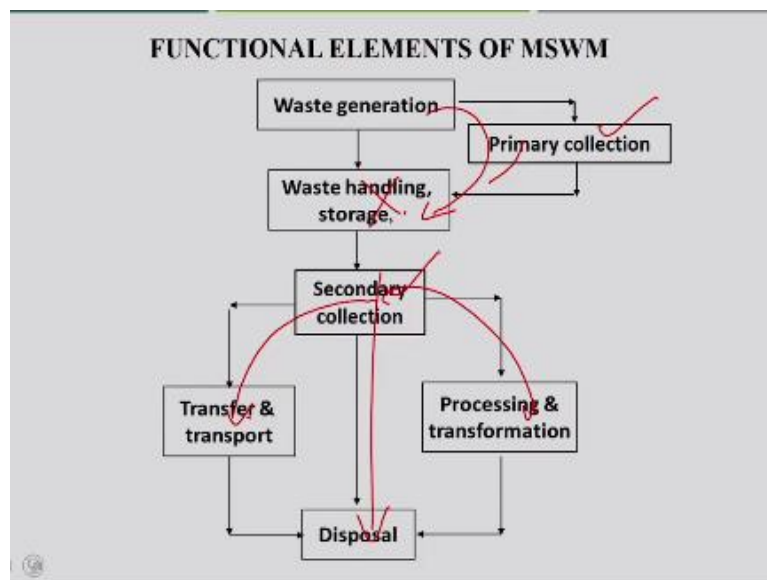


Municipal Solid Waste Management
Prof. Ajay Kalamdhad
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Lecture - 09
Primary Collection

So hello students. Today we will continue module 5, which is on the collection of solid waste. This is one of the very important activities in the entire system of solid waste management.

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So today we will go for primary collection. Now here, you just understand that this entire collection is divided into two parts. One is the primary collection and the other is the secondary collection. Now, here understand that we talked about waste generation sources, and also we talked about the storage facility that is dustbin location. Now, whatever waste is producing at the generation sources, will go to the storage facility or a dustbin location.

Followed by that, a bigger vehicle will collect the waste from the dustbin area, which will go either to the disposal site directly or it will go to the processing site likewise. So here I think because both the activities are different, normally we consider the primary collection as a collection of services and there are different services which today we are going to discuss.

And similarly, we have a different kind of collection system based on the different kinds of dustbins, whether it is a haul container or stationary container, which we will discuss. And also now, here you will see that this entire collection is from the source or from the dustbin location to the disposal site considered as a collection. Now there is no transportation.

Now here, transportation will come up when this storage or dustbin location or the secondary collection is up to transfer stations. So it is possible that because cities are getting bigger and bigger now it is possible that some cities will have a transfer station where the amount of waste will get collected at one location and it will go to the disposal site or any treatment facility likewise.

It is also possible that, because now there are different services available for the collection of waste, the house-to-house collection has been started with mechanical vehicles. So it is possible that we need not require the dustbins and directly from the waste generation site it will go to the transfer stations and from the transfer station, it will go either to the processing sites or disposal site.

So in this case, this will be considered as a primary collection. And transportation will be done through any outside road or highways and from there it will transport to the disposal site. So here normally the bigger size of the vehicle which can take around 8 tons, 10 tons or 15 tons of waste in one route itself will be required.

But if you do not have a transfer station we have only a simple secondary collection system. So, vehicle size will be the smaller, which can take maybe one ton, two tons or three tons of waste, and has to be travel from the inside city area. So the size of the vehicle also should be small and that will go to either processing site or disposal site.

So today, that is why I thought that for a collection especially if you separate two different ideas like for primary collection and secondary collection, it will be more beneficial. This lecture is on primary collection.

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WASTE COLLECTION

❑ The term “waste collection” includes not only **gathering of solid waste** from the various sources **but also the hauling of these wastes** to the location where the content of collection vehicles are emptied.



Collection vehicle collecting segregated wastes from households in Chandigarh, India



Hauling of wastes to the transfer station or treatment facility

Now as I said that primary collection includes not only the gathering or collection of waste from the various sources but also hauling of this waste to the location where the vehicle will get empty or waste will get disposed of. So you see here the primary collection from the in Chandigarh segregated waste, the dry waste, and wet waste. Similarly, this is another kind of vehicle that is normally used.

