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PORT CONTAINER MOVEMENTS IN SYDNEY

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ABSTRACT: *The nature and impact of container movements is a rich lode for speculation by various levels of government and the community. A two week road and rail survey of container movements through Sydney's Port Jackson in mid 1978 has proved helpful in explicating some of the more worrisome issues that have been raised in debate.*

Information is presented on mode split, the spatial distribution of container users and the time profile of container movements. Traffic and environmental impacts are considered. Attention is also drawn to the planned transfer of many existing container operations from Port Jackson to Port Botany.

While the material for much of this paper is taken from an Urban Transport Study Group (UTS) survey, the use and interpretation of that material are the authors' own and do not necessarily reflect the views of the Study Group.

Background Paper for
Session 3

INTRODUCTION

One of the more prominent local transport issues in recent years has been the nature of container movements and their perceived environmental and traffic impacts. From the very early days of containerisation in Sydney controversy has existed on such issues as road haulage through residential streets and the construction of inland depot facilities. One of the more important recent issues has been the development of new container handling facilities at Port Botany to supplement, and in part replace, existing congested facilities at Port Jackson. The environmental problems of road based container movements associated with these new facilities may be seen as the main motivation for the inquiry into the Botany Bay port development commissioned by the New South Wales Government in 1976.

The transport implications of the port development were subsequently addressed by the Urban Transport Study Group (UTS) in its 1977 study of the Central Industrial Area(1). In that study it was found that the main regional issues were the general impact of through traffic, especially heavy vehicles on residential streets and in shopping centres; increasing volumes of truck traffic due to industrial growth within the Central Industrial Area and more generally in the Sydney region; noise and exhaust fumes from traffic, especially trucks; and the possible impact of port traffic on the road system.

The findings of the study suggested that the anticipated Port Botany impact was something of a myth since the number of port trucks was small in relation to total truck volumes and measurable environmental impacts were low.

At the same time it was apparent that there was little detailed information available on container movements in the metropolitan area. Such information would not necessarily resolve any of the issues considered in the Central Industrial Area study, but it would obviously be helpful to informed debate and may be regarded as a prerequisite to effective planning. With this in mind UTS, early in 1978, decided to undertake a study of port container movements to supplement existing sources of information.

The most useful existing source was the information published in the Maritime Services Board's (MSB's) annual "Port Statistics". This provided a good time series record of total container throughput broken down by 40 foot or 20 foot container, whether full or empty, and whether import or export. It was, however, of limited value for an analysis of land transport. Accordingly, supplementary information sought by UTS in its survey related to the land origin or destination of the containers, the breakdown by road and rail and the split between FCL's and LCL's(2).

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1 The Central Industrial Area (CIA) comprises the Municipalities of South Sydney and Botany and the industrial areas of the Marrickville and Randwick Municipalities. It also includes all of Sydney Kingsford Smith Airport which is partly in the Rockdale Municipality.

2 FCL's (full container loads) are containers destined for just one consignee, or coming from just one consignor. LCL's (less than container loads) are defined as containers with two or more consignees or consignors and as such require breaking down (unstuffing) or consolidating (stuffing) at container depots.

More specifically on the road side, there was also a wish to gain information on the breakdown by wharf, the time of day of movement, the type of vehicle in use and the extent of backloading.

The survey results have tended to confirm the myth about Port Botany's likely impact, and have also yielded interesting background on a number of other issues associated with container movements. Some of these, such as the potential share of rail haulage, the spatial distribution of container users and the time profile of container movements are highlighted in this paper.

THE SURVEY

A two week survey was mounted at the port from June 12 to June 23, 1978. Two weeks was regarded as being of sufficient length to ensure a reasonable sample size. It was also regarded as sufficient for establishing representative data on origins and destinations, time of day of movement, vehicle type and FCL:LCL ratio.(1)

Road movement information was obtained by means of a cordon survey of 9 gates in Port Jackson. Coverage was between 7.30 A.M. and 2.30 P.M. over 10 weekdays. Each container truck movement in and out of a gate was recorded on a separate form - see sample form in Appendix A.

The gate and time coverage were arrived at after consultation with the MSB. There was no coverage at Woolloomooloo or Pyrmont, where there were believed to be just isolated container movements. Similarly there was no coverage before 7.30 A.M., after 2.30 P.M. or at weekends. At these times the gates would generally be closed and there would be very few movements. The only exceptions would be stack runs between inland depots(2) and the port that spilled over from or occurred outside the survey hours. These were monitored during the survey by daily telephone contact with port terminal operators, and the numbers were found to be low in relation to survey totals.

Rail movements into and out of the port were obtained daily from the Public Transport Commission (PTC) for the full two week period.

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1 While these data are argued to be representative it should be recognised that it is of the nature of container throughput to be extremely variable. The concept of an "average" figure needs to be approached with caution.

2 Major container depots served by road are located at Alexandria (Liner Services Pty. Ltd.) and Rozelle (Consolidated Cargo Services (NSW) Pty. Ltd.) while depots with both road and rail links are located at Chullora (Seatainers Terminals Ltd.) and Villawood (Freightbases Pty. Ltd.).

It was anticipated of course that different areas of the port would yield different proportions of road and rail traffic. Mort Bay (see Figure One) had no access to rail at all. The five gates covered at Darling Harbour were several hundred metres distant from the nearest rail facilities at Darling Harbour Goods Yard and there would be a significant double handling charge if rail were used for short distance movements. On the other hand both White Bay and Glebe Island had adjacent rail facilities and could be expected to use rail where appropriate.

