स्वच्छ भारत
एक कदम स्वच्छता की ओर

सत्यमेव जयते
Ministry of Urban Development
Government of India

Swachh Roads

Standard Operating Procedures


USAID
FROM THE AMERICAN PEOPLE


BRIDGING THE KNOWLEDGE GAP
WASH
INSTITUTE

FOREWORD

M. Venkaiah Naidu

Minister of Urban Development, Housing & Urban Poverty Alleviation and Parliamentary Affairs

The Swachh Bharat Mission, which aims to make India a clean and open defecation free nation by October 2019, needs to become a 'jan andolan' with participation from every stakeholder.

We have taken up a multi-pronged strategy for making the Mission a people's movement. In its second year since launch, it is heartening to note that the Swachh Bharat Mission has caught the imagination of all stakeholders.

The Ministry of Road Transport and Highways has been partnering with us in our journey towards 'swachhata'. I am pleased to see the Standard Operating Procedures for "Roads" being released by my Ministry, which lays out the infrastructure norms, assessment & inspection procedures and checklists, and sanitation and waste management best practices to be followed by Roads. Given the crucial role of roads and highways plays in cities, It is my firm belief that this will go a long way in our collective journey towards a "Swachh Bharat" by 2nd October 2019.

FOREWORD

Rao Inderjit Singh
Minister of State, Ministry of Urban Development
Government of India

On 2nd October 2014, the Hon'ble Prime Minister Shri Narendra Modi launched the Swachh Bharat Mission to clean India's cities and towns. The Swachh Bharat Mission has now reached a very crucial stage in its implementation, with every stakeholder involved in a city / town's development beig required to contribute their efforts towards 'swachhata'.

We present the Standard Operating Procedures for "Swachh Roads". It enlists various infrastructure norms, assessment & inspection procedures and checklists, and sanitation and waste management best practices to be followed by roads.

I hope the concerned authorities will find these guidelines very useful in keeping the roads and higways 'swachh', in the larger contet of a 'Swachh Bharat".

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Background, Objectives & Scope

Background

Waste management is a major problem in India, especially littering in the public spaces. Roads are among the badly hit areas owing to this malpractice of littering. Other than being treated as garbage dumps, they bear the brunt of clogged drainage and open defecation too. According to the Central Pollution Control Board (CPCB), Urban India generates about 47 million tones of solid waste every year. Faced with rapid population growth, lack of public awareness and attude of apathy towards cleanliness, Indian roads have been struggling for maintaining good cleanliness and hygienic standards.

The Hon'ble Prime Minister launched the Swachh Bharat Mission on 2nd October 2014 with a target to make the country clean and sanitized by 2nd October, 2019. As a part of the Swachh Bharat Mission mandate, it is imperative for the concerned authorities to ensure that roads under supervision are well-maintained and clean, to move towards the larger goal of a healthy, unpolluted environment.

Objectives

For uniform cleanliness guidelines it is essential to have a standard operating procedure to ensure that the concerned authority maintains some set standards of cleanliness on the roads and the adjacent areas under their supervision.

The purpose of this SOP is to improve current cleanliness levels of the roads in India, with active participation from users.

- ✓ All commuters, management/municipal corporation/ local authority and staff concerned are responsible for the cleanliness of the roads
- ✓ The Standard Operating Procedures for Cleanliness of Roads provides detailed best practice guidelines for all aspects of cleaning of roads
- ✓ All roads should comply with the guidelines set out in the Standard Operating Procedures

An assessment framework has also been defined in this document, which can help the concerned authority to improve its cleanliness & maintenance processes and achieve a greater level of cleanliness than the existing ones for the roads under their supervision.

These directions will be updated continually to incorporate new procedures and products. As it is dynamic in nature, it is advisable to periodically check for updated

version on the swachhbharaturban.in portal. Any amendments to the procedures based upon requirement should be identified and incorporated as per the requirement.

This document serves as the base document. The actual allocation of resources and the actual frequency of cleaning may vary according to the local situations.

It is important that all aspects of cleaning and sanitation provision are aligned with the Swachh Bharat Mission Guidelines and other relevant environment-related guidelines issued by the Government of India.

The Standard Operating Procedures are set out in a detailed format to cover the issues required to implement proper cleaning of roads and the areas under their purview.

Scope

This SOP for 'Swachh Roads' is applicable for all the urban roads maintained by government and private entities, in states and cities, across India.

Responsibilities

Overall Responsibility

The concerned government authority, i.e. for roads within cities are the responsibility of Municipal Corporation/ Urban Development Authority/ Panchayat, or whichever Urban Local Body (ULB) is looking after the area, for the upkeep/cleaning and maintenance of the roads. The roads connecting villages and towns are usually taken care of by the Public Works Department (PWD) of the state. Additionally, the PWD or a dedicated Implementation Authority (e.g. UPSHA, MSRDC) has the mandate of developing State Highways in the state. MoRTH/ NHAI/ NHIDCL have the mandate for National Highways. The concerned government authority through their facility management service provider would be responsible for ensuring compliance to the SOP for the roads under their supervision area.

Every area/ locality should have a committee overseeing sanitation and cleanliness for the roads which originate/ cross/ connect that locality to other locations. The concerned committee will need to monitor and supervise the works being carried out by the responsible party (Management/Contracted Agency) and ensure compliance to the SOP.

The committee should also ensure compliance to infrastructure requirements as laid out in this SOP. Further, in case of contracting an external agency to carry out the cleanliness works, Service Level Agreements should be drafted and signed by all the involved parties.

Responsibilities of the Facility Management /Contracted Agency

It is the responsibility of the Government Agency/ Contracted Agency to carry out the cleaning of the roads, including roadways, footpaths, dividers, public toiets and other infrastructure installed on the roads on a regular basis, and comply with the following guidelines:

- Ensure a clean environment for the commuters through proper selection of agencies required for the job
- Regular surprise inspection of the roads and associated infrastructure to ensure compliance with the SOP
- Attain and maintain high standards of cleanliness and general upkeep
- Train, control and supervise staff under its establishment
- Control and issue cleaning materials and equipment
- Maintain official records on staffing, cleaning materials and equipment

- Clearly define cleaning standards, frequency and accountability for cleaning; i.e., who cleans, what and how they clean, when they clean it.
- Ensure that during cleaning schedules, no area is missed out from routine cleaning
- Statutory requirements are met in relation to Waste Management, Environment Protection Act, and Pest control

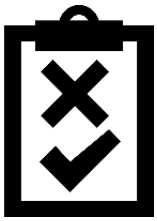
Responsibilities of Commuters

The nature of services provided by the roads is dynamic. Therefore, other than the concerned government agency/contracted agency, it is the duty of commuters to contribute towards maintaining the cleanliness of roads directly or indirectly in the following way:

- Desist from and discourage others from using roads as garbage dumping ground
- Support hygiene promotion activities on the roads during the travel/ or as pedestrians
- Encourage healthy and responsible road-use behavior within peer group and family
- Stick to the norms laid down in terms of waste management, safe driving and using public roadside toilets
- Promote healthy hygiene practices at home and in the community
- Participate in monitoring and corrective actions

Assessments & Inspections

Self-Evaluation



Three broad parameters, viz. infrastructure availability, maintenance of road premises and equipments, and feedback from commuters, Staff and Municipal Corporation – are being proposed here for assessing/ rating roads on overall cleanliness. The parameters for these ratings may also be utilized for conducting self-evaluation by the concerned authority to identify areas of improvement and intervention. The proposed parameters and their scoring are given below:

INFRASTRUCTURE (MAX. SCORE- 88)					
1.	Roadway	In good condition	In fair condition	In broken condition	
		4	2	0	
2.	Road shoulders	In good condition	In a fair condition	In broken condition	Not marked
		4	2	1	0
3.	Water drainage system (with covered drains)	In good condition	In broken condition	Not covered	
		4	2	0	
4.	Street markings	In good condition	In bad condition	No markings	
		4	2	0	
5.	Side guard rails	In good condition	In broken condition	Not available	
		4	2	0	
6.	Road barriers	In good condition	In bad condition	Not available (if required)	
		4	2	0	
7.	Road cleaning equipment	Available in good condition	Available in poor condition	Not available	
		4	2	0	
8.	Sufficient number of public toilets with water facility available	Available in good condition	Available in poor condition	No toilets available	
		4	2	0	

