STUDY TO IMPROVE
DISCARD MANAGEMENT SYSTEMS AND
POLICIES
AT
CENTRAL RAILWAY STATION
THIRUVANANTHAPURAM

Thanal
December 2007
Thanal is a public interest research and campaign organization working for environmental health and justice. It is based in Thiruvananthapuram and is actively involved in State, National and International level programs and campaigns.

Thanal is the pioneer in the concept of Zero Waste in India and one of the 3 organisations selected globally for a zero waste fellowship to develop field level program. The theory of zero waste was translated into practice through a project - Zero Waste Kovalam, which got national and international attention. This project bagged national level recognition for Kerala Tourism and bagged international award for India in best environmental initiative category from Pacific Association of Travel Agents (PATA) in 2006. Thanal is a member of Technical Support Group formed by Govt of Kerala for Solid Waste Management Campaign in the State. It is member of GAIA (Global Alliance for Incineration Alternatives) a global network of organisations and Waste Not Asia - a platform for Asian organisations to address the waste issues.

The study to improve systems and policies at Central Railway Station, Thiruvananthapuram was undertaken by Thanal as a research project. The cost towards the study was taken from internal resources which was nearly Rs.60,000/-, since the initiative taken by Thiruvananthapuram Railway Station can set an example to other Railway stations in India. Solid waste management has been identified by Local Self Government as a problem which needs imaginative activities with regard to awareness campaigns and easy to apply solutions which are environment friendly. In such a scenario we thought it prudent to invest the technical expertise available internally for a social cause. The study was conducted by a team of 3 persons working continuously to collect information and also to conduct interaction meetings. Incase Railways find the recommendations given are practical and start implementing the same; the effort put in by Thanal is rewarded.
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1. Introduction

Indian Railways is one of the largest networks of railways in the world. It has become the backbone of the economic and social growth of India. Millions of people and million tonnes of goods are handled by this network on a daily basis. It is the biggest employer in the Indian economy and is one of the efficiently run railways in the world. Indian Railways plays an important role in sustaining national integration.

The rail traffic is growing at a faster rate to fulfill the demand from the public and industry. Being the hub of all transport systems of the country, Indian Railway have to cater the needs of the passengers and businesses. It paved way for growth of modern amenities and facilities in and around of railway stations and in trains. It also became a captive market for food and snacks industry as part of new fashions and taste of the people. This left behind a huge quantity of waste along the rails and railway stations.
2. Waste at Railways

The nature of waste at railway station is different from a municipal area.

- **Floating population**: The waste is mainly generated by the floating population who spends very little time – five minutes to few hours. This floating population is highly diverse coming from different parts of the country, from different cultural background with different habits, tastes and preferences; and they speak in different languages. There is no uniformity in them except they all are travelers. The stable population includes of traders, vendors, hawkers, porters and police.

- **Packaging Waste**: Being a hub of long journeys, food and water is the main product traded in railway stations and trains. And all these food and snacks are packed using disposable material especially plastics and aluminium foil. This forms the major part of the waste along the railway lines, stations and within the train.

- **Limitation in space**: All Railway stations and facilities are working with limited space and limited resources on a continuous manner. It operates round the clock.

- **Vulnerability of vector diseases**: Since the railways connect the entire country, poor sanitation or hygiene condition in one place can cause an out break of vector disease to other parts of the country. The poor drainage, stagnant water and nigt soil on tracks due to toilet flushing also add to this possibility.

The Station managers are finding it hard to manage this waste which is heterogeneous as the passengers are. It is high time to think in terms of proper systems supported by policies and programmes to keep the railway stations and trains clean.
3. **Objectives**

- To make Thiruvananthapuram Central Railway Station a litter free area.
- To help Indian Railways to attain hygiene and sanitation at international standards.
- To design and develop better discard handling system for Indian Railways.
- Saving resources.
4. **Strategy**

- Multi-focal and decentralised systems – Looking at possibilities of decentralised systems suitable to discards generated from different sources.
- User friendly systems – Modifying or creating systems to ensure involvement of people and reduce the burden of workers.
- Awareness and Motivation – Designing and developing awareness campaign and motivation plan for different stake holders by consultative process including workers.
- To identify alternatives to present materials used by railways which get converted to waste.