SURVEY RESULTS

During the survey period almost 10,000 container truck movements were recorded through the nine gates manned and these represented some 6,500 container movements during the ten week days of the survey. In addition almost 4,500 containers were moved into or out of the port by rail during the two week period.

Present Mode Split

The starting point for any discussion of the nature and impact of port container movements is the mode split. For the port as a whole, on an average weekday, 61% of containers are transported by road and 39% by rail. This aggregate figure masks significant differences between terminal areas.

TABLE 1 THE ROAD SHARE OF CONTAINER MOVEMENTS

	Ave. Weekday Throughput[a]	% Moved by Road	Ave. Weekday Truck Movements	% of all Road Movements
Darling Harbour	363	85	458	46
Mort Bay	126	100	205	21
Glebe Island	214	59	223	22
White Bay	350	24	111	11
TOTAL	1053	61	997	100

(a) Expressed in twenty foot equivalent units (TEU's). The relatively uncommon 40 foot container is regarded as two TEU's and the common 20 foot container as one TEU.

It can be seen from Table One that just under half of all container movements by road are generated at Darling Harbour. The small rail share (15%) relates almost entirely to country and inter-state areas and mostly to inwards movements.

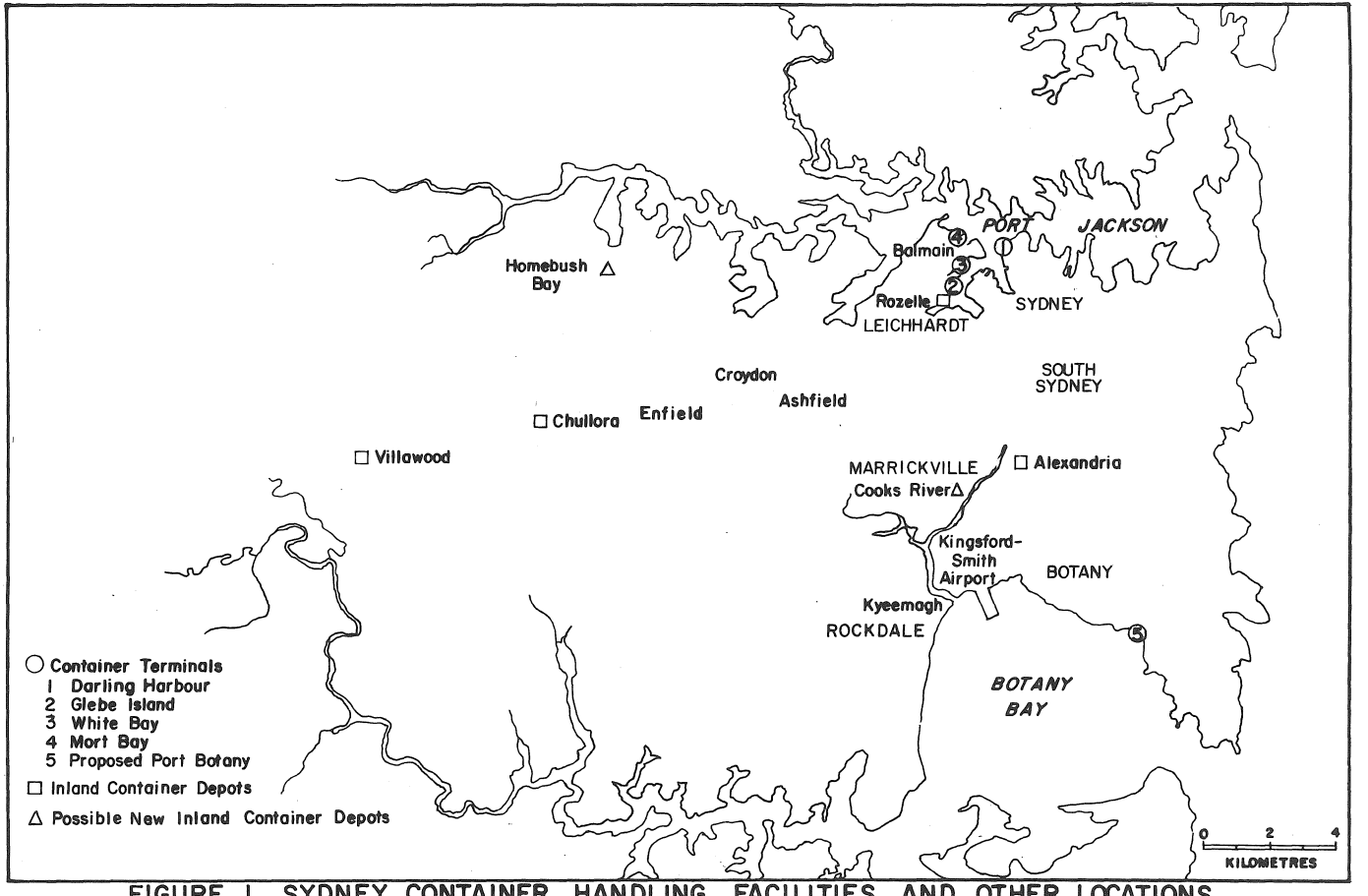

FIGURE 1 SYDNEY CONTAINER HANDLING FACILITIES AND OTHER LOCATIONS

The Mort Bay container movement is exclusively by road since there is no rail connection to the wharf. At Glebe Island and White Bay on the other hand there are both road and rail connections. In the former case rail is used for the delivery of LCL's to and from inland depots served by rail and for most long distance movements. Road is used for the majority of movements, including most of the metropolitan FCL's and LCL movements to and from the Liner Services depot at Alexandria.