And it could be made possible, i.e. hauling of waste to the transfer stations as I said it to the transfer stations or any treatment facility. It is possible that the collected waste is not going to the dustbins area or the disposal site. It is possible that once the waste from the source is collected, it will go to the transfer station or treatment facility and followed by it, later will go to the disposal facility or disposal areas.

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WASTE COLLECTION

❑ The term “waste collection” includes not only **gathering of solid waste** from the various sources **but also the hauling of these wastes** to the location where the content of collection vehicles are emptied.



Collection vehicle collecting segregated wastes from households in Chandigarh, India




Hauling of wastes to the transfer station or treatment facility

So similarly, here you see that bigger size of vehicle can collect from the source and which will go to the transfer station or treatment facility.


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WASTE COLLECTION

- ❑ The term “waste collection” includes not only **gathering of solid waste** from the various sources **but also the hauling of these wastes** to the location where the content of collection vehicles are emptied.
- ❑ The unloading of the collection vehicle is also considered part of the collection operation.
- ❑ The gathering or picking up of solid waste will vary with the characteristics of the facilities, activities of the location where wastes are generated, and the methods used for onsite storage of accumulated wastes between collections.
- ❑ There are two types of collection:
 - ✓ Primary collection also termed as **collection services**.
 - ✓ Secondary collection also termed as **collection systems**.



Collection vehicle collecting segregated wastes from households in Chandigarh, India



Hauling of ~~wastes~~ to the disposal site

And finally, from the treatment sites or transfer station, it will finally go to the disposal site. So here, unloading of the collection vehicle is also considered collection operation okay. This is to be understood that, not only the collection from the source also the unloading of these vehicles and the transportation from one location to another is also included in the collection process.

And the picking of waste or collection of waste also depends upon different kinds of activity of the location, i.e. how much amount of waste is generated and what kind of method we are using. So this is why I said that primary collection can also be termed as a collection service, which we are going to discuss today. And after that, we will talk about the collection system that is for the secondary collection, okay.

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PRIMARY COLLECTION/COLLECTION SERVICES

- Primary collection is the collection of solid waste from the source of generation.
- The collection points can be located outside individual household or communal containers serving a number of households/apartments.
- Depending on the collection vehicle and the distance to the waste treatment/disposal site, the waste may be taken to the disposal site or to a transfer station.

Now there are different kinds of collection services like the primary collection is from the source of generation collection. This is another photo from Indore. Now here we can see a source-separated collection process. So I was talking about dry waste, wet waste, and domestic or household hazardous waste in a different part.

Now suppose, if there is no house-to-house collection system, it could be possible that for communal waste collection bin one location is finalized in the different areas. This kind of dustbins is provided by the local corporation and the households have to dispose of the waste in these locations.


This here is another transfer station depending upon the type of collection vehicle, the distance from the treatment site, or the distance between the disposal site to the transfer station. From here, the waste will go to the transfer stations or disposal site.

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DIFFERENT TYPES OF COLLECTION SERVICES
(For low rise detached apartments)

Curb services ✓

- ✓ Homeowner/resident is responsible for **placing the containers** to be emptied at the curb on collection day.
- ✓ Homeowner/resident is also responsible for **returning the empty containers** to their storage location until the next collection.



Curb Services

Now there are different kind of collection services based on the different dwellings or apartment level because we have already discussed the storage and dustbins facilities that can be provided based on the type of apartment such as low-rise buildings, high-rise buildings, medium-rise buildings, what kind of storage we will use, what are the factors affecting those storage locations, etc.

So similarly, we will see that the collection services will also be different based on different types of detached apartments. So first for the low-rise detached apartment normally curb service is very well known, where the house owner or residents is responsible for placing the containers to be emptied at the curb on the collection day.

So you see here, the local authorities will provide some kind of location they will finalize and there could be hundreds of different locations in cities, where the corporation is finding some location and asking the house owners or household people or residents in that particular area to dispose the waste into that particular location. And also they are responsible for returning the empty container.

