Sl. no	EQUIPMENTS	100 TPD QTY	COMMENTS
2.	**TIPPING & PRE-PROCESSING SECTION**		
a)	Feeder	1NO	For feeding materials at controlled rule.
b)	Trommel-100mm	1NO	For screening.
c)	Transfer Conveyor	1NO	For conveying materials to dumper.
d)	Rejection Conveyor	1NO	For removal of rejection and transfer it to sorting belt.
e)	Sorting Belt Conveyor	1NO	For sorting of Bio-mass; if any.
3.	**COASER SEGREGATION SECTION**		
a)	Pay Loader (0.4 cum)	1NO	For shifting material in rain shed & feeding material to feeder.
b)	Feeder	1NO	For feeding material at controlled rate.
c)	Trommel 35mm	1NO	For screening.
d)	Process 35 conveyor	1NO	For feeding materials to next trommel.
e)	Trommel 14mm	1NO	For removal of rejects offline.
f)	Transfer 14mm	1NO	For screening.
g)	Transfer Conveyor	1NO	For transferring materials to curing area.
h)	Reject – 14 conveyor	1NO	For removal of rejection off-line.
i)	Shortage conveyor	1NO	For stacking materials in curing area.
4.	**REFINEMENT SECTION**		
a)	Pay loader (0.4 cum)	1NO	For spreading material in curing area & feeding material to feeder.
b)	Drag Chain Feeder	1NO	For feeding material at controlled rate.
c)	Elevator	1NO	For lifting material & feeding it to rotary screen.
d)	Rotary Screen	1NO	For screening.
e)	Gravity Seperator With Aspirator	1NO	For spreading of heavy impurities.
f)	Reject Conveyor	1NO	For removal of rejection off-line.
g)	Add-mixer	1NO	For adding additives to improve quality of end product.
5.	**PACKAGING SECTION**		
a)	Bag Stiching Machine	2NOS	For stitching bags.
b)	Weight scale(100kg)	2NOS	For weighing bags.
c)	Peller Trucks	2NOS	For stacking & moving packed material.
6.	**CONTROL PANEL**		

Sl. no	EQUIPMENTS	100 TPD QTY	COMMENTS
a)	Hydraulic Power Pack	3SETS	Push Button station with hydraulic system to improve efficiency and safety of equipment against continuously fluctuating load.
b)	Central Control Panel	1SET	

5.9.4 Vehicles & Manpower Requirement for Waste Processing Plant

Table 5-14: List of Vehicles for Processing Plant

Compost Plant Operation Vehicle		
Sl. No	Vehicle type	Number
1	Loader cum Backhoe	2
2	Tractor attached loader	3
3	Water tanker with slurry pump	1
4	Tractor	1
5	Tipping trolley	4
6	Dumper 6 m^3	1

Table 5-15: List of Man power Details

List of Manpower details of Compost		
Sl. No.	Particulars	Nos.
1	Plant Manager (Env. Engineer) - B.E	1
2	Supervisor – B.Sc.	2
3	Accountant --- B.Com	1
4	Chemist - B Sc	1
5	Weigh Bridge Operator - H.S.C	1
6	Mechanic – ITI	1
7	Labourers	10
8	Tractor Driver	1
9	Tractor Attached Loader Driver	2
10	Dumper Driver	1
11	Loader Cum Backhoe Driver	1
12	Rag pickers	8
13	Security Guard	4
14	Gardener	2

5.10 IMPLEMENTATION OF PROCESS FACILITY - MATERIALS RECOVERY(MRF)

The separation of house-hold and commercial waste can be done at the source, at the point of collection by primary waste collectors or at centralized materials recovery facilities or large integrated processing, materials recovery facility (MRF).MRF shall have facility for-

- baling of separated materials for shipping; storage of baled materials, manual separation of cardboard and mixed paper; baling of separated materials for shipping;
- storage of baled materials like Mixed plastics, manual separation of PETE, HDPE, and other plastics from commingled mixed plastics; baling of separated materials for shipping;
- storage of baled materials likemixed glass with sorting Manual separation of clear, green, and amber glass;
- storage of separated materials Plastic, aluminum cans, tin cans, sandglass Manual or pneumatic separation of polyethylene eterepholate (PETE), high-density polyethylene (HDPE), and other plastics;
- magnetic separation may occur before or after the separation of plastic; baling of plastic (typically two types), aluminum cans and tin cans, and crushing of glass and shipping;
- storage of baled and crushed materials

A centralized process facility is recommended at Panihati.

5.11 PLANNING & DESIGN OF SANITARY LANDFILL FACILITY

This section of the report presents planning and design for development of secured/ engineered landfill at the identified locations beside Kalyani Highway near Muragacha of Panihati. The basic proposals for site engineering encompass,

- To select most suitable part for landfill within the sanitary landfill site.
- To collect base line data on ground water and air quality.
- To allocated and mark the area required for landfill for the entire project period.

5.11.1 General

A sanitary landfill is a controlled method of solid waste disposal. The site must be geologically, hydrological, and environmentally suitable. ***It is not an open dump***. The nuisance conditions associated with an open dump, such as smoke, odor, unsightliness, and insect and rodent and seagull and other bird problems, are not present in a properly designed, operated, and maintained sanitary landfill. Professional planning and engineering supervision is required. A well-designed and operated landfill must prevent groundwater pollution, provide gas (methane) venting or recovery, have a leachate collection and treatment system, provide gas and leachate monitoring wells, and be located above the 100-year flood level. A typical cross section through a modern landfill is shown in **Figure 5.16**.

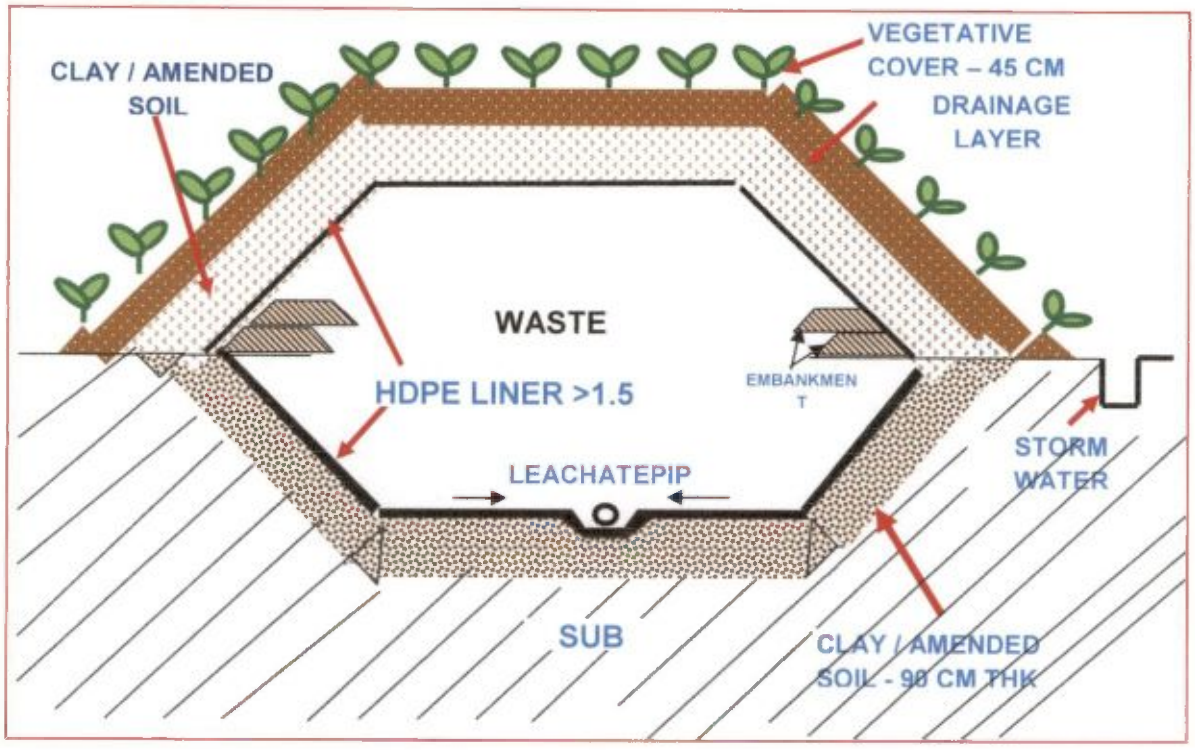


Figure 5-16: A scientifically engineered and designed Landfill Facility

5.11.2 Regulatory Requirements for Development of SLFs as per Municipal Solid Waste (Management & Handling) Rules, 2016)

As per Schedule-III of MSW (Management & Handling) Rules, 2016, following specifications have been laid down for Sanitary Landfill Facilities (SLFs):

5.11.2.1 Facilities at the Site

- Landfill site shall be fenced or hedged and provided with proper gate to monitor incoming vehicles or other modes of transportation.
- The landfill site shall be well protected to prevent entry of unauthorized persons and stray animals.
- Approach and other internal roads for free movement of vehicles and other machinery shall exist at the landfill site.
- The landfill site shall have waste inspection facility to monitor wastes brought in for landfill, office facility for record keeping and shelter for keeping equipment and machinery including pollution monitoring equipments.
- Provisions like weigh bridge to measure quantity of waste brought at landfill site, fire protection equipments and other facilities as may be required shall be provided.

- Utilities such as drinking water (preferably bathing facilities for workers) and lighting arrangements for easy landfill operations when carried out in night hours shall be provided.
- Safety provisions including health inspections of workers at landfill site shall be periodically made.

The above mentioned facilities have been provided in the design of SLF.

5.11.2.2 Specifications for Land Filling

- Wastes subjected to land filling shall be compacted in thin layers using landfill compactors to achieve high density of the wastes. In high rainfall areas where heavy compactors cannot be used alternative measures shall be adopted.
- Wastes shall be covered immediately or at the end of each working day with minimum 10 cm of soil, inert debris or construction material till such time waste processing facilities for composting or recycling or energy recovery are set up as per Schedule I.
- Prior to the commencement of monsoon season, an intermediate cover of 40-65 cm thickness of soil shall be placed on the landfill with proper compaction and grading to prevent infiltration during monsoon. Proper drainage berms shall be constructed to divert run-off away from the active cell of the landfill.
- After completion of landfill, a final cover shall be designed to minimize infiltration and erosion. The final cover shall meet the following specifications, namely :--
    - The final cover shall have a barrier soil layer comprising of 60 cms of clay or amended soil with permeability coefficient less that 1 x 10-7 cm/sec.
    - On top of the barrier soil layer there shall be a drainage layer of 15 cm.
    - On top of the drainage layer there shall be a vegetative layer of 45 cm to support natural plant growth and to minimize erosion.

5.11.2.3 Pollution Prevention

In order to prevent pollution problems from landfill operations, the following provisions shall be made, namely:

- Diversion of storm water drains to minimize leachate generation and prevent pollution of surface water and also for avoiding flooding and creation of marshy conditions;
- Construction of a non-permeable lining system at the base and walls of waste disposal area. For landfill receiving residues of waste processing facilities or mixed waste or waste having contamination of hazardous materials (such as aerosols, bleaches, polishes, batteries, waste oils, paint products and pesticides) minimum liner specifications shall be a composite barrier having 1.5 mm high density polyethylene (HDPE) geomembrane, or equivalent, overlying 90 cm of soil (clay or amended soil) having permeability coefficient not greater than 1 x 10-7 cm/sec. The highest level of water table shall be at least two meter below the base of clay or amended soil barrier layer;

- Provisions for management of leachates collection and treatment shall be made. The treated leachates shall meet the standards specified in Schedule- IV;
- Prevention of run-off from landfill area entering any stream, river, lake or pond.

5.11.2.4 Water Quality Monitoring

- Before establishing any landfill site, baseline data of ground water quality in the area shall be collected and kept in record for future reference. The ground water quality within 50 meters of the periphery of landfill site shall be periodically monitored to ensure that the ground water is not contaminated beyond acceptable limit as decided by the Ground Water Board or the State Board or the Committee. Such monitoring shall be carried out to cover different seasons in a year that is, summer, monsoon and post-monsoon period.
- Usage of groundwater in and around landfill sites for any purpose (including drinking and irrigation) is to be considered after ensuring its quality. The following specifications for drinking water quality shall apply for monitoring purpose, namely :-

Table 5-16: Desirable Limit of Constituents of Drinking Water

Sl. No.	Parameters	Desirable limit as per IS 10500: (mg/l except for pH)
1.	Arsenic	0.05
2.	Cadmium	0.01
3	Chromium	0.05
4.	Copper	0.05
5.	Cyanide	0.05
6.	Lead	0.05
7.	Mercury	0.001
8.	Nickel	-
9.	Nitrate as NO_3	45.0
10	pH	6.5-8.5
11.	Iron	0.3
12.	Total hardness (as $CaCO_3$)	300.0
13.	Chlorides	250
14.	Dissolved solids	500
15.	Phenolic compounds (as C_6H_5OH)	0.001
16.	Zinc	5.0
17.	Sulphate (as SO_4)	200

5.11.2.5 Ambient Air Quality Monitoring

- Installation of landfill gas control system including gas collection system shall be made at landfill site to minimize odour generation, prevent off-site migration of gases and to protect vegetation planted on the rehabilitated landfill surface.
- The concentration of methane gas generated at landfill site shall not exceed 25 per cent of the lower explosive limit (LEL).
- The landfill gas from the collection facility at a landfill site shall be utilized for either direct thermal applications or power generation, as per viability. Otherwise, landfill gas shall be burnt (flared) and shall not be allowed to directly escape to the atmosphere or for illegal tapping. Passive venting shall be allowed if its utilization or flaring is not possible.
- Ambient air quality at the landfill site and at the vicinity shall be monitored to meet the following specified standards, namely :-

Table 5-17: Specified standards of Parameters of Ambient air quality

Sl. No.	Parameters	Acceptable Levels
(i)	Sulphur dioxide	120 mg/m3 (24 hours)
(ii)	Suspended Particulate Matter	500 mg/m3 (24 hours)
(iii)	Methane	Not to exceed 25 per cent of the lower explosive limit (equivalent to 650 mg/m3)
(iv)	Ammonia daily average (Sample duration 24 hrs)	0.4 mg/m3 (400 m g/m3)
(v)	Carbon monoxide	1 hour average : 2 mg/m3 8 hour average : 1 mg/m3

- The ambient air quality monitoring shall be carried out by the concerned authority as per the following schedule, namely:-
  - Six times in a year for cities having population of more than fifty lakhs;
  - Four times in a year for cities having population between ten and fifty lakhs;
  - Two times in a year for town or cities having population between one and ten lakhs.

5.11.2.6 Plantation at Landfill Site

A vegetative cover shall be provided over the completed site in accordance with the and following specifications, namely:-

- Selection of locally adopted non-edible perennial plants that are resistant to drought and extreme temperatures shall be allowed to grow;
- The plants grown are such that their roots do not penetrate more than 30 cms. This condition shall apply till the landfill is stabilized;

- Selected plants shall have ability to thrive on low-nutrient soil with minimum nutrient addition;
- Plantation to be made in sufficient density to minimize soil erosion.

5.11.2.7 Closure of Landfill Site and Post-care

The post-closure care of landfill site shall be conducted for at least fifteen years and long term monitoring or care plan shall consist of the following, namely :-

- Maintaining the integrity and effectiveness of final cover, making repairs and preventing run-on and run-off from eroding or otherwise damaging the final cover;
- Monitoring leachate collection system in accordance with the requirement;
- Monitoring of ground water in accordance with requirements and maintaining ground water quality;
- Maintaining and operating the landfill gas collection system to meet the standards.

Use of closed landfill sites after fifteen years of post-closure monitoring can be considered for human settlement or otherwise only after ensuring that gaseous and leachate analysis comply with the specified standards.

5.11.3 Site Characteristics

5.11.3.1 Landuse

The proposed site beside Kalyani Highway near Muragacha of Panihati is a pond. There are some water bodies around the proposed landfill site. The depth of all water bodies are 2-2.5 m approx and tentatively around 1.5m -2mdifferences between Road level and upper surface of water bodies.

5.11.3.2 Ground Water Hydrology

Occurrence of ground water in any area is controlled by its geological features. The area under study is underlain by quaternary sediments consisting of a succession of clay, silty clay, sand and sand mixed with occasional gravel. Although clay lenses often occur within the sand beds and individual sand bed often tend to thicken and thin out depending upon the sedimentary fancies variation, the sand beds are on the whole interconnected and from a group of inter-connected aquifers.

5.11.3.3 Water-Table and Piezometric Surface

The water table represents the upper limit of the zone of saturation and the pressure on the water table is equal to one atmosphere. But water occurring in the confined aquifers is held under pressure greater than one atmosphere and water levels in the tube wells tapping such aquifers rise some distance above the base of the confining beds. Such levels are designated as piezometric surface or potentiometric surface. Piezometric surface, as a matter of fact is an imaginary one which can be obtained only by punching the confined aquifers. The water tables in the shallow zones lie very close to surface. During the post monsoon period, the depth to the water table is shallowest, ranging generally in depth

from 8 to 9 m below the land surface. During the summer months, the water table, however, recedes to depths generally ranging between 10 to 12 m.

5.11.3.4 Lean Season Availability of Water

In the upper aquifers, the lean season flow will be somewhat reduced. In the absence of observation wells tapping the upper aquifer, a definite quantification of such reduction in flow cannot be made. However, the lowering the water table consequent to season pumping suggested that large scale ground water withdrawal might create a dent in the overall water regime. The capability of recharge and recharge-discharge relationship of the aquifers system may control the seasonal flow of the ground water to a great extent.

5.11.3.5 Site Suitability

The suitability of the site for disposal facility has been assessed in accordance to the site suitability criteria provided in the MSW Rules, 2016 and also as per the guidelines provided in the Municipal Solid Waste Management manual. Based on these criteria, the waste processing and disposal site beside Kalyani Highway near Muragacha is suitable and can be used as a waste processing and disposal facility.

5.12 LANDFILL DESIGN

Some of the issues that have direct influence on the design are discussed. They are:

- Waste to be Handled
- Design Life of SLF
- Surface Drainage Facilities
- Operational Plan
- Layout of MSW landfill
- Completed Waste Fill Features
- Estimation of landfill Capacity
- Selection of Liner Systems
- Selection of Leachate Control Facilities
- Selection of landfill Gas Control Facilities
- Green Area (Buffer Zone & Landscaping)
- Monitoring Facilities

5.12.1 Waste to be handled

Considering the present waste type and proposed collection and processing system the following indicative configuration of waste is considered as landfi3.6lable waste. The percentages will vary with increase in awareness level, application of taxes and service charges etc.

- 25-30% of inert waste (will be reduced with efficiency improvementsprojection)

5.12.2 Design Life of SLF

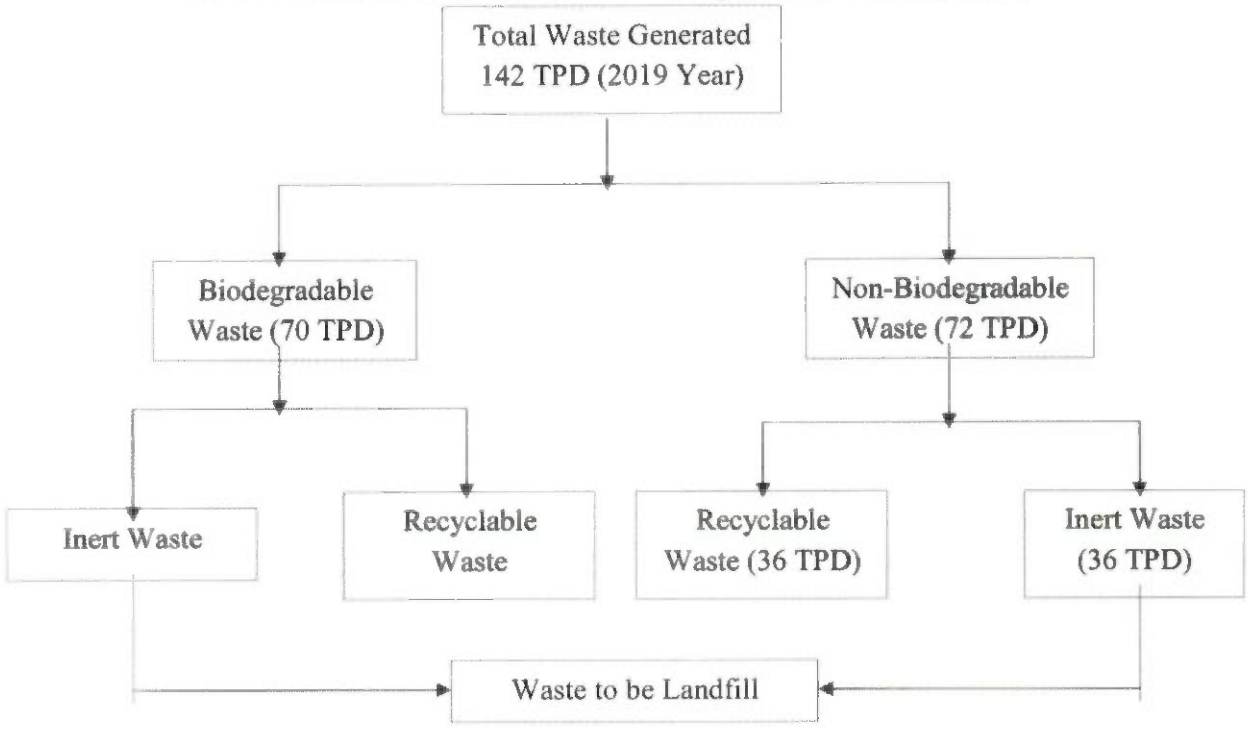
The detail design of the proposed site is given below.

The total area required for the land fill site is mainly depends upon

- Present population of the city,
- Population growth rate,
- Quantity of solid waste generated,
- Characteristic of the solid waste,
- The active period for which the solid waste is to be dump, and
- Area required for infrastructural facility.

As per computation, the population of the Panihati municipality is 4.20 lakhs in 2019 which is growing at the rate of 1.3% annually. As per the house hold survey, it was observed that waste generation in the study area is about 330 gm/capita/day. Present mass balance of MSW management system in the study area is shown in a flow chart.

Flow Chart of Mass Balance of MSW Management System in Panihati



The proposed facility comprises of Sanitary landfill (SLF), Aerated Lagoon, Sedimentation Pond, Leachate Tank, Road, Car wash pool, Parking area, Substation, Guard Room, Pump House. The available land for landfill construction & other facilities is 3.6 acre which will considered as first phase. The construction of landfill shall be taken up into two phases. The phase-1 land has been utilized for MSW landfill so that the landfill holds large amount of waste covering for a disposal period of about 3-3.5 years. Around 15 % of the area has been earmarked for green belts, associated facilities and buffer zones in as much as the surrounding environment is not disturbed/effected by noise, odors and defacement (from aesthetic considerations). All services are accommodated within this area.

The cost getting after estimation which will reserve for second phase of approx 3.2 acre (estimated) land in future provision. After filling of first phase it will be covered with top cover and filling of MSW in the second phase area will be started.

5.12.2.1 Calculation of Design Life of SLF

Considering, 30% of generated waste come to SLF;

Assuming, Density of Waste after compaction = 0.85 Tn/m3

Bottom area of the landfill (at 6 m deep level) = A1 = 3850 m2

Top area of landfill at the embankment level = A2 = 7427 m2

Depth of Landfill from top of Embankment = 6m

Volume of landfill till top of the Embankment =V1= 33248.66 m3

Area of the waste fill at the top of the landfill =A3 = 23 m2

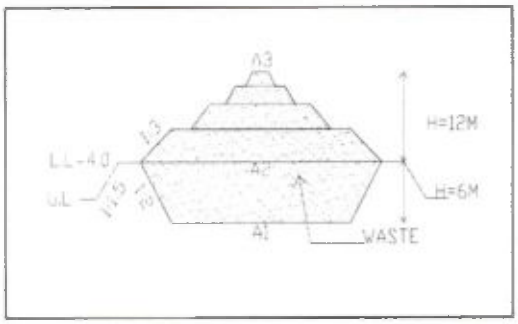


Figure 5-17: Sanitary Landfill

Height of the landfill above embankment = 12m

Volume of landfill above Embankment to 12m height =V2 = 31453.22 m3

Total volume of landfill = V1 + V2 = 64701.88 m3

Life of landfill of Phase- 1(considering 30% of total waste generation coming to landfill) = (64701.88/20679) = 3.2years (approx).

Table 5-18: Calculation of Design Life of SLF Phase-1

Year	per capita WG in PM in gms	Waste (TPD)	Incoming waste at Landfill TPD (30% of incoming waste)	Yearly (TPY)	Waste in Vol. (m3)	Yearly (m3)	Total waste including soil cover (m3)
2017	330	135	41	14802	48	17414	19155

Year	per capita WG in PM in gms	Waste (TPD)	Incoming waste at Landfill TPD (30% of incoming waste)	Yearly (TPY)	Waste in Vol. (m3)	Yearly (m3)	Total waste including soil cover (m3)
2018	334.29	139	42	15188	49	17868	19655
2019	338.63577	142	43	15580	50	18330	20162
2020	343.038035	146	44	15979	52	18799	20679
2021	347.4975295	150	45	16385	53	19276	21204
2022	352.0149973	153	46	16798	54	19762	21738
2023	356.5911923	157	47	17217	55	20255	22281
2024	361.2268778	161	48	17644	57	20757	22833
2025	365.9228272	165	50	18077	58	21268	23394
2026	370.679824	169	51	18518	60	21786	23965

Therefore, based on the aforementioned calculation, design of the proposed sanitary landfill of Phase-1:

- Active life: 3-3.5 years
- Density after compaction: 850 kg/m^3 (as recommended in CPHEEO)
- Base year: 2019
- Subsoil Conditions: Primarily clay

5.12.3 Drainage Facilities

The storm water routing within the MSW landfill site has been planned to effectively discharge storm water through storm water drains/ control structures effectively discharge to the offsite channels. For this purpose storm water drains, intercepting drains, peripheral drains and toe drains are provided. All these drains shall have masonry construction with lined bottom and sides.

5.12.4 Operational Plan

The facility shall be developed as a MSW disposal facility conforming to the statutory guidelines of MoEF/CPCB/SPCB and CPHEEO Manual with elaborate operation and management (O&M) plans matching to the size and environmental protection requirements. The O&M plan shall ensure operational efficiency and also timely feedback well before onset of any eventuality/emergency.

For this the following areas have been given emphasis:

5.12.4.1 Inventorization and Characterization of MSW

A mechanism shall be established whereby continuous update on MSW inventory in Panihati is available. Special attention shall be placed in case of entry of any development of new colonies, institutions, mandis, markets etc. A separate cell has been planned to track quantity and characteristics of such MSW. The cell shall comprise of one environmental engineer assisted by a laboratory support. The team shall develop liaison with ULBs, RWAs etc.

5.12.4.2 Change in Laws, Governing Rules/Regulations, Updates etc.

Conforming to changing scenarios and rulings of the governmental agencies due modifications/improvements shall be implemented. A liaison engineer shall be appointed for monitoring and updating these activities.

5.12.4.3 Operation Manual

An operation manual conforming to the procedures for effective running shall be developed wherein the landfill facility operator, local residents and the government agencies are apprised of their roles and responsibilities.

5.12.4.4 Emergency Management Program

In case of any emergencies like vandalism, fire, floods, earthquake, groundwater and soil contamination, etc. the emergency cell on site shall keep liaison with the concerned agencies such as firefighting squad, hospitals, police, district administration, local PCB office, etc. for a coordinated timely action.

5.12.4.5 Monitoring Program

Adequate instrumental monitoring systems for knowing the condition of the landfill and the surrounding areas (soil, groundwater, air) covering range of2 km has been planned. These instruments shall be maintained and operated as per the operation manual. A well-equipped laboratory for exercising quality controls is also planned. A monitoring cell shall be responsible for upkeep of the monitoring program. Logbooks and records relating to waste quantities received, disposed in the landfill, etc. shall be maintained in soft and hard copies by this cell.

5.12.4.6 Human Resource Plan

A team shall be created for addressing issues related to environmental concerns, public unrest, grievances, on-site and off-site health hazards, compensations, etc. This team shall make timely and coordinated efforts to sorting out differences, if any.

5.12.5 Layout of the MSW landfill

Considering the broad parameters outlined above conceptual layout has been developed.

These drawings provide detailed description of various supporting and infrastructure facilities. The landfill facility shall have 2 m high permanent fencing all along the boundary with one lockable

secured gate 3mwide. A complete list of the utilities, services and buildings that are planned in this MSW landfill are given in Table the locations of the facilities are marked in these drawings.

Table 5-19: List of Facilities provided at Panihati landfill

Sl. No.	Description	Size / Nos.
1	Main Entrance Gate	6m wide
2	Security office	3.75 m X3.25 m
3	Vehicle Wheel Wash	25 m X 5 m
4	Parking (Paved Area)	20 m X 8 m
5	Leachate Collection sump	3.0 m Dia.
6	Aerated Lagoon	30 m X 20 m
7	Sedimentation Pond	18 m X 15 m Trapezoidal Section
8	Substation cum Pump House	6 m X 5 m
9	Road	6m wide
10	RCC Ramp	3 m wide
11	Earthen Embankment	1V:2H Slope inside &1V:1.5H Slope outside
12	Green Belt& Garden	5m wide& 3 m distance between each steps; 2 nos. step
13	Monitoring Well	4 Nos.
14	Storm Water Drain	500 m length & 1 m wide
15	Boundary Wall	510 m length & 2 m height from G.L

5.12.6 Completed Waste Fill Features

The design of MSW landfillshall be done considering 3.6 acres of land. The base of landfill i.e., top of liner has been kept at pond bed levelwhich is 2.0m below than G.L and 4.0m high (above GL) earthen embankment has been provided to achieve the required storage capacity within the area available. Top width of the embankment has been kept at 1.5m. Inner & outer slopes of the embankment have been kept at 1V: 2H and1V: 1.5Hfor stability of slopes. All around the landfill site 2.0 m high fencing shall be provided to prevent any unauthorized entry & stray animals. A 5.0 m wide green belt has been provided all along the facility boundary.

The geo-composite liner has been provided on the inner side of the landfill as per the requirement of Central and State Pollution Control board norms. Leachate collection system has been provided at the base of the landfill with300 mm dia HDPE header and 250 mm dia perforated HDPE lateral pipes. Leachate shall be collected in the Leachate collection sump from where it will be pumped to Effluent Treatment Plant. Leachate transfer pumps shall be provided of adequate capacity.

MSW shall be dumped in the landfill by trucks, which shall be further levelled and compacted. Periodic waste audits will ensure that non-conforming waste shall not be dumped at the landfill site. The waste shall be compacted in thin layers using compactors and covered with a daily cover of soil layer or inert waste. After the landfill is filled it will be covered with top cover system with single

liner arrangement and on the top 45 cm thick surface layer (Top Soil) shall be provided with vegetation. The slope of top cover shall be kept as 1V:3H to provide quick drainage of rainfall.

For ground water monitoring 4 Nos. of wells shall be provided. A suitable 3.0m ramp to reach the embankment top shall be provided so that truck/ dumper can reach the top of embankment and can directly dump the municipal solid waste in the landfill.

5.12.7 Estimation of landfill Capacity

The sketch showing section of landfill is given below for the estimation of landfill capacity. The capacity of landfill is worked out by considering mainly three parts of landfill which are as follows:

- Middle part (V_1)
- Bottom part in the slope of header pipe (V_2)
- Top portion (V_3)

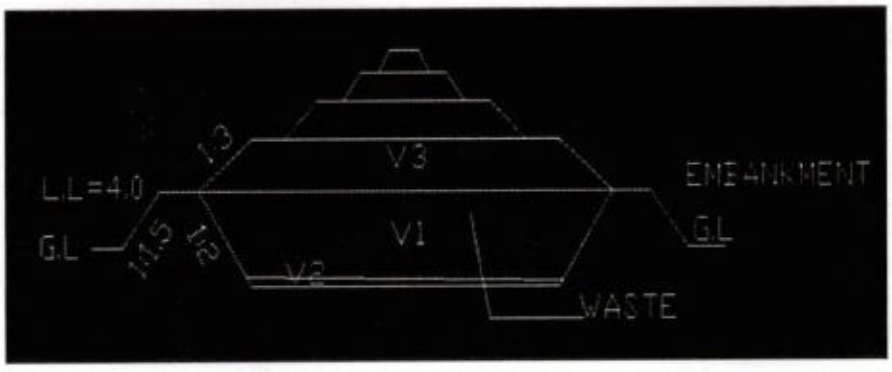


Figure 5-18: Top, Middle & Bottom part of Landfill

The leachate treatment units, leachate collection sumps, etc. shall be provided outside the embankment. Waste conveying facilities are provided for mechanically depositing the residue into the MSW landfill after segregation.According to 2016 MSW rules, 40-65cm thickness of intermediate soil cover is proposed other than the daily cover. It minimizes the problem of odor generated from landfill. In that case one intermediate cover of soil of thickness 450 mm may be provided at the mid-level of landfill.

Wastes are filling 1V:3H above the embankment level which is total 12.0 m height from top of embankment level to top cover. A network of intercepting drains and peripheral drains are provided for quick draining of the rainwater.The facility shall have green belts, trees and turfing on the embankment/ formation slopes as slope protection and to present pleasing appearance.

5.12.8 Selection of Liner Systems

The objective in the design of liners is to minimize the infiltration of leachate and gases into subsurface soils below the landfill eliminating the potential for ground water contamination. Composite liner designs employing a geomembrane and clay layer provide more protection and are hydraulically more effective than other types of linings. Liners provide an effective hydraulic barrier

beneath the waste to contain the waste and to allow for effective removal of leachate generated during containment.

In the present MSW landfill, single composite liner system shall be provided meet stringent performance criteria that provide a high margin of safety. Each of the liner systems is discussed in more detail in the following sections.

Bottom Liners& Side Liners

The bottom portion of the landfill directly rests on stable compacted specially prepared soil bed.The side slopes in the soil formation are similarly made on firm compacted specially prepared stable slopes of 2H: 1V. The various layers of bottom liners &side liners from bottom to top are:

Table 5-20: Material Specification of Bottom Liners

Sl. No.	Item	Material Specification
1	900 mm thick compacted clay/ amended soil (k£ 10-7 cm/sec.)	900 mm thick compacted clay or compacted amended soil (to be laid in 3 layers of thickness 30 cm each), above compacted sub-base, with permeability less than or equal to 1X10-7 cm/s with the following specifications:
		1) Permeability would be checked at each layer after laying
		2) Free of any stones, kankars and any other foreign material
		3) Moisture content would be maintained at 2 – 3 % more than optimum moisture content (OMC) during laying.
		4) To be compacted to achieve minimum 95 % Proctor Density.
		5) Permeability & moisture content has to be checked in each layer.
		6) To be kept covered during installation so that moisture is not evaporated.
2	400GSM NonWoven Geo-textile	Geo-textile layer above HDPE layer
		1) Type – Non woven
		2) Make – HDPE
		3) 400 GSM
3	1.5 mm thick High Density Polyethylene (HDPE) Geo-membrane	HDPE Geo-membrane of minimum thickness 1.5 mm would be laid above compacted clay liner. The HDPE Geo-membrane would meet the minimum technical specification as given in "*Criteria for Hazardous Waste Landfills published by CPCB in 2001*", the same specifications are reproduced below:
		1) Tensile strength at yield greater than 18 KN / m.
		2) Tensile Strength at break greater than 30 KN / m.
		3) Tear Resistance greater than 150 N

Sl. No.	Item	Material Specification
		4) Puncture Resistance greater than 250 N
4	400GSM Non-Woven Geo-textile	Geo-textile layer above HDPE layer
		1) Type – Non woven
		2) Make – HDPE
		3) 400 GSM
5	300 mm thick granular drainage layer (Leachate Collection Layer)	300 mm thick Leachate drainage layer having permeability greater than 1 X 10 $^{-2}$ cm /sec to be laid on entire bottom surface above geo textile layer laid over HDPE geo membrane, in:3 layers as described below:
		1) 100 mm thick layer of gravels of size 22 to 32 mm or any other material laid over geo-textile layer. The gravels would be free of dust and any angular or sharp aggregates.
		2) 200 mm thick layer of stone chips of size 16 – 22 mm over gravel layer. The chips would be dust free.

Top Cover Liners

The top cover the landfill directly rests on compacted specially shaped waste surface. The bed shall be laid to 3 to 5 % slope (after allowing for pre-grade settlements of the waste) for providing good natural drainage.The various layers of liners from bottom to top are:

Table 5-21: Material Specification of Top Liners

Sl. No.	Item	Material Specification
1	600 mm thick compacted clay/ amended soil (k£ 10-7 cm/sec.)	600 mm thick compacted clay or compacted amended soil (to be laid in 2 layers of thickness 30 cm each), above compacted sub-base, with permeability less than or equal to 1X10-7 cm/s with the following specifications:
		1) Permeability would be checked at each layer after laying
		2) Free of any stones, kankars and any other foreign material
		3) Moisture content would be maintained at 2 – 3 % more than optimum moisture content (OMC) during laying
		4) To be compacted to achieve minimum 95 % Proctor Density
		5) Permeability & moisture content has to be checked in each layer.
		6) To be kept covered during installation so that moisture is not evaporated.
2	150 mm thick granular drainage layer (Gas	150 mm thick drainage layer consisting of stone chips & coarse sand having a permeability of more than 1x10^{-2} cm/s.

Sl. No.	Item	Material Specification
	Collection layer)	
3	450 mm thick vegetative layer	1) To be laid in two layers, the bottom layer to be compacted mildly and the top layer to be kept loose for growing vegetation.
		2) Vegetation cover with grass, shrubs etc. having root length less than 300 mm

5.12.9 Selection of Leachate Control Facilities

5.12.9.1 Leachate Management

The leachate that will be collected from the landfill facility contains lots of pollutants and hence required to be transported safely to a treatment facility for the treatment. As the quality of the leachate that will be generated from the operation of the landfill facility will be similar to that of the effluent, the same could be treated in the facility. This is more justified considering the fact that the quantum of generation of the leachate is very less compared to the treatment capacity of the leachate is very high and the treatment plant also looks inadequate, the leachate could be stored in a collection tank.

Before considering the design of any leachate management system it is important to consider the objectives that are to be achieved. Protection of surrounding environment of landfill site is effectively achieved through segregation and isolation of potentially polluting waste from the surrounding strata of surface water and ground water. The principle means of achieving this is by providing appropriate sealing layers at the base, sides and top of the landfill. The disposal of treated leachate as per MSW, 2000 shall follow standards mentioned in *Table 5.22*below.

Table 5-22: Standards for Disposal of Treated Leachate

Sl. No.	Parameter	Standards		
		Inland Surface Water	Public Sewers	Land Disposal
1	Suspended solids, mg/l, max	100	600	200
2	Dissolved solids (inorganic) mg/l, max.	2100	2100	2100
3	PH value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
4	Ammonical nitrogen (as N), mg/l, max.	50	50	-
5	Total Kjeldahl nitrogen (as N), mg/l, max.	100	-	-
6	Biochemical oxygen demand (3 days at 27^0C) max.(mg/l)	30	350	100
7	Chemical oxygen demand, mg/l, max.	250	-	-
8	Arsenic (as As), mg/l, max	0.2	0.2	0.2
9	Mercury (as Hg), mg/l, max	0.01	0.01	-

Sl. No.	Parameter	Standards		
		Inland Surface Water	Public Sewers	Land Disposal
10	Lead (as Pb), mg/l, max	0.1	1	-
11	Cadmium (as Cd), mg/l, max	2	1	-
12	Total Chromium (as Cr), mg/l, max.	2	2	-
13	Copper (as Cu), mg/l, max.	3	3	-
14	Zinc (as Zn), mg/l, max.	5	15	-
15	Nickel (as Ni), mg/l, max	3	3	-
16	Cyanide (as CN), mg/l, max.	0.2	2	0.2
17	Chloride (as Cl), mg/l, max.	1000	1000	600
18	Fluoride (as F), mg/l, max	2	1.5	-
19	Phenolic compounds (as C_6H_5OH) mg/l, max.	1	5	-

5.12.9.2 Leachate Charateristics

The composition of the leachate is an indication of the state of the biological processes occurring within the waste body and the solubility of the ions. If leachate is to be removed and treated, certain parameters will have particular environmental and economic significance.