There is rather less selectivity at White Bay. Virtually all import containers are railed to the Seatainers depot at Chullora because of severe space constraints at the wharfside. Exceptions to this rule are special cargoes which need to be road hauled: refrigerated containers which require speedy delivery, containers with chemicals or other dangerous contents and containers with unusual dimensions not suited for rail. From Chullora FCL's are generally road hauled to consignees, many of whom may well be closer to White Bay than Chullora. There is less wharfside space constraint on exports from White Bay so the pattern is fairly similar to Glebe Island, in that FCL's are generally roaded to the wharf, and LCL's and long distance FCL's generally rail hauled.

Importance of FCL : LCL Ratio

A significant factor affecting the number of road movements is the relative proportion of FCL and LCL containers since each has different transport requirements. It was considered important to obtain information during the survey on the ratio of FCL's to LCL's and on likely changes over time.

Discussion with industry and government departments over the past two years had suggested an FCL:LCL ratio of approximately 60:40, with a prevailing view that the ratio was increasing. In order to derive a ratio from the survey results it was necessary to identify the sub-total of containers travelling to or coming from the four inland depots in the two weeks of the survey, and to assume these were LCL's. In fact when depot totals were checked subsequently with depot operators and the method for calculating the ratio was explained a downward revision of the Chullora and Villawood figures was necessary since there was an estimated component of FCL's travelling by rail to and from the depots. The sub-total was then expressed as a proportion of the total containers moved and yielded an 80:20 ratio.[1]

This seems a surprisingly high ratio of FCL's in view of previous discussions and appears much higher than was achieved in earlier days of the port. The order of magnitude of the ratio has since been supported from two other sources:

(1) from examination of LCL container availability listings in the Daily Commercial News over a subsequent four week period for imported containers only.

1 If empty containers are excluded from the definition of FCL's the ratio falls to 77:23.

(2) a breakdown of figures contained in the ANL-CTAL joint submission to the Botany Bay Port and Environment Inquiry which for 1985 estimated a 77:23 ratio.

LCL movements by their nature must have their land end at one of the limited number of inland depots where stuffing or unstuffing occurs which makes them amenable to rail transport where rail is available. Direct rail links are currently available, and are extensively used, for moving LCL's between White Bay and Chullora and between Glebe Island and Villawood. All movements between the Mort Bay and Darling Harbour terminals and inland depots are made by road.[1]

On the other hand FCL's must be delivered to or collected from a large number of dispersed locations, many of which are poorly served by rail or have no usable rail facilities. In these circumstances the need for road movement is clear. Moreover, where an FCL import is involved additional factors operate in favour of road movements. The inadequacy of receival facilities at many destinations means that the container often has to be left on the truck and unpacked from there. In these circumstances delivery in the morning or by early afternoon at the latest is essential to allow sufficient time for unpacking before the normal close of business. Otherwise, additional costs in the form of overtime payments to staff involved in unpacking may be incurred. Where staff is not readily available there may be demurrage charges, typically after two hours.

Future Mode Split

Although it is difficult to estimate the likely future mode split with very much confidence it appears, on the evidence available, that following the opening of the Port Botany terminals there will be a more limited role for rail in the movement of containers to and from Sydney's ports.

Port Botany

The proposed Port Botany development includes the construction of two port container terminals which, it is understood, will be used purely for the transhipment of containers between ships and land transport. There will be no stuffing or unstuffing of LCL cargo at these terminals. All such work will be carried out at inland depots. There will, however, be an empty container depot adjacent to the terminals which will be used for the cleaning, storage and repair of empty containers.

Submissions to the Botany Bay Port and Environment Inquiry suggested that about 25% of container movements to and from the new port would be made by rail.[2]

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1 About one third of the LCL's imported through Darling Harbour are unstuffed on the wharves and distributed from there as general cargo.

2 Container Terminals Australia Pty. Ltd. (CTAL) estimated the rail share to and from its terminal to be 32%. The Australian National Line (ANL) estimate for its terminal was 20%.

These estimates assumed that rail would be used to transport LCL containers between the port and those depots with suitable rail connections and that most FCL's would be road oriented. Similarly, it was assumed that empty containers would be moved by road. It appears now that the only containers, apart from LCL's, likely to be attracted to rail are long distance FCL movements to and from country and interstate areas.

The report of the Botany Bay Inquiry suggested that an increase in the percentage moved by rail would be desirable, but there were no explicit suggestions as to how this might be achieved.[1] In the absence of any Government policy directive on the matter the estimates of the companies must be accepted as the likely outcome. The anticipated small rail share of movements through Port Botany is supported by an examination of those parts of the Port Jackson trade to be transferred to Port Botany.

The proposed transfers include all of the current Mort Bay operations which, as indicated earlier, are all road oriented and all of the current White Bay operations which are heavily rail oriented. On balance it appears that these two transfers will result in an increasing road share of movements. Roughly 80% of current rail movements to and from White Bay are FCL's and in the absence of enforced railing these will probably be carried by road. They currently represent some 200 movements a day and would only be offset by about 30 existing LCL movements into and out of Mort Bay which might be transferred to rail. The situation in respect of the Glebe Island trade appears to reflect an essentially optimal situation in which most LCL's and long distance FCL movements are now carried by rail. This situation could be expected to continue at the new port.

