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APPENDIX 3D

REVIEW OF CURRENT CONDITIONS –
OPERATIONAL**1. Introduction**

Operational and technical aspects currently are the main considerations for solid waste management practices in Malaysia. It has been recognised that additional funding is necessary to sustain improvement¹. Generally, there has been an improvement in service provision since two Concessionaires² took over the services, on an interim basis, from several LAs in the Central and Southern regions³. It is anticipated that further improvements will take place with the strengthening of the legal framework and institutional structure, capacity building/human resources development, technological advancement and increased funding.

Review and assessment of the current operational practices are thus required to enable identification and definition of various issues associated with existing solid waste management in Malaysia. With this objective the scope of assessment covered in this chapter includes the followings:

- At source storage and handling;
- Collection, transportation and fleet;
- Separation and recycling; and
- Disposal.

The assessment will be further refined when questionnaires, which were recently sent to State and Local Authorities, are evaluated.

2. At Source Storage and Handling

Wastes generated are temporarily stored at their pickup points for later collection and disposal. Due to the limitation of storage space in urban areas, biodegradability of the wastes and pursuant potential public health risks, current service standards generally impose a three times a week collection frequency in such areas. Traditionally, storage bins for solid waste at source are provided by the householders or owners. However, in recent years, many LAs and the solid waste Concessionaires have been providing various types of storage bins to the users, in order to improve the quality of services and collection efficiency.

The present situation in respect of on-site storage is not satisfactory in many LAs, although some LAs have attempted to improve the situation. A variety of storage containers are used, including baskets, tins, wooden boxes, carton boxes, drums, half drums, stationary concrete bins and concrete enclosures (**Plates 1 to 6**). In many premises, no container is provided and waste is packed in plastic bags and hung outside the house on fences, trees or left at the roadside (**Plates 7 to 10**). These are then subject to attack by stray animals and rodents and eventually the waste is scattered, causing a significant litter problem.

¹ Inception Report of National Strategic Plan Study for Solid Waste Management, Yachiyo Engineering Co. Ltd. February 2002

² Southern Waste Management Sdn. Bhd. and Alam Flora Sdn. Bhd.

³ Eighth Malaysia Plan 2001-2005 Chapter 7 (2001).

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Various types of communal bins are also being used, including metal bins, stationary concrete bins and bulk bins for tilt frame vehicles. The use of larger containers is intended to improve the collection efficiency and to deliver services to people who are living especially in more rural or remote areas (**Plates 11 to 13**). However, the selection of bin types and locations is often not satisfactory, and there is evidence that greater public awareness is required for the public to use containers effectively. Communal bins are sometimes badly managed and in many cases they become a “mini” dumpsite causing odour, rodents, health, and aesthetic problems (**Plate 14**).

Where the Concessionaires have taken over waste collection services from the LAs, they also maintain the storage receptacles provided. While existing types of bins are still being used, the Concessionaires have proposed, and gradually introduced, limited standardisation of waste receptacles. Existing damaged receptacles at specific locations are replaced with standard bins of 120-litre, 240-litre, 360-litre, 660-litre, 770-litre and 1,100-litre capacity.

For typical urban areas, such as several locations in Kuala Lumpur and the Klang Valley, the Concessionaires, with the co-operation of the respective LAs have carried out upgrading of community bin points. In some rural areas, replacement of compactor bins by roll-on-roll-off (Ro-Ro) bins has been carried out to enable larger storage, and in consequence, reduced collection frequency.

Stationary compactors are being used in high-density areas to cater for more waste and optimisation of collection frequency.

3 Collection, Transportation and Fleet

i. Collection System

Collection activity in urban areas is becoming increasingly complex because of the spatial generation patterns, increasing quantity of wastes and the high cost of fuel and labour. In Malaysia, solid wastes are collected by various agencies, namely LAs and/or Concessionaires and private waste contractors.