This significance will alter with the route for treatment / disposal chosen. Typical chemical characteristics of leachate are given in *Table 5.23*.The most significant parameters are given below:

- Ammonia
- Organic loading
- Chloride
- Phosphorous
- Metals
- Sulphate
- Dissolved gases
- Other compounds

Table 5-23: Typical Characteristics of Leachate from MSW Landfills

Constituents		Range (mg/l)	
Type	Parameter	Minimum	Maximum
Physical	pH	3.7	8.9
	Turbidity	30 JTU	500 JTU

Constituents		Range (mg/l)	
Type	Parameter	Minimum	Maximum
	Conductivity	480 mho/cm	72500 mho/cm
Inorganic	Total Suspended Solids	2	170900
	Total Dissolved Solids	725	55000
	Chloride	2	11375
	Sulphate	0	1850
	Hardness	300	225000
	Alkalinity	0	20350
	Total Kjeldahl Nitrogen	2	3320
	Sodium	2	6010
	Potassium	0	3200
	Calcium	3	3000
	Magnesium	4	1500
	Lead	0	17.2
	Copper	0	9
	Arsenic	0	70.2
	Mercury	0	3
	Cyanide	0	6
Organic	COD	50	99000
	TOC	0	45000
	Acetone	170	11000
	Benzene	2	410
	Toulene	2	1600
	Chloroform	2	1300
	Delta	0	5
	1,2 dichloroethane	0	11000
	Methly ethyl ketone	110	28000
	Naphtalene	4	19
	Phenol	10	28800
	Vinyl Chloride	0	100
Biological	BOD	0	195000
	Total Coliform bacteria	0	100
	Fecal Coliform bacteria	0	10

5.12.9.3 Leachate Collection and Removal System

The leachate collection layer is proposed in the granular soil (drainage) layer of the bottom liner system. The collection layer shall comprise of a network of perforated HDPE lateral pipes laid at a slope of 2% and 20 m c/c spacing. These laterals collect leachate and transfer it to the HDPE header pipe, which is laid at a slope of 1%. The leachate collection system is a network consisting, 200 mm diameter branch pipes at spacing of 25 m connected to 300 mm diameter header pipe. The higher diameter pipes are suggested to maintain the uniformity and to take care of clogging and algae growth. The pipes should be HDPE perforated pipes with sufficient strength (minimum 6 *kgf*) and should be safe from particulate and biological clogging and deflections. The header pipe ultimately transfers the leachate into the Leachate collection sump. The general arrangement of header and laterals is proposed in the layout plan of MSW landfill.

Figure 5-19: Arrangement of Pipes, Liners in Landfill

The landfill receives inert wastes only. All operations are planned in such a way that generation of liquid waste is minimum and the leachate directly reaches the leachate collection sump for treatment. Apart from the leachate generated as a result of inflow of rainwater into thelandfill, the seepage from the moisture content present in the solid waste and the moisture present in the daily soil cover are the few sources of leachate generation. As the climate is hot with average temperature around 35° C, evaporation losses could be significant except in winter season hence 10% evaporation has been considered.

5.12.9.4 Assessment of Leachate Quantity

Area	=	7427m^2(area of top of embankment)
Rainfall max. Daily	=	5 mm (Approx)
Total (Max.) Rainfall water	=	1.5 m^3/hour

Around 1.5 m^3/ hr is generation of leachate in case of 5 mm rainfall. This would only happen when waste in the land retain the moisture upto its maximum retaining capacity. From the time of the rain and based on the experience the leachate keeps on coming out for days even after stopping of rain. On existing landfills experience internationally the leachate tank of one hour capacity can take care of the flow variation and for the downstream unit the design capacity taken is 25% of the average inflow in leachate tank.

The leachate generation will be minimized through:

- Proper run off & soil covers
- Operations during heavy rains to be avoided
- To ensure rain water other of SLF does not enter treatment plant.

Since leachate will be received intermittent by during the rainy season and may also vary in BOD, COD, TSS etc. level the system proposed is simple and with ease of operations and O&M, leachate from the SLF will be collection in leachate tank through collection sump. Aeration will be done through aeration to avoid anaerobic conditions and also to reduce BOD & COD through aerobic bacteria.

The waste water the leachate tank will then be transferred to clarifier for settling suspended impurities. Settled sludge will be drained to drying bed and then to SLF.

5.12.10 Selection of landfill Gas Control Facilities

The landfill is a secured landfill with double composite liners well in place at bottom, sides and top. The liner system consists of one-layer of 1.5mm geomembrane , two layers of 400 GSM geo-textile and one-layer of 900 mm thick amended clay as liners whereby the chances of gases escaping from the ground and contaminating the groundwater and soil are remote. The gases developed due to continued confinement of degradable wastes, if any, are released through the gas extraction facilities provided in the landfill. For this purpose GI Vents are planned at 1.0m x 1.0m grids.

5.12.10.1 Landfill Gas Management

Landfill gas is generated as a product of waste biodegradation. In landfill sites organic waste is broken down by enzymes produced by bacteria in a manner comparable to food digestion. Considerable heat is generated by these reactions with methane, carbon dioxide and hydrogen sulphide as the byproducts. Methane and carbon dioxide are the principle gases produced with almost 50 – 50 per cent share.

When methane is present in the air in concentrations between 5 to 15 per cent, it is explosive. Landfills generate gases with which can create pressure inside the landfill and damage the final cover.

As suggested by CPHEEO Manual the gas management strategies should follow the following three plans,

- Controlled Passive Venting
- Uncontrolled Release
- Controlled Collection/Removal

5.12.11 Green Area (Buffer Zone & Landscaping)

MSW Rule 2016 specifies that a buffer zone of no-development shall be maintained around landfill site and shall be incorporated in the Planning Department's land-use plans. Buffer zone with

plantation is also required within the site as well to minimize nuisance of odor, flies, rodents, bird menace and fire hazard as well as to provide better working environment for the comfort of the workers.

Considering the above, Green belt/area shall be provided on the entire slope of the embankment all along the periphery of the proposed site and within the site as far as possible for aesthetic environmental point of view

Adequate measures are planned to give a facelift by utilizing the abundantly available on site natural soil for raising buffer zones /embankments. Two rows of vegetative plantation shall be developed along the circumference of the outer embankment along with turfing on the slopes. In addition the top cover shall also be developed as a green belt.

The vegetative soil layer with a thickness necessary for the selected plant but not less than 300mm shall be provided for the green area. The plants shall be selected considering the ambient conditions. It is recommended that those existing trees in the site shall be transplanted in the green area as far as possible. The implementing contractor shall be requested to draw up the greenbelt development plan in accordance with the existing guidelines of Ministry of Environment and Forest (MoEF) / West Bengal Pollution Control Board and also provide data of the plants adopted in the design preferably with pictures so that characteristic nature of the plant can be easily understood.

5.12.12 Monitoring Facilities

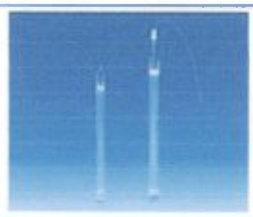
The soil, air and water in the area shall be continuously monitored for no contamination. Both sampling methods and non-sampling methods are adopted and monitored as per the monitoring plan for timely action to be taken before water contamination and leakage of gases into the soil. The facility is proposed with a minimum four monitoring wells for soil water and gas measurements which will be set at each side; the north, south, east and west side because the direction of groundwater is unknown. Diameter of monitoring wells is more than 100 mm. Monitoring wells should equip with strainers at aquifer, and covers on the top to seal up in order to prevent inflow of soil and foreign substances.

5.12.12.1 Monitoring Equipment

It is necessary to monitor leachate, surface water; groundwater and landfill gas periodically with portable monitoring equipments because each element has a possibility of substantial impacts on the environment. pH meters and EC meters will be procured to understand the rough quality of leachate, surface water and groundwater. Gasmeter which can measure CO_2, O_2, CO, H_2S and CH_4 will be utilized for the landfill gas in terms of explosion and impact on human health.

a) Specifications for Water Quality Monitoring Equipment

Table 5-24: Water Quality Monitoring Equipments

Equipment	Specification	Photograph	Remarks
EC meter (Portable type)	Measurement range: 0-19.9ms/cm Temperature range: 5°C-40°C		For all
pH meter (Portable type)	Measurement range: 2-12pH Temperature range: 5°C-35°C		For all
Water sampler	Diameter: 40mm Length: 600mm Volume: 400ml		For groundwater
Water level gauge	Measurement range: 50m Display form: alarm and lanp Minimum scale: 2mm		For groundwater The alarm goes off by electric current when the sensor at the end of the rope touches water. Water level is the scale of the rope at that time.
Bucket	Material: plastic Volume: 5L	—	For leachate and Surface water
Beaker	Material: glass Volume: 500ml and 100ml	—	For all

b) Specifications for Gas Meter

Table 5-25: Measurement range of Landfill Gases

Item	CH_4, CO_2, O_2, CO and H_2S	
Measurement Range	CH_4,	0-100%
	CO_2	0-100%
	O_2	0-25%
	CO	0-500ppm
	H_2S	0-200ppm

Table 5-26: Monitoring Plan

Monitoring Method	Type of Monitoring	Equipment	Information/data to be recorded
Sampling Monitoring Method (Methods involving collection of samples for laboratory analysis)	Air Monitoring (Collection of Air samples)	Gas Syringes Air Bags	Air quality/analysis of gas
	Ground Water Monitoring (Collection of ground Water)	Monitoring wells (Background wells) – both single depth and multiple depth	Water quality
	(Collection of Ground Water)	Piezometers	Water quality
	(Collection of Leachate samples)	In landfill piezometers	Leachate quality
	Vadose Zone Monitoring	Collection Lysimeters, Soil gas probes & Suction Cup Lysimeters	Analysis of Leachate between, VOC in soil, Gas monitoring, liquid monitoring in Vadose zone
Non-sampling Monitoring Method (Methods involving Physical and Electrical measurements)	Ground water Conductivity	Conductivity cells	Monitor changes in Groundwater Conductivity
	Leachate Monitoring	Inland fill Piezometers	Measure depth of Leachate in landfill
	Temperature	Temperature probes	Measure temperature In land fill
	Vadose zone	Electric probes	Salinity of vadose zone
		Electric Resistance Block	Changes in the water content
		Gamma ray attenuation probes	For monitoring of moisture content
		Neutron Moisture meter	Moisture content in the soil
		Tensiometer	Used to measure negative pressure that exists in soil/landfill
		TDR meter & Thermocouple psychometers	For recording Thermo Dielectric Properties of water and soil – any change in temperature and moisture will be recorded
		Waves Sensing Devices (seismic type)	To identify leak detection

Apart from the above, regular inspection and monitoring of important components of the landfill shall be done as per the schedule given below:

Final Top Cover:	Once in a year and after each substantial rainfall it should be checked for any erosion, landslides, movement of soil, slope, etc.
Vegetation:	Four times in a year a check should be made for existence of dead plants/trees. Any plant/tree found dead shall be removed immediately.
Final Grade:	Twice a year should be checked for ponding/logging of water. If any abnormalities found, slope should be corrected by putting soil.
Surface drains:	Four times a year and after each substantial rain should be checked for any blockages. Leaves, debris or any other accumulation found in the drain shall be removed immediately.
Gas Monitoring:	As required in the Management Plan it should be checked for strong presence of odor. The gas monitoring equipments (compressor, pipes, flaring stand, etc) should be checked to ensure their workability as they might become inoperable due to high gas generation.
Groundwater Monitoring:	As per the Action Plan. A regular inspection shall be done to check for any failures in the monitoring system.
Leachate Management:	As required by the plan.

5.13 DESIGN CALCULATION FOR INTEGRATED SOLID WASTE MANAGEMENT FACILITY AT PANIHATI

The total land area requirement has been worked out on basis of solid waste generated in the Panihati city, characteristics of the waste etc.

The construction of landfill shall be taken up into two phases. Panihati Municipality has demarcated 3.6 acre of land for the construction of the sanitary landfill site for first phase construction and estimated 3.2 acre land (approx.) will be considered as second phase for future provision.

Table 5-27: Area Requirement for Integrated Solid Waste Management facilities

Sl. No.	Description	Area Requirement (in Acre for the year 2029)
1	Design Area (first phase)	3.6Acre
2	Design Area (second phase)	3.2 Acre

5.13.1 Vehicles & Manpower Requirement for SLF

Table 5-28: Vehicles Requirement Landfill Processing

Landfill Operation Vehicle		
Sl. No	Vehicle type	Number
1	Buldozer	1
2	Excavator	1
3	Loader cum Backhoe	1
4	Dumper 10 m^3	1

Table 5-29: Man power Details of Landfill

List of Manpower details of Landfill		
Sl. No.	Particulars	Nos.
1	Assistant manager – Landfill	1
2	Supervisor – B.Sc.	2
3	Electritian	1
4	Laborers	6
5	Excavator Driver	1
6	Dozer Driver	1
7	Loader Driver	1
8	Dumper Driver	1
9	Gardener	2
10	Security Guard	4

CHAPTER 6 PROPOSED INSTITUTIONAL FRAMEWORK

It is proposed to take steps for institutional strengthening and internal capacity building to ensure that endeavor to improve the existing scenario is successful. Institutional strengthening can be done by adequately decentralizing the administration, delegating adequate powers at the decentralized level, by inducting qualified and competent professionals into the administration and providing adequate training to the existing staff.

PanihatiMunicipality (PM) has demonstrated its commitment to developing slums and poor communities. PM is responsible for the delivery of variety of functions like Water Supply, Sewerage, Sanitation, drainage, solid waste management, roads and transportation to the citizens and has taken long strides in this regard. It has also been dealing with medical relief, preventive medicine, sanitation and conservancy, maternity and child welfare, control of food adulteration and some other functions under the Public Health regulations.

6.1 INTRODUCTION

The sustenance of the proposed SWM services depends on robustness and capacity of institutional framework. It is proposed to take steps for institutional framework to ensure that endeavor to improve the existing scenario is successful. Institutional framework can be done by adequately decentralizing the administration, delegating adequate powers at the decentralized level by inducting qualified and competent professionals into the administration and providing adequate training to the existing staff.

6.2 RECOMMENDATIONS FOR INSTITUTIONAL STRENGTHENING

The recommendations for the institutional framework are based on the specific tasks to be carried out under the proposed MSW Project. The activities which need to be focused as per the proposed plan include:

- Segregation of waste at source
- Mechanism of waste collection
  - Primary collection
  - Secondary collection
- Transportation of waste from secondary collection locations
- Development of integrated SWM processing facility
- Operation and maintenance of installed SWM system
  - Landfill
  - Composting
  - Transportation

- Waste collection infrastructure

In the above listed components, several activities/infrastructure developments are proposed to be taken up for implementation for the first time. The Panihati Municipality(PM) requires capacity building to execute the proposed plan.

In view of successful PPP arrangement in many cities for SWM management; it is proposed to consider the private sector participation for developing and operating new services. Based on analysis of the merits and demerits of the existing system, it is proposed to have responsibility delegation for undertaking each activity under proposed SWM plan as below:

Table 6-1: Roles and Responsibilities for O&M of ISWM

Activities	Organization/ Institution	Scope of work/ Responsibilities
Segregation and collection	Panihati Municipality	• Deploy of more sanitary workers • Sensitization of residents/public about segregation. • Provide facilities/bins for segregation • Collection from house holds • Transportation of waste to bins. • Orientation/sensitization of sanitary workers. • Involve NGO's / CBO's in public awareness.
Transportation	Panihati Municipality Private agency	• Selection of party/ agencies for procurement and execution • Work out finance model with agency. • Funding • Monitoring and supervision of agency work. • Readdressal of issues. • Monitoring management and coordination. • Procurement of equipments/ facilities. • Installation of facility. • Safety of equipments. • Collection/ lifting of waste from secondary collection points. • Operation and maintenance of vehicles. • Transportation of waste to site

Activities	Organization/ Institution	Scope of work/ Responsibilities
Integrated SWM facility	Panihati Municipality	• Selection of agency for execution • Funding • Monitoring of construction and management • Supervision of commissioning.
	PPP	• Design and construction • Commissioning • O&M

The existing staff of PM shall be adequate for doing monitoring of SWM services by different private operators but require capacity building to undertake this activity efficiently. Therefore in addition to private operator participation, institutional strengthening is required within PM to ensure sustainability. For institutional strengthening, it is proposed to decentralize the administration, delegate adequate powers at decentralized level and bring accountability at all levels. It is proposed to decentralize SWM functions at three levels:

- Election ward level
- Sanitary ward level, and
- City level

6.3 ELECTION WARD LEVEL

The election ward level administrationshall be fully responsible for ensuring storage of segregated waste at source, primary collection of waste, street sweeping and transferring waste to bins, cleaning surface drains and public places. The cleaning of each street, lane, by-lane, markets and public places shall be regularly supervised by the election ward level supervisors. It is proposed to have two wards under one supervisor.

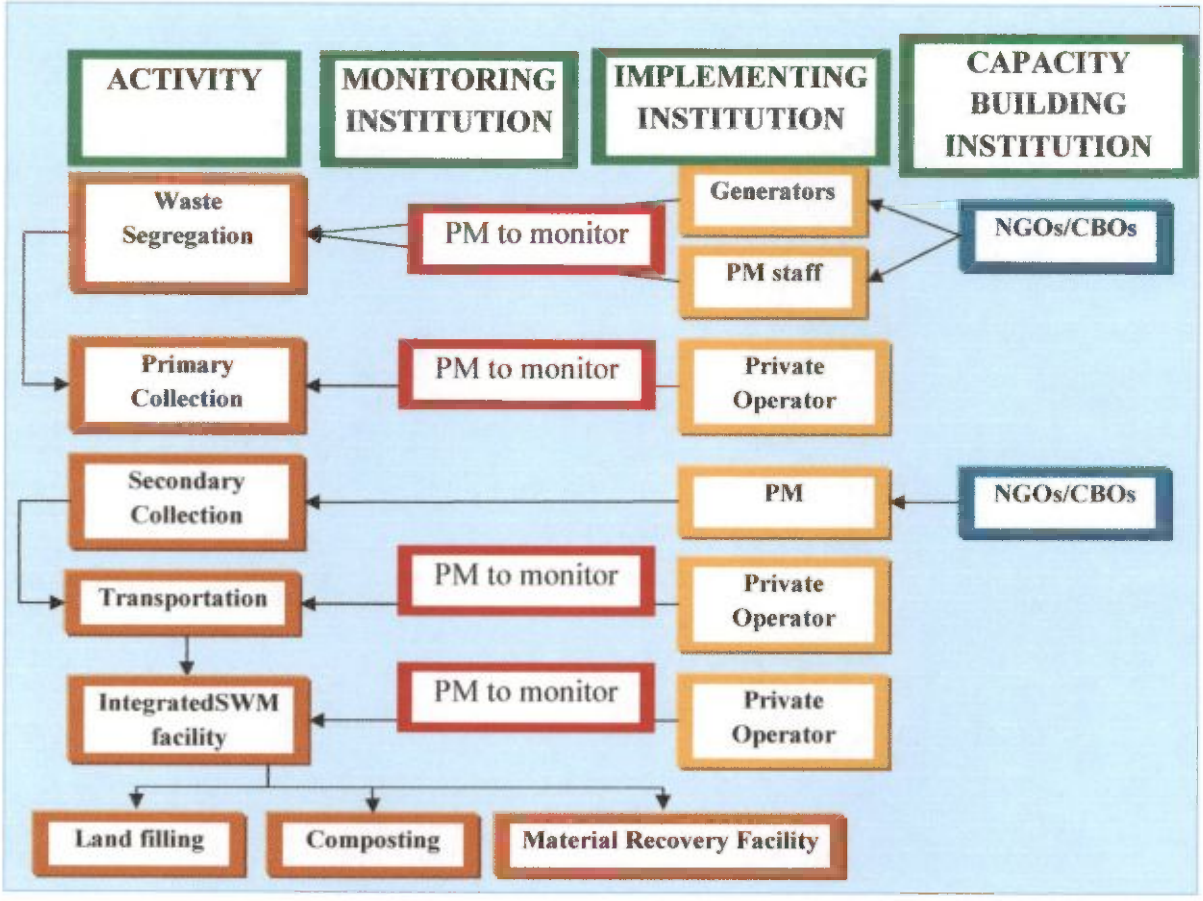


Figure 6-1: Proposed Institutional Framework for SWM

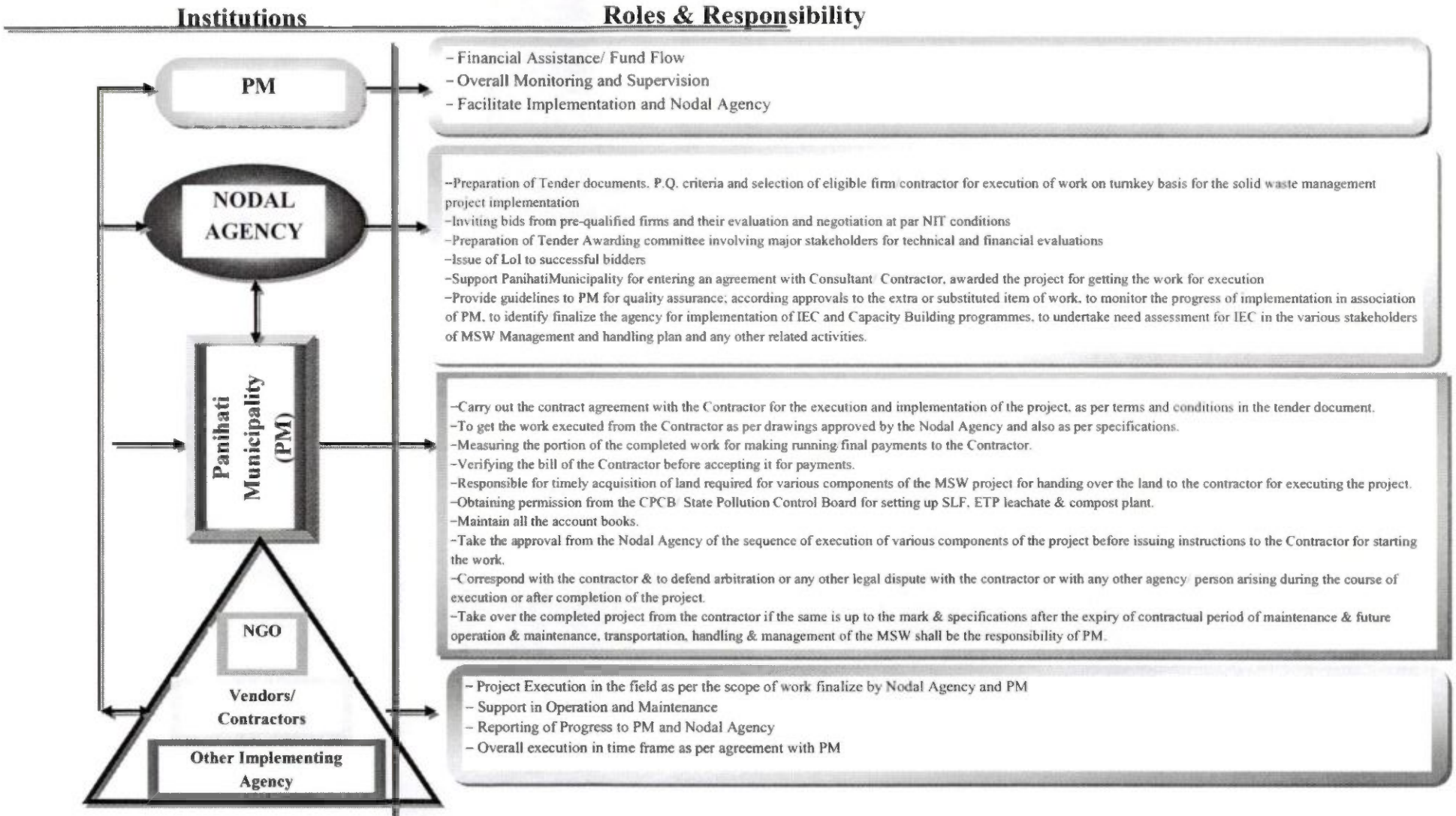
6.4 SANITARY WARD LEVEL

The sanitary ward level administration shall effectively supervise and support the work of sanitary supervisors and also provide due support for upkeep of solid waste collection infrastructure, transportation of waste processing and disposal sites. The sanitary inspector shall ensure that there is adequate coordination between sanitary supervisors of his ward. The fleet of vehicles shall be assigned at sanitary ward level.

6.5 CITY LEVEL

The city leveladministration shall supervise and support the sanitary ward administration. The city level administration shall monitor daily waste quantities collected and transported from each sanitary ward and enquire if any abnormality is reported. The central department is responsible for monitoring activities at the integrated solid waste management facility. The city level administration shall ensure that private operator is undertaking SWM services as per the contract.

Figure 6-2: Proposed Institutional Framework for Operation and Maintenance



6.6 LEGAL ASPECTS

Solid waste management systems adopted in Indian cities are highly inefficient and outdated, lacking public participation. Overall public apathy is observed in the matter of handling and disposal of municipal waste. A system of throwing garbage on the streets by citizens and local bodies collecting the waste from the streets and disposing of it in the most unhygienic manner is in vogue. These systems can be corrected by taking concerted measures involving the public at large through their active participation in the process and by Municipality performing its duties effectively.

Solid waste management practices can never reach the desired level of efficiency until the public participates and discharges its obligation religiously. The system therefore, can only be improved by modernizing the solid waste management system by the Municipality and ensuring public participation through very serious motivational efforts along with adequate legislative support for taking punitive measures.

For improving solid waste management practices in city, the Supreme Court Committee has given wide ranging recommendations defining the roles and responsibilities of the citizens, NGOs, local bodies, etc. Subsequent to the aforesaid report, the Government of India, Ministry of Environment has notified municipal solid waste (Management & Handling) Rules 2016 under the Environment Protection Act 1986, these rules have clearly laid down the measures to be taken by the Municipalityas well as smaller urban local bodies. Keeping in view both the above report and the rules it is necessary to incorporate suitable provisions in the state law to ensure public participation and for providing for minimum level of service.

Local law also needs to provide for punishment on the spot to those who do not adhere to the directions given for maintaining appropriate solid waste management system in the city giving adequate power to the Municipality to punish the offenders.

The following legal provisions may be incorporated by the State Governments in the law-governing Municipality.

6.7 LEGAL PROVISIONS

6.7.1 Duty of occupiers of premises to store solid waste at source of generation

It shall be incumbent on the occupiers of all premises to keep two receptacles, one for the storage of food/organic/bio-degradable waste and another for recyclables and other types of solid wastes generated at the said premises.

6.7.2 Duty of occupier not to mix recyclable /non-bio-degradable waste and domestic hazardous waste with food waste etc.

It shall be incumbent on the occupier of any premises to ensure that the recyclable waste as well as domestic hazardous waste generated at the said premises does not get mixed with the food/bio-degradable waste and that they are stored separately.

6.7.3 Duty of Societies/Associations/Management to provide community bins

It shall be incumbent on the management of Co-operative Societies, Associations, Residential and Commercial Complexes, Institutional buildings, markets and the like to provide community bin/bins of appropriate size as may be prescribed by urban Municipality, for the temporary collection of waste other then recyclable waste and hazardous waste, to be stored at their premises for its primary collection by the municipal authorities. A separate community bin may also be provided for the storage of recyclable waste where door to door collection of recyclable waste is not practiced.

6.7.4 Receptacles to be kept in good repair

Receptacles as stated in 3 above shall at all times be kept in good repair and condition and shall be provided in such number and at such places as may be considered adequate and appropriate to contain the waste produced by the citizens supposed to be served by the community bins.

6.7.5 Duty of occupiers to deposit solid waste in community bins

It shall be incumbent on occupiers of all premises for whom community bins have been provided as per 3 above, to cause all segregated domestic waste, trade waste, institutional waste from their respective premises to be deposited in the appropriate community bins.

6.7.6 Duty of Municipality to provide bins for Waste storage depots

It shall be incumbent on the Municipality to:Provide and hygienically maintain adequate waste storage bins in the city and place large mobile receptacles at such places for the temporary storage of waste collected from households, shops and establishments as well as from streets and public places until the waste is transported to processing and disposal sites.

6.7.7 Duty of Municipality to collect waste from community bins transport

It shall be incumbent for Municipality to remove all solid waste deposited in community bins on a daily basis transport to processing or disposal sites.

6.7.8 Duty of Municipality to clean all public streets, open public spaces and slums

It shall be incumbent on Municipality to arrange for cleaning of all public streets having habitation on both or either side, and all slums on all days of the year including Sundays and public holidays.

6.7.9 Prohibition against littering the street and deposit of solid waste

No person shall litter public streets or public places or deposit or cause or permit to be deposited or thrown upon or along any public street, public place, land belonging to the Municipality or any unoccupied land or on the bank of a water-body.

6.7.10 Punishment for littering on streets and depositing or throwing any solid waste

Whosoever litters the street /or public places or deposits or throws or causes or permits to be deposited or thrown any solid waste or construction debris at any place in city would be punished as specified under penalty subsection.

CHAPTER 7 IEC MATERIAL &PUBLIC AWARENESS

To enable people to participate in the development process, it is necessary that people have adequate knowledge about the nature and content of these Programmes. Public Awareness through Information, Education and Communication (IEC), therefore, assumes added significance in the context of the Programmes. Through IEC techniques the stakeholders and local community could be educated and aware about the issues and advantages of existing and implementing system of the solid waste management. The basic approach of IEC plan is to create effectiveness of the Solid Waste Management System. Its operational efficiency can be improved through Information, Education and Communication (IEC) techniques.

Apart from this, to have the municipal solid waste collection in segregated form and adequate handling and processing, the Municipal staff as well as the other stakeholders/ private operators involved in this process should be properly trained and sensitized. For this purpose need of Information, Education & Communication (IEC) Plan and Training & Capacity Building of PMstaffs responsible for Solid Waste Management have been assessed and are being proposed.

7.1 OBJECTIVE

The major objectives of the IEC and Capacity Building are as follows:

Bringing of attitudinal and behavioural changes among the residence about the segregation of waste and sanitation improvement.
Public awareness through informing and educating the masses on various aspects of solid waste management and achieve the target of receiving segregated waste from each household.
Creating Public Participation in Planning and Management of MSW Activities
Capacity Building of the personnel's involved in implementing MSW i.e. Institutional Capacity of Health Department of PanihatiMunicipalityfor Improved MSW Management.
Integration and involvement of private sweepers and Rag Pickers in improving MSW management

7.2 PUBLIC PARTICIPATION AND AWARENESS THROUGH INFORMATION, EDUCATION AND COMMUNICATION (IEC) PLAN

The success of any solid waste management scheme can be measured through the extent of cooperation and participation of people, effectiveness of the proposed system and operational efficiency. Communication is an integral part of planning for sustained development. The development of human society has largely been due to its ability to communicate information and ideas with each other and to use such information and ideas for progress.
The Programmes being implemented by the Govt. Departments aim at sustainable holistic development in all development projects. The success of these programmes is critically dependent on the participation of the people, particularly target groups, in the implementation process. The approach should be to emphasize on communication with target groups, local

community for the implementing programme of Solid Waste Management in respective areas of Panihati.

7.3 APPROACH OF IEC PLAN

The basic approach of Information, Education and Communication Plan is to make aware the public about the need of reduction and segregation of waste from the households along with the collection system of waste to take public cooperation to make hygienic structure of the area.

- Focus Group Discussions
- Inter personal communications
- Creating watchdog committees comprising of local influential people and important stakeholders, societies
- Printed materials and Audio-visual aids
- Other locally popular media.

The entire implementation shall be designed to cover entire Municipal area of the city in a very planned and strategic way for the efficient implementation and for the success and sustainability of the MSW management.

7.3.1 Communication:

Communication Planning is an integral part of planning for sustained development. The development of human society has largely been due to its ability to communicate information and ideas with each other and to use such information and ideas for progress. First attempt would be a public campaign, which is the objective of the IEC Plan, will be launches to raise awareness about cleanliness.

7.3.1.1 Door to Door Campaign:

For door to door information spreading, involvement of health workers (Sanitary staff) would be easy and speedy along with the volunteers. It will also create a platform for a better communication management among public and sanitary staff. The volunteers and health workers will lead to spread the project information with the help of support material which will be helpful for providing effective information along with time saving.

7.3.1.2 Public Address Meeting:

Interpersonal and community meeting is a great tool to share the information, views and direct interaction for the effective involvement and awareness among the residents. The message and information and people commitment can be taken for the segregation and better management for the Segregated Solid Waste Management Scheme. Some workshop and seminars will also lead to inform the stakeholders at a time with proper preparation and communication and their participation and cooperation for sanitary improvement.

7.3.1.3 Media Support:

Media support is essential and a very important part of IEC programme to inform, educate and aware the masses. Media support includes the use of television, radio, print media and folk theatre therefore, accords priority for the promotion of non-formal sanitary improvement education and creation of awareness among all sections of the society through diverse activities using traditional and modern media of communication. The media should be informed and involved for each programme which would be conducting according to the IEC plan.

7.3.1.4 Folk Programme:

Street play which is an important tool for creating entertained information, education and basically aware the lower income group and lower middle income group residents. The street play theme should be to the point on the IEC plan and in local point of view to realize the residents as of their part. Mass media should also be encouraged for their support in public awareness program.

7.3.2 Social Mobilization:

For the social mobilization, attitudinal and behavioral changes of the residents' involvement of major and social stakeholder are essential. For this purpose institutional and other organizations involved in social activities are a great awareness center for the social mobilization and public awareness as indicated below:

- Educational Institutions (Schools and Colleges etc.)
- NGOs/ CBOs/ Societies Support
- Sr. Officials/ Administration Officers / Sr. Citizens
- Ministerial Supports etc.

7.4 IDENTIFICATION & ACTION

Identification and selection of target groups plays a key role in creating effective awareness in residential. For solid waste management, it becomes more important as the source of MSW starts from houses due to which target starts from household female head, youths and children who requires some form of role model or different methods to influence their behavior. It is a very important aspect which could be at waste generators level and may reduce, reuse and recycle their waste. The other part of target groups may be waste collector and waste managers. These types of target groups are directly involved with the solid waste management. Along with this, there are other groups which can be helpful for the better management of MSW segregated waste collection, operation, handling and proper disposal. The major target groups are as following:

Table 7-1: IEC action Identification

Sl. No.	Target Groups	Target Group Details	Action Plan
1	Waste Generator	Residential Areas (Women (household), Maids, children and Youths) Commercial Areas (Shopping areas, Vegetable markets, Offices, Hotels, Restaurants) Institutional Areas (Jr. High Schools, Colleges)	Holding locality-wise meetings, seminars, targeted community meetings with self help groups, through street plays, technical and pictorial presentation along with aware them about health hazards and remedial measures and sanitation improvement. Informing and suggesting them about the segregated waste management and their important role.
2	Waste Collector	Sweepers Rag pickers Waste loaders Truck drivers Landfill supervisors	They all should be involved and sensitize about the need of segregated waste collection and sanitation improvement. The waste collection, transportation and disposal of the waste in proper timing so that waste could not be overflow. The waste collector should be trained about the collection of segregated waste.
3	Waste Managers	Administrators and supervisors Control and monitoring team Complaint handlers Computer software operators and specialists	Presenting them about the Rules and Regulation and updating them about the ongoing activities and techniques for MSW management. Training programmes for the technical staffs Providing the reviews of progress and monitoring activities
4	Leaders	Political Leaders (Local MLA, MP) Religious Leaders Community Leaders	These leaders can be motivated to participate actively in promotional efforts of community involvement in segregated solid waste management.
5	School Teachers and Students	Primary Schools Jr. High Schools Public Schools	School teachers can be informed and involved in the segregated solid waste management scheme and can be motivated to educate the children for the sanitary improvement. The students can be educated and trained for the segregated waste management system and they can be great awareness creators for the societies. Some groups of students can be created as monitoring and awareness team for sanitation improvement which will make a great impact on societies and communities.

Sl. No.	Target Groups	Target Group Details	Action Plan
6	Media	Print Media Electronic Media	Launching mass campaign for educating and motivating local communities and families about the need of segregation of Solid Waste and its management for sanitation and hygienic improvement.
7	Elite groups or social organizations	NGOs, Societies CBOs Sr. citizens Association Rotary Clubs/ Lions Club	Sensitize and motivate local influential people like Sr. citizens, leading businessmen, social club members, NGOs and CBOs etc. to undertake or sponsor such activities for solid waste management for effective strategy of public participation and awareness.

Once the target groups have been identified, the responsibility lies in developing the approach for educating these groups. For successful implementation of any program involving public at large, it is essential to spell out clearly and make them know the manner in which the problem is proposed to be tackled to keep area clean and improve the quality of life.

The communication material should be developed and must be utilized in public awareness program through the tools of publicity. The use of various publicity tools as public address meetings, workshops, School Activities, Street Plays, Distribution of Handbills, Pamphlets and Handbills etc. can be used.

This professional work be outsourced to Event management Companies/ NGOs etc who will carry out all programmes for not less than six months through:-

- Mobile Campaign;
- Leaflets;
- Cinema Slides;
- Arranging Hoardings & Banners;
- Holding Seminars and Workshops;
- Locality wise general Campaign for awareness;
- Involving schools and their students for ***"Keep Your City Clean"*** Campaign;
- Holding Exhibitions;
- Importing Trainings to workers for cleaning works in Public and Community Toilets;
- Record Consultations, suggestions and general feedback from the people and deliver to ULB for planning and mitigating redressal issues of complains.

7.4.1 Quantification of Works

Slide - 1

Through **Auto Van** & **Loudspeaker** and distributions of one page handouts (1,00,000 nos.) – **5 Vehicles** each week for **30 weeks** covering the entire city

Slide - 2

Leaflets: on segregation of solid waste to each house – 70,000 nos. in Hindi

Slide - 3

Cinema Slides & TV Slots: Slides 10 nos. on sanitation daily show for one minute for 6 months

Slide - 4

Hoardings: 20 nos(20 ft x 10 ft) & **Banners :** 50 nos(6 ft x 5 ft)

Slide - 5

Workshops & Seminars: 2 nos. per month per ward for 6 months i.e. 12 x 51 = 612 nos.

