Garbage Handling Guidelines

1. Per capita waste generation shall be considered as follows:

Application	Value	Unit
Residential - Casa	0.35	kg/capita/day
Residential - Aspi	0.4	kg/capita/day
Residential - Hi End	0.45	kg/capita/day
Commercial	0.2	kg/capita/day
Retail	As per use (F&B, Retail, Supermarket, etc.)	
Horticulture	20	kg/acre/day

2. Various codes and agencies define different composition percentages of dry, wet and inert wastes. Our consideration while designing the solid waste management facility shall be as follows:

Solid Waste Composition

Source	Compostable	Dry	Inert	
CPHEEO	20-60%	20-70%	1-30%	Middle Income Country
CPCB	40-45%	25%-40%	20-30%	
NEERI	47.43%	27.37%	25.16%	
NBC	40%	60%		

Policy Adoption	Compostable	Dry	Inert
Project with MSW<5TPD	45%	55%	
Project with MSW>5TPD	45%	40%	15%

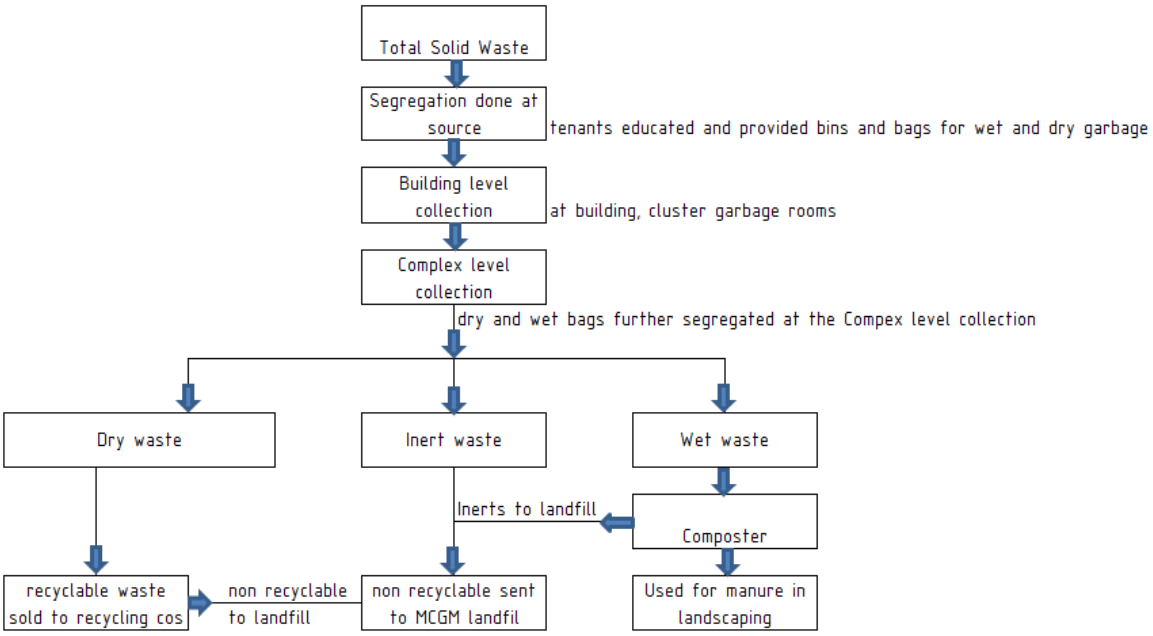
Abbreviations:

CPHEEO	Central Public Health and Environmental Engineering Organisation
CPCB	Central Pollution Control Board
NEERI	National Environmental Engineering Research Institute
NBC	National Building Code
MSW	Municipal Solid Waste
TPD	Tons Per Day

References at the end of this document

3. Garbage should be segregated at source into two groups – wet and dry at source. Space will be provided in the kitchen for a two bucket dustbin (maximum 10litres each).

Flow chart for Solid Waste Management



4. All projects which have compostable waste <5Tons shall be planned with Automatic Organic Waste Composters (unless otherwise required by MOEF approvals) while alternate technologies (Biomethanation, Refuse Derived Fuel, Gassification, etc.) should be adopted in large township projects (with compostable waste in excess of 5Tons), as per commercial and operational merits (to be evaluated separately).
5. Approx. 50sqft space per federation (group of buildings/societies which share club) to be allocated for e-waste.

