Illustration of the Initial Assessment of Data Requirements

This is an extract from the Auckland data specification.

1.   Existing Data

1.1   Introduction

Sources of existing data that may be of use are being collated and reviewed as to their relevance and usefulness and will then be co-ordinated with the ATM2 data requirements. An initial list of existing data relevant to ART follows.

1.2   Road and PT Networks

The road network and associated data will be updated for ART and be compatible with GIS; this will cover:

- updated road network information including alignment, lanes, free-flow speed, side-friction information, and time-of-day variations for parking, bus lanes etc
- intersection data such as intersection types, specific signalised intersection information and geometry.

Public transport routes, services and fares will be required for each time period. We understand that the routes are coded into GIS files and are available from ARTA.

1.3   Vehicle O-D Data

Transit have recently undertaken fully enclosed ramp-to-ramp number-plate surveys on the Southern, Northern and North-western motorways. These were in the peak flow directions during the AM and PM peak periods and separated light and heavy vehicles. A 20% sample was achieved from which full motorway matrices have been developed using count data.

1.4   Traffic Count Data

A catalogue of existing traffic counts, counting programmes and methodologies is being prepared prior to determining our count data requirements. This catalogue will be used to establish the scope and coverage of relevant existing data, including classified counts. It will also assist in checking the reliability and consistency of counts; the time series data on current ART screenlines already collected by the ARC will be used in particular.

1.5   Journey Time Surveys

As with count data a summary of existing data is being collated with a view to establishing its relevance prior to determining the requirements for ART. The ARC/Transit surveys for the regional congestion indicator are the most comprehensive, but the methodology used may not fit well with the modelling needs.

1.6   Public Transport Data

It is desirable to obtain data of this nature in association with the interviews for expansion and validation purposes; existing ETM data may be most appropriate.

Other existing and planned public transport interview and count data include:

- rail passengers:
    - May 2003: pre-Britomart, O-D survey (2,520 achieved questionnaires); 100% station-station counts,

- March 2004: post-Britomart, 100% station-station counts,
        - May 2006: repeat of 2004 survey planned by ARTA,
        - weekly patronage counts at Britomart (between 700-900) undertaken by the operator,
        - ticket sales data reported weekly by the operator,
        - the annual CBD count cordon, AM peak inbound;
    - bus passengers:
        - numerous loading surveys (counts),
        - the annual CBD count cordon, AM peak inbound,
        - the West and Central intercept survey, October 2004;
    - ferry passengers:
        - the annual CBD count cordon, AM peak inbound,
        - the operator do an annual survey on all their ferries that may available,
        - surveys of some individual services:: Bayswater 2004, Birkenhead 2004, West Harbour 2005, Gulf Harbour 2004, Beach Haven and West harbour 2001.

Real time bus information should be available for some services. The information gathered includes travel times at a detailed (stop) level.

Customer satisfaction surveys are carried out annually by ARTA obtaining information on income, ticket types, mode difference, age ranges etc

The scope and availability of other data is presently being established including before and after travel time surveys on bus lane routes undertaken by Auckland City.

1.7   Commercial Vehicle Data

The scope of the Auckland City Port Survey, January 2004, is presently being sought. The Ports of Auckland and Metroport have counts of inbound and outbound container numbers.

Some of the traffic counts are classified and provide heavy commercial vehicle counts. The use of this in the development of a base year matrix will be determined.

We are aware of the Regional Freight Strategy and the FORST research project on economic input/output tables.

1.8   Airport Data

The airport operator, AIAL, have recently undertaken surveys associated with airport travel, however it is understood that it is not possible to make use of this data. This may be further pursued.

ARTA are planning to survey airport employees in 2006 as part of there travel plan programme. We have provided input into the design of that survey and intend to make use of the data arising, for example the timing of employee travel.

1.9   Parking Data

Parking supply and price data is required for the parking supply representation in ART. Auckland City maintain an inventory of off-street parking supply and location for the CBD. Other recent databases exist for Henderson, New Lynn, Takapuna, Browns bay, Newmarket and Ponsonby.

