus</th>
<th>4th Bus</th>
<th>WORK (END)</th>
</tr>
</thead>
</table>
```

4a. Where are you COMING FROM NOW? (starting place)
- Work
- School (K-12) (student only)
- Shopping
- College/University/Tech school (student only)
- Social visit/Church/Personal
- Medical appointment/Hospital visit
- Recreation/Sightseeing/Restaurant
- Medical appointment/Hospital visit
- Airport
- Home/Hotel (guest only)
- If you gave your Home/Hotel information in Question 2

4b. What is the name of the PLACE you are COMING FROM NOW?

- Place Name or Nearest Landmark (like Ala Moana Center)

4c. What is the ADDRESS?

- Address
- Cross Street
- City

5. How did you GET TO the FIRST bus you used for this ONE-WAY bus trip? (mark one only)
- Drove and parked my car
- Walked
- Bicycled
- Rode w/ someone who parked in a park & ride lot

6. LIST ALL BUS ROUTES you used or will use to get from where you are COMING FROM to where you are GOING TO NOW:

<table>
<thead>
<tr>
<th>1st Bus Route #</th>
<th>2nd Bus Route #</th>
<th>3rd Bus Route #</th>
<th>4th Bus Route #</th>
</tr>
</thead>
</table>

7a. Where are you GOING NOW? (ending place)
- Work
- School (K-12) (student only)
- Shopping
- College/University/Tech school (student only)
- Social visit/Church/Personal
- Medical appointment/Hospital visit
- Recreation/Sightseeing/Restaurant
- Medical appointment/Hospital visit
- Airport (passenger only)
- Home/Hotel (guest only)
- If you gave your Home/Hotel information in Question 2

7b. What is the name of the PLACE you are GOING NOW?

- Place Name or Nearest Landmark (like Ala Moana Center)

7c. What is the ADDRESS?

- Address
- Cross Street
- City

8. After you GET OFF the LAST bus, how will you get to the place you are GOING NOW? (mark one only)
- Drive my car
- Rode w/ someone who parked in a park & ride lot
- Walked
- Bicycled

9. How did you pay your FARE on THIS BUS? (mark only one)
- Adult cash fare ($2)
- Senior Monthly Pass ($5)
- Transfer Slip
- Senior Annual Pass ($30)
- Adult Monthly Pass ($40)
- Persons w/ Disabilites Monthly Pass ($5)
- Adult Annual Pass ($440)
- Persons w/ Disabilities Annual Pass ($30)
- Youth cash fare ($1)
- Visitor Pass ($20)
- Youth Monthly Pass ($20)
- Football Express ($3)
- Youth Annual Pass ($220)
- U-Pass ($100)
- Senior cash fare ($1)

All personal information is confidential and WILL NOT be shared or sold.

10. How many CARS, TRUCKS, or MOTORCYCLES does your household have?
- None
- 1
- 2
- 3
- 4 or more

11. How OLD are you?
- 6 - 11 (That’s all our questions, mahalo/thank you!)

12. Do you have a VALID DRIVER’S LICENSE?
- Yes
- No

13. Including yourself, how many PEOPLE live in your household?
- None
- 1
- 2
- 3
- 4 or more

14. Including yourself, how many people in your household have a JOB OUTSIDE the home?
- None
- 1
- 2
- 3
- 4 or more

15. What was your estimated HOUSEHOLD INCOME in 2004?
- Less than $10,000
- $10,000 - $24,999
- $25,000 - $34,999
- $35,000 - $49,999
- $50,000 - $74,999
- $75,000 or more

**Thank you!** Return the completed survey to the surveyor, OR place it in the special box located near the exit door of this vehicle OR drop it in any mailbox (no postage required).
5. ONE WAY bus trip の例：

場所の名前を記入してください (乗車前)?

場所の名前または日付になる場所を書いて下さい (アラモアナセンターなど)

住所

近くの大きな通りの名前

市の

この ONE WAY BUS TRIP でバス (今度、最初のバス) に乗った場所までの交通機関は何ですか？ (1つのみ選択)

自家用車で運転して駐車した

乗車箇所へ → ブロック

他の人が運転して駐車した

バスの出発点と目的地までに使用するルートをすべてお書きください。

6. 今回の料金の支払い方法は次のどれですか？ (1つのみ選択)

大人料金1 - 現金 ($2)

シニア料金1 (¥226)

U-Pass ($100)

7. これから、どこに行きますか？ (one-way bus trip の最終目的地)

これから行く場所をお書き下さい?

場所の名前または日付になる場所を書いて下さい (アラモアナセンターなど)

住所

近くの大きな通りの名前

市の

最後のバスを降りてから、目的地までの交通手段をお書き下さい。

○ 自分の車で運転する

○ 同じ鉄道路線に乗った人と同乗する

○ 徒歩 → ブロック

○ 他の人を迎えに行く

○ 自転車

8. 今回の料金の支払い方法は次のどれですか？ (1つのみ選択)

大人料金1 - 現金 ($2)

シニア料金1 (¥226)

U-Pass ($100)

9. 現在、車（自家用車、トラック、バイク）はご家庭に何台ありますか？

○ なし ○ 1 ○ 2 ○ 3 ○ 4 台以上

10. 年齢をマークしてください？

○ 6-11歳 → これで終了です。ありがとうございました!

○ 12-17歳 ○ 25-34歳 ○ 50-64歳

○ 18-24歳 ○ 35-49歳 ○ 65歳以上

11. 現在有効な運転免許証はお持ちですか？

○ はい ○ いいえ

12. 何人家族ですか？

○ 1人 ○ 2人 ○ 3人 ○ 4人以上

13. あなたを含めて自宅外で仕事をしている人は、家族に何人いますか？

○ なし ○ 1人 ○ 2人 ○ 3人 ○ 4人以上

14. 投込みの世帯収入（2004年）をマークしてください？

○ ＄10,000以下 ○ ＄25,000- ＄49,999 ○ ＄50,000- ＄74,999

○ ＄10,000- ＄24,999 ○ ＄35,000- ＄49,999 ○ ＄75,000以上

15. この調査を調査元に返すか、バスの出口に設置された箱または郵便ポストに投函して下さい（切手不要）。

TheBus に関して追加のコメントがあれば裏に記入下さい。