6. Following is a list of items which constitute wet, dry and inert wastes:

Dry Waste	Compostable Waste	Inert Waste
Dry Waste (Uncontaminated)	**Wet Waste**	**Hazardous Waste**
Paper	cooked food	A. Biomedical (Hazardous)
Metal	uncooked food	Syringes, Razor
Used Fabric, Clothes	fruits, vegetable peels	Medicines
Glass	flowers	Thermometers
Rubber		Used cosmetics
Thermocol or Polystyrene	egg shells, bones, fish scales	B. Toxic substances, like:
Plastic		Paints and chemicals
Leather or Rexine	tea leaves and coffee grounds	Cleaning agents, Insecticides
Debris, Construction Waste**	**Horticulture Waste**	**E-waste**
Dust, Debris	Leaves	Computer parts
Bricks, boards, wood	Branches	Mobile phones
Mortar	Grass, etc.	Electrical and Electronic equipment of any kind
Broken glass panes		Watches
Construction waste		Remote Controllers
		Cables
		Bulbs, Tubelights, CFLs
		Batteries
		Biomedical (Sanitary) Waste
		Diapers
		Sanitary napkins
		Bandages
		Blood or other body fluid contaminated cloth

Legend and notes:

- to be handed over to municipality
- to be treated by the society/FM
- expected to be handled by the resident themseves
- to be handed over to the recycler by the society/FM

** debris collection agency to be arranged by FM, to be paid case to case by the resident

Horticulture waste to be directly deposited by the horticulture team to the waste management area

7. Since there is a significant proportion of dry and inert waste which the resident manages by self, a diversity of 0.6 shall be considered while sizing the dry waste storage space within the Solid Waste Management Facility.

8. The Facilities Management (FM) will provide dual coloured garbage bags – blue for compostable wet garbage and black/white for dry garbage. The bags should be such that they can be easily tied (e.g. with drawstring / stick able flap).

9. The space planning for the solid waste management system shall be done with the following considerations:

Composter space	a. Shall house only the composter and shredder b. Shall be adequately ventilated (fan or naturally), preferably should away from the buildings to facilitate natural ventilation c. Shall have trough and water provision for local cleaning c. Leachate drain shall be connected to the nearest Sewage chamber
Segregation space	a. Shall house segregation table, and have space for multiple trolleys as per requirement b. Shall be air conditioned to minimize odour c. Shall have water provision for local cleaning
Dry waste storage	a. Shall be an empty room within the solid waste management area b. Shall be sized to contain 3 days capacity of the waste to be handed over to municipality or recycler
Manure Storage	a. Space for manure heap b. Manure heap shall always be covered by tarpoline (or similar) or to be kept in bags to avoid odour issues

10. The residents and staff will be trained about the need and method of segregation at time of possession. A detailed note on handling of garbage will also be provided to each resident at time of possession.
11. Garbage can be collected in any one of two fashions:
    a. Human collection: Door to door collection by human using a movable garbage bin and thereafter, the garbage bin is emptied into an external waste receptacle (dumpster).
    b. Garbage Chute: The resident (and/or their domestic help) will drop their garbage (likely on daily basis) into the garbage chute after properly tying the bag. The garbage chute will empty into a (movable) plastic (or equivalent) garbage trolleys on the ground/other floor. The garbage room on the ground floor of each wing/cluster will have space for at least two trolleys. The trolley will have a cover so that the garbage can be covered at time of movement of the trolley. The trolley will be such that its height is 2.4 m or less and it can move easily in the path from the location of the garbage trolleys in the building to the external waste receptacles/dumpster. The garbage trolley will be collected each night (after 9 pm) and then again in the morning (before 6 am) by the collection staff and taken to the dumpster through a pre-determined, which should be decided such that interaction with the key common areas and other areas frequently used by the owners is minimized. The garbage chute, if provided, inside the building will have a sprinkler system and the entire chute shall be sprinkled each

day around 7 am (after removal of the previous day's garbage bags from the ground level). Further, the garbage chute shall be fumigated at least once a month by a professional agency.



Reference image of a movable garbage trolley (size not indicative)

12. It is expected that each home will produce solid waste as per item 1 above, – assuming 80% occupancy, calculate the total garbage trolley capacity required, assuming that garbage is collected only twice a day.
13. If the segregation is working efficiently, (based on the residents' adherence to the segregation norms) the collection staff will segregate the bags into two dumpsters/storages, separating wet and dry garbage. The wet garbage should be used to create compost/manure which will be used in the landscape and the garden, however remaining manure to be disposed off as our requirement is less than the total production. Suitable space as per item 9 should be planned in the project. The dry and inert garbage will be collected by the municipal collection/recycler truck,– the dumpster/storage used for the same should be capable of being easily lifted by the municipal truck. Total dumpster capacity required would be equivalent to garbage generation happening between the agreed frequencies of municipal collection. Adequate parking space is to be provided for the municipal truck so that it can easily lift the dumpster.