Slide - 6

Through **Auto Van** & **Loudspeaker** and distributions of one page handouts (1,00,000 nos.) – **5 Vehicles** each week for **30 weeks** covering the entire city

Slide - 7

All Schools: 100 nos. Rally for 10 days in 6 months

Slide - 8

Exhibitions: 2 nos. in 6 months

Slide - 9

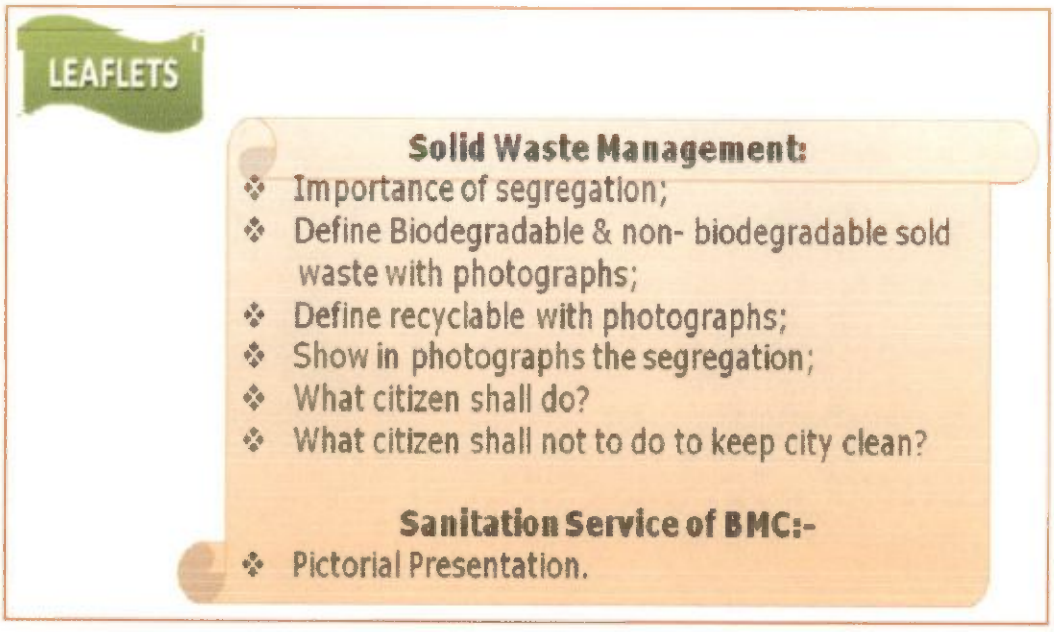
Trainings to workers: 10 programmes for 20 participants each

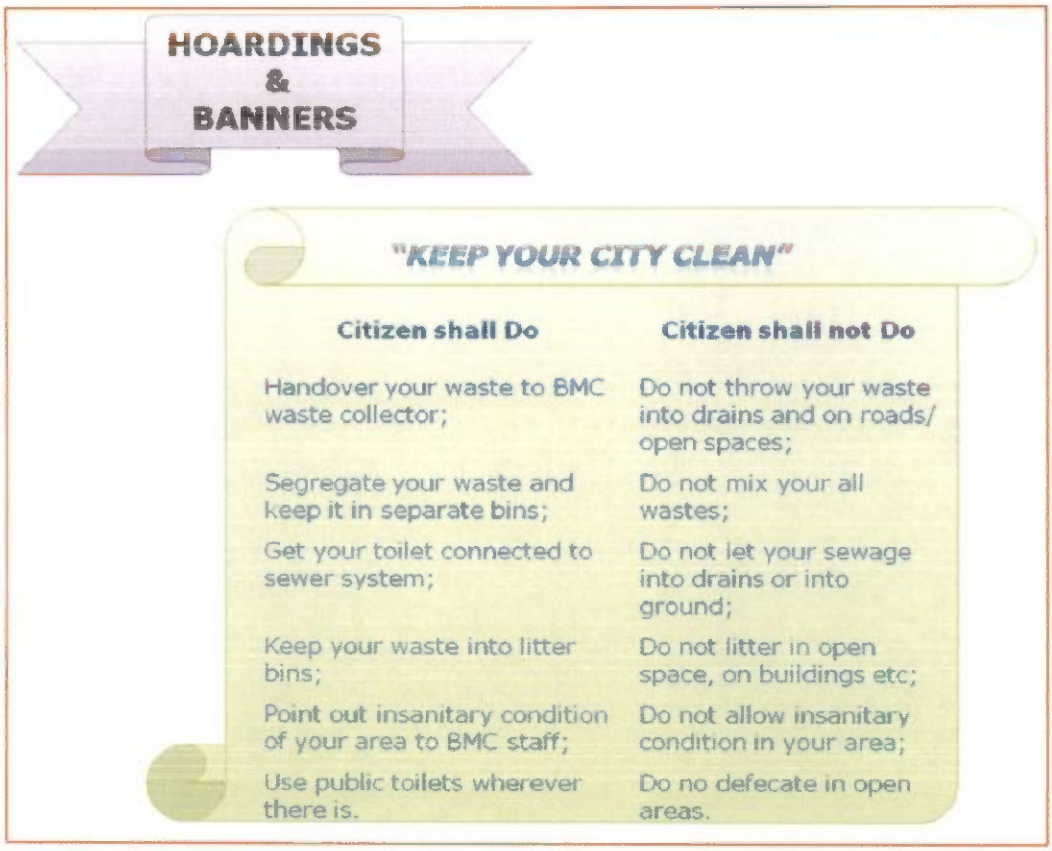
Slide - 9

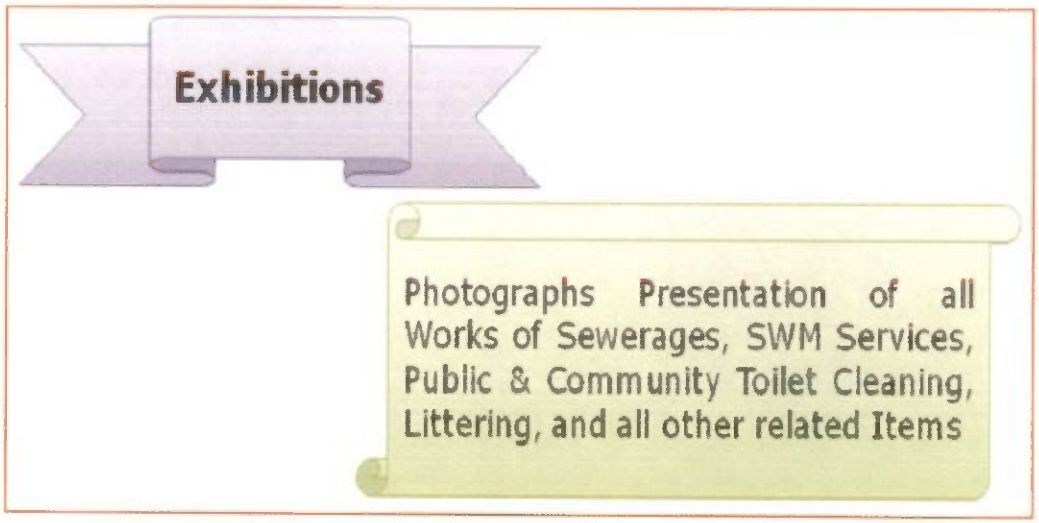
Record Feedback: Submit a full report

7.4.2 Subject Matters (Seminar, Workshops)

7.4.3 Activities Covered in Leaflets, Hoardings and Banners, Campaign and Exhibitions




HOARDINGS
&
BANNERS
"KEEP YOUR CITY CLEAN"
Citizen shall Do
Citizen shall not Do
Handover your waste to BMC waste collector;
Do not throw your waste into drains and on roads/ open spaces;
Segregate your waste and keep it in separate bins;
Do not mix your all wastes;
Get your toilet connected to sewer system;
Do not let your sewage into drains or into ground;
Keep your waste into litter bins;
Do not litter in open space, on buildings etc;
Point out insanitary condition of your area to BMC staff;
Do not allow insanitary condition in your area;
Use public toilets wherever there is.
Do no defecate in open areas.


Exhibitions
Photographs Presentation of all Works of Sewerages, SWM Services, Public & Community Toilet Cleaning, Littering, and all other related Items

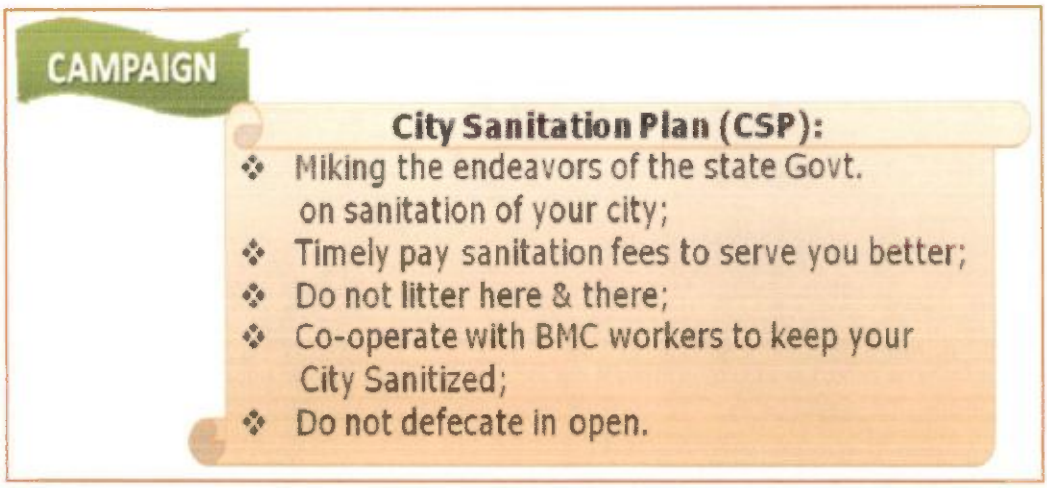


Table 7-2: Proposed Financial Budget for IEC

Sl. No.	IEC materials and methods for one year budget	Quantity	Approximate Cost (Rs.)
1	Sanitation Booklet (4page)	2,00,000	Rs 10,00,000
2	Sanitation Leaflet (One page)	4,00,000	Rs 9,00,000
3	Banner (4'-0"x2'-0") flex	500 nos.	Rs 9,00,000
4	Hoarding (20'-0"x10'-0"x6'-0") for one year	100 nos.	Rs 16,00,000
5	Advertisements to Newspaper TV & Other Media	L.S	Rs 10,00,000
6	Workshop, Seminars	100 nos	Rs 11,00,000
7	Niking 10 sets (Weekly one year)	520 times	Rs 25,00,000
8	Student Rally Each Month	12 nos	Rs 10,00,000
	Total		Rs 100,00,000
	Total (say)		Rs 100,00,000/-

CHAPTER 8 ENVIRONMENTAL AND SOCIAL ASPECTS

8.1 ENVIRONMENTAL AND SOCIAL ASPECTS

Present environmental situation is not monitored. It is considered that due to inadequate basic sanitation facilities, pollution of air and water is prevailing. There is no activity undertaken by the Panihati for mainstreaming the rag pickers and work is to planned for their resettlement.

8.2 SOCIAL ISSUES OF RAGPICKERS AND RESETTLEMENT PLAN

Mainstreaming activity will be taken up by the Panihati by employing the rag pickers in waste processing plant and sanitary landfill site. Free medical checkup can be taken up by Panihati for all their SWM workers & other manual workers.

It is observed that near about 100-120 (approx.) rag pickers involved in segregation and reselling goods from the waste in the Panihati city. For rag pickers the reselling of goods is the livelihood. Therefore, to ensure living wage for rag pickers it is proposed to educate them and involve in waste management system in due course of project implementation.

8.3 ENVIRONMENTAL ISSUES AND THEIR MITIGATIONS

During execution of projects of sewer line, there will be environmental hazards in air, water and river construction activity shall be planned for minimization of all hazards by following standard methods of mitigation.

Major environmental issues involved in MSW management system are given below:

Table 8-1: Environmental Issue and Action Plan

Sl. No.	SWM Management System	Major Issues Involved	Action Plan
1	Primary Collection	Primary Collection of solid waste is not appropriate resulting accumulation of solid waste on roadsides and vacant plots and in low lying areas and storm water drains.	Door-to-door waste collection service has to be provided to households. The roadside waste collected by street sweepers must be directly dumped into a separate bin at the secondary waste collection point.
2	Secondary Storage of Solid Waste	In the absence of secondary storage facility for MSW, it is dumped at any location in the vicinity – drains, vacant plots, street corners, low lying areas, and other open areas. Heaps and stretches of un-segregated waste in open areas is an eyesore, thereby causing environmentally hazardous & unhygienic conditions across the city, thus,	Separate colored bins must be provided at the secondary storage location for biodegradable and non-biodegradable, and recyclable wastes. The bins must be covered and cleared at the scheduled time to prevent storage of waste for a long time and littering of waste outside the bins

Sl. No.	SWM Management System	Major Issues Involved	Action Plan
		creating conditions for breeding of mosquitoes, grazing by cattle	
3	Solid Waste Transportation	It is observed that transportation vehicles are overloaded with waste, resulting in road littering during transportation. The loading and unloading of waste is done manually and safai karamcharis involved in this activity do not use any Personal Protection Equipment (PPE) for their protection.	The waste transportation vehicles must be covered at all times expect while loading and unloading activities and the loaded waste should not exceed the capacity of these vehicles.
4	Collection and disposal of construction waste	The construction/ demolition waste generated by local residents is transported in tractor trolleys and disposed off in open/ low-lying areas in the vicinity, privately	The construction and demolition waste must not be dumped in any open areas in an unorganized manner.
5	Disposal of solid waste	The solid waste collected from various sources is disposed off in open dumpsites indiscriminately without segregation or preprocessing. There is no engineered sanitary landfill site for safe disposal of solid waste.	According to MSW Rules, 2016, biodegradable waste shall be processed and converted into compost or used for power generation; recyclables shall be segregated and sold to recyclers; no hazardous waste be dumped along with MSW; construction waste to be segregated and used for filling low lying areas and only remaining waste shall be dumped into engineered landfill facility.

Municipalityshould have strict initiative for proper implementation of action plan to avoid environmental and social nuisance.

8.4 ENVIRONMENTAL SCENARIO

Due to growing prosperity and changing lifestyle of people, communities are getting increasingly oriented towards consumerism. They are guzzling resources in a wasteful manner and in the process, generating a variety of wastes, a bulk of which is in the form of solid waste. Consequently, a sea change has occurred lately in both quantum and composition of solid waste. In many cities, the rate of generation of solid waste has increased so much that the civic agencies responsible for the collection and disposal of wastes are unable to deal with the total quantity produced every day. As a result, a major part of the waste remains uncollected and accumulates in the form of heaps at various locations within the inhabited areas. Inefficient and improper methods of disposal result in scenic blights and create serious hazards to human health. These include pollution of air and water resources, accident hazards and an increase in rodent and insect vectors of disease.

The composition of solid waste has changed in such a manner that, today, a major proportion of the waste is composed of non-biodegradable materials such as plastics, iron, glass and other metals. The Indian Cities generate about 110,000 tonnes of garbage in one day of which around 44,000 tonnes are organic and 66,000 tonnes are inorganic. This type of waste can only be recycled or disposed of through special processes. Due to these reasons, the task of handling solid waste has become a highly specialized managerial task.

In most of the Indian cities, waste comprises mainly of not easily combustible vegetable and meat wastes, since the more easily combustible substances such as cardboard, paper, cloth, and plastics are already eliminated at source or by rag pickers for sale to 'kabariwalas'. Even with the implementation of waste reduction, recycling, and transformation technologies, disposal of solid waste in landfills remains a significant component of an integrated waste management strategy. Contrary to what its name suggests, the method of land filling, till now, has been operated in an unsanitary manner. Most landfill sites give an unhygienic look. Not only this, the consideration of the environmental parameters in designing and developing these projects has been neglected.

The recent directions of the Supreme Court of India to the various municipalities and states' departments of Urban Development to ensure compliance with the Municipal Solid Waste Rules, 2016 (MSW Rules), have brought municipal solid waste management (MSWM) issues under the spotlight. Municipalities have thus started to address the MSW issue, for a number of reasons, including citizen concern and recent mandates from the Supreme Court.According to legislation on municipal solid waste formulated and enacted by the Union Ministry of Environment and Forest as empowered under the Environment Protection Act of 1986—the submission of an environmental impact assessment prior to the designing and development of any landfill facility in the country has been made mandatory.

8.5 ENVIRONMENTAL MANAGEMENT PLAN

8.5.1 Environmental Monitoring

Environmental monitoring has to be conducted at MSW landfill and composting facility to ensure that no contaminants that may affect public health and surrounding environment are released from the environment. The monitoring required is divided in to three categories:

- Vadose zone monitoring for gases and liquids
- Ground water monitoring and
- Air quality monitoring

8.5.1.1 Vadose Zone Monitoring

The vadose zone is defined as the zone from the ground surface to where the permanent ground water is found. An important characteristic of the vadose zone is that the pore spaces are not filled with water, and that the small amounts of water that are present coexist with air. Vadose zone monitoring at landfills involves both liquids and gases.

8.5.1.2 Liquid Monitoring In the Vadose Zone

Monitoring for liquids in the vadose is necessary to detect any leakage or leachate from the bottom of a landfill. In the vadose zone, moisture held in the interstices of soil particles or within porous rock is always held at pressures below atmospheric pressure. To remove the moisture it is necessary to develop a negative pressure or vacuum to pull the moisture away from the soil particles. Because suction must be applied to draw moisture out of the soil in the vadose zone, convention wells or other open cavities cannot be used to collect samples in this zone. The sampling devices to be used for sample extraction in the unsaturated zone are suction lysimeters.

The most commonly used class of lysimeter used for obtaining samples of moisture in the vadose zone is the ceramic cup sampler, which consists of a porous cup or ring made or ceramic material that is attached to a short sections of nonporous tubing (e.g. PVC). When placed in the soil, because of its pores it becomes extension of the pore space of the soil. Soil moisture is drawn in through the porous ceramic element by the application of a vacuum. When a sufficient surface through a narrow tube by the application of vacuum or is pushed up by air pressure.

8.5.1.3 Gas Monitoring In the Vadose Zone

Monitoring for gases in the vadose zone is necessary to detect the lateral movement of any landfill gases. Vadose zone gas monitoring probe is to be used for monitoring of land gases. Gas samples are to be collected from multiple depths in the vadose zone.

8.5.1.4 Ground Water Monitoring

Monitoring of the ground water is necessary to detect changes in water quality that may be caused by the escape of leachate and landfill gases. Both down and up gradient wells are required to detect any contamination of the underground aquifer by leachate from the landfill. To obtain a representative sample, the liquid in permanent sample collection tubing, where used, must be purged before the sample is collected.

8.5.1.5 Landfill Air Quality Monitoring

Air quality monitoring in landfills involves:

- The monitoring of ambient air quality at and the Landfill and composting facility.
- The monitoring of landfill gases extracted from the landfill and
- The monitoring of gases from any gas processing or treatment facility.

Monitoring Ambient Air Quality

Ambient air quality is to be monitored at landfill site to detect the possible movement of gaseous contaminants from the boundaries of the landfill site and emission from the composting plant.

Monitoring Extracted Landfill Gas

Landfill gas is to be monitored to assess the composition of the gas, to determine the presence of trace constituents that may pose a health or environmental risk.

Monitoring Off-Gases

Monitoring of-gases from landfill and composting facilities is to be done to determine compliance with the local air pollution control requirements.

The following table gives the details of parameters to be monitored and the frequency of monitoring during the operation of SLF:

Table 8-2: Environmental Monitoring Plan during Operation of SLF

Sl. No.	Activities to be Carried Out	Parameters to be Monitored	Duration of Monitoring
1	Monitoring of groundwater quality at up and down streams in monitoring wells	Colour, Odour, Taste, Turbidity, pH, CaCO3, Iron , Chlorides , Fluoride, TDS, Ca2+, Mg2+, Cu, Mn, SO4, NO3, C6H5OH, Hg, Cd, Se, As, CN, Pb, Zn, Anionic Detergent (as MBAS)	Quarterly (4 times in a year covering every season)
		Cr6+, Mineral oil, Alkalinity as CaCO3, Aluminum (as Al)	
		Boron (as B), Total Coliform E.coli	
2	Monitoring of ambient air quality at landfill	PM_{10}, $PM_{2.5}$, CH_4, SO_x, NH_3, CO & NO_2	Twice a week per one month for each season.
3	Monitoring of leachate quality before and after treatment	pH, turbidity, TDS, TSS, Ammonical Nitrogen, Kjeldal Nitrogen, CN, Ntrates, Total hardness (as $CaCo_3$), Cl, F, Sulphates, Kjeldahl N, BOD, COD, Phenolic compounds (as C_6H_6 OH), heavy metals such as As, Hg, Pb, Cd, Cr, Cu, Zn, Ni, CN etc.	Monthly during rainy season
4	Monitoring of landfill gas quality	CH4, CO2, CO, H2S	Monthly
5	Monitoring of surface water quality from drain channel at the exit of landfill	pH, Dissolved Oxygen, BOD (3 Days at 27C°), Free Ammonia (as N), Sodium Adsorption Ratio, Boron	Monthly during rainy season & twice a year (one post monsoon, pre monsoon)
		Conductivity, Temperature	
		Turbidity, Magnessium Hardness (as CaCO3), Total Alkalinity (as CaCO3), Chloride (as Cl), sulphate (as SO4), Nitrate (as NO3), Fluoride (as F), Sodium (as Na), Potassium (as K)	
		TKN, Total Phosphorous (as PO4), COD, Phenolic compounds (as C6H5OH), Lead (as Pb), Iron (as Fe), Cadmium (as Cd), Zinc (as Zn), Arsenic (as As), Mercury (as Hg), Chromium (as Cr)	
		Nickel (as Ni), Total Coliform, Faecal Coliform	

The post-closure monitoring plan envisaged for the site is as mentioned below:

Table 8-3: Environmental Monitoring Plan during Post-Closure Period

Sl. No.	Activities to be Carried Out	Parameters to be Monitored	Duration of Monitoring
1	Monitoring of groundwater quality at up and down streams from monitoring wells	Colour, Odour, Taste, Turbidity, pH, CaCO3, Iron , Chlorides , Fluoride, TDS, Ca2+, Mg2+, Cu, Mn, SO4, NO3, C6H5OH, Hg, Cd, Se, As, CN, Pb, Zn, Anionic Detergent (as MBAS)	**Quarterly, for first five years. If there is no change in the groundwater quality, then annually for another 10 years**
		Cr6+, Mineral oil, Alkalinity as CaCO3, Aluminum (as Al)	
		Boron (as B), Total Coliform	
		E.coli	
2	Monitoring of ambient air quality at landfill	PM_{10}, $PM_{2.5}$, CH_4, SO_2, NH_3, H_2S & CO, NO_2	**For first five years bimonthly**
			For another 10 years, yearly
3	Monitoring of landfill gas quality	CH_4, CO_2& CO	**For first five years, bimonthly**
4	Monitoring of surface water quality from storm water drain channel at the exit of landfill	pH, Dissolved Oxygen, BOD (3 Days at 27C°), Free Ammonia (as N), Sodium Adsorption Ratio, Boron	**For first five years, quarterly.**
		Conductivity, Temperature	**For another 10 years, semiannually.**
		Turbidity, Magnesium Hardness (as CaCO3), Total Alkalinity(as CaCO3), Chloride (as Cl), sulphate (as SO4), Nitrate (as NO3), Fluoride (as F), Sodium (as Na), Potassium (as K) TKN, Total Phosphorous (as PO4), COD, Phenolic compounds (as C6H5OH), Lead (as Pb), Iron (as Fe), Cadmium (as Cd), Zinc (as Zn), Arsenic (as As), Mercury (as Hg), Chromium (as Cr)	
		Nickel (as Ni), Total Coliform, Fecal Coliform	
5	Inspection of final cover to check,		**Quarterly**
	a. The vegetation growth is occurring satisfactorily without stunted growth		
	b. If any erosion gullies are formed exposing the barrier		

Sl. No.	Activities to be Carried Out	Parameters to be Monitored	Duration of Monitoring
	layer.		
	c. Identifying collection of water on landfill cover		
6	Inspection of surface water drainage system to check a. Cracks in drains and pipes due to settlements. b. Clogs in drains which need immediate cleaning		**Quarterly**

8.5.2 Environmental Monitoring Agency

PM should ensure periodical environmental monitoring with outsourcing it to established government/private organization. Generally Pollution Control Board has all the necessary equipments to cater the requirement of monitoring; hence Panihati Municipality may take the services of Pollution Control Board in this regard.

CHAPTER 9 COST ESTIMATION

9.1 CAPITAL COST OF THE PROPOSED SCHEME

The implementation of the scheme is scheduled to complete by year 2019 after which commercial production of integrated facility will commence.

Table 9-1: Primary Collection System

Primary Equipments				
Sl. No	Item	Unit Rate in INR	Required Number	Total Amount (INR) in Figures
1	House hold Bin 10 lit	170	195972	33,315,240.00
2	Tricycle van with 6 nos. of 50 lit bins	26780	44	1,178,320.00
	6 nos. 50 lit bin for existing tricycle	590	588	346,920.00
	fabrication and fitting charges of bins into existing tricycle	2000	140	280,000.00
3	Battery operated Auto Rickshaw	160000	67	10,720,000.00
	8 nos. of 60lit bins	1187	536	636,232.00
4	Auto tipper	900000	12	10,800,000.00
5	Compactor bin -1100 lit	46725	73	3,433,796.89
6	Road side bins- 240 lit capacity	3947	887	3,500,989.00
7	TT Container	185000	110	20,350,000.00
	Repairing for existing TT Container	25000	50	1,250,000.00
8	Wheel barrow for Street Sweeping & drain cleaning -110 lit	6925	189	1,308,825.00
Total				**87,120,322.89**

Table 9-2: PPE Equipment Costing

PP Equipment Requirement				
Sl. No.	Equipments / Implements	Quantity	Unit Rate	Amount
1	Long hand brooms	189	80	15,120.00
2	Metal tray with Plate	189	110	20,790.00
3	M. S. Shovel	189	580	109,620.00
4	Gloves	462	170	78,540.00
5	Mask	462	55	25,410.00
6	Appron	462	285	131,670.00
7	Rain coat	462	620	286,440.00
8	Safety Boot	494	500	247,000.00
Total				**914,590.00**

Executive Engineer
Plng. Divn. & KSWMIP
SD & SWM KMDA

Chief Engineer-In-Charge
Sanitation & S.W.
Water & Sanitation Se
K. M. D. A.

Table 9-3: Capital Cost for Construction of Processing Plant (Compost Plant and Material Recovery Facility)

Sl. No.	Items	Description of Items	Unit Rate	Total Quantity	Total Amount (INR) in Figures
1	**Preliminaries**				
1.2	Topographical Survey	Conduct topographical survey for all the sites to recognize the current condition of the sites for detail design.-	LS	LS	100000.00
1.3	Geotechnical Survey	Conduct geotechnical survey for all the sites to recognize the soil condition for the detail design.	LS	LS	300000.00
1.4	Detail Design	Prepare detail design on the basis of topographical and Geotechnical survey date {Report of geotechnical and topographical survey carried out by KMDA is attached for reference. The survey report (KMDA and contractor) which show worst condition will have be considered for design purpose} meeting the requirement and specification. The design includes drawings, shop drawings, construction planning (methodologies and schedules), etc. for all the structures and facilities.	LS	LS	600000.00
1.6	As-built Drawings	Prepare as-built drawings incorporating all the variation occurred during the construction.	LS	LS	50000.00
2	**Land Preparation**				
2.1	Clearing and Grubbing	Removing obstructions like large size trees, grass, hutments, boundary wall etc and disposing the as per instruction of Engineer in charge.	11	18600	204600.00
2.2	shifting of Utilities	Shifting of utilities in form of electric lines, telephone line etc. as required, as per instruction of Engineer in charge.	LS	LS	300000.00
2.5	Earth /Sand Fill	Filling of earth or any approved material after removing all garbage within the site and below the structure up to design ground level (approx. 0.5m above the existing road level in front of site) in layers including watering, ramming and consolidation of sub grade in layers at OMC to required dry density including filling the depressions which occurred during the process using vibratory rollers all complete as per instruction of Engineer-In-charge	517	33695	17420315.00

Sl. No.	Items	Description of Items	Unit Rate	Total Quantity	Total Amount (INR) in Figures
2.6	Dewatering	Make all necessary arrangement for dewatering of site if required and make site condition good for construction	LS	LS	500000.00
3	**Buildings and Structures**				
3.1	Compost Plant				
3.1(a)	Excavation	Cutting and excavation down to the required level and shapes for the foundation. The work includes storage, levelling, compaction, slope formation, etc. all complete as specified in Tender Document.	120.47	1575	189740.25
3.1 (b)	Anti-termite	Anti termite treatment to back filling of the masonry foundation with chemical emulsion by admixing chloropyrofos emulsifiable concentrates (1% concentration) with water by weight at the rate of 7.5 Litres per sq. m. of the vertical surface of the vertical surface of the substructure for each side of the foundation.. The work shall be carried out as per specification described in 6.2.2. of code IS-6313 (part -II) 1981. (Mode of measurement will be vertical area treated.)	131	840	110040.00
3.1(c)	Sand filling	Filling in foundation or plinth by silver sand in layers not exceeding 150 mm as directed and consolidating the same by thorough saturation with water, ramming complete including the cost of supply of sand. (payment to be made on measurement of finished quantity)	98.524	393.75	38793.825
3.1 (d)	BFS	Single Brick Flat Soling of picked jhama bricks including ramming and dressing bed to proper level and filling joints with local sand.	377	12952.5	4883092.50
3.1(e)	PCC	Ordinary Cement concrete (mix 1:1.5:3) with graded stone chips (20 mm nominal size) excluding shuttering and reinforcement if any, in ground floor as per relevant IS codes. Pakur Variety	5389	164.063	884132.8125
3.1(f)	Foundation	Designing, providing & constructing Compost Pad area* with detail foundation design, R.C.C foundations, concrete works, DPC, etc all complete as per approved design.	6884	2816.36	19387787.82

Sl. No.	Items	Description of Items	Unit Rate	Total Quantity	Total Amount (INR) in Figures
	Concrete platform	Designing, providing & constructing Compost Pad area* (121m x 80m) with detail foundation design, with min 200 mm thick Impermeable reinforced cement concrete floor min M25 grade (as per approved drawing) and maintaining proper slope of 1.5% in transverse direction, earthworks, concrete works, masonry works, finishing works etc all complete.			
	R.C.C column	Designing, providing & constructing R.C.C column over concrete platform upto min height of 2m above top of concrete floor level as per approved drawing.			
3.1(k)	Back filling	Filling in foundation or plinth by silver sand in layers not exceeding 150 mm as directed and consolidating the same by thorough saturation with water, ramming complete including the cost of supply of sand. (payment to be made on measurement of finished quantity)	98.524	20222.3	1992381.39
3.1(j)	Brick Work below Compost Pad Area	Brick wall all around the compost plant area below compost pad slab.	6068	162	983016.00
3.1(g)	Steel (Foundation, beam, compost platform, column)	Reinforcement for reinforced concrete work in all sorts of structures including distribution bars, stirrups, binders etc initial straightening and removal of loose rust (if necessary), cutting to requisite length, hooking and bending to correct shape, placing in proper position and binding with 16 gauge black annealed wire at every intersection, complete as per drawing and direction. For works in foundation, basement and up to roof of ground floor/up to 4m	61.936	289459	17927935.72
		(i) Tor steel/Mild Steel			
		I. SAIL/ TATA/RINL			
3.1(h)	Tubular Truss	Designing, providing & constructing Steel/tubular truss including M.S Pipe, ISMB Column, Gusset Plate etc	70957	386.27	27408210.14
		Bolts connected steel column to concrete column	70982	34.92	2478842.28
3.1(g)	G.I & Fiber Glass Sheet	Designing, providing & constructing 0.8 mm thick G.I sheet (of approved make like Everest etc) at the roof top	947	9575.86	9068344.00

Sl. No.	Items	Description of Items	Unit Rate	Total Quantity	Total Amount (INR) in Figures
		Designing, providing & constructing min 1.6 mm fiber glass Sheet (of approved make etc) at the roof top	1042	2393.97	2494512.79
		Rectangular and Triangular side sheet	932	1169.56	1090026.19
3.1(i)	Brick Work at Compost Pad Area	Brick wall all around the compost plant area (2.0m height), etc all complete.	6293	220.866	1389909.74
3.1(l)	Plastering	Plaster (to wall, floor, ceiling etc.) with sand and cement mortar including rounding off or chamfering corners as directed and raking out joints including throating, nosing and drip course, scaffolding/staging where necessary (Ground floor).[Excluding cost of chipping over concrete surface] (i) With 1:6 cement mortar (b) 20 mm thick plaster	181	2539.95	459731.49
3.1 (m)	Painting	Applying Interior grade Acrylic Primer of approved quality and brand on plastered or concrete surface old or new surface to receive Distemper/ Acrylic emulsion paint including scraping and preparing the surface thoroughly, complete as per manufacturer's specification and as per direction of the EIC. (In Ground Floor) (b) Two Coats ii) Solvent based interior grade Acrylic Primer	53.03	2539.95	134693.71
3.1 (n)	Leachate Drain	Designing, providing & constructing R.C.C Leachate drains of Impermeable cement concrete including plaster, all complete over all around the compost pad area. This leachate should connect to leachate collection tank.	Calculated		1524860.43
3.1 (o)	Leachate Tank	Designing, providing & constructing R.C.C leachate collection sump (effective capacity min 12m^3) of with R.C.C slab cover at the top. Water proofing compound and epoxy paint is to be provided inside the tank. The R.C.C slab is to be provided with manhole of 1m x 1m, the manhole has to be covered with hinged steel gate in order to avoid the entry of rain water into the sump.	Calculated		113617.64
3.2	Material Recovery Facility				
3.2 (a)	Excavation	Cutting and excavation down to the required level and shapes for the foundation. The work includes storage, levelling, compaction, slope formation, etc. all complete as	120.47	233.479	28127.23019

Sl. No.	Items	Description of Items	Unit Rate	Total Quantity	Total Amount (INR) in Figures
		specified in Tender Document.			
3.2 (b)	Anti-termite	Anti termite treatment to back filling of the masonry foundation with chemical emulsion by admixing chloropyrofos emulsifiable concentrates (1% concentration) with water by weight at the rate of 7.5 Litres per sq. m. of the vertical surface of the vertical surface of the substructure for each side of the foundation.. The work shall be carried out as per specification described in 6.2.2. of code IS-6313 (part -II) 1981. (Mode of measurement will be vertical area treated.)	131	99.6178	13049.92656
3.2 (c)	Sandfilling	Filling in foundation or plinth by silver sand in layers not exceeding 150 mm as directed and consolidating the same by thorough saturation with water, ramming complete including the cost of supply of sand. (payment to be made on measurement of finished quantity)	98.524	46.6958	4600.659462
3.2 (d)	BFS	Single Brick Flat Soling of picked jhama bricks including ramming and dressing bed to proper level and filling joints with local sand.	377	1287.67	485452.6268
3.2 (e)	PCC	Ordinary Cement concrete (mix 1:1.5:3) with graded stone chips (20 mm nominal size) excluding shuttering and reinforcement if any, in ground floor as per relevant IS codes. Pakur Variety	5389	19.4566	104851.5837
3.2 (f)	Foundation	Designing, providing & constructing Compost Pad area* with detail foundation design, R.C.C foundations, concrete works, DPC, etc all complete as per approved design.	6884	287.092	1976338.52
	Concrete platform	Designing, providing & constructing Compost Pad area* (121m x 80m) with detail foundation design, with min 200 mm thick Impermeable reinforced cement concrete floor min M25 grade (as per approved drawing) and maintaining proper slope of 1.5% in transverse direction, earthworks, concrete works, masonry works, finishing works etc all complete.			
	R.C.C column	Designing, providing & constructing R.C.C column over concrete platform upto min height of 2m above top of concrete floor level as per approved drawing.			

Sl. No.	Items	Description of Items	Unit Rate	Total Quantity	Total Amount (INR) in Figures
3.2 (k)	Back filling	Filling in foundation or plinth by silver sand in layers not exceeding 150 mm as directed and consolidating the same by thorough saturation with water, ramming complete including the cost of supply of sand. (payment to be made on measurement of finished quantity)	98.524	4.33111	426.72
3.2 (j)	Brick Work below Compost Pad Area	Brick wall all around the compost plant area below compost pad slab.	6068	40.7527	247287.5
3.2 (g)	Steel (Foundation, beam, compost platform, column)	Reinforcement for reinforced concrete work in all sorts of structures including distribution bars, stirrups, binders etc initial straightening and removal of loose rust (if necessary), cutting to requisite length, hooking and bending to correct shape, placing in proper position and binding with 16 gauge black annealed wire at every intersection, complete as per drawing and direction. For works in foundation, basement and up to roof of ground floor/up to 4m	61.936	29664.7	1837312.69
		(i) Tor steel/Mild Steel			
		I. SAIL/ TATA/RINL			
3.1(h)	Tubular Truss	Designing, providing & constructing Steel/tubular truss including M.S Pipe, ISMB Column, Gusset Plate etc	70957	40.64	2883517.70
		Bolts connected steel column to concrete column	70982	4.14	293972.28
3.1(g)	G.I & Fiber Glass Sheet	Designing, providing & constructing 0.8 mm thick G.I sheet (of approved make like Everest etc) at the roof top	947	913.46	865051.04
		Designing, providing & constructing min 1.6 mm fiber glass Sheet (of approved make etc) at the roof top	1042	228.37	237957.55
		Rectangular and Triangular side sheet	932	286.778	267277.47
3.2 (i)	Brick Work at Compost Pad Area	Brick wall all around the compost plant area (2.0m height), etc all complete.	6293	54.5785	343462.23

Sl. No.	Items	Description of Items	Unit Rate	Total Quantity	Total Amount (INR) in Figures
3.2 (l)	Plastering	Plaster (to wall, floor, ceiling etc.) with sand and cement mortar including rounding off or chamfering corners as directed and raking out joints including throating, nosing and drip course, scaffolding/staging where necessary (Ground floor).[Excluding cost of chipping over concrete surface] (i) With 1:6 cement mortar (b) 20 mm thick plaster	181	536.004	97016.71
3.2 (m)	Painting	Applying Interior grade Acrylic Primer of approved quality and brand on plastered or concrete surface old or new surface to receive Distemper/ Acrylic emulsion paint including scraping and preparing the surface thoroughly, complete as per manufacturer's specification and as per direction of the EIC. (In Ground Floor) (b) Two Coats ii) Solvent based interior grade Acrylic Primer	53.03	536.004	28424.29
3.2 (n)	Leachate Drain	Designing, providing & constructing R.C.C Leachate drains of Impermeable cement concrete including plaster, all complete over all around the compost pad area. This leachate should connect to leachate collection tank.	Calculated		391042.31
3.3	Administrative building (Annexure – 12)	Designing, providing & constructing Administrative building cum workshop (14.25m x 8.5m c to c) which have office for plant manager 3.25 m x 3.25 m, engineer room 4.0 m x 3.25 m, store room 7.25m × 4.25m, clerk office 2.5 m x 2.0 m, lab 7.25 m x 4.25 m, conference hall 4.0mx 3.25 m, staircase, toilet 3.25 m x 3.25 m and workshop 5.0 m x 4.75 m with including earthworks, sand filling, foundations, concrete works, masonry works, anti-termite treatment, DPC, Roof treatment, Finishing works, fittings, plumbing, drainage, HVAC, painting etc. all complete.	Calculated		2999353.92
3.4	Weighbridge Cabin & Weighbridge Foundation (Annexure – 14)	Designing, providing & constructing Weigh bridge cabin, internal dimension should be 3.5 m X 2 m and 'Designing providing & constructing Weighbridge foundation and cabin including earthworks, sand filling foundations, concrete works, anti-termite treatment, DPC, Roof treatment, masonry works, finishing works, fittings, earthing, plumbing, painting etc. all complete	Calculated		733832.91
3.4	Guard Room (Annexure – 13)	Designing, providing & constructing Guard room of internal dimension should be 3.75 m X 3.25 m including earthworks, sand filling foundations, concrete works, masonry works, anti-termite treatment, DPC, Roof treatment, finishing works,	Calculated		322265.81

Sl. No.	Items	Description of Items	Unit Rate	Total Quantity	Total Amount (INR) in Figures
		fittings, painting etc all complete.			
3.5	Panel Room & D.G Room (Annexure – 17)	Panel Room (6m × 5m) - Designing, providing & constructing Pump house including earthworks, foundations, concrete works, masonry works, finishing works, fittings, plumbing, drainage, etc. all complete as specified in Tender Document.	Calculated		520992.79
3.6	Godown (Annexure – 16)	Godown (18m × 12m) - Designing, providing & constructing Pump house including earthworks, foundations, concrete works, masonry works, finishing works, fittings, plumbing, drainage, etc. all complete as specified in Tender Document.	Calculated		1943928.54
4	**Infrastructure**				
4.1	Road and Pavements including Parking Area	Design & Construction of Roads and Pavements for both flexible pavement and rigid pavement as per IRC applied for all the internal roads, parking area, connection with the existing road in front of entrance, etc. including earthworks, sand filling, sub-base, base course, wearing course, shoulders, barriers, road signs, road marking, etc. as per approved drawing.	Calculated		2800010.69
	(Annexure – 18)	Construction of Paved covered parking area of required size (250 m2 for Compost plant vehicle), including earthworks, sand filling sub-base, base course, wearing course, etc. as per approved drawing.			
4.2	Water Supply	Necessary approval, Designing & Construction of water supply system for the facility including connection, storage tank, piping, valves, pumps, etc. as required. As per necessary approval.	LS		800000.00
4.3	Sewarage	Necessary approval, Designing & Construction of sewage system for the facility including connection, storage tank, piping, valves, pumps, etc. as required. As per necessary approval.	LS		1000000.00
4.4	Storm Water Drain (Annexure – 22)	Construction of storm water drainage system in the site to drain and discharge the surface water to the existing drains out of the site, including earthworks, P.C.C, Brick wall, piping, open ditches and gutters, catch basin, etc. as required.	Calculated		2586209.30

Sl. No.	Items	Description of Items	Unit Rate	Total Quantity	Total Amount (INR) in Figures
4.5	Power Supply	Provision of Electricity connection, necessary approval, for permanent connection for electricity board including connection charges, earthworks, cabling, inspection chambers, fittings, equipment, devices, etc. all complete.		LS	500000.00
4.6	Lighting Works	Design & Construction of indoor and outdoor lighting facilities (Average Level of Illumination on Road Surface should be 4 Lux) all over the site and with in all structures (Compost Plant, Material Recovery Facility, Admin building, workshop, Panel Room, Guard Room, Parking etc) including earthworks, foundations, lighting post, lights, switchboard, etc all complete.		LS	1500000.00
4.8	Boundary Walls and Gate	Design & Construct Boundary wall (approx. 670 m) all around the plant site upto 2.0m height above design ground level with R.C.C pillar at every 3.0 m and expansion joint at 12-15 m. Including earthworks, sand filling foundations, masonry works, anti-termite treatment, DPC, steel works, finishing works, boundary stones, name plate, fittings, plaster etc. all complete.		Calculated	8053674.52
		Contractor has to supply and install 2 nos. of sliding gate of 6m width.			
	(Annexure – 24)				
4.9	Buffer Zone and Landscaping	Development of Green Belt including providing, sowing and maintaining (for whole time limit of contract) small flowering non flowering plants, big trees on peripheral area, lawns including cost of plants, trees, lawns, necessary excavation for sowing, fertilizer, manure, watering, insecticide, etc. As per list of plants approved by Engineer-In-charge.	688	245	168560.00
4.1	Consent from WBPCB	Consent to establish from WBPCB. Contractor has to prepare all documents and apply to WBPCB with required fees for consent to establish on behalf of KMDA/Municipality.		LS	50000.00
5	**Mechanical Works and Equipment**				
5.1	Equipment Material Recovery Facility			LS	