9.	Toilet provision for men / women / disabled	Separate facilities available for men and women, with at least one disabled friendly facility	Separate facilities available for men and women, without any disabled friendly facility	Common toilet facilities available, with at least one disabled friendly facility	Common toilet facilities available, without any disabled friendly facility	No toilets available
		4	3	2	1	0
10.	Braille toilet signage	Signage available for Toilets on Roadside		Signage not available for Toilets on Roadside		
		4		0		
11.	Traffic signs	Available in good condition	Available in bad condition or not visible		Available but not appropriate	Not available
		4	2		1	0
12.	Traffic signals	Available in good working condition	Available in poor condition (not working properly or broken)	Not available		
		4	2	0		
13.	Street lights	Available in good working condition	Available in fair condition (Some Lights working)	Available in poor condition (Lights not working)	Not available	
		4	2	1	0	
14.	Plantation area	Available in good condition	Available in poor condition	Not Available		
		4	2	0		
15.	Bridges and flyovers	Available in good condition	Available in fair condition	Available in bad condition	Not available	
		4	2	1	0	

16.	Footpath	Available in good condition 4	Available in broken condition 2	Not available 0	
17.	Safety measures for emergency	Available in good condition	Available in bad condition	Not Available	
		4	2	0	
18.	Waste storage depots	Available in good condition	Available in fair condition	Available in bad condition	Not Available
		4	2	1	0
19.	Texture of the road	In good condition	In fair condition	In broken condition	
		4	2	0	
20.	Zebra crossing	Available in good condition	Available in fair condition	Available in bad condition	Not Available
		4	2	1	0
21.	Speed breakers	Available in good condition	Available in fair condition	Available in bad condition	Not Available
		4	2	1	0
22.	Road dividers	Available in good condition	Avaialble in fair condition	Available in bad condition	Not available
		4	2	1	0
SUB-TOTAL (INFRASTRUCTURE SCORE)-A					

SERVICE/MAINTENANCE (MAX. SCORE- 55)				
1.	Prompt repairs of potholes, cracks, concrete joints, drains, lighting and signage	Done regularly 4	Done sometimes 2	Never done 0
2.	Cleaning of vehicular accident areas	Done regularly 4		Never done 0
3.	Toilet cleaning	Cleaned regularly 4	Cleaned sometimes 2	Never cleaned 0
4.	Toilet water availability	Available 4		Not available 0
5.	Cleaning water stagnation on the roofs, courtyards, roadside	Cleaned regularly 4	Cleaned sometimes 2	Never cleaned 0
6.	Repairing any leakage from the water supply line, sewers or unfiltered water supply line	Maintained regularly 4		No regular maintenance 0
7.	Cleaning of waste storage depots	Done regularly 4	Done sometimes 2	Never done 0
8.	Bio-degradable waste processing	Processed at compost pit/ compost equipment 3		Not composted 0
9.	Collection and Transportation of Waste	Done regularly 4	Done sometimes 2	Not done 0
10.	Painting the road markings (Zebra crossing, road markings, speed	Done regularly 4	Done sometimes 2	Never done 0

11.	breakers and dividers etc.) Maintaining the plantation area near road	Done regularly 4	Done sometimes 2	Never done 0
12.	Cleaning of road pavement, shoulder and footpath area	Done regularly 4	Done sometimes 2	Never done 0
13.	Maintenance of flyovers and bridges	Done regularly	Done sometimes	Never done
		4	2	0
	Keeping the construction site /facilities in a clean, tidy and orderly condition, free of litter and debris and taking care of road furniture	Cleaned regularly	Cleaned once in a week	Never cleaned
14.		4	2	0
SUB-TOTAL (MAINTENANCE SCORE)-B				

FEEDBACK FROM COMMUTERS (MAX. SCORE- 20)				
1.	Adequate toilet facilities to the communters	Adequate number available for use	Inadequate number available for use	
		4	0	
2.	Availability of sufficient number of dustbins for disposing waste	Adequate number available	Inadequate number available for use	Not available
		4	2	0
3.	Waste collection done	Done regularly (One in 3 days)	Done sometimes (Once in 2 weeks)	Not done
		4	2	0
4.	Cleaning of roads	Done regularly	Done sometimes	Not done
		4	2	0

11.	Maintenance of potholes, cracks, concrete joints, drains, line marking, lighting and signage	Well-maintained and clean	Poorly-maintained and not clean
		4	0
SUB-TOTAL(FEEDBACK SCORE)-C			
TOTAL SCORE (A+B+C) = ____/163			

Gap Assessment

Apart from self-evaluation as described above, a periodic assessment of infrastructure gaps is also essential in order to maintain the standards of sanitation and cleanliness in the school premises. The format given below is used for the same:

S.No	Parameter	Standard	Actual
1.	User-Specific Toilets	As per need for Men, women and disabled with ramp provision and braille signage	
2.	Water Taps	With adequate drainage arrangement	
3.	Street Lights	Maintained regularly and in working condition	
4.	Traffic Light	Place at appropriate intersections and functioning properly	
5.	Markings on Roads	Done appropriately and are visible enough to serve the purpose (White/broken white /solid white/yellow lines)	
6.	Traffic Signs	Regulatory, warning, information, oneway street and stop & yield signs should be placed appropriately	
7.	Dustbins	• Municipal Solid Waste (MSW) storage depot – For container size 3-10m^3 capacity, distance between 2 depots should not be more than 500m • For smaller depots: 1 m^3 capacity container size required • Container size should be decided according to density of the waste and the quantity of waste produced • (In India: density is about 500 kg/ m^3 wherein 1 tonne MSW requires about 2 m^3 volume) • Height of depot should be less than 1m	

		• Toilets-1 per toilet • Dhaba / Food outlet -As per need but should have color segregation	
8.	Transportation of Waste[1]	• Transportation vehicle should be compatible with the storage depots • Vehicles should regularly empty the depot (manually or mechanically) • Ordinary truck capacity should be 5 tonnes/trip • Transfer stations are required if disposal site is far away i.e. more than 15 km • Routing of vehicle should be done appropriately to minimize distance, time pollution during transportation and traffic jams etc. • The large waste containers should be replaced after every 8 to 10 years • Large handcarts should be replaced after every 4 to 5 years	
9.	Footpath	• Atleast one meter walking space should be available along roads • Maintained and cleaned regularly	
10.	Road Cleaning Staff	• The area should be appropriately divided for cleaning by staff members • A schedule of street cleaning which indicates the roads which require cleaning daily and one needs to be cleaned periodically, should be shared with members	

[1] Improving Municipal Solid Waste Management in India: A Sourcebook for Policymakers and Practitioners by P U Asnani, Chris Zurbrugg, World Bank publications

		• List of such roads with their length and width also needs to be shared • A timeline for cleaning of open public spaces daily or periodically	
11.	Road Maintenance Staff	Areas for maintenance should be divided appropriately amongst road maintenance staff memebers	
12.	Brooms and other cleaning equipment	1 set per cleaning staff + Backup sets	
13.	Parking Spaces	Regularly cleaned and maintained with appropriate markings done	
14.	Cleaning of Vehicular Accident area	Accident site cleaned urgently since it might contain hazardous material which needs to be disposed off appropriately	
15.	Road Direction Signages	Regularly cleaned and maintained for better visibility to the commuters	

Periodic Inspection

Daily inspection

To be conducted by: Direct supervisor of the Maintenance Staff	
S.No.	**Area and Activity**
1.	Check if the roadways have been cleaned and waste removed appropriately. (ones scheduled for daily cleaning)
2.	Check if the footpaths have been adequately cleaned and maintained.
3.	Check if the road shoulders have been regularly cleaned. (ones scheduled for daily cleaning)
4.	Check if the Dhabas/ food outlets on the road sides are maintaining adequate standards of cleanliness and hygiene.
5.	Check if all the waste storage depots have been emptied and cleaned regularly.
6.	Check if the flyovers and bridges are cleaned and maintained regularly. (ones scheduled for daily cleaning)
7.	Ensure that there are no open sewers, gutters, damaged drain pipes, sewage blockages; and if there are, address them immediately.
6.	Check if cleaning and scrubbing of toilets along with their wash basins, sanitary fittings, glasses and mirrors and toilet floors has been done.
7.	Check if toilets are clean and dry, and all fixtures (light bulbs, wash basin, exhaust fans) are functional.
8.	Check if cleaning and disinfecting of all vitreous fixtures including toilet bowls, urinals, sinks, toilet seats, containers etc. has been done properly. Check below water level and under rims including areas at hinges and cistern handles.
9.	Check if one maintenance staff is present in front of every common toilet.
10.	Check if construction, renovation waste has been adequately disposed.
11.	Check if any kind of water logging is present on the roads, roadsides and toilets.
12.	Check if all the traffic signals are functioning properly.
13.	Check if all the street lights are functioning properly and are cleaned regularly.
14.	Check for any potholes, cracks, breaks, unsurfacing on the roads/speed breakers/road dividers and address them immediately.
15.	Check whether maintenance of plants on the roadside has been done regularly.