5. **Scope of Study**

A study on the current discard handling system, people attached to it, their attitude, roles, responsibilities, hierarchy, problems faced by them, their suggestions etc were considered to draw a picture of current ground reality. An appropriate management plan was prepared based on this for implementation. The stages of study were as under.

- Reviewing the current system through audit of water and solid waste management.
- Preliminary stakeholder consultations on infrastructure, budget involvement of people and attitudes.
- Drawing up modified System
- Final presentation and consultation/comment
- Final Report
6. Area and Responsibility of Solid Waste Management - TVC Railway Station

a) The study is confined to Central Railway Station, Thiruvananthapuram which has an area of nearly 3,20,000 sq. metres. The daily passenger movement is approximately 63,532.

b) Maintenance of cleanliness and sanitation of Thiruvananthapuram Central Railway station is the responsibility of Medical and Mechanical branches of Thiruvananthapuram Division. They work in close association with each other and report to Additional Divisional Railway Manager on all such matters.

i) Medical: Medical branch has divided its area of responsibility into two namely; Area 1 and Area 2.

Area 1 consists of platforms 1 to 5 (15,960 sq.m.) and tracks (9,650 sq.m) within platform limits and beyond platform limits upto 200 meters at both ends towards road over bridges. Commercial establishments includes 3 restaurants (vegetarian refreshment room, non vegetarian refreshment room & food plaza), 11 refreshment stalls/ auxiliary stalls, 3 stationary stalls, 2 book stalls and 2 medical shops situated at platforms 1 to 5.

Area 2 covers office rooms of appointments like Station Manager, Deputy Station Manager, Station Master, Chief Commercial Inspector, Chief Ticket Inspector & Ticket inspector. Other offices include Information centre, VIP lounge, Booking office, RPF office, RRI Cabin, Parcel office, TTE rest room, Reservation office and passenger amenities including waiting halls (First class/ II class & ladies), retiring rooms, officers rest house and dormitories, concourse hall and circulating area, parking areas ( front & rear), front and rear entries and foot over bridges. The total area is approximately 25,000 sq.m.

ii) Mechanical: The area consists of shunting yards from track number 6 to 16, coach servicing area from track number 18 to 25, pit and yard apart from rear entry offices, toilets etc. The north and south boundary of the area are Thampanoor and Thycaud over bridges respectively.
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Thiruvananthapuram Central Railway Station - Front Gate

Thiruvananthapuram Central Railway Station - Back Gate

Platform No. 1
7. Waste - Source, Nature and Quantity

Waste generation occurs at 5 major areas namely, platform & tracks, rail yards, trains, offices & service areas and shops & commercial establishments. The waste generated by engines during servicing like diesel, grease, oil, waste from batteries and pesticides and other chemicals used for disinfection etc. do not form part of this study (They are also very important since they belong to hazardous waste category and needs special attention). The total quantity of waste generated per day is nearly 1263 kg which include both biodegradable and non biodegradable. The details are as under.

**a) Platforms & Tracks.** The sources include passengers, hawkers and vendors, dust bins, train etc. Nature of waste is:

- Biodegradable- Cooked food left over, food leftover covered in aluminium or tetra packs, fruit peels, towels and cloth pieces, tissue paper, paper and paper cups.
- Non bio degradable- Drinking water /soft drink plastic bottles, plastic sachets of oil, snacks, soaps, polythene covers, styrofoam plates, tetra pack plates, aluminium foils,
- Qty: 314 kg /day (aprx).

**b) Rail Yards.** The sources include sweepings from platforms, passengers in the train, vendors and hawkers, trains, shunting yard, coach service area etc. The nature of waste is:

- Biodegradable- Cooked food left overs, Food leftover covered in aluminium or tetra packs, fruit peels, towels and cloth pieces, tissue paper, paper and paper cups.
- Non bio degradable- Drinking water /soft drink plastics bottles, plastic sachets of oil, snacks, soaps, polythene covers, styrofoam plates, tetra pack plates, aluminium foils, glass, leather and oil etc.
- Qty: 647 kg / day (aprx).
c) Trains. The sources include passengers and pantry car. Nature of waste are:

- Biodegradable- Cooked food left overs, Food leftover covered in aluminium or tetra packs, fruit peels, towels and cloth pieces, tissue paper, paper and paper cups.
- Non bio degradable- Drinking water /soft drink plastics bottles, plastic sachets of oil, snacks, soaps, polythene covers, styrofoam plates, tetra pack plates, aluminium foils
- Qty: Not available.

d) Offices and service areas. The sources include office staff and passengers. Nature of waste includes card board, carbon paper, cartons, gunny bags, spoiled food articles and food waste.
- Qty: 136 kg /day (appx).

e) Shops and Commercial Establishments. The sources include restaurants, refreshment stalls, book shops, medical shops and stationary shops. Nature of waste includes food waste, paper cups, plastic covers, plastic bottles etc.
- Qty: 166 kg /day (appx).

