Survey on Goods Vehicle Trip Characteristics 2003

Final Report

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EXECUTIVE SUMMARY

E.1   Project Objectives and Scope

E.1.1 In November 2002, Transport Department commissioned LLA Consultancy Limited in association with Policy 21 Limited of the Hong Kong University to conduct the Survey on Goods Vehicle Trip Characteristics 2003 (GVTCS 2003).

E.1.2 The main objectives of the Project were to collect up-to-date information on Hong Kong goods vehicles, and to develop such information into a goods vehicle trip characteristics database. This database will be used to enhance the transport model developed in the Third Comprehensive Transport Study (the CTS-3 model) as well as provide information to facilitate future transport planning.

High Proportion of Goods Vehicles

E.1.3 The Project included the design, supervision and conducting of interviews and other surveys, data analysis and reporting of results, preparation of deliverables and suggestions on the approach for conducting future surveys.

E.1.4 The Project involved the following main groups of surveys :

- Goods Vehicle Owner and Driver Interview Survey – to collect data and information on the ownership, usage and operation of goods vehicles.

- Special Generator Survey – to collect data and information for the subsequent derivation of trip ends and trip matrices of various goods vehicle types at special generators.

Kwai Chung Container Terminal

- Goods Vehicle Trip Generation Rate Survey – to establish the trip generation rates of different goods vehicle types generated by different landuse development at various geographical areas in the territory and at different times of the day.

- Goods Vehicle Traffic Composition Survey – to collect data for further classifying the compositions of goods vehicles on major roads in Hong Kong.

E.1.5 The survey fieldwork was conducted between 8 September 2003 and 21 November 2003.

E.1.6 Other information, such as landuse data and cross-boundary goods vehicle movements, was sought from other sources. Trip matrices for different time intervals on a weekday, vehicle types, trip origin and destination locations were developed.

E.1.7 The data and information collected were assembled to form a database of goods vehicle trip characteristics for enhancing the CTS-3 model and providing information for transport planning.

E.2   Interview Surveys

Goods Vehicle Owners

E.2.1 A total of 2,260 owners of goods vehicles had been approached for interview survey on goods vehicle operational characteristics and a 68% response rate had been achieved. The owners participating in the survey owned 7,140 goods vehicles altogether, equivalent to 6.3% of the total licensed goods vehicle fleet size of 113,000. As shown in **Table E.1**, 904 (59%) out of a total of 1,532 owners surveyed were found to own one goods vehicle only.

Table E.1 : Fleet Size of Goods Vehicle Owners Participated in the Survey

Fleet Size	1	2-3	4-10	11-25	26+	Overall
No. of Owners Sampled	1,400	300	260	200	100	**2,260**
No. of Owners Surveyed	904	216	186	151	75	**1,532**
No. of Vehicles Surveyed	874	428	429	564	690	**2,985**

A Medium Goods Vehicle

Goods Vehicle Drivers

E.2.2 Goods vehicle trip data were collected through interviewing drivers in the last quarter of 2003. A total of some 4,750 drivers were selected for interview, and a 63% response rate was achieved, equivalent to 2.6% of the total licensed goods vehicle fleet size of 113,000. During the survey, 15,811 trip records were fully completed. The distribution of the number of surveyed goods vehicles and trips records is presented in **Table E.2**.

Table E.2 : Number of Surveyed Goods Vehicles and Trip Records

Goods Vehicle Type	No. of Licensed Vehicles	No. of Surveyed Vehicles	No. of Trip Records
Goods Van	39,000	378	2,130
Light Goods Vehicle	30,100	946	5,255
Medium Goods Vehicle	27,500	747	4,049
Heavy Goods Vehicle	3,300	124	902
Container Vehicle	13,400	790	3,475
Total	**113,300**	**2,985**	**15,811**

A Container Vehicle

E.3   Special Generator Survey

E.3.1   At special generators, a total of 45 sites were surveyed. This resulted in 7,988 driver interviews. Data from these interviews were expanded using the traffic counts conducted in tandem with the interviews. **Table E.3** shows the number of special generator sites surveyed.

Table E.3 : Number of Sites Surveyed at Special Generators

Special Generator Sites	No. of Surveyed Sites
Kwai Chung Container Terminals	3
River Trade Terminal/ Mid-stream sites	2
Public Cargo Handling Areas	6
Private Wharfs	1
KCRC Freight Terminals	2
Hong Kong Air-Cargo Terminals	1
Freight forwarding/ logistics centres	20
Open storage of containers and port back-up uses	10
Total	45

E.4   Trip Generation Rate Survey

E.4.1   The volumes of goods vehicle movements generated varies for different landuse types and employment categories. For the contract, a total of 199 sites were surveyed to obtain trip generation and attraction rates for different goods vehicle types and time periods. **Table E.4** shows the number of surveyed sites by landuse/employment types.

Table E.4 : Number of Surveyed Sites for Trip Generation Rate Survey

Landuse Type / Employment Categories	No. of Surveyed Sites
Household	21
School	11
Manufacturing	18
Wholesale & Retail / Import & Export	27
Electricity, Gas & Water	2
Agriculture & Fishing	2
Mining & Quarrying	0
Construction	21
Finance, Insurance, Real Estate & Business Services	21
Restaurants & Hotels	14
Transportation, Storage & Communication	25
Community, Social & Personal Services	25
Public Administration	12
Total	**199**

Survey Conducted at an Industrial Centre

E.5   Goods Vehicle Traffic Composition Survey

E.5.1   About half of the number of the traffic counting stations forming the cordons or screenlines in the Annual Traffic Census 2002, equivalent to around 52 traffic counting stations including the 3 cross-harbour tunnels, had been selected for the survey.

E.5.2   At each selected survey station, classified goods vehicle counts were conducted on a normal weekday over a 14-hour period (7:00 am to 9:00 pm). Traffic flow data of each goods vehicle type by direction were recorded at 15-minute intervals.

E.6 Key Findings

E.6.1 Goods vehicle owners were interviewed on the annual operating costs. Goods vehicle operating costs obtained from Goods Vehicle Owner Surveys were calculated for all goods vehicle types. These cost rates took into account factors such as vehicle capital costs, staff salaries, vehicle maintenance, insurance, licence and fuel expenses. **Figure E.1** summarises the average annual financial operating costs by vehicle type. As expected, the operating costs increase with the size of vehicles. The operating cost of container vehicles was the highest amongst all goods vehicle types.

Figure E.1 : Average Annual Operating Costs of Goods Vehicle
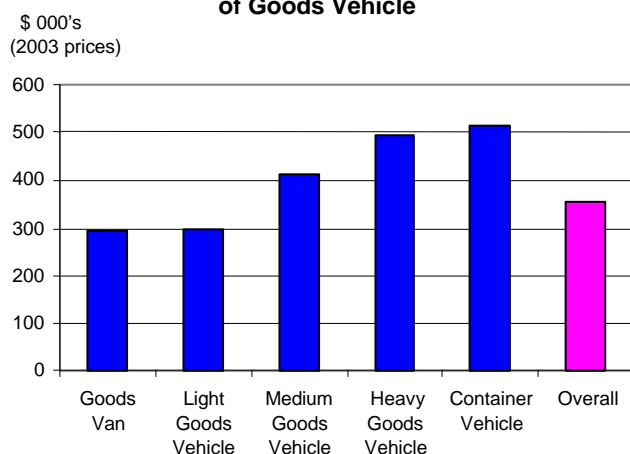
E.6.2 Figure E.2 summarises the distribution of goods vehicle owners by employment category and landuse type. About half of the goods vehicle owners were engaged in the transportation, storage and telecommunication sector and 15% of them in construction, 14% in wholesale & retail/ import & export and 8% in manufacturing.

Figure E.2 : Employment Category of Goods Vehicle Owners
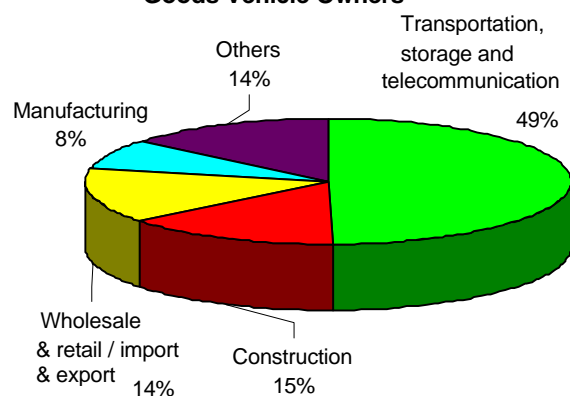
E.6.3 Over 90% of goods vehicle owners employed full-time drivers and about one-quarter of them employed delivery staff.

E.6.4 As shown in **Figure E.3**, most goods vehicles (90%) were parked within the territory while 10% were parked in the Mainland. Of those vehicles parked in Hong Kong, the vast majority (93%) were parked off-street, among which some 60% were parked in permanent facilities.

Figure E.3 : Overnight Parking Locations
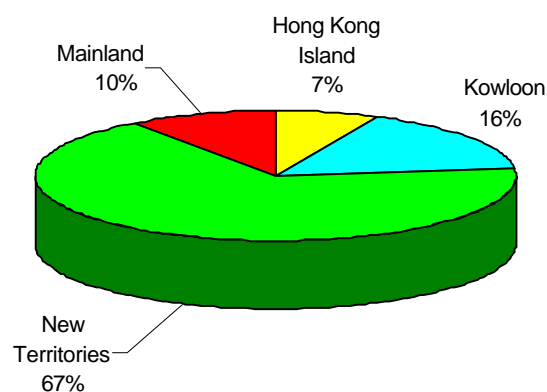
E.6.5 As shown in **Figures E.4 and E.5**, goods vehicle drivers, on average, worked about 22 to 24 days a month and about 8 to 12 hours per working day, depending on the goods vehicle types. The survey results indicated that the number of working hours per day tends to increase with the vehicle size.