I think, here everything is dependent upon the local people or residents in that particular area. It is a very economical method. The corporation needs not to see how many people are disposing of the waste every day. They will have particular timing, maybe morning at 7 o'clock this waste is getting collected. Sometimes, it is possible that the waste getting collected or sometimes the entire dustbin is getting hauled off. **So based on a different kind of secondary collection system.**

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DIFFERENT TYPES OF COLLECTION SERVICES
(For low rise detached apartments)

Curb services ✓

- ✓ Homeowner/resident is responsible for **placing the containers** to be emptied at the curb on collection day.
- ✓ Homeowner/resident is also responsible for **returning the empty containers** to their storage location until the next collection.

Alley services ✓

- ✓ This is used where alleys are a part of layout of the city.
- ✓ Storage of containers is done on the alleys.
- ✓ The collection is similar to curb services.



As you can see here, this is another picture, where the house owners are responsible to dispose of the waste. Another collection method is alley service. This alley which by its name can be understood. Now, in the curb services, the dustbins are located in the main areas and especially close to the main roads where the bigger vehicle for secondary collection can easily reach and can collect the waste.

But a problem in these kinds of locations is what you can see here in the photograph. As people are responsible, nobody wants to go near those dustbins and so they just dispose of the waste around that particular container or dustbin. Also, one more point, in the curb services, corporations do not find many locations. Let's say that a city has around 30 wards.

So maybe, one ward could have one location or two locations based on the population, based on the number of houses and wherever the space is available for the local authority they are finalizing the locations. But, the locations they are finalizing are such that it is close to the main road so that vehicles can easily reach and collect the waste for disposal or treatment.

But now, the alley service made it possible that the smaller size of dustbins can be put in the different alleys. In those alleys, the bigger size of the vehicle cannot go, but the small size of the vehicle can easily collect from this kind of location. It is an example

of the secondary method of collection by the small size of the vehicle which can easily go to the alley size. Normally this is also similar to the curb service.

But for the curb service, the number of bins required will be more at a single location as the number of households is more. But in the alley, you can reduce that number and as you can put it in the different alleys these kinds of dustbins.

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DIFFERENT TYPES OF COLLECTION SERVICES
(For low rise detached apartments)

Curb services ✓

- ✓ Homeowner/resident is responsible for **placing the containers** to be emptied at the curb on collection day.
- ✓ Homeowner/resident is also responsible for **returning the empty containers** to their storage location until the next collection.



Curb Services

Alley services ✓

- ✓ This is used where alleys are a part of layout of the city.
- ✓ Storage of containers is done on the alleys.
- ✓ The collection is similar to curb services.




Alley Services

You can see here, another alley service.

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Setout-setback services/Door-to-door services

Containers are set out from the homeowners property and set back after being emptied by additional crews that work in conjunction with the collection crew responsible for **loading the collection vehicle**.



Setout- setback service

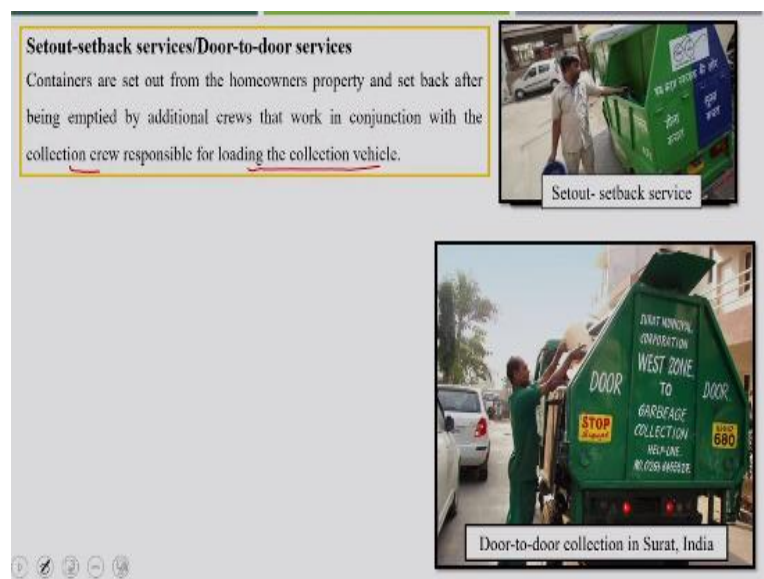
Next, the third one is a setout setback service. Normally we call it a setout setback service as it is set out from the household and setback to the vehicle. That is setout setback service or normally we say door-to-door collection system or house-to-house

collection system. I think this system is proposed in the Swachh Bharat Mission. Most of the cities have started the house-to-house collection system.