16.	Check whether the safety equipments for emergency are available.
17.	Check for the cleaning of any vehicular accident area. (if any)
18.	(In case of parks, gardens on roadside): Check whether mowing, hedge clipping has been done and waste from the park has been adequately removed.

Weekly Inspection

To be conducted by: Supervisor of the Maintenance Staff	
S.No.	**Area and Activity**
1.	Check all daily reports since past week for compliance. Check all items as outlined in daily inspection report during weekly inspection as well.
2.	Check past 3 weekly reports for areas identified for improvement/corrections and check if the same have been addressed.
3.	Check for road direction signages for their cleaning and proper visibility to the commuters.
4.	Check for cleaning of electrical fittings on road and ensure they are in good, working condition.
5.	Check if there are potholes or spaces where stagnant water is collecting and immediately address them.
6.	Inspect public toilets and ensure they have been cleaned regularly.
7.	Inspect waste disposal depots and ensure they are cleaned regularly.

Monthly Inspection

To be conducted by: Members of the Municipal Corporation	
S.No.	**Area and Activity**
1.	Check all daily and weekly reports since last month for compliance. Check all items as outlined in daily and weekly inspection report during monthly inspection as well.
2.	Check past 3 monthly reports for areas identified forimprovement/ corrections and check if same have been addressed.
3.	Conduct self-evaluation as per parameters given in assessment tool above. Identify areas of improvement and delineate action items.
4.	Conduct infrastructure gap assessment (as outlined previously in this document) and identify action items (can be done quarterly as well, depending on need).

5.	Check all major infrastructural items and fittings to ensure they are in good condition.
6.	Check if all roads, parks, entry-exit points; fittings, fixtures in toilets and grounds are in good condition.
7.	Check roster/daily register of cleaning staff to see that the deployment is adequate and timely.

Annual Inspection

To be conducted by: Municipal Corporation	
S.No.	**Area and Activity**
1.	Check past 2 quarterly reports for areas identified for improvement/ corrections and check if same have been addressed.
2.	Check for the need of any structural repair or construction required.
3.	Check for thorough cleaning of sewage and waste water lines.
4.	Check for associated painting work.
5.	Check for cleaning of septic tanks and leach pits (If applicable).
6.	Check whether any electrical repair is required.
7.	Check if any sort of training and capacity building of the staff is required.

Emergency Maintenance

Emergency maintenance deals with occasional, unforeseen events like landslides, large trees or debris on the road and broken drainage structures. It basically constitutes two types of restoration works:

- Temporary restoration works for re-opening safe passage on the road
- Permanent restoration, for securing the stability of the road and reinstating all components to a better condition

Off-carriageway works include maintaining shoulders and drains, removal of debris, cutting of grass and bushes, minor repairs to drainage and other structures in the roadside area, maintenance of road signs and pavement markings, side slopes and all surface areas within the road reserve.

On-carriageway works include work related to road pavement and surface repairs, basically for the purpose of maintaining a good running surface on the road, free from any obstructions and damage and with secure proper surface drainage.

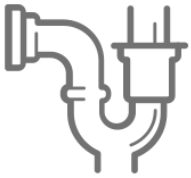
Infrastructure Set-Up and Good Practices

Water and Drainage Infrastructure

The requirements for fitments for water supply, drainage and sanitation, shall comply with general requirements of all premises intended for human habitation, occupancy or use of **Indian Standards IS 1172:1993 (Reaffirmed 2007)**.

All premises shall be provided with supply of clean water (with adequate provision of potable water), and shall ensure it is nowhere connected with unsafe water subject to the hazards of backflow or back siphonage. All structures for use on premises abutting on a sewer or with a private sewage disposal system shall have adequate sanitary facilities.

Drainage:



Adequate arrangements shall be made for satisfactory drainage of all sewage and waste water. Drainage should be addressed while design of cycle lanes and tracks to prevent ponding and erosions during rains. Efforts should be made to install environment-friendly mechanisms like, rainwater harvesting, to prevent rainwater from flowing off and being lost. All the drains should be covered.

Water Requirements: For sanitation: Usual public/ Sulabh toilet with a twin pit system utilizes 1400 million litres per day (700 million people x 2 Litre water consumed per flush).[2]

Water Quality:

Drinking water should be at a safe distance of at least 10 meters from the leach/ soak pits attached to toilets or nearby toilets or from the community sewage water drain. Wherever there are existing facilities, these must be reviewed from the perspective of user friendliness and afterwards repaired/augmented, rather than creating new one. It is important to make sure that water used for drinking, personal hygiene, cleaning and laundry is safe for the purpose intended.

[2] Sulabh International Social Service Organisation

Water Quality Indicators:

a. **Microbiological quality of drinking water:** Escherichia coli or thermo tolerant coliform bacteria are not detectable in any 100-ml sample[3]

b. **Treatment of drinking wate**r: Drinking water from unprotected sources should be treated to ensure microbiological safety

c. **Chemical and radiological quality of drinking water**: Water should meet WHO Guidelines for drinking-water quality or national standards and acceptance levels concerning chemical and radiological parameters

d. **Acceptability of drinking water**: There are no tastes, odors or colors to be added that would discourage consumption of the water

e. **Water for other purposes**: Water that is not of drinking water quality should be utilized only for cleaning, laundry and sanitation

[3] WHO drinking water values of bacteriological quality of drinking water (WHO 1993)

Sanitary Infrastructure

All roads must have adequate provision of public toilets. A public toilet (also called a bathroom, restroom, toilet room, washroom, water closet, W.C., public lavatory) is a public toilet facility, in contrast to a private usually residential toilet room, which may be a standalone water closet, or part of a bathroom. At a minimum, a public toilet can be a single unit featuring a toilet and hand basin for hand washing.

Public toilets are commonly separated by gender into male and female facilities, although some can be unisex, particularly the smaller or single occupancy types. Both male and female toilets may incorporate toilet cubicles, while many male toilets also feature urinals. Increasingly, public toilets incorporate accessible toilets and features to cater for people with disabilities.

Public toilets may be stand alone buildings or installations at streets, roads or be contained within buildings such as railway stations, schools, bars, restaurants, nightclubs or filling stations.

Common public toilets on roads are Sulabh flush twin-pit compost toilets. It is an indigenous technology and the toilet can easily be constructed by local labour and materials. It provides health benefits through safe disposal of human excreta on-site. It consists of a pan with a steep slope of 25°-28° and an especially designed trap with 20 mm water seal requiring only 1 to 1.5 litres of water for flushing, thus helping conserve water. It does not need scavengers to clean the pits.[4]

- Such toilets do not cause water pollution. When constructed in homogeneous soil, horizontally, bacteria do not travel more than 3 meters, and vertically the seepage is not more than 1 meter. To this is to be added the precaution that the toilet is built at a safe distance from the source of water.
- All public toilets should be mechanically ventilated. Small public toilets should be fitted with an exhaust fan as minimum.

Depending on the availability of space, the shape of pits may be designed. It may be rectangular, circular or linear in shape. It should fulfill all the seven conditions of a sanitary latrine laid down by the WHO:

- The surface soil should not be contaminated.
- There should be no contamination of ground water that may enter springs or wells.
- There should be no contamination of surface water.
- Excreta should not be accessible to flies or animals.
- There should be no handling of fresh excreta; or when this is indispensable, it should be kept to a strict minimum.

[4] Sulabh International Social Service Organisation

- There should be freedom from odours or unsightly conditions.