1.10   Students

The Ministry of Education has been approach in respect of the availability of their surveys of students home addresses and to seek their approval for undertaking surveys of school bus patronage.

ARTA is undertaking a series of travel surveys with individual schools associated with their travel plan programme. This is an ongoing programme surveying staff, students and parents to obtain their origin-destination and mode (school and scheduled buses are not separately identified). Some 30 schools have been surveyed to date encompassing almost a thousand staff, 3,500 parents and some 9,000 students.

Auckland and Massey universities have previously undertaken student travel surveys, and ARTA is planning a comprehensive on-line survey of CBD universities (Auckland and AUT) as part of their travel plan programme. We have liaised with them over this with a view to providing some input into the survey form;

In 2002 Auckland City commissioned a study into international students, university and language, which included data on accommodation. The usefulness of this data is probably reduced given the volatile nature of this market.

1.11   Census Data

2001 Census data, including population, household and possibly employment data, will be used in the development of the interim ASP model. The role of the 2001 Journey-to-work census data will need to be considered.

1.12   Time Series Data

Data is required on historic trends in:

- the sensitivity of travel time choice,
- car ownership,
- commercial vehicle travel,
- company cars and company-assisted vehicle travel,
- CBD parking supply.

1.13   Other Data

Other possible data sources include:

- ARGS area reports;
- Manukau City surveys of residential, industrial areas; these are surveys of different areas with solely residential and business activities – usually cul-de-sacs, carried out at the time of the Census in 1991, 1996 and 2001, and planned for 2006:
    - 12-hour surveys (7am to 7pm) of all travel into and out of the area;
    - data includes time of day (5 minute intervals), number of pedestrians, cyclists, vehicles and occupants, vehicle number- plates;
    - the data has been matched to demographic data for the area to facilitate analyses of differences in residential trip making;
    - other information that might be useful for the re-timing and HOV models;
- data that may be required for model outputs, such as crash statistics, air quality and emissions data, etc;
- The ARTA surveys associated with workplace travel plans and the segmentation survey; the latter is planned to take place around Easter 2006.

2. New Surveys

2.1 Introduction

The types of data collection required for ART and the specific information requirements for each are set out below. A common issue for the scope of these surveys is the geographical coverage of the study area. Planning for the major surveys is currently underway.

For the transport model we have identified the key areas where there will be special data requirements. These are listed for each survey "specific information requirements above the norm". They will be used in the detailed questionnaire design, at which time the specific data implications will be considered in greater detail in conjunction with model specification details.

2.2 Household Travel Survey

The HIS will be used to calibrate the models and not to directly develop matrices. The major features are:

- interviewer-assisted self-completion techniques adopted in Wellington, Perth and Brisbane, with personal delivery and pick-up of questionnaires;

- 1 weekday's travel diary from all household members; a full week diary for cycle trips if it can be done at marginal cost with acceptable accuracy (consider whether the sample should be limited; consider focus on commuting and school trips);

- explore option of a supplementary weekend day diary for the Monday and Friday travel day samples;

- sample:

    - size: expected to be 6-8,000 households, depending on budget;

    - structured random sample, with consideration given to feasibility of biasing sampling rates towards: lower density areas, ARGS growth nodes, and intensified and mixed use areas;

    - consider specific sampling of dedicated student accommodation (for university students and for English language students), measures to avoid under-sampling of students resident in households and apartments and, related to this, multilingual interviewers and a specific, simpler questionnaire;

- specific information requirements, above the norm:

    - business trip purpose,

    - bus type: school, public,

    - serve passenger and HOV-related details of car driver and passengers,

    - captive-to-car and car availability measures,

    - parking type, price and location,

    - education level: primary, secondary, tertiary and foreign English student,

    - vehicle technology (fuel type, engine size etc),

    - company cars, free car parking and other company-provided assistance.

