



**Estimate of freight volume and composition between Sydney and
Melbourne on the Hume Freeway in 2001**

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Abstract

In November 2001 the Transport Research Centre at RMIT University conducted a truck stop survey of road freight vehicles using the Hume Freeway between Melbourne and Sydney. The purpose of the survey was to determine the amount and type of freight moving by road between Melbourne and Sydney. The survey results showed that approximately only 30% of the trucks using the freeway on any day moved between the two capitals. Data from a variety of sources was also used to estimate total tonnages of freight. The field survey was conducted at major truck stops on the Hume Freeway just north of Melbourne and south of Seymour in Victoria.

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Introduction

The Transport Research Centre at RMIT University was engaged to provide estimates of the volume and composition of freight on the Hume Freeway going direct between Sydney and Melbourne for a private engineering company in October 2001. Specifically the TRC was engaged to:

- Estimate the density and type of freight moving between the cities.
- Estimate the annual volume of freight moving between the two cities

The budget for the study was quite modest, and as such a pragmatic approach was necessary. Certainly, utilising a commercial database was not an option. This paper describes the survey methodology and results of the project. The results of this work not only provide estimates of the demand for freight movement in Australia's largest road freight corridor, but also shed some light on the potential for achieving modal shift from road-based transport, which is currently by far the dominant mode for moving freight in the corridor. The latter is considered to be important, especially given the priority now being afforded within Government circles to modal shift.

Literature and data sources review

A review of the literature indicated that there was no recent published data available for estimating freight composition and movement between Melbourne and Sydney in 2001. Maitland and Higgins (1999) provide a good description of the relevant data available from the Australian Bureau of Statistics. The Australian Bureau of Statistics (ABS) has since completed a survey of freight movements throughout Australia by all modes. The survey was undertaken in 2000, but since the results were not released until March 2002, they were not utilised in this study. To estimate road freight the ABS survey used a sample of 14,000 articulated trucks from a population of 63,000 on the motor vehicle registry. The ABS obtained a 76% response rate. Earlier work by Gargett and Perry (1998) used truck traffic counts at Marulan to develop a forecasting model of the freight task between Sydney and Melbourne as part of their estimation of interstate non-bulk freight traffic. However, their results were not detailed enough for the current task and the Marulan counts ceased sometime before 1999.

Discussions with the Road Traffic Authority of New South Wales and VicRoads indicated that 'weigh in motion' traffic count data was available, and this was used as part of the dataset to estimate the volume of traffic on the Hume Freeway. This source could provide estimates of the actual movements of trucks; however, the contents of the trucks were unknown. Also, the counts were at a point on the freeway and did not indicate if the vehicles actually moved between Sydney and Melbourne. They may for, example, have entered the freeway for a short time between two other destinations on the east coast of Australia, for example, Brisbane and Wodonga or Canberra and Adelaide.

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Another source of freight movement information is FDF Pty. Ltd., a Melbourne based consulting company that has been continuously engaged in the systematic estimation of freight movements nationwide for over ten years. They use an econometric method first developed by Howard Quinlan. FDF have provided several reports on freight movement estimates that are in the public domain, for example, the National Highway System Strategy Study in 1995. More recently a report on freight movements in Melbourne for the Victorian Department of Infrastructure was completed (Flagstaff Consulting Group, 2000). There has also been a freight survey conducted for the Commonwealth Department of Transport on by-passable freight on the national highway around Albury/Wodonga (Fuller, 2002)

The Bureau of Transport Economics (recently renamed the Bureau of Transport and Regional Economics) has published freight estimates on the Sydney to Melbourne Corridor. The BTE estimates are informed by the Freightinfo™ database of FDF Management. Table 1 summarises the results of the BTE analyses.

Table 1. BTE Freight Estimates Sydney-Melbourne (non-bulk)

BTE Occasional Paper 98 **Sydney/Melbourne** **Average annual growth rate %**

1964/65	1,300,000	tonnes	-
1985/86	4,300,000	tonnes	6

BTE Information Sheet 17, August 2000 **Sydney/Melbourne** **Average annual growth rate %**

Actual	1995	5,472,000	tonnes	-
Forecast	2000	7,000,000	tonnes	6 (est)

Research Method

The approach adopted for this study involved the use of three main types of information. These included field surveys, a third-party database of freight trips between Sydney and Melbourne from Australiawide Loading, and secondary data sources from the Bureau of Transport and Regional Economics (BTRE), VicRoads and the Road Traffic Authority (RTA), NSW. Australiawide Loading is an internet-based loading agent that has been operating since 1999 and has established a database of over one million road freight trips, mostly

concentrated in the eastern half of the continent. In addition the five largest freight companies were approached for information on their freight movements between Sydney and Melbourne.