The following table details out the sanitary infrastructure requirements for commuters[5]:

FITMENTS	
Location[6]	• Location of accessible toilets should not be too remote from the main traffic area to avoid long travel distance
Layout	• Single entrance/exit plans work satisfactorily • Main entrance shall preferably be wide, have no door, and the cubicles • Clear signage should be designated for each gender of required public toilet facilities
Water Closets[#]	• 1 closet for every 50 users. WCs for men and women should be in the ratio of 3:5 respectively
Lighting	• The minimum lighting level shall be 300 lux to ensure that areas with water closets, wash basins and urinals are sufficiently illuminated
Ablution Taps	• 1 water tap with draining arrangements to be provided for every 50 persons or part thereof in the vicinity of water closet and urinals
Urinals	• Urinal for Men should be in ratio of 2:1 (urinal: WC)
Handrails or grab bars	• Provided for at least one urinal
[#] Some of the water-closets may be of European style, if desired	

[5] Sulabh Public Toilet & Bath Complexes, Sulabh International Social Service Organization
[6] A Guide to Better Public Toilet Design and Maintenance Third Edition 2013 - A Publication by the Restroom Association (Singapore)

Certain infrastructure requirements to be taken care of include[7]:

- A WC (Water closet) should not be set closer than 450mm from its centre to any side wall, partition, vanity or other obstruction. There should be at least a 900mm clearance in front of the WC to any wall, fixture or door
- WC cubicles shall be at least 900mm (width) x 1500mm (length). Cubicles should be provided with easily closable free-swinging doors
- Doors should be fitted with latches, sliding dead-bolts or other similar locking devices
- In order to keep the cubicles dry, the vanity top-cum-wash basins should be installed outside for common use by all users
- For high-traffic, wet or vandalism-prone areas such as parks, MRT stations, hawker centres, wet markets and beaches, wash basins should be installed outside the main toilet entrance
- The flow rate at these basins shall be at least 2 litres per minute without exceeding 6 litres per minute
- The use of flat bottom wash basins is not recommended
- Some accessory provisions required include:
    - Waste bins should be provided inside each male and female toilet and outside toilets located directly below or in close proximity to the washbasin vanity. A sanitary bin for the disposal of sanitary pads should be provided in each water closet cubicle in the female toilet.
    - A minimum of one hand-dryer blower or paper towel dispenser should be provided near the hand washbasin area
    - One soap dispenser should be provided for the first washbasin and should be increased in number by a minimum of one for every two hand washbasins. Soap valves should be made of corrosion-free materials and suited to dispense hand soap.

7. A Guide to Better Public Toilet Design and Maintenance Third Edition 2013 - A Publication by the Restroom Association (Singapore)

Solid Waste Management Infrastructure

Management of municipal solid waste and adoption of processing technologies are dependent on the quantity and characteristics of the total waste generated in a local authority, the financial resources available and in-house capability of local authorities. However, standard requirements for effective solid waste management include the following:

- Appropriate identification and classification of waste based on their type
- Segregation and storage of waste
- Delivery and collection of waste
- Processing and proper disposal of waste

Waste Identification:

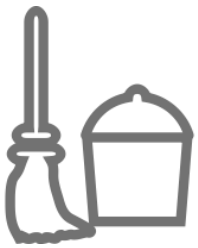
Wet Waste	Cooked and uncooked food, plant leaves, compostable materials, coffee powder, tea powder, meat and poultry waste etc.
Sanitary Waste	Menstrual cloth (used), disposable diapers, sanitary napkins, bandages, etc.
Dry Waste (paper)	All types of paper, paper plates, tickets, telephone bills, wrappers, leaflets, flyers, etc.
Dry Waste (plastic/ glass)	All types of plastic, plastic bags, coke bottles, water bottles, garbage packs, milk packets, pouches, bangles, crockeries
Dry Waste (hazardous)	Used syringes, insecticides and containers, discarded medicines, battery cells, household chemicals, etc.
E-Waste	Mobile, CDs, electronic equipment, CFL, tube lights
Dry Waste (others)	Metal items, tetra packs, aluminum foils, aluminum cans, thermocol, bottles, plates, utensils, packaging material etc.
Garden Waste	Plant leaves, dry and wet cut branches
Inert Waste	All types of construction materials, cement, mud, sweeping dust etc.

For easy identification, colour coded dustbins are useful and must be used. These dustbins should be emptied thrice every day (or more frequently in case of heavy use) and should be cleaned periodically as per requirements.

The numbers, sizes, and locations of receptacles for segregated solid waste would be in accordance with the minimum requirements included in The Municipal Solid Wastes (Management and Handling) Rules, 2016, Ministry of Environment and Forests, Government of India. The manual suggests that bins be placed at a distance ranging from 25 meters to 250 meters depending on the local conditions.

It is the responsibility of the concerned Municipal Corporations to manage the removal of solid waste. Night conservancy should be carried out in all important roads and commercial areas of the city. There are mainly two levels of collection of solid waste, primary and secondary.

- **Primary:** This consists of sweeping, collecting and storing of waste in the specific bins. Further, it involves collection of source separated waste from bins by tricycles or light motor vehicles for unloading in transfer stations. It is important to put black garbage plastic bag for easier collection of waste from bins and replace it with a new one every time waste is collected.

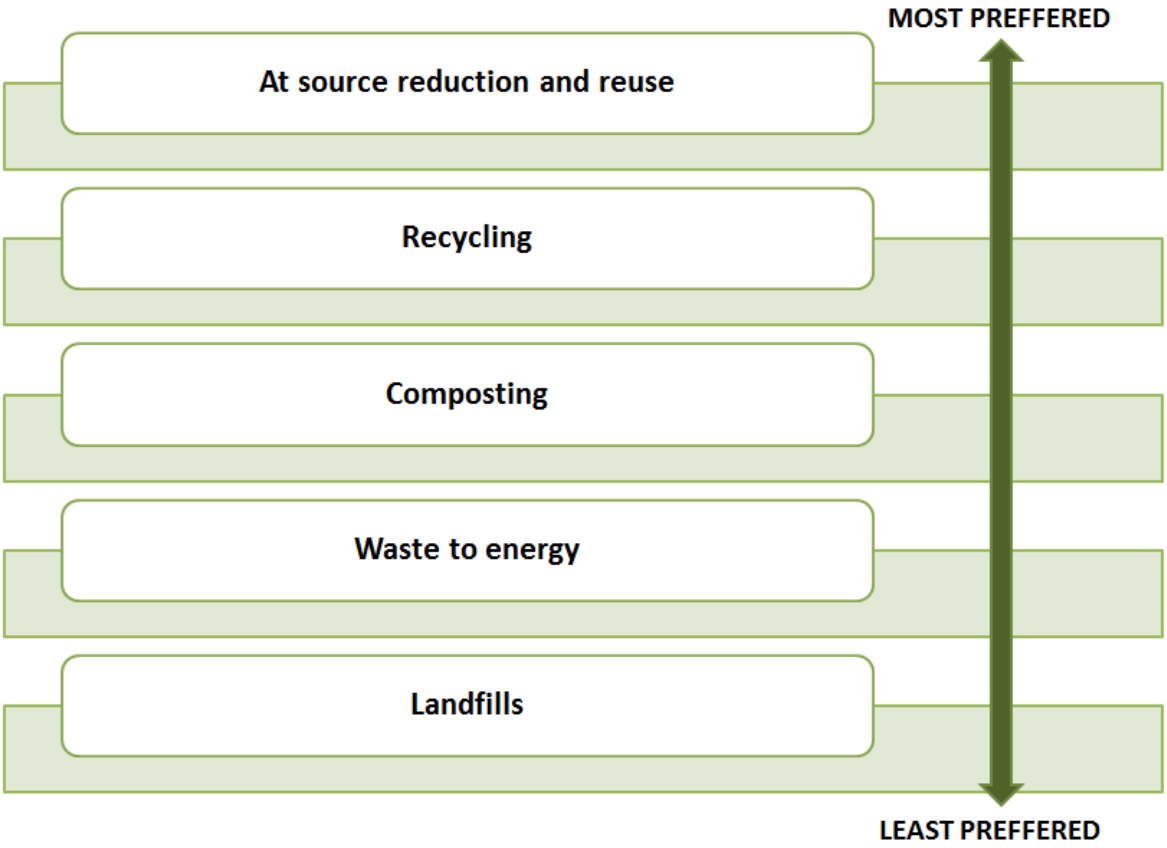


  All public roads, streets, lanes and bye-lanes having habitation or commercial activity on one or both sides of the street should be cleaned on a daily basis assigning clearly demarcated area to each sweeper and street sweeping waste should not be mixed with domestic waste and be deposited in the special container placed at the secondary waste storage depot. Trucks/ tractors mounted and road vacuum sweeping machines help the state municipal corporation to keep the city dust free.