In the efforts for utilization of wastes as a resource, it will be appropriate to know the value that can be recovered or its reutilization capabilities. Table 1, 2, 3 4 and 5 in Annexure give an insight for general information purpose.

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Waste dump behind refreshment stall in Platform No-1

Waste dumped along the shunting track

Waste from Trains
8. Water - Source, Use & Disposal.

The sources of water for daily use at Thiruvananthapuram railway station are Kerala Water Authority which supplies 10 lakh litres per day and pumping of nearly 2 lakh litres of water from Karamana River by Railways. Water is used for cleaning, watering the coaches, drinking, washing, cooking and use in toilets etc. The detailed working sheet is attached at Table 6 in annexure. Waste water goes to Amayizhanjan canal which is a waste / rain / storm water drain flowing adjacent to railway station and maintained by Municipal Corporation of Thiruvananthapuram.

To avoid cleaning process using brooms / brush normally water is splashed using connected water hoses which end up in wastage of water.

....and clogging of drains with solid waste.

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9. **Waste – Flow and Disposal in the Present System.**

A study to understand the current flow of waste was undertaken by the team in order to suggest improvements in the system. The details are as under.

**a) Platforms & Tracks**

Wastes in mixed condition are collected by hand by contract workers from bins 6 times and platform 12 times a day. These are subsequently dumped for segregation behind workers rest room. Here the workers carry out segregation and it is stored in sacks for transportation. The items like pet bottles, cardboard etc. are kept separate. Next day both the biodegradable and non-biodegradable discards are handed over to Kudumbasree workers for onward dispatch to Municipal Corporation of Thiruvananthapuram.

**b) Rail Yards**

Collection of waste in mixed condition from trains, pit and yard by contract workers which is dumped near incinerator for segregation. This incinerator has been established without permission of State Pollution Control Board and records of standards maintained for exhaust gases could not be verified. After segregation bio degradable as well as a part of non-biodegradable discards are fed to incinerator and burnt. Items which could be sold are taken by workers.

**c) Offices and service areas**

Collection of waste by hand by contract workers in mixed conditions which are dumped for segregation behind workers rest room. After segregation it is stored in sacks for transportation. Next day it is handed over to Kudumbasree workers for onward dispatch to Municipal Corporation of Thiruvananthapuram.


**d) Shops and Commercial Establishments**

Here the waste is handled by Kudumbasree workers who are paid a monthly sum by the owners of these shops. Waste in mixed condition is collected in the bins which are segregated by Kudumbasree workers by hand. Subsequently the waste is sent to Municipal Corporation of Thiruvananthapuram by them.
10. Manpower & Responsibility in the Present System

Manpower engaged for waste management in railway station are as under. Their responsibility includes dry sweeping, washing, mopping, watering, Sweeping-Watering -Toilet cleaning and Mechanized cleaning.

<table>
<thead>
<tr>
<th>Position</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweepers of Railways</td>
<td>4</td>
</tr>
<tr>
<td>Contract workers</td>
<td>273</td>
</tr>
<tr>
<td></td>
<td>(54 under medical &amp;219 under Mechanical)</td>
</tr>
<tr>
<td>Kudumbasree workers</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>292</td>
</tr>
</tbody>
</table>

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11. Observations

Major observations on the present waste management system in Thiruvananthapuram railway station are given below.

**a. Nature of waste**

i) Mixed waste spread all over.
ii) Putrefied mixed waste in long distance trains.
iii) Large quantity of plastic waste.
iv) Large quantity of packaging waste.