In designing the field survey a pilot survey was initially conducted at the Caltex roadhouse at Avenel, Victoria. The principal purpose of the pilot survey was to test the questions to be put to truck drivers when they stopped and to locate optimal sites for the survey proper. Based on the results of this survey, four sites were selected that provided maximum opportunity for intercepting truck drivers at stops.

The field survey was conducted on the Hume Freeway on the outskirts of Melbourne between Somerton and Seymour at large truck stops. When leaving Melbourne, heading north on the Hume toward Albury, trucks have a choice of three large truck stops outbound. They are Ampol at Somerton, BP at Somerton and Shell at Bunker Hill. The Ampol truck stop at Somerton refused to participate but the other two stations agreed. Trucks heading southbound toward Melbourne have a choice of Mobil (near Seymour), Caltex at Kalkallo and BP at Somerton. Approval was obtained from the RMIT University Ethics Committee to conduct the surveys.

Specifically, the four field interview sites for truck drivers were;

- BP Somerton (Northbound and Southbound access)
- Shell Bunker Hill, just south of Kalkallo (Northbound))
- Caltex Kalkallo (Southbound)
- Mobil Seymour (Southbound).

A vehicle count was also conducted at the Shell Bunker Hill site. This site was chosen because it lies midway between the other sites without any major roads between the sites. Thus the site is considered to be representative of the volume of traffic passing the other three sites.

When a truck stopped at one of the four sites, interviewers asked the driver the following questions:

- Where are you coming from?
- Where are you going to?
- What load are you carrying?
- How many pallets?
- How many tonnes of freight?

The oral responses of the drivers were not corroborated by documentation, or observation of loads carried in tautliners or covered by tarpaulins. In almost all cases drivers were rushed and in some cases brusque. Communication was kept to a minimum to avoid confrontation.

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Also the following information on the vehicle was recorded:

Number of axles

Vehicle type: Tautliner, tarpaulin, refrigerated, bulk, B Double etc.

A coding sheet used to record vehicle types is provided in appendix A.

Table 2 records the days and times of the surveys at each station.

Table 2. Field Survey Details

Location	Date	From	Until
Avenel	Tues, Nov 20th	10.30am	8.30pm
Bunker Hill/Somerton	Wed, Nov 21	3.25pm	7.35pm
Bunker Hill/ Kalkallo	Sat, Nov 24th	3.25pm	7.35pm
Bunker Hill / Somerton / Kalkallo	Tues/ Wed Nov 24th	10.45pm	6.00am
Bunker Hill/ Somerton, Kalkallo/Seymour	Sun/Mon Dec 10th	Midnight	6am

The locations chosen represent major truck stops into and out of Melbourne on the Hume Freeway between Melbourne and Albury/Wodonga. The actual period of the survey was dictated by the requirements of the client and the restricted nature of the budget. The timing of the survey was chosen to provide representative coverage throughout a week including weekends, peak periods and night times.

The field surveys were supplemented with approximately 1,900 records of trips between Sydney and Melbourne provided by Australiawide Loading. The data was provided over the period 1999 to 2001 and included dates, vehicle type, load description and any special requirements.

These results were then cross-checked with other estimates of freight volumes between Sydney and Melbourne derived from a review of the literature. Survey results are given in Table 3.

Table 3. Field Survey Results

Location	Mel/Syd only	Syd/Mel only	Declined to interview	Total Surveyed	Total stopped	%
Bunker Hill	53	6	14	173	246	60%
Somerton	13	20	22	40	95	23%
Avenel	8	-	-	27	35	9%
Seymour	-	4	4	10	18	4%
Kal Kallo	1	4	2	10	17	4%
Total	75	34	42	260	411	-
% of total stopped	18%	8%	10%	64%	-	-
% of total stopped adjusted for non-response	20%	9%	-	70%	-	-

The time periods covered by the survey results covered are shown in Table 2. A total of 411 freight vehicles stopped at the survey sites during the survey period. Almost two-thirds of these responded to the survey. Of these, 75 were moving north from Melbourne to Sydney and 34 were moving south from Sydney to Melbourne. Table 3, shows that about 30% (20% Mel/Syd and 9% Syd/Mel) of the vehicles that stopped and agreed to be surveyed were moving between Melbourne and Sydney. Overall the response to the survey was very good, with only 10% of drivers refusing to participate. Extrapolation of these results based on VicRoads Culway data is shown in Table 4.