- **Secondary (Transportation):** This consists of transportation of waste from the street and transfer station to the disposal site. It is important that compactor vehicles carry the waste in a covered manner instead of open garbage lorries. Moreover, compactor vehicles reduce the garbage in its volume by compacting it.

Processing & Disposal:

Integrated Solid Waste Management (ISWM) system proposes a waste management hierarchy[8] with an aim to reduce the amount of waste being disposed, while maximizing resource conservation and resource efficiency.



Source separation is promoted to reduce the waste coming to the landfills, thereby increasing the life time of the landfills. Biodegradable waste (organic waste) can be sent to composting units or decentralized biogas plants to make biogas and manure Also, recycling of PET bottles can be done to reduce the waste generated. The shredded material can then be sent to recycling.

Shredder:

Shredding machines are used for shredding thin plastics below 40 micron and the shredded plastics can be used for laying of roads.
A shredder requires an electrical power source and should be sited to provide convenient and safe feeding of the waste.

[8] Municipal Solid Waste Management Manual (2014), Ministry of Urban Development, Govt. of India

Food waste disposer (For areas with food vendor stalls)

Food waste disposers are easily installed and eliminate the need to store biodegradable kitchen waste. They are a complementary tool to methods of waste storage and collection. The units are designed to grind biodegradable kitchen waste in a safe, clean and efficient manner to tiny particles by the food disposer's shredding blades. When a small amount of water is run into the disposer, the remaining particles of material are easily flushed down the drain into the sewerage system or septic tank. Food waste disposers enable segregation of waste types at source, without which recycling of different types of waste is not possible. The potential for hygienic collection and recycling of various dry recyclables such as paper, glass and metals is increased with the reduction of contamination of food waste.

Organic waste, which includes – food waste, meat waste, garden/ agriculture waste is considered as best raw material for rich organic compost. Compost can be rich in nutrients and can be used in gardens, landscaping, horticulture and agriculture. Compost is generally recommended as an additive to soil, or other matrices such as coir and peat, as a tilt improver, supplying humus and nutrients. Some of the composting methods that can be implemented are as below:

Pit Composting: Holes or trenches are dug to bury the waste, where organic materials gradually break down over long period. The trench is also a good place to bury weeds and dead/semi dead plants. If buried deep enough, the weed seeds will not regerminate and keep the playground away from unwanted growth of plants. This method is zero cost but requires labor for digging.

In -essel Composting has three stages before the compost is screened for use. The wet waste is delivered to an enclosed reception area. Any contamination such as plastic bags or metal cans is removed before it is shredded to a uniform size. The composting process is kick started by naturally occurring micro-organisms already in the waste. They break down the material, releasing the nutrients and in doing so they increase the temperature to 60-70^0 C, which is needed to kill the pathogens and weed seeds.

The second stage normally lasts 21 days. The material is transferred to second barrier, where the composting process continues. The O_2 level, moisture and temperature are carefully monitored and controlled during both composting stages, till the material is

fully sanitized. Once the sanitization process is complete the compost is left to mature in an open wind-row or an enclosed area for approx.10-14 weeks to ensure stabilization. Screening usually takes place pre or post maturation, to produce a range of product grades suitable for various end uses such as soil conditioning. The capex ranges from Rs.4-5 lakhs for a capacity up to 2-3 tons with operational cost ranging between Rs.10,000-15,000/-per cycle.

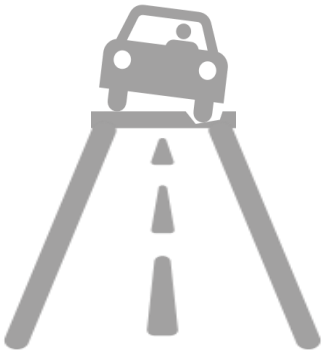
Incineration, a waste treatment process involving combustion of waste at very high temperatures, in the presence of oxygen leading to the production of ash, flue gas and heat. The potential for energy generation depends on the composition, density, moisture content and presence of inert in the waste. Incineration is an option especially where other options of processing of waste are not feasible and land for landfilling and other waste processing methods is scarce. It is quite efficient in reducing landfill volumes. Location of a municipal solid waste incineration plant should always be determined keeping in mind both economic as well as environmental issues. A controlled and well-operated landfill for disposing residues (bed and fly ash) is required for proper functioning of a municipal solid waste incineration plant. Such plants should be at least 300 to 500 meters away from residential areas.

Remaining residual wastes at the end of the hierarchy, which are ideally comprised of inerts, are to be disposed in sanitary, lined landfills, which are constructed in accordance with stipulations of the MSW Management and Handling Rules, 2016.

Good Practices

Road maintenance:

i. Cyclic and periodic road maintenance is very necessary to ensure that roads remain serviceable throughout its design life. It provides users with a smooth running surface, improves safety of road users, improves the reliability of the road allowing it to remain open for traffic on a continuous basis and thus contribute to more reliable transport services, and sustains social and economic benefits of improved road access



ii. It is important to ensure proper design and quality construction to reduce the burden of maintenance

iii. Keeping road shoulders clean and free from potholes allows pedestrians and cyclists to travel safely at a distance from vehicles

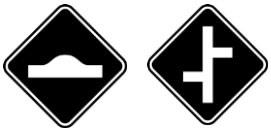
iv. Clearing bushes improves sightlines and allows road users to spot each other in time. However planting of herbaceous species in the median, embankment slopes and along pedestrian paths serve as a ground cover

v. It is necessary to accommodate utility services along and across the roads These include:

- Sewer and drainage
- Storm Water Drain
- Water Supply lines
- Electricity cables
- Telecommunication cables
- Gas pipelines
- Lighting
- Drainage

Utility duct may be provided to protect cables and pipes against external influences

vi. It is important to repair signs, labels, bins and equipment and promptly replace damaged equipment using the same designs



vii. Mechanical markers and road signs should be put up as and where required. All signs should be visible, clear and consistent

Waste collection and disposal:

i. The bins or containers wherever placed shall be cleared before they start overflowing, since dirty and untidy waste facilities demotivates people to use the facilities

ii. It is important to provide clear signs with consistent wording, symbols and colors on all bins

iii. To ensure that streets look better and cleaner on a long-term basis, formulation and thorough implementation of a street cleaning schedule is the first and most important part of defining street cleaning practices

iv. Road cleaning machines should be used for cleaning the roads to increase the efficiency. Mechanical brooms and vacuum cleaning devices must be used simultaneously so that street sweeping does not cause formation of dust clouds

v. It is mandatory to use disinfectants in the rainy season (and it's a best practice in other seasons, too) so that the streets stay free from any possibility of fungal, viral, or bacterial attack

vi. The dumping sites must be accessible from all the streets yet they should be far away from the residential areas so that no bacterial or viral disease threatens public health

vii. Vehicles used for transportation of wastes shall be covered. Wastes should not be visible to public, nor exposed to open environment preventing their scattering

viii. Some other things to be kept in mind on the issue of waste management:

- Frequency of waste collection
- Identifying waste storage requirement/points
- Color identification of garbage bins
- Preparing checklists
- Providing signage boards/posters on bins and important area of waste generation and handling
- Closed-circuit television (CCTV) monitoring of roads to oversee public littering
- Compliance to the SOP for maintaining cleanliness standards on roads

Creating awareness in an organized and comprehensive manner:

Implementing these strategies may seem like a lot of effort initially, but they become easier to manage and maintain, once everybody gets used to understanding the relevance working with the system. However, infrastructure development alone cannot bring about the change hoped for. It has to be complimented by creating awareness and interest, motivating people to want to change their behaviour.