Because you see that these dustbins locations are very problematic and a lot of politicians are coming out of that particular location. Nobody wants to visit that kind of location. To avoid those kinds of curb problems, it is possible to have a door-to-door collection to avoid spreading waste over an area. Also, at present, the door-to-door collection system is adopted without segregation of the waste.

But, if under Swachh Bharat Mission, we are to segregate at the household level, then the collection crew is to be made responsible for loading or unloading of waste in the collection vehicle. The house owner is not responsible for that.

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Is another one. Like in the door-to-door collection in Surat city. Now under Swachh Bharat Mission, most of the cities have started the house-to-house collection system.

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Setout-setback services/Door-to-door services


Containers are set out from the homeowners property and set back after being emptied by additional crews that work in conjunction with the collection crew responsible for loading the collection vehicle.



Setout- setback service

Status of MSW management in India (CPCB, India, 2016)

Parameter	States
House-to-house collection of waste	18 states (of 29)
Segregation of waste at the source	5 states (of 29)
Number of unsanitary landfill sites identified	1-285
Number of sanitary landfill sites constructed	95
Number of ULBs operating compost/vermicompost facilities	553
Number of ULBs under construction compost/vermicompost facilities	173
Number of operating pipe composting facilities	7,000
Number of operating RDF facilities	12
Number of operating biogas plants	645
Number of energy generation plants	11 (6 operational)
Waste generation	143,449 Mt/day
Waste collection	117,644 Mt/day (82%)
Waste treated	32,871 Mt/day (38%)

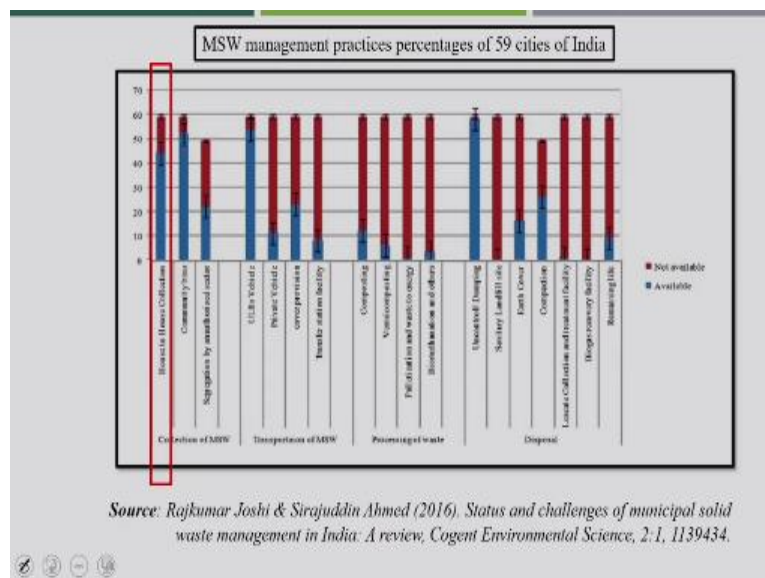


Door-to-door collection in Indore, India

This is another photograph from Indore. Now you see some of the states by 2016. You see the house-to-house collection system of 18 states of total 29 states. And you see the waste collection at 82% which was earlier before house-to-house collection system or in the curb services the collection was only 40% or 50%. That easily we reach up to 82%.

And still, I think a few cities have left out with the house-to-house collection system. If every state will have house-to-house collection system, then through the setout setback service we can possibly have more than 95% of waste collection.

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Now here you can see some of the management practice percentages of 59 cities of India. You can see that the house-to-house collection system is adopted in more than 45 cities out of 59 cities.

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Setout services

- ✓ Setout service is essentially the same as setout-setback service.
- ✓ Only difference is that the homeowner is responsible for returning the containers to their storage location.

Backyard services

- ✓ The wastes are stored in containers or sealed bags in the backyard of the house.
- ✓ It is then collected by the collection crew.