2.3 Bus, Rail and Ferry Passenger Intercept Survey

The PT intercept survey will be aimed at providing data for the calibration of the models in conjunction with the HIS, but will not necessarily be sufficient for developing accurate fully observed trip matrices at a detailed level. The features are:

- weekday survey;
- sample:
  - we have assumed that a similar sample to that achieved for the Auckland Public Transport (APT) model would be targeted, to serve the purposes of updating both APT and ART; however, for the purposes of ART, smaller samples would be acceptable;
  - sample coverage (flow, time period and mode), statistical requirements and cost-effectiveness will determine the sampling strategy and sample size in the public transport surveys; critical is the scheduling of interviewer shifts (this was a less good feature of the original APT surveys for which, depending on the balance between the number of public transport stops/stations and the number of services, a choice will be made between on-board interviews or at stops/stations in consultation with operators and survey agencies, as would the demanding interviewer scheduling for on-board surveys;
- specific information requirements, above the norm:
  - car and parking availability, other company-assistance for car travel,
  - it is likely that a supplementary small sample survey will be needed to confirm segmentation data which could not efficiently be included in the main survey questionnaire.
- in such surveys, school bus interception is highly inefficient, so the potentially more cost-effective alternatives of school-based surveys will be investigated.

2.4 External Cordon Roadside Interview Survey

- for vehicle travel into and out of the study area (PT travel assumed to be insignificant);
- specific information requirements, above the norm:
  - car and parking availability, other company-assistance for car travel,
  - tours.

2.5 Commercial Vehicle Interview Survey

- there are very significant issues over cost-effective accurate OD surveys of commercial vehicles, not least in regard to response rates and sample frames (which may use operators registered with institutions or clubs, licensed drivers or companies);
- sample:
  - the sample frame will need to be determined, whether vehicles or operators; issue of vehicles owned and garaged outside the region;
  - the sample size will be determined once the survey method is decided; for limited statistics such as average trip length (by type) the vehicle sample could be relatively

small (in the hundreds), but for more detailed matrix information a larger sample would be required;

- – minimum coverage will be medium and heavy commercial vehicles;
- information requirements:
  - – average trip length, or trip length distribution, by vehicle type;
  - – operator surveys might also be extended to seek a better qualitative understanding of the link between commercial vehicle trip-making and land use;
- the use of GPS will be considered.

2.6   School Survey

- sample:
  - – a survey of school buses as they arrive at (or depart) the schools, aimed solely at the school bus trip matrix; or
  - – a survey of one class of each age group in each school covering wider data on all transport modes;
- information: mode of transport, age/class, home address, school address.

2.7   Classified Counts

- for model validation and matrix estimation;
- a dense series of screenlines and cordons across the city; 1-day counts (period to be defined);
- around selected special areas and specific generators: sub-regional and regional CBDs, major commercial vehicle generators, intensified and mixed use areas, commercial centres, growth nodes (ARGS), ports (including inland) and airport;
- classified: distinguishing at least cars, taxis (at the airport only), medium goods vehicles, heavy goods vehicles and buses; consideration required as to how to deal with commercial vans and utes.

2.8   Vehicle Times/Delays Survey

- for model validation and tuning;
- multiple times runs along a series of major routes.

2.9   Bus Travel Time Surveys

- for calibrating the relationship between bus running times and highway speeds;
- requires concurrent surveys of bus running times and car running times;
- routes should be broken down into sections to provide adequate numbers of observations.

2.10   Other Data Requirements

- information that might be useful for the re-timing and HOV models;
- supplementary data collection for student institutional accommodation and foreign English student apartments.

2.11 Survey Management

A critical component of the management of the data collection is constant and detailed monitoring. We will hold fortnightly meetings with the data collection contractor to ensure satisfactory progress, and carefully appraise the final data provided before acceptance to ensure the data provided is that required. This monitoring along with the appointment of a competent and able contractor have served us well in the past at achieving a successful survey outcome.

2.12 Survey Exclusions

The following surveys are not presently envisaged, but existing information will instead be drawn on:

- motorway and/or screenline OD surveys; the inclusion of OD surveys for the purposes of model validation and checks is still being investigated; this includes consideration of means other than intercept surveys, such as sampling using vehicle registration plates;

- public transport counts (assuming ETM data is available);

- monitoring/before-and-after data;

- airport interviews;

- employee survey;

- parking survey.

2.13 Data Processing

A Data Processing Specification will be prepared before the task is started.