Awareness and education campaigns are essential to bring about a behavioral change among the citizens in managing their waste. This can be done by:

i. Using supermarkets & retail stores as a central and consistent point for consumer education, packaging reduction projects, material substitution minimizing the use of plastic and collection of recyclable wastes

ii. Developing and maintaining Information, Education and Communication (IEC) material, activities and awareness and education programs targeting:

- Households, shops, commercial and institutional premises
- School programs that increase public awareness
- Other stakeholders such as municipal officials, elected representatives, schools, non-governmental organizations (NGOs), the informal sector, media, etc.

iii. Involve the community by explaining them their responsibilities towards the cleanliness of their roads and cities. Discussing their role in maintaining cleanliness would include the following:

- Importance of waste reduction, reuse and recycling
- Need to stop littering the streets, drains and other open spaces
- Practice of segregation of waste at source into biodegradable (wet) and non-biodegradable (dry) waste
- Importance of cooperating with the sweepers and cleaners
- Need to encourage and assist in local composting and recycling initiative

iv. Routine maintenance requires simple work activities (i.e. bush-clearing, clearing drains and culverts, pothole patching), but a cadre of well-trained team of technical staff is necessary to supervise the work. Training of all maintenance staff in the use of the waste system ad equipments is therefore mandatory

v. Having educational messages in pubic toilets can also help persuade users to do their part in keeping toilets clean

Penal Provisions:

According to the Ministry of Urban Development, littering or urinating in public places invites penalties ranging between Rs 200 and Rs 5,000.

At the same to the Draft Environment Laws Amendment Bill, 2015 Ministry of Environment and Forests is working on introducing the Environmental Laws (Amendment) Bill to add violations like littering, throwing waste in the open, dumping electronic waste, defacement of public places and use of banned plastic bags to the non-cognizable criminal offense category. As per it the offense will not call for FIRs or arrests, it will have monetary penalties much like the penalties which come under the category of 'making atmosphere noxious to health', the section 278 of Indian Criminal Law. The concerned authority should ensure the practicing of levying fines (in accordance with the rules of the State) on offenders to curb the menace of littering etc.

Manpower Requirement

An estimation of manpower requirement should be made on an annual basis by the relevant authority. This should take into account the following:

- Area of the specified roads
- Area of the pedestrian pathways and dividers
- Area of the garden park/ plantation area
- Number of toilets and baths
- Number and area of flyovers, foot over bridges, subways and staircases
- Other areas (area of adjacent commercial and/or residential area, drinking water booths, food vendor stalls)
- Area of parking spaces

Street cleaning is a fundamental service ensuring clean and hygienic conditions. Based on the density of roads, street sweeping norms with regards to staff requirements vary for small towns, small and mega cities.

STAFF REQUIREMENT BASED ON ROAD DENSITY[9]			
Road density	Small town	Small city	Mega city
High density	1 person per 300-350 running meter road length	1 person per 300-350 running meter road length	1 person per 300-350 running meter road length
Medium density	1 person per 500 running meter of road length	1 person per 500 running meter of road length	1 person per 500 running meter of road length
Low density	1 person per 750-1000 meter of road length	1 person per 750-1000 meter of road length	1 person per 750-1000 meter of road length

Staff involved in street sweeping should also be responsible for cleaning drains (up to 18' in depth). The local sanitary should be responsible for inspecting and maintain records on the extent of service provision. Staff required for drain cleaning is dependent on the length of the drain and could be adjusted based on local conditions. As a general principle, one person can clean up to 500 m of shallow surface drain per

[9] Municipal Solid Waste Management Manual (2014), Ministry of Urban Development, Govt. of India

day. All staff employed must have appropriate uniforms allowing them to work comfortably without ruining their clothes. Night shift staff must wear clothes with appropriate light reflectors.

Adequate number of supervisors should be employed. Supervisors responsible for monitoring and supervision of standardized and timely cleaning as per SOP should be identified and names displayed prominently. Adequate number of backup staff may also be provisioned for.

Spacious and well- lit safe roads allow collection systems with compactor vehicles and tipping equipment which are more efficient. Narrow streets do not allow for the use of conventional primary collection vehicles. In cramped streets, hand carts/push carts, tri-cycles and/or small mechanized vehicles may be used for collection of waste, which may then be transferred to a larger vehicle in the vicinity. Staff requirements in such cases could vary and extra manpower might be required.

The staff employed must be sensitized enough on the relevance and importance of clean roads. They must be trained on prevention of occupational hazards and its appropriate reporting. They should be adequately trained for separate collection and further handling for final disposal of segregated dry and wet waste from the dustbins.

It is very important to deploy the cleaning staff based on prior planning in shifts, to ensure that cleanliness is maintained throughout. All those areas with minimal people and vehicle interaction should be cleaned once a day grouped with other such areas.

Cleaning Practices

Clean roads encompass all public roads including those in residential as well as commercial areas. Cleaning of roads includes street sweeping, cleaning of public places and surface drains. Streets are classified based on their location, traffic intensity, type of street surface, land use of adjacent area and others. The following frequency of sweeping shall be adopted basis the character of street[10]:

CHARACTER OF STREET	FREQUENCY OF SWEEPING
Shopping areas	Daily/Twice, depending on need
Market areas	Daily
Minor streets	Daily
Sub-urban shopping streets	Daily
Residential streets	Daily
Roads and streets having no households/establishments on either sides	Once a week
Highways	Rarely necessary to sweep highways due to turbulence through motor traffic
Sub-urban main street	Twice a week
Open-spaces	Occasionally, when required (minimum once in a fortnight)

Tourist places, where more number of people are present almost at all hours, regular cleaning throughout the day (2 to 3 times) and during weekends and national holidays may be necessary.

Garbage Bins:

a) Remove garbage from dustbins and clean them regularly
b) They should be emptied when they are 3/4th full
c) Provide separate dustbins for biodegradable and non-biodegradable materials
d) Segregate, collect and store waste according to the type of waste carefully
e) Transport waste with care

[10] Municipal Solid Waste Management Manual (2014), Ministry of Urban Development, Govt. of India

f) Replace cleared dustbins to original spot
g) If any trash is found anywhere on the roads, pick up immediately
h) Dustbins on the roads must not hinder the clear passage of vehicles and pedestrians

Public toilets

a) Fixtures including toilets and sinks should be free of streaks, soil, stains and soap scum
b) Premises should have good quality basic fitments like ablution taps, washbasins, etc.
c) Mirrors and windows should be free of dust and streaks
d) Dispensers should be free of dust, soiling, residue, etc. and replaced/replenished when empty
e) Waste should be disposed appropriately on a daily basis
f) Provisioning of soap, toilet paper, hand towel/dryer, sanitary pads dispenser, dustbins, and other necessary items should be adequate
g) Toilet bowls, urinals and adjoining bathing areas (if applicable) should be cleaned with disinfectant on a daily basis, and the use of acid-based disinfectants should be avoided
h) Toilet floors should be kept dry to the extent possible/feasible
i) There should be a well functioning drainage system
j) Thorough cleaning of toilets should be carried out during off-peak hours when toilet usage is low

Food vendor stalls (if any):

a) Food outlets on road side should be regularly cleaned
b) Dustbins should be placed at easily accessible spots to prevent littering
c) Segregation and composting of food waste should be done (if feasible)

The timing and frequency of cleaning should be carefully defined to avoid conflicts with traffic, parked vehicles and pedestrians. The service should be carried out preferably during hours of less activities on the roads, e.g. early in the morning and at night. Night-time service is only advisable on main roads which are well-lit. Scheduled cleaning should be carried out periodically on a weekly, fortnightly or monthly basis. Supervisors should also be trained with the right knowledge and skills not only to effectively supervise the cleaning attendants but also inspect the cleanliness.

Do's and Don'ts[11]

DO	DON'T
Operate all sweeper equipment according to manufacturer's settings and standards.	**DO NOT** transfer or dispose of sweeper materials near or in storm drains, or drainage ditches, even temporarily.
Dispose all waste as per guidelines.	**DO NOT** dispose waste outside or near parking lots, drainage, ditches or any other location where they can damage the environment.
Keep all equipment clean; do not allow a build-up of wastes.	**DO NOT** let equipment get damaged or rusted; replace if unsuitable for further use.
Oversee contractors to ensure that correct procedures are followed and SOP guidelines are complied with.	**DO NOT** let contractors conduct maintenance in conflict with proper procedures and guidelines; monitor closely.
Impose penalty on defaulters for littering/ spitting/ open urinating within the premises or near the boundary walls	**DO NOT** allow littering, spitting, open urination/defecation or any other practices that affect the cleanliness and aesthetics of the premises.
Make note of any streets that have consistently higher content of debris and/or sediments and inform supervisor who can increase schedule of operations.	**DO NOT** ignore routine maintenance requirements for the sweeper equipment that can possibly mitigate future problems
Make sure that sweeper debris is taken directly to the permanent disposal site or is taken to a secure temporary location, away from inlets or direct runoff, for storage.	**DO NOT** wash down any streets or curbs with the exception of very fine water spray for dust control.