Table 4. Estimate of Total Freight Between Sydney & Melbourne 2000

Total Vehicles on Hume Freeway		
Weighting Factor*	Day	Vehicle Estimate
1.00	Thursday	2464
0.95	Friday	2341
0.49	Saturday	1207
0.50	Sunday	1232
0.75	Monday	1848
0.99	Tuesday	2439
0.96	Wednesday	2365

Total Weekly Estimate	13897 vehicles
Total Annual Estimate	722,642 vehicles - one way (northbound)
	1,445,284 vehicles -two way
Total travel Sydney/Melbourne	433,585 vehicles - 30% split
Average estimated load*	20 tonnes
Total per annum	8,671,703 tonnes

*Source: VicRoads Culway data

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The weighting factor is derived from an observation of freight vehicle movement by day of week. The busiest day of the week on the Hume Freeway is Thursday. On an average Thursday, about 2,464 vehicles are recorded one way on the Hume at Culway measuring stations near Seymour. To derive a weekly total of freight trips this volume was factored by day of week and summed to give a one-way weekly total. This was then factored up by 52 (for weeks in the year) and doubled to get a two way total volume for freight traffic.

It has been assumed that approximately the same number of freight vehicles (class 9 and 10) move in the southbound direction, so that the total annual volume of traffic passing Bunker Hill is estimated to be 1,445,000. Class 9 and 10 vehicles represent the 6 axle and 9 plus axle trucks. Note that the difference in survey count totals was due to an artefact of the survey where southbound traffic was only recorded for two of the survey days. This limited number of observations was due to budget constraints.

Based on the survey estimates, indicating that 30% of the freight vehicles move directly between Sydney and Melbourne, there are about 433,500 annual freight trip movements in both directions.

Assuming the average load is 20 tonnes, this yields an annual estimate of 8.6 million tonnes of freight. This average load figure is based on VicRoads Culway Data (Casagrande, 2001).

Assumptions in the freight estimates for the Hume Freeway

In deriving the total tonnes, the key assumption was that truck drivers stopping at the survey site were representative of the total population of trucks on the Hume. It has been argued by some that since many Sydney-Melbourne trucks are managed by large transport organisations, their drivers do not stop because they have already refuelled at their depots and so are not captured in the survey. This would have the effect of under-estimating the split.

Whilst this may be so, drivers who were found to have stopped at Bunker Hill did so for a variety of reasons other than to refuel. They used the truck stops as a toilet stop, a coffee refill and a restaurant. Some used it as a meeting point with other drivers. The survey did capture drivers from larger transport companies, suggesting that these are represented at least to some degree.

Another significant problem was the lack of a reliable continuous traffic count at Bunker Hill. The closest VicRoads traffic counting point was in the Mitchell Shire and thus not representative of the volume of trucks passing the Bunker Hill recording site.

During the conduct of the field survey, detailed hourly traffic counts were recorded at the same times as the truck stop interviews were conducted. Thus it was possible to create a synthetic traffic count based on the hourly counts

during the survey period. Data from the survey period was then factored to represent a week using VicRoads vehicle counts at Seymour and Balmattum.

In this analysis no factoring by month has been used. This is based on an analysis of Culway data by VicRoads that shows fairly constant levels of traffic at other stations across the years.

The average load of 20 tonnes is taken from Culway data over 1999 and is an average of class 9 and 10 loads. At present there are substantially more class 9 vehicles and less class 10. Hence the average weight is approximately 20 tonnes. A more detailed study of the distribution of weights is required but has not been conducted here.

Finally it has been assumed that the volumes of traffic heading north is the same as the volume heading south. Again, Culway and other VicRoads traffic counts indicate a fairly balanced flow in both directions.