Now another service is called setout service This is not well known in India. The idea is similar to the setout-setback service. Only here the difference is only the house owner is responsible for returning the container to their storage location. But normally in India, I think such kind of services is not there.

Here actually the filled container will be collected by the corporation crew member and that empty container has to be returned to the house owner. That is the only difference but in the curb service both the responsibility is of the house owner. That is the only difference between both the services. And one is the backyard services.

This method is not much practiced in India because a lot of apartments are coming up, and a single building or single home is difficult to find. It is also difficult to find backyard roads often. Also, as dustbins are placed in the backside of your house and there a small road may be connecting the location where waste is getting collected. Therefore, large vehicles cannot approach such locations easily. Also, dustbins are not placed in front of the house.

Because nobody likes to have a solid waste collection vehicle in front of your house. So in that case we can have backyard services. This method is well-known in the

European and American countries. But in India, there are only a few locations where this service is possible. If any city is planning to adopt setout-setback service or house-to-house collection, it may not be possible to employ the method in every location of the city.

This is because, especially in the setout-setback service, for the house owner to dispose of the waste, some crew members will come to your house and collect the waste. Some people may not like somebody who is visiting their house and collecting waste often. We cannot have the door-to-door collection system in that case.

So it is possible that in a city, for some locations we can have door-to-door collection system and for some other locations we can adopt curb services. And likewise, we can say we can have different kinds of services in the same city. Because some of the locations like in the slum area or LIGs area, it is very difficult to find some recyclable matter. So in that case, segregation also sometimes will be very difficult.

So in that case we can have the curb service and collect the waste from those areas. But if you go to the other areas where people are easily segregating the waste and a lot of recyclable matters or compostable matter are produced, we can have the house-to-house collection system in those areas.

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For low and medium rise apartments

- **Common** collection service is **curbside**.
- The **maintenance staff** of these apartments are **responsible for the transportation of storage containers** to the curbs which can be done manually or mechanically.
- For **larger sized storage containers**, **mechanical emptying is common**.



A lady maintenance staff transporting the storage container to the collection crew who are manually unloading the container in Chennai, India

That was for the low-rise buildings, low-rise detached apartment. Now for medium-rise apartments, a common collection service is curbside only in medium-rise building.

Now, here maintenance staff of these apartments is responsible for the transportation of waste to the storage location. And then from the storage location to the curb. That is managed by the maintenance staff.

You can see here on the photograph- this lady is a maintenance staff transporting the waste from the storage container to the collection crew who are manually unloading the waste into the vehicle.

At present, in India a lot of apartments. So these apartments, are to have some kind of maintenance staff or maybe the security itself, who can help with the collection of the waste from the apartment area to transport the waste to the collection vehicle. Here in the large size storage container mechanically emptied is very common in that case.

Because the apartment will have several households together so that waste generation also will be large. So it is good to have a larger size container that can be used in this kind of scheme.

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As you can see, the mechanical unloading of a container is under progress.

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For high-rise apartments, a large storage container is commonly used. Here, the curb service is very common and generally mechanical unloading is done to empty the waste into the collection vehicle, which can be seen here.

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Now there are different kinds of vehicles we are using for primary collection. You can see here- this is a one hand cart with the bins. This is a well-known tricycle rickshaw. There are different kinds of tricycle rickshaw and here in rickshaw itself, we can have different parts where dry waste and wet waste could be gets collected separately. Now, this is a tricycle with a hydraulic tipping container.

Now in that case unloading of waste from the tricycle rickshaw is very easy on to the dustbins area. But, the unloading of waste itself is somewhat difficult because the

vehicles often do not have a tipping facility. So the time required for unloading of waste itself is large. Now under Swachh Bharat Mission, several cities have started employing mini trucks with hydraulic container.

Nowadays, auto tippers are being used commonly. Now in that case, if any cities have these kinds of auto tippers, the household members need not dispose of the dustbins area. These kinds of vehicles can directly reach the transfer station or if not transfer station directly can reach the treatment facility. Now the segregated waste is collected by these auto tippers will directly go to the treatment facility.

And from the treatment facility whatever is not recyclable or compostable, which will go to the disposal site with the secondary collection facilities.