In case cleaning services are to be outsourced, sample Scope of Work and bid evaluation parameters for reference in at Annexure 1.

[11] Standard Operating Procedure (SOP) For Street Sweeping by South East Metro Stormwater Authority.

Cleaning Equipment

Street Sweeping Tools[12]:

Appropriate tools play an important role for improved efficiency. At present, most of the tools used by the sanitary workers are inefficient or in appropriate. Traditionally the workforce resists any change, even if it is positive. Persuasion and awareness efforts will, therefore, be necessary to convince the workforce to adopt improved tools and equipments.

TOOL	DESIGN CONSIDERATIONS
Broom	The design of the broom is important for both the efficiency and the occupational health of the worker
Metal tray and plate	A metal tray and a plate facilitate the transfer of street waste into the handcart or tricycle and protect the worker from too much contact with waste
Handcart or tricycle	• A handcart facilitates the movement of the sweeper • Detachable containers allow easy emptying into the secondary waste storage bins • The volume of each container should be such that it can be easily lifted • The total capacity of the handcart should be such that it can carry the total quantity of waste to be picked up by the worker in three trips • The handcart should have at least three wheels, and the handle should be at navel height so that the worker does not have to bend while pushing the cart.
Baskets (Bamboo and Aluminium)	As per need
Brushes	As per need
Wheeled bins or containerized push carts	As per need

[12] Improving Municipal Solid Waste Management in India: A Sourcebook for Policymakers and Practitioners by P U Asnani, Chris Zurbrugg, World Bank publications

Waste Storage Depots[13]:

Municipal authorities need to dispense with open waste storage depots and to replace concrete cylindrical bins and missionary bins, which are inefficient and unhygienic, with neat, mobile covered containers. They should identify suitable locations, preferably from among the existing locations of waste storage depots in the city, where large containers ranging from three cubic meters to seven cubic meters could be placed for secondary storage of waste. The number of containers required will depend on the area of the city and its population.

A waste collector with a handcart should not be expected to walk more than 250 meters. Therefore,

- Containers should be available within a radius of 250 meters
- At least four containers per square kilometer need to be placed
- In high-density areas, one container should be placed for every 5,000 to 10,000 residents, depending on the size of the container
- A three cubic meter container will hold 1.25 to 1.50 metric tons of waste, just enough for a population of 5,000 whereas, a container of seven cubic meter capacity can easily handle the waste of a population of 10,000 to 12,000
- In highly spread-out areas, the municipalities may use their discretion in placing containers to facilitate an appropriate secondary storage system in a cost-effective manner
- The containers could be either be taken directly to disposal site if the distance is shorter than 15 kilometers or might be taken to a transfer station if the distance is longer
- Since waste is segregated at its source, two bins are needed:
  - One for biodegradable waste
  - Other for recyclables and waste collected by street sweepers
- Appropriate waste storage depots should ensure easy access for:
  - Primary waste collectors
  - Easy further handling of containers
  - Easy cleaning and prevention of water clogging
  - Coverage to protect the rain and animals

Transfer Stations:

Waste is transferred from small vehicles into large container trucks so that waste can be transported more efficiently over long distances. It would be uneconomic to

[13] Improving Municipal Solid Waste Management in India: A Sourcebook for Policymakers and Practitioners by P U Asnani, Chris Zurbrugg, World Bank publications

transport small quantities of waste to a long distance haul. The following might be considered:

- The transfer station needs to be so designed that waste can directly be transferred into a large vehicle or container
- Large vehicles or containers with a capacity of 20 to 30 cubic meters are typically used for long distance waste transport to a treatment and disposal site
- The design and capacity of transfer stations and storage equipment strongly depends on the waste quantity and on vehicles used for primary and secondary waste
- One or more transfer stations in each city can facilitate optimum use of the fleet of small vehicles and can take optimum advantage of large hauling vehicles for bulk transport of waste
- Transfer stations should be decentralized within the city, allocated to an enclosed area, and situation in the general direction of the main landfill site
- The timings of the transfer station should match with the timings of waste transport from the city so that direct transfer of waste from a small vehicle to large vehicle is possible
- Vehicle should be selected according to capital cost, carrying capacity, life expectancy, loading speed, local spare part availability, speed, fuel consumption and maintenance cost

General considerations[14]:

- The transport vehicle must be covered
- The transport of waste can be managed and monitored centrally or through a large decentralized arrangement
- Transport can be contracted out to private operators
- Transport system must be harmonized with the secondary storage system of waste
- Transport capacity must be sufficient to ensure a frequent evacuation of secondary waste storage containers
- A two-shift working system capitalizes the collection fleet and reduces the requirement for new vehicle
- Work at night will increase efficiency as trucks will not be slowed down by daily traffic

[14] Improving Municipal Solid Waste Management in India: A Sourcebook for Policymakers and Practitioners by P U Asnani, Chris Zurbrugg, World Bank publications

- In small cities that lack adequate maintenance facilities for hydraulic vehicles, combined tractor-trolley vehicles or tractors with lifting devices may be more suitable

Waste Management

A strategy needs to be in place to ensure proper management of waste generated and reduction of waste through recycling and reusing. Neighbouring structures/ institutions such as restaurants, fruit and vegetable markets, parks, construction sites add to the generation of waste on roads.

Types of waste generated[15]

WASTE	CHARACTERISTICS
Waste from hotels or restaurants	• Hotel and restaurant waste has a similar composition to that of household waste but may contain more organic waste • In general, hotels and restaurants either receive municipal collection service or must make their own arrangements for waste disposal • If waste is segreagated, the recyclable material has a high value and might be collected by a specialized waste collector
Waste from Fruit and vegetable markets	• Market waste contains a high fraction of biodegradable waste.Therefore, the waste might be of value for specialized waste treatment plants such a composting sites • Market require large but easy accessible containers, which should be transported and emptied during non peak hours
Waste from parks and gardens	• Park and garden mainly consists of biodegradable waste and litter • Litter must be collected in litter bins in the park or garden. This waste could be collected on a daily basis • If garden waste treatment is not possible within the premises being organic, it could be collected on a weekly basis by arranging a rotation schedule
Costruction and Demolition debris	• Such debris is inert and does not cause direct harm to people and the environment. Therefore, such waste could be collected separately and taken to landfill sites to be used as inert cover material. Another option is to use this material to fill low-lying areas in the cit. • The municipal authority should prescribe the rate per matric ton for the collection, transport, and disposal of construction waste and debris and should announce such rates to the public • Skip containers that are lifted on trucks are mostly suitable for debris collection and transport

[15] Improving Municipal Solid Waste Management in India: A Sourcebook for Policymakers and Practitioners by P U Asnani, Chris Zurbrugg, World Bank publications

Management of Waste

1. Waste Recyclin: there is a need to upgrade and reorganize the recycling system, to increase effectiveness of the waste collection and recycling system, and to improve the working condition of rag pickers. The mandatory directions for waste segregation and processing within municipal management services should be followed

2. Biodegradable Solid Waste, household waste can contain 40 to 50 per cent organic waste. Waste from urban fruit and vegetable markets contain even higher amounts. Follow the mandate for improved management and treatment of this fraction before final disposal. Several treatment options for organic waste are available:
   - Composting: composting is defined as a controlled process involving microbial decomposition of organic matter under aerobic conditions. Biodegradable waste is converted t a soil-like substance (compost), which is a valuable soil amendment and fertilizer.
   - Anaerobic digestion: Anaerobic digestion is process that produces biogas from decomposed waste. The biogas can be used to power electricity generators or to produce heat.
3. Hazardous Waste, especially waste from chemical factory and hospitals shall be scientifically disposed as per Municipal Solid Waste Management norms. Good management practice should ensure that hazardous wastes are stored, collected, transported and disposed of separately, preferably after suitable treatment to render them innocuous