Sl. No.	Items	Description of Items	Unit Rate	Total Quantity	Total Amount (INR) in Figures
a)	Pushcart with 4 nos. of 50 lit bins	As per Standard Specifications approved by Engineer-In- Charge	15000	3	45000.00
5.2	Equipments at Compost Plant				
a)	Waste receiving platform				
1)	Pushcart with 4 nos. of 50 lit bins	As per Standard Specifications approved by Engineer-In- Charge	15000	3	45000.00
b)	Quality Control cum Packing Section				
1)	Bag Stitching Machine	As per Standard Specifications approved by Engineer-In- Charge	Nos.	1	5000.00
2)	Weighing Scale	As per Standard Specifications approved by Engineer-In- Charge	Nos.	1	5000.00
3)	Wheel Barrow	As per Standard Specifications approved by Engineer-In- Charge	5000	6	30000.00
4)	Moisture Probe with Digital Indicator	As per Standard Specifications approved by Engineer-In- Charge	Nos.	1	1000.00
5)	Temperature Probe with Digital Indicator	As per Standard Specifications approved by Engineer-In- Charge	Nos.	1	1000.00
5.3	Weighbridge				
1)	Weighbridge	Supplying and Installing fully electronic weigh bridge of Pit-less type with digital indicator of 40 MT capacity with testing erection alignment and presenting the same to the weight & measures department for verification and stamping including design, fabrication including all civil works Measuring method : Loading cell method, Maximum load : 40t, Minimum load : 10kg, Size of Loading area : 3m x 8m	Nos.	1	1350000.00

Sl. No.	Items	Description of Items	Unit Rate	Total Quantity	Total Amount (INR) in Figures
2)	Indicator	Digital indicator	Nos.	1	10000.00
3)	Desktop Computer	Processor : Core i3, Memory : 1GB, HDD : 512 GB, Display : SAMSUNG 17" LCD Color Monitor, Optical Device , DVD--RW, Operating System : Pre-Installed Windows 7 with License, Operating soft ware	Nos.	1	25000.00
4)	Dot Matrix Printer (EPSON)	Pins-9, 337cps (High speed draft 12cpi), 64kb input buffer, USB interface and copy facility (1 original & 4 duplicate)	Nos.	1	15000.00
5)	Furniture	1 office tables (1.5m x 0.6m), 1 Nos. Normal Chair	Nos.	1	8000.00
5.4	Administration Building				
1)	Desktop Computer	Processor : Core i3, Memory : 1GB, HDD : 512 GB, Display : SAMSUNG 17" LCD Color Monitor, Optical Device , DVD--RW, Operating System : Pre-Installed Windows 7 with License, Operating soft ware	Nos.	2	50000.00
2)	Laser Printer cum Scanner cum Copy Machine	Paper Size : A4 (Black), Resolution : 600 x 600 dpi (for print), 600x400 dpi (for Xerox), 1200dpi (for scan), Memory : 16 MB RAM, Xerox zoom facility 30% to 400% and scan output facility in pdf, tiff, bmp jpg, gif format.	Nos.	1	40000.00
3)	Furniture	2 nos. of Cupboard, 3 office tables (1.5m x 0.6m), 12 nos. of Executive chair, 6 Nos. Normal Chair, Meeting table – 4 m x 1.5 m .	Set	1	300000.00
4)	Laboratory Equipment	Laboratory must be well equipped with Furniture and all necessary provision for monitoring of the process, as oven, muffle furnace, balance, different chemicals required for testing of NPK value of manure, glassware etc. (Contractor will provided list of equipments for approval before procurement)	Set	1	120000.00
5.5	Workshop				
1)	Maintenance Tools	As per Standard Specifications approved by Engineer-In- Charge	Set	1	20000.00
5.6	Guardhouse				

SL No.	Items	Description of Items	Unit Rate	Total Quantity	Total Amount (INR) in Figures
1)	Hand light	As per Standard Specifications approved by Engineer-In- Charge	Nos.	2	1000.00
2)	Furniture	1 No tables (1.5m x 0.6m), 2 Nos. Normal Chair.	Set	1	5000.00
5.7	D.G of capacity (100 KV)	Supply & Delivery D.G of capacity (100 KVA). As per Standard Specifications approved by Engineer-In- Charge	Nos.	1	850000.00
5.8	Transformer (150KVA)	Supply, Delivery, installation, testing and commissioning of 150KVA, 11/0.433 KV substation including allied HT works. As per Standard Specifications approved by Engineer-In- Charge	Nos.	1	1000000.00
5.9	Sign Board	Construction and erection of permanent sign board 10'x 6' with M.S framework as approved by Engineer-In- Charge	Nos.	1	50000.00
5.1	Project 3D Scale model	Construction project 3D model of size mentioned in Technical Specification and as approved by Engineer-In- Charge	Nos.	1	50000.00
		Grand Total			**150,144,581.26**

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SD & SWM KMDA

Superintending Engineer,
Planning Circle, SD & SWM Sector
K M D A

Table 9-4: Construction Cost of Phase-1 of Sanitary Landfill

Sl. No.	Description of Items	Cost of Items
1	**Preliminaries**	
1.1	Conduct Topographical Survey for the sites to recognize the current condition of the sites for detail design	100000.00
1.2	Conduct Geotechnical Survey (4 nos. of boreholes) for the sites to recognize the soil condition for the detail design and Prepare Detail Design on the basis of topographical and Geotechnical survey.	300000.00
2	**Land Preparation**	
2.1	Shifting of utilities in form of electric lines, telephone line etc. from the site and below all the structures and dispose the same as per instruction of Engineer in charge.	250000.00
2.2	Cleaning- Removing obstructions like large size trees, grass, hutments, boundary wall etc and disposing the as per instruction of Engineer in charge.	154605.00
2.3	Dewatering- Make all necessary arrangement for dewatering of site if required and make site condition good for construction	500000.00
2.4	Bamboo sheet pilling	655350.00
2.5	Site filling upto design level which is 0.5mt from the existing road level	2326500.00
3	**Sanitary Landfill**	
3.1	**Excavation** - Cutting and excavation down to the required level and shapes for the site including landfill area. The work includes storage, levelling, compaction, slope formation, etc. all complete as specified in Tender Document.	266200.99
3.2	**Construction of Embankment** - Construction of Embankment as per tender drawing. The work includes haulage from the storage, levelling, compaction in layers, slope formation, testing, etc. all complete as specified in Tender Document.	13115013.12
3.3	**Designing, Providing & Constructing Liner System** - Supplying and Laying 900mm clay or amended soil of permeability 1x 10-7 cm/sec in accordance with MSW Rules 2000, all complete and approved by Tender Accepting Authority	2738061.00

Sl. No.	Description of Items	Cost of Items
3.4	**Supplying and Laying 400 GSM Non Woven Geo-textile** or Equivalent. Laying beneath the HDPE Geo- membrane at the base and in one layer beneath the HDPE Geo-membrane on the slopes, as shown in the drawing. Geo-textile shall be Standard Make and approved by the Tender Accepting Authority.	1575000.00
3.5	**Supplying and Laying 1.5mm HDPE Geo-membrane** including Anchoring at top Approved by the Tender Accepting Authority	3525000.00
3.6	**Supplying and Laying 400 GSM Non Woven Geo-textile** or Equivalent. Laying beneath the HDPE Geo-membrane at the base and in one layer beneath the HDPE Geo-membrane on the slopes, as shown in the drawing. Geo-textile shall be Standard Make and approved by the Tender Accepting Authority.	1575000.00
3.7	**Drainage Layer** - Designing, providing & constructing 300 mm thick granular drainage layer at the bottom of landfill area. The size of the metal stone for drainage layer is of 30-50mm diameter. All complete as specified in Tender Document.	4116758.40
3.8	**Leachate Collection System** - Designing, providing & constructing leachate collection system for sanitary landfill area including 300mm dia main pipe and 200mm dia branch perforated HDPE pipes surrounded with gravel or crushed stone, connection pits, collection pit, leachate collection and conduction pipe, protection, etc. as required. All complete as specified in Tender Document and the Basic Design Report.	2090000.00
3.9	**RCC road for Ramp** 5mt Wide	1078902.00
4	**Leachate Collection Sump** - Designing, providing & constructing receiving sump pit made of RCC to receive leachate from the Landfill. The work includes excavation, concrete works, waterproofing, etc. all complete as specified in Tender Document and the Basic Design Report.	842149.13
5	**Gas Removal System** - Designing, providing & constructing gas collection system for sanitary landfill area including gas vent pipes of perforated U-PVC pipe surrounded with circular gabion filled with crushed stones, provisions for extension required during operation, etc. all complete as specified in Tender Document and the Basic Design Report.	280865.00
6	**Car Wash Pool (Annexure - 15)** - Designing, providing & constructing Car Wash facility including earthworks, foundations, concrete platform, finishing works, plumbing, drainage with high pressure jet water type motors with accessory: one nozzle, etc all complete as specified in Tender Document	814116.04

Sl. No.	Description of Items	Cost of Items
7	**Road (Annexure - 19)**- Design & Construction of Roads and Pavements for both flexible pavement and rigid pavement as per IRC applied for all the internal roads, parking area, connection with the existing road in front of entrance, etc. including earthworks, sand filling, sub-base, base course, wearing course, shoulders, barriers, road signs, road marking, etc. as per approved drawing.	2287420.02
8	**Equipment Storage (20m × 8m)** - Designing, providing & constructing Equipment Storage rooms of size as per tender drawing for bulldozer, wheel loader, excavator, including earthworks, foundations, concrete works, masonry works, structural frame, roof shed, finishing works etc. all complete as specified in Tender Document.	
9	**Substation cum Pump House (Annexure - 17)** - Designing, providing & constructing Pump house including earthworks, foundations, concrete works, masonry works, finishing works, fittings, electrical works, plumbing, drainage, HVAC, furniture, etc. all complete as specified in Tender Document.	520992.79
10	**Aerated lagoon (Annexure - 20)** - Earth work excavation, construction of embankment, P.C.C, H.D.P.E, inspection road etc.	2089549.30
11	**Sedimentation pond(Annexure - 21)**- Earth work excavation, construction of embankment, P.C.C, H.D.P.E, inspection road etc.	1048618.00
12	**Design & Construct Boundary wall (approx. 485 m) (Annexure - 25)** all around the plant site up to 2.0m height above design ground level and 3.0 m below design ground level with R.C.C pillar at every 3.0 m and expansion joint at 12-15 m. Including earthworks, sand filling foundations, masonry works, anti-termite treatment, DPC, steel works, finishing works, boundary stones, name plate, fittings, plaster etc. all complete. Contractor has to supply and install 2 nos. of sliding gate of 6m width.	7732919.09
13	**Monitoring Well** 4 nos. - As per Standard Specifications approved by Engineer-In- Charge	100000.00
14	Providing **Grass turfing** at the outer slope of the embankment.	30960.00
15	Procurement & Supply of 20mm thick **Steel Plate** of size 3m x 1.5 m - 40 Nos.- this is for movement of vehicles inside landfill during monsoon period at the time of landfill operation.	1695600.00
16	**Consent from WBPCB** - Consent to establish from WBPCB. Contractor has to prepare all documents and apply to WBPCB with required fees for consent to establish on behalf of KMDA/Municipality.	50000.00
17	**Green Belt**	214656.00
18	**Electric lighting inside plant**	1000000.00

Sl. No.	Description of Items	Cost of Items
19	**Guard Room (Annexure - 13)**- Designing, providing & constructing Guard room of internal dimension should be 3.75 m X 3.25 m including earthworks, sand filling foundations, concrete works, masonry works, anti-termite treatment, DPC, Roof treatment, finishing works, fittings, painting etc all complete.	322265.81
20	**Construction of storm water drainage (Annexure - 23)**- system in the site to drain and discharge the surface water to the existing drains out of the site, including earthworks, P.C.C, Brick wall, piping, open ditches and gutters, catch basin, etc. as required.	2214545.00
21	6 nos. Aerators for aerated lagoon including supply & complete	600000.00
22	Supply, Delivery, installation, testing & commissioning of 5HP submersible pump 4nos.(3 working & 1 standby) all complete	500000.00
23	Steel pipes 4mt length each pipe 4nos. Required	200000.00
24	Supply, Delivery, installation, testing & commissioningof 63 KVA Transformer, 11/0.433 KV substation including allied HT works	900000.00
25	Supply & Delivery of D.G of capacity (63 KVA)	550000.00
26	Water supply system	800000.00
27	Sign Board- Construction and erection of permanent sign board 10'x 6' with M.S framework as approved by Engineer-In- Charge	100000.00
28	**Guardhouse**	
28.1	Hand light- As per Standard Specifications approved by Engineer-In- Charge	1000.00
28.2	Furniture- 1 No tables (1.5m x 0.6m), 2 Nos. Normal Chair.	6000.00
	Total	**59,268,046.69**

Executive Engineer
Plng. Divn. & KSWMIP
SD & SWM KMDA

Superintending Engineer,
Planning Circle, SD & SWM Sector
K M D A

Table 9-5: Construction Cost of Phase-2 of Sanitary Landfill

Sl. No.	Description of Items	Cost of Items
1	Preliminaries	
1.1	Conduct Topographical Survey for the sites to recognize the current condition of the sites for detail design	100000.00
1.2	Conduct Geotechnical Survey (4 nos of boreholes) for the sites to recognize the soil condition for the detail design and Prepare Detail Design on the basis of topographical and Geotechnical survey.	300000.00
2	Land Preparation	
2.1	Cleaning- Removing obstructions like large size trees, grass, hutments, boundary wall etc and disposing the as per instruction of Engineer in charge.	170065.50
2.3	Dewatering -Make all necessary arrangement for dewatering of site if required and make site condition good for construction	550000.00
2.4	Bamboo sheet pilling	720885.00
3	Sanitary Landfill	
3.1	Excavation - Cutting and excavation down to the required level and shapes for the site including landfill area. The work includes storage, levelling, compaction, slope formation, etc. all complete as specified in Tender Document.	292821.09
3.2	Construction of Embankment - Construction of Embankment as per tender drawing. The work includes haulage from the storage, levelling, compaction in layers, slope formation, testing, etc. all complete as specified in Tender Document.	14426514.43
3.3	Designing, Providing & Constructing Liner System - Supplying and Laying 900mm clay or amended soil of permeability 1x 10-7 cm/sec in accordance with MSW Rules 2000, all complete and approved by Tender Accepting Authority	3011867.10
3.4	Supplying and Laying 400 GSM Non Woven Geo-textile or Equivalent. Laying beneath the HDPE Geo- membrane at the base and in one layer beneath the HDPE Geo-membrane on the slopes, as shown in the drawing. Geo-textile shall be Standard Make and approved by the Tender Accepting Authority.	1732500.00
3.5	Supplying and Laying 1.5mm HDPE Geo-membrane including Anchoring at top Approved by the Tender Accepting Authority	3877500.00
3.6	Supplying and Laying 400 GSM Non Woven Geo-textile or Equivalent. Laying beneath the HDPE Geo- membrane at the base and in one layer beneath the HDPE Geo-membrane on the slopes, as shown in the drawing. Geo-textile shall be Standard Make and approved by the Tender Accepting Authority.	1732500.00

Sl. No.	Description of Items	Cost of Items
3.7	Drainage Layer - Designing, providing & constructing 300 mm thick granular drainage layer at the bottom of landfill area. The size of the metal stone for drainage layer is of 30-50mm diameter. All complete as specified in Tender Document.	4528434.24
3.8	Leachate Collection System - Designing, providing & constructing leachate collection system for sanitary landfill area including 300mm dia main pipe and 200mm dia branch perforated HDPE pipes surrounded with gravel or crushed stone, connection pits, collection pit, leachate collection and conduction pipe, protection, etc. as required. All complete as specified in Tender Document and the Basic Design Report.	2299000.00
3.9	RCC road for Ramp 5mt Wide	1078902.00
4	Gas Removal System - Designing, providing & constructing gas collection system for sanitary landfill area including gas vent pipes of perforated U-PVC pipe surrounded with circular gabion filled with crushed stones, provisions for extension required during operation, etc. all complete as specified in Tender Document and the Basic Design Report.	308951.50
5	Road- Design & Construction of Roads and Pavements for both flexible pavement and rigid pavement as per IRC applied for all the internal roads, parking area, connection with the existing road in front of entrance, etc. including earthworks, sand filling, sub-base, base course, wearing course, shoulders, barriers, road signs, road marking, etc. as per approved drawing.	2516162.02
6	Design & Construct Boundary wall all around the plant site up to 2.0m height above design ground level and 3.0 m below design ground level with R.C.C pillar at every 3.0 m and expansion joint at 12-15 m. Including earthworks, sand filling foundations, masonry works, anti-termite treatment, DPC, steel works, finishing works, boundary stones, name plate, fittings, plaster etc. all complete. Contractor has to supply and install 2 nos of sliding gate of 6m width.	7732919.09
7	Providing Grass turfing at the outer slope of the embankment.	34056.00
8	Green Belt	236121.60
9	Electric lighting inside plant	800000.00
10	Construction of storm water drainage system in the site to drain and discharge the surface water to the existing drains out of the site, including earthworks, P.C.C, Brickwall, piping, open ditches and gutters, catch basin, etc. as required.	2435999.50
	Total	**48,885,199.07**

Table 9-6: Vehicle Cost for Compost Plant

Compost Plant Operation Vehicle				
Sl No.	**Vehicle Type**	**Number**	**Unit Rate**	**Total Cost**
1	Loader cum Backhoe	2	2500000	5,000,000.00
2	Tractor attached loader	3	1450000	4,350,000.00
3	Water tanker with slurry pump	1	300000	300,000.00
4	Tractor	1	700000	700,000.00
5	Tipping trolley	4	180000	720,000.00
6	Dumper 6 m^3	1	1400000	1,400,000.00
	Total			**12,470,000.00**

Table 9-7: Vehicle Cost for Landfill Processing

Landfill Operation Vehicle				
Sl. No.	**Vehicle Type**	**Number**	**Unit Rate**	**Total Cost**
1	Buldozer	1	10000000	10,000,000.00
2	Excavator	1	4864000	4,864,000.00
3	Loader cum Backhoe	1	2500000	2,500,000.00
4	Dumper 10 m^3	1	2500000	2,500,000.00
	Total			**19,864,000.00**

Executive Engineer
Plng. Divn. & KSWMIP
SD & SWM KMDA

Superintending Engineer,
Planning Circle, SD & SWM Sector
K.M.D.A

Chief Engineer & In Charge
Sanitation & S.W.M.
Water & Sanitation Sector
K.M.D.A

Summary of Total Project Cost

Estimated Cost for SWM System	
A. Collection System	
A.1 Procurement of vehicles for Primary Collection & Secondary Transportation	87,120,322.89
A.2 Procurement PP Equipments for primary collection	914,590.00
B. Processing Plant	
B.1 Construction of Processing Plant & Material Recovery Facility	150,144,581.26
B.2 Procurement of Machineries for the plant	30,000,000.00
B.3 Procurement of vehicles for Operation of the plants	12,470,000.00
C. Sanitary Landfill	
C.1 Construction of Sanitary Landfill Phase-1	59,268,046.69
C.2 Construction of Sanitary Landfill Phase-2	48,885,199.07
C.3 Procurement of Vehicles for Operation of the landfill	19,864,000.00
D. Social Awareness Program (Per Year)	**10,000,000.00**
E. One year O&M of CP & SLF	**20,400,000.00**
Sub Total	**439,066,739.91**
Contingency – 3%	**13,172,002.20**
Total	**452,238,742.11**

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SD & SWM KMDA

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K M D A

Chief Engineer-in-Charge
Sanitation & S.W.M.
Water & Sanitation Sector
K. M. D. A.

CHAPTER 10 OPERATION AND MAINTENANCE ARRANGEMENT AND COST

10.1 O&M ARRANGMENTS

SWM will be under a separate department in the Panihati Municipality. It is considered as emergency department and round the year service shall be rendered. There Asst. Engineers will be in charge of

- Landfill Site Manager
- Waste Processing Unit Manger
- City Conservancy service Manger.

They will be supported by Sub-Assistant Engineerand Sanitary Inspector. Other category staff shall be placed according to the necessity from manpower strength. Monitoring cell headed CEO and City Manager will daily monitor S.W.M. Services for the ULB and will prepare reports in the report format (Daily/Monthly/Quarterly/Annually) and publish annual administrative report along with preparation of draft SWM budget & Schedule of fees and charges.

10.1.1 Monitoring Cell as Sanitation Cell

Maintaining the sanitary condition of a town is one of the crucial aspects of sanitation apart from creating basic infrastructure. A successful operation requires a threefold attention for all the time as noted below.

A Strong 'Sanitation Cell' in the ULB comprising of.

- Municipal commissioner/ CEO;
- Environmental Engineer with his team sanitary Supervisory engineers;
- Municipal Health officer with his team of health inspectors and sanitary workers;
- Ward wise sanitary inspectors and general sanitary inspectors;
- A sub-cell of monitoring and grievance redressal system management professional team of at least 5 persons.

City Sanitation Task Force for taking monthly situation analysis on the city sanitation

- This task force shall take note of sanitation situation of the town once a month under chairmanship of Mayor/ Chairman of the ULB.

An informal body administering all day to day support in

- Awareness and Campaign;
- Indentifying the violators of sanitation rules;
- Institutional support services from
    - State Govt.

- Civil Societies
- Local NGOs
- Elected representatives
- Urban departments of the State Govt.
- National Govt. (CPCB, CPHEEO)

District Magistrate or his representative shall sit quarterly with all the members and overview the sanitation situation. All dept shall provide all manpower & expertise with special assistance to sanitation and O& M where possible.

10.1.2 Annual Operation and Maintenance Cost

The objective of a good maintenance programme is to keep the system in a good operating condition so that it can function efficiently throughout its design life. Lack of maintenance can have health implications as well as cause damage to properties when things go wrong. It is important that the operation and maintenance personnel continuously monitor the condition of the sanitation system to ensure proper functioning thereof. Inspection and testing provide the means for the monitoring activity. *Table 10.1* shows cost for manpower for operation of vehicles and equipments.

Table 10-1: Cost Requirement of Manpower for Operation of Vehicles and Equipments

Sl No	Description of Equipments	Waste cum Sweeper Collector			Drivers			Helper		
		Nos.	Salary	Amount	Nos.	Salary	Amount	Nos.	Salary	Amount
1	Tricycle van with 6 nos. of 50 lit bins	142	7546	1071532						
2	Battery operated Auto Rickshaw	67	7546	505582						
3	Wheel barrow for Street Sweeping & drain cleaning -110 lit	189	7546	1426194						
4	Auto tipper	12			12	8301	99612	24	7546	181104
5	Movable compactor	2			2	9132	18264	4	8301	33204
6	Tractor	18			18	9132	164376	36	7546	271656
	Total	**430**		**3003308**	**32**		**282252**	**64**		**485964**

Table 10-2: Structure of Manpower of Plant

Sl No.	Position	Nos.	Salary	Amount
1	Supervisor	18	9132	164376
2	Sanitary Inspector	1	30000	30000
3	Health Officer	1	40000	40000
	Total			**234376**

Table 10-3: Operation & Maintenance Cost of Primary Collection Equipments & Vehicles

Sl No.	Description of Items	Equipment Numbers	Operation Cost	Total	Maintenance Cost	Total	O&M Cost
1	Tricycle van with 6 nos. of 50 lit bins	142	0	0	500	71000	71000
2	Battery operated Auto Rickshaw	67	3000	201000	1000	67000	268000
3	Auto tipper	12	13500	162000	1350	16200	178200
4	TT Container	110	0	0	800	88000	88000
5	Tractor	18	45000	810000	4500	81000	891000
6	Movable compactor	2	64800	129600	6480	12960	142560
7	Wheel barrow for Street Sweeping & drain cleaning -110 lit	189	0	0	200	37800	37800
	Total		**126300**	**1302600**	**14630**	**336160**	**1638760**

O & M cost of Primary Waste Collection

- **O & M Cost = 3,003,308+ 282,252+485,964+ 234,376+ 1,638,760 = 5,644,660per Month**

O & M cost of Processing Plant and Sanitary Landfill

Table 10-4: O&M Cost of Manpower of Plant

O & M cost of Compost Plant and Landfill				
Sl. No.	Position	Nos.	Salary	Amount
1	Plant Manager (Env. Engineer) - B.E	1	30,000	30,000
2	Assistant manager – Landfill	1	25,000	25,000
4	Supervisor – B.Sc.	4	16,000	64,000
5	Accountant --- B.Com	1	20,000	20,000
6	Chemist - B Sc	1	20,000	20,000

O & M cost of Compost Plant and Landfill				
Sl. No.	Position	Nos.	Salary	Amount
7	Weigh Bridge Operator - H.S.C	1	14,000	14,000
8	Mechanic – ITI	1	12,000	12,000
9	Tractor Driver	1	12,000	12,000
10	Tractor Attached Loader Driver	2	12,000	24,000
11	Dumper Driver	2	12,000	24,000
12	Loader Cum Backhoe Driver	1	12,000	12,000
13	Laborers	10	8,000	80,000
14	Excavator Driver	1	16,000	16,000
15	Dozer Driver	1	16,000	16,000
16	Loader Driver	1	12,000	12,000
17	Labourers	6	8,000	48,000
18	Rag pickers	8	8,000	64,000
19	Gardener	4	8,000	32,000
20	Security Guard	8	10,000	80,000
21	Electritian	1	15,000	15,000
	Total			**620,000**

Table 10-5: Operational Cost Analysis for Compost Plant and Sanitary Landfill

Sl. No.	Particulars	Amount (INR)
A	**Salary of Staff**	**620,000**
B	**Utilities, Consumables & Miscellaneous Supplies- per day**	
B.1	Fuel (Diesel)	482,400
B.2	Inoculants (Bio-culture)	20,000
B.3	Electricity - machine operation daily	150,000
	Utilities, Consumables & Miscellaneous Supplies Per Day	652,400
C	**Other Expenses**	
C.1	Repair and Maintenance of CP Machinery	50,000
C.2	Repair and Maintenance of SLF & CP Vehicles	60,000
C.3	Plant & Office Running Expenses	25,000
C.4	Marketing & Promotional Expenses	25,000
C.5	Insurance premium of the plant	10,000
C.6	Quality check of Compost & Chemical Testing of facilities of SLF	15,000

Sl. No.	Particulars	Amount (INR)
C.8	Miscellaneous	10,000
	Other Expenses Per Year	195,000
D	**TOTAL (A+B+C)**	**1,467,400**
E	**Contingency 3%**	**44,022**
F	**Contractors Profit - 15%**	**220,110**
TOTAL MONTHLY COST FOR OPERATION OF PLANTS		**1,731,532**

Table 10-6: Operational Monthly Expenditure

Sl. No.	O&M Cost (per month)	Amount (INR)
1	O & M cost of Primary collection and Secondary Transportation	5,644,660
2	O & M of Processing plant and Sanitary landfill	1,731,532
	Total (INR)	**7,376,192**

O & M Cost per month - **7,376,192.00 (INR)**

O & M Cost per year – **88,514,304.00 (INR)**

Escalation of O&M Cost per year after full utilization - 5.0%

Escalation Factor - 1.05

Table 10-7: Operation and Maintenance Charges calculation for 10 Years

Expenses	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
O&M cost for the project	88,514,304.00	92,940,019.20	97,587,020.16	102,466,371.17	107,589,689.73	112,969,174.21	118,617,632.92	124,548,514.57	130,775,940.30	137,314,737.31
Total O&M	88,514,304.00	92,940,019.20	97,587,020.16	102,466,371.17	107,589,689.73	112,969,174.21	118,617,632.92	124,548,514.57	130,775,940.30	137,314,737.31

10.1.3 Operation and Maintenance (O & M) Cost Recovery

To make the system of cleaning the whole city on regular basis, the residential as well as commercial waste collection method has to be implemented. To make system self-sustainable, there is requirement of revenue collection by selling out recyclable items (non-biodegradable) and biodegradable wastes and by collecting user charges.

10.1.3.1 Proposed User Charges for Sanitation Services

Table 10-8: Proposed user Charges for sanitation services

Sl. No	Items		Nos.	Unit Rate	Amount per month
1		Household	93371	30	2,801,130.00
2		Markets	17	200	3,400.00
3	Institution	Higher Secondary School	34	500	17,000.00
		Secondary School			
		Primary School	80	300	24,000.00
		Research Institute & Engg. College	7	1000	7,000.00
4		Restaurants & Hotel	34	500	17,000.00
5	Health Center	Hospital	2	800	1,600.00
		Nursing Home	7	1000	7,000.00
		Municipal Health Sub-center	40	100	4,000.00
		Others Health Center	10	100	1,000.00
6		Park Garden	20	300	6,000.00
7		Play Ground	14	300	4,200.00
8		Bank	15	300	4,500.00
9		Bus Terminus	4	200	800.00
10		Public Library	72	200	14,400.00
11		Auditorium	4	500	2,000.00
12		Cinema Hall	3	500	1,500.00
13		Ghat	10	200	2,000.00
Total (monthly)					**2,918,530.00**
Revenue from Proposed User Charges per annum					**35,022,360.00**

10.1.3.2 Revenue Generation from Recyclable Items

Table 10-9: Revenue Generation by Recyclable Items

Sl. no.	Parameter	AVERAGE % of each Parameter in Total quantity of Solid Waste (7 days)	Quantity in TPD (2019) 142	Unit rate per Ton	Total Amount	Amount Per Month
1	Metals	1.61%	2.3	10,000	22,862	685,860
2	Glass & Ceramics	6.33%	9.0	8,000	71,908.8	2,157,264
3	Leather	1.88%	2.7	7,000	18,687.2	560,616
Total (Monthly)						**3,403,740**
Revenue Generation by Recyclables Items per annum						**40,844,880**

10.1.3.3 Revenue Generation from Plant

Table 10-10: Revenue Generation by Biodegradable items

Sl. No.	Type	Unit Rate/Ton	Quantity (TPD)	Total Amount	Per Month	Per Annum
1	Compost	5000	15.0	75,000.00	2,250,000.00	27,000,000.00

Table 10-11: Total Revenue Generation

Sl. No.	Revenue Generation (per year)	Amount (INR) in Year
1	Revenue from Proposed User Charges	35,022,360.00
2	Revenue from selling out the recyclable items	40,844,880.00
3	Revenue from Compost	27,000,000.00
Total Revenue per annum (INR)		**102,867,240.00**

Total monthly Revenue generation = **8,572,270.00 (INR)**

Total yearly Revenue generation = **102,867,240.00 (INR)**

Escalation of Revenue after every 3years after full allocation - 12%

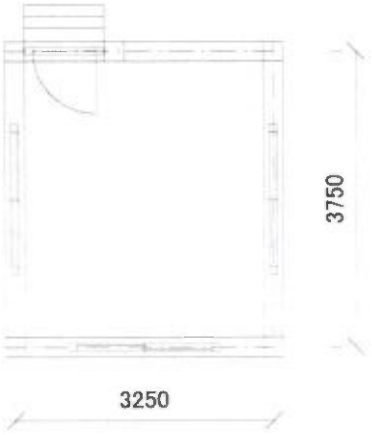
Escalation factor - 1.20

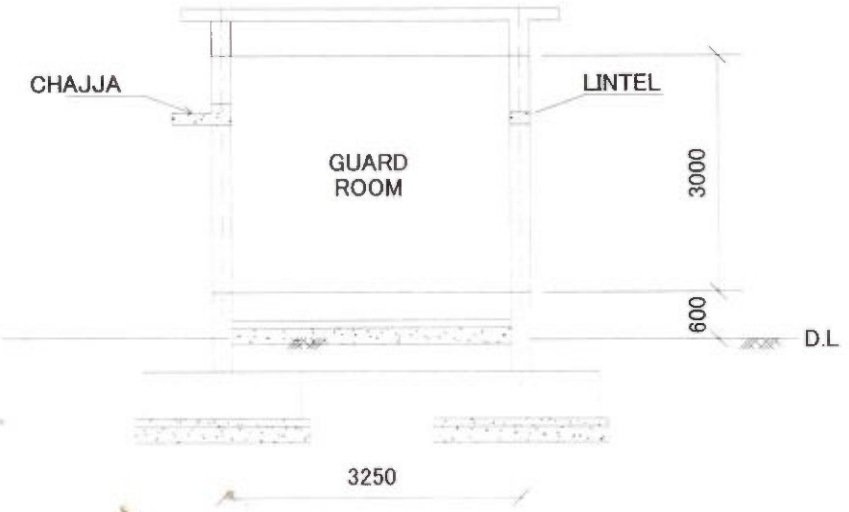
Table 10-12: Total Revenue Generation calculation for 10 years

Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
TOTAL REVENUE	55,444,800.00	89,367,240.00	102,867,240.00	102,867,240.00	102,867,240.00	123,440,688.00	123,440,688.00	123,440,688.00	148,128,825.60	148,128,825.60
Total Revenue	**55,444,800.00**	**89,367,240.00**	**102,867,240.00**	**102,867,240.00**	**102,867,240.00**	**123,440,688.00**	**123,440,688.00**	**123,440,688.00**	**148,128,825.60**	**148,128,825.60**

ANNEXURE

Annexure number	Description of Items
1	Typical detail of Guard Room
2	Typical weighbridge and weighbridge cabin details
3	Typical drawings of Workshop cum Administrative Building
4	Detail of Storm Water Drain of CP
5	Typical detail of Godown
6	Typical details of substation
7	Detail of Storm Water Drain of SLF
8	Typical section of Internal Road of CP & SLF
9	Details of Gate and Boundary Walls
10	Drawing of Panihati Processing Plant
11	Panihati sanitary landfill phase-1
12	Estimation of Admin Building
13	Estimation of Security Room
14	Estimation of Weighbridge Building
15	Estimation of Vehicle Wheel Wash
16	Estimation of Godown
17	Estimation of Substation
18	Estimation of Road of Compost Plant
19	Estimation of Road of SLF
20	Estimation of Aerated Lagoon
21	Estimation of Sedimentation Pond
22	Estimation of Drain of Compost Plant
23	Estimation of Drain of SLF
24	Estimation of Boundary Wall of Compost Plant
25	Estimation of Boundary Wall of SLF
26	Estimation of Leachate Tank of SLF
27	Door to door SWM Survey Sheet
28	Vegetable Market SWM Survey Sheet
29	Institutions SWM Survey Sheet
30	Hotel & Restaurants SWM Survey Sheet
31	Hospital Nursing Home SWM Survey Sheet





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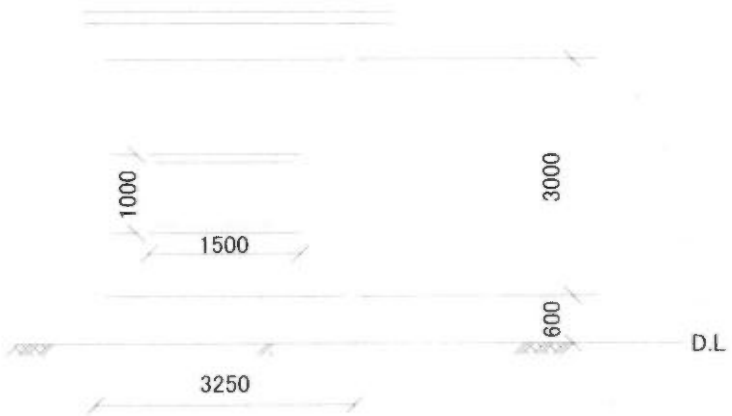


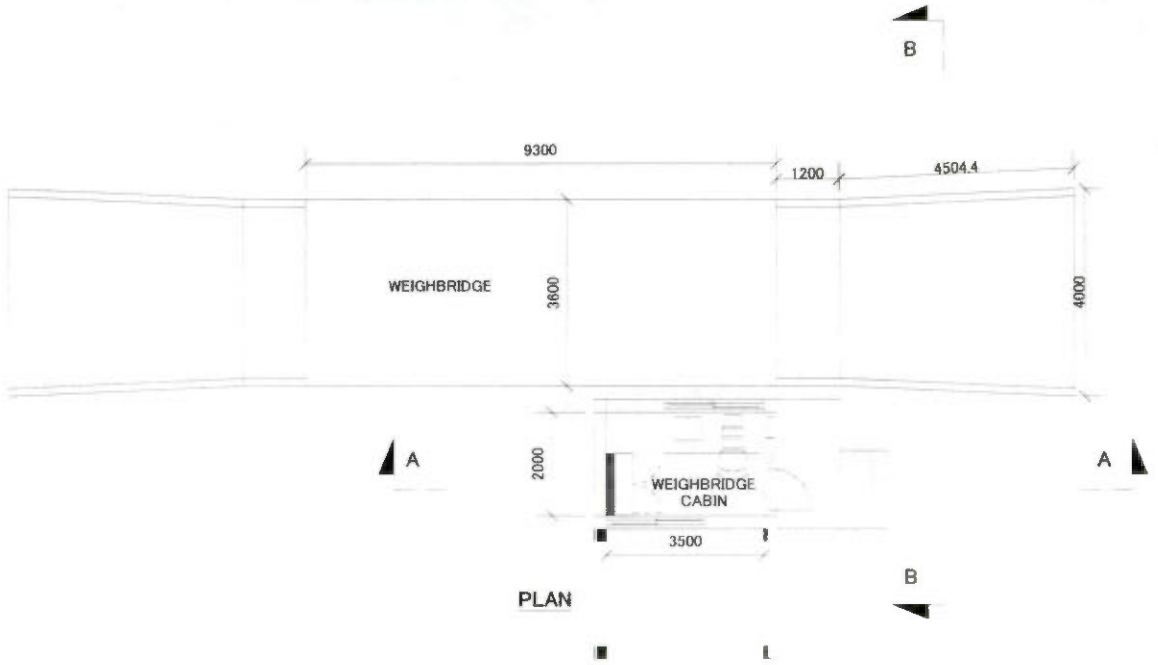
ELEVATION

PROJECT TITLE:
PANIHATI SWM PROJECT

DRAWING TITLE:
TYPICAL GUARD ROOM DETAILS

PREPARED BY:
ENVIRONMENTAL ENGINEERING SERVICES

DWG NO P-1



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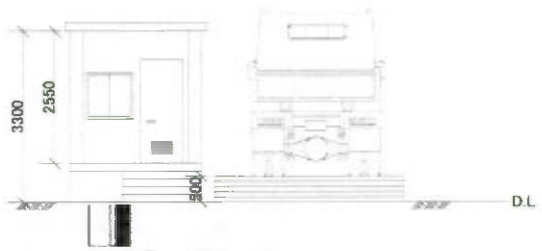

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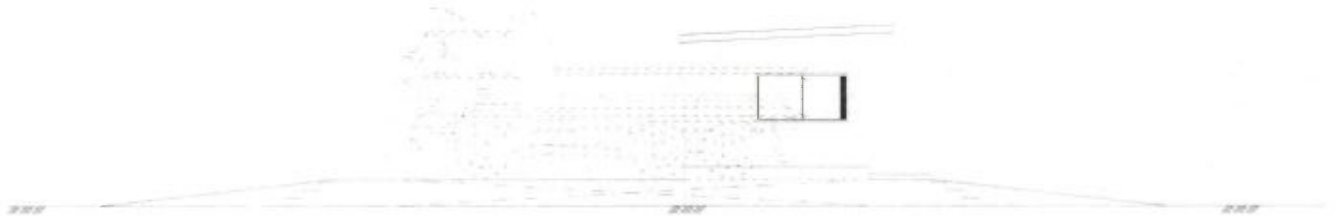