Port Jackson

The writers are unaware of any published work on the future of container handling at Port Jackson but here again it also appears that there will be little prospect for increasing the rail share of movements to and from the remaining terminals after Port Botany opens. On present indications only Darling Harbour and Glebe Island will be used for the container trade at that time.

Darling Harbour has experienced rapid growth in throughput in recent years and is now operating beyond its capacity as estimated by the MSB. (MSB, 1976, p. 79). Its ultimate capacity is uncertain but since it does not have a railhead adjacent to the wharves it is to be expected that the current reliance on road transport will continue. At Glebe Island rail facilities are available but in the initial period after the opening of Port Botany it must be assumed that the terminal will be operating at about 40% capacity. In these circumstances there will be little pressure to clear the wharf by bulk handling which means that a greater proportion of its throughput could be transported by road.

1 Butlin (1976, pp 87-89) suggested that all containers should be transferred to and from the new port by rail and that new inland container depots could be built at Cook's River and Homebush Bay.

Overall it appears that if operators at both Port Jackson and Port Botany are left to their own devices the future mode split to road will be greater than at present.

Origins and Destinations

Detailed origin and destination information is useful on two counts. Firstly it assists in notionally planning the location and scale of container facilities so as to best serve the needs of both customer and operator and secondly it furnishes a starting point for assessing the level of traffic and environmental impacts generated by container transport.

The existing data base is of little assistance on either of these two counts since it is aggregated to between five and seven regions in Sydney (for example (ANL/CTAL, 1976), (EHCD, 1976)).[1]

To avoid this limitation the recent survey was pitched towards recording origin-destination information at a detailed level, generally at the level of firm and suburb. It was subsequently coded to local government areas (40 LGA's in the Sydney region plus 5 externals), SATS traffic districts (73 internal, 5 externals) and SATS traffic zones (578 internal, 5 externals).

Location of Facilities

In planning the location of container facilities it is important to know the locations of the consignors and consignees of container cargo. This information is to be obtained from studying the distribution of loaded FCL's only. The distribution of LCL's and most empties is of little use in this regard. Their movement is oriented to inland depots rather than the ultimate customer, and thus reflects existing rather than desired facility locations.

The distribution of customers, as represented by loaded FCL's, is shown in Table Two. It can be seen that the distribution is dominated by five LGA's, these being South Sydney, Botany and Marrickville (essentially the Central Industrial Area), Sydney and Leichhardt. Between them they account for just over half (51%) of all loaded FCL movements, with the remaining 49% being widely scattered throughout the metropolitan area. This is an interesting finding in view of the generally accepted belief that the centre of the market is well to the west of these five LGA's in the vicinity of Enfield, and is moving further west each year.[2]

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1 It is interesting to aggregate the survey results to the corresponding areas in these other studies and compare the percentage distributions. The original ANL/CTAL container distribution given to the Inquiry was a poor match. A subsequent "loaded container truck" distribution however turned out to be a very close fit, as was the distribution for FCL import destinations presented in the EHCD study.

2 In fact when a centroid is calculated for the loaded FCL distribution from the survey, using just the land end of the trip, it is in the vicinity of Croydon, only 1.5 kms. to the east of Enfield. The significant feature of the distribution then is the great concentration in the five LGA's mentioned.

TABLE 2

IMPORTS PLUS EXPORTS OF FCL's - AVERAGE DAILY TEU MOVEMENTS BETWEEN PORT JACKSON AND SELECTED LGA's BY ROAD

WHARF AREA \ LGA	AUBURN	BANKSTOWN	BOTANY	LEICHHARDT	MARRICK-VILLE	SOUTH SYDNEY	SYDNEY	EXTERNAL ZONES	OTHER SYDNEY	TOTAL
DARLING HARBOUR	9.4	6.2	31.9	8.4	15.7	6.1	18.2	12.3	49.9	158.1
GLEBE ISLAND	7.8	13.1	10.3	5.9	4.5	12.2	12.6	7.3	38.2	111.9
WHITE BAY	3.7	3.1	5.5	2.4	1.5	5.0	2.0	1.8	10.4	35.4
MORT BAY	2.5	3.7	10.7	13.5	2.8	2.7	11.3	21.3	23.4	91.9
TOTAL	23.4	26.1	58.4	30.2	24.5	26.0	44.1	42.7	121.9	397.3

A valid question is whether the origin-destination pattern observed in June 1978 could be expected to hold in the future, for example when Port Botany is in full operation. The market shares of individual companies may well alter significantly, but this is seen as a sifting and sorting within the overall pattern. Similarly there may well be a westward shift of industry, but this would be seen as gradual and unlikely to affect the overall pattern significantly over the next 10 years.

As far as is known no LCL depot survey has yet been attempted in the Sydney region to ascertain the distribution of consignors and consignees of LCL cargo. It may well be possible to use the loaded FCL distribution as a surrogate for the distribution of LCL customers. This is based on the argument that FCL cargo is similar in content to LCL cargo. If this is a reasonable argument, and it seems so, the loaded FCL distribution may then be used as a guide for the siting of LCL depots. One of the corollaries of this however is the anomalous location of the Villawood depot in respect of LCL customers. Another is the resource cost implications of enforced railing of White Bay FCL imports to Chullora, when at least half of them then face a back-haul to the five important inner LGA's.