Composition of Freight

The field survey of vehicles that stopped and answered the survey at the road houses showed that general freight was almost a quarter of total freight moved. This includes housewares, electrical goods, and other retail products. If refrigerated food and food are combined then about one third of the freight moved between the cities is food items.

Figure 1. Freight Categories

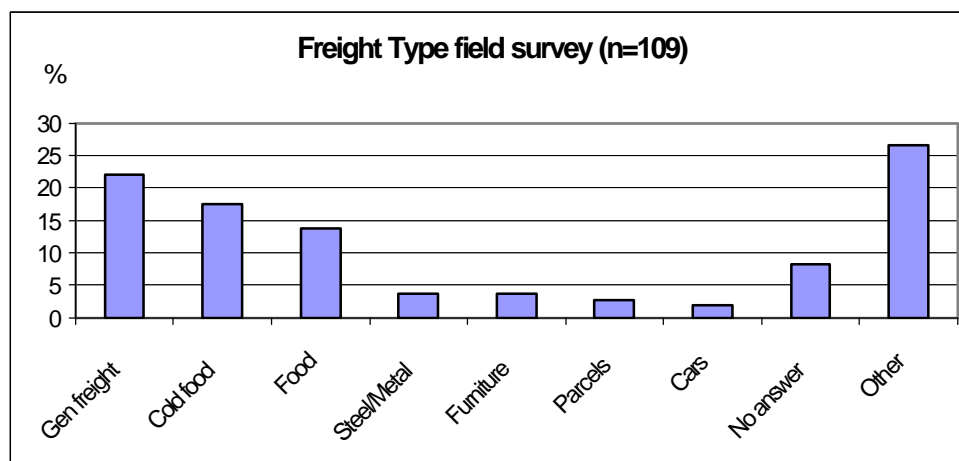
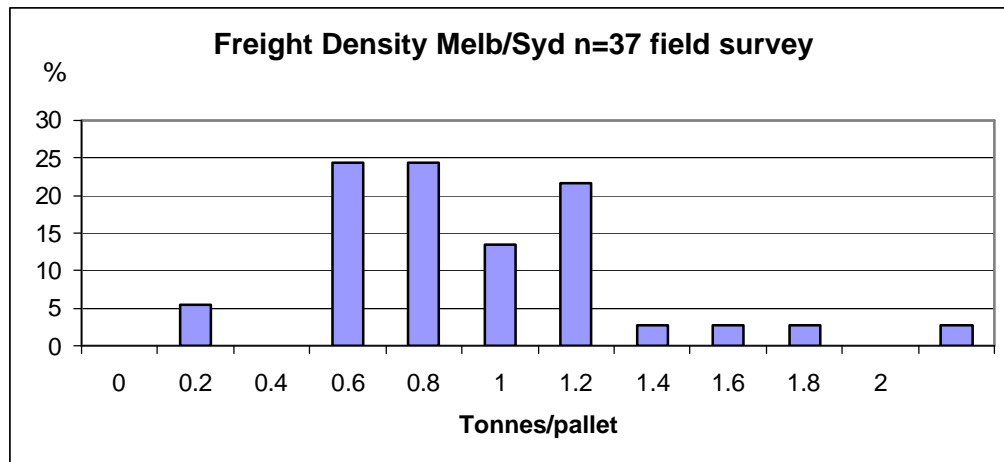


Figure 2 shows the density of the freight calculated by recording the tonnes per pallets carried. The sample size is reduced (n=37) because some freight was not palletized or the tonnage or number of pallets was not provided by the driver.

Figure 2. Freight Density



Hume Corridor: Definition

Beside Sydney and Melbourne, the Hume corridor contains a number of key freight generators that substantially increase the volume of freight on the Hume freeway. This freight uses part of the corridor without moving directly between Sydney and Melbourne. For example, the regional centres of Canberra, Albury Wodonga and Shepparton generate significant freight volumes along the corridor. Much of this freight movement has one leg in either Sydney or Melbourne but not both. That is, it usually includes one of these cities, but not both.

There is also a substantial amount of traffic between Melbourne and Brisbane which bypasses Sydney and this corridor in favour of a more direct inland route.

This means that the actual volume of traffic on the Hume Freeway moving between the two cities of Sydney and Melbourne is a fraction of the total traffic using the Hume Freeway. The truck stop surveys estimated this fraction to be 30% of the class 9 and 10 freight vehicles.