Cleaned and edited data received from survey agencies will be subject to acceptance testing, and be returned to the survey agency if unacceptable. Some data cleaning/editing may be done in-house.

Survey data has imperfections and, during design, we specify data quality requirements by defining the minimum information content (MIC) for any survey questionnaire. Survey agency contracts may cover missing travel diaries and key data items. For some data items, plans will be made for imputing values of, for example, household income. Recent surveys in Brisbane and Melbourne have made substantial innovations in the geo-coding of trip destinations, the coding and editing of questionnaires and the imputation of missing data which can be transferred to the ART survey programme.

With many different survey data sets being used, responses to each survey will be processed into common codes required for modelling: eg addresses to zone codes, classifications of transport modes, trip purposes and vehicle types. Travel diary stage data will be linked to complete trips.

Surveys will be expanded to a 24 hour period using census data for the household survey and count sources for the roadside and public transport surveys. Trip reversal techniques may be required.

Finally, data from these data sets will be merged for modelling purposes, to build calibration data files and trip matrices from a combination of survey sources, where appropriate allowing for differences in survey sample sizes.

Appendix A Detailed Survey Task Schedule

A.1 Household Survey

Project Team Planning (Dec/Feb)

- Define data requirements

- Draft illustrative questionnaire

- Specify survey method

- Specify survey scope (study area, period, sample selection & size, coding, editing, quality assurance, data accuracy/synthesis/fault & omission frequencies); key tasks:

  - survey sample design

  - specify data requirements

  - address coding

- Draft and issue tender

- Appoint survey agency

Survey Agency (Feb-Apr)

- Set up survey resource and administration

- Detailed design

- Pilot Survey

- Pilot review and fine tune main survey

Main Survey (May/Nov)

- Survey Implementation

- Survey Checking/quality management

- Data Analysis and review

- Survey Final Report

- Survey Signoff and Data acceptance

A.2 Public Transport Intercept Survey

Project Team Planning (Jan/Mar)

- Define data requirements

- Draft illustrative questionnaire

- Specify survey method

- Specify survey scope (study area, period, sample selection & size, coding, editing, quality assurance, data accuracy/synthesis/fault & omission frequencies):

  - survey method

  - survey sample frame of bus and rail services; school buses

  - method of sampling

- Draft and issue tender

- Appoint survey agency

Survey Agency (Mar/Apr)

- Set up survey resource and administration

- Detailed design

- Pilot

- Pilot review and fine tune main survey

Main Survey (May Nov)

- Survey Implementation

- Survey Checking/quality management

- Data Analysis and review

- Survey Final Report

- Survey Signoff and Data acceptance

A.3   CV Interview Survey

Project Team Planning (May/mid-Jun)

- Define data requirements

- Draft illustrative questionnaire

- Specify survey method

- Specify survey scope (study area, period, sample selection & size, coding, editing, quality assurance, data accuracy/synthesis/fault & omission frequencies); key tasks:

  - specify data requirements

  - survey method, sample frame and sample

- Draft and issue tender

- Appoint survey agency

Survey Agency (mid-Jun/Jul)

- Set up survey resource and administration

- Detailed design

- Pilot

- Pilot review and fine tune main survey

Main Survey (July/Oct)

- Survey Implementation

- Survey Checking/quality management

- Data Analysis and review

- Survey Final Report

- Survey Signoff and Data acceptance

A.4   School Survey

Project Team Planning (May/mid-Jun)

- Establish need
- Define data requirements
- Draft illustrative questionnaire
- Specify survey method
- Specify survey scope (study area, period, sample selection & size, coding, editing, quality assurance, data accuracy/synthesis/fault & omission frequencies); key tasks:
  - specify data requirements
  - survey method, sample frame and sample
- Draft and issue tender
- Appoint survey agency

Survey Agency (mid-Jun/Jul)

- Set up survey resource and administration
- Detailed design
- Pilot
- Pilot review and fine tune main survey

Main Survey (Jul/Nov)

- Survey Implementation
- Survey Checking/quality management
- Data Analysis and review
- Survey Final Report
- Survey Signoff and Data acceptance