Waste is collected by using manual, semi-mechanical or fully mechanical methods. Manual collection is the most common method where the bins are picked up and transferred manually by field crews from door to door or specific locations. (**Plates 15 to 16**). The bins are usually small in size and may not be of a standard type, and it is a common practice for open trucks to be used.⁴ Semi-mechanical collection systems use hydraulic lifters attached to the collection vehicles (**Plate 17**). However, in many cases, wastes are collected manually into these vehicles because either the system is difficult to use, or due to the use of non-standard receptacles. A fully mechanical hauled-container system needs a Ro-Ro vehicle, which can transport a 15m³ container (**Plate 18**). Both full-and semi-mechanical systems require the public to place the wastes into the bins before they can be collected and this has sometimes created problems for collection because of indiscriminate disposal (**Plate 19 to 21**).

⁴ In interviews with the two Concessionaires they stated that they have introduced standards to their own collection crews, and to contractors they use, imposing the use of closed vehicles for solid waste collection (except bulk waste).

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About 60% to 80% of the total amount of money spent on solid waste operations is in collection and transportation phases⁵. A small percentage of improvement in the collection operation can effect a significant saving in overall cost. This amount is reflected in the cost of labour and other overhead costs. The high cost of the waste collection system is due to the method of collection employed and inefficient use of labour. On average, the manual collection time per point is about 24 seconds. A 1.5m³ container can cater for about 40 houses and the collection time ranges from 2 to 5 minutes (Wahid, 1990).

A compactor with a capacity of 10.5 m³ is able to collect waste from 300 to 350 houses per trip, with a minimum of two collection trips per working day. It is estimated that the total collection time is around 4 to 4.5 hours compared to 8 hours of actual working time. On average, haulage return time from collection area to disposal point is between 40 and 65 minutes. Off-route time usually takes more than 3 hours of the workers' time due to factors such as road congestion, poor routing, improper use of waste containers, and workers' truancy. In some areas, the majority of the workers have to work overtime in order to finish their job for the day (Noor Rashidah, 1995).

Manual collection is more expensive and slower compared to hauled-container systems. A study conducted (Noor Rashidah, 1995) in Seremban showed that about 45% of working time was spent on actual collection, 25% for haulage activity and the remainder was spent off-route. Zaidi (1993) studied the waste collection system in Kuantan, which showed that a hauled-container system reduced collection time by more than 40%, compared to normal or conventional collection time, using methods commonly practiced by the majority of the LAs. Collection costs can be reduced through adopting hauled-container collection systems, improved collection routing systems, together with the participation of the public in waste recovery programmes, and the efficient use of communal bins.

In low-rise residential areas, the most widely practiced methods of collection are door-to-door front kerbside collection and door-to-door back lane collection. In this case, the wastes are collected and loaded directly into the collection vehicles. In some cases where the houses or areas are not fully accessible to collection vehicles, central collection points are established and communal bins are placed. In some cases, the house owners are requested to bring out their wastes and throw them into the communal bins, but in other cases, workers collect the wastes from each household and transport them to a central collection point by using handcarts, resulting in double handling of waste.

In high-rise residential areas, refuse chute systems are sometimes used. But in many cases the collection of waste from refuse chambers has been troublesome because of poor access for collection vehicles. The refuse chute system also causes safety and hygiene problems. However, in some new high-rise residential areas, central bins are being installed instead of using refuse chutes. The success of the central bin system depends on the co-operation of the residents and the design of the bin to facilitate both users and refuse collection operators.

In commercial areas, both the door-to-door collection and communal bin systems are used. The most widely used bin is the 0.5-1.5m³ communal container, but large metal containers handled by tilt frame vehicles are also found in many LAs. The use of

⁵ Pillay, S.M. (1986). An overview of municipal solid waste management in Malaysia. Paper presented at the National Seminar on Management and Utilisation of Solid Waste. University Pertanian Malaysia 30 Sep-1 Oct 1986.