4. Construction and Demolition waste should be removed from roads immediately after all the work is done and not allowed to disperse on the roads to avoid traffic jams and unnecessary diversions. In case of a prolonged activity, appropriate markings and barricades should be used to demarcate the area. No person shall dispose of construction waste or debris on the streets, public spaces, footpaths or pavements. Doing so will attract penalty

5. Bulk garden and horticultural waste shall be kept un-mixed and composted at source. The Director (Horticulture) or the concerned officer shall notify Instructions/ guidelines with regard to pruning of trees and storage and delivery of tree trimmings including collection schedules

6. All other Non-biodegradable ("Dry") waste – both recyclable and non-recyclable – shall be stored and delivered by every generator of waste to the dry waste collection vehicle
7. Burning of waste: Disposal by burning of any type of solid waste is prohibited
8. The Municipal Corporation/ Contracted Agency must ensure that commuters do not throw any waste on the streets, footpaths, open spaces, drains or water bodies and instead store the waste at source of waste generation in two bins/bags, one for food waste/bio-degradable waste and another for recyclable waste such as papers, plastic, metal, glass, rags etc. (as under):

- Types of wastes to be put in the bin meant for food wastes & bio-degradable wastes:
  a. Food wastes of all kinds, cooked and uncooked, including eggshells
  b. Flower and fruit wastes including juice peels and house-plant wastes
  c. Road sweepings

- Types of recyclable and other non-bio-degradable wastes to be kept separately:
  a. Paper and plastic, all kinds
  b. Cardboard and cartons
  c. Containers of all kinds excluding those containing hazardous material
  d. Packaging of all kinds
  e. Glass, all kinds
  f. Metals, all kinds
  g. Rags, rubber, wood
  h. Foils, wrappings, pouches, sachets and tetrapak (rinsed)
  i. Cassettes, computer diskettes, printer cartridges and electronic parts
  j. Discarded clothing, furniture and equipment

9. Wastes such as used batteries, containers for chemicals and pesticides, discarded medicines and other toxic or hazardous waste if and when produced, should be kept separately from the above two streams of waste.

Annexure 1: SOW and Evaluation parameters for Outsourcing

Sample Scope of Work

<<Road is located from<<beginning mark on road >> to <<ending mark>>. It has <<details of roadway, shoulders, dividers, footpath, markings on roads, etc. >>.
The scope of work would encompass cleaning the specified area so that the area is always clean and presentable. This area in <<Road>> includes the following:

1) Roadways, road shoulders, dividers, footpath, foot over bridges, flyovers and subways, speed breakers, guard rails etc.: <<No.s and distance>> (Occupied Areas)
2) Traffic signals, traffic signs, street lights, road direction signages: <<No.s>> & <<No.s>>
3) Toilets: Men Toilets <<No.s>>and Women Toilets <<No.s>>.Toilets for disabled <<No.s>>, Washbasins <<No.s>>
4) Surroundings: Plantation area, Parking area, road markings, Zebra crossing etc.
5) Waste storage depots, water drainage system, food vendor stalls on roads, safety measures for emergency, cleaning of vehicular accident area (if any) etc.
6) Any other area of <<Road>> not specifically mentioned above

Cleaning Services

The aim and objective is to provide a clean, hygienic and presentable look to the entire road network. Pre-designated in charges/supervisors of the successful bidder will supervise the awarded work. General administration of <<Road>> will monitor the cleanliness of the entire road network, cleaning staff deployed by the successful bidder. The successful bidder has to ensure that the staff deployed for cleaning is well trained, following hygiene and sanitation norms, and taking proper precautionary steps to maintain their own health.

Daily & Weekly Services

Daily cleaning of streets and public spaces is essential because waste littering is common in India. Dust and leaves accumulate rapidly on roads and pathways. Municipal authorities are expected to undertake regular cleaning of streets and removal of rubbish. The yardstick of work may be prescribed by the municipal authority, depending on the local situation, type of roads, and amount of effort required by the sweeper. Solid waste authorities should prepare the following:

- A schedule of street cleaning that indicates which roads require daily cleaning and which ones need to be cleaned periodically
- A list of such roads and streets, together with their length and width
- A program for their cleaning, keeping in view the norms of work
- A timeline for cleaning of open public spaces daily or periodically

Schedule of Cleaning Services

S.NO.	AREA & ACTIVITY	FREQUENCY
1.	Cleaning roadways: pathway and shoulders	Daily
2.	Cleaning road dividers and footpath	Daily
3.	Cleaning flyovers, foot over bridges, subways and guardrails etc.	Weekly or as per need
4.	Cleaning of waste storage depots	Daily or as per need, depending on local conditions
5.	Transporting waste from waste storage depots for disposal/recycling	Daily or as per need
6.	Cleaning of Toilets and washing areas (One Cleaning personnel should always be present in front of every toilet)	Daily/call based
7.	Cleaning of road direction signages, traffic signals and traffic signs	Weekly
8.	Cleaning of street lights	Weekly
9.	Painting of parking areas, street markings, zebra crossing, road dividers, speed breakers etc.	Monthly or as per requirement
10.	Cleaning of vehicular accident area (if any)	Immediately/call basis
11.	Cleaning of waste from roadside food vendor stalls	Daily or as per need
12.	Maintaining plantation area. The maintenance shall include watering, manuring, fertilizing, plant protection for pests and diseases, sweeping, weeding, and disposal of garden	Twice a week

	refuse, cultivation and cutting of edges, pruning and clipping of hedges, etc.	
13.	Maintenance or prompt repairing of potholes, cracks, concrete joints and drains	Daily or as per need
14.	Mopping of toilets	Thrice in a day or as per need
15.	Street sweeping after melting of snow (in case of areas having snow fall)	Daily, depending on local conditions
16.	Change/ check of toilets papers/ napkins	Thrice in a day
17.	Removal of waste papers and any other garbage and blockage and choking from the entire area covered under the tender	Daily
18.	Acid-cleaning and scrubbing of toilets, wash basins, sanitary fittings, and glasses & mirrors and toilets floors	Daily
19.	Cleaning and disinfecting all vitreous fixtures including toilet bowls, urinals, sinks, toilet seats, containers etc. Brush thoroughly to include below water level and under rims including areas at hinges and cistern handles. Restock toiletries, which include liquid hand soap, toilet paper, air freshener, sanitary cubes and naphthalene balls in toilets after daily check-ups in the morning, afternoons and on call basis during daytime.	Daily
20.	Check and remove dust, dirt or any such object from anywhere in area covered under the tender	Daily
21.	Cleaning/maintenance of water drainage system to avoid collection of water on roads	Weekly
22.	Cleaning and repairing of fountains, aesthetic infrastructure (if any) on the road side	Weekly or as per requirement
23.	All other work which are not listed here	-

Other Works:

a. The Bidder's supervisory staff should be available at site every day during office working hours. In case of emergency complaints, the Bidder is to ensure rectification of defects immediately
b. The Bidder will immediately attend the complaint and complete the same on its receipt on the same day
c. The Bidder will have to maintain all types of records for consumption and receipt of material as desired by <<Road>> and instructions issued from time to time in this regard should be complied with by the Bidder

Evaluation Parameters

Bids should be evaluated on the basis of total tender value for 1 supervisor and required number of cleaning personnel as may be estimated for the specified distance/locality with specified beginning and ending limit:

S.No.	Particulars	Description	Cleaning Personnel (Rates per person per month)	Supervisor (Rates per person per month)
a	b	c	d	e
1	Basic pay + VDA	Minimum wages must be followed as per rules		
2	Employees Provident Fund	12% of Basic plus VDA		
3	Employees State Insurance	4.75% of Basic plus VDA		
4	Bonus	Ceiling of Rs.7,000 per year		
5	Total cost per employee	Sum of Sr. No.1 to Sr. No.4		
6	No. of Employee	As per tender document		
7	Total Cost	S.no. 5 x S.no.6		
8	Total Cost of <<No>> employee	S.no. 7 (d) & S.no. 7(e)		
9	Cleaning material cost	-		
10	**Total Cost**	**Sum of S.no. 8 & S.no. 9**		
11	Service Charge in %age (on Sr.No.10 in %age)			
12	**Sum Total**	**Sum of S.no. 10 & S.no. 11**		

13	Service Tax @<<>>%	On S.no. 12		
14	**Total Cost of Service per month**	**Sum of S.no. 12 & S.no. 13**		
15	**Tender Value (One Year):-**	**S.no. 14 x 12months**		

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