Figure E.4 : Average Number of Working Days of Goods Vehicle Drivers
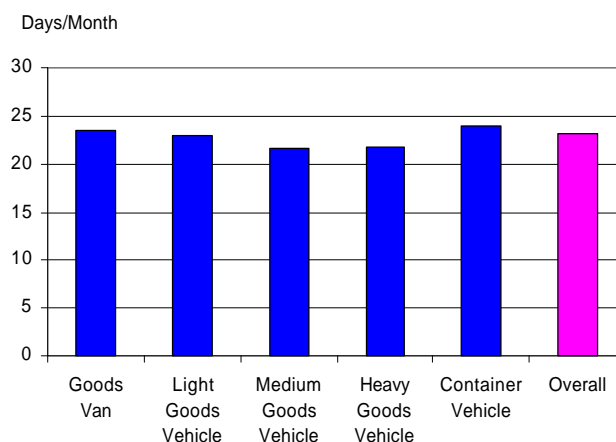
Figure E.5 : Average Number of Working Hours of Goods Vehicle Drivers

Hours/Day
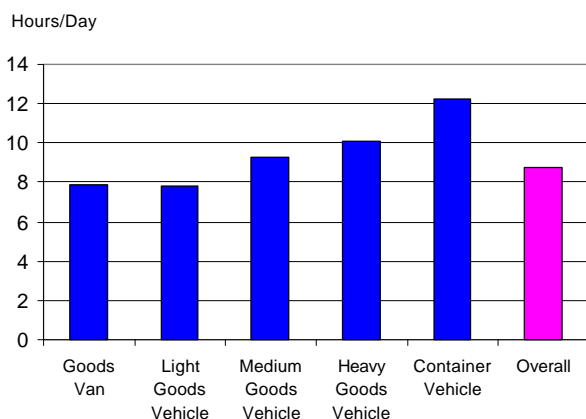
Figure E.6 : Average Number of Trips per Vehicle per Weekday

No. of Daily Trips/Vehicle
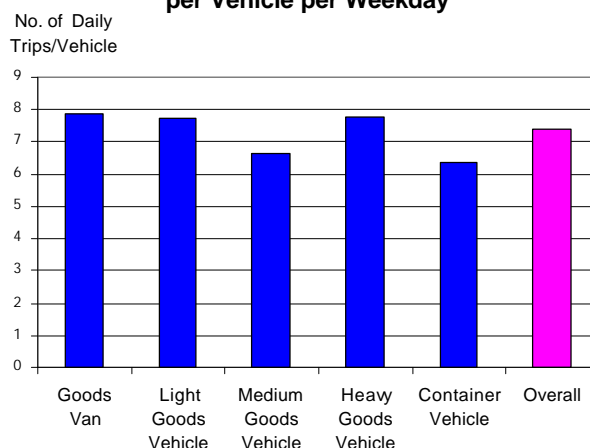
Container Vehicles Near Lok Ma Chau

E.6.6 Most of the data collected represent partial sampling, such as a proportion of goods vehicles surveyed, or a proportion of container terminals surveyed. The goods vehicle trip data were collated against independent traffic count data of the 2003 last quarter situation. The resulting average number of trips per weekday made by goods vehicles is illustrated in **Figure E.6**. On average, goods vehicles made 7.4 trips per day, although this figure varies for different goods vehicle types. Goods vans, light goods vehicles and heavy goods vehicles made an average of 7.7 to 7.9 trips per day. Medium goods vehicles made fewer trips per day (6.7 trips per day) while container vehicles made 6.4 trips per day.

E.6.7 Based on the findings of the survey, it was estimated that about 833,000 goods vehicle trips were made by a licensed fleet of 113,000 goods vehicles on a typical weekday in 2003.

E.6.8 **Table E.5** shows the annual average daily distance travelled per goods vehicle. It is observed that heavy goods vehicle and container vehicle travel some 20%-30% longer than goods van and light goods vehicle. It should be noted that distances travelled outside the territory were not included.

Table E.5 : Annual Average Daily Distance Travelled per Vehicle

Vehicle Type	Goods Van	Light Goods Vehicle	Medium Goods Vehicle	Heavy Goods Vehicle	Cont-ainer Vehicle	Over -all
Distance (km/day)	83	82	89	109	101	**87**

E.6.9 As shown in **Figure E.7**, the vast majority (90%) of goods vehicle trips occurred during the period of 7:00 am - 7:00 pm, with the peak hour being 10:00 am - 11:00 am.

Figure E.7 : Hourly Distribution of Goods Vehicle Trips
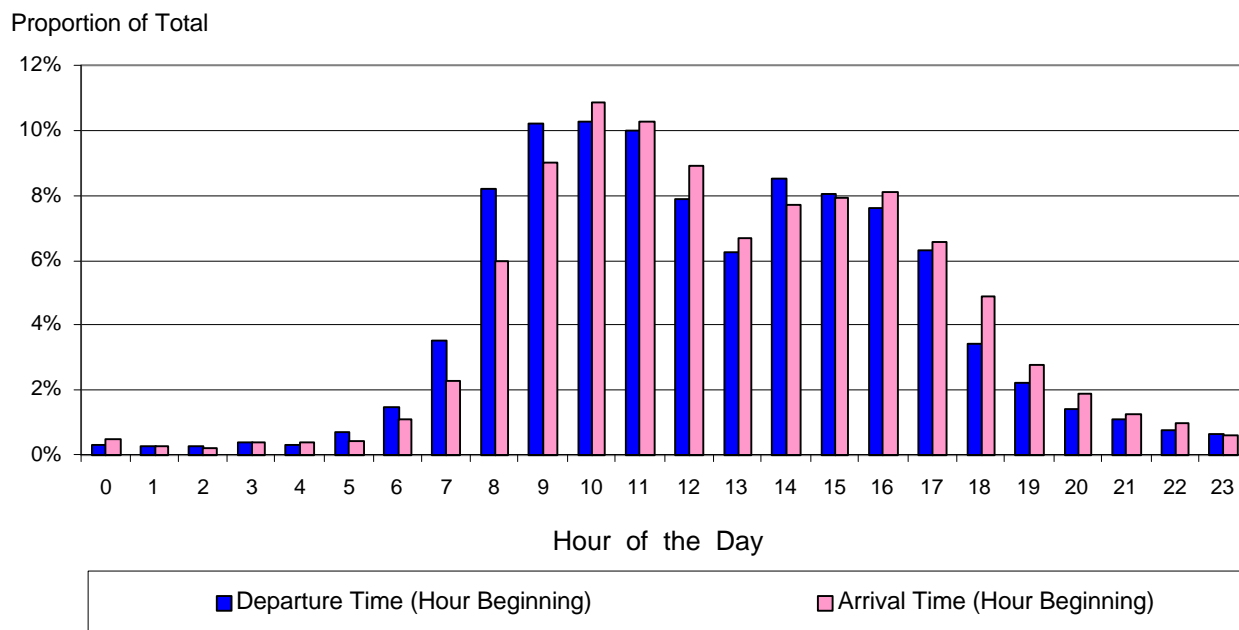
E.7   Way Forward

E.7.1 One of the key objectives of the GVTCS 2003 was to collect up-to-date trip characteristics data and information of goods vehicle for enhancing the CTS-3 model. The data collected were stored in a database for future use in the re-calibration and enhancement of the CTS-3 model.

E.7.2 Based on the experience gained in the Project, the approach for future updating of the goods vehicle data sets was studied and the results are summarised in **Table E.6.**

Table E.6 : Proposed Approach for Conduction Future Survey

Goods Vehicle Data	Updating Frequency
Operational Characteristics from Owners	Once every 10 years
Trip Characteristics from Drivers	Once every 10 years
Trip Characteristics at Special Generators	Once every 10 years except justified on specific case needs
Trip Generation Rates	Once every 5 years or in line with enhancement time-scale of CTS-3 model
Goods Vehicle Traffic Composition	Once every 5 years or in line with the enhancement of CTS-3 model

1   INTRODUCTION

1.1   Background

1.1.1   The transport model developed in the Third Comprehensive Transport Study (the CTS-3 model) is used as an analytical tool to facilitate planning of strategic transport infrastructures in Hong Kong.   The model simulates both passenger and goods vehicle movements among various parts of the territory.

1.1.2   In 2003, about 20% of the licensed vehicles in Hong Kong were goods vehicles but they constituted about 40% of the total traffic flows on major roads such as Tuen Mun Road and Tolo Highway.   A goods vehicle, on average, occupies about twice the road space of a private car.   Hence, simulation of goods vehicle movements on major roads is important in determining the accuracy and characteristics of the total simulated flows on these roads.

Goods Vehicles Constitute a High Proportion of Traffic

1.1.3   The goods vehicle model within the CTS-3 model was developed mainly based on the 1991 information collected in the Freight Transport Study (FTS).   Over the last decade, trip characteristics of goods vehicles were perceived to have changed substantially as a result of various factors, such as the expansion of container and river trade terminals, relocation of the airport and the associated air cargo terminals to Chek Lap Kok, shift of factories to the Mainland and completion of various major highway infrastructure projects.   The above changes would affect goods vehicle movements, travel patterns and route choices. Consequently, up-to-date information on goods vehicle movements is required to update the CTS-3 model to make better projection of goods vehicle movements for transport planning.

1.1.4   Against the above background, the Survey on Goods Vehicle Trip Characteristics 2003 (GVTCS 2003) was commissioned by Transport Department to collect up-to-date goods vehicle trip data for enhancing the CTS-3 model.

1.1.5   In November 2002, Transport Department commissioned the LLA Consultancy Limited in association with Policy 21 Limited of the Hong Kong University to undertake GVTCS 2003 under Contract No. TD52/2002.

1.2   Project Objectives

1.2.1   The key objectives of the Project are:

- To collect up-to-date trip characteristics data and information of goods vehicles in Hong Kong for enhancing the CTS-3 model.

- To develop a database of up-to-date trip characteristics of goods vehicles to enable better transport planning.

- To make recommendations on the approach to conduct future survey updates.

1.2.2 The Project does not include any enhancement work of the CTS-3 model. The enhancement of the CTS-3 model will be based on the GVTCS 2003 data in a future study.

1.3   Project Scope

1.3.1 The main scope of the Project is summarised below:

Design

- To review and establish the scope and data requirements of the surveys necessary for achieving the project objectives.

- To design surveys for collecting the data required for the derivation of goods vehicle movements.

Survey

- To manage and undertake the surveys.

- To supervise and monitor the data collection exercise.

Data Analysis and Reporting

- To process, check and analyse the data collected from the survey and other sources.

- To develop a database of goods vehicle trips.

- To make recommendations on the approach to conduct future surveys.

- To prepare reports on the findings.

1.4   Structure of this Report

1.4.1   The remaining sections of this Report are structured as follows:

- Section 2 describes the data collection and processing.

- Section 3 presents survey results, data analysis and key findings.

- Section 4 discusses the changes in goods vehicle movement characteristics over time.

- Section 5 presents the way forward relating to the future use of GVTCS 2003 data and approach for conducting future surveys.

Survey at the Entrance of Kwai Chung Container Terminal

2　DATA COLLECTION AND PROCESSING

2.1　Data Requirements

2.1.1　In this Project, the following classification for the five different types of goods vehicles, as shown in **Table 2.1,** were employed.

