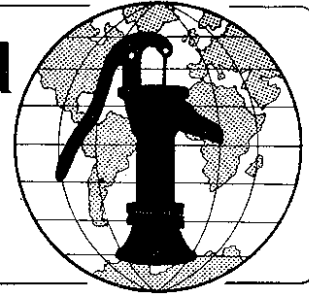


Water for the World



Designing a Solid Waste Collection System Technical Note No. SAN. 3.D.3

A solid waste collection system is a means of removing solid waste from houses, yards, marketplaces, factories, or public buildings and transporting it to a landfill, composting area, or biogas plant. Designing a collection system involves selecting a method of collection, determining necessary materials, selecting personnel, and establishing a schedule of operation. The products of the design process are a detailed materials list and a scheduling chart. These products will be given to the construction supervisor prior to operation.

This technical note describes how to design a solid waste collection system and arrive at the essential end-products. Read the entire technical note before beginning the design process.

Useful Definitions

GARBAGE - Food and crop wastes from growing, harvesting, storing, preparing, cooking, or serving of food; these materials rot quite quickly.

RUBBISH - All material other than garbage that is thrown away, including broken dishes, utensils, and furniture; useless scraps of wood, metal, or glass; sweepings from house, yard, or street; and anything else that is discarded.

SOLID WASTE - Garbage, rubbish, animal manure, dead animals, and ashes.

Selecting a Method of Collection

The three basic methods of collection and transport are: (1) household, (2) community, and (3) paid-worker. The collection method selected should be compatible with the method of waste disposal or reuse. See "Methods of Solid Waste Management," SAN.3.M.

Household. This is suitable for small amounts of waste and an on-lot landfill, compost stack, or biogas plant if there is a lot of animal manure. Householders sweep out house, porch, and yard; put garbage in a container; shovel animal manure into a cart; and rake up waste from the harvest. They hand-carry or cart the waste to an on-lot site for disposal or reuse.

Community. This is suitable for larger amounts of waste and community disposal or reuse. Members of the community clean up houses, yards, stables, marketplaces, or public buildings and put wastes in either privately-owned or public containers. They load the containers on a vehicle and transport them to a community landfill or composting area. To function properly, this method requires unflinching cooperation among members of the community.

Paid-worker. This is suitable for larger amounts of waste and community disposal or reuse. Members of the community put solid waste in public containers located near a road, marketplace or public area, and paid workers transport the waste to a community disposal site. Or, there may be door-to-door collection from homes and shops. This method requires cooperation among community members and money to pay workers.

Table 1 summarizes the factors that influence the selection of a collection method.

Determining Necessary Materials

The types of materials needed can be roughly divided into three categories: (1) cleaning equipment, (2) containers, and (3) vehicles. All materials should be locally available.

Cleaning equipment. The type of equipment depends on the area to be

cleaned, the nature of the waste, and personal preference. Brooms and dust-pans can be used to clean out houses, porches, sidewalks, or streets. Shovels can be used to remove animal manure from the yard. Rakes, pitch-forks, and shovels can be used to pick up harvest wastes or rubbish from factories or plants. For household and community systems, individuals must provide their own equipment. For paid-worker systems, the equipment should be provided by the community. See Figure 1.

Containers. The purpose of a container is to temporarily hold solid waste before disposal. The type of container and its size may vary depending on availability and local preference. Acceptable containers include buckets, baskets, cans, barrels, and drums. They all should have lids to keep out flies and keep in odors. Containers used for community and paid-worker collection systems should hold 50-200 liters and must be sturdy enough to stand up to rough handling. The number of containers needed depends on the amount of waste and the frequency of collection. There should be more than enough containers to hold all the waste generated between collection days. See Figure 2.