Environmental and Traffic Impacts

In assessing the level of traffic and environmental impacts generated by container transport a knowledge of the distribution of all road hauled containers is required. A member of the public observing a container on a truck makes no differentiation between an FCL, LCL or empty. All are perceived as having the same impact.

The distribution of all loaded container trucks is shown in Table Three. Once again the distribution is dominated by the same five LGA's, only in this case the domination is more marked. No less than 64% of loaded container trucks are generated in this inner belt. The still greater concentration is accounted for by the large proportion of empty container parks in these five LGA's, and the presence of the Liner Services container depot, which has a high volume of road movements since it is off rail.

If the concern is with environmental and traffic impacts it is important to establish the routes taken by loaded container trucks. Figure Two is a district spider diagram so constructed as to show the broad corridors of movement. The important north-south axis through Leichhardt, Sydney, South Sydney, Marrickville and Botany is apparent from this. There is also a fairly heavy concentration of movements to the west of the port in the inner city, though this concentration breaks down fairly rapidly with distance from the port.

The actual routes usually taken by container trucks can in principle be established from the survey data, in combination with UTS inverview information used in its truck routing study (UTS, 1978) and in-house road network assignment procedures. But having established the route choice there is also a need to look at additional factors such as the vehicle type in use and load status, the time of day of movement and, more generally, the potential use of rail as a means of minimising road movements. All are factors affecting, or potentially affecting, the perceived environmental and traffic impact.

TABLE 3

AVERAGE DAILY LOADED CONTAINER TRUCK MOVEMENT BETWEEN PORT AND SELECTED LGA's

WHARF AREA \ LGA	AUBURN	BANKSTOWN 1.	BOTANY	LEICHHARDT 2.	MARRICK-VILLE	SOUTH SYDNEY 3.	SYDNEY	EXTERNAL ZONES	OTHER SYDNEY	TOTAL*
DARLING HARBOUR	7.6	11.4	28.8	17.1	16.8	60.1	16.5	9.7	43.2	211.2
GLEBE ISLAND	6.6	11.3	7.6	6.3	3.6	15.9	12.2	6.3	31.2	101.0
WHITE BAY	4.9	4.8	6.2	4.3	1.4	12.9	1.9	1.7	8.9	47.0
MORT BAY	2.5	4.4	10.2	21.3	2.8	13.7	9.3	21.6	21.9	107.7
TOTAL	21.6	31.9	52.8	49.0	24.6	102.6	39.9	39.3	105.2	466.9

NOTE: * Between known Origins and Destinations. Excludes an average of 30.9 movements a day.