Table 2.1 : Goods Vehicle Classifications

Vehicle Type	Permitted Gross Vehicle Weight (tonnes)	General Descriptions
Goods Van	<=3.5	• All van-type light goods vehicle excluding passenger van
Light Goods Vehicle	<=5.5	• Usually shorter than 6m • 2-axle light goods vehicle other than goods van
Medium Goods Vehicle	>5.5 to 24	• Usually longer than 6m • Having 2 or 3 axles or double rear tyres
Heavy Goods Vehicle	>24	• Usually longer than 7m • Usually having 4 axles
Container Vehicle	-	• All articulated vehicles

Note: Goods vehicle classifications are in accordance with the definitions in the Road Traffic Ordinance.

2.1.2　To achieve the objectives of this Project, information and data were collected in the following surveys:

• Goods Vehicle Owner and Driver Interview Survey

• Special Generator Survey

• Goods Vehicle Trip Generation Rate Survey

• Goods Vehicle Traffic Composition Survey

Goods Vehicle Owner and Driver Interview Survey

2.1.3　Information gathered from goods vehicle owners included: trade classification, fleet size, number of employees (drivers and delivery staff), operating cost, distance travelled per day, number of working hours per day and number of working days per year of their drivers, and locations where goods vehicles were parked overnight.

2.1.4　Data gathered from goods vehicle drivers included details of all trips made on the weekday preceeding the survey day: trip origin and destination, landuse types at trip ends, trip purpose, starting and ending time of trips, load factor, parking location, number of people in the goods vehicles, and tolled roads used.

2.1.5　Goods vehicle annual operating costs were obtained from goods vehicle owners for different goods vehicle types. These costs took into account factors such as vehicle capital costs, staff salaries, vehicle maintenance, insurance, licence and fuel expenses.

Special Generator Survey

2.1.6　Special generators refer to sites that generate significant goods vehicle movements with specific trip characteristics. Special generators surveyed include: container and river trade terminals, public cargo handling areas, rail freight and air cargo terminals and sites for open storage of containers and port back-up uses.

2.1.7　Data obtained from goods vehicles entering/leaving special generator sites included: number of vehicles, vehicle type; weight (laden and unladen), trip origin or destination (as appropriate) and the landuse types at trip ends, trip purpose, load factor, number of delivery workers and tolled roads used.
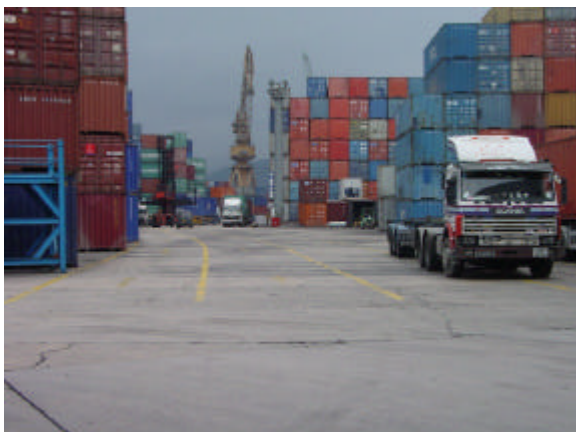
Tuen Mun River Trade Terminal

Goods Vehicle Trip Generation Rate Survey

2.1.8   Trip generation rates for various time periods on a typical day were collected for goods vehicles generated by different landuse or employment categories, such as: household, school, manufacturing, wholesale & retail / import & export, transportation, storage and communication, construction etc. Data were prepared for goods vehicle movements in different broad areas in Hong Kong: Hong Kong Island, Kowloon, Tseung Kwan O, Tsuen Wan and Kwai Tsing, Lantau Island, Northwest New Territories, Northeast New Territories.

Goods Vehicle Traffic Composition Survey

2.1.9   Traffic flows used in this Project were based on the data documented in the Annual Traffic Census 2002. As the traffic flows for goods vehicles are classified under two categories (light goods vehicle and medium/ heavy goods vehicle) in the Annual Traffic Census 2002, further classified traffic counts were required to disaggregate the goods vehicle flows in the Annual Traffic Census 2002 from 2 categories to 5 categories adopted in this project.

2.2   Data Derived from Other Sources

2003 Last Quarter Landuse Data

2.2.1   Landuse data for the last quarter of 2003 were compiled based on 2002 landuse data provided by Planning Department. The landuse data include: population, households, school places and employment places.

Cross-Boundary Goods Vehicle Traffic Movements

2.2.2   Classified hourly traffic count data collected in 2003 at the three cross-boundary control points: Man Kam To, Sha Tau Kok and Lok Ma Chau were obtained from Transport Department.

2.3   Survey Design

Goods Vehicle Owner and Driver Interview Survey

2.3.1   A stratified sampling approach was adopted to collect information cost effectively. The sampling frame was based on the 113,000 licensing record of goods vehicles as at end-2002.

2.3.2   A 4.3% (about 4,800 goods vehicles) gross sample was set, based on the assumption of a 60% completion rate to give a 2.3% (about 2,600 vehicles) successful sample rate overall. **Figure 2.1** shows the number of goods vehicle owners surveyed by fleet size. In addition, 85 Government goods vehicles were sampled.

Figure 2.1 : Number of Goods Vehicle Owners Surveyed by Fleet Size

Fleet Size: 11-25
151 owners
(10%)

Fleet Size: 4-10
186 owners
(12%)

Fleet Size: 26+
75 owners
(5%)

Fleet Size: 2-3
216 owners
(14%)

Single Fleet
904 owners
(59%)
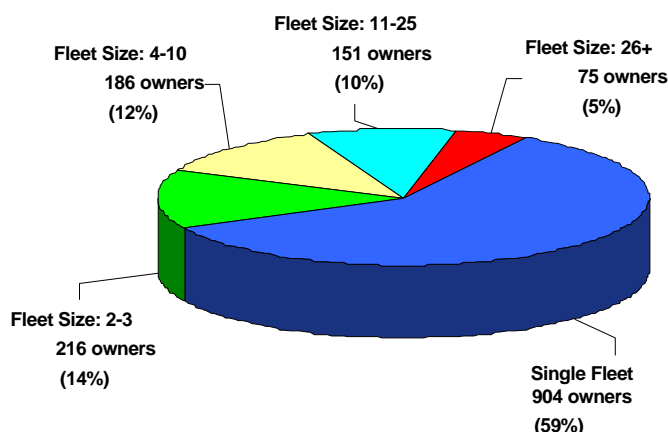
2.3.3 Questionnaires to collect the information outlined in Section 2.1 were designed to be easy to understand and complete, so as to improve data quality and minimise under-reporting. Questionnaires were tested in pilot surveys and modified to incorporate feedbacks from survey field staff, interviewees and the project team. Data analysis of initial responses were checked and questionnaires revised as necessary. The questionnaires for goods vehicle owner and driver are shown in **Appendix A1** and **Appendix A2** respectively.

Special Generator Survey

2.3.4 Three kinds of surveys were conducted to collect data and information for the subsequent derivation of trip ends and trip matrices of various types of goods vehicles at special generators. The surveys were:

- Basic data related to the landuse of the special generator sites.

- Interview surveys with goods vehicle drivers for collecting data and information on the trip characteristics of goods vehicle traffic entering and leaving the special generator sites.

- Traffic count surveys at the special generator sites for collecting data to expand the data and information gathered in the interview surveys.

2.3.5 Surveys were conducted at each selected special generator site during their operating hours for at least two consecutive days in the last quarter of 2003. In general, a minimum sample rate of 50% of goods vehicle drivers arriving or departing these sites was interviewed.

2.3.6 A simple interview form as shown in **Appendix A3** was designed such that all necessary information could be obtained within a very short time to minimise the extent of possible disruption to the traffic flow or businesses at these special generator sites.

2.3.7 **Figure 2.2** shows the location of the special generator sites surveyed.

Kwai Chung Container Terminal

Figure 2.2 : Geographical Distribution of Special Generator Sites
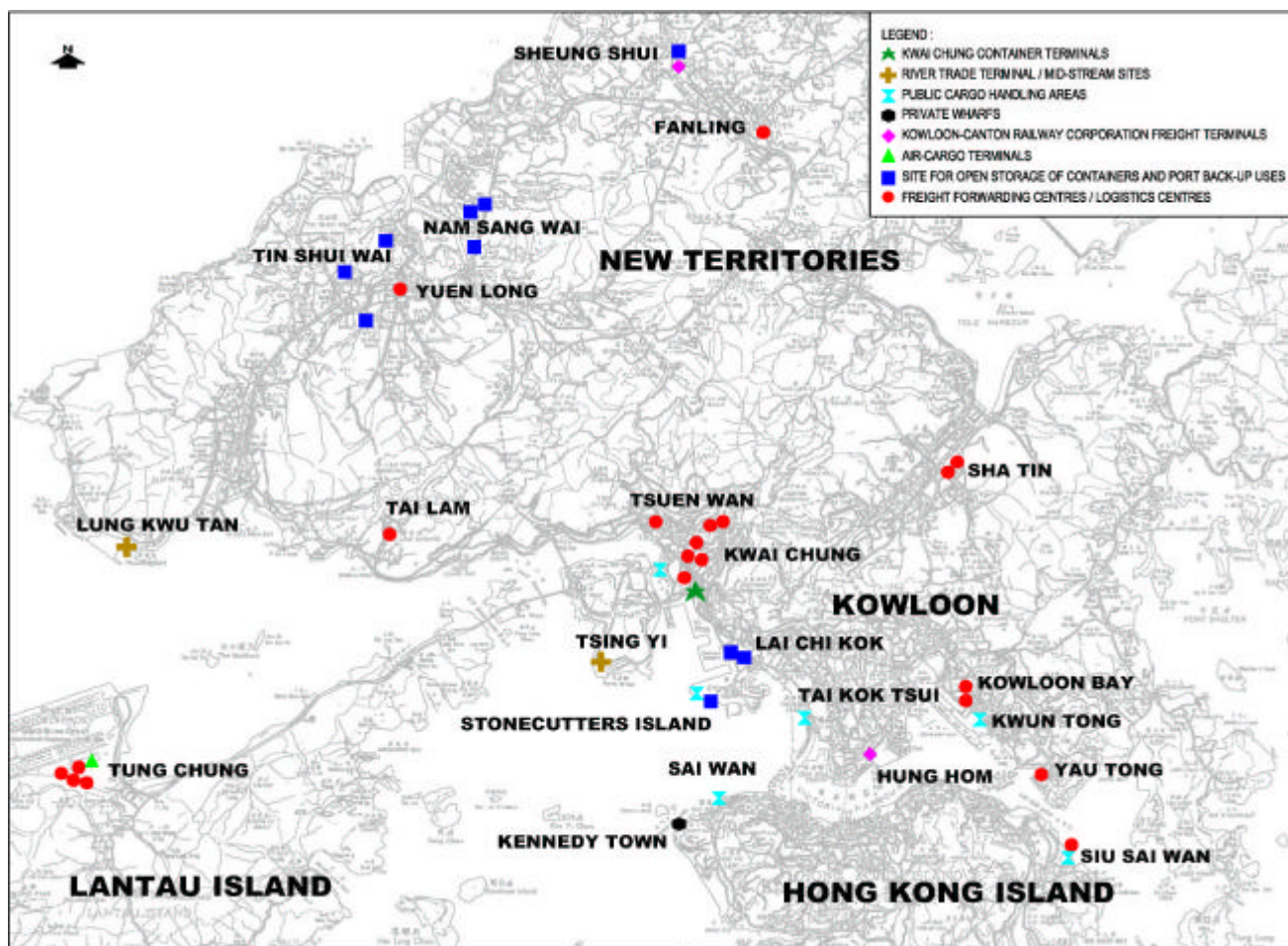
Goods Vehicle Trip Generation Rate Survey

2.3.8   Based on the landuse data supplied by the Planning Department, 199 sites categorised by landuse and broad district were selected for survey.   Landuse types adopted in the survey were: residential, school and employment categories. Broad districts adopted in the survey were: Hong Kong Island, Kowloon, Tseung Kwan O, Tsuen Wan and Kwai Tsing, Lantau Island, North West New Territories and North East New Territories.