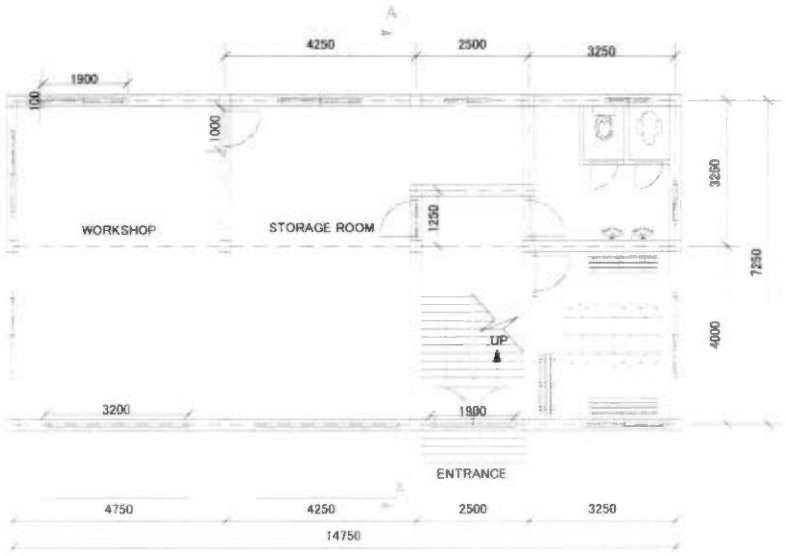
SECTION A-A

PROJECT TITLE:
PANIHATI SWM PROJECT

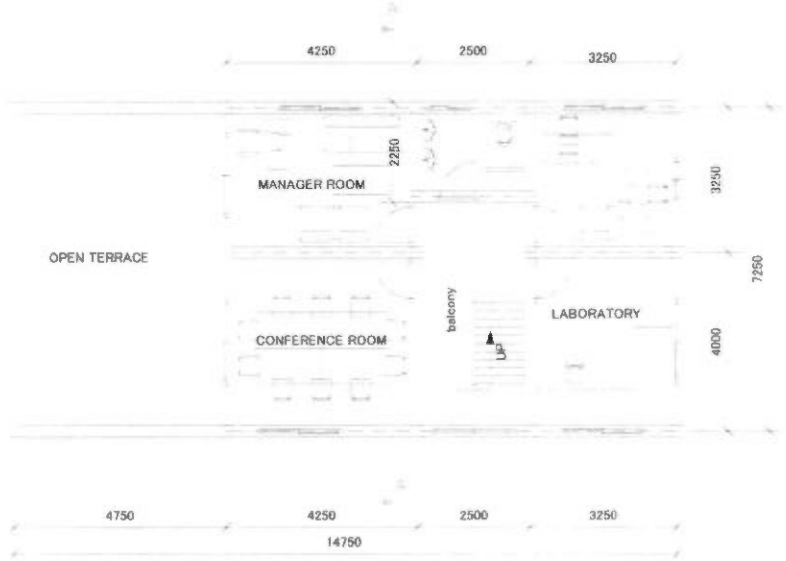
DRAWING TITLE:
TYPICAL WEIGHBRIDGE & WEIGHBRIDGE CABIN DETAILS

PREPARED BY:
ENVIRONMENTAL ENGINEERING SERVICES

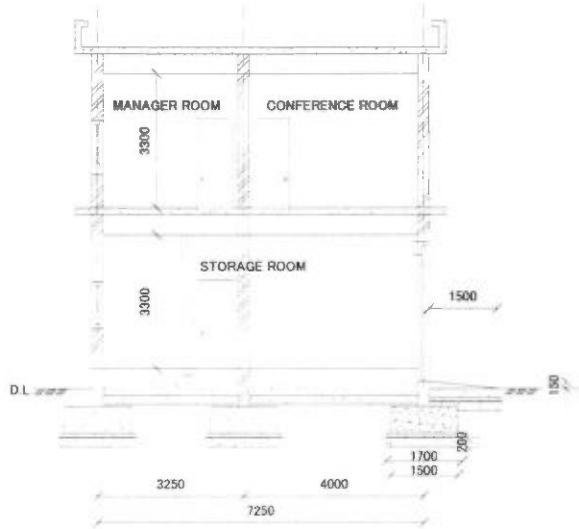
DWG NO: P-2



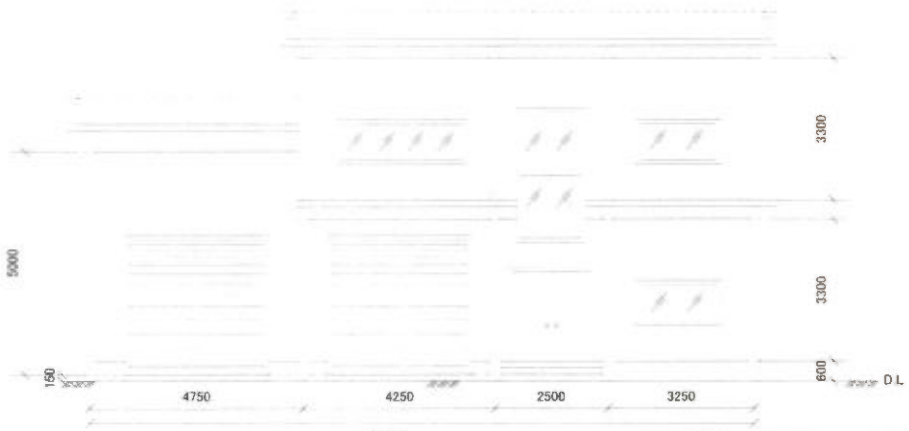
GROUND FLOOR PLAN



FIRST FLOOR PLAN



SECTION AA



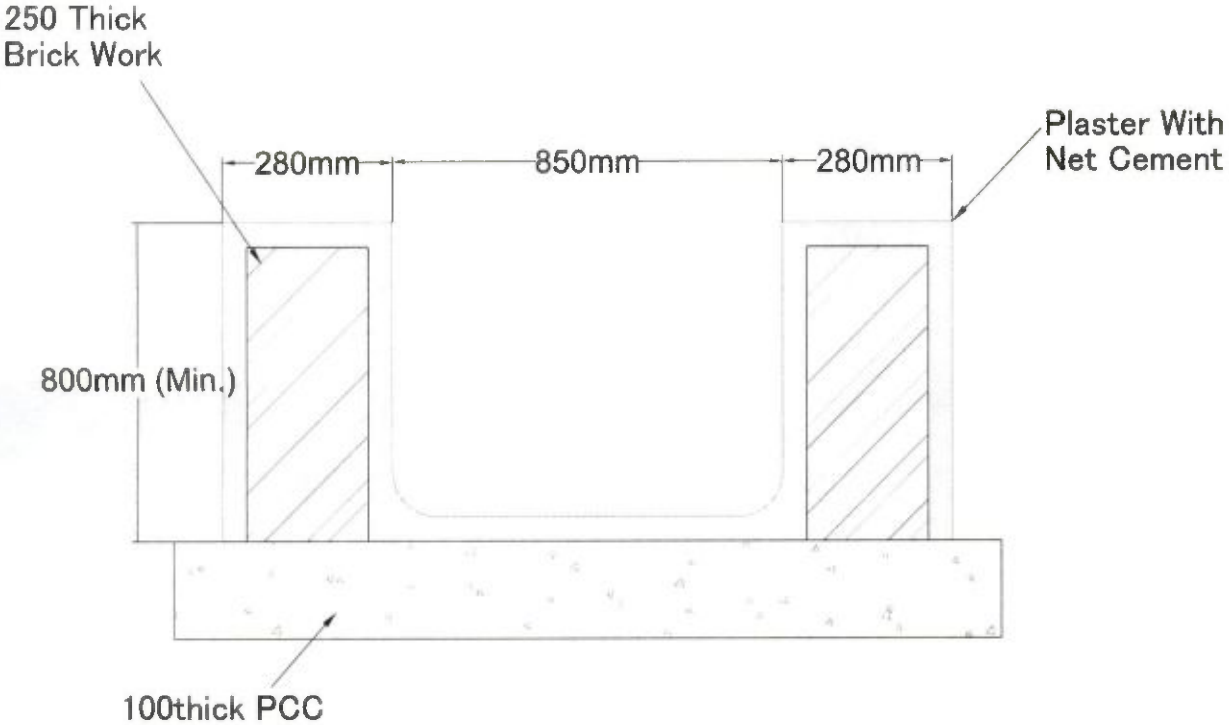
FRONT ELEVATION

PROJECT TITLE:
PANIHATI SWM PROJECT

DRAWING TITLE:
TYPICAL DRAWING OF WORKSHOP CUM ADMINISTRATIVE BUILDING

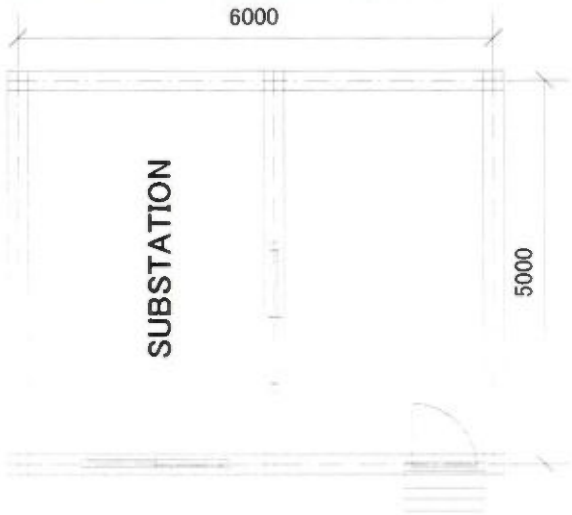
PREPARED BY:
ENVIRONMENTAL ENGINEERING SERVICES

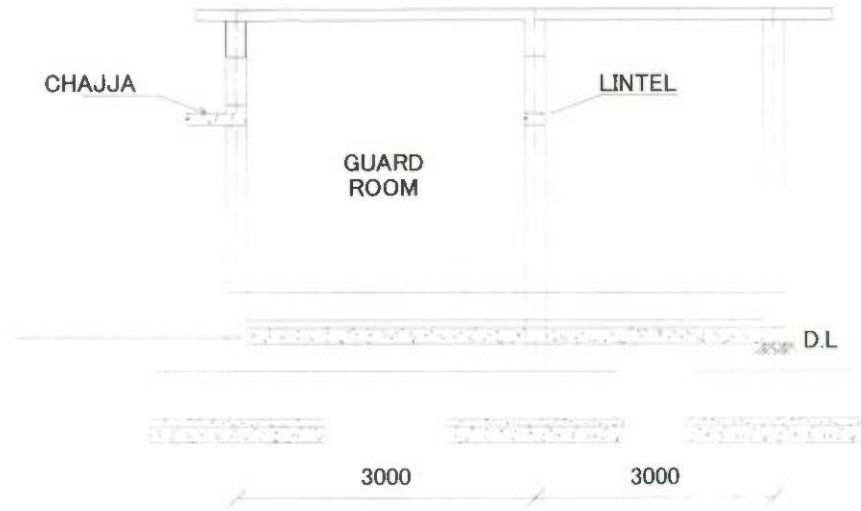
DWG NO: P-3



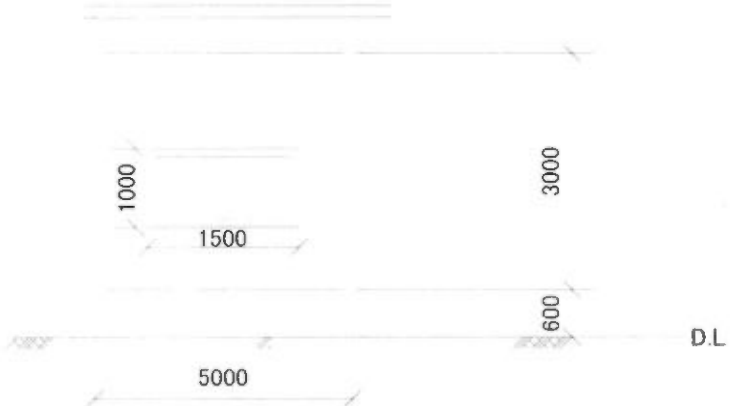
TIPICAL CROSS SECTIONAL DETAILS OF STORM WATER DRAIN

PROJECT TITLE:	PANIHATI SWM PROJECT
DRAWING TITLE:	DETAIL OF STORM WATER DRAIN OF CP
PREPARED BY:	ENVIRONMENTAL ENGINEERING SERVICES
DWG NO. P-4	



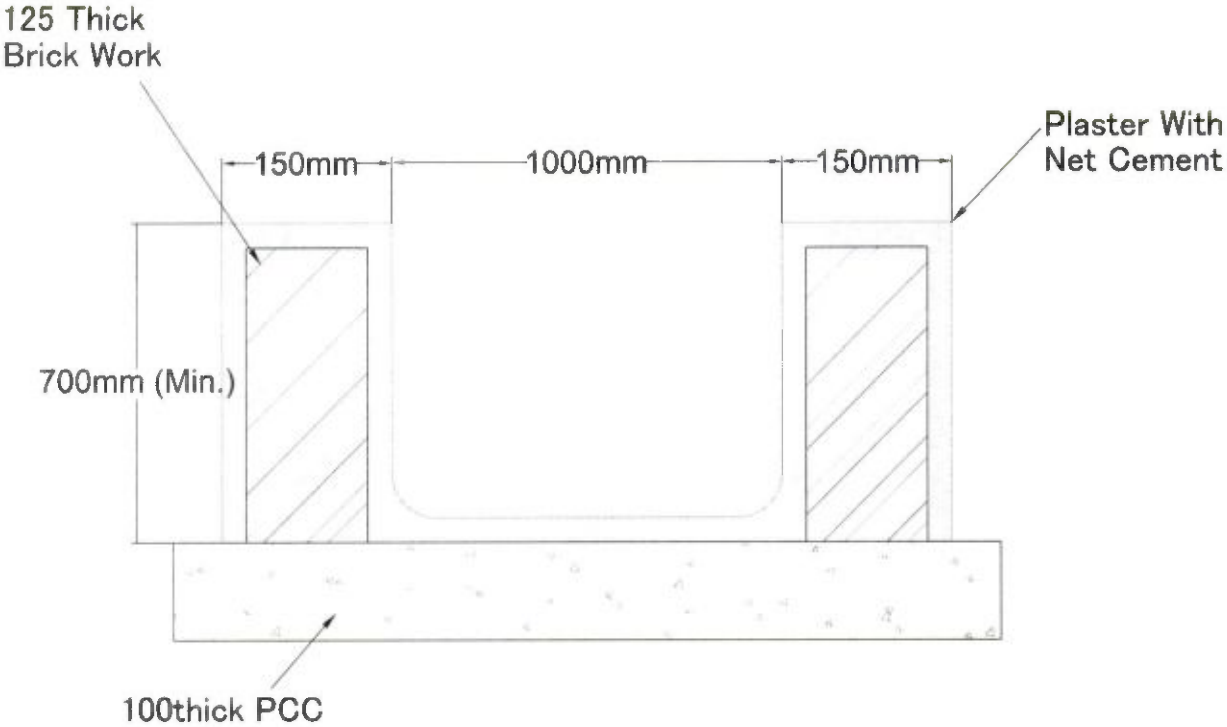


SECTION



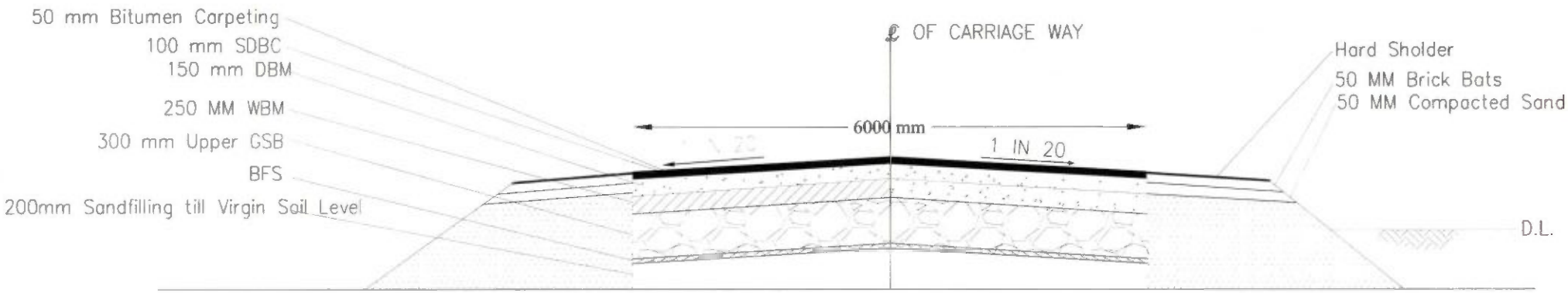
ELEVATION

PROJECT TITLE:	PANIHATI SWM PROJECT
DRAWING TITLE:	TYPICAL DETAILS SUBSTATION
PREPARED BY:	ENVIRONMENTAL ENGINEERING SERVICES
	DWG NO P-6



TIPICAL CROSS SECTIONAL DETAILS OF STORM WATER DRAIN

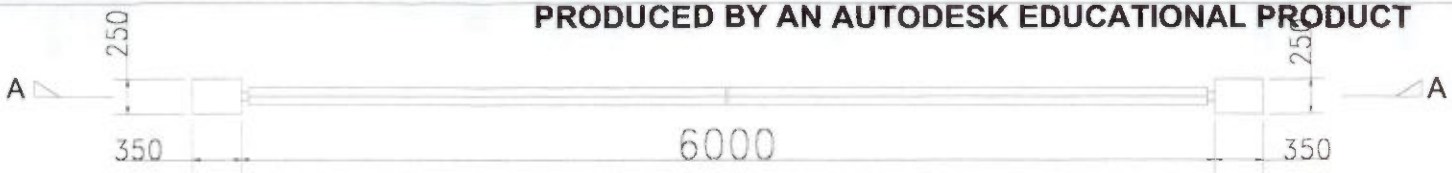
PROJECT TITLE:	PANIHATI SWM PROJECT
DRAWING TITLE:	DETAIL OF STORM WATER DRAIN FOR SLF
PREPARED BY:	ENVIRONMENTAL ENGINEERING SERVICES
DWG NO. P-7	



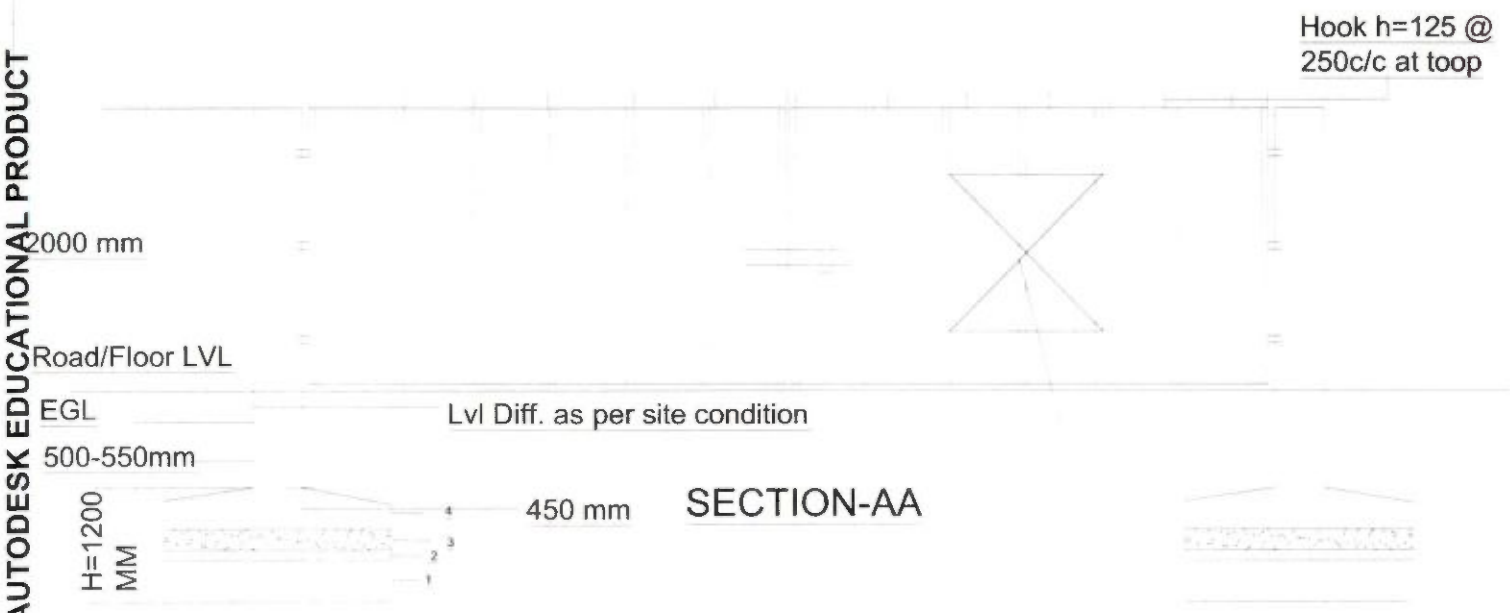
TYPICAL SECTION OF INTERNAL ROAD

NOTE: Road Level should be 300mm above from Design Level

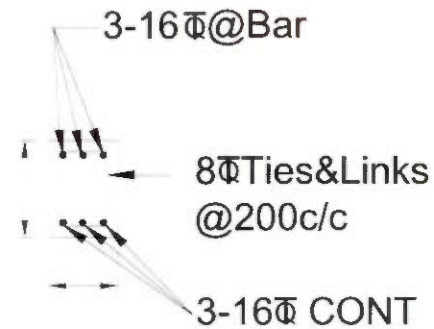
PROJECT TITLE:	PANIHATI SWM PROJECT
DRAWING TITLE:	TYPICAL SECTION OF INTERNAL ROAD
PREPARED BY:	ENVIRONMENTAL ENGINEERING SERVICES
DWG NO:	B-8



PLAN OF GATE



SECTION-AA



DETAIL OF COLUMN

FOOTING SIZE 1200X1200
and Reinforcement ,10mm
Dia & 150c/c bothways
1 SAND FILLING ,550MM,
2) SBFS-100mm,
3) PCC-100,mm
4) RCC-300 mm

PROJECT TITLE
PANIHATI SWM PROJECT

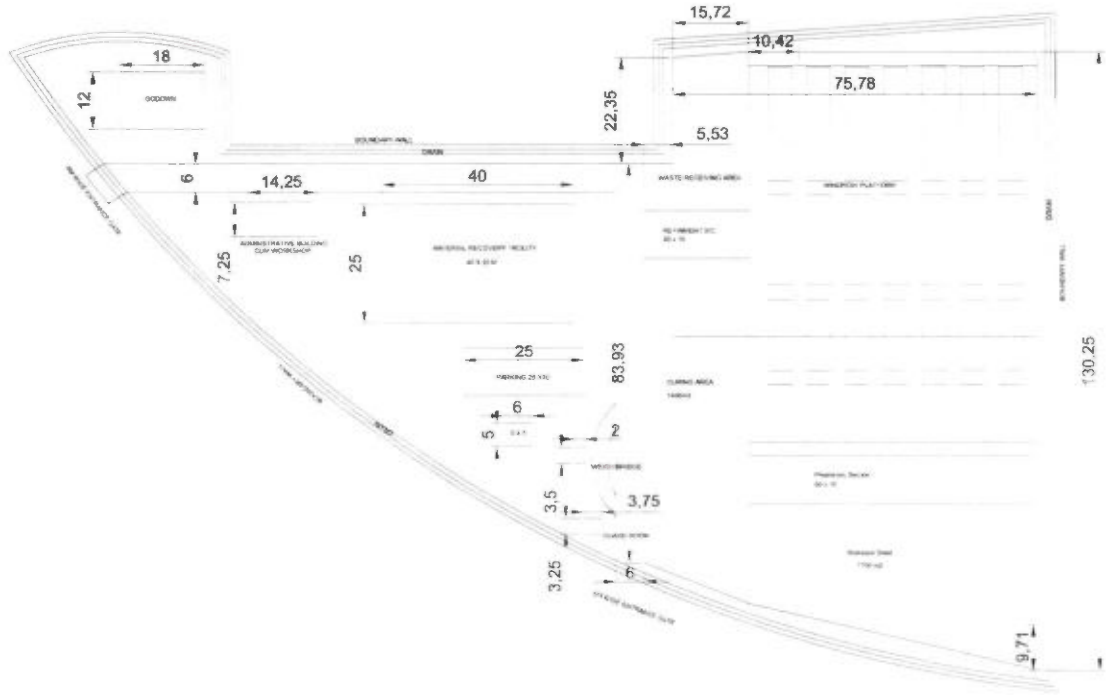
DRAWING TITLE:
DETAIL OF GATE & BOUNDARY WALL

PREPARED BY:
ENVIRONMENTAL ENGINEERING SERVICES

DWG NO. B-9

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT



PANIHATI PROCESSING PLANT

PROJECT TITLE:

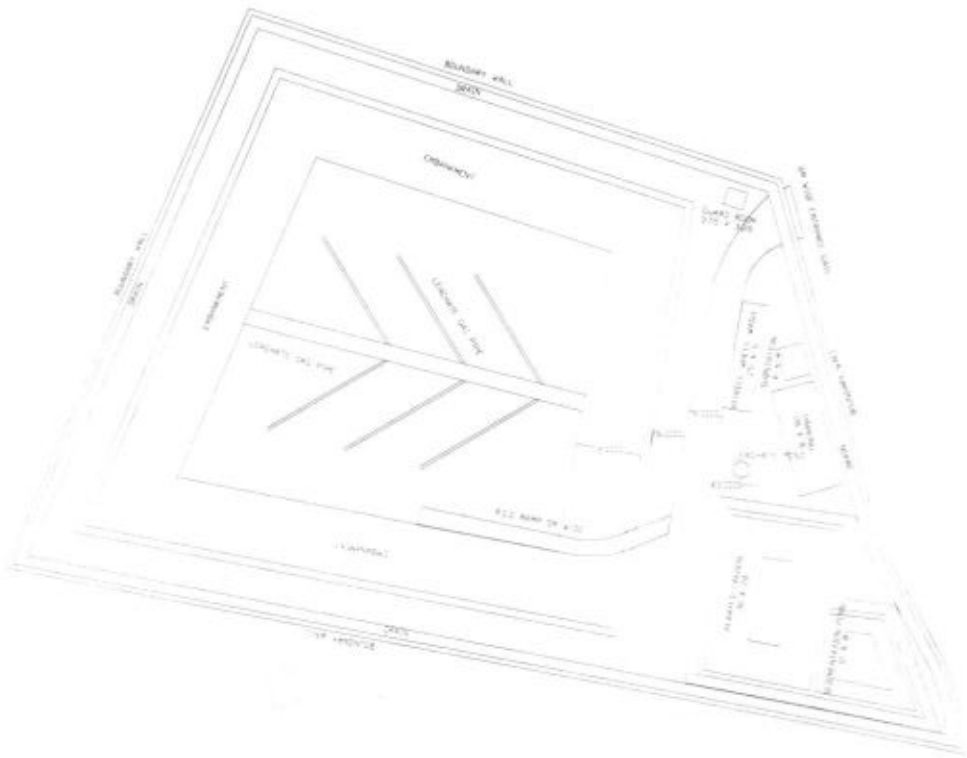
PANIHATI SWM PROJECT

DRAWING TITLE:

PANIHATI PROCESSING PLANT

PREPARED BY:

ENVIRONMENTAL ENGINEERING SERVICES



PANIHATI SANITARY LANDFILL PHASE-I

PROJECT TITLE:

PANIHATI SWM PROJECT

DRAWING TITLE:

PANIHATI SANITARY LANDFILL PHASE-I

PREPARED BY:

ENVIRONMENTAL ENGINEERING SERVICES

DPR for MSW Management- Panihati						Remarks
Abstract - Administration Building - 14.750 x 7.250 m						
Sl. No	Description of Item	Units	Qty	Rate	Amount	
2	Earth work in excavation of foundation trenches or drains, in all sorts of soil (including mixed soil but excluding laterite or sandstone) including removing, spreading or stacking the spoils within a lead of 75 m. as directed. The item includes necessary trimming the sides of trenches, levelling, dressing and ramming the bottom, bailing out water as required complete. Depth of excavation not exceeding 1.500 mm.	cum	67	120.47	7962.59	1mt inside
3	Filling in foundation or plinth by silver sand in layers not exceeding 150 mm as directed and consolidating the same by thorough saturation with water, ramming complete including the cost of supply of sand. (payment to be made on measurement of finished quantity)	cum	195	98.524	18968.23	PWD SOR Vol-I , Page no. 2
4	Anti termite treatment to back filling of the masonry foundation with admixing chloropyrofos emulsifiable concentrates (1% concentration) with water by weight at the rate of 7.5 Litres per sq. m. of the vertical surface of the substructure for each side of the foundation.. The work shall be carried out as per specification described in 6.2.2. of code IS-6313 (part -II) 1981. (Mode of measurment will be vertical area treated.)	sqm	56	131	7215.48	PWD SOR Vol-I , Page no. 4
5	Single Brick Flat Soling of picked jhama bricks including ramming and dressing bed to proper level and filling joints with local sand.	sqm	56	377	20765.16	PWD SOR Vol-I , Page no.12
6	Ordinary Cement concrete (mix 1:1.5:3) with graded stone chips (20 mm nominal size) excluding shuttering and reinforcement if any, in ground floor as per relevant IS codes. Pakur Variety	cum	7	5389	37103.27	PWD SOR Vol-I , Page no. 15
7	Supplying ready mixed concrete of M 25 Grade with well graded stone chips of 20 mm nominal size containing designed quantity of cement per Cu.m of wet concrete produced in computerised batching plant under controlled condition using approved super plastisizer, designing concrete mix following I.S. 10262 and I.S. 456, transporting the mix with agitation in transit mixer to work site depositing the mix on a platform erected for the purpose at required levels of concreting and then placing the mix in its final location of form work compacting and curing the same complete as per specification	cum	105.00	6884	722820.00	PWD SOR Vol-I , Page no. 22

8	Rainforced cement concrete					
	Reinforcement for reinforced concrete work in all sorts of	kg	10500.00	61.936	650328.00	PWD SOR Vol-I , Page no. 28
	structures including distribution bars, stirrups, binders etc					
	initial straightening and removal of loose rust (if necessary),					
	cutting to requisite length, hooking and bending to correct					
	shape, placing in proper position and binding with 16 gauge					
	black annealed wire at every intersection, complete as per					
	drawing and direction.					
	For works in foundation, basement and upto roof of ground					
	floor/upto 4 m- SAIL/ TATA/RINL					
7	Hire and labour charges for shuttering with centering and necessary staging upto 4 m using approved stout props and thick hard wood planks of approved thickness with required bracing for concrete slabs, beams and columns, lintels curved or straight including fitting, fixing and striking out after completion of works (upto roof of ground floor)					
	(a) 25 mm to 30 mm thick wooden shuttering as per decision &	sqm	700.00	351	245700.00	PWD SOR Vol-I , Page no. 27
	direction of Engineer-In-Charge.					
8	Brick work with 1st class bricks in cement mortar (1:6)	cum	25.00	5719	142975.00	PWD SOR Vol-I , Page no. 30
	foundation and plinth					
9	Brick work with 1st class bricks in cement mortar (1:6)					
	In superstructure, ground floor	cum	70.00	5943	416010.00	PWD SOR Vol-I , Page no. 30
10	Plastering					
	Plaster (to wall, floor, ceiling etc.) with sand and cement mortar					
	including rounding off or chamfering corners as directed and					
	raking out joints including throating, nosing and drip course,					
	scaffolding/staging where necessary (Ground floor).[Excluding					
	cost of chipping over concrete surface]					
	15 mm thick plaster with 1:6 cement mortar	sqm	1500.00	156	234000.00	PWD SOR Vol-I , Page no. 164
11	Painting					
	Applying Interior grade Acrylic Primer of approved quality and brand	sqm	1500.00	53.03	79545.00	PWD SOR Vol-I , Page no. 172
	on plastered or concrete surface old or new surface to receive					
	Distemper/ Acrylic emulsion paint including scraping and preparing					
	the surface throughly, complete as per manufacturer's specification					
	and as per direction of the EIC. (In Ground Floor)					
	Two Coats- Solvent based interior grade Acrylic Primer					
12	Dry Distemparing to interior walls or ceiling including washing, cleani	sqm	720.00	51	36720.00	PWD SOR Vol-I , Page no. 174
	washing, smoothening surface - Two Coats					
13	With Sand Cement Mortar (1:4) 20 mm thick & 2 mm thick	sqm	160.00	1040	166400.00	PWD SOR Vol-I , Page no. 54
	cement slurry at back side of tiles using cement @ 2.91					

	Kg/Sq.m & joint filling using white cement slurry @					
	0.20kg/Sq.m.					
	Area of each tile above 0.09 Sq.m/ Coloured decorative					
14	Earth work in filling in foundation trenches or plinth	cum	28.00	138.55	3879.40	PWD SOR Vol-I , Page no. 1
	with good earth, in layers not exceeding 150 mm.					
	including watering and ramming etc. layer by layer					
	complete. (Payment to be made on the basis of					
	measurement of finished quantity of work) With earth obtained by					
	(including cost of excavation upto 1,800 mm. depth)					
	from land arranged by the Deptt. within a lead of 100 m.					
15	Supplying, fitting and fixing steel rolling shutter profile type with	sqm	21.10	2688	56716.80	PWD SOR Vol-I , Page no. 80
	18 B.G . of approved type steel latche section 75mm wide, fitted					
	with coil wire spring to necessiate the fitting of required Nos. of C.I.					
	Pulleys on heavy type solid drawn seamless steel tube complete with					
	locking arrangements both inside and outside specially builtup side					
	guide channels including providing a hood for the steel rolling					
	shutter in the room, painting two coats of approved aluminium paint					
	over a coat of red lead primer complete.					
16	Supplying, fitting and fixing windows and ventilators with or	sqm	36	1330	47880.00	PWD SOR Vol-I , Page no. 84
	without integrated grills conforming to IS 1038-1975 and					
	manufactured from rolled steel sections conforming to IS 7452-1974					
	with non-friction projecting type, box type hinges, glazing clips,					
	lugs locking bracket, handle plate etc, including hoisting in					
	position, straightening if required, fixing lugs in cement concrete (					
	1:2:4) with stone chips 20 mm down cutting holes and mending					
	good damages to match with existing surface complete in all respect					
	excluding glazing.					
	(a) Fixed type steel windows as per IS sizes with horizontal glazing					
17	Supplying, fitting & fixing UPVC pipes A- Type and fittings	Metre	15	291	4365.00	
	IS:13592-1992 with all necessary clamps nails, including making					
	walls, floor etc. cutting trenches in any soil through masonry concrete					
	structures etc if necessary and mending good damages including					
	with jointing materails (Spun Yarn, Valamoid/Bitumen/M-Seal					
	complete.					
	UPVC Pipes: 110 mm. Dia					
18	Plumbing & Sanitary Works	ls	1	100000	100000.00	
	Total				**2999353.92**	

DPR for MSW Management- Panihati						Remarks
Abstract - Security Room - 3.75 m x 3.25 m						
Sl. No	Description of Item	Units	Qty	Rate	Amount	
				in INR	in INR	
1	Earth work in excavation of foundation trenches or	cum	6.00	120.47	722.82	PWD SOR Vol-I , Page no. 1
	drains, in all sorts of soil (including mixed soil but					
	excluding laterite or sandstone) including removing,					
	spreading or stacking the spoils within a lead of 75					
	m. as directed. The item includes necessary trimming					
	the sides of trenches, levelling, dressing and					
	ramming the bottom, bailing out water as required					
	complete. Depth of excavation not exceeding 1,500 mm.					
2	Anti termite treatment to back filling of the masonry foundation with chemical emulsion by	sqm	6.00	131	786.00	PWD SOR Vol-I , Page no. 4
	admixing chloropyrofos emulsifiable concentrates					
	(1% concentration) with water by weight at the rate					
	of 7.5 Litres per sq. m. of the vertical surface of the					
	substructure for each side of the foundation.. The					
	work shall be carried out as per specification					
	described in 6.2.2. of code IS-6313 (part -II) 1981.					
	(Mode of measurment will be vertical area treated.)					
5	Single Brick Flat Soling of picked jhama bricks including	sqm	6	377	2262.00	PWD SOR Vol-I , Page no.12
	ramming and dressing bed to proper level and filling joints with					
	local sand.					
3	Filling in foundation or plinth by silver sand in	cum	2	98.524	197.05	PWD SOR Vol-I , Page no. 2
	layers not exceeding 150 mm as directed and					
	consolidating the same by thorough saturation with					
	water, ramming complete including the cost of					
	supply of sand. (payment to be made on					

	measurement of finished quantity)					
4	Ordinary Cement concrete (mix 1:1.5:3) with graded stone	cum	0.80	5389	4311.20	PWD SOR Vol-I , Page no. 15
	chips (20 mm nominal size) excluding shuttering and					
	reinforcement if any, in ground floor as per relevant IS codes.					
	Pakur Variety					
5	Supplying ready mixed concrete of M 25 Grade with well graded stone chips of 20 mm nominal size containing designed quantity of cement per Cu.m of wet concrete produced in computerised batching plant under controlled condition using approved super plastisizer, designing concrete mix following I.S. 10262 and I.S. 456, transporting the mix with agitation in transit mixer to work site depositing the mix on a platform erected for the purpose at required levels of concreting and then placing the mix in its final location of form work compacting and curing the same complete as per specification & direction of the Engineer-in-charge including computerised batching plant transit mixer with all accessories vibrators etc. inclusive of all other incidental charges in this connection complete but excluding cost of hire charge of platform and its supporting staging which would be paid through separate item. [cement to be supplied by the Manufacturer/ supplier]	cum	12	6884.00	82608.00	PWD SOR Vol-I , Page no. 22
5	Rainforced cement concrete					
	Reinforcement for reinforced concrete work in all sorts of	kg	1200.00	61.936	74323.20	PWD SOR Vol-I , Page no. 28
	structures including distribution bars, stirrups, binders etc					
	initial straightening and removal of loose rust (if necessary),					
	cutting to requisite length, hooking and bending to correct					
	shape, placing in proper position and binding with 16 gauge					
	black annealed wire at every intersection, complete as per					
	drawing and direction.					
	For works in foundation, basement and upto roof of ground					

	floor/upto 4 m- SAIL/ TATA/RINL					
6	Hire and labour charges for shuttering with centering and necessary staging upto 4 m using approved stout props and thick hard wood planks of approved thickness with requiredbracing for concrete slabs, beams and columns, lintels curvedor straight including fitting, fixing and striking out aftercompletion of works (upto roof of ground floor) necessary staging upto 4 m using approved stout props and thick hard wood planks of approved thickness with required bracing for concrete slabs, beams and columns, lintels curved or straight including fitting, fixing and striking out after completion of works (upto roof of ground floor) HIRE, LABOUR CHARGES FOR CENTERING & SCAFFOLDING - Unsupported Height up to 3.66 M Steel scaffolding pipes, jack Props, wallers, Foot plates, brackets, steel Centering Plates, etc., complete					
	(a) 25 mm to 30 mm thick wooden shuttering as per decision &	sqm	50.00	351	17550.00	PWD SOR Vol-I , Page no. 27
	direction of Engineer-In-Charge.					
7	Brick work with 1st class bricks in cement mortar (1:6)	cum	6.00	5719	34314.00	PWD SOR Vol-I , Page no. 30
	foundation and plinth					
8	Brick work with 1st class bricks in cement mortar (1:6)					
	In superstructure, ground floor	cum	10.00	5943	59430.00	PWD SOR Vol-I , Page no. 30
9	Plastering					
	Plaster (to wall, floor, ceiling etc.) with sand and cement mortar					
	including rounding off or chamfering corners as directed and					
	raking out joints including throating, nosing and drip course,					
	scaffolding/staging where necessary (Ground floor).[Excluding					
	cost of chipping over concrete surface]					
	15 mm thick plaster with 1:6 cement mortar	sqm	93.00	156	14508.00	PWD SOR Vol-I , Page no. 164
10	Painting					

	Applying Interior grade Acrylic Primer of approved quality and brand					
	on plastered or concrete surface old or new surface to receive					
	Distemper/ Acrylic emulsion paint including scraping and preparing					
	the surface throughly, complete as per manufacturer's specification					
	and as per direction of the EIC. **(In Ground Floor)**					
	Two Coats- Solvent based interior grade Acrylic Primer	sqm	93.00	53.03	4931.79	PWD SOR Vol-I , Page no. 172
11	Dry Distemparing to interior walls or ceiling including washing, cleaning					
	washing, smoothening surface - Two Coats	sqm	48.00	51	2448.00	PWD SOR Vol-I , Page no. 174
12	With Sand Cement Mortar (1:4) 20 mm thick & 2 mm thick					
	cement slurry at back side of tiles using cement @ 2.91					
	Kg/Sq.m & joint filling using white cement slurry @					
	0.20kg/Sq.m.					
	Area of each tile above 0.09 Sq.m/ Coloured decorative	sqm	15.00	1040	15600.00	PWD SOR Vol-I , Page no. 54
13	Earth work in filling in foundation trenches or plinth					
	with good earth, in layers not exceeding 150 mm.					
	including watering and ramming etc. layer by layer					
	complete. (Payment to be made on the basis of					
	measurement of finished quantity of work) With earth obtained by fresh excavation					
	(including cost of excavation upto 1,800 mm. depth)					
	from land arranged by the Deptt. within a lead of 100 m.	cum	5.00	138.55	692.75	PWD SOR Vol-I , Page no. 1
14	Supplying, fitting and fixing windows and ventilators with or	sqm	5.70	1330	7581.00	PWD SOR Vol-I , Page no. 84
	without integrated grills conforming to IS 1038-1975 and					
	manufactured from rolled steel sections conforming to IS 7452-1974					
	with non-friction projecting type, box type hinges, glazing clips,					
	lugs locking bracket, handle plate etc, including hoisting in					
	position, straightening if required, fixing lugs in cement concrete (					
	1:2:4) with stone chips 20 mm down cutting holes and mending					
	good damages to match with existing surface complete in all respect					
	excluding glazing.					