1. Contains (a) Seatainers, Chullora
   (b) Freightbases, Villawood

2. Contains CCS, Rozelle.

3. Contains Liner Services, Alexandria.

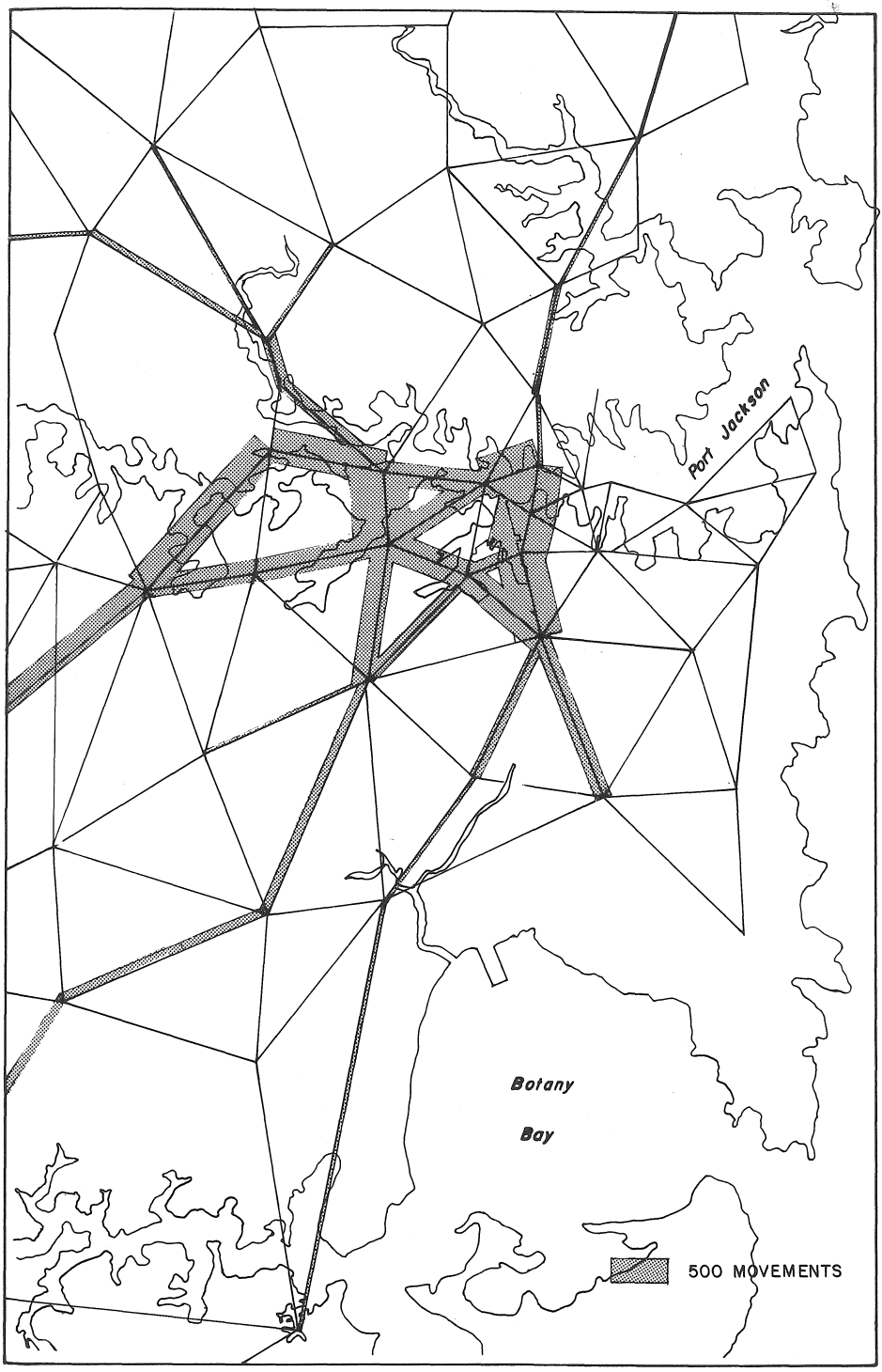

FIGURE 2 DISTRICT SPIDER - AVERAGE DAILY MOVEMENT OF LOADED CONTAINER TRUCKS, JUNE, 1978

Vehicle Type and Load Status

The breakdown of trucks by vehicle type over the 10 working days of the survey is shown in Table Four. Approximately 69% of all trucks engaged in the movement are semi trailers, followed by rigid vehicles with 25% and rigid vehicles pulling a trailer with 6%. The proportion of each type varies between wharf areas, in part reflecting the different container haulage tasks and in part the utility of the semis in use, with their favourable axle-load rating, for carrying 40 foot or two 20 foot containers where necessary. The forty foot semi trailer is of course a large vehicle with limited manoeuvrability and acceleration, and tends to be perceived adversely by many other road users and in environmentally sensitive areas. When loaded with a container it is readily identifiable as a class and possibly tends to draw criticism aimed at a much broader class of heavy vehicles.

TABLE 4 VEHICLE TYPE BY WHARF AREA

VEHICLE TYPE \ WHARF AREA		DARLING HARBOUR	GLEBE ISLAND	WHITE BAY	MORT BAY	TOTAL
RIGID	NUMBER	1035	830	240	371	2476
	%	22.6	37.1	21.7	18.1	24.8
SEMI	NUMBER	3116	1343	823	1629	6911
	%	68.0	60.0	74.5	79.3	69.2
DOG-TRAILER	NUMBER	431	65	42	54	592
	%	9.4	2.9	3.8	2.6	5.9
TOTAL	NUMBER	4582	2238	1105	2054	9979
	%	100	100	100	100	100

Container trucks, as is the case with most heavy and light trucks, were observed in the survey to travel with considerable spare capacity in many instances. This does not necessarily refer to inefficient usage however, bearing in mind for example the particular requirements of FCL haulage. Fifty percent of trucks observed at the wharf gates were unloaded, thirty five percent travelled with one 20 foot container, and the remaining fifteen percent with two 20 foot containers or one 40 foot container.(1)

1 The figures are indicative only. As they stand, with fifty percent of trucks recorded unladen, it would appear there was no backloading, which was not the case. The problem relates to a difficulty in defining a container truck. For example an empty semi with a twist lock fitting might have been recorded as an unloaded container truck when it entered a Darling Harbour gate. When it exited from the gate some hours later it might have been carrying a load of newsprint, and would not have been recorded as an outwards container truck movement. The problem occurred sufficiently often, in both directions, to negate attempts at arriving at useful backloading statistics.

Time of Day of Movement

Table Five shows container movements for the port as a whole on an hourly basis. An important finding is the overall evenness of movements throughout the day. There is little peaking except for a decline in the volume of movements in the hour ending 12.30 P.M., this presumably is a result of the lunch break on the wharves.

One of the implications for traffic is that during the morning commuter peak there is no matching container truck peak. In fact during this period, as may be seen from Table Six, the predominant movement is inwards to the port and involves empty trucks arriving to collect FCL's for delivery. Laden trucks tend to enter the traffic stream more towards the end of the commuter peak and then mainly in the vicinity of the port.

An additional aspect is that the movement tends to be compressed into the early part of the day. After 2.30 P.M. there is a rapid fall-off, and by the afternoon commuter peak there are practically no port containers on the road.

On the environmental side the evenness of the movements through the day, albeit the early part, is potentially disadvantageous. The decline in other traffic after the A.M. peak results in the loaded container truck presence being that much more visible.

Potential for Minimising Road Haulage

This aspect has been explored earlier in the paper and clearly has significance in relation to perceived traffic and environmental impacts. These perceived impacts may be lessened to the extent that part of the haulage task can be transferred to rail, rail being generally assumed to impose few impacts, and the number of vehicles required to move a given number of containers can be reduced. Increased backloading would generally be desirable in this regard, but it is not clear what sort of perceptual response there would be to an increased incidence of two containers per truck.