Some of the locations where segregation is very easy, a lot of recyclable matter or compostable matters were getting and easy segregation is very easy, in that case, we can have these kinds of vehicles, mechanical vehicles and can directly go to the treatment facility. But I think the fuel cost and vehicle maintenance expenses will be a deciding factor.

So this kind of method will be a somewhat costly method. But I think to say the entire city could have a different kind of collection system. Even for house-to-house collection systems also different kinds of vehicles we can use in a particular city.

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Considerations	Type of services					
	Curb (manual)	Curb (mechanized)	Alley	Setout setback	Setout	Backyard
Requires homeowner cooperation:						
a) To carry full containers	Yes	Yes	Optional	No	No	No
b) To carry empty containers	Yes	Yes	Optional	No	Yes	No

Now I think we will compare, different considerations of these services (five services). So the first consideration which is required is house owner cooperation. So here, I separated this curb into two different types. One curb is a manual where waste is manually getting collected into the secondary vehicle. And the other is the curb locations where waste is getting unloading into the collection vehicle mechanically.

For alley service, setout-setback service, setout, and backyard service, the first consideration that needs to be done is to carry full container and empty container, both the cases are required. House owner cooperation is required because he/she is responsible to dispose of the waste in those locations.

Although alley service is an optional one, I think based on the different city or country, we can have the option provided that the house owner cooperation is required. Now here, for setout setback service, I guess I won't need much house-hold cooperation. You can say that the crew member is visiting your house and collecting the waste and in that case, house owner cooperation is required.

However, I can say that the co-operation is not required highly because it is possible that the house owners are putting the waste bins in front of the house or they know the timing of the particular collection person is visiting their particular area or particular house. So what they can do is whatever waste they had segregated in the bins/containers, they can put it in front of their door and the collection crew will collect the waste and empty the waste into the collection vehicle.

After emptying, they will put it again in the same location. That is why I said that the house owner cooperation is not required highly. But I think if the house owners are not able to put the dustbins outside their house, so there, in that case, their cooperation also is required.

So here house owners are carrying full and empty containers and in that case, co-operation is required in the curb manual. The house owner cooperation is required. So here the mechanical services, mechanical unloading of the waste is optional in the alley.

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Considerations	Type of services					
	Curb (manual)	Curb (mechanized)	Alley	Setout setback	Setout	Backyard
Requires homeowner cooperation:			✓	✓		
a) To carry full containers	Yes	Yes	Optional	No	No	No
b) To carry empty containers	Yes	Yes	Optional	No	Yes	No

And not required in setout setback service but at least you are seeing some house owners are disposing of the waste, I would not say is a responsibility of them, but I think we can say yes in that case in house-to-house collection system.

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Considerations	Type of services					
	Curb (manual)	Curb (mechanized)	Alley	Setout setback	Setout	Backyard
Requires homeowner cooperation:			✓	✓		
a) To carry full containers	Yes	Yes	Optional	No	No	No
b) To carry empty containers	Yes	Yes	Optional	No	Yes	No

So this required setout only for carrying empty containers. So I put it here yes, setout. And not required in the backyard service. There is no responsibility for them.

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Considerations	Type of services					
	Curb	Curb (mechanized)	Alley	Setout setback	Setout	Backyard
Requires scheduled service for homeowner cooperation	Yes ✓	Yes ✓	No	No	Yes ✓	No
Poor aesthetically	High ✓	Moderate ✓	High	Low	High	Low
a) Spillage and litter problem	High	Moderate	High	Low	High	Low
b) Container visible	Yes	Yes	No	No	Yes	No

So this is another consideration which is the requirement of scheduled service for house owner cooperation. I put it yes and put it in the red color here scheduling. Even in the setout also I put it yes. Because specially in the curb area, if there is a scheduling for the unloading of waste into that particular location, if the local people know that at what time the vehicle will come to that location.

So they can dispose of the waste before that particular time. So that we can avoid unnecessary spilling etc. in that particular location. So it is good to have the scheduling system in curb services. And even for setout service also, scheduling is very important because, as I said it that if people are not ready to put the dustbins in front of their door, then if you give them particular scheduling for bringing out their bins, in that case also particular scheduling will be required.