	(a) Fixed type steel windows as per IS sizes with horizontal glazing bars.					
	Total			Total	**322265.81**	

DPR for MSW Management- Panihati						Remarks
Abstract - Weighbridge - 9.3 m x 3.6 m & Cabin 3.5 m x 2.0 m						
Sl. No	Description of Item	Units	Qty	Rate	Amount	
1	Earth work in excavation of foundation trenches or	cum	12	120.47	1445.64	PWD SOR Vol-I , Page no. 1
	drains, in all sorts of soil (including mixed soil but					
	excluding laterite or sandstone) including removing,					
	spreading or stacking the spoils within a lead of 75					
	m. as directed. The item includes necessary trimming					
	the sides of trenches, levelling, dressing and					
	ramming the bottom, bailing out water as required					
	complete. Depth of excavation not exceeding 1,500 mm.					
2	Anti termite treatment to back filling of the masonry foundation with chemical emulsion by	sqm	12	131	1572	PWD SOR Vol-I , Page no. 4
	admixing chloropyrofos emulsifiable concentrates					
	(1% concentration) with water by weight at the rate					
	of 7.5 Litres per sq. m. of the vertical surface of the					
	substructure for each side of the foundation.. The					
	work shall be carried out as per specification					
	described in 6.2.2. of code IS-6313 (part -II) 1981.					
	(Mode of measurment will be vertical area treated.)					
3	Filling in foundation or plinth by silver sand in	cum	28	98.524	2758.672	PWD SOR Vol-I , Page no. 2
	layers not exceeding 150 mm as directed and					
	consolidating the same by thorough saturation with					
	water, ramming complete including the cost of					
	supply of sand. (payment to be made on					
	measurement of finished quantity)					
5	Single Brick Flat Soling of picked jhama bricks including	sqm	80	377	30084.60	PWD SOR Vol-I , Page no.12
	ramming and dressing bed to proper level and filling joints with					
	local sand.					
4	Ordinary Cement concrete (mix 1:1.5:3) with graded stone	cum	3	5389	16167	PWD SOR Vol-I , Page no. 15
	chips (20 mm nominal size) excluding shuttering and					
	reinforcement if any, in ground floor as per relevant IS codes.					
	Pakur Variety					

5	Supplying ready mixed concrete of M 25 Grade with well graded stone chips of 20 mm nominal size containing designed quantity of cement per Cu.m of wet concrete produced in computerised batching plant under controlled condition using approved super plastisizer, designing concrete mix following I.S. 10262 and I.S. 456, transporting the mix with agitation in transit mixer to work site depositing the mix on a platform erected for the purpose at required levels of concreting and then placing the mix in its final location of form work compacting and curing the same complete as per specification & direction of the Engineer-in-charge including computerised batching plant transit mixer with all accessories vibrators etc. inclusive of all other incidental charges in this connection complete but excluding cost of hire charge of platform and its supporting staging	cum	35.00	6884	240940.00	PWD SOR Vol-I , Page no. 22
4	Rainforced cement concrete					
	Reinforcement for reinforced concrete work in all sorts of	kg	3500	61.936	216776.00	PWD SOR Vol-I , Page no. 28
	structures including distribution bars, stirrups, binders etc					
	initial straightening and removal of loose rust (if necessary),					
	cutting to requisite length, hooking and bending to correct					
	shape, placing in proper position and binding with 16 gauge					
	black annealed wire at every intersection, complete as per					
	drawing and direction.					
	For works in foundation, basement and upto roof of ground					
	floor/upto 4 m- SAIL/ TATA/RINL					
6	Hire and labour charges for shuttering with centering and necessary staging upto 4 m using approved stout props and thick hard wood planks of approved thickness with required bracing for concrete slabs, beams and columns, lintels curved or straight including fitting, fixing and striking out after completion of works (upto roof of ground floor) necessary staging upto 4 m using approved stout props and thick hard wood planks of approved thickness with required bracing for concrete slabs, beams and columns, lintels curved or straight including fitting, fixing and striking out after completion of works (upto roof of ground floor) HIRE, LABOUR CHARGES FOR CENTERING & SCAFFOLDING - Unsupported Height up to 3.66 M Steel scaffolding pipes, jack Props, wallers, Foot plates, brackets, steel Centering					
	(a) 25 mm to 30 mm thick wooden shuttering as per decision &	sqm	80	351	28080.00	PWD SOR Vol-I , Page no. 27
	direction of Engineer-In-Charge.					
7	Brick work with 1st class bricks in cement mortar (1:6)	cum	4	5719	22876.00	PWD SOR Vol-I , Page no. 30
	foundation and plinth					

8	Brick work with 1st class bricks in cement mortar (1:6)					
	In superstructure, ground floor	cum	5.5	5943	32686.50	PWD SOR Vol-I , Page no. 30
9	Plastering					
	Plaster (to wall, floor, ceiling etc.) with sand and cement mortar					
	including rounding off or chamfering corners as directed and					
	raking out joints including throating, nosing and drip course,					
	scaffolding/staging where necessary (Ground floor).[Excluding					
	cost of chipping over concrete surface]					
	15 mm thick plaster with 1:6 cement mortar	sqm	60	156	9360.00	PWD SOR Vol-I , Page no. 164
9	Painting					
	Applying Interior grade Acrylic Primer of approved quality and brand	sqm	55	53.03	2916.65	PWD SOR Vol-I , Page no. 172
	on plastered or concrete surface old or new surface to receive					
	Distemper/ Acrylic emulsion paint including scraping and preparing					
	the surface throughly, complete as per manufacturer's specification					
	and as per direction of the EIC. (In Ground Floor)					
	Two Coats- Solvent based interior grade Acrylic Primer					
10	Earth work in filling in foundation trenches or plinth	cum	3	138.55	415.65	PWD SOR Vol-I , Page no. 1
	with good earth, in layers not exceeding 150 mm.					
	including watering and ramming etc. layer by layer					
	complete. (Payment to be made on the basis of					
	measurement of finished quantity of work) With earth obtained by fresh excavation					
	(including cost of excavation upto 1.800 mm. depth)					
	from land arranged by the Deptt. within a lead of 100 m.					
11	With Sand Cement Mortar (1:4) 20 mm thick & 2 mm thick	sqm	8.20	1040	8528.00	PWD SOR Vol-I , Page no. 54
	cement slurry at back side of tiles using cement @ 2.91					
	Kg/Sq.m & joint filling using white cement slurry @					
	0.20kg/Sq.m.					
	Area of each tile above 0.09 Sq.m/ Coloured decorative					
12	Supplying, fitting and fixing steel rolling shutter profile type with	sqm	2.40	2688	6451.20	PWD SOR Vol-I , Page no. 80
	18 B.G . of approved type steel latche section 75mm wide, fitted					
	with coil wire spring to necessiate the fitting of required Nos. of C.I.					
	Pulleys on heavy type solid drawn seamless steel tube complete with					
	locking arrangements both inside and outside specially builtup side					
	guide channels including providing a hood for the steel rolling					
	shutter in the room, painting two coats of approved aluminium paint					
	over a coat of red lead primer complete.					
13	Supplying, fitting and fixing windows and ventilators with or	sqm	4	1330	5320.00	PWD SOR Vol-I , Page no. 84
	without integrated grills conforming to IS 1038-1975 and					

	manufactured from rolled steel sections conforming to IS 7452-1974					
	with non-friction projecting type, box type hinges, glazing clips,					
	lugs locking bracket, handle plate etc. including hoisting in					
	position, straightening if required, fixing lugs in cement concrete (					
	1:2:4) with stone chips 20 mm down cutting holes and mending					
	good damages to match with existing surface complete in all respect					
	excluding glazing.					
	(a) Fixed type steel windows as per IS sizes with horizontal glazing bars.					
14	Supplying, fitting & fixing UPVC pipes A- Type and fittings conforming to	Metre	5	291	1455.00	
	IS:13592-1992 with all necessary clamps nails, including making holes in					
	walls, floor etc. cutting trenches in any soil through masonry concrete					
	structures etc if necessary and mending good damages including joining					
	with jointing materails (Spun Yarn, Valamoid/Bitumen/M-Seal etc)					
	complete.					
	UPVC Pipes: 110 mm. Dia					
15	Supplying, fitting, fixing in position rails on any surface.	kg	800	70	56000.00	PWD SOR Vol-I , Page no. 79
16	Earthing & Plumbing	L.S			50000.00	
				Total	**733832.91**	

DPR for MSW Management- Panihati						
Abstract - Vehicle Wheel Wash - 25.0 m x 5.0 m						
Sl. No	Description of Item	Units	Qty	Rate	Amount	Remarks
2	Earth work in excavation of foundation trenches or	cum	206.25	120.47	24846.9375	PWD SOR Vol-I , Page no. 1
	drains, in all sorts of soil (including mixed soil but					
	excluding laterite or sandstone) including removing,					
	spreading or stacking the spoils within a lead of 75					
	m. as directed. The item includes necessary trimming					
	the sides of trenches, levelling, dressing and					
	ramming the bottom, bailing out water as required					
	complete. Depth of excavation not exceeding 1,500 mm.					
2	Anti termite treatment to back filling of the masonry foundation with chemical emulsion by	sqm	125.00	131	16375	PWD SOR Vol-I , Page no. 4
	admixing chloropyrofos emulsifiable concentrates					
	(1% concentration) with water by weight at the rate					
	of 7.5 Litres per sq. m. of the vertical surface of the					
	substructure for each side of the foundation.. The					
	work shall be carried out as per specification					
	described in 6.2.2. of code IS-6313 (part -II) 1981.					
	(Mode of measurment will be vertical area treated.)					
4	Ordinary Cement concrete (mix 1:1.5:3) with graded stone	cum	1.40	5389	7544.60	PWD SOR Vol-I , Page no. 15
	chips (20 mm nominal size) excluding shuttering and					
	reinforcement if any, in ground floor as per relevant IS codes.					
	Pakur Variety					
5	Supplying ready mixed concrete of M 25 Grade with well graded stone chips of 20 mm nominal size containing designed quantity of cement per Cu.m of wet concrete produced in computerised batching plant under controlled condition using approved super plastisizer, designing concrete mix following I.S. 10262 and I.S. 456, transporting the mix with agitation in transit mixer to work site depositing the mix on a platform erected for the purpose at required levels of concreting and then placing the mix in its final location of form work compacting and curing the same complete as per specification & direction of the Engineer-in-charge including computerised batching plant transit mixer with all accessories vibrators etc. inclusive of all other incidental	cum	55.00	6884	378620.00	PWD SOR Vol-I , Page no. 22

4	Rainforced cement concrete					
	Reinforcement for reinforced concrete work in all sorts of	kg	5500.00	61.936	340648.00	PWD SOR Vol-I , Page no. 28
	structures including distribution bars, stirrups, binders etc					
	initial straightening and removal of loose rust (if necessary),					
	cutting to requisite length, hooking and bending to correct					
	shape, placing in proper position and binding with 16 gauge					
	black annealed wire at every intersection, complete as per					
	drawing and direction.					
	For works in foundation, basement and upto roof of ground					
	floor/upto 4 m- SAIL/ TATA/RINL					
6	Supplying and laying brick Khoa of ordinary bats of size (38	sqm	125.00	195	24375.00	PWD SOR Vol-I , Page no. 12
	mmx 63 mm)of approved quality in 100 mm layer (loose) filling					
	in gaps with small ones rammed and compact as directed true					
	to level and grade.					
7	Hire and labour charges for shuttering with centering and necessary staging upto 4 m using approved stout props and thick hard wood planks of approved thickness with required bracing for concrete slabs, beams and columns, lintels curved or straight including fitting, fixing and striking out after completion of works (upto roof of ground floor)					
	(a) 25 mm to 30 mm thick wooden shuttering as per decision &	sqm	50.00	351	17550.00	PWD SOR Vol-I , Page no. 27
	direction of Engineer-In-Charge.					
13	Earth work in filling in foundation trenches or plinth	cum	30.00	138.55	4156.50	PWD SOR Vol-I , Page no. 1
	with good earth, in layers not exceeding 150 mm.					
	including watering and ramming etc. layer by layer					
	complete. (Payment to be made on the basis of					
	measurement of finished quantity of work) With earth obtained by fresh excavation					
	(including cost of excavation upto 1,800 mm. depth)					
	from land arranged by the Deptt. within a lead of 100 m.					
	Total				814116.04	

DPR for MSW Management- Panihati						
Abstract - Godown Room - 18 m x 12 m						
Sl. No	Description of Item	Units	Qty	Rate	Amount	Remarks
				in INR	in INR	
2	Earth work in excavation of foundation trenches or	cum	16.00	120.47	1927.52	PWD SOR Vol-I , Page no. 1
	drains, in all sorts of soil (including mixed soil but					
	excluding laterite or sandstone) including removing,					
	spreading or stacking the spoils within a lead of 75					
	m. as directed. The item includes necessary trimming					
	the sides of trenches, levelling, dressing and					
	ramming the bottom, bailing out water as required					
	complete. Depth of excavation not exceeding 1,500 mm.					
3	Anti termite treatment to back filling of the masonry	sqm	15.00	131	1965.00	PWD SOR Vol-I , Page no. 4
	foundation with chemical emulsion by					
	admixing chloropyrofos emulsifiable concentrates					
	(1% concentration) with water by weight at the rate					
	of 7.5 Litres per sq. m. of the vertical surface of the					
	substructure for each side of the foundation.. The					
	work shall be carried out as per specification					
	described in 6.2.2. of code IS-6313 (part -II) 1981.					
	(Mode of measurment will be vertical area treated.)					
3	Filling in foundation or plinth by silver sand in	cum	5	98.524	492.62	PWD SOR Vol-I , Page no. 2
	layers not exceeding 150 mm as directed and					
	consolidating the same by thorough saturation with					
	water, ramming complete including the cost of					
	supply of sand. (payment to be made on					
	measurement of finished quantity)					
5	Single Brick Flat Soling of picked jhama bricks including	sqm	14	377	5278.00	PWD SOR Vol-I , Page no.12
	ramming and dressing bed to proper level and filling joints with					
	local sand.					
4	Ordinary Cement concrete (mix 1:1.5:3) with graded stone	cum	2.00	5803	11606.00	PWD SOR Vol-I , Page no. 12
	chips (20 mm nominal size) excluding shuttering and					
	reinforcement if any, in ground floor as per relevant IS codes.					
	Pakur Variety					

5	Supplying ready mixed concrete of M 25 Grade with well graded stone chips of 20 mm nominal size containing designed quantity of cement per Cu.m of wet concrete produced in computerised batching plant under controlled condition using approved super plastisizer, designing concrete mix following I.S. 10262 and I.S. 456, transporting the mix with agitation in transit mixer to work site depositing the mix on a platform erected for the purpose at required levels of concreting and then placing the mix in its final location of form work compacting and curing the same complete as per specification & direction of the Engineer-in-charge including computerised batching plant transit mixer with all accessories vibrators etc. inclusive of all other incidental charges in this connection complete but excluding cost of hire charge of platform and its supporting staging which would be paid through separate item. (cement to be supplied by the Manufacturer/ supplier)	cum	100	6884.00	688400.00	PWD SOR Vol-I , Page no. 22
5	Rainforced cement concrete					
	Reinforcement for reinforced concrete work in all sorts of	kg	#######	61.936	619360.00	PWD SOR Vol-I , Page no. 28
	structures including distribution bars, stirrups, binders etc					
	initial straightening and removal of loose rust (if necessary),					
	cutting to requisite length, hooking and bending to correct					
	shape, placing in proper position and binding with 16 gauge					
	black annealed wire at every intersection, complete as per					
	drawing and direction.					
	For works in foundation, basement and upto roof of ground					
	floor/upto 4 m- SAIL/ TATA/RINL					

	Hire and labour charges for shuttering with centering and necessary staging upto 4 m using approved stout props and thick hard wood planks of approved thickness with required bracing for concrete slabs, beams and columns, lintels curved or straight including fitting, fixing and striking out after completion of works (upto roof of ground floor) necessary staging upto 4 m using approved stout props and thick hard wood planks of approved thickness with required bracing for concrete slabs, beams and columns, lintels curved or straight including fitting, fixing and striking out after completion of works (upto roof of ground floor) HIRE, LABOUR CHARGES FOR CENTERING & SCAFFOLDING - Unsupported Height up to 3.66 M					
7	Steel scaffolding pipes, jack Props, wallers, Foot plates, brackets, steel					
	(a) 25 mm to 30 mm thick wooden shuttering as per decision &	sqm	100.00	351	35100.00	PWD SOR Vol-I , Page no. 27
	direction of Engineer-In-Charge.					
8	Brick work with 1st class bricks in cement mortar (1:6)	cum	32.00	5155	164960.00	PWD SOR Vol-I , Page no. 30
	foundation and plinth					
9	Brick work with 1st class bricks in cement mortar (1:6)					
	In superstructure, ground floor	cum	45.00	5380	242100.00	PWD SOR Vol-I , Page no. 30
10	Plastering					
	Plaster (to wall, floor, ceiling etc.) with sand and cement mortar					
	including rounding off or chamfering corners as directed and					
	raking out joints including throating, nosing and drip course,					
	scaffolding/staging where necessary (Ground floor).[Excluding					
	cost of chipping over concrete surface]					
	15 mm thick plaster with 1:6 cement mortar	sqm	600.00	156	93600.00	PWD SOR Vol-I , Page no. 164
11	Painting					
	Applying Interior grade Acrylic Primer of approved quality and brand					
	on plastered or concrete surface old or new surface to receive					
	Distemper/ Acrylic emulsion paint including scraping and preparing					
	the surface throughly, complete as per manufacturer's specification					
	and as per direction of the EIC. **(In Ground Floor)**					
	Two Coats- Solvent based interior grade Acrylic Primer	sqm	600.00	53.03	31818.00	PWD SOR Vol-I , Page no. 172
12	Dry Distemparing to interior walls or ceiling including washing,					

	cleaning , washing, smoothening surface - Two Coats	sqm	400.00	51	20400.00	PWD SOR Vol-I , Page no. 174
13	Earth work in filling in foundation trenches or plinth					
	with good earth, in layers not exceeding 150 mm.					
	including watering and ramming etc. layer by layer					
	complete. (Payment to be made on the basis of					
	excavation					
	(including cost of excavation upto 1.800 mm. depth)					
	from land arranged by the Deptt. within a lead of 100 m.	cum	8.00	138.55	1108.40	PWD SOR Vol-I , Page no. 1
14	Supplying, fitting and fixing windows and ventilators with or	sqm	4.00	1330	5320.00	PWD SOR Vol-I , Page no. 84
	without integrated grills conforming to IS 1038-1975 and					
	manufactured from rolled steel sections conforming to IS 7452-1974					
	with non-friction projecting type, box type hinges, glazing clips,					
	lugs locking bracket, handle plate etc, including hoisting in					
	position, straightening if required, fixing lugs in cement concrete (					
	1:2:4) with stone chips 20 mm down cutting holes and mending					
	good damages to match with existing surface complete in all respect					
	excluding glazing.					
	(a) Fixed type steel windows as per IS sizes with horizontal glazing bars.					
15	Supplying, fitting and fixing steel rolling shutter profile type with	sqm	6.00	2688	16128.00	PWD SOR Vol-I , Page no. 80
	18 B.G . of approved type steel latche section 75mm wide, fitted					
	with coil wire spring to necessiate the fitting of required Nos. of C.I.					
	Pulleys on heavy type solid drawn seamless steel tube complete with					
	locking arrangements both inside and outside specially builtup side					
	guide channels including providing a hood for the steel rolling					
	shutter in the room, painting two coats of approved aluminium paint					
	over a coat of red lead primer complete.					
16	Supplying, fitting & fixing UPVC pipes A- Type and fittings conforming to	Metre	15.00	291	4365.00	
	IS:13592-1992 with all necessary clamps nails, including making holes in					
	walls, floor etc. cutting trenches in any soil through masonry concrete					
	structures etc if necessary and mending good damages including joining					
	with jointing materails (Spun Yarn, Valamoid/Bitumen/M-Seal etc)					
	complete.					
	UPVC Pipes: 110 mm. Dia					
	Total				**1943928.54**	

DPR for MSW Management- Panihati						
Abstract - Substation Room - 6 m x 5 m						
Sl. No	Description of Item	Units	Qty	Rate	Amount	Remarks
				in INR	in INR	
1	Earth work in excavation of foundation trenches or	cum	8.00	120.47	963.76	PWD SOR Vol-I , Page no. 1
	drains, in all sorts of soil (including mixed soil but					
	excluding laterite or sandstone) including removing,					
	spreading or stacking the spoils within a lead of 75					
	m. as directed. The item includes necessary trimming					
	the sides of trenches, levelling, dressing and					
	ramming the bottom, bailing out water as required					
	complete. Depth of excavation not exceeding 1,500 mm.					
2	Anti termite treatment to back filling of the masonry	sqm	6.00	131	786.00	PWD SOR Vol-I , Page no. 4
	foundation with chemical emulsion by					
	admixing chloropyrofos emulsifiable concentrates					
	(1% concentration) with water by weight at the rate					
	of 7.5 Litres per sq. m. of the vertical surface of the					
	substructure for each side of the foundation.. The					
	work shall be carried out as per specification					
	described in 6.2.2. of code IS-6313 (part -II) 1981.					
	(Mode of measurment will be vertical area treated.)					
3	Filling in foundation or plinth by silver sand in	cum	2	98.524	197.05	PWD SOR Vol-I , Page no. 2
	layers not exceeding 150 mm as directed and					
	consolidating the same by thorough saturation with					
	water, ramming complete including the cost of					
	supply of sand. (payment to be made on					
	measurement of finished quantity)					
5	Single Brick Flat Soling of picked jhama bricks including	sqm	6	377	2262.00	PWD SOR Vol-I , Page no.12
	ramming and dressing bed to proper level and filling joints with					
	local sand.					
4	Ordinary Cement concrete (mix 1:1.5:3) with graded stone	cum	1.00	5389	5389.00	PWD SOR Vol-I , Page no. 15
	chips (20 mm nominal size) excluding shuttering and					
	reinforcement if any, in ground floor as per relevant IS codes.					
	Pakur Variety					

5	Supplying ready mixed concrete of M 25 Grade with well graded stone chips of 20 mm nominal size containing designed quantity of cement per Cu.m of wet concrete produced in computerised batching plant under controlled condition using approved super plastisizer, designing concrete mix following I.S. 10262 and I.S. 456, transporting the mix with agitation in transit mixer to work site depositing the mix on a platform erected for the purpose at required levels of concreting and then placing the mix in its final location of form work compacting and curing the same complete as per specification & direction of the Engineer-in-charge including computerised batching plant transit mixer with all accessories vibrators etc. inclusive of all other incidental charges in this connection complete but excluding cost of hire charge of platform and its supporting staging which would be paid through separate item. [cement to be supplied by the Manufacturer/ supplier]	cum	18	6884.00	123912.00	PWD SOR Vol-I , Page no. 22
5	Rainforced cement concrete					
	Reinforcement for reinforced concrete work in all sorts of	kg	1800.00	61.936	111484.80	PWD SOR Vol-I , Page no. 28
	structures including distribution bars, stirrups, binders etc					
	initial straightening and removal of loose rust (if necessary),					
	cutting to requisite length, hooking and bending to correct					
	shape, placing in proper position and binding with 16 gauge					
	black annealed wire at every intersection, complete as per					
	drawing and direction.					
	For works in foundation, basement and upto roof of ground					
	floor/upto 4 m- SAIL/ TATA/RINL					
7	Hire and labour charges for shuttering with centering and necessary staging					
	(a) 25 mm to 30 mm thick wooden shuttering as per decision &	sqm	70.00	351	24570.00	PWD SOR Vol-I , Page no. 27
	direction of Engineer-In-Charge.					
8	Brick work with 1st class bricks in cement mortar (1:6)	cum	8.00	5719	45752.00	PWD SOR Vol-I , Page no. 30
	foundation and plinth					
9	Brick work with 1st class bricks in cement mortar (1:6)					
	In superstructure, ground floor	cum	17.08	5943	101476.73	PWD SOR Vol-I , Page no. 30
10	Plastering					
	Plaster (to wall, floor, ceiling etc.) with sand and cement mortar					
	including rounding off or chamfering corners as directed and					
	raking out joints including throating, nosing and drip course,					
	scaffolding/staging where necessary (Ground floor).[Excluding					
	cost of chipping over concrete surface]					
	15 mm thick plaster with 1:6 cement mortar	sqm	230.00	156	35880.00	PWD SOR Vol-I , Page no. 164

11	Painting					
	Applying Interior grade Acrylic Primer of approved quality and brand					
	on plastered or concrete surface old or new surface to receive					
	Distemper/ Acrylic emulsion paint including scraping and preparing					
	the surface throughly, complete as per manufacturer's specification					
	and as per direction of the EIC. **(In Ground Floor)**					
	Two Coats- Solvent based interior grade Acrylic Primer	sqm	170.00	53.03	9015.10	PWD SOR Vol-I , Page no. 172
	Dry Distemparing to interior walls or ceiling including washing,					
	cleaning , washing, smoothening surface - Two Coats	sqm	115.00	51	5865.00	PWD SOR Vol-I , Page no. 174
12	With Sand Cement Mortar (1:4) 20 mm thick & 2 mm thick					
	cement slurry at back side of tiles using cement @ 2.91					
	Kg/Sq.m & joint filling using white cement slurry @					
	0.20kg/Sq.m.					
	Area of each tile above 0.09 Sq.m/ Coloured decorative	sqm	25.00	1038	25950.00	PWD SOR Vol-I , Page no. 54
13	Earth work in filling in foundation trenches or plinth					
	with good earth, in layers not exceeding 150 mm.					
	including watering and ramming etc. layer by layer					
	complete. (Payment to be made on the basis of					
	excavation					
	(including cost of excavation upto 1,800 mm. depth)					
	from land arranged by the Deptt. within a lead of 100 m.	cum	3.20	138.55	443.36	PWD SOR Vol-I , Page no. 1
14	Supplying, fitting and fixing windows and ventilators with or	sqm	4.00	1330	5320.00	PWD SOR Vol-I , Page no. 84
	without integrated grills conforming to IS 1038-1975 and					
	manufactured from rolled steel sections conforming to IS 7452-1974					
	with non-friction projecting type, box type hinges, glazing clips,					
	lugs locking bracket, handle plate etc, including hoisting in					
	position, straightening if required, fixing lugs in cement concrete (					
	1:2:4) with stone chips 20 mm down cutting holes and mending					
	good damages to match with existing surface complete in all respect					
	excluding glazing.					
	(a) Fixed type steel windows as per IS sizes with horizontal glazing bars.					
15	Supplying, fitting and fixing steel rolling shutter profile type with	sqm	7.00	2688	18816.00	PWD SOR Vol-I , Page no. 80
	18 B.G . of approved type steel latche section 75mm wide, fitted					
	with coil wire spring to necessiate the fitting of required Nos. of C.I.					
	Pulleys on heavy type solid drawn seamless steel tube complete with					
	locking arrangements both inside and outside specially builtup side					
	guide channels including providing a hood for the steel rolling					
	shutter in the room, painting two coats of approved aluminium paint					
	over a coat of red lead primer complete.					
16	Supplying, fitting & fixing UPVC pipes A- Type and fittings conforming to	Metre	10.00	291	2910.00	

	IS:13592-1992 with all necessary clamps nails, including making holes in					
	walls, floor etc. cutting trenches in any soil through masonry concrete					
	structures etc if necessary and mending good damages including joining					
	with jointing materails (Spun Yarn, Valamoid/Bitumen/M-Seal etc)					
	complete.					
	UPVC Pipes: 110 mm. Dia					
	Total				**520992.79**	

DPR for MSW Management- Panihati						
Abstract -Road - 6.0 wide and Parking 25 × 10 CP						
Sl. No	Description of Item	Units	Qty	Rate	Amount	Remarks
2	Earth work in excavation of foundation trenches or	cum	2625.00	120.47	316233.75	PWD SOR Vol-I , Page no. 1
	drains, in all sorts of soil (including mixed soil but					
	excluding laterite or sandstone) including removing,					
	spreading or stacking the spoils within a lead of 75					
	m. as directed. The item includes necessary trimming					
	the sides of trenches, levelling, dressing and					
	ramming the bottom, bailing out water as required					
	complete. Depth of excavation not exceeding 1,500 mm.					
3	Filling in foundation or plinth by silver sand in	cum	1660.00	98.524	163549.84	PWD SOR Vol-I , Page no. 2
	layers not exceeding 150 mm as directed and					
	consolidating the same by thorough saturation with					
	water, ramming complete including the cost of					
	supply of sand. (payment to be made on					
	measurement of finished quantity)					
4	Water Bound Macadam Sub Base by consolidating	cum	305.00	419	127795	Volume III: Road & Bridge Works
	Jhama metal / Laterite chelly or stone metal /					Page no. 244
	shingles of specific size in hard crust to requisite					
	thickness (measured after compaction) in layers					
	including screening of metals etc. as necessary,					
	hand packing, sweeping, watering and rolling in					
	stages with power roller to proper line, grade and					
	camber, lighting, guarding & barricading and					
	making necessary earthen bundh of one metre					
	width on each side where necessary to protect					
	edges and preparing the bed by necessary cutting					
	or filling and rolling all complete including the cost of					
	all materials and hire and labour charges of all men					
	and machineries and compacting to the required					
	density, as per Clause 404 of Specifications for Road					
	& Bridge Works of MoRT&H (5th Revision).					
	(i) For Construction of Sub Base by consolidating					
	screening :					
5	Providing and laying dense bituminous macadam	cum	185.00	1307	241795	Volume III: Road & Bridge Works
	with Hot Mix Plant producing an average output of					Page no. 250
	75 tonnes per hour using coarse aggregate,					
	fine aggregate, filler and bituminous binder as per design					
	Job Mix Formula conforming Marshall Method as per					
	specification, including screening, cleaning of chips					

	and preparing a uniform and quality mix in Hot Mix					
	Plant and ensuring a homogeneous mix, in which all					
	particles of the mineral aggregates are coated					
	uniformly, transporting the hot mix to work site, laying					
	the mixed materials at specified laying temperature					
	with a hydrostatic paver finisher with sensor control to					
	the required grade, level and alignment over					
	prepared surface coated with tack coat, rolling with					
	smooth wheeled, vibratory and tandem rollers for					
	break down, inter-mediate and finished rolling to					
	achieve the desired density of at least 98% of that of					
	Laboratory Marshall specimen, hand packing and					
	pinning to give an even surface including cost and					
	carriage of bitumen, coarse and fine aggregates					
	and filler materials and hire charges of machinery					
	and equipment for construction and quality control,					
	fuels and lubricants and wages of operational staff					
	complete as per Clause 505 of Specifications for					
	Road & Bridge Works of MoRT&H (5th Revision).					
	For Grading 1 (37.5 mm nominal size, 75-100 mm thick.)					
	Using Batch Type HMP of minimum capacity 100-120 TPH.					
7	Providing & laying Semi-dense Bituminous Concrete	cum	125.00	1278	159750	Volume III: Road & Bridge Works
	(SDBC) as wearing coarse by Hot Mix Plant, using					Page no. 251
	coarse aggregates, fine aggregates, filler materials					
	and binder of required specification and grading as					
	per approved job mix formula, over thoroughly					
	cleaned surface coated with tack coat, including					
	screening, cleaning of aggregates, mixing the					
	components as per approved Job Mix Formula with					
	hot binder, carrying the mixture by tipper truck or					
	any other approved suitable arrangements, laying					
	the mixture uniformly, maintaining the specified					
	laying temperature, thorough rolling with power roller					
	with necessary hand packing and pinning to give an					
	uniform surface to achieve the desired density of at					
	least 98% of that of Laboratory Marshall specimen					
	including the cost and carriage of aggregates, filler					
	and binder, heating the binder, preheating the					
	aggregates, and filler to the specified temperature					
	including the hire charges of Hot Mix Plant and other					
	machineries, pay of operators, cost of fuel and lubricants					
	and all other incidental charges complete.					
	For Grading 1					
	(13 mm nominal size, **35-40 mm thick.**)					
	Using Batch Type HMP of minimum capacity					

	100-120 TPH.					
8	Construction of granular sub-base by providing	cum	365.00	397	144905	Volume III: Road & Bridge Works
	graded material, mixing in Wet Mix Plant at					Page no. 251
	OMC, carriage of mixed material to work site,					
	spreading in uniform layers with Motor grader					
	on prepared surface in proper grade and					
	camber, compacting with vibratory power					
	roller to achieve the desired density, including					
	lighting, guarding, barricading, including cost					
	of all materials, machinery, tools and plants and					
	cost of quality control complete as per Clause					
	401 of Specifications for Road & Bridge Works of					
	MoRT&H (5th Revision).					
	(i) Grading - I					
9	Providing and laying bituminous macadam with Hot	cum	62.00	1136	70432	Volume III: Road & Bridge Works
	Mix Plant using approved crushed aggregates of					Page no. 249
	specified grading as per Table 500.7 premixed with					
	bituminous binder, transported to site laid over a					
	previously prepared surface at specified laying					
	temperature with paver finisher to the required					
	grade, level and alignment and rolled with suitable					
	power roller for break down, inter-mediate and					
	finished rolling as per specification to achieve the desired -					
	compaction including cost and carriage of stone					
	materials and bitumen, hire charges of machinery					
	and equipment, cost of fuel and lubricants and					
	wages of operational staff, quality control complete					
	as per Clause 504 of Specifications for Road & Bridge					
	Works of MoRT&H (5th Revision).					
	For Grading 2 (19 mm nominal size, 50-75 mm thick.)					
	Using Drum mix Type HMP of minimum capacity					
	40-60 TPH.					
10	Brick soling with picked jhama bricks including preparation of bed as	sqm	182.00	695	126490.00	PWD SOR Vol-I , Page no. 201
	necessary with brick joints properly filled in and packed with powdered					
	earth and including necessary cushion of similar material below the					
	soling (and in between layers when more than one layer is used)					
	completes as per direction.					
	(b) Double brick flat soling (thickness 150 mm.)					
11	Construction of subgrade and earthen shoulders with	cum	60.00	94.8	5688.00	Volume III: Road & Bridge Works

	approved material obtained from borrow pits with all					Page no. 236
	lifts and leads, transporting to site, spreading, grading					
	to required slope and compacted to meet					
	requirement of Table 300.2 with lead upto 1000 m as					
	per Technical Specification Clause 303.1 for Rural					
	Roads of MORD. (Borrow pit /pre work post work					
	measurement)					
12	Anti termite treatment to back filling of the masonry foundation	sqm	250.00	131	32750.00	PWD SOR Vol-I , Page no. 4
	with chemical emulsion by admixing chloropyrofos emulsifiable					
	concentrates (1% concentration) with water by weight at the rate					
	of 7.5 Litres per sq. m. of the vertical surface of the					
	substructure for each side of the foundation.. The					
	work shall be carried out as per specification					
	described in 6.2.2. of code IS-6313 (part -II) 1981.					
	(Mode of measurment will be vertical area treated.)					
7	Ordinary Cement concrete (mix 1:1.5:3) with graded stone	cum	11.00	5389	59279.00	PWD SOR Vol-I , Page no. 15
	chips (20 mm nominal size) excluding shuttering and					
	reinforcement if any, in ground floor as per relevant IS codes.					
	Pakur Variety					
11	Supplying ready mixed concrete of M 20 Grade with well	cum	60.00	6411	384660.00	PWD SOR Vol-I , Page no. 21
	graded stone chips of 20 mm nominal size containing designed					
	quantity of cement per Cu.m of wet concrete produced in					
	computerised batching plant under controlled condition using					
	approved super plastisizer, designing concrete mix following					
	I.S. 10262 and I.S. 456, transporting the mix with agitation in					
	transit mixer to work site depositing the mix on a platform					
	erected for the purpose at required levels of concreting and					
	then placing the mix in its final location of form work,					
	compacting and curing the same complete as per specification					
	& direction of the Engineer-in-charge including computerised					
	batching plant transit mixer with all accessories vibrators etc.					
	inclusive of all other incidental charges in this connection					
	complete but excluding cost of hire charge of platform and its					
	supporting staging which would be paid through separate item.					
	[Cement to be supplied by the Manufacturer or supplier]					
	With approved concrete pump.					
19	Brick work with 1st class bricks in cement mortar (1:4)	cum	14.00	6068	84952.00	PWD SOR Vol-I , Page no. 30
	(a) In foundation and plinth					
9	Plastering					

	Plaster (to wall, floor, ceiling etc.) with sand and cement mortar					
	including rounding off or chamfering corners as directed and					
	raking out joints including throating, nosing and drip course,					
	scaffolding/staging where necessary (Ground floor).[Excluding					
	cost of chipping over concrete surface]					
	15 mm thick plaster with 1:6 cement mortar	sqm	16.00	156	2496.00	PWD SOR Vol-I , Page no. 164
13	Reinforcement for reinforced concrete work in					
	structures including distribution bars, stirrups, binders etc					
	initial straightening and removal of loose rust (if necessary),					
	cutting to requisite length, hooking and bending to correct					
	shape, placing in proper position and binding with 16 gauge					
	black annealed wire at every intersection, complete as per					
	drawing and direction.	kg	6000.00	61.936	371616.00	PWD SOR Vol-I , Page no. 28
12	Supplying, fitting and fixing glass reinforced polyester	sqm	330.00	1133	373890.00	PWD SOR Vol-I , Page no. 65
	translucent fiber glass sheet to match with GCI Corrugation					
	as per IS: 12866 - 1989 in roof fitted and fixed with 10 mm					
	dia "J" or "L" hook, bolts and nuts, limpet and bitumen					
	washers and putty with 150mm end lap and one corrugation					
	minimum side lap complete.					
	b) 2.0mm +/- 0.2 mm thick sheet.(3.25Kg/Sq.m)					
13	M.S. structural works in columns, beams etc. with simple rolled	MT	0.80	68292	54633.60	PWD SOR Vol-I , Page no. 74
	structural members (e.g. joists, angle, channel sections conforming					
	to IS: 226, IS: 808 & SP (6)- 1964 connected to one another with					
	bracket, gussets, cleats as per design, direction of Engineer-in-					
	charge complete including cutting to requisite shape and length,					
	fabrication with necessary bolting, metal arc welding conforming to					
	IS: 816- 1956 & IS: 1995 using electrodes of approved make and					
	brand conforming to IS:814- 1957, haulage, hoisting and erection					
	all complete. The rate includes the cost of rolled steel section,					
	consumables such as electrodes, gas and hire charge of all tools					
	and plants and labour required for the work including all incidental					
	chages such as electricity charges, labour insurance charges etc.					
	I) For structural members of specified sections weighing less than					
	22.5 Kg./m					
12	Earth work in filling in foundation trenches or plinth	cum	210.00	138.55	29095.50	PWD SOR Vol-I , Page no. 1
	with good earth, in layers not exceeding 150 mm.					
	including watering and ramming etc. layer by layer					
	complete. (Payment to be made on the basis of measurement of					
	finished quantity of work) With earth obtained by fresh excavation					
	(including cost of excavation upto 1,800 mm. depth)					

	from land arranged by the Deptt. within a lead of 100 m.					
	Road Sign & Road Marking				50000.00	approx
	Total				**2800010.69**	