2.3.9   The survey forms were designed to cater for single landuse sites to record both on-street and off-street trips relating to the concerned site and multiple landuse sites. For each multiple landuse site, the goods vehicle trips recorded were allocated to the

various landuses comprising the site to avoid double counting.

Trip Generation Survey at Construction Site

Goods Vehicle Traffic Composition Survey

2.3.10 To disaggregate the goods vehicle flow data in the Annual Traffic Census 2002 from 2 categories to 5 categories, traffic data were collected at various counting stations forming cordons or screenlines. A total of 52 traffic counting stations were selected for the survey. This represents over half of the total number of traffic counting stations forming the cordons or screenlines in the Annual Traffic Census 2002. At each selected station, classified goods vehicle count surveys were undertaken on a typical weekday between 7:00 am and 9:00 pm. The directions and vehicle types of traffic flows were recorded at 15-minute intervals. Survey results were then compared with the corresponding or latest available data from the Annual Traffic Census 2002 to identify any problematic results so that appropriate follow-up actions could be taken.

Traffic Count Survey

2.4   Survey Fieldwork

2.4.1 Survey fieldwork for this Project was undertaken during the period between 8 September and 21 November 2003.

Goods Vehicle Owner and Driver Interview Survey

2.4.2 The following procedures were followed in undertaking the interview surveys of goods vehicle owners and drivers:

- Preparation of guidelines and manual for the interviewers to complete the interview surveys.

- Regular training, briefing and debriefing sessions for the interviewers/ enumerators before and after surveys.

- Verification visits by supervisors to check the quality of fieldwork operation.

- Continual coaching of interviewers/ enumerators from observation by supervisors.

- Random checking of 1% of the completed questionnaires.

- Quality checks were undertaken by a team of independent checkers on 15% of the interviews/counts, selected on a random basis, to counter-check the accuracy and quality of data collected.

- Questionnaires were coded and input into the computer using double data entry system, i.e. all data were key punched twice into the computer by two separate staff.

2.4.3 The target sampling rate for the survey was 2% of all licensed goods vehicles. Overall, target sampling rate for all goods vehicle types had been achieved.

2.4.4 As shown in **Table 2.2**, a total of 2,260 owners were approached for interview, covering 4,749 vehicles. Achieving a 68% successful rate, 1,532 goods vehicle owners and 2,985 drivers were interviewed. Information on the trip characteristics of 2.6% of the total licensed fleet of 113,000 goods vehicles was collected. For Government goods vehicles, a sampling fraction of 5.1% was adopted over a total fleet size of 1,660 vehicles.

Table 2.2 : Number of Surveyed Goods Vehicle Owners by Fleet Size

Fleet Size	1	2-3	4-10	11-25	26+	Over-all
No. of Owners Sampled	1,400	300	260	200	100	**2,260**
No. of Owners Surveyed	904	216	186	151	75	**1,532**
Response Rate	**65%**	**72%**	**72%**	**76%**	**75%**	**68%**
No. of Vehicles Sampled	1,400	683	710	912	1,044	**4,749**
No. of Vehicles Surveyed	874	428	429	564	690	**2,985**
Response Rate	**62%**	**63%**	**60%**	**62%**	**66%**	**63%**

2.4.5   A response rate of 63% was achieved for driver interview survey. With the stratified sampling method, the achieved surveyed samples of goods vehicles were about 2.6% of the number of goods vehicles as shown in **Table 2.3**.

Table 2.3 : Number of Goods Vehicles Surveyed

Vehicle Type	Goods Van	Light Goods Vehicle	Medium Goods Vehicle	Heavy Goods Vehicle	Container Vehicle	Overall
No. of Licensed Vehicles	39,000	30,100	27,500	3,300	13,400	**113,300**
No. of Vehicles Surveyed	378	946	747	124	790	**2,985**
Achieved Rate						**2.6%**

Air Cargo Terminal at Chek Lap Kok

Special Generator Survey

2.4.6   At special generators, a total of 45 sites were surveyed. This resulted in 7,988 driver interviews. Data from these interviews could be expanded using the traffic counts conducted in tandem with the interviews. **Table 2.4** shows the number of special generator sites surveyed.

Table 2.4 : Number of Sites Surveyed at Special Generators

Special Generator Sites	Sample Frame	No. of Surveyed Sites
Kwai Chung Container Terminals	8	3
River Trade Terminal/ Mid-stream sites	13	2
Public Cargo Handling Areas	8	6
Private Wharfs	1	1
KCRC Freight Terminals	6	2
Hong Kong Air-Cargo Terminals	2	1
Freight forwarding/ logistics centres	630	20
Open storage of containers and port back-up uses	400	10
Total	**-**	**45**

Goods Vehicle Trip Generation Rate Survey

2.4.7   A total of 199 sites were successfully surveyed to obtain data on goods vehicle trip generation rates by landuse, vehicle type and time of day.

Goods Vehicle Traffic Composition Survey

2.4.8   About half of the number of the traffic counting stations forming the cordons or screenlines in the Annual Traffic Census 2002, equivalent to around 52 traffic counting stations including the 3 cross-harbour tunnels, had been selected for the survey.

2.4.9 At each selected survey station, classified goods vehicle counts (see Table 2.1 for classifications) were conducted on a normal weekday over a 14-hour period (7:00 am to 9:00 pm). Traffic flow data of each goods vehicle type by direction were recorded at 15-minute intervals.

2.5 Data Processing and Expansion

2.5.1 Data processing began with comprehensive data checks. Typically these comprised three steps:

- Data were manually checked.

- Data were checked by computer to identify any illogical or other errors not readily identifiable manually.

- A proportion of processed records were randomly selected and double checked against the original survey forms.

2.5.2 Most of the data collected represent partial sampling, such as a proportion of goods vehicles surveyed, or a proportion of container terminals surveyed. It was therefore necessary to weigh and expand these survey data for them to be representative of the full data of goods vehicle movements in Hong Kong. The expansion of the survey data collected was based on independent traffic data.

2.5.3 The data obtained from goods vehicle interview surveys were expanded to take account into the proportions of goods vehicles surveyed and the non-responses of goods vehicle owners and drivers approached for interview.

2.5.4 For trip characteristics of landfill sites and barging points, complete data were obtained directly from relevant Government departments and did not require data expansion. Data on open storage of containers and port back-up uses were expanded based on a control total and by site area. The data for private wharfs did not require data expansion because full data were available. For other special generators,

data expansion was based on control counts and tonnage output of the various sites and landuses.

2.5.5 From the expanded daily goods vehicle trips from the interview survey and special generators / cross-boundary trips. It is noted that trips generated by the special generators and cross-boundary constitute only a small proportion (about 10%) of the total trips and the majority of goods vehicle trips were generated by other landuse developments.

2.5.6 Goods vehicle trip generation rates obtained from the surveys were generally in the form of number of trips per unit floor area and were thus expanded based on gross floor area of the concerned sites. By applying these rates to 2003 landuse data, trip ends were derived. The trip rates were weighted by landuse data and classified into Urban (including Tsuen Wan and Kwai Tsing) and New Territories.

Data Processing

3   SURVEY RESULTS AND DATA ANALYSIS

3.1   General Overview

3.1.1   This section presents the results of the survey work undertaken for the Project and subsequent analysis of the data collected.

3.1.2   In this section, the results relating to the following are presented:

- Goods Vehicle Owner and Driver Interview Survey

- Special Generator Survey

- Goods Vehicle Trip Generation Rate Survey

- Goods Vehicle Traffic Composition Survey

- Cross-boundary Goods Vehicle Traffic Movements

3.2   Interview Survey Results

Goods Vehicle Owner Interview Survey

3.2.1   Goods vehicle annual operating costs were obtained from owners of different goods vehicle types. These costs took into account factors such as vehicle capital costs, staff salaries, vehicle maintenance, insurance, licence and fuel expenses.

3.2.2   **Figure 3.1** summarises the average annual vehicle operating costs by vehicle types.   As expected, the operating costs increases with the size of vehicle. The operating cost of container vehicles was the highest amongst all types of goods vehicles.

Figure 3.1 : Average Annual Operating Cost of Goods Vehicles

$ 000's (2003 prices)
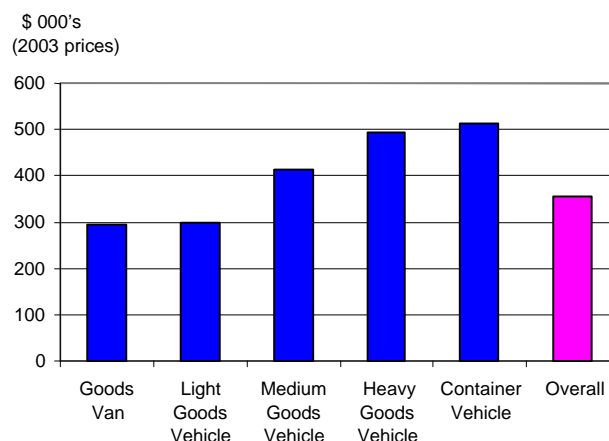
3.2.3   The overall proportion of different cost items/expenses spent by goods vehicle owners annually are shown in **Table 3.1**. It can be seen that the major cost item was on salary, which constituted over 60% of the annual cost.