Environmental Impacts

It is a useful step forward to establish the volume of road-hauled containers, the routes taken, the vehicle type, the load status and the time of day of movement. These can then be used as a basis for measuring such environmental impacts as air and noise pollution, and vibration.

Noise impacts on the road system were in fact given considerable attention in the Central Industrial Area Study. Detailed readings were obtained at four problem locations identified by councils. It was found that background noise levels were not very much below recorded (L_{10}) levels due to the built-up nature of the area and the proximity of other passing traffic. Recorded noise levels were in excess of acceptable standards, with the main contributor being heavy trucks.

TABLE 5

CONTAINER TRUCK MOVEMENTS BY TIME OF DAY : ALL TERMINALS

(Average Number of Movements Per Day)

MOVEMENTS \ HOUR ENDING	8.30 A.M.	9.30 A.M.	10.30 A.M.	11.30 A.M.	12.30 P.M.	1.30 P.M.	2.30 P.M.	TOTAL PER DAY
INWARDS	113.4	77.7	60.9	70.2	57.1	86.8	65.1	531.2
OUTWARDS	40.9	73.0	61.4	87.8	37.3	86.1	80.2	466.7
TOTAL	154.3	150.7	122.3	158.0	94.4	172.9	145.3	997.9

TABLE 6

HOURLY AVERAGE MORNING PEAK MOVEMENTS COMPARED WITH HOURLY AVERAGE DAILY MOVEMENTS

WHARF AREA		DARLING HARBOUR	GLEBE ISLAND	WHITE BAY	MORT BAY	TOTAL
INWARDS MOVEMENTS	AVERAGE HOURLY MOVEMENTS MORNING PEAK	45.6 (38.9)*	25.7 (14.1)*	12.8 (49.6)*	17.4 (39.4)*	101.5 (34.1)*
	AVERAGE HOURLY MOVEMENTS TAKEN OVER WHOLE DAY	34.6	17.0	9.1	15.2	75.9
OUTWARDS MOVEMENTS	AVERAGE HOURLY MOVEMENTS MORNING PEAK	24.8 (60.1)*	10.7 (81.1)*	4.1 (50.2)*	17.7 (73.6)*	57.3 (50.9)*
	AVERAGE HOURLY MOVEMENTS TAKEN OVER WHOLE DAY	30.8	14.9	6.7	14.2	66.6
TOTAL MOVEMENTS	AVERAGE HOURLY MOVEMENTS MORNING PEAK	70.5 (46.4)*	36.3 (33.8)*	16.9 (49.7)*	35.2 (56.7)*	158.9 (46.1)*
	AVERAGE HOURLY MOVEMENTS TAKEN OVER WHOLE DAY	65.5	32.0	15.8	29.3	142.6

* Percent of loaded container trucks in early morning peak.

Note: Columns may not add because of rounding.

The results from the four locations were used to validate a noise estimation model. This in turn was used to estimate future noise levels at a further 60 locations in and around the Central Industrial Area, using estimates of total traffic, speed and percent heavy vehicles. It was found that noise levels were again generally in excess of acceptable standards, though Port Botany container trucks were such a small proportion of the heavy vehicles that, in themselves, they made a negligible contribution to noise levels.

Air pollution was treated in the Central Industrial Area study at a regional level. Most of the pollution was argued to come from fixed industrial sources rather than vehicles. In the future as new emission regulations began to bite, heavy trucks would make a fairly small contribution to air pollution levels.

Difficulty of measurement meant that the attention given to air pollution levels was limited. The dispersion effect of the daily air movement pattern in the Sydney region was not taken into account, nor was the total "canyon" effect of buildings adjacent to the road. Furthermore there was no consideration of visible smoke emissions from trucks. Nevertheless the small percentage of port container trucks in the heavy truck total suggests that the port container truck impact per se would not be large.

A more complete picture of environmental impacts would be obtained by relating movement information to information on the routes and the sensitivity of adjacent land uses. Some preliminary steps were taken in this regard in the UTS truck routing study (UTS, 1978), in which effects were categorised by land uses. The residual need is for some Sydney inventory on the "environmental capacity" of the road system, but to date little work has been completed in this area.

Noise and air pollution levels may be regarded as "conventional" measures of environmental impact, in that they are the ones most commonly used. As reported above the measured environmental impact of port container trucks appears low, yet this is not borne out by the expressed public concern over container truck movements. There is a variety of reasons why this is the case, but the more likely reason is that the wrong factors are being measured. Opposition may not be directed at the noise and air pollution impacts of port container trucks for example so much as at the whole notion of developing Botany Bay as a port. In this sense port container trucks are very much a tangible symbol of Botany Bay development. It follows that conventional measures of impact may not be all that meaningful.

Despite these difficulties it is possible to make some provisional statements on environmental impact. Just the transfer of operations to Port Botany alone will increase the container kilometres of travel by approximately 15% - this assumes the same level of throughput, distribution of customers and mode split as observed in the survey. The increase will be greater than 15% if allowance is made for the greater proportionate share of road haulage likely to follow the transfer.

Notionally this suggests more environmental impacts simply because more container kilometres are being travelled, although whether there are more impacts depends of course on the adequacy of the roads being used and the nature of the adjacent land uses.