DPR for MSW Management- Panihati

Abstract -Road - 6.0 wide and Parking 20 × 8 SLF

Sl. No	Description of Item	Units	Qty	Rate	Amount	Remarks
1	Site filling upto G.L which is 2.5mt from the pond bed level	cum	1504.00	517	777568	PWD SOR Vol-I , Page no. 1
3	Filling in foundation or plinth by silver sand in	cum	815.00	98.524	80297.06	PWD SOR Vol-I , Page no. 2
	layers not exceeding 150 mm as directed and					
	consolidating the same by thorough saturation with					
	water, ramming complete including the cost of					
	supply of sand. (payment to be made on					
	measurement of finished quantity)					
4	Water Bound Macadam Sub Base by consolidating	cum	141.00	419	59079	Volume III: Road & Bridge Works
	Jhama metal / Laterite chelly or stone metal /					Page no. 244
	shingles of specific size in hard crust to requisite					
	thickness (measured after compaction) in layers					
	including screening of metals etc. as necessary,					
	hand packing, sweeping, watering and rolling in					
	stages with power roller to proper line, grade and					
	camber, lighting, guarding & barricading and					
	making necessary earthen bundh of one metre					
	width on each side where necessary to protect					
	edges and preparing the bed by necessary cutting					
	or filling and rolling all complete including the cost of					
	all materials and hire and labour charges of all men					
	and machineries and compacting to the required					
	density, as per Clause 404 of Specifications for Road					
	& Bridge Works of MoRT&H (5th Revision).					
	(i) For Construction of Sub Base by consolidating					
	screening :					
5	Providing and laying dense bituminous macadam	cum	98.10	1307	128216.7	Volume III: Road & Bridge Works
	with Hot Mix Plant producing an average output of					Page no. 250
	75 tonnes per hour using coarse aggregate,					
	fine aggregate, filler and bituminous binder as per design					

	Job Mix Formula conforming Marshall Method as per					
	specification, including screening, cleaning of chips					
	and preparing a uniform and quality mix in Hot Mix					
	Plant and ensuring a homogeneous mix, in which all					
	particles of the mineral aggregates are coated					
	uniformly, transporting the hot mix to work site, laying					
	the mixed materials at specified laying temperature					
	with a hydrostatic paver finisher with sensor control to					
	the required grade, level and alignment over					
	prepared surface coated with tack coat, rolling with					
	smooth wheeled, vibratory and tandem rollers for					
	break down, inter-mediate and finished rolling to					
	achieve the desired density of at least 98% of that of					
	Laboratory Marshall specimen, hand packing and					
	pinning to give an even surface including cost and					
	carriage of bitumen, coarse and fine aggregates					
	and filler materials and hire charges of machinery					
	and equipment for construction and quality control,					
	fuels and lubricants and wages of operational staff					
	complete as per Clause 505 of Specifications for					
	Road & Bridge Works of MoRT&H (5th Revision).					
	For Grading 1 (37.5 mm nominal size, 75-100 mm thick.)					
	Using Batch Type HMP of minimum capacity 100-120 TPH.					
7	Providing & laying Semi-dense Bituminous Concrete	cum	56.40	1278	72079.2	Volume III: Road & Bridge Works
	(SDBC) as wearing coarse by Hot Mix Plant, using					Page no. 251
	coarse aggregates, fine aggregates, filler materials					
	and binder of required specification and grading as					
	per approved job mix formula, over thoroughly					
	cleaned surface coated with tack coat, including					
	screening, cleaning of aggregates, mixing the					
	components as per approved Job Mix Formula with					
	hot binder, carrying the mixture by tipper truck or					
	any other approved suitable arrangements, laying					
	the mixture uniformly, maintaining the specified					
	laying temperature, thorough rolling with power roller					
	with necessary hand packing and pinning to give an					
	uniform surface to achieve the desired density of at					

	least 98% of that of Laboratory Marshall specimen					
	including the cost and carriage of aggregates, filler					
	and binder, heating the binder, preheating the					
	aggregates, and filler to the specified temperature					
	including the hire charges of Hot Mix Plant and other					
	machineries, pay of operators, cost of fuel and lubricants					
	and all other incidental charges complete.					
	For Grading 1					
	(13 mm nominal size, **35-40 mm thick.**)					
	Using Batch Type HMP of minimum capacity					
	100-120 TPH.					
8	Construction of granular sub-base by providing	cum	170.00	397	67490	Volume III: Road & Bridge Works
	graded material, mixing in Wet Mix Plant at					Page no. 251
	OMC, carriage of mixed material to work site,					
	spreading in uniform layers with Motor grader					
	on prepared surface in proper grade and					
	camber, compacting with vibratory power					
	roller to achieve the desired density, including					
	lighting, guarding, barricading, including cost					
	of all materials, machinery, tools and plants and					
	cost of quality control complete as per Clause					
	401 of Specifications for Road & Bridge Works of					
	MoRT&H (5th Revision).					
	(i) Grading – 1					
9	Providing and laying bituminous macadam with Hot	cum	28.20	1136	32035.2	Volume III: Road & Bridge Works
	Mix Plant using approved crushed aggregates of					Page no. 249
	specified grading as per Table 500.7 premixed with					
	bituminous binder, transported to site laid over a					
	previously prepared surface at specified laying					
	temperature with paver finisher to the required					
	grade, level and alignment and rolled with suitable					
	power roller for break down, inter-mediate and					
	finished rolling as per specification to achieve the desired -					
	compaction including cost and carriage of stone					
	materials and bitumen, hire charges of machinery					
	and equipment, cost of fuel and lubricants and					

	wages of operational staff, quality control complete					
	as per Clause 504 of Specifications for Road & Bridge					
	Works of MoRT&H (5th Revision).					
	For Grading 2 (19 mm nominal size, 50-75 mm thick.)					
	Using Drum mix Type HMP of minimum capacity					
	40-60 TPH.					
10	Brick soling with picked jhama bricks including preparation of bed as	sqm	85.00	695	59075.00	PWD SOR Vol-I , Page no. 201
	necessary with brick joints properly filled in and packed with powdered					
	earth and including necessary cushion of similar material below the					
	soling (and in between layers when more than one layer is used)					
	completes as per direction.					
	(b) Double brick flat soling (thickness 150 mm.)					
11	Construction of subgrade and earthen shoulders with	cum	28.20	94.8	2673.36	Volume III: Road & Bridge Works
	approved material obtained from borrow pits with all					Page no. 236
	lifts and leads, transporting to site, spreading, grading					
	to required slope and compacted to meet					
	requirement of Table 300.2 with lead upto 1000 m as					
	per Technical Specification Clause 303.1 for Rural					
	Roads of MORD. (Borrow pit /pre work post work					
	measurement)					
12	Anti termite treatment to back filling of the masonry foundation	sqm	160.00	131	20960.00	PWD SOR Vol-I , Page no. 4
	with chemical emulsion by admixing chloropyrofos emulsifiable					
	concentrates (1% concentration) with water by weight at the rate					
	of 7.5 Litres per sq. m. of the vertical surface of the					
	substructure for each side of the foundation.. The					
	work shall be carried out as per specification					
	described in 6.2.2. of code IS-6313 (part -II) 1981.					
	(Mode of measurment will be vertical area treated.)					
13	Ordinary Cement concrete (mix 1:1.5:3) with graded stone	cum	8.20	5389	44189.80	PWD SOR Vol-I , Page no. 15
	chips (20 mm nominal size) excluding shuttering and					
	reinforcement if any, in ground floor as per relevant IS codes.					
	Pakur Variety					
11	Supplying ready mixed concrete of M 20 Grade with well	cum	40.00	6411	256440.00	PWD SOR Vol-I , Page no. 21

	graded stone chips of 20 mm nominal size containing designed					
	quantity of cement per Cu.m of wet concrete produced in					
	computerised batching plant under controlled condition using					
	approved super plastisizer, designing concrete mix following					
	I.S. 10262 and I.S. 456, transporting the mix with agitation in					
	transit mixer to work site depositing the mix on a platform					
	erected for the purpose at required levels of concreting and					
	then placing the mix in its final location of form work,					
	compacting and curing the same complete as per specification					
	& direction of the Engineer-in-charge including computerised					
	batching plant transit mixer with all accessories vibrators etc.					
	inclusive of all other incidental charges in this connection					
	complete but excluding cost of hire charge of platform and its					
	supporting staging which would be paid through separate item.					
	[Cement to be supplied by the Manufacturer or supplier]					
	With approved concrete pump.					
19	Brick work with 1st class bricks in cement mortar (1:4)	cum	11.00	6068	66748.00	PWD SOR Vol-I , Page no. 30
	(a) In foundation and plinth					
9	Plastering					
	Plaster (to wall, floor, ceiling etc.) with sand and cement mortar					
	including rounding off or chamfering corners as directed and					
	raking out joints including throating, nosing and drip course,					
	scaffolding/staging where necessary (Ground floor).[Excluding					
	cost of chipping over concrete surface]					
	15 mm thick plaster with 1:6 cement mortar	sqm	13.00	156	2028.00	PWD SOR Vol-I , Page no. 164
13	Reinforcement for reinforced concrete work in					
	structures including distribution bars, stirrups, binders etc					
	initial straightening and removal of loose rust (if necessary),					
	cutting to requisite length, hooking and bending to correct					

	shape, placing in proper position and binding with 16 gauge					
	black annealed wire at every intersection, complete as per					
	drawing and direction.	kg	4000.00	61.936	247744.00	PWD SOR Vol-I , Page no. 28
12	Supplying, fitting and fixing glass reinforced polyester	sqm	220.00	1133	249260.00	PWD SOR Vol-I , Page no. 65
	translucent fiber glass sheet to match with GCI Corrugation					
	as per IS: 12866 - 1989 in roof fitted and fixed with 10 mm					
	dia "J" or "L" hook, bolts and nuts, limpet and bitumen					
	washers and putty with 150mm end lap and one corrugation					
	minimum side lap complete.					
	b) 2.0mm +/- 0.2 mm thick sheet.(3.25Kg/Sq.m)					
13	M.S. structural works in columns, beams etc. with simple rolled	MT	0.80	68292	54633.60	PWD SOR Vol-I , Page no. 74
	structural members (e.g. joists, angle, channel sections conforming					
	to IS: 226, IS: 808 & SP (6)- 1964 connected to one another with					
	bracket, gussets, cleats as per design, direction of Engineer-in-					
	charge complete including cutting to requisite shape and length,					
	fabrication with necessary bolting, metal arc welding conforming to					
	IS: 816- 1956 & IS: 1995 using electrodes of approved make and					
	brand conforming to IS:814- 1957, haulage, hoisting and erection					
	all complete. The rate includes the cost of rolled steel section,					
	consumables such as electrodes, gas and hire charge of all tools					
	and plants and labour required for the work including all incidental					
	chages such as electricity charges, labour insurance charges etc.					
	I) For structural members of specified sections weighing less than					
	22.5 Kg./m					
12	Earth work in filling in foundation trenches or plinth	cum	122.00	138.55	16903.10	PWD SOR Vol-I , Page no. 1
	with good earth, in layers not exceeding 150 mm.					
	including watering and ramming etc. layer by layer					
	complete. (Payment to be made on the basis of measurement of					
	finished quantity of work) With earth obtained by fresh excavation					
	(including cost of excavation upto 1,800 mm. depth)					
	from land arranged by the Deptt. within a lead of 100 m.					
	Road Sign & Road Marking				50000.00	approx
	Total				**2287420.02**	

Abstract - Aerated Lagoon - 30.0 m x 20.0 m at top						
Sl. No	Description of Item	Units	Qty	Rate	Amount	Remarks
1	Site filling upto design level which is 1.5mt from the pond bed level	cum	2162.50	517	1118012.5	
2	Construction of embankment with approved material	cum	580.00	517	299860	Volume III: Road & Bridge
	obtained from borrow pits with a lift upto 1.5 m,					Work; Page no. 236
	transporting to site, spreading, grading to required					
	slope and compacting to meet requirement of Tables					
	300.1 and 300.2 with a lead upto 1000 m as per					
	Technical Specification Clause 301.5 for Rural Roads of					
	MORD. (Mode of measurement: pre works and post works)					
3	Ordinary Cement concrete (mix 1:1.5:3) with graded stone	cum	20.00	5389	107780.00	PWD SOR Vol-I , Page no. 15
	chips (20 mm nominal size) excluding shuttering and					
	reinforcement if any, in ground floor as per relevant IS codes.					
	Pakur Variety					
8	Supplying ready mixed concrete of M 25 Grade with well	cum	18.00	6884	123912.00	PWD SOR Vol-I , Page no. 22
	graded stone chips of 20 mm nominal size containing designed					
	quantity of cement per Cu.m of wet concrete produced in					
	computerised batching plant under controlled condition using					
	approved super plastisizer, designing concrete mix following					
	I.S. 10262 and I.S. 456, transporting the mix with agitation in					
	transit mixer to work site depositing the mix on a platform					
	erected for the purpose at required levels of concreting and					
	then placing the mix in its final location of form work.					

	compacting and curing the same complete as per specification					
	& direction of the Engineer-in-charge including computerised					
	batching plant transit mixer with all accessories vibrators etc.					
	inclusive of all other incidental charges in this connection					
	complete but excluding cost of hire charge of platform and its					
	supporting staging which would be paid through separate item.					
	[Cement to be supplied by the Manufacturer or supplier]					
	With approved concrete pump.					
4	Rainforced cement concrete					
	Reinforcement for reinforced concrete work in all sorts of	kg	1800.00	61.936	111484.80	PWD SOR Vol-I . Page no. 28
	structures including distribution bars, stirrups, binders etc					
	initial straightening and removal of loose rust (if necessary),					
	cutting to requisite length, hooking and bending to correct					
	shape, placing in proper position and binding with 16 gauge					
	black annealed wire at every intersection, complete as per					
	drawing and direction.					
	For works in foundation, basement and upto roof of ground					
	floor/upto 4 m- SAIL/ TATA/RINL					
5	Supplying and laying of 1.5 mm thick flat cost geomembrane to correct profile	sqm	730.00	450	328500.00	http://www.indiamart.com/kohino
	as per drawing and specification including unrolling, cutting ,testing ,placing					
	in proper position and jointing the side through welding and					
	anchoring the side anchor trench.					
	Total				**2089549.30**	

Abstract - Sedimentation Pond - Trapizoidal Shape						
Sl. No	Description of Item	Units	Qty	Rate	Amount	Remarks
1	Site filling upto design level which is 1.5mt from the pond bed level	cum	910.00	517	470470	
2	Construction of embankment with approved material	cum	140.00	85.6	11984	Volume III: Road & Bridge
	obtained from borrow pits with a lift upto 1.5 m,					Work; Page no. 236
	transporting to site, spreading, grading to required					
	slope and compacting to meet requirement of Tables					
	300.1 and 300.2 with a lead upto 1000 m as per					
	Technical Specification Clause 301.5 for Rural Roads of					
	MORD. (Mode of measurement: pre works and post works)					
3	Ordinary Cement concrete (mix 1:1.5:3) with graded stone	cum	16.00	5389	86224.00	PWD SOR Vol-I , Page no. 15
	chips (20 mm nominal size) excluding shuttering and					
	reinforcement if any, in ground floor as per relevant IS codes.					
	Pakur Variety					
8	Supplying ready mixed concrete of M 25 Grade with well	cum	25.00	6884	172100.00	PWD SOR Vol-I , Page no. 22
	graded stone chips of 20 mm nominal size containing designed					
	quantity of cement per Cu.m of wet concrete produced in					
	computerised batching plant under controlled condition using					
	approved super plastisizer, designing concrete mix following					
	I.S. 10262 and I.S. 456, transporting the mix with agitation in					
	transit mixer to work site depositing the mix on a platform					
	erected for the purpose at required levels of concreting and					
	then placing the mix in its final location of form work,					

	compacting and curing the same complete as per specification					
	& direction of the Engineer-in-charge including computerised					
	batching plant transit mixer with all accessories vibrators etc.					
	inclusive of all other incidental charges in this connection					
	complete but excluding cost of hire charge of platform and its					
	supporting staging which would be paid through separate item.					
	[Cement to be supplied by the Manufacturer or supplier]					
	With approved concrete pump.					
4	Rainforced cement concrete					
	Reinforcement for reinforced concrete work in all sorts of	kg	2500.00	61.936	154840.00	PWD SOR Vol-I , Page no. 28
	structures including distribution bars, stirrups, binders etc					
	initial straightening and removal of loose rust (if necessary),					
	cutting to requisite length, hooking and bending to correct					
	shape, placing in proper position and binding with 16 gauge					
	black annealed wire at every intersection, complete as per					
	drawing and direction.					
	For works in foundation, basement and upto roof of ground					
	floor/upto 4 m- SAIL/ TATA/RINL					
5	Supplying and laying of 1.5 mm thick flat cost geomembrane to correct profile	sqm	340.00	450	153000.00	
	as per drawing and specification including unrolling, cutting ,testing ,placing					
	in proper position and jointing the side through welding and					
	anchoring the side anchor trench.					
	Total				**1048618.00**	

DPR for MSW Management- Panihati						
Abstract - CP Drain 1mt wide						
Sl. No	Description of Item	Units	Qty	Rate	Amount	Remarks
				in INR	in INR	
2	Earth work in excavation of foundation trenches or	cum	690.00	120.47	83124.30	PWD SOR Vol-I , Page no. 1
	drains, in all sorts of soil (including mixed soil but					
	excluding laterite or sandstone) including removing,					
	spreading or stacking the spoils within a lead of 75					
	m. as directed. The item includes necessary trimming					
	the sides of trenches, levelling, dressing and					
	ramming the bottom, bailing out water as required					
	complete. Depth of excavation not exceeding 1,500 mm.					
6	Ordinary Cement concrete (mix 1:1.5:3) with graded stone	cum	135.00	5389	727515.00	PWD SOR Vol-I , Page no. 15
	chips (20 mm nominal size) excluding shuttering and					
	reinforcement if any, in ground floor as per relevant IS codes.					
	Pakur Variety					
7	Hire and labour charges for shuttering with centering and necessary staging					
	(a) 25 mm to 30 mm thick wooden shuttering as per decision &	sqm	150.00	351	52650.00	PWD SOR Vol-I , Page no. 27

	direction of Engineer-In-Charge.					
8	Brick work with 1st class bricks in cement mortar (1:4)	cum	200.00	6068	1213600.00	PWD SOR Vol-I , Page no. 30
	foundation and plinth					
10	Plastering					
	Plaster (to wall, floor, ceiling etc.) with sand and cement mortar					
	including rounding off or chamfering corners as directed and					
	raking out joints including throating, nosing and drip course,					
	scaffolding/staging where necessary (Ground floor).[Excluding					
	cost of chipping over concrete surface]					
	15 mm thick plaster with 1:4 cement mortar	sqm	2380.00	176	418880.00	PWD SOR Vol-I , Page no. 164
11	Neat cement punning about 1.5mm thick in wall,dado,window	sqm	2380.00	38	90440.00	PWD SOR Vol-I , Page no. 166
	sill,floor etc.					
	NOTE:Cement 0.152 cu.m per100 sq.m.					
	Total				**2586209.30**	

DPR for MSW Management- Panihati						
Abstract - SLF Drain 1mt wide						
Sl. No	Description of Item	Units	Qty	Rate	Amount	Remarks
				in INR	in INR	
1	Site filling upto design level which is 1.5mt from the pond bed level	cum	1170.00	517	604890	
6	Ordinary Cement concrete (mix 1:1.5:3) with graded stone	cum	95.00	5389	511955.00	PWD SOR Vol-I , Page no. 15
	chips (20 mm nominal size) excluding shuttering and					
	reinforcement if any, in ground floor as per relevant IS codes					
	Pakur Variety					
7	Hire and labour charges for shuttering with centering and necessary staging upto					
	(a) 25 mm to 30 mm thick wooden shuttering as per decision &	sqm	120.00	351	42120.00	PWD SOR Vol-I , Page no. 27
	direction of Engineer-In-Charge.					
8	Brick work with 1st class bricks in cement mortar (1:4)	cum	120.00	6068	728160.00	PWD SOR Vol-I , Page no. 30
	foundation and plinth					
10	Plastering					
	Plaster (to wall, floor, ceiling etc.) with sand and cement mortar					
	including rounding off or chamfering corners as directed and					
	raking out joints including throating, nosing and drip course,					
	scaffolding/staging where necessary (Ground floor).[Excluding					
	cost of chipping over concrete surface]					
	15 mm thick plaster with 1:4 cement mortar	sqm	1530.00	176	269280.00	PWD SOR Vol-I , Page no. 164
11	Neat cement punning about 1.5mm thick in wall,dado,window	sqm	1530.00	38	58140.00	PWD SOR Vol-I , Page no. 166
	sill,floor etc.					
	NOTE:Cement 0.152 cu.m per100 sq.m.					
	Total				**2214545.00**	

DPR for MSW Management- Panihati						Remarks
Abstract -CP Boundary Wall 2m height						
Sl. No	Description of Item	Units	Qty	Rate	Amount	
				in INR	in INR	
1	Earth work in excavation of foundation trenches or	cum	1010.00	120.47	121674.70	PWD SOR Vol-I , Page no. 1
	drains, in all sorts of soil (including mixed soil but					
	excluding laterite or sandstone) including removing,					
	spreading or stacking the spoils within a lead of 75					
	m. as directed. The item includes necessary trimming					
	the sides of trenches, levelling, dressing and					
	ramming the bottom, bailing out water as required					
	complete. Depth of excavation not exceeding 1,500 mm.					
2	Filling in foundation or plinth by silver sand in	cum	505	98.524	49754.62	PWD SOR Vol-I , Page no. 2
	layers not exceeding 150 mm as directed and					
	consolidating the same by thorough saturation with					
	water, ramming complete including the cost of					
	supply of sand. (payment to be made on					
	measurement of finished quantity)					
3	Single Brick Flat Soling of picked jhama bricks including	sqm	82	377	30914	PWD SOR Vol-I , Page no. 12
	ramming and dressing bed to proper level and filling joints with					
	local sand.					
5	Ordinary Cement concrete (mix 1:1.5:3) with graded stone	cum	82.00	5389	441898.00	PWD SOR Vol-I , Page no. 15
	chips (20 mm nominal size) excluding shuttering and					
	reinforcement if any, in ground floor as per relevant IS codes.					
	Pakur Variety					

5	Supplying ready mixed concrete of M 25 Grade with well graded stone chips of 20 mm nominal size containing designed quantity of cement per Cu.m of wet concrete produced in computerised batching plant under controlled condition using approved super plastisizer, designing concrete mix following I.S. 10262 and I.S. 456, transporting the mix with agitation in transit mixer to work site depositing the mix on a platform erected for the purpose at required levels of concreting and then placing the mix in its final location of form work compacting and curing the same complete as per specification & direction of the Engineer-in-charge including computerised batching plant transit mixer with all accessories vibrators etc. inclusive of all other incidental charges in this connection complete but excluding cost of hire charge of platform and its supporting staging which would be paid through separate item. [cement to be supplied by the Manufacturer/ supplier]	cum	192	6884.00	1321728.00	PWD SOR Vol-I , Page no. 22
6	Rainforced cement concrete					
	Reinforcement for reinforced concrete work in all sorts of	kg	19200.00	61.936	1189171.20	PWD SOR Vol-I , Page no. 28
	structures including distribution bars, stirrups, binders etc					
	initial straightening and removal of loose rust (if necessary),					
	cutting to requisite length, hooking and bending to correct					
	shape, placing in proper position and binding with 16 gauge					
	black annealed wire at every intersection, complete as per					
	drawing and direction.					
	For works in foundation, basement and upto roof of ground					
	floor/upto 4 m- SAIL/ TATA/RINL					
7	Hire and labour charges for shuttering with centering and necessary					
	(a) 25 mm to 30 mm thick wooden shuttering as per decision &	sqm	220.00	351	77220.00	PWD SOR Vol-I , Page no. 27
	direction of Engineer-In-Charge.					

7	Brick work with 1st class bricks in cement mortar (1:6)	cum	110.00	5719	629090.00	PWD SOR Vol-I , Page no. 30
	foundation and plinth					
9	Brick work with 1st class bricks in cement mortar (1:6)					
	In superstructure, ground floor	cum	580.00	5943	3446940.00	PWD SOR Vol-I , Page no. 30
10	Plastering					
	Plaster (to wall, floor, ceiling etc.) with sand and cement mortar					
	including rounding off or chamfering corners as directed and					
	raking out joints including throating, nosing and drip course,					
	scaffolding/staging where necessary (Ground floor).[Excluding					
	cost of chipping over concrete surface]					
	15 mm thick plaster with 1:6 cement mortar	sqm	2800.00	156	436800.00	PWD SOR Vol-I , Page no. 164
11	Painting					
	Applying Interior grade Acrylic Primer of approved quality and brand					
	on plastered or concrete surface old or new surface to receive					
	Distemper/ Acrylic emulsion paint including scraping and preparing					
	the surface throughly, complete as per manufacturer's specification					
	and as per direction of the EIC. **(In Ground Floor)**					
	Two Coats- Solvent based interior grade Acrylic Primer	sqm	2800.00	53.03	148484.00	PWD SOR Vol-I , Page no. 172
	1 no. 6mt wide Gate	nos	2	80000	160000.00	
	Total				**8053674.52**	

DPR for MSW Management- Panihati Abstract -SLF Boundary Wall 2m height						Remarks
Sl. No	Description of Item	Units	Qty	Rate	Amount	
				in INR	in INR	
2	Filling in foundation or plinth by silver sand in	cum	365	98.524	35961.26	PWD SOR Vol-I , Page no. 2
	layers not exceeding 150 mm as directed and					
	consolidating the same by thorough saturation with					
	water, ramming complete including the cost of					
	supply of sand. (payment to be made on					
	measurement of finished quantity)					
3	Single Brick Flat Soling of picked jhama bricks including	sqm	60	377	22620	PWD SOR Vol-I , Page no. 12
	ramming and dressing bed to proper level and filling joints with					
	local sand.					
4	Ordinary Cement concrete (mix 1:1.5:3) with graded stone	cum	60.00	5389	323340.00	PWD SOR Vol-I , Page no. 15
	chips (20 mm nominal size) excluding shuttering and					
	reinforcement if any, in ground floor as per relevant IS codes.					
	Pakur Variety					
8	Supplying ready mixed concrete of M 25 Grade with well	cum	145.00	6884	998180.00	PWD SOR Vol-I , Page no. 22
	graded stone chips of 20 mm nominal size containing designed					
	quantity of cement per Cu.m of wet concrete produced in					
	computerised batching plant under controlled condition using					
	approved super plastisizer, designing concrete mix following					
	I.S. 10262 and I.S. 456, transporting the mix with agitation in					
	transit mixer to work site depositing the mix on a platform					
	erected for the purpose at required levels of concreting and					
	then placing the mix in its final location of form work,					
	compacting and curing the same complete as per specification					
	& direction of the Engineer-in-charge including computerised					
	batching plant transit mixer with all accessories vibrators etc.					
	inclusive of all other incidental charges in this connection					
	complete but excluding cost of hire charge of platform and its					
	supporting staging which would be paid through separate item.					
	[Cement to be supplied by the Manufacturer or supplier]					
	With approved concrete pump.					
6	Rainforced cement concrete					
	Reinforcement for reinforced concrete work in all sorts of	kg	14100.00	61.936	873297.60	PWD SOR Vol-I , Page no. 28

	structures including distribution bars, stirrups, binders etc					
	initial straightening and removal of loose rust (if necessary),					
	cutting to requisite length, hooking and bending to correct					
	shape, placing in proper position and binding with 16 gauge					
	black annealed wire at every intersection, complete as per					
	drawing and direction.					
	For works in foundation, basement and upto roof of ground					
	floor/upto 4 m- SAIL/ TATA/RINL					
7	Hire and labour charges for shuttering with centering and necessary staging upto					
	(a) 25 mm to 30 mm thick wooden shuttering as per decision &	sqm	200.00	351	70200.00	PWD SOR Vol-I , Page no. 27
	direction of Engineer-In-Charge.					
8	Brick work with 1st class bricks in cement mortar (1:4)	cum	400.00	6068	2427200.00	PWD SOR Vol-I , Page no. 30
	foundation and plinth					
9	Brick work with 1st class bricks in cement mortar (1:6)					
	In superstructure, ground floor	cum	430.00	5943	2555490.00	PWD SOR Vol-I , Page no. 30
10	Plastering					
	Plaster (to wall, floor, ceilmg etc.) with sand and cement mortar					
	including rounding off or chamfering corners as directed and					
	raking out joints including throating, nosing and drip course,					
	scaffolding/staging where necessary (Ground floor) [Excluding					
	cost of chipping over concrete surface]					
	15 mm thick plaster with 1:6 cement mortar	sqm	2041.00	156	318396.00	PWD SOR Vol-I , Page no. 164
11	Painting					
	Applying Interior grade Acrylic Primer of approved quality and brand					
	on plastered or concrete surface old or new surface to receive					
	Distemper/ Acrylic emulsion paint including scraping and preparing					
	the surface throughly, complete as per manufacturer's specification					
	and as per direction of the EIC. **(In Ground Floor)**					
	Two Coats- Solvent based interior grade Acrylic Primer	sqm	2041.00	53.03	108234.23	PWD SOR Vol-I , Page no. 172
	1 no. 6mt wide Gate	nos	1	100000	100000.00	
	Total				**7732919.89**	

DPR for MSW Management- Panihati Abstract -Leachate Tank						Remarks
Sl. No	Description of Item	Units	Qty	Rate	Amount	
				in INR	in INR	
1	Earth work in excavation of foundation trenches or					
	drains, in all sorts of soil (including mixed soil but					
	excluding laterite or sandstone) including removing,					
	spreading or stacking the spoils within a lead of 75					
	m. as directed. The item includes necessary trimming					
	the sides of trenches, levelling, dressing and					
	ramming the bottom, bailing out water as required complete.					
	a) Depth of excavation not exceeding 1,500 mm.	cum	15.30	120.47	1843.19	PWD SOR Vol-I , Page no. 1
	b) Depth of excavation for additional depth beyond	cum	15.30	194.3	2972.79	PWD SOR Vol-I , Page no. 1
	1,500 mm. and upto 3,000 mm. but not requiring shoring.					
	c) Depth of excavation for additional depth beyond	cum	12.50	237.04	2963.00	PWD SOR Vol-I , Page no. 1
	3000 mm. upto 4000mm. excluding cost of shoring as necessary.					
2	Filling in foundation or plinth by silver sand in	cum	5.1	98.524	502.4724	PWD SOR Vol-I , Page no. 2
	layers not exceeding 150 mm as directed and					
	consolidating the same by thorough saturation with					
	water, ramming complete including the cost of					
	supply of sand. (payment to be made on					
	measurement of finished quantity)					

3	Single Brick Flat Soling of picked jhama bricks including	sqm	2.1	377	791.7	PWD SOR Vol-I , Page no. 12
	ramming and dressing bed to proper level and filling joints with					
	local sand.					
4	Ordinary Cement concrete (mix 1:1.5:3) with graded stone	cum	1.82	5389	9807.98	PWD SOR Vol-I , Page no. 15
	chips (20 mm nominal size) excluding shuttering and					
	reinforcement if any, in ground floor as per relevant IS codes.					
	Pakur Variety					
5	Supplying ready mixed concrete of M 25 Grade with well graded stone chips of 20 mm nominal size containing designed quantity of cement per Cu.m of wet concrete produced in computerised batching plant under controlled condition using approved super plastisizer, designing concrete mix following I.S. 10262 and I.S. 456, transporting the mix with agitation in transit mixer to work site depositing the mix on a platform erected for the purpose at required levels of concreting and then placing the mix in its final location of form work compacting and curing the same complete as per specification & direction of the Engineer-in-charge including computerised batching plant transit mixer with all accessories vibrators etc. inclusive of all other incidental charges in this connection complete but excluding cost of hire charge of platform and its supporting staging which would be	cum	11	6884.00	75724.00	PWD SOR Vol-I , Page no. 22
6	Rainforced cement concrete					
	Reinforcement for reinforced concrete work in all sorts of	kg	11000.00	61.936	681296.00	PWD SOR Vol-I , Page no. 28
	structures including distribution bars, stirrups, binders etc					
	initial straightening and removal of loose rust (if necessary),					
	cutting to requisite length, hooking and bending to correct					
	shape, placing in proper position and binding with 16 gauge					
	black annealed wire at every intersection, complete as per					
	drawing and direction.					
	For works in foundation, basement and upto roof of ground					

	floor/upto 4 m- SAIL/ TATA/RINL					
7	Hire and labour charges for shuttering with centering and necessary					
	(a) 25 mm to 30 mm thick wooden shuttering as per decision &	sqm	80.00	351	28080.00	PWD SOR Vol-I , Page no. 27
	direction of Engineer-In-Charge.					
10	Plastering					
	Plaster (to wall, floor, ceiling etc.) with sand and cement mortar					
	including rounding off or chamfering corners as directed and					
	raking out joints including throating, nosing and drip course,					
	scaffolding/staging where necessary (Ground floor).[Excluding					
	cost of chipping over concrete surface]					
	15 mm thick plaster with 1:6 cement mortar	sqm	45.00	156	7020.00	PWD SOR Vol-I , Page no. 164
11	With Sand Cement Mortar (1:3) 15 mm thick & 2 mm thick	sqm	26.00	1198	31148.00	PWD SOR Vol-I , Page no. 54
	cement slurry at back side of tiles using cement @ 2.91					
	Kg/Sq.m & joint filling using white cement slurry @ 0.20kg/Sq.m.					
	Area of each tile above 0.09 Sq.m/ Coloured decorative					
	Other than Coloured decorative including white					
	Total				**842149.13**	

SWM SURVEY

ANALYSIS OF HOUSEHOLD WASTE GENERATION

Category of living- MIG

ANALYSIS OF HOUSEHOLD WASTE GENERATION

SL NO	WARD NO	NAME OF THE RESPONDENT	RESIDENTIAL ADDRESS	HOUSEHOLD SIZE	QUANTITY OF WASTE IN gms	NO OF DAYS	PER DAYS WASTE in gms	PER CAPITA in gms
1	33	Debojyoti Roy	52 Chanditala road. Sodepur-kolkata110.	4	990	1	990	248
2	33	Krishna Sankar Dutta Roy	Falguni appartment chanditala. Block B. Kolkata 110.	2	1460	2	730	365
3	33	Arun Bhowmik	Chanditala. Block B. Sodepur. Kolkata 110.	4	1300	2	650	163
4	33	Subrata Chowdhury	10A Bodhikanan Sodepur. Kolkata 110.	2	760	2	380	190
5	33	Jharna Bhattacharya	9A Bodhikanan. Sodepur. Kolkata 110.	4	965	1	965	241
6	24	Karabi Dutta	Ghoshpara, Tarapukur Road. Kolkata 109.	2	562	2	281	141
7	24	Priyanka Pal	Ghoshpara, Tarapukur Road. Kolkata 109.	4	3815	2	1908	477
8	24	Abhijit Das	Ghoshpara, Tarapukur Road. Kolkata 109.	4	1180	2	590	148
9	24	Robin Saha	Ghoshpara, Tarapukur Road. Kolkata 109.	3	905	1	905	302
10	24	Niranjan Ghosh	Ghoshpara, Tarapukur Road. Kolkata 109.	3	1350	1	1350	450
11	24	Monoranjan Ghosh	Ghoshpara, Tarapukur Road. Kolkata 109.	3	1185	1	1185	395
12	24	Deboprasad Bhattacharya	Ghoshpara, Tarapukur Road. Kolkata 109.	5	3140	2	1570	314
13	24	Saroj Mitra	Ghoshpara, Tarapukur Road. Kolkata 109.	3	1855	2	928	309
14	24	Promod Bayal	Ghoshpara, Tarapukur Road. Kolkata 109.	6	290	1	290	48
15	24	Gour Ghosh	Ghoshpara, Tarapukur Road. Kolkata 109.	4	2435	2	1218	304
16	24	Rumpa Biswas	Ghoshpara, Tarapukur Road. Kolkata 109.	4	650	2	325	81
17	24	Basabi Ghosh	Ghoshpara, Tarapukur Road. Kolkata 109.	4	1010	2	505	126
18	24	Subrata Ghosh	Ghoshpara, Tarapukur Road. Kolkata 109.	3	1140	2	570	190
19	25	Piyali Das	15 Khagen Sen Road Pirtala Agarpara Kolakata109	4	2980	2	1490	373
20	25	Subhash Chandra dan	16 Khagen Sen Road Pirtala Agarpara Kolakata109	6	1795	1	1795	299
21	25	Subimal Bag	Pirtala Tala Pukur Road. Kolkata 109	4	2130	2	1065	266
22	25	Tripti Chatterjee	Pirtala Tala Pukur Road. Kolkata 109	5	2855	2	1428	286
23	25	Malati Saha	Pirtala Tala Pukur Road. Kolkata 109	5	2200	2	1100	220
24	25	Bappa Roy	Utpal Appartment.Pirtala Tara Pukur Road. Kolkata 109	21	9285	2	4643	221
25	25	Jiten pal	Pirtala Agarpara Road. Kolkata 109.	10	1945	1	1945	195

26	25	Sarmila Roy	Pirtala Agarpara Road. Kolkata 109.	3	2940	2	1470	490
27	25	Sanjit Das	Pirtala Agarpara Road. Kolkata 109.	3	1375	2	688	229
28	25	Mira Majumder	Pirtala Agarpara Road. Kolkata 109.	1	870	2	435	435
29	25	Nandan Sengupta	Pirtala Agarpara Road. Kolkata 109.	3	1435	2	718	239
30	25	Bharati Dutta	Pirtala Agarpara Road. Kolkata 109.	3	3300	2	1650	550
31	25	Debasish Majumder	Pirtala Agarpara Road. Kolkata 109.	3	2170	2	1085	362
32	25	Santana Nag	Pirtala Agarpara Road. Kolkata 109.	2	1200	2	600	300
33	4	Bholanath Chakaborty	2/32 Vivekananda colony. Panihati Kolkata 114	6	1000	2	500	83
34	4	Sima Sur	2 Vivekananda Colony. Panihati Kolkata114	4	3780	2	1890	473
35	4	Manoj Kumar Sur	2 Vivekananda Colony. Panihati Kolkata114	8	2240	2	1120	140
36	4	Foni Bhusan Sur	2 Vivekananda Colony. Panihati Kolkata114	3	2020	2	1010	337
37	4	Karabi Dey	2 Vivekananda Colony. Panihati Kolkata114	5	2780	2	1390	278
38	4	Apu Dey	2 Vivekananda Colony. Panihati Kolkata114	3	500	2	250	83
39	4	Swapna Dey	2 Vivekananda Colony. Panihati Kolkata114	5	1000	2	500	100
40	4	Subrata Sarkar	2/11 Vivekananda Colony. Panihati Kolkata114	5	370	2	185	37
41	4	Jibon Krishna Brahma	2 Vivekananda Colony. Panihati Kolkata114	5	810	2	405	81
42	4	Jitendra Nath Chakraborty	2 Vivekananda Colony. Panihati Kolkata114	5	900	2	450	90
43	4	Goutam Banerjee	2 Vivekananda Colony. Panihati Kolkata114	16	2750	2	1375	86
44	4	Rabindra Nath Saha	2 Vivekananda Colony. Panihati Kolkata114	4	970	2	485	121
45	1	Chaitali Pal	Chandrachur Chowdhury Road. Kolkata 115.	4	1385	1	1385	346
46	1	Sanjib Saha	Chandrachur Chowdhury Road. Kolkata 115.	3	65	1	65	22
47	1	Binay Kumar Saha	Chandrachur Chowdhury Road. Kolkata 115.	5	170	1	170	34
48	1	Dulal Saha	Chandrachur Chowdhury Road. Kolkata 115.	4	500	1	500	125
49	1	Chitra Roy	Chandrachur Chowdhury Road. Kolkata 115.	5	130	1	130	26
50	1	Debjani Banerjee	Chandrachur Chowdhury Road. Kolkata 115.	13	1875	1	1875	144