Table 3.1 : Proportion of Operating Cost Item of Goods Vehicles

Annual Cost Item	Goods Van	Light Goods Vehicle	Medium Goods Vehicle	Heavy Goods Vehicle	Container Vehicle
Tyre Replacement	1%	1%	1%	1%	1%
Licence Fee	2%	1%	1%	1%	1%
Insurance Cost	2%	2%	3%	3%	2%
Maintenance Cost	3%	3%	5%	6%	5%
Parking Cost	5%	6%	5%	4%	4%
Fuel Consumption	11%	13%	20%	23%	26%
Salary Cost	76%	74%	65%	62%	61%
Total	**100%**	**100%**	**100%**	**100%**	**100%**

3.2.4   On average, owners would spend around $3,500 annually for tyre replacement. Annual licence and insurance costs are about $9,000 for goods van and light goods vehicle and around $14,000 to $18,000 for all other goods vehicles. Average annual maintenance costs are typically under $15,000 while average parking costs are around $1,500 per month. The majority of owners (58%) would spend less than $1,000 per week on fuel consumption.

3.2.5 **Figure 3.2** summarises the employment category of goods vehicle owners. About half of owners were engaged in the transportation, storage and telecommunications sector, 15% in construction, 14% in wholesale & retail / import & export, and 8% in manufacturing. Over 90% of goods vehicle owners employed full-time drivers and about one-quarter of them employed delivery staff.

Figure 3.2 : Employment Category of Goods Vehicle Owners
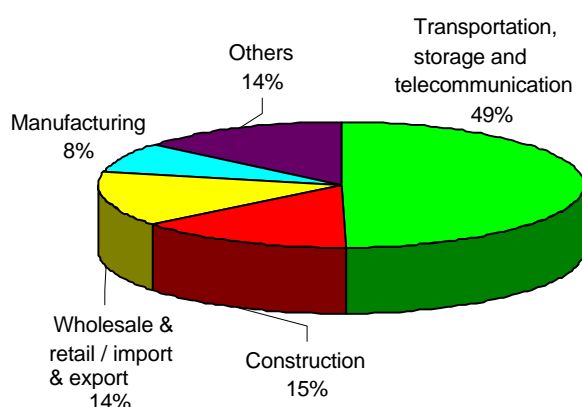
3.2.6 As shown in **Figure 3.3**, most goods vehicles (90%) were parked within the territory and the remaining 10% parked in the Mainland. Amongst the goods vehicles that were parked in Hong Kong, the vast majority (93%) were parked off-street, among which some 60% were parked in permanent facilities.

Figure 3.3 : Overnight Parking Locations
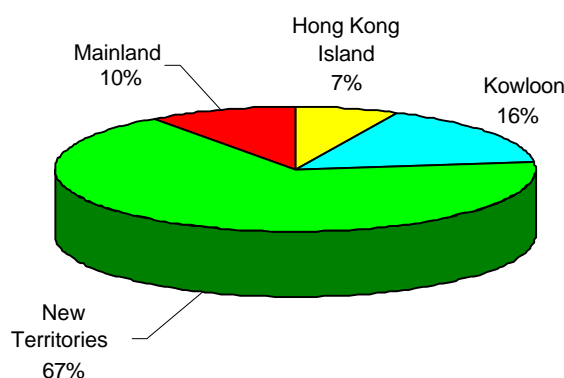
3.2.7 The average numbers of working hours and working days of drivers and delivery staff are listed in **Figures 3.4 and 3.5** respectively. They show that on average, goods vehicle drivers worked 22 to 24 days a month and 8 to 12 hours per day, depending on the goods vehicle types. The survey results indicated that the number of working hours per day tends to increase with the vehicle size.

Figure 3.4 : Average Number of Working Days of Goods Vehicle Drivers
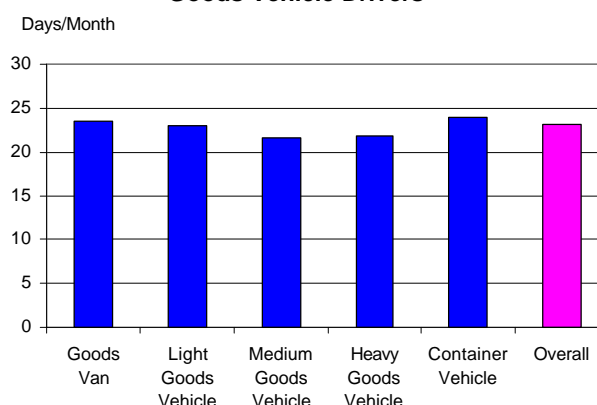
Figure 3.5 : Average Number of Working Hours of Goods Vehicle Drivers
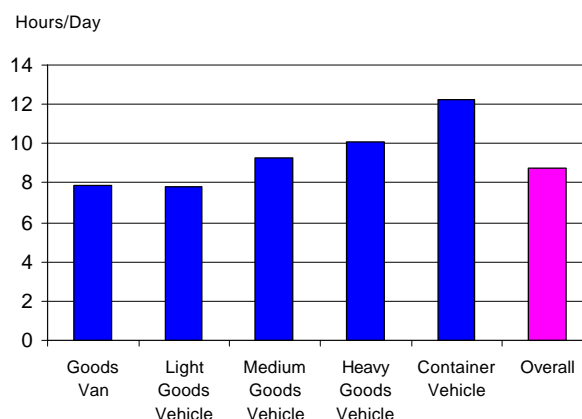
Goods Vehicle Driver Interview Survey

3.2.8 Analysis of trip origins showed that 19% of goods vehicle trips were originated from Kwai Tsing. As shown in **Figure 3.6**, the next most common origins were Yuen Long (10%) and North District (9%).

Figure 3.6 : Distribution of Departing Goods Vehicle Trips by District

Proportion of Total Goods
   Vehicle Trips
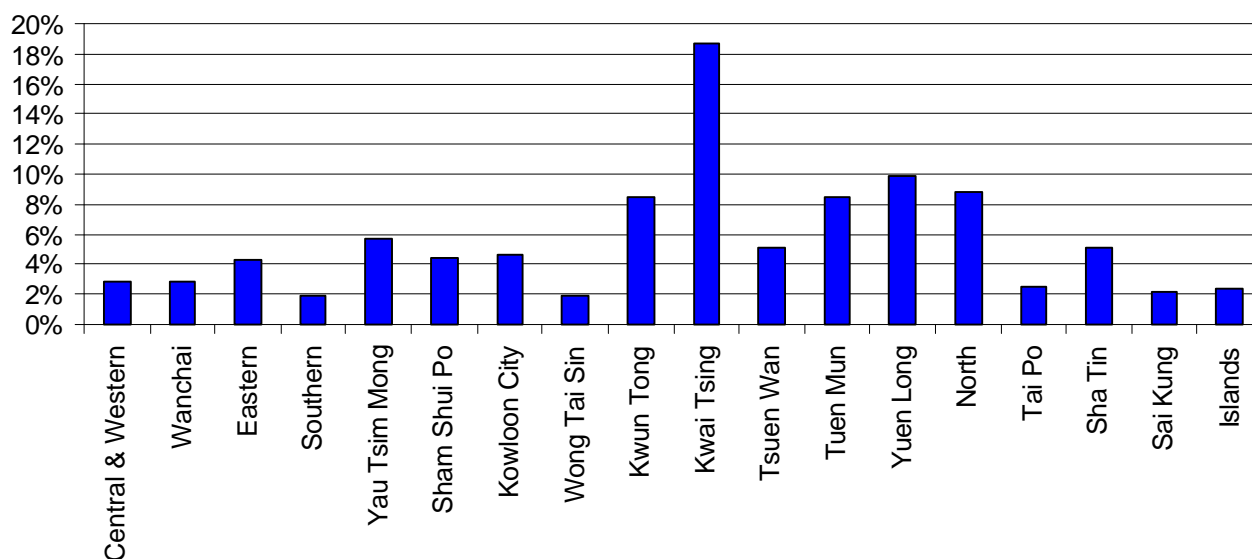
3.2.9   As shown in **Figure 3.7**, on average, goods vehicles made 7.4 trips per weekday, although this figure varies for different goods vehicle types. Goods vans, light goods vehicles and heavy goods vehicle made 7.7 to 7.9 trips per weekday.   Medium goods vehicles made 6.7 trips and container vehicles made 6.4 trips per weekday.

Figure 3.7 : Average Number of Trips per Vehicle per Weekday

No. of Daily
Trips / Vehicle
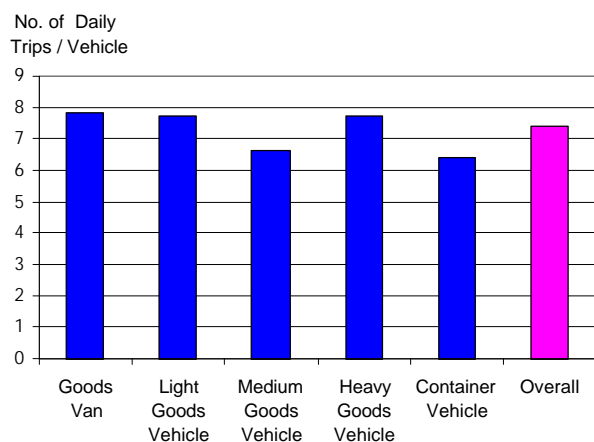
3.2.10 **Table 3.2** shows the annual average daily distance travelled by different goods vehicle types, ranging from 83 to 109 km per day.   On average, the daily distances travelled increased generally according to vehicle size. It should be noted that the daily distance travelled for all the goods vehicles shown in the table are confined to distance travelled within the territory. A significant proportion of container vehicles trips (24%) involved cross-boundary movements.

Table 3.2 : Annual Average Daily Distance Travelled per Vehicle

Vehicle Type	Goods Van	Light Goods Vehicle	Medium Goods Vehicle	Heavy Goods Vehicle	Cont-ainer Vehicle	Over-all
Distance (km/day)	83	82	89	109	101	**87**

3.2.11 Refer to **Table 3.3**, between 40% and 50% of trips were made by empty goods vehicles (defined as under 10% of carrying capacity utilised). Heavy goods vehicles and container vehicles surveyed were found to have a higher proportion (38% and 32% respectively) of full loading, as they are less likely to undertake multi-stops servicing activities.