Next, manual curb services are aesthetically very poor. There are possibilities of spillage and litter problems because obviously, the biological matters are there so obviously that will degrade and littering problems will occur or leachate will get produced. So this is aesthetically very poor. Mechanically, I said a moderate one because your collection is not manual.

As the collection is mechanical, so you would not require a lot of manpower. So you will find only one or two crew members can unload the waste from those locations. And especially in the setout-setback method, it is very low. Containers are not visible


in that case. You will see here high curbside spillage because they deserve entire responsibility for the house owners.

And, the house owners, you know that nobody wants to go near that location and dispose of the waste into such kind of dustbin. This kind of dustbins are mechanically or we can say haul containers. Directly these containers are getting hauled off into the collection vehicle. This is another, this is a stationary kind of locations. You will see this kind of moderately alley spillage.


Now we see here, in the house-to-house collection system. There is no spillage. That is why under Swachh Bharat Mission it was proposed that we should have the house-to-house collection system collection services into most of the city area.

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Considerations	Type of services					
	Curb	Curb (mechanized)	Alley	Setout setback	Setout	Backyard
Requires scheduled service for homeowner cooperation	Yes ✓	Yes ✓	No	No	Yes ✓	No
Poor aesthetically	✓	✓				
a) Spillage and litter problem	High	Moderate	High	Low	High	Low
b) Container visible	Yes	Yes	No	No	Yes	No



High spillage in setout services



Low spillage in backyard

This is another in the spillage into the setout service. And there is no spillage in the backyard area.

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Considerations	Type of services					
	Curb	Curb (mechanized)	Alley	Setout setback	Setout	Backyard
Attractive to scavengers	Yes	Yes	Highest	No	No	No
Prone to upsets	Yes	No	Yes	No	Yes	No

Now another consideration that needs to be done here is an attraction to the scavengers. This is highly attractive to the scavengers and very prone to be upset. But here I put it “NO” because, in mechanical curb service, the upsetting of waste would not be there, but it is highly attractive to the scavengers such as straw animals, rag pickers also are possible. But I think in the alley service, it is highest.

Because is a small quantity of waste, easy to get the recyclable matter out of that. And India kind of country where most of the recycling materials are collecting by the rag pickers. So it is possible to attract those rag pickers to such locations. But in setout setback service, there would not be any scavenging in that kind of practice. See here curbside scavengers, you see that. You see here scavenger scavenging.

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Considerations	Type of services					
	Curb	Curb (mechanized)	Alley	Setout setback	Setout	Backyard
Attractive to scavengers	Yes	Yes	Highest	No	No	No
Prone to upsets	Yes	No	Yes	No	Yes	No

No scavenger problem in setout-setback, setout, or backyard service. That is why is good to have house-to-house collection system or setout-setback service.

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Considerations	Type of services					
	Curb	Curb (mechanized)	Alley	Setout setback	Setout	Backyard
Number of persons in crew						
a) Typical	2	2	1	3	3	3
b) Range	1-3	1-2	1-3	3-7	1-5	3-5



Another is the number of persons in the crew. This is also very important because ultimately we have to think about the economy also. So in the curb service, the requirement of crew number is less in comparison to the setout setback service. This is another issue about the setout-setback service. You will require, a large number of crew members into setout-setback service.

Because in that case, a crew member has to visit each household. So obviously you will be required more number of crew members. We will see here 1 to 3 collection crew in the curb service. But obviously, for setout-setback services, more collection crew will be required.

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Considerations	Type of services					
	Curb	Curb (mechanized)	Alley	Setout setback	Setout	Backyard
Number of persons in crew						
a) Typical	2	2	1	3	3	3
b) Range	1-3	1-2	1-3	3-7	1-5	3-5



1-5 collection crew in setout service



3-5 collection crew in setout service

This is in the setout service. This is also another setout service.