Industry Sources

The top five freight transport companies were contacted and asked to provide details on the number of loads between Sydney and Melbourne. The companies were selected by asking senior logistics executives to provide a list of the largest freight companies in eastern Australia. One of these companies declined to respond. Although some companies did not provide daily manifest summaries, they all provided total vehicles employed on the run. This data was current as of January 2002. The companies did not provide vehicle or load details. Table 5 summarises the information obtained from the transport companies.

Table 5. Telephone Survey of Freight Transport Companies

Number of loads daily	Mel Syd	Syd Mel	Total Av. gross mass
T'liner	91	47	20
Bdouble	23	12	45
Tonnes Carried	Mel Syd	Syd Mel	Total
T'liner	1820	940	
Bdouble	920	480	
Daily Tonnes	2740	1420	4160
Annual Total Tonnes (based on 260 days/year):			1,081,600

Australiawide Loading is a freight matching company that provides a computer matching service between the supply of freight transport and demand for the movement of goods around Australia. Its data-base records the number of trailers (trucks), trailer availabilities, load availabilities and the number of matches. The company provided a random sample of 1719 records from their database with origins or destinations in either Sydney or Melbourne.

Figure 3. Relative Distribution of Categories of Freight Moving between Melbourne and Sydney

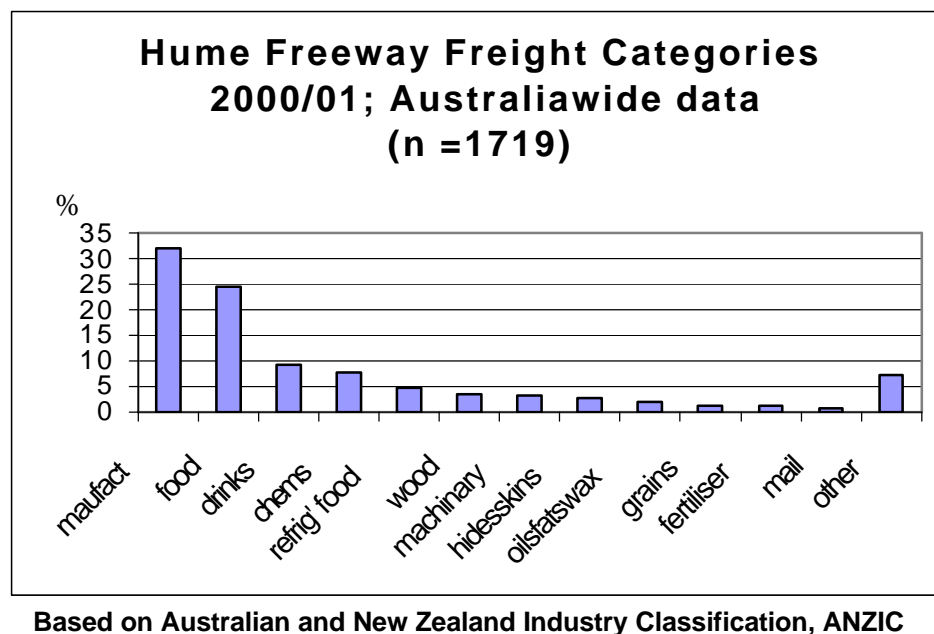


Figure 3 shows the commodity classification of freight moving between Sydney and Melbourne from their records. The classification of manufactured goods includes general freight.