Table 3.3 : Goods Vehicle Loading Conditions

Loading Conditions	Goods Van	Light Goods Vehicle	Medium Goods Vehicle	Heavy Goods Vehicle	Container Vehicle
Empty (<10%)	46%	43%	43%	50%	52%
Partly loaded (10-40%)	26%	26%	18%	6%	2%
Partly loaded (41-80%)	20%	20%	19%	6%	14%
Full (>80%)	8%	11%	20%	38%	32%

3.2.12 **Figure 3.8** shows the departure and arrival times for trips surveyed respectively. Survey results show that majority (90%) of goods vehicle trips were made during the period of 7:00 am - 7:00 pm, with the peak hour being 10:00 am - 11:00 am.

3.2.13 Most drivers (83%) reported that they did not use tolled roads in their trips. For those who reported using tolled roads, the Cross-harbour Tunnel was the most commonly used one (25%). This is in line with observed traffic flow data.

3.2.14 **Figure 3.9** illustrates the distribution of goods vehicle trips by vehicle type.

Figure 3.9 : Distribution of Goods Vehicle Trips on a Weekday by Vehicle Type

Heavy Goods Vehicle 26,000 (3%)

Container Vehicle 85,000 (10%)

Goods Van 304,000 (37%)

Medium Goods Vehicle 183,000 (22%)

Light Goods Vehicle 235,000 (28%)
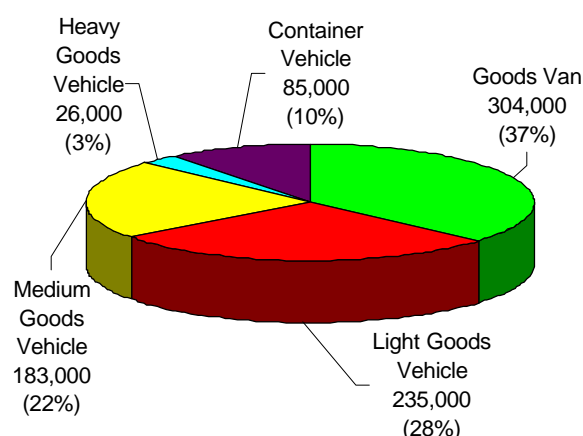
Figure 3.8 : Hourly Distribution of Goods Vehicle Trips

Proportion of Total

Hour of the Day

■ Departure Time (Hour Beginning)   □ Arrival Time (Hour Beginning)
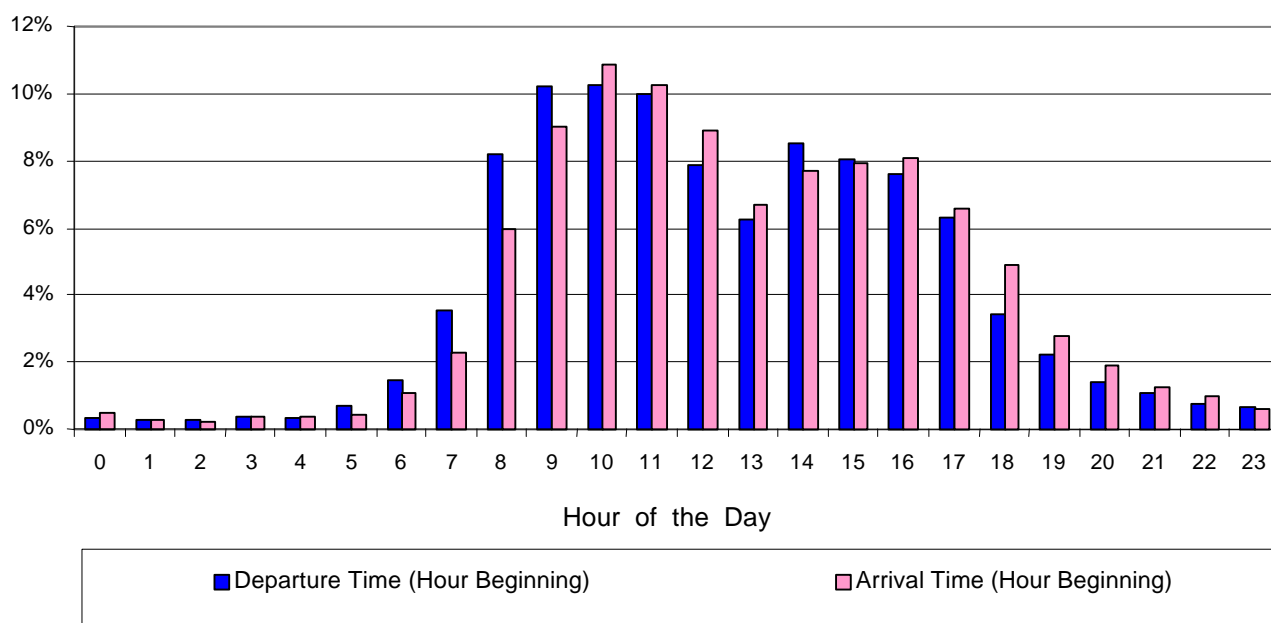
3.3   Other Survey Results

Special Generator Survey

3.3.1   Over 86% of trips surveyed at special generators were deployed for delivering or picking up goods. As with the driver interview surveys, Kwai Tsing was the most popular origin or destination for trips to or from special generator sites.

3.3.2   Excluding tractor units without trailers, around half of these trips (48%) were made by empty goods vehicles (defined as under 10% of carrying capacity utilised). Heavy goods vehicles and container vehicles had higher proportion of full loading (32% and 31% respectively).

3.3.3   A summary of the daily goods vehicle movements to/from special generators (including boundary control points) are shown in **Table 3.4**.

Table 3.4 : Average Weekday Goods Vehicle Movements at Special Generators

Special Generator	2-way Goods Vehicle Movements (Vehicle/Day)
Private Wharfs	300
KCRC Freight Terminals	1,300
River Trade Terminal/ Mid-stream sites	7,200
Public Cargo Handling Areas	10,600
Landfill Sites/ Barging Points	12,000
Air-Cargo Terminals	13,000
Kwai Chung Container Terminals	25,100
Cross-boundary Control Points	31,200
Total	**100,700**

Goods Vehicle Movements at Landfill Sites and Barging Points

3.3.4   Vehicular movements at landfill sites and barging points for the last quarter of 2003 were supplied by Civil Engineering Department and Environmental Protection Department. Analysis of weekly profile data suggested that the pattern was quite consistent over different days of the week. **Table 3.5** summarises the total daily goods vehicle movements by vehicle type.

Table 3.5 : Average Weekday Goods Vehicle Movements at Landfill Sites and Barging Points

Vehicle Type	2-way Goods Vehicle Movements (Vehicle/Day)	
	Landfill Sites	Barging Points
Goods Van	10	0
Light Goods Vehicle	0	30
Medium Goods Vehicle	3,540	4,440
Heavy Goods Vehicle	50	250
Container Vehicle	3,680	0
Total	**7,280**	**4,720**

Goods Vehicle Movements at Cross-Boundary Control Point

3.3.5   Classified traffic count data at the three cross-boundary control points: Man Kam To, Sha Tau Kok and Lok Ma Chau were obtained from Transport Department. **Table 3.6** summarises the average weekday goods vehicle movements by cross-boundary control point. Container vehicles constitute some 46% of the total cross-boundary goods vehicle movements of approximately 31,200 trips per day. Compared with the average number of weekday goods vehicle trips in Hong Kong (833,000), the cross-boundary trips constitute only a relatively small percentage of under 4%.

Table 3.6 : Average Weekday Goods Vehicle Movements at Cross-boundary Control Points

Cross-boundary Control Point	Traffic Movements (vehicle/day)						
	Goods Vehicles (except container vehicles)		Container Vehicles		Total Goods Vehicles		
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	2-way
Man Kam To	2,200	2,400	1,400	1,500	3,600	3,900	7,500
Sha Tau Kok	700	800	200	300	900	1,100	2,000
Lok Ma Chau	5,300	5,300	5,500	5,600	10,800	10,900	21,700
Total	**8,200**	**8,500**	**7,100**	**7,400**	**15,300**	**15,900**	**31,200**

Goods Vehicle Trip Generation Rate Survey

3.3.6 Data were assembled relating good vehicle trip generations and attractions to different landuses by time of day and goods vehicle type. Examples of the trip generation rates are shown in **Table 3.7**.

Cross-boundary Goods Vehicles

Table 3.7 : Examples of Daily Trip Generation Rates

Employment Category	Urban (including Tsuen Wan and Kwai Tsing)		New Territories	
	Generation Rate*	Attraction Rate*	Generation Rate*	Attraction Rate*
Public Administration (goods vehicle trip / worker)	0.024	0.025	0.063	0.063
Restaurants & Hotels (goods vehicle trip / worker)	0.026	0.025	0.074	0.075
Community, Social & Personal Services (goods vehicle trip / worker)	0.073	0.070	0.243	0.234
Construction (goods vehicle trip / worker)	0.162	0.155	0.139	0.106
Transportation, Storage & Communication (goods vehicle trip / worker)	0.382	0.371	0.667	0.722
Wholesale & Retail / Import & Export (goods vehicle trip / worker)	0.430	0.414	0.532	0.597

Notes: *Generation/attraction rate is the average number of goods vehicle trips generated/attracted by each worker. It should be noted that the above trip rates can vary significantly for different sites.

3.4   Data Analysis

3.4.1 A key objective of the surveys and associated data processing was to derive goods vehicle trip matrices to enable the enhancement of the CTS-3 model as regards the simulation of goods vehicle movements.

3.4.2 Goods vehicle movement matrices were derived for the following time periods on an average weekday in 2003 :

- Daily   – a consecutive period of 24 hours

- AM peak hour – 8:00 am - 9:00 am

- Inter-peak hour – an hourly interval which is the average of the period between 9:00 am - 6:00 pm

- PM peak hour – 6:00 pm - 7:00 pm

- Off-peak hour – an hourly interval which is the average of the period between 7:00 pm - 8:00 am of the following day.

3.4.3 The estimated goods vehicle daily trip movements on an average weekday by geographical area are summarised in **Table 3.8** below.

3.4.4 Referring to **Table 3.8**, it can be seen that goods vehicle movements are dominated by trips within the same geographical area, i.e. within Hong Kong; within Kowloon and within New Territories. Of the total of 107,100 trips generated from Hong Kong Island, 72% were within Hong Kong Island, only some 28% (29,600 trips) crossed the harbour with destinations in Kowloon, New Territories or cross-boundary. In the reverse direction, the pattern was very similar. For Kowloon, of the total 296,100 goods vehicles generated, 62% were within Kowloon, 5% destined in Hong Kong Island and 33% destined in the New Territories or crossed the boundary. A similar pattern for the reverse direction was observed. For the New Territories, of the 414,900 goods vehicle trips generated, 75% were within the New Territories, with 4% going to Hong Kong Island, 19% in Kowloon and 2% crossed the boundary. Again, similar pattern for goods vehicle movement in the reverse direction was observed.