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Considerations	Type of services					
	Curb	Curb (mechanized)	Alley	Setout setback	Setout	Backyard
Crew time	Low	Low	Low	High	Medium	Medium
Collector injury rate due to lifting carrying	Low	Low	Low	High	Medium	High
Trespassing complaint	Low	Low	Low	High	High	High
Special considerations		Requires standardized containers	Requires alleys and vehicle that can maneuver.			Requires wheeled caddy. Works best with driveway
Cost due to size and time requirements	Low	Low	Low	High	Medium	Medium

Now crew time. Obviously, in curb services, crew time is low because no crew is visiting any household. So the crew time will be low in the curb services. But in the setout setback service, it is very high. The timing of the crew is also required in this case. Carrying an injury rate due to lifting or carrying. So, in curb service, it is low again. But injury case here is possible because a crew member has to touch the waste.

And here also, it is possible and as the crew members have to run the tricycle rickshaw or any mechanical vehicle. So injury is possible in that case. Trespassing complaints will be very low here. I think we will have the complaints only for the secondary

collection. Primary collection, there would not be any primary collection because house owners are responsible. They would not complain about that.

But what they will complain about is that the waste disposed of by the house owners has to be collected regularly, that is what they are asking and sometimes they are pushing to collect two times in a day, three times on a day because there is no timeline they are managing there is no scheduling they are managing. So that is what the complaints could be possible.

But here, a very important problem that needs to be discussed is the trespassing complaint. It is possible in the setout setback services because sometimes crew members may forget to go to that particular households or the quantity is more from the household and crew member is not able to collect that kind of waste. And it may also be possible that in a house-hold segregation collection is compulsory but that particular household has not been segregated. That kind of complaint also will come up in the house-to-house collection system. So in that case, if you go for setout-setback service, especially you will require a lot of awareness. So before starting the house-to-house collection system or setout setback services you need to run a lot of awareness schemes.

These awareness schemes could be started into the school, temples, or different local areas, and to ask the local people to help for making the people aware especially not only for the waste collection but also for segregation, it is very important to have proper awareness. Through television also, it is possible to spread such kind of awareness.

Special considerations need to be made for mechanical curb services. You will require a standardized vehicle because as the system of collection is mechanical a special kind of mechanical system will be required. Not only the standardized container or dustbin will be needed but also the standardized vehicle will be required. But in the case of setout-setback, I think we do not require any standardization.

We can design based on available vehicle facilities or container facilities. And last is the cost due to the size and time required. You see here the cost is low and the process is highly economical, but setout-setback is a very costly unit based on size and time

requirement. That is why in the older days we used to have the curb services for the waste collection from the household area. That was very popular in India.

But you see that you saw a lot of photographs. It can be inferred that in the case of curb services, there is a lot of issues of scavenging, littering, etc. To avoid that we started the setout-setback service but is a very costly process. So for that, we need some kind of money from the house owners also. Because obviously, it is a service. And services means I think we have to pay for the service.

So under Swachh Bharat Mission if any city or particular area have started the house-to-house collection system, it has been asked to the house owner to pay rupees 32 rupees 200 rupees based on the different city, class 1, class 2 cities, different fees have been proposed starting from the 30 rupees to the 200, 250 rupees in Delhi kind of cities.

That is a per month payment is required. Or fees are required for the setout-setback service. Otherwise, because we have to pay for the crew member we will be required a lot of money for vehicle management. So that money has to come up from the house owners only. Or otherwise, the waste may be getting collected in a segregated way and directly reaching the treatment facility.

So treatment means the dry waste is getting recycled. From that, we are getting some kind of money. And the biological waste can produce some kind of compost or biogas, which are sellable. So from that, the money has to come up for the setout-setback service. So before just finishing that, you just understand that there are different services in India.

And different cities have different kinds of collection methods, planned under the Swachh Bharat Mission. Again and again, I am saying that the entire city cannot be a house-to-house collection service, it is not possible. This plan is in such a way that some of the locations or maybe most of the locations where road conditions are very good, house owners are well aware, well aware of segregation.

So why not to provide a setout-setback service on segregated waste collection services. Plan it in some areas. Maybe 10%, 20% of that particular city will have still curb

services that could be planned. But that also if you make it the particular scheduling and we can reduce the spillage or scavenging, that kind of method can run within a good way.

And in the next lecture, we will see, once the waste is reached the dustbin, we will go to the secondary collection. From the dustbin now it will go to the treatment facility, transfer stations, or disposal site. That we will discuss in the next class. Thank you.