Figure 4. Freight Density

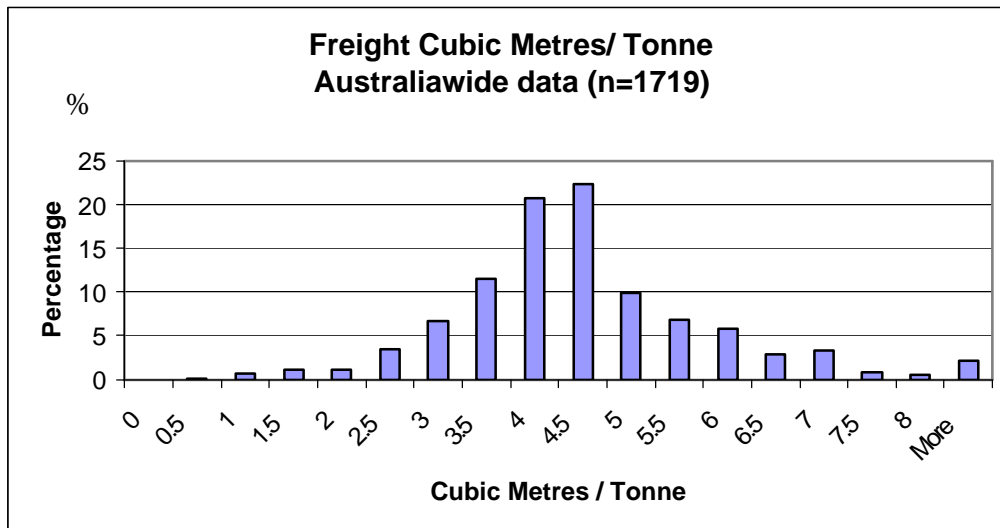


Figure 4 shows the density of freight moving between Sydney and Melbourne extracted from Australiawide Loading records. About half the freight is between 4 and 5 cubic metres per tonne.

Figure 5. Number of pallets per consignment

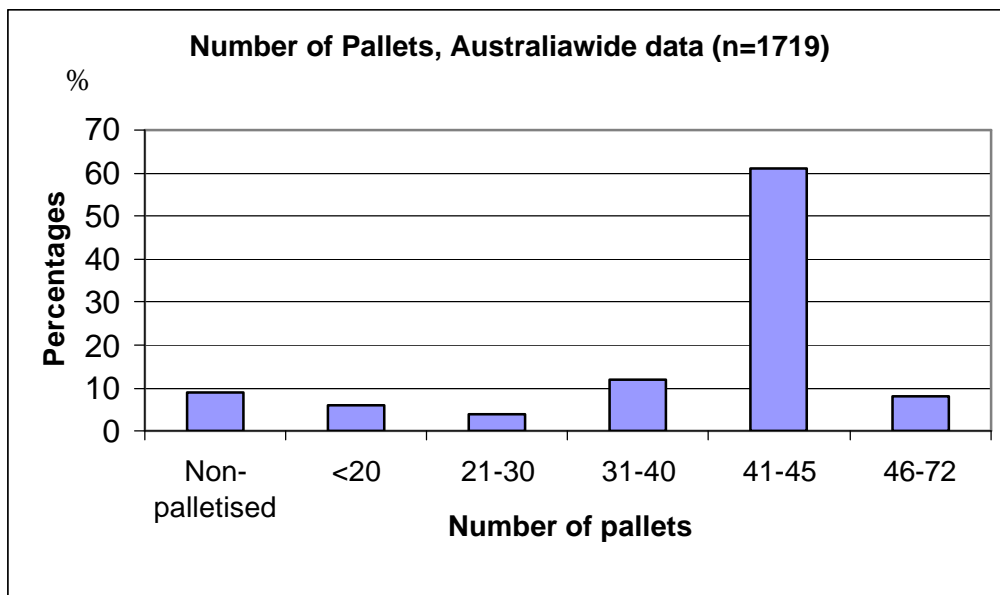


Figure 5 shows that most consignments had 45 pallets. Note that almost 10% of Australiawide freight was non-palletised.

Conclusions

Based on the results of the field surveys it was estimated that the quantity of road freight moving directly between Sydney and Melbourne using the Hume Freeway is approximately 8.6 million tonnes in both directions annually. Most of this freight is palletised and has a low density, less than 1 tonne per pallet or 400 kgs per cubic metre. These estimates compare favourably with data from the BTE. See Table 1 and Sheet 17 from the BTE, August 2000.

During the industry surveys some managers pointed out that not all of this road freight was contestable. Some freight had special time-window requirements that they felt rail could not meet due to level of service constraints. For some industries, regular two or three hourly drops of material are required throughout the day.

Thus the figure of 8.6 million tonnes is an upper bound on the corridor's freight market in 2002 that could be considered contestable by another competitive mode in the corridor.

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Appendix A. Coding frame used for the Field Survey

Date: **Time:** **signature**

	6 axle	9 axle	Other Bdouble	Rigid	Other
Pan's					
Tautliners					
Tankers					
Refrig					
Bulk					
Flat containers					
Flat-others					
Flat -tarpaulin					
Car-carrier					
Dog Trailer					
Livestock					

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