Table 3.8 : Estimated 2003 Goods Vehicle Daily Trip Movements

To / From	Hong Kong Island	Kowloon	New Territories	Cross-boundary Control Points	Total
Hong Kong Island	77,500	14,400	14,400	800	**107,100**
Kowloon	13,500	184,400	94,000	4,200	**296,100**
New Territories	15,000	79,800	309,200	10,900	**414,900**
Cross-boundary Control Points	900	3,600	10,800	N/A	**15,300**
Total	**106,900**	**282,200**	**428,400**	**15,900**	**833,400**

4   CHANGES IN GOODS VEHICLE MOVEMENT CHARACTERISTICS OVER TIME

4.1   Introduction

4.1.1 Based on the data collected through the various surveys and the subsequent analysis of these data, an up-to-date picture of the goods vehicle movement characteristics had been established.

4.1.2 To make the best use of the data collected and the information acquired, an understanding of the key background, changes and analysis of these changes against which the goods vehicle movements were measured would be useful. For this purpose, the 1991 Freight Transport Study (FTS) provided the useful reference.

4.2   Key Changes

4.2.1 Since the completion of the FTS in 1994, the territory had undergone many changes that affected goods vehicle movements. Over the past decade, population had increased by more than one million with pronounced population increase in new towns. The relocation of the airport and the associated air cargo terminals to

Chek Lap Kok had significantly affected the pattern of goods vehicle movements. With the completion of new highway infrastructures, such as Western Harbour Crossing, Route 3 etc., route choice had also been affected. The shift of manufacturing base to the Mainland and the changes to the cross-boundary control arrangements over time and changes in the economic situation over the last decade likewise affected goods vehicle movements.

4.3   Comparison of Key Findings

4.3.1 **Table 4.1** compares the operating cost characteristics collected in the FTS and GVTCS 2003.

4.3.2 Between 1991 and 2003, the usage level of all goods vehicle types had increased, both in terms of number of hours used per day and number of working days per month. For both characteristics, container vehicle recorded the highest growth with a 31% increase in the number of hours used per working day, and a 9% increase in the number of working days used per year.

Table 4.1 : Operating Characteristics of Goods Vehicles in 1991 and 2003

Key Characteristics	Year	Goods Van	Light Goods Vehicle	Medium Goods Vehicle	Heavy Goods Vehicle	Container Vehicle
No. of Working Days per Year	1991	274	273	266 [1]		264
	2003	282	276	260	262	288
	Change	**3%**	**1%**	**-2%**		**9%**
No. of Hours Used per Working Day	1991	7.4	7.3	7.7 [1]		9.3
	2003	7.9	7.8	9.3	10.1	12.2
	Change	**7%**	**7%**	**21%**		**31%**
Annual Average Daily Distance Travelled (km/day) [2]	1991	73	72	70 [1]		84
	2003	83	82	89	109	101
	Change	**14%**	**14%**	**31%**		**20%**
Cost per Km Travelled (2003 prices) [3]	1991	$9.0	$10.0	$15.3 [1]		$14.9
	2003	$9.8	$10.0	$12.8	$12.5	$13.8
	Change	**9%**	**0%**	**-17%**		**-7%**

Notes: (1) Amalgamation of the 2 goods vehicle classes was required due to different grouping of data in FTS.
    (2) Estimated from FTS, GVCTS 2003 and the Annual Traffic Census.
    (3) 1991 cost adjusted to 2003 prices based on Composite Consumer Price Index growth (+40.6%) between 1991 and 2003.

4.3.3 There had also been a considerable increase in daily distance travelled for all goods vehicle types. Both goods van and light goods vehicle recorded a 14% growth rate while the corresponding figure for container vehicle is 20%. While direct comparison between the FTS and GVTCS on this parameter for medium goods vehicle and heavy goods vehicle cannot be undertaken because the FTS had adopted a different definition of these vehicles. The weighted average daily distance travelled for these 2 types of goods vehicles combined can nevertheless be done and show that there had been a 31% increase.

4.3.4 For similar reasons, the cost per unit distance travelled can only be compared by the 4 goods vehicle types. The comparison results showed that, between 1991 and 2003, cost per unit distance travelled had slightly increased for goods van, remained constant for light goods vehicle and decreased for medium goods vehicle, heavy goods vehicle and container vehicle, ranging from 7 to 17%. For goods van, the rate of increase of total operating costs, of which 77% were due to salary had out-paced the rate of increase in total distance travelled. For the larger vehicles, the proportion of salary costs over the total operating costs is lower, ranging between 61% for container vehicles and heavy goods vehicles to 66% for medium goods vehicles. As such, the rate of increase of total operating costs for these vehicles was lower than that of the rate of increase in daily distance travelled, resulting in lower cost per unit distance travelled.

4.3.5 **Table 4.2** sets out the comparison of key characteristics including those for fleet size, operators, utilisation of goods vehicles and overnight parking.

4.3.6 The proportion of goods van and light goods vehicle in the total goods vehicle fleet had decreased from 76% in 1991 to 61% in 2003. The total fleet size of goods vehicle had also decreased by 9% from 121,000 to 113,000. The proportion of single-vehicle goods vehicle fleet had decreased from 49% in 1991 to 39% in 2003, indicating that there had been an increase in operators owning larger fleet of goods vehicles.

Table 4.2 : Comparison of Key Goods Vehicle Movement Characteristics in 1991 and 2003

Key Parameters	1991	2003
Goods Vehicle Fleet Characteristics		
No. of Licensed Goods Vehicle	121,000	113,000
Goods Van + Light Goods Vehicle	76%	61%
Proportion of Goods Vehicle Owned by Single Fleet Owners	49%	39%
Operations Characteristics		
Main Usage of Goods Vehicle: Transport Own Goods Providing Transport Services Hiring Out	53% 27% 8%	47% 40% 6%
Average Operating Costs per km travelled (2003 prices)	$10.8	$11.1
Vehicle Utilization Characteristics		
Average Working Days per Year	271 days	275 days
Average Working Hours per Working Day	7.5hrs	8.8hrs
Annual Average Daily Distance Travelled	75 km	87 km
Total No. of Goods Vehicle Trips per Weekday	691,000	833,000
Average No. of Trips per Weekday per Goods Vehicle	5.7	7.4
Distribution of Trips by Time of Day: 0700-1900 2200-0400	92% 1%	90% 3%
Distribution of Trip Ends by Main Locations: Hong Kong Island Kowloon Tsuen Wan and Kwai Tsing Remaining New Territories Boundary Control Points	18% 38% 18% 25% 1%	13% 35% 14% 36% 2%
Overnight Parking Characteristics		
Overnight Parking Location in Hong Kong: Hong Kong Island Kowloon New Territories	10% 29% 61%	8% 18% 74%

4.3.7   The average working days per year had increased from 271 days in 1991 to 275 in 2003 while the average working hours per working day had increased from 7.5 hours in 1991 to 8.8 hours in 2003.

4.3.8   The annual average daily distance travelled had increased from 75 km to 87 km. This may reflect the greater dispersion of new development areas in Hong Kong. The total number of goods vehicle trips per weekday had also increased, from 691,000 to 833,000. As a result, the average number of trips per weekday per goods vehicle had increased from 5.7 trips to 7.4 trips.

4.3.9   Geographically, there had been some changes, with more trips going to/from New Territories (36%) and boundary-control points (2%) while there were proportionately less trips within the urban areas (62%).

4.3.10 A higher proportion of goods vehicles were parked overnight in the New Territories in 2003 (74%) as compared with 1991 (61%).

5   WAY FORWARD

5.1   Applications of Data for Model Enhancement

5.1.1 One of the key objectives of the Project is to collect up-to-date trip characteristics data and information of goods vehicles in Hong Kong for enhancing the CTS-3 model. The database of goods vehicle trip characteristics developed in this Project can be used for restructuring, enhancing and re-calibrating the goods vehicle model of the CTS-3 model. As the proportion of goods vehicles is usually high (20 to 40%) on major roads, representative/reliable simulation of goods vehicle movements on major roads are important to the accuracy of the total simulated flows on these roads.

5.2   Future Survey Updates

5.2.1 The database compiled for the Project, with suitable analyses and assessments, should enable understanding of the updated key characteristics of goods vehicle movements in the territory. However, to cater for the development and economic changes that may impact on goods vehicle movement, continuous updating of the changes in key parameters affecting the characteristics of goods vehicle movements will be required.

5.2.2 Whilst it might be desirable to update changes in key parameters continually, it would neither be practical nor cost-effective to undertake large-scale data collection exercises too often. Moreover, surveys for some of the related data are already being undertaken at regular intervals, e.g. the Annual Traffic Census, Vehicle Licensing Records, Cross-boundary Surveys etc. Regular review of these readily available data would enable identification of major changes that would greatly affect the characteristics of goods vehicle movements. Also, the updating of the goods vehicle trip characteristics data set should best tie in with the time-scale of the other related major survey exercises such as the General Census and enhancement of the CTS model. Taking the above into consideration, an approach for updating the data set, with a view to striking the best

balance between collecting up-to-date information and managing costs of data collection exercise has thus been formulated.

5.2.3 The optimal updating approach should take into consideration the following key elements:

- Key parameters that will have most impact on goods vehicle movement characteristics.

- Extent of the tendency of key parameters to change over time.

- Availability and applicability of key data that are to be updated.

- Objectives for updating the data set.

5.2.4 Overall, based on the experience gained through the GVTCS 2003, the approach for future updating of the goods vehicle data sets are summarised in **Table 5.1**.