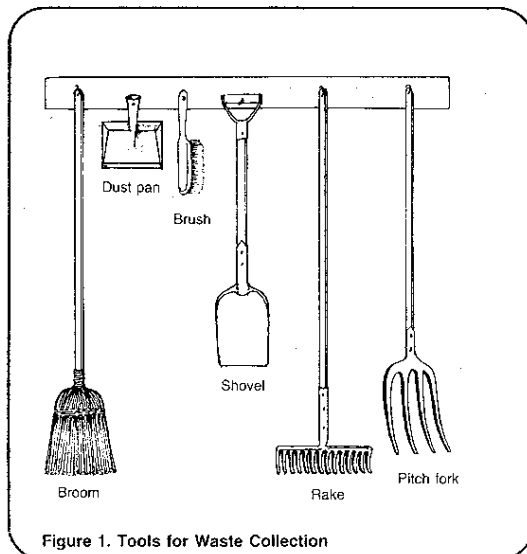
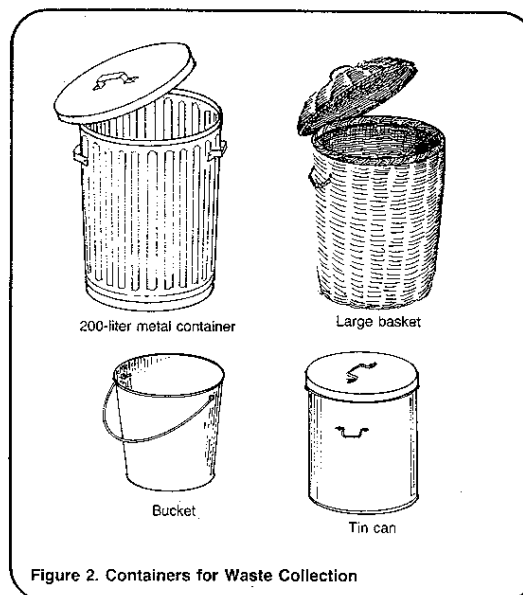


Table 1. Factors Influencing Collection Methods

Collection Method	Influencing Factors
Household	Small amounts of waste; on-lot site for disposal or reuse
Community	Larger amounts of waste; community site for disposal or reuse; community cooperation
Paid-worker	Larger amounts of waste; community site for disposal or reuse; community cooperation; money to pay workers



Vehicles. For all community and paid-worker systems, and for some household systems, vehicles are needed to transport solid waste, in containers or not, to the site for disposal or reuse. Vehicles should be locally constructed and may be hand-drawn, animal-drawn, bicycle-powered, or motorized. If containers are transported, the loading height of the vehicle should be no more than 1.0m for ease of handling. Vehicle repair and replacement parts must be readily available, especially for paid-worker

collection systems. See Figure 3. Design a storage shed for the vehicles. It should be weatherproof and have a door with a lock. Locate it near the disposal site.

Selecting Personnel

Every collection system must have someone in charge and someone to do the work.

For a household collection system, one member of the family should be responsible for seeing that waste is collected regularly. This person may also carry the waste to the disposal site.

For a community collection system, each marketplace vender or someone from each household voluntarily performs the work. However, a volunteer overseer respected by the community will have to organize the collection system. In addition, his or her continued presence will ensure a more efficient operation. The overseer could, for example, walk through the marketplace on collection day encouraging vendors to clean out their stalls and place garbage in containers.

For a paid-worker collection system, a paid supervisor must be hired. The supervisor must be a responsible person with the ability to give orders. He may or may not be charged with hiring workers. Workers should be able-bodied and capable of following orders. Their numbers will depend on the size of the collection system, but they should be able to complete their daily work within a reasonable length of time, for example six to ten hours.

When the method of collection has been selected and all necessary equipment and personnel have been determined, make out a materials list similar to Table 2 and give it to the construction supervisor.

Establishing a Schedule of Operation

Establishing an operation schedule involves determining the frequency of collection, selecting locations for containers, and, for paid-worker systems, determining a collection route. In all systems, the persons collecting wastes may also be the ones disposing of it in a landfill or

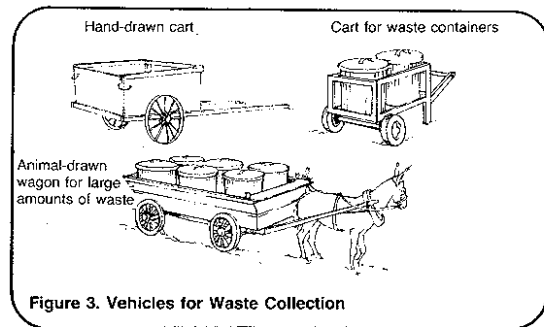


Figure 3. Vehicles for Waste Collection

Table 2. Sample Materials List

Item	Description	Quantity	Estimated Cost
Labor	Supervisor (for one year)	1	—
	Workers (for one year)	4	—
Supplies	Equipment: shovels	—	—
	brooms	—	—
	dust pans	—	—
	Containers: 200-liter metal drums with lids	—	—
	Vehicles: animal-drawn carts	—	—
	Other: gloves	—	—
	boots first-aid kit	—	—

Total Estimated Cost = —

placing it in a compost stack or biogas system. See "Designing a Landfill," SAN.3.D.1, "Designing a Composting System," SAN.3.D.2, and "Designing a Biogas System," SAN.3.D.4.