**b. Process**

i) No separate bins for biodegradable and non bio degradable wastes.
ii) No segregated collection.
iii) Use of brooms on tracks for collection of waste.
iv) Washing of tracks soaks solid waste Plastic bottles and cups fall into drain and choke it.
v) Nearly 2.7 lakh litres of waste water goes to Amayizhanjan canal every day.
vi) Pit and yard cleaning not done on a daily basis.
ii) All machines as per contract seemed to be not used in mechanical cleaning process.
ix) Unassigned areas for cleaning.

**c. Hygiene & Sanitation**

i) Area where waste is dumped for segregation gives foul smell and is closer to restaurants and platform No: 1.
ii) Leachate is found spreading all around in the area.
iii) Workers are not using protective gears like gloves, aprons and caps during handling of waste.
iv) Wastes are carried on head by workers
v) Disinfectants used seem to be of inferior quality.
vi) Frequent choking of waste water drain.
vii) Chances of waste water from canal entering railway yard.

d. Facilities and Practices
i) Number of bins: 58(platforms), 55(offices).
ii) Transfer points: Behind the rest room of workers on platform number 1 for waste collected from platforms and tracks. Near the incinerator for waste collected from trains, rail yards, coach servicing area and rear entry offices.
iii) Machines and tools provided:
   - Dry sweep: Broom, plastic sacks, plastic basket, bamboo basket, long handled brush & flipper machine.
   - Washing: Mug, bucket, various types of brushes, polythene hose pipe, high pressure jet & washing plant.
   - Mopping: Ezee clean mop, Mopping machine, Heavy duty scrubber dryer.
   - Incinerator: Provided to contractor by railways to dispose off mainly biodegradable waste. Works for 24 hrs and emits smoke and unpleasant smell. Produces hazardous ash.

e. Communication & Signs
i) There is no indication on bins for segregated deposition of discards.
ii) No video / audio displays to encourage public, to maintain cleanliness.
iii) No sign boards to support waste collection / disposal system.
**f. Safety of Workers**

i) Records of medical examination of contract workers are not available.

ii) Workers are not using proper protective gears.

**g. Responsibility & Accountability**

i) Role and responsibility of station manager/master regarding waste management is unclear.

ii) Most of the officers assume the responsibility of the Division as a whole and none is assigned station specific responsibility.

iii) Records / Document giving out clear cut area of responsibility for cleaning not available.

iv) Low priority accorded to cleanliness in charter of duties.

v) Organization chart is vague on accountability and reporting.

**h. Documentation and Reporting**

i) The record of workers present each day and jobs undertaken are not available in Mechanical Section.

ii) Record of grading for cleanliness is not maintained in Medical section.

iii) Review of cleaning process by senior officers and corrective action taken if any, are not recorded.

**i. Possible Threats and Future**

i) Mixed waste collection and subsequent segregation in an open area and its storage can result in scavenging by vectors. This is a health hazard for the public.

ii) Incineration of waste is also a health hazard and is violation of MSW (M&H) Rules 2000.

iii) Waste water disposal to the canal is resources wasted.
iv) Scattered waste and choking drains may bring bad name for Railways.

j. **Laws Vs Practices**


ii) Incineration – Against MSW (M&H) Rules 2000, Environment Protection Act, Water, Air Acts and International Law/ negotiation and treatise. The existing one is clear violation of all provisions and works without permit.
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Waste Storage Tank near Municipal Waste Incinerator at TVC Railway Station

Workers dumping waste near Municipal Waste Incinerator at TVC Railway Station

Name board depicting the official inauguration of Municipal Waste Incinerator
12. Recommendations

Keeping the objectives and strategy of the study in focus, there are some points which need immediate attention. This may also involve changes in organizational hierarchy, accountability, infrastructure, policies and awareness campaigns. The details are enumerated below.

a. Collection and Transportation

i) Segregated collection is a fundamental requirement for an efficient waste management system. Please refer chart 1 for details. Discard pickers can work in pairs which ensures 100 percent picking and no area is overlooked.

ii) Use cloth and plastic bags or trolley buckets to avoid spillage.

iii) Movement of waste through trolleys to avoid carrying on head which is unsightly and against basic tenets of human rights/ manual labour.

iv) Earmark safe and adequate space for interim storage.

v) Need to create a resource recovery facility for sorting, cleaning and final storage.

b. Cleaning

i) Segregated collection (refer chart 1) helps further cleaning process due absence of solid waste on tracks, coaches and platforms.