Table 5.1 : Proposed Approach for Conducting Future Survey

Key Objective	General Methodology	Sample Size	Frequency
Operational Characteristics	Interview Survey - Owners	Not less than 2% of all goods vehicle	Once every 10 years
Trip Characteristics	Interview Survey - Drivers	Not less than 2% of all goods vehicle	Once every 10 years
Special Generator Characteristics	Interview and Count Survey - Drivers - Manual count for control total	50% per main category of operator 100% daily count by hours	Once every 10 years except justified on specific case needs
Trip Generation Rates	Manual Count Survey - Major landuse categories	About 200 sites but ensure each major landuse category is adequately addressed	Once every 5 years or in line with enhancement time-scale of CTS model
Goods Vehicle Traffic Composition	Manual Count Survey - Five goods vehicle types	About 50 stations but ensure each cordon/ screenline is adequately addressed	Once every 5 years or in line with enhancement time-scale of CTS model

APPENDICES

A1 Goods Vehicle Owners Questionnaire

A2 Goods Vehicle Drivers Questionnaire

A3 Special Generator Survey Questionnaire

A1 - Owner Questionnaire

Sample Code: _____   E_No. _____

1. Nature of business of your company？

(1) ☐ Agriculture, fishing and mining
(2) ☐ Manufacturing
(3) ☐ Construction
(4) ☐ Transportation, storage and telecommunications
(5) ☐ Hotel, tourism and catering
(6) ☐ Coal mining

(7) ☐ Electrical supply, fuel and water supply
(8) ☐ Wholesale and retail
(9) ☐ Import and export trades
(10) ☐ Banking, insurance, real estate and commercial services
(11) ☐ Public administration, community & personal services
(12) ☐ Government

Others：_____

2. The number of vehicles with license owned (including trailer) under your name or your company ownership? Among the vehicles owned, how many of them travel between Mainland and Hong Kong

	No. of vehicles owned	Traveling between Mainland and HK
(1) Van type goods vehicle :	_____	_____
(2) Light goods vehicle :	_____	_____
(3) Medium goods vehicle (5.5-16 tons) :	_____	_____
(4) Medium goods vehicle (>16-24 tons) :	_____	_____
(5) Heavy goods vehicle :	_____	_____
(6) Tractor :	_____	_____
(7) Trailer :	_____	_____
(8) Other goods vehicle :	_____	_____

3. Number of employees in your company？

(1) ☐ 1 - 2
(2) ☐ 3 - 5
(3) ☐ 6 - 9
(4) ☐ 10 - 19
(5) ☐ 20 - 49

(6) ☐ 50 - 99
(7) ☐ 100 - 199
(8) ☐ 200 - 499
(9) ☐ 500 or above

3a. Number of driver and delivery staff employed for the goods vehicle owned：

(1) Total employed driver   : Full time_____ Part time_____
(2) Total employed delivery staff   : Full time_____ Part time_____

3b. Are you in charge of the above mentioned vehicles？

(a) No ☐
(b) Yes ☐ **Which types of goods vehicle do you drive?**
    (1) ☐ Van type goods vehicle
    (2) ☐ Light goods vehicle
    (3) ☐ Medium goods vehicle (5.5-16 tons)
    (4) ☐ Medium goods vehicle (>16-24 tons)
    (5) ☐ Heavy goods vehicle
    (6) ☐ Tractor
    (7) ☐ Trailer
    (8) ☐ Other goods vehicle

4. What is the main usage of the goods vehicle in your company?

(Read the following options and fill in the percentage of the usage of relevant vehicles in the boxes provided. Please make sure that the total sum of each category should be 100%.)

Major usage	Van type goods vehicle (1)	Light goods vehicle (2)	Medium goods vehicle (5.5-16 tons) (3)	Medium goods vehicle (>16-24 tons) (4)	Heavy goods vehicle (5)	Tractor (6)	Trailer (7)	Other goods vehicle (8)
1 Hiring out	%	%	%	%	%	%	%	%
2 Providing transport services direct to customers	%	%	%	%	%	%	%	%
3 Transportation of goods of you or your company	%	%	%	%	%	%	%	%
4 Transportation of employees of you or your company	%	%	%	%	%	%	%	%
5 Personal transport by you and/ or your family	%	%	%	%	%	%	%	%
6 Others： _____	%	%	%	%	%	%	%	%
7 No specific use at the moment	%	%	%	%	%	%	%	%

5. About the vehicles owned by you or your company, where are the parking locations in Hong Kong while the vehicles are non-operated?

(Read the following options and fill in the percentage of the information about the parking location of the vehicles in the boxes provided. Please make sure that the total sum of parking location under each type of vehicle should be 100%.)

Parking Location			Van type goods vehicle (1)	Light goods vehicle (2)	Medium goods vehicle (5.5-16 tons) (3)	Medium goods vehicle (>16-24 tons) (4)	Heavy goods vehicle (5)	Tractor (6)	Trailer (7)	Other goods vehicle (8)
Off-street	**a)** Off-street private owned		%	%	%	%	%	%	%	%
	Rented	**b)** Off-street rented (permanent)	%	%	%	%	%	%	%	%
		c) Off-street rented (temporary)	%	%	%	%	%	%	%	%
	d) Off-street free of charge		%	%	%	%	%	%	%	%
Street	**e)** Street marked with meter		%	%	%	%	%	%	%	%
	f) Street marked without meter		%	%	%	%	%	%	%	%
	g) Street without marking		%	%	%	%	%	%	%	%
h) Others：			%	%	%	%	%	%	%	%

6. About the vehicles owned by you or your company, do the vehicles park in Hong Kong or Mainland when the vehicles are non-operated?
(Please make sure that the total sum of parking location under each type of vehicle should be 100%.)

Regional Parking Location	Van type goods vehicle (1)	Light goods vehicle (2)	Medium goods vehicle (5.5-16 tons) (3)	Medium goods vehicle (>16-24 tons) (4)	Heavy goods vehicle (5)	Tractor (6)	Trailer (7)	Other goods vehicle (8)
Hong Kong	%	%	%	%	%	%	%	%
Mainland	%	%	%	%	%	%	%	%

7. Please provide the expected years of the vehicles owned by you or your company as if the vehicles were newly purchased.

	Van type goods vehicle (1)	Light goods vehicle (2)	Medium goods vehicle (5.5-16 tons) (3)	Medium goods vehicle (>16-24 tons) (4)	Heavy goods vehicle (5)	Tractor (6)	Trailer (7)	Other goods vehicle (8)	Remarks (9)
Expected Years									

8. Please provide the information about the number of driver and delivery staff employed, their daily working hours and monthly working days for the goods vehicle owned.

			Van type goods vehicle (1)	Light goods vehicle (2)	Medium goods vehicle (5.5-16 tons) (3)	Medium goods vehicle (>16-24 tons) (4)	Heavy goods vehicle (5)	Tractor (6)	Trailer (7)	Other goods vehicle (8)	Remarks (9)
Driver	a	Total number of driver									
	b	Average number of working hours (day)									
	c	Average number of working days (month)									
Delivery staff	d	Total number of delivery staff									
	e	Average number of working hours (day)									
	f	Average number of working days (month)									

9. Please provide the information about average expenditures and salary of the vehicles owned by you or your company.

(Please fill in all the relevant information of each type of vehicles owned.)

			Van type goods vehicle (1)	Light goods vehicle (2)	Medium goods vehicle (5.5-16 tons) (3)	Medium goods vehicle (>16-24 tons) (4)	Heavy goods vehicle (5)	Tractor (6)	Trailer (7)	Other goods vehicle (8)	Remarks (8)
Information	a	Annual average accumulated miles run									
	b	Annual average repair days									
Expenses	c	Weekly average gasoline consumption (HK$)									
	d	Average time for tyre change (per year)									
	e	Average expenses for tyre change (HK$)									
	f	Average expenses for maintenance and repairs (per year) (HK$)									
	g	Average expenses for parking (per month) (HK$)									
	h	Average expenses for insurance (per year) (HK$)									
	i	Average expenses for drivers' payment (per year) (HK$)									
	j	Average expenses for deliveries' payment (per year) (HK$)									

-- The End --

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A2 - Driver Questionnaire

Sample Code: _____   E. No.: _____

1. What is the main usage of your goods vehicles? (Card 1, can choose more than one) (**1**) ☐ (**2**) ☐ (**3**) ☐ (**4**) ☐
(**5**) ☐ (**6**) ☐ (**7**) ☐

2. Please provide the information about the vehicle that you drove yesterday
(Please list out the details of each trip in the following table. After filling in the information of all trips traveled yesterday, please record the details of last trip in the last row at the bottom of the table.)

Trip	Depar-ture Time	Location				Zone Code	Land Use at Departure/ Destination (Card 3)	Parking Location (Card 4)	No. of Persons in the Vehicle (Including Driver)	Loading Condition (Card 5)		Trip Purpose (Card 6)	Toll Facility Being Used (Card 7)	Arrival Time	Rem-arks
		District (Card 2)	Street Name	Street No.	Building Name					All 1-4	Tractor 5-10				
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															

	District (Card 2)	Street Name	Street No.	Building Name	Zone Code	Land Use at Departure/ Destination (Card 3)	Parking Location (Card 4)	No. of Persons in the Vehicle (Including Driver)	Loading Condition (Card 5)		Remarks
									All 1-4	Tractor 5-10	
Last Trip											

--The End--

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A3 - Special Generator Questionnaire

Interviewer					SG Site	
Code:					Reference no. :	
Date:					SG Site Location:	
Time:	From:		To:		Shift:	

Vehicle (V) Type
(1) Goods van
(2) Light goods vehicle
(3) Medium goods vehicle I (5.5-16 Tonnes)
(4) Medium goods vehicle II (>16-24 Tonnes)
(5) Heavy goods vehicle
(6) Tractor + Trailer
(7) Tractor only

Trip Purpose
(1) Pick-up goods
(2) Deliver goods
(3) (1)+(2)
(4) Personal
(5) Rental service
(6) Maintenance
(7) Parking
(8) Shift/Off duty
(9) Others, Pls specify

Load Conditions
(1) Empty (<10%)
(2) Partly-loaded (10-40%)
(3) Partly-loaded (41-80%)
(4) Full (>80%)
For Tractor Unit (T)
(5) Tractor only
(6) T+ 20 ft trailer
(7) T+ 40 ft trailer
(8) T+ 20 ft container
(9) T+2x20 ft container
(10) T+ 40 ft container

Toll Facility Being Used
(0) Not Used
(1) Cross Harbour
(2) Western Harbour
(3) Eastern Harbour
(4) Aberdeen Tunnel
(5) Lion Rock Tunnel
(6) Shing Mun Tunnel
(7) TKO Tunnel
(8) Tate's Cairn Tunnel
(9) Tai Lam Tunnel
(10) Lantau Link
(11) Discovery Bay Tunnel

Inter-view Time eg. 1400	Entering SG (Origin)/ Leaving SG (Destination)	Vehicle Regis-tration No	V. Type 1-7	Location					Zone No. 1-338	Land-use of Origin/ Destination (Card 3)	Trip Purpose 1-9	No. of Persons in the Vehicle (incl. Driver)	Loading Conditions		Toll Facility Being Used 0-10
				District (Card 2)	Street Name	Street No.	Building Name	Rem-arks					All 1-4	Tractor Unit 5-10	
	Origin														
	Destination														
	Origin														
	Destination														
	Origin														
	Destination														
	Origin														
	Destination														
	Origin														
	Destination														
	Origin														
	Destination														
	Origin														
	Destination														

-- The End --