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communal bin systems is affected by the availability of suitable locations for bin siting. Because of the hot and equatorial climate and high content of organics in the wastes in Malaysia, minimum collection frequency of 2 to 3 times a week is essential. Everyday collection is desirable in commercial areas.

ii. Zones and Collection Routes

To ensure efficient collection system, all operating areas within a service area are usually divided into a number of zones. Each zone is further subdivided into collection routes. All zones and routes are coded and monitored through daily tracking record by the LAs or the Concessionaires. Geographical Information System (GIS) technology is an important tool to facilitate this operation, and has been considered by the Concessionaires. However, it is not yet widely used among LAs and the Concessionaires to optimise their operations.

iii. Collection Vehicles

Many types of collection vehicles are being used in Malaysia, presently ranging from simple handcarts to compactor vehicles (**Plates 22 to 25**). However, open tippers and side loader vehicles without compaction are still popular and being used by many LAs (**Plate 26**). These vehicles have a limited capacity and a high loading height, which reduces worker efficiency while loading. However, over the past few years, the larger LAs have purchased compactor vehicles to carry out house-to-house collection of refuse. Many of those compactor vehicles are also equipped with hydraulic systems to handle mechanical bins. Open trucks are nowadays used mainly for the collection of yard or garden refuses and other non-compacting waste, such as broken furniture, construction/demolition wastes and metal objects. Some small contractors are also using open trucks for waste collection mainly because of the financial constraints, but new requirements have been introduced by Concessionaires to use closed vehicles for solid waste collection (see footnote 4).

Most of the vehicles used and managed by the LAs are old, with ages ranging from 10 to 20 years. Frequent breakdown of vehicles and lack of back-up vehicles generally affect the collection efficiency. When taken into consideration those vehicles above 10 years, and assuming that at least 20 percent of these are under repair at any one time, some of the LAs will not have sufficient vehicle strength. Thus, LAs having insufficient vehicles are not able to provide the desired service level. For some smaller LAs, due to the distance between towns, the existing collection fleet (discounting the aged vehicles, above 10 years old) is also insufficient. Some new collection vehicles are being used, especially by the Concessionaires.

iv. Collection Frequency

The collection frequency from both LAs and Concessionaires are similar, i.e.:

- Residential (Landed property): 3 times per week
- Residential (High-rise): 6 times per week
- Community Bin: 6 times per week
- Commercial: 6 times per week
- Markets: 7 times per week

Based on the findings of a due diligence exercise (Alam Flora Sdn. Bhd. 1996), many LAs failed to follow the collection frequency as proposed, mainly due to the inefficient collection route organisation and frequent breakdown of vehicles.

Appendix 3D**v. Paid Collection Services**

Concessionaires have introduced paid collection services at certain service areas for the collection of construction, garden and bulky wastes. The services can be classified into two categories, namely scheduled services and on-call services.

vi. Collection Crew

Typical collection crew size is 1 driver plus 4 or 5 loaders. The number of loaders is considered necessary due to the lack of vehicle mechanisation and no standardisation of the types of bins in use. Certain LAs with adequate vehicle mechanisation and consistency of bin type have reduced crew size to 1 driver with 3 loaders (**Plate 27**).

vii. Collection Service Contractor

The use of private contractors in refuse collection is gradually increasing. The intention to privatise the provision of solid waste management services will lead to all operations in Peninsular Malaysia being undertaken by contractors (i.e. the Concessionaires and their nominated sub-contractors). While some LAs still control all waste collection, others have contracted virtually all collection responsibilities. Waste management services for LAs, which have been taken over by the Concessionaires, are undertaken either directly by the concessionaires or by sub contractors working on their behalf. Contractor companies, which were working directly for the LAs previously, have been retained by the two active Concessionaires when they entered into management agreements with LAs.⁶

It has been identified that the contracting out⁷ of collection services by the LAs still could not significantly improve service performance (Ghazali et al., 1997) mainly due to the following reasons:

- Contracts are often given to small contractors who did not have adequate capital to provide suitable vehicles for collection service;
- Most of the vehicle used are relatively small open lorries which were not efficient for collection service;
- Breakdown and lack of back-up vehicles affects the collection services.

However, Alam Flora Sdn. Bhd. has identified certain critical issues with regard to contract management and practice. They are:

- Contract values awarded to most of the contractors are in the range of RM5,000 to RM20,000/month. This amount is not sufficient to invest in equipment and transportation in order to increase their quality of services.
- Too many contractors to be managed, scattered operation areas for the same contractor and scope of work is not clear and standardised. Difficult to monitor and involves more time, resources and cost.
- Capacity and resources of subcontractors are minimal. The contractors sometimes do not want to invest in the business because of no securities in their contract.

⁶ Information gained from discussions with Concessionaires.

⁷ Prior to Concessionaires taking over service provision.