Another factor to be considered is the possibility that decreases in container truck movements in certain parts of the metropolitan area will be more than offset, in terms of perceived environmental impacts, by the increase in port container trucks in other areas. For example when the first container terminal at Port Botany opens later this year operations at Mort Bay will be transferred to there. This certainly represents an improvement for the residents of Balmain. Gains in Balmain and other residential suburbs around Port Jackson will to an unknown extent be offset by a transfer of impacts to residential areas around Port Botany. Rockdale LGA in particular is affected due to the lack of high standard east-west roads west of Kingsford-Smith Airport, which tends to funnel movements through Rockdale. A number of roadworks are planned to minimise this intrusion. However the proposed new Chullora-Kyeemagh route to the west will not be completed for several years after Port Botany opens, and is itself subject to charges of environmental intrusion and may possibly still not be built.(1)

Impacts on Traffic

As noted previously the survey results show that approximately one thousand container trucks per day presently travel to or from Port Jackson, of which approximately half are loaded. Furthermore roughly 69% of the trucks are semi trailers, 25% rigid vehicles and 6% rigid vehicles in combination with a trailer. These vehicles are less manoeuvrable and speedy in traffic than private cars, utilities and station wagons, and in principle require some p.c.u. weighting for an assessment of their impact on traffic.

Altogether the total truck numbers make up considerably less than 1% of daily heavy truck movements in the metropolitan area. However much of this movement is concentrated in the north-south axis between Port Jackson and Botany. The relevant question is whether this concentrated flow poses a traffic problem in these areas.

On the basis of information contained in the UTS 1976 Central Industrial Area study it appears that even with a p.c.u. allowance the numbers on the road system at any given time are low absolutely, and do not generally constitute a significant increment to traffic in volume/capacity terms. The possible exceptions are in the immediate vicinity of Darling Harbour, where road access is currently poor, and certain intersections in the Central Industrial Area and to the north that are already heavily loaded with other traffic.

Road planning in the vicinity of Port Botany has been designed to meet traffic needs around the port, where roughly one-third of the total port-generated traffic will consist of container trucks. It is estimated that in the 1985 A.M. peak approximately 12 percent of outwards traffic on the foreshore road will consist of heavy container trucks, and four percent of inwards traffic. With increasing distance from the port the significance of port truck traffic may be seen to lessen. At the intersection with General Holmes Drive heavy container trucks will make up five percent of the traffic in the 1985 A.M. peak in the contra-flow direction and just one percent in the with-flow direction.

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1 An impact statement is to be prepared before construction starts.

On the most heavily travelled section of the Chullora-Kyeemagh expressway, assuming it is completed by 1985, port container trucks are likely to make up no more than two percent of the total traffic stream. Altogether port container trucks are not seen as constituting a significant increment to traffic, and certainly not in comparison with traffic growth generally.

CONCLUSION

Much of this paper has been concerned with developing the results of the 1978 survey, which yielded a good deal of data on the land movement of containers not formerly available.

The results showed that while the distribution of container users is widely dispersed throughout the metropolitan area the pattern is nonetheless dominated by a heavy orientation to five inner LGA's. There is a prevalent belief that the centre of the market is in the vicinity of Enfield, and that it is gradually moving west, but in the face of the survey findings this appears to be a not very useful concept either for planning new facilities or assessing truck movement impacts.

Road is currently the dominant mode for transporting containers and the survey results indicate that in the absence of Government enforcement there is little potential for rail haulage following the opening of the Port Botany terminals. At that time road haulage is likely to increase both proportionately and absolutely.

Container truck numbers are not large, either as measured in the survey or as estimated for 1985 in the Central Industrial Area study. In this study it was found that away from the immediate environs of the port and when assigned to their most likely routes, container truck numbers would be low in relation to other heavy trucks, and insignificant in terms of their impact on traffic. As a class, port container trucks would contribute little to volume/capacity problems on roads although this is not to deny that heavy trucks have impacts. While it is difficult to quantify the various impacts, the authors are of the opinion that concern in respect of impacts on traffic may have been overstated.

It has not proved possible to make quite the same emphatic statement on the environmental side, despite information on truck volumes, route choice, load status and time of day of movement. If all containers could somehow be transferred from road to rail there would be a negligible decrease in terms of the noise and air pollution measures that are customarily recorded. Yet there appears to be a continuing public concern with road haulage of containers, which suggests that further work in the environmental area is required.

APPENDIX A

URBAN TRANSPORT STUDY GROUP - CONTAINER SURVEY FORM

1.	GATE	Darling Harbour 4	1
		" " 5	2
		" " 6	3
		" " 7,8	4
		" " 9,10	5
		Glebe Island	6
		White Bay	7
		Mort Bay, Mort St.	8
		Mort Bay, Ballast Pt. Rd.	9

2. DATE June 12 13 14 15 16 19 20 21 22 23

3.	TIME - hour	07	08	09	10	11	12	13	14
	- ¼hr. starting					00	15	30	45

4.	INWARDS/OUTWARDS	Inwards	1
		Outwards	2
5.	VEHICLE	Rigid	0
		Semi	1
		Dog Trailer	2
6.	NUMBER OF CONTAINERS, regardless of size	none	0
		one	1
		two	2
		three	3
7.	SIZE OF CONTAINERS	one 20'	1
		two 20'	2
		one 40'	3
8.	ORIGIN OF INWARDS CONTAINER or DESTINATION OF OUTWARDS CONTAINER	Company _____	
		Suburb _____	
9.	IS CONTAINER EMPTY	one empty	1
		two empty	2
		one loaded	3
		two loaded	4
		don't know	5

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