ii) Manual cleaning / dry sweeping of areas from where waste has been collected.

iii) Washing and mopping of dry swept areas.

iv) Disinfection of areas as applicable.
c. Disposal

i) Cleaning and drying of non bio degradable at resource recovery facility.

ii) Sale items at scrap market as per rules in vogue. Also refer table 1,2 &3.

iii) Recovering bio degradable discards as compost. In vessel composting or vermi composting can be adopted. This can be contracted out to either Kudumbasree/ Self help group/ workers corporative or local community groups if required.

d. Communication and Signs

i) Mark bins with color code or icons for segregated disposal of waste.

ii) Instructions to use them should be easy to understand by all class of people.

iii) Put up sign boards to locate dustbins on platforms and trains and they should be clearly visible.

iv) Adopt uniform design and color code for sign boards for improved aesthetics.

e. Organisation

i) Organisation has to be streamlined for better coordination and efficiency. Refer chart 2 for suggested organization.

ii) Reporting process have to be refined for generating information for management purpose. Recommended procedure is given below.

➢ Supervisor to give status report on waste handled and man power deployed to implementing officer every day.

Supervise cleaning process.
Implementing officer to compile daily reports, carry out checks of cleaning process at random and forward reports so compiled with remarks to nodal officer once a week.

Nodal officer collates all these reports and note down points requiring immediate attention. Monthly report will be submitted to the sanitation committee by the nodal officer.

A review meeting will be called once a month by sanitation committee. Decisions taken for improvements and corrective action will be intimated to all concerned by fastest means.

**f. Accountability and Responsibility**

Unless an organization is supported by clear cut charter of accountability and responsibility, there are chances of failure or an inefficient functioning. The following guidelines may be followed to avoid such a situation.

i) **Sanitation Committee**

This is the functional committee formed with expertise available in the Division. Representatives of medical, mechanical and administrative divisions will form the committee.

Functions of the Committee:-

- Preparation of Management Plans for waste management
- Developing norms for the Contract and Technical support
- Monitoring and Evaluation

ii) **Nodal Officer**

Nodal Officer is the person responsible for implementation of the plans and coordination of different programmes as well as departments for waste management. Nodal Officer has to file monthly performance report to the Sanitation Committee.

Functions of Nodal Officer:-

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- Assigning duties and coordination of process
- Organising awareness training and training programmes
- Coordination of Campaign
- Evaluation and Reporting

iii) Implementing Officer(s)
Railway station and premises have to be divided into regions / sectors based on accessibility and functions. Implementing officer is the person responsible for sanitation of a specific region / area. Implementing officer has to file weekly performance report to the Nodal Officer.

Functions of Implementing Officer:-
- Preparation of Working Plans based on Management plan in consultation with Nodal Officer
- Implementation of working plans
- Coordination of Supervisors
- Evaluation and Reporting

iv) Supervisor(s)
Each region / sector may have one or more supervisors based on the area, time and function who has the responsibility of ensuring the cleaning and sanitation process. The supervisor has to exercise control of the workers and issue job cards and file daily reports to the Implementing officer in a fixed format.

Functions of Supervisor:-
- Preparation of job cards
- Maintenance of attendance
- Ensuring safety and security to the workers and railway property
- Day to day monitoring and reporting

g. Infrastructure
Additional infrastructure have to be created and modification for existing need to be carried out. They include
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i) Information/communication boards  
ii) Colored bins for segregated collection of discards  
iii) Trolley bins and trolleys for easy movement of waste  
iv) Tools and equipments should be user friendly and work efficiently  
v) Resource recovery facility where discards are sorted, cleaned, and stored for making it accessible for reuse, repair, recycling and composting.  
vi) Composting yard if it is being done in house.  
vii) Improvements to drainage like covers, traps for solid waste and easiness to maintain/periodical cleaning.  
viii) Waste water recycling plant to reclaim the grey water for cleaning purposes, thereby saving resources and money.

**h. Worker Safety**

i) Provide protective gears such as gloves, shoes, helmet, fluorescent jackets etc.  
ii) Better tools and equipments which can be maintained easily.  
iii) Adopt safe practices of carrying waste.  
iv) Plan suitable training module on health and safety.  
v) Implement monthly health check up of workers.