51	1	Jayashree Das	Chandrachur Chowdhury Road. Kolkata 115.	4	175	1	175	44
52	1	Dipak Banerjee	3 H.S Ghat Road. Kolkata115.	6	7065	2	3533	589
53	1	Kamala Ghosh	30 H.S Ghat Road. Kolkata 115.	4	2835	2	1418	354
54	1	Surajit Dey	7 H.S ghat Road. Kolkata 115.	4	3995	2	1998	499
55	1	Saraswati Chatterjee	7 H.S ghat Road. Kolkata 115.	3	1315	2	658	219
56	1	Gayatri Koley	10 H.S ghat Road. Kolkata 115.	3	865	2	433	144
57	1	Bijay Sutra Dhar	10 H.S ghat Road. Kolkata 115.	5	1165	2	583	117
58	1	Mamata Dewan	10 H.S ghat Road. Kolkata 115.	3	1245	2	623	208
59	1	Sujoy Mondal	H.S ghat Road. Kolkata 115.	5	1015	2	508	102
60	11	Shipra Sarkar	108 Lahabagan New Bhawanipur Kolkata 114.	8	400	1	400	50
61	11	Parimal Sarkar	104 Lahabagan New Bhawanipur Kolkata 114.	4	2325	2	1163	291
62	11	Rasu Debnath	107 Lahabagan New Bhawanipur Kolkata 114	2	800	3	267	133
63	11	Ramesh Sarkar	104 Lahabagan New Bhawanipur Kolkata 114.	3	1155	2	578	193
64	11	Gopal Das	104 Lahabagan New Bhawanipur Kolkata 114.	1	500	2	250	250
65	11	Sankar Saha	110 Lahabagan New Bhawanipur Kolkata 114.	3	300	1	300	100
66	11	Puspo Bose	106 Lahabagan New Bhawanipur Kolkata 114.	11	1500	2	750	68
67	11	Shib Sankar Chakraborty	102 Lahabagan New Bhowanipur Kolkata 114.	3	1675	2	838	279
68	11	Monika Saha	110 Lahabagan New Bhawanipur Kolkata 114.	2	2680	3	893	447
69	11	Biswanath Chakrabarty	102 Lahabagan New Bhowanipur Kolkata 114.	3	400	1	400	133
70	11	Anima Biswas	176A Gandhinagar Kolkata 114.	3	1200	2	600	200
71	11	Bulu Dey	176A Gandhinagar Kolkata 114.	2	220	1	220	110
72	11	Prabhu Solanki	176A Gandhinagar Kolkata 114.	10	3000	2	1500	150
73	11	Konika Nayek	Lahabagan Kolkata 114.	4	3375	3	1125	281
74	11	Jay Prakash	82 Lahabagan Kolkata 114.	4	4870	3	1623	406
75	11	Samir Ghati	86 Lahabagan Kolkata 114.	5	814	1	814	163

76	11	Samarjit Jaday	86 Lahabagan Kolkata 114.	4	1415	1	1415	354
77	11	Jayeta Dey	S.N Bose Road Lahabagan Panihati Kolkata 114.	4	700	1	700	175
78	11	Swapan kumar Biswas	124/A Lahabagan Kolkata 114.	3	1230	2	615	205
79	11	Pallab Dasgupta	124/A Lahabagan Kolkata 114.	3	980	1	980	327
80	11	Pradip Dasgupta	124/A Lahabagan Kolkata 114.	5	1700	1	1700	340
81	11	Rinku Bhaskar	124/A Lahabagan Kolkata 114.	3	1065	1	1065	355
82	11	Dipali Seal	124/A Lahabagan Kolkata 114.	4	600	1	600	150
83	11	Sima Saha	124/A Lahabagan Kolkata 114.	3	1000	1	1000	333
84	11	Renu Bhowmik	124/A Lahabagan Kolkata 114.	2	850	1	850	425
85	11	Sima Dutta	124/A Lahabagan Kolkata 114.	4	960	1	960	240
86	11	Uttam Debnath	124/A Lahabagan Kolkata 114.	4	600	1	600	150
87	12	Gita Roy	Indira nagar Block 03. Kolkata 110	6	1290	1	1290	215
88	12	Subhash Chandra Saha	Indira nagar Block 03. Kolkata 111	3	2825	3	942	314
89	12	Swapna Saha	Indira nagar Block 03. Kolkata 112	2	2200	3	733	367
90	12	Purnima Saha	Indira nagar Block 03. Kolkata 113	3	1100	2	550	183
91	12	Gita Roy	Indira nagar Block 03. Kolkata 114	3	500	1	500	167
92	12	Doli Dey	Indira nagar Block 03. Kolkata 115	4	600	1	600	150
93	12	Robi Saha	Indira nagar Block 03. Kolkata 116	2	1562	2	781	391
94	12	Debi Saha	Indira nagar Block 03. Kolkata 117	2	690	1	690	345
95	12	Ramgopal Ghosh	Indira nagar Block 03. Kolkata 118	7	3720	2	1860	266
96	12	Shanti Das	Indira nagar Block 03. Kolkata 119	2	650	1	650	325
97	12	Monika Guha Thakurata	Indira nagar Block 03. Kolkata 120	4	3000	2	1500	375
98	12	Mona Sarkar	Indira nagar Block 03. Kolkata 121	3	630	1	630	210
99	12	Mritunjay Paul	Indira nagar Block 03. Kolkata 122	3	1560	2	780	260
100	12	Raju Chatterjee	Indira nagar Block 03. Kolkata 123	6	1405	1	1405	234

101	12	Alo Biswas	Indira nagar Block 03. Kolkata 124	4	315	1	315	79
102	12	Tapan Singh	Indira nagar Block 03. Kolkata 125	2	685	2	343	171
103	12	Mamani Das	Indira nagar Block 03. Kolkata 126	4	3380	2	1690	423
104	12	Bapi Kundu	Indira nagar Block 03. Kolkata 127	5	780	1	780	156
105	12	Sujata Ghosh	Indira nagar Block 03. Kolkata 128	1	730	1	730	730
106	12	Mousumi Biswas	Indira nagar Block 03. Kolkata 129	4	1045	1	1045	261
107	12	Saraswati Das	Indira nagar Block 03. Kolkata 130	1	1320	3	440	440
108	15	Biplab Chakraborty	West Pansila, Sadhur more, Kolkata-112	3	2710	3	903	301
109	15	Kakuli Malakar	West Pansila, Sadhur more, Kolkata-112	3	3090	3	1030	343
110	15	Debdulal Chowdhury	West Pansila, Sadhur more, Kolkata-112	6	6120	2	3060	510
111	15	Avik Pramanik	West Pansila, Sadhur more, Kolkata-112	5	1975	2	988	198
112	15	Pradip Kumar Bhakta	West Pansila, Sadhur more, Kolkata-112	4	1145	1	1145	286
113	15	Santo Gopal Saha	West Pansila, Sadhur more, Kolkata-112	4	3060	2	1530	383
114	15	Asutosh Paul	West Pansila, Sadhur more, Kolkata-112	5	3500	2	1750	350
115	15	Sripada Chakraborty	West Pansila, Sadhur more, Kolkata-112	3	2080	2	1040	347
116	15	A.K Sen	West Pansila, Sadhur more, Kolkata-112	3	3140	3	1047	349
117	15	Anil Bnadhu Banerjee	West Pansila, Sadhur more, Kolkata-112	2	5040	4	1260	630
118	15	Tarak Nath Banik	West Pansila, Sadhur more, Kolkata-112	6	4900	3	1633	272
119	15	Anima Saha	West Pansila, Sadhur more, Kolkata-112	3	3400	3	1133	378
120	15	Soma Saha	West Pansila, Sadhur more, Kolkata-112	3	4000	3	1333	444
121	15	Niranjan Das	West Pansila, Sadhur more, Kolkata-112	4	5900	3	1967	492
122	15	Gita Deb Sarkar	West Pansila, Sadhur more, Kolkata-112	7	1600	1	1600	229
123	15	Tapasi Sannal	West Pansila, Sadhur more, Kolkata-112	4	2400	3	800	200
124	15	Sudhan Kanti Chakraborty	West Pansila, Sadhur more, Kolkata-112	8	5600	3	1867	233
125	8	Dipa Shah	Agarpara North Station Road, Agamani, kokata-109.	3	595	1	595	198

126	8	Monoranjan Das	137 North Station By Lane Agarpara, Kolkata-109.	5	475	1	475	95
127	8	Kakali Sarkar	73 North Station Road Agarapara, Kolkata-109	5	1175	1	1175	235
128	8	Dipak Bhowmik	North Station Road Agarapara, Kolkata-109	5	2200	1	2200	440
129	8	Ajay Mannan	North Station Road Agarapara, Kolkata-109	4	3900	2	1950	488
130	8	Bandita Chakraborty	105/D North Station Road Agarapara, Kolkata-109	3	4435	3	1478	493
131	8	Rekha Chatterjee	68, North Station Road Agarpara, Kolkata-109	3	2615	2	1308	436
132	8	Bimal Chandra Acharjee	North Station Road Agarpara, Kolkata-109	2	3675	3	1225	613
133	8	Parimal Biswas	North Station Road Agarpara, Kolkata-109	3	1230	2	615	205
134	8	Sankar Chatterjee	Dakshin pally South Station Road, Kolkata-109	3	2150	2	1075	358
135	8	Sanjay Mishra	Dakshin pally South Station Road, Kolkata-109	3	2150	2	1075	358
136	8	Ashok Chatterjee	107, South Station Road, Kolkata-109	4	4125	3	1375	344
137	8	Pradip Paswal	107, South Station Road, Kolkata-109	3	2650	2	1325	442
138	8	Bhola Chatterjee	Agarpara Kuthir silpa, South Station Road Kolkata-109	3	4210	3	1403	468
139	8	Atanu Chakraborty	107, South Station Road, Kolkata-109	6	4450	2	2225	371
140	8	Chandradip Chatterjee	107, South Station Road, Kolkata-109	3	2475	2	1238	413
141	8	Susmit Mukherjee	107, South Station Road, Kolkata-109	3	2150	2	1075	358
142	8	A.B Chakraborty	107, South Station Road, Kolkata-109	3	3360	3	1120	373
143	8	Shamal Basak	107, South Station Road, Kolkata-109	3	3500	3	1167	389
144	8	Nakul Saha	107, South Station Road, Kolkata-109	3	2100	2	1050	350
145	8	Paritosh Chatterjee	107, South Station Road, Kolkata-109	5	4600	2	2300	460
146	8	Kanika Chakraborty	107, South Station Road, Kolkata-109	3	3650	2	1825	608
147	8	Sibu Chatterjee	Agarpara Kuthir silpa, South Station Road Kolkata-109	4	3315	2	1658	414
148	8	Rabindra nath Dutta	Agarpara Kuthir silpa, South Station Road Kolkata-110	7	3214	2	1607	230
149	8	Sekhar Ghosh	Agarpara Kuthir silpa, South Station Road Kolkata-111	6	4324	2	2162	360
150	8	Pubali Dutta	Agarpara Kuthir silpa, South Station Road Kolkata-112	7	4734	2	2367	338

SWM Survey Sheet

Vegetable Market Questionnaire

1	Ward No.	34
2	Date	21.03.2017
3	Contact Person	Amiya Saha (Secretory)
4	Contact No.	9477530149
5	Location or Address of Market	Kadamtala Bazar, Natagar
6	No. of Shops in the Market (approx.)	158nos (135+23)
7	Quantity of Waste Generated per day (approx.)	700-800kg (approx)
	a) Peak Season	1000 kg
	b) Slack Season	500 kg
8	Municipal Solid Waste Collection Mechanism	Collection by tractor trailer from the open dump area.
9	Solid Waste Collection Frequency	Daily
10	Suggestions/Remarks	Bazar committee contact with Panihati Municipality for the disposal of waste. They also dump the waste at a pond near the market place.

Signature of Respondent

SWM Survey Sheet

Vegetable Market Questionnaire

1	Ward No.	32
2	Date	21.03.2017
3	Contact Person	Arup Dey
4	Contact No.	8017849560
5	Location or Address of Market	Ghola Bazar (Barasat Road, Ghola)
6	No. of Shops in the Market (approx.)	100nos.
7	Quantity of Waste Generated per day (approx.)	500-600kg (approx)
	a) Peak Season	800kg
	b) Slack Season	500kg
8	Municipal Solid Waste Collection Mechanism	Trailer/Tractor Trailer
9	Solid Waste Collection Frequency	Once in a month
10	Suggestions/Remarks	Bazar committee usually pays to panihati municipality for the removal of solid waste from the bazar premises.

Signature of Respondent

SWM Survey Sheet

Vegetable Market Questionnaire

1	Ward No.	32
2	Date	21.03.2017
3	Contact Person	Prodip Poddar (Bazar committee member)
4	Contact No.	9804164065
5	Location or Address of Market	C" Block Bazar
6	No. of Shops in the Market (approx.)	250nos
7	Quantity of Waste Generated per day (approx.)	1000kg or 1tn (approx)
	a) Peak Season	1200 kg
	b) Slack Season	600-700 kg
8	Municipal Solid Waste Collection Mechanism	Open dump
9	Solid Waste Collection Frequency	Daily
10	Suggestions/Remarks	They store their waste and dump it near the kalyani express way. Every seller store their waste at their own shops every day primarily.

Signature of Respondent

SWM Survey Sheet

Vegetable Market Questionnaire

1	Ward No.	14
2	Date	15.03.2017
3	Contact Person	Ratan Pal (Bazar committee member)
4	Contact No.	9748939078
5	Location or Address of Market	Station Market Sodepur
6	No. of Shops in the Market (approx.)	300nos
7	Quantity of Waste Generated per day (approx.)	1.5tn -2.0 tn (approx)
	a) Peak Season	2.0 tn
	b) Slack Season	1.5tn – 1.6tn
8	Municipal Solid Waste Collection Mechanism	Dumper
9	Solid Waste Collection Frequency	After 3 to 5 days interval
10	Suggestions/Remarks	They store their waste in a Dumping area inside the market place.

Signature of Respondent

SWM Survey Sheet

Vegetable Market Questionnaire

1	Ward No.	18
2	Date	22.03.2017
3	Contact Person	Manoj Das (Secretary)
4	Contact No.	9874549105
5	Location or Address of Market	Panchanantala Ganguly Bazar (Natagar)
6	No. of Shops in the Market (approx.)	220
7	Quantity of Waste Generated per day (approx.)	500 kg (approx)
	a) Peak Season	500-600 kg
	b) Slack Season	300-400 kg
8	Municipal Solid Waste Collection Mechanism	Open dump
9	Solid Waste Collection Frequency	Once in a month
10	Suggestions/Remarks	Bazar committee usually stores their own waste at the closed shop in the market premises. They also dump in a pond near the market.

Signature of Respondent

SWM Survey Sheet

Vegetable Market Questionnaire

1	Ward No.	14
2	Date	15.03.2017
3	Contact Person	Bapi Kundu (Committee memeber)
4	Contact No.	9088647412
5	Location or Address of Market	Sukhchar Market
6	No. of Shops in the Market (approx.)	80
7	Quantity of Waste Generated per day (approx.)	500 kg (approx)
	a) Peak Season	600-700 kg
	b) Slack Season	200-300 kg
8	Municipal Solid Waste Collection Mechanism	Collection by tractor trailer from the dumper area inside the market.
9	Solid Waste Collection Frequency	After 2 to 3 days interval
10	Suggestions/Remarks	Sellers dump their waste in a separate location in the market premises.

Signature of Respondent

SWM Survey Sheet

Vegetable Market Questionnaire

1	Ward No.	10
2	Date	15.03.2017
3	Contact Person	Tapash Chakraborty (Committee member)
4	Contact No.	9331616636
5	Location or Address of Market	Mollarhat Market
6	No. of Shops in the Market (approx.)	160nos
7	Quantity of Waste Generated per day (approx.)	600-700 kg (approx)
	a) Peak Season	800 kg
	b) Slack Season	400-500 kg (approx)
8	Municipal Solid Waste Collection Mechanism	Open dump
9	Solid Waste Collection Frequency	Once in a month
10	Suggestions/Remarks	Collection frequency must be increased by the municipality to remove the solid waste from the market.

Signature of Respondent

SWM Survey Sheet

School/College Questionnaire

1.	Word No.	16
2.	Date	17.03.2017
3.	Contact Person	Pinaki Paul (TIC)
4.	Contact No	9433760261
5.	Designation	TIC
6.	Name of School or College	Sodepur Desbondhu Bidyapore for boys
7.	Location or Address of School or College	1 no D.B Nagar.P.O. Sodepur, Kolkata-110
8.	Total no of Teachers and Staffs (approx.)	33
9.	Total no. of Students (approx)	600
10.	Quantity of Waste Generated per day in Kg (approx)	20 kg (approx)
11.	Municipal Solid Waste Collection Mechanism	Open Dump
12.	Solid Waste Collection Frequency	Daily
13.	Suggestions/Remarks	

Signature of Respondent

SWM Survey Sheet

School/College Questionnaire

1.	Word No.	33
2.	Date	18.09.2017
3.	Contact Person	Tandra Majumder
4.	Contact No	033-2565-1954
5.	Designation	Head Mistress
6.	Name of School or College	Ghola Bubaneshwari Balika Vidyamandir
7.	Location or Address of School or College	Sodepur, Kolkata-110
8.	Total no of Teachers and Staffs (approx.)	16+2
9.	Total no. of Students (approx)	70
10.	Quantity of Waste Generated per day in Kg (approx)	5-7kg (approx)
11.	Municipal Solid Waste Collection Mechanism	Open Dump
12.	Solid Waste Collection Frequency	-Nil-
13.	Suggestions/Remarks	Municipality does not collect the waste from the dump area near the school premises.

Signature of Respondent

SWM Survey Sheet

School/College Questionnaire

1.	Word No.	31
2.	Date	18.03.2017
3.	Contact Person	Amitava Bhattachariya
4.	Contact No	033-2565-9176
5.	Designation	Head Master
6.	Name of School or College	Sodepur Tirthabharati Shiksha Mandir
7.	Location or Address of School or College	Post Sodepur, Kolkata-110
8.	Total no of Teachers and Staffs (approx.)	25 (5-12 class) Including Part Time Teachers
9.	Total no. of Students (approx)	450 (5-12 class)
10.	Quantity of Waste Generated per day in Kg (approx)	25 kg (approx)
11.	Municipal Solid Waste Collection Mechanism	No Mechanism
12.	Solid Waste Collection Frequency	- Nil-
13.	Suggestions/Remarks	Municipality does not collect the waste from the dumping area.

Signature of Respondent

SWM Survey Sheet

School/College Questionnaire

1.	Word No.	14
2.	Date	17.03.2017
3.	Contact Person	Dr. Sudip Chowdhury
4.	Contact No	033-2555-32968
5.	Designation	Head Master
6.	Name of School or College	Sodepur High School (H.S) Govt Sponsored.
7.	Location or Address of School or College	Post Sodepur, Kolkata-110
8.	Total no of Teachers and Staffs (approx.)	55
9.	Total no. of Students (approx)	1600
10.	Quantity of Waste Generated per day in Kg (approx)	40-50 kg (approx)
11.	Municipal Solid Waste Collection Mechanism	Push Cart
12.	Solid Waste Collection Frequency	After 1 day
13.	Suggestions/Remarks	

Signature of Respondent

SWM Survey Sheet

School/College Questionnaire

1.	Word No.	16
2.	Date	17.03.2017
3.	Contact Person	Smt. Sujata Chaterjee
4.	Contact No	8481945980
5.	Designation	Head Mistress
6.	Name of School or College	Deshbondhu Vidyapith For Girls
7.	Location or Address of School or College	1 No Deshbondhu Nagar School Road Post Sodepur, Kolkata-110
8.	Total no of Teachers and Staffs (approx.)	18
9.	Total no. of Students (approx)	400
10.	Quantity of Waste Generated per day in Kg (approx)	20-25 kg (approx)
11.	Municipal Solid Waste Collection Mechanism	Open Dump
12.	Solid Waste Collection Frequency	Daily
13.	Suggestions/Remarks	

Signature of Respondent

SWM Survey Sheet

Hotel/Restaurant Questionnaire

1.	Ward No	14
2.	Date	21.03.2017
3.	Contact Person With Designation	Raju Das (Manager)
4.	Contact No	8582836360
5.	Name of Hotel/Restaurant	Penguin Restaurant Sodepur
6.	Location or Addres of Hotel/Restaurant	Station Road sodepur. Opp khadim. Kolkata-110.
7.	Capacity of Hotel (Total no. of Rooms)	02(01 Dining, 02 kitchen) 01 Floor
8.	Average Occupancy per Day (No. of Guests/Customers)	150-160(approx)
	a) Peak Season	200(approx)
	b)Slack Season	120(approx)
9.	Quantity of Waste Generated per day in Kg (approx)	50-60kg (approx)
	a) Peak Season	60kg
	b) Slack Season	35-40kg
10.	Municipal Solid Waste Collection Mechanism	Push Carts/ Van
11.	Solid Waste Collection Mechanism	After 2 days
12.	Suggestions/Remarks	

Signature of Respondent

SWM Survey Sheet

Hotel/Restaurant Questionnaire

1.	Ward No	17
2.	Date	20.03.2017
3.	Contact Person With Designation	Subhobroto Som(Manager)
4.	Contact No	8017647409
5.	Name of Hotel/Restaurant	Delicious Taverna
6.	Location or Addres of Hotel/Restaurant	Amraboti More. Sodepur. Kolkata-110
7.	Capacity of Hotel (Total no. of Rooms)	03 (02 Dinning,01 Kitchen)
8.	Average Occupancy per Day (No. of Guests/Customers)	70-80 (approx)
	a) Peak Season	80
	b)Slack Season	60
9.	Quantity of Waste Generated per day in Kg (approx)	15-20kg (approx)
	a) Peak Season	25kg
	b) Slack Season	15kg
10.	Municipal Solid Waste Collection Mechanism	Tri Cycle
11.	Solid Waste Collection Mechanism	After 2 days
12.	Suggestions/Remarks	

Signature of Respondent

SWM Survey Sheet

Hotel/Restaurant Questionnaire

1.	Ward No	17
2.	Date	20.03.2017
3.	Contact Person With Designation	Proprietor
4.	Contact No	9830444861
5.	Name of Hotel/Restaurant	Probha Fast Food Centre
6.	Location or Addres of Hotel/Restaurant	C 74, Amrabati, Sodepur Kolkata-110
7.	Capacity of Hotel (Total no. of Rooms)	02
8.	Average Occupancy per Day (No. of Guests/Customers)	80-100(approx)
	a) Peak Season	120
	b)Slack Season	50-60
9.	Quantity of Waste Generated per day in Kg (approx)	15-20kg (approx)
	a) Peak Season	22kg
	b) Slack Season	15kg
10.	Municipal Solid Waste Collection Mechanism	Tri Cycle
11.	Solid Waste Collection Mechanism	Daily
12.	Suggestions/Remarks	

Signature of Respondent

SWM Survey Sheet

Hotel/Restaurant Questionnaire

1.	Ward No	
2.	Date	22.03.2017
3.	Contact Person With Designation	Sankar Kar (Manager)
4.	Contact No	033-2583-5579
5.	Name of Hotel/Restaurant	The Pearl Hotel
6.	Location or Addres of Hotel/Restaurant	4, B.T Road, Panihati, Kolkata-110
7.	Capacity of Hotel (Total no. of Rooms)	20
8.	Average Occupancy per Day (No. of Guests/Customers)	100-110 (approx)
	a) Peak Season	120-130 (approx)
	b)Slack Season	70-80 (approx)
9.	Quantity of Waste Generated per day in Kg (approx)	30-35kg (approx)
	a) Peak Season	40kg
	b) Slack Season	20-25kg
10.	Municipal Solid Waste Collection Mechanism	Truck
11.	Solid Waste Collection Mechanism	After 1 Week
12.	Suggestions/Remarks	

Signature of Respondent

SWM Survey Sheet

Hotel/Restaurant Questionnaire

1.	Ward No	14
2.	Date	21.03.2017
3.	Contact Person With Designation	Lakhbir Singh (Manager)
4.	Contact No	9836126800
5.	Name of Hotel/Restaurant	Punjabi Food Junction
6.	Location or Addres of Hotel/Restaurant	Sodepur Station Road. Opp. Loksangeet Bhavan kolkata-110
7.	Capacity of Hotel (Total no. of Rooms)	01
8.	Average Occupancy per Day (No. of Guests/Customers)	125-130 (approx)
	a) Peak Season	150
	b)Slack Season	100
9.	Quantity of Waste Generated per day in Kg (approx)	35-40kg
	a) Peak Season	40kg
	b) Slack Season	30kg
10.	Municipal Solid Waste Collection Mechanism	Any other
11.	Solid Waste Collection Mechanism	After 1 day
12.	Suggestions/Remarks	They dump their waste at dunlop area outside the panihati municipality area.

Signature of Respondent

SWM Survey Sheet

Hotel/Restaurant Questionnaire

1.	Ward No	23
2.	Date	21.03.2017
3.	Contact Person With Designation	S.Chatterjee
4.	Contact No	9339575642
5.	Name of Hotel/Restaurant	Disha Restaurent and Bar
6.	Location or Addres of Hotel/Restaurant	31,Dakshin Pally. Sodepur Kolkata-110
7.	Capacity of Hotel (Total no. of Rooms)	01
8.	Average Occupancy per Day (No. of Guests/Customers)	110-120 (approx)
	a) Peak Season	150 (approx)
	b)Slack Season	70-80 (approx)
9.	Quantity of Waste Generated per day in Kg (approx)	30-35kg
	a) Peak Season	40kg (approx)
	b) Slack Season	25kg (approx)
10.	Municipal Solid Waste Collection Mechanism	Tractor trailer
11.	Solid Waste Collection Mechanism	Daily
12.	Suggestions/Remarks	

Signature of Respondent

SWM Survey Sheet

Hotel/Restaurant Questionnaire

1.	Ward No	16
2.	Date	17.03.2017
3.	Contact Person With Designation	Kishor Dey
4.	Contact No	8902287937
5.	Name of Hotel/Restaurant	Chung Wahh
6.	Location or Addres of Hotel/Restaurant	181, School Road, Sodepur. Kolkata-110
7.	Capacity of Hotel (Total no. of Rooms)	02 (1 no Kitchen, 1 no Dinning)
8.	Average Occupancy per Day (No. of Guests/Customers)	100-120
	a) Peak Season	130
	b)Slack Season	80
9.	Quantity of Waste Generated per day in Kg (approx)	25-30kg
	a) Peak Season	30-40kg
	b) Slack Season	20-25 kg
10.	Municipal Solid Waste Collection Mechanism	Truck or Mini door
11.	Solid Waste Collection Mechanism	After 2 Week
12.	Suggestions/Remarks	

Signature of Respondent

SWM Survey Sheet

Hotel/Restaurant Questionnaire

1.	Ward No	14
2.	Date	21.03.2017
3.	Contact Person With Designation	Raju Das (Manager)
4.	Contact No	8582836360
5.	Name of Hotel/Restaurant	Sodepur Inn
6.	Location or Addres of Hotel/Restaurant	SH 2, No. 4 Deshbondhu Nagar, Panihati, Sodepur, West Bengal 700110
7.	Capacity of Hotel (Total no. of Rooms)	02(01 Dining, 02 kitchen) 01 Floor
8.	Average Occupancy per Day (No. of Guests/Customers)	160-17050-60kg (approx)
	a) Peak Season	200
	b)Slack Season	100-120
9.	Quantity of Waste Generated per day in Kg (approx)	50-60kg (approx)
	a) Peak Season	70kg
	b) Slack Season	40kg
10.	Municipal Solid Waste Collection Mechanism	Push Carts/ Van
11.	Solid Waste Collection Mechanism	After 2 days
12.	Suggestions/Remarks	

Signature of Respondent

SWM Survey Sheet

Hospital Questionnaire

1.	Ward No		04
2.	Date		22.03.2017
3.	Contact Person With Designation		Krishna Mahajan (Nurse)
4.	Contact No		033-25531172
5.	Location / Address of Hospital		Panihati Nursing Home Sodeshi More, Panihati,3rd Floor Ration Office
6.	No. of Beds in Hospital		02
7.	Quantity of Waste Generated per day in Kg (approx.)		-
8.	Type of Waste	Bio- Medical Waste	Individual(picture)
		Municipal Solid Waste	3-5 kg
		Others Waste if any	-
9.	Whether they have any system for collection of Bio-Medical Waste		SembRamky / Medicare Environmental Management pvt. ltd.
10.	Municipal Solid Waste Collection Mechanism		Truck/Mini Door
11.	Solid Waste Collection Frequency		Daily
12.	Suggestions/Remarks		

Signature of Respondent

SWM Survey Sheet

Hospital Questionnaire

1.	Ward No		02
2.	Date		22.03.2017
3.	Contact Person With Designation		Siladitya Chakraborty(Manager)
4.	Contact No		9674644453
5.	Location / Address of Hospital		Dewan Medicare Ambagan, Modern Bus Stop Sukhchar kolkata-115
6.	No. of Beds in Hospital		50
7.	Quantity of Waste Generated per day in Kg (approx.)		-
8.	Type of Waste	Bio- Medical Waste	Individual(picture)
		Municipal Solid Waste	10-12 kg (approx)
		Others Waste if any	-
9.	Whether they have any system for collection of Bio-Medical Waste		SembRamky / Medicare Environmental Management pvt. ltd.
10.	Municipal Solid Waste Collection Mechanism		T.T Container
11.	Solid Waste Collection Frequency		Daily
12.	Suggestions/Remarks		

Signature of Respondent

SWM Survey Sheet

Hospital Questionnaire

1.	Ward No		02
2.	Date		22.03.2017
3.	Contact Person With Designation		Sanjib Ghosh(Manager)
4.	Contact No		7603032236
5.	Location / Address of Hospital		Sumangal Hospital(Midland medicare ltd) 26 B.T Road kolkata-115
6.	No. of Beds in Hospital		50
7.	Quantity of Waste Generated per day in Kg (approx.)		-
8.	Type of Waste	Bio- Medical Waste	Individual
		Municipal Solid Waste	15-20 kg (approx)
		Others Waste if any	-
9.	Whether they have any system for collection of Bio-Medical Waste		SembRamky / Medicare Environmental Management pvt. ltd.
10.	Municipal Solid Waste Collection Mechanism		Try cycle
11.	Solid Waste Collection Frequency		Daily two times
12.	Suggestions/Remarks		Hospital management usually pay an amount and contact with municipality authorized person to dispose off their municipality waste.

Signature of Respondent

SWM Survey Sheet

Hospital Questionnaire

1.	Ward No		31
2.	Date		18.03.2017
3.	Contact Person With Designation		Bidyut Mukherjee (Facility Manager)
4.	Contact No		9932246757
5.	Location / Address of Hospital		Panihati Municipal Hospital
6.	No. of Beds in Hospital		150
7.	Quantity of Waste Generated per day in Kg (approx.)		-
8.	Type of Waste	Bio- Medical Waste	Individual (Every day collection)
		Municipal Solid Waste	40-45kg (approx)
		Others Waste if any	-
9.	Whether they have any system for collection of Bio-Medical Waste		SembRamky / Medicare Environmental Management pvt. ltd.
10.	Municipal Solid Waste Collection Mechanism		After 1 week
11.	Solid Waste Collection Frequency		Tractor Trailer (Municipality)
12.	Suggestions/Remarks		Latrine area is blocked and night soil has been dried and thickened

Signature of Respondent

SWM Survey Sheet

Hospital Questionnaire

1.	Ward No		10
2.	Date		18.03.2017
3.	Contact Person With Designation		Kasinath Das. (Manager)
4.	Contact No		9231974709
5.	Location / Address of Hospital		Green View Nursing Home
6.	No. of Beds in Hospital		50
7.	Quantity of Waste Generated per day in Kg (approx.)		-
8.	Type of Waste	Bio- Medical Waste	Individual
		Municipal Solid Waste	15kg (approx)
		Others Waste if any	-
9.	Whether they have any system for collection of Bio-Medical Waste		SembRamky / Medicare Environmental Management pvt. ltd.
10.	Municipal Solid Waste Collection Mechanism		After 2 day
11.	Solid Waste Collection Frequency		Tractor Trolley(Municipality)
12.	Suggestions/Remarks		

Signature of Respondent

The municipality owns land to an extent of 4.5 acres at Ramchandrapur which is presently used as a dumping ground and they have proposed a new land for processing facility and sanitary landfill site which capacity of 4.6 acre and 3.6 acre. This location beside Kalyani Highway (ward no. 34) is considered for the proposed Composting Facility and Sanitary Landfill site.

5.9.1.2 Design Considerations

The following design considerations have been adopted in planning and designing Processing Facility for the study area.

- The facility is designed for processing MSW to compost.
- The installed capacity of the entire plant shall be 100 MT/day in accordance with the future increase in waste quantities.
- For the purpose of designing the plant equipments, the operations have been planned for 1 shift initially with 8 hours effective operating hours daily.
- MSW shall be treated by spraying a suitable bio-culture on the waste. Chemicals may be needed to eliminate insects, flies and odour.
- The overall rejects reaching the scientific landfill would be around 25-30% of the incoming waste to the processing facility.
- The proposed landfill shall be developed as per the MSW Rules 2016; CPHEEO manual and other relevant guidelines / specifications.
- The infrastructure of the plant will be constructed for 20 years but the machineries were designed for 7 years.

The total municipal solid waste generation is 135 TPD for the year 2017. The biodegradable portion in the waste is 48.34%. The projected biodegradable waste quantity for the year 2019, 2023, 2029, 2034 and 2039 is as given below in *Table 5.10.*

Table 5-10: Biodegradable Waste Generation

Year	Population of Panihati Planning Area	Total Waste Qty in TPD	Waste for Processing in TPD
Year 2019	420169	142	68.64
Year 2024	446063	161	77.83
Year 2029	471291	182	87.98
Year 2034	495852	204	98.61
Year 2039	519746	228	110.22

Table 9-6: Vehicle Cost for Compost Plant

Compost Plant Operation Vehicle				
Sl No.	Vehicle Type	Number	Unit Rate	Total Cost
1	Loader cum Backhoe	2	2500000	5,000,000.00
2	Tractor attached loader	3	1450000	4,350,000.00
3	Water tanker with slurry pump	1	300000	300,000.00
4	Tractor	1	700000	700,000.00
5	Tipping trolley	4	180000	720,000.00
6	Dumper 6 m^3	1	1400000	1,400,000.00
	Total			**12,470,000.00**

Table 9-7: Vehicle Cost for Landfill Processing

Landfill Operation Vehicle				
Sl. No.	Vehicle Type	Number	Unit Rate	Total Cost
1	Buldozer	1	10000000	10,000,000.00
2	Excavator	1	4864000	4,864,000.00
3	Loader cum Backhoe	1	2500000	2,500,000.00
4	Dumper 10 m^3	1	2500000	2,500,000.00
	Total			**19,864,000.00**

Executive Engineer
Ping. Divn. & KSWMIP
SD & SWM KMDA

CHAPTER 9 COST ESTIMATION

9.1 CAPITAL COST OF THE PROPOSED SCHEME

The implementation of the scheme is scheduled to complete by year 2019 after which commercial production of integrated facility will commence.

Table 9-1: Primary Collection System

Primary Equipments				
Sl. No	Item	Unit Rate in INR	Required Number	Total Amount (INR) in Figures
1	House hold Bin 10 lit	170	195972	33,315,240.00
2	Tricycle van with 6 nos. of 50 lit bins	26780	44	1,178,320.00
	6 nos. 50 lit bin for existing tricycle	590	588	346,920.00
	fabrication and fitting charges of bins into existing tricycle	2000	140	280,000.00
3	Battery operated Auto Rickshaw	160000	67	10,720,000.00
	8 nos. of 60lit bins	1187	536	636,232.00
4	Auto tipper	900000	12	10,800,000.00
5	Compactor bin -1100 lit	46725	73	3,433,796.89
6	Road side bins- 240 lit capacity	3947	887	3,500,989.00
7	TT Container	185000	110	20,350,000.00
	Repairing for existing TT Container	25000	50	1,250,000.00
8	Wheel barrow for Street Sweeping & drain cleaning -110 lit	6925	189	1,308,825.00
	Total			**87,120,322.89**

Table 9-2: PPE Equipment Costing

PP Equipment Requirement				
Sl. No.	Equipments / Implements	Quantity	Unit Rate	Amount
1	Long hand brooms	189	80	15,120.00
2	Metal tray with Plate	189	110	20,790.00
3	M. S. Shovel	189	580	109,620.00
4	Gloves	462	170	78,540.00
5	Mask	462	55	25,410.00
6	Appron	462	285	131,670.00
7	Rain coat	462	620	286,440.00
8	Safety Boot	494	500	247,000.00
	Total			**914,590.00**

Summary of Total Project Cost

Estimated Cost for SWM System	
A. Collection System	
A.1 Procurement of vehicles for Primary Collection & Secondary Transportation	87,120,322.89
A.2 Procurement PP Equipments for primary collection	914,590.00
B. Processing Plant	
B.1 Construction of Processing Plant & Material Recovery Facility	150,144,581.26
B.2 Procurement of Machineries for the plant	30,000,000.00
B.3 Procurement of vehicles for Operation of the plants	12,470,000.00
C. Sanitary Landfill	
C.1 Construction of Sanitary Landfill Phase-1	59,268,046.69
C.2 Construction of Sanitary Landfill Phase-2	48,885,199.07
C.3 Procurement of Vehicles for Operation of the landfill	19,864,000.00
D. Social Awareness Program (Per Year)	**10,000,000.00**
E. One year O&M of CP & SLF	**20,400,000.00**
Sub Total	**439,066,739.91**
Contingency – 3%	**13,172,002.20**
Total	**452,238,742.11**

Executive Engineer
Plng. Divn. & KSWMIP
SD & SWM KMDA

Chief Engineer-in-Charge
Sanitation & S.W.M.
Water & Sanitation Sector
K. M. D. A

No 459 /WBVB/1M-72/82 Dated the 19-11-2012

From :
Member Secretry,
West Bengal Valuation Board.

To
The Joint Secretary to the
Govt. of West Bengal,
Writers' Buildings,
Kolkata – 700 001.

Sub.: Publication of Notification for general assessment of property tax within Kurseong Municipality.

Sir,

In forwarding herewith a copy of the copy of letter since received from the Chairman, Kurseong Municipality under memo no. 875/M/T/D/12 dated 11.10.12 (enclosed); I am to request you to take appropriate action in the very matter early - in the backdrop of situation that Assessment of General Valuation for determination of property tax pertaining to land & buildings of Kurseong Municipality is said to be not done during the last 23 years.

Yours faithfully,

Member Secretary

Enco. As stated

D/C

Estd: 1879

Ph: 0354-2344286/2344527
Fax: 0354-2344286

OFFICE OF THE BOARD OF COUNCILLORS
KURSEONG MUNICIPALITY
KURSEONG

Memo. No. 875/M/TD/12 Dated: 11th Oct'12

From:
Shri. Samir Dip Blon,
Chairman,
Kurseong Municipality,
Kurseong.

To:
The Special Secretary to the Govt. of W.B.
Department of Municipal Affairs
Writers Buildings
Kolkata.

Dy. No. 1027
Date 10 Time
West Bengal Valuation Board

Sub: Publication of notification for General Assessment of Property Tax within Kurseong Municipality.

Sir,

This is to inform you that the Board of Councillors of this Municipality on their monthly meeting held on 28th, September 2012 at 02.00 p.m. in the Municipal has adopted a resolution, copy of which is enclosed herewith for your perusal, and it is requested that a Notification for General Assessment of Property Tax within this Municipality may kindly be published, to enable this office to conduct assessment as the same has not been done for the last 23 years due to the political instability that prevailed then.

Thanking you in anticipation.

Yours faithfully.

Sd/-

Chairman,
Kurseong Municipality.

Memo. No. 875/02/M/TD/12 Dated, Kurseong, the 11th Oct'..2012.

Copy forwarded for information and necessary action to:

1 The Chairman,
West Bengal Valuation Board "Mayukh" (Ground Floor), Bidhan Nagar
Kolkata-700091.

2. The Member Secretary,
West Bengal Valuation Board, Mayukh" (Ground Floor), Bidhan Nagar
Kolkata-700091

Chairman,
Kurseong Municipality

Extract of Res. No.7 d passed by the meeting of the Board of Councillors of Kurseong Municipality held on dated 28th September, 2012.

The matter regarding Assessment of Property Tax within the Municipal area was tabled and Chairman briefed the members on the need to assess the property tax for it is the only option Municipality has, to increase the inflow of revenue, to improve it's financial status, furthermore he informed that it could have been done by the previous Board then but it seems that the then Board could do it due to the political instability then.

After discussion on the matter it was resolved to sent a letter to M.A. Deptt. Govt. of W.B. requesting for issue of Notification for the General Assessment of Property Tax in Kurseong Municipality area as the earlier notification could not come into force during that year when the Notification was published, as such for the last 23 years General Assessment of the Property Tax has not been conducted in Kurseong Municipality and Municipality has become a looser because of it.

And after discussion on the matter for some time, it was resolved to write M.A. Deptt. Govt. of W.B. to issue of notification for General Assessment of Property Tax in Kurseong Municipality and to communicate with W.B.V.B. Cal. as soon as the notification is published for the assessment of property tax within the Municipal area.

Sd/-
S.D. Blon
Chairman,
Kurseong Municipality

Certified true copy

S Dip Blon
11/10/12

Samir Dip Bion
Chairman
Kurseong Municipality