Frequency of Collection. Solid waste should be collected often enough so that the amount collected is easily handled. This may mean collecting daily or two or three times a week. In no case should collection be less frequent than once each week, because it takes just over a week for fly eggs to hatch and mature. Usually two collections per week are enough although a central market will require daily collection.

Some examples of collection frequency:

- Members of a household throw garbage into a garbage can after each meal. Every two or three days, one member of the family carries the can to the disposal site or compost stack.

- The community established a "Clean Day" to be observed once each week: every Saturday or Monday, for example. On this day, household members and shop keepers clean out their living and working areas and cart the waste to a community disposal site.

- Community members place their solid waste in public containers. Each day or two, paid workers either empty the containers into a vehicle or load them on a vehicle, and transport the waste to a community disposal site.

Location of Containers. Containers should be placed in easily accessible areas or collection points. If containers are transported from a collection point to a disposal site, they must either be replaced with empty ones or returned to the collection point.

It may be that a container is filled in one location and collected from another. For example, a container may be placed near a market stall and filled with garbage during the morning, then carried to the side of the road for collection by a paid worker in the afternoon.

Route. A collection route must be established for a paid-worker system in order to save time and effort and ensure efficiency of the system. An established collection route encourages a routine of cleanliness in the community. Plan the route so that it is as short and simple as possible and ends as near as practical to the disposal site.

When the schedule of operation has been established, draw up a scheduling chart similar to Figure 4, showing the route, collection points, collection days, and approximate time of collection, morning or afternoon. Give the chart to the construction supervisor.

In summary, give the construction supervisor a materials list and a scheduling chart similar to Figure 4 prior to operation of the collection system.

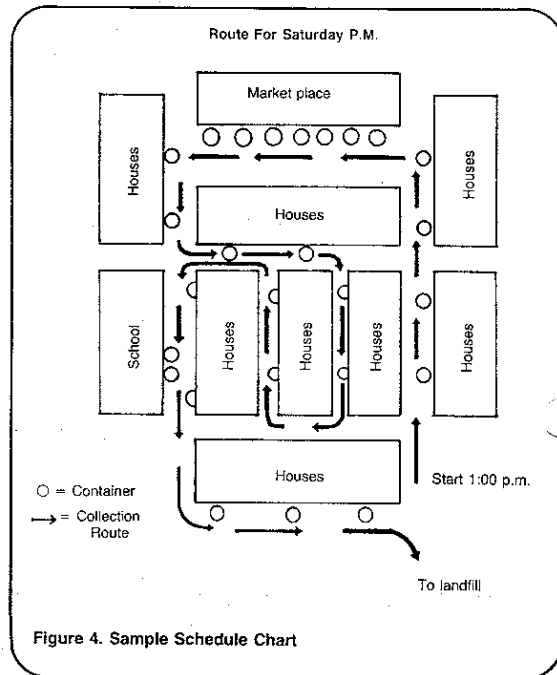


Figure 4. Sample Schedule Chart

Technical Notes are part of a set of "Water for the World" materials produced under contract to the U.S. Agency for International Development by National Demonstration Water Project, Institute for Rural Water, and National Environmental Health Association. Artwork was done by Redwing Art Service. Technical Notes are intended to provide assistance to a broad range of people with field responsibility for village water supply and sanitation projects in the developing nations. For more detail on the purpose, organization and suggestions for use of Technical Notes, see the introductory Note in the series, titled "Using 'Water for the World' Technical Notes." Other parts of the "Water for the World" series include a comprehensive Program Manual and several Policy Perspectives. Further information on these materials may be obtained from the Development Information Center, Agency for International Development, Washington, D.C., 20523, U.S.A.