**i. Awareness Creation**

Awareness programmes should be able to sensitise people and be thought provoking. It is advisable to seek professional assistance. Some of the suggestions are as under.

i) **Passengers**  
   • Message boards in trains, platforms and passenger amenity facilities.  
   • Video / animation screening / announcements in platforms.  
   • Messages on tickets / reservation forms.
- Punitive action for littering.

ii) **Staff**
- Training on public health and waste
- Interaction with passengers / campaign

iii) **Workers**
- Training on public health, segregation of waste
- Training on public interaction

iv) **Vendors**
- Training on best practices in business
- Training on public interaction

**j. Policy**

Policy initiatives will help ongoing activities to achieve the desired level of international standards in waste management. Some of the initiatives could be:

i) Railways to adopt the policy of zero waste in material use, which include
- Promotion of reusable and recyclable materials
- Promotion of fuller utilization of existing systems like drinking water kiosks by ensuring its efficiency and quality
- Phasing out plastic carry bags, disposable plates, cups, spoons and forks
- Phasing out the sale of snacks, food, beverage and water in containers or packets made of plastics or other non viable materials.
- Setting targets for optimum recovery of discards and reduction of waste.

ii) Extended producer responsibility to be imposed on supplier of package drinking water to railways
iii) Ensuring good quality food, water and beverage at reasonable price can discourage passengers from bringing packed food

iv) Punitive action to be taken for littering railway premises and trains

v) Dismantle incinerator
13. **Benefits**

Apart from setting up a model discard management system which can be replicated in Indian Railways, benefits can be reaped locally which are mentioned below.

**a. Economical**

i) Revenue from Compost since there is potential for minimum 200kg matured compost / day

ii) Revenue from scrap

iii) Savings in maintenance cost

iv) Reduction in water bill due to water recycling

**b. Public Health**

i) Improved standard of public health and sanitation.

ii) Reduction in scavenging by animals like dogs, rats and birds.

iii) Control on vector diseases.

**c. Environmental**

i) Clean and Green railways

ii) Clean station premises

iii) Compost for gardening

iv) Resource Conservation

v) Conservation of water

vi) Recovery of discards for recycling
14. **The Way Forward**

**a. Approach**
- Discard handling needs priority
- Appropriate management policies have to be framed to tackle the future needs

**b. Side scaling**
- Better discard handling systems have to be devised and implemented at other railway stations

**c. Participation**
- Ensure participation of passengers, railway staff, shop keepers and contract workers in planning, implementation and monitoring of discard handling programmes. Involve them in awareness campaigns.

15. **Conclusion**

The initiative taken by Thiruvananthapuram Railway Division to improve the present discard management system is a progressive step towards tackling the huge amount of use and throw items that blemish the railway lines all over India. It can also affect India’s march to achieve world class standards in tourism sector. Since solid waste management has emerged as a material problem of considerable magnitude, a determined and focused attempt is necessary to find pragmatic and long lasting solutions. There is no doubt that the technical expertise and resources at the disposal of Indian Railways can realize that goal.
16. **Acknowledgement**

Thanal gratefully acknowledge the support provided by the officers and staff of Divisional Railway Manager's Office and Thiruvananthapuram Central Railway Station to carry out this study. Thanal is also thankful to the cooperation extended by Contractors and their employees, Commercial establishments and porters of Thiruvananthapuram Central Railway Station.
17. **Annexures**

**Table 1.**

<table>
<thead>
<tr>
<th>Area</th>
<th>Qty (Kg.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platforms and Tracks</td>
<td>314*</td>
</tr>
<tr>
<td>Rail yards</td>
<td>647**</td>
</tr>
<tr>
<td>Offices and Service area</td>
<td>136*</td>
</tr>
<tr>
<td>Shops and Commercial Establishments</td>
<td>166</td>
</tr>
<tr>
<td>Trains</td>
<td>***</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1263</td>
</tr>
</tbody>
</table>

*Data from Medical Division, **data from Mechanical division ***data not available