Reference image of a dumpster (size not indicative)

14. Garbage cans shall also be placed at appropriate locations in the landscape area, as well as other common facilities, to ensure that garbage is appropriately thrown by users at all times.
15. The garbage path shall be duly mopped and cleaned after the garbage trolley has been taken through it to the dumpster.
16. The Project team shall be responsible for:
    a. provision of all necessary spaces for the solid waste management including the Solid Waste Management plant (composter or others),
    b. Lighting, Power and Ventilation of the Solid Waste Management spaces

17. While the Facilities Management team shall be responsible for the procurement of:
    a. All types of bins,
    b. garbage collection and processing agencies
    c. Sorting table and weighing scales
    d. Municipal interface for garbage collection.

References

National Action Plan for Solid Waste Management – CPCB

2015

3.2 The characterization of MSW is an important aspect as the composition will determine the applicability of waste processing technology. On an average, garbage is composed of 40-45% of organic fraction and 20-30% inert fraction, rest being plastics, paper, rags and other components. The calorific value of garbage will help to identify the treatment technologies like Waste-to-Energy and other thermal processes.

CPHEEO – Municipal Solid Waste Manual (Swatch Bharat Mission) – 2016

NEERI Study

- **2004-2005:** NEERI's study "Assessment of Status of Municipal Solid Wastes Management in Metro Cities and State Capitals" in 2004–2005 assessed 59 cities (35 metro cities and 24 state capitals). Studies have revealed that waste generation rate varies from 0.12 to 0.60 kg/capita/day. Analysis of physical composition indicates that total compostable matter in the waste is 40%–60%, while recyclable fraction is 10%–25%. The moisture content in the MSW is 30%–60%, while the C/N ratio is 20–40.

Table 1.6: Physical Composition of Municipal Solid Waste[9]

YEAR	COMPOSITION (%)							
	Biodegradables	Paper	Plastic/ Rubber	Metal	Glass	Rags	Other	Inerts
1996	42.21	3.63	0.60	0.49	0.60	-	-	45.13
2005	47.43	8.13	9.22	0.50	1.01	4.49	4.016	25.16

CPHEEO Manual – Chapter 3 – Composition and Quantity of Solid Waste

Table 3.3 : Patterns of Composition, Characteristics and Quantities

	Low Income Countries (1)	Middle Income Countries (2)	High Income Countries (3)
Composition : (% by weight)			
Metal	0.2 – 2.5	1 – 5	3 – 13
Glass, Ceramics	0.5 – 3.5	1 – 10	4 – 10
Food and Garden waste	40 – 65	20 – 60	20 – 50
Paper	1 – 10	15 – 40	15 – 40
Textiles	1 – 5	2 – 10	2 – 10
Plastics/Rubber	1 – 5	2 – 6	2 – 10
Misc. Combustible	1 – 8	–	–
Misc. Incombustible	–	–	–
Inert	20 – 50	1 – 30	1 – 20
Density (kg/m^3)	250 – 500	170 – 330	100 – 170
Moisture Content (% by wt)	40 – 80	40 – 60	20 – 30
Waste Generation (kg/cap/day)	0.4 – 0.6	0.5 – 0.9	0.7 – 1.8

(1) Countries having a per capita income less than US$360 (1978 prices)
(2) Countries having a per capita income US$360-3500 (1978 prices)
(3) Countries having a per capita income greater than US$3500 (1978 prices)

Source : Holmes, J : Managing Solid Waste in Developing Countries.

NBC 2016

5 ASSESSMENT OF PER CAPITA WASTE QUANTITY

5.1 For purposes of this Section, the following municipal refuse generation rates are recommended:

a) Residential refuse : 0.3 to 0.6 kg/capita/day
b) Commercial refuse : 0.1 to 0.2 kg/capita/day
c) Street sweepings : 0.05 to 0.2 kg/capita/day
d) Institutional refuse : 0.05 to 0.2 kg/capita/day

Out of the total solid waste generated, 40 percent may be taken as organic waste and 60 percent as inorganic waste. The knowledge of chemical characteristics of waste is important for selecting and designing the waste processing and disposal facilities.