**Table 2.**

<table>
<thead>
<tr>
<th>Recyclable</th>
<th>Price per Kg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium foil/ Cans</td>
<td>Rs. 85</td>
</tr>
<tr>
<td>Stainless steel</td>
<td>Rs. 30</td>
</tr>
<tr>
<td>Paper cups and paper plates</td>
<td>Rs. 2</td>
</tr>
<tr>
<td>Tissue paper</td>
<td>Rs. 2</td>
</tr>
<tr>
<td>Cardboard</td>
<td>Rs. 4.5</td>
</tr>
<tr>
<td>News paper</td>
<td>Rs. 5</td>
</tr>
<tr>
<td>Pet bottles</td>
<td>Rs. 5 to 18</td>
</tr>
<tr>
<td>HDPE spoons and forks</td>
<td>Rs. 15</td>
</tr>
<tr>
<td>Milk / Curd / Sachets</td>
<td>Rs. 10 to 20</td>
</tr>
</tbody>
</table>

**Table 3.**

<table>
<thead>
<tr>
<th>Compostable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tissue paper</td>
</tr>
<tr>
<td>Cloths and cloth pieces</td>
</tr>
<tr>
<td>Leaf plates</td>
</tr>
<tr>
<td>Food Left over</td>
</tr>
<tr>
<td>Tea bags</td>
</tr>
<tr>
<td>Vegetable Waste</td>
</tr>
<tr>
<td>Meat waste</td>
</tr>
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</table>
Table 4.  
Price of Compost

<table>
<thead>
<tr>
<th>Compost</th>
<th>Vermi Compost</th>
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<tbody>
<tr>
<td>Rs. 6</td>
<td>Rs. 5 to 10</td>
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Table 5.  
Inert Materials

<table>
<thead>
<tr>
<th>Inert:</th>
<th>Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweep dust and soil</td>
<td>Filling / Construction</td>
</tr>
<tr>
<td>Construction &amp; Demolition waste</td>
<td>Filling / Construction</td>
</tr>
</tbody>
</table>

Table 6.  
Use of Water and Recyclability

<table>
<thead>
<tr>
<th>#</th>
<th>Process</th>
<th>Qty water needed</th>
<th>Sub Total</th>
<th>% available for Recycling</th>
<th>Qty available for recycle</th>
<th>Qty. recoverable (80%)</th>
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<td>35480</td>
<td>31932</td>
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<td>25546</td>
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<td>Washing of Carriages on Washing lines</td>
<td>140000</td>
<td>126000</td>
<td>90</td>
<td>100800</td>
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<td>4</td>
<td>Cleaning of Carriage on Platform</td>
<td>50000</td>
<td>45000</td>
<td>90</td>
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Raw Water demand  
Total: 241430

Potable Water demand  
Total: 873150

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<th>Process</th>
<th>Qty water needed</th>
<th>Sub Total</th>
<th>% available for Recycling</th>
<th>Qty available for recycle</th>
<th>Qty. recoverable (80%)</th>
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<td>20</td>
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Total: 1114580

2000 sq.m X 2.5 mtrs of rain water per year = 750000 litres

Potential of rain water harvesting

Thanal  
December 2007

35
## Table 7
Cleaning Process - Chemicals and Pesticides

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<tr>
<th>Sl.No</th>
<th>Disinfectants used</th>
<th>Sl.No</th>
<th>Anti Mosquito and Anti Fly measures</th>
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<td>Phenyl Black</td>
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<td>Baytex</td>
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<td>Bleaching Powder</td>
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<td>Baygon Bait</td>
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<td>4</td>
<td>Vim/ Cleaning powder</td>
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<td>Blottanax</td>
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<tr>
<td>5</td>
<td>Lime Powder</td>
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<td>Nuvan</td>
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<tr>
<td>6</td>
<td>Soda Ash</td>
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<td>7</td>
<td>Aromatic Compound</td>
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<td>Solfac 50 WP</td>
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<td>Deodorant Jelly</td>
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<td>Malethion Liquid</td>
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<td>Odonil Cakes</td>
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<td>Gamaxine Powder</td>
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<td>Urinal Cakes</td>
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<td>Cythion Liquid</td>
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<td>Pine oil</td>
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</table>

Data from Medical Division
Chart - 1
Cleaning Process
Chart 2. 
Organisation Chart

Division Level
Station Level

DRM
ADRIM
Sanitation Committee

Nodal Officer
Station - 1
Implementing Officer
Jobs X1 to Xn
Supervisor

Nodal Officer
TVC
Implementing Officer
Jobs Y1 to Yn
Supervisor

Nodal Officer
Station - N
Implementing Officer
Jobs Z1 to Zn
Supervisor

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