

क्षेत्रीय कार्यालय नगरीय प्रशासन एवं विकास (यां.प्र.) रायपुर संभाग, रायपुर
नेताजी सुभाष स्टेडियम, द्वितीय तल, मोतीबाग के सामने रायपुर (छ.ग.)

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क्रमांक / 129 / RECR / तक.स्वी. / 2025-26
प्रति,

रायपुर, दिनांक 17.04.2026

मुख्य नगर पालिका अधिकारी,
नगर पंचायत - भखारा
जिला - धमतरी (छ.ग.)

विषय :- प्राक्कलन की तकनीकी स्वीकृति प्रदान करने बाबत।

संदर्भ :- नगर पंचायत भखारा का पत्र क्रं./1547/लो.नि.वि./न.पं./2025-26, भखारा, दिनांक 13.04.2026

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संदर्भित पत्र द्वारा नगर पंचायत भखारा क्षेत्रांतर्गत स्वच्छ भारत मिशन-शहरी 2.0 अंतर्गत सूखे एवं गीले कचरे के प्रबंधन हेतु संयंत्रों की स्थापना तथा स्थापित संयंत्रों के उन्नयन/विकास कार्य हेतु राशि रु. 30.57 लाख की तकनीकी स्वीकृति हेतु निम्नानुसार प्रस्ताव प्रस्तुत किया गया है :-

S. No.	Location Name	Cost of SOR Items (A)	18 % GST on SOR Items (B)	Cost of NON SOR Items (C)	18 % GST on NON SOR Items (D)	Total
COMPOST PLANT						
1	Ward 2	1687751.41	0.00	58500.00	10530.00	1756781.41
SLRM/MRF PLANT						
2	Ward 2	714771.80	0.00	446963.00	80453.34	1242188.14
TOTAL		2402523.21	0.00	505463.00	90983.34	2998969.55
		Total of SOR (A)				2402523.21
		Total of NON-SOR (C)				505463.00
		Sub Total (E)				2907986.21
		Total GST (F)				90983.34
		Total (G)				2998969.55
		Add Contingency 1% @ A				24025.23
		Add Consultancy 1.16% @ E				33732.64
		Grand Total				3056727.42
		Say in Lakh				30.57

उक्त कार्य के लिए लोक स्वास्थ्य यांत्रिकी विभाग के USOR दिनांक 01.06.2020, लोक निर्माण विभाग के SOR (भवन निर्माण कार्य) दिनांक 01.01.2015, SOR (सड़क निर्माण कार्य) दिनांक 01.01.2025 तथा लोक निर्माण विभाग के SOR (विद्युत और यांत्रिकी) दिनांक 01.06.2020 से प्रभावित अद्यतन दर अनुसूची पर प्राक्कलन तैयार किया गया है। जिसमें प्राक्कलन की राशि रु. 30.57 लाख (SOR, Non SOR, GST, Contingency & Consultancy) है।


विभागीय आदेश क्रमांक एफ-5-190/18/05 दिनांक 29.10.2010 के प्रदत्त अधिकारों का प्रयोग करते हुए मुख्य नगर पालिका अधिकारी, नगर पंचायत भखारा को ठोस अपशिष्ट प्रबंधन हेतु संयंत्र स्थापित किये जाने कार्य के लिए स्वीकृत राशि रु. 30.57 लाख (शब्दों में तीस लाख सतावन हजार रुपये मात्र) की तकनीकी स्वीकृति क्रं. 314 दिनांक 17.04.26 द्वारा निम्न शर्तों के तहत प्रदान की जाती है, जो निर्माण प्रकृति की आवश्यकतानुसार लागू होगी :-

- कार्य की विधिवत प्रशासकीय स्वीकृति सक्षम प्राधिकारी से प्राप्त की जावे।
- यह तकनीकी स्वीकृति निकाय के अभियंता द्वारा स्थल निरीक्षण तकनीकी प्रतिवेदन के आधार पर दी जा रही है।
- प्राक्कलन में सारवान परिवर्तन बिना सक्षम स्वीकृति के न किया जावे।

2023-24/Tech/T.S.



4. जिस एस.ओ.आर. से प्राक्कलन में आइटम लिये गये हैं, उस एस.ओ.आर. का स्पष्ट उल्लेख निविदा में किया जावे एवं Non SOR Item का पूर्ण Specification निविदा जारी करने के पूर्व निर्धारित करना अनिवार्य होगा एवं निविदा प्रपत्र में Non SOR Item का पूर्ण Specification का उल्लेख करते हुए निविदा आमंत्रित की जावे।
 5. निर्माण कार्यो का संपादन बजट प्रावधान व उपलब्ध राशि के अंतर्गत किया जावे।
 6. यह तकनीकी स्वीकृति, अनुदान स्वीकृति का द्योतक नहीं है।
 7. स्थल विवाद की स्थिति में तकनीकी स्वीकृति स्वयं निरस्त मानी जावेगी।
 8. स्थल पर किये गये वास्तविक निर्माण कार्य का ही भुगतान किया जावे।
 9. प्रशासकीय स्वीकृति एवं शासन से आबंटन प्राप्त किये बिना कार्यादेश जारी न किया जावे।
 10. निर्माण कार्य निकाय की भूमि पर किया जावे। अन्य की भूमि होने पर सक्षम स्वीकृति पश्चात् कार्य कराया जावे।
 11. फ्लाई एस ब्रिक का उपयोग किया जाना सुनिश्चित करे।
 12. निर्माण कार्य हेतु संबंधित कार्यवाही नगर पालिका अधिनियम-1961 तथा छ.ग. कार्य विभाग मैनुअल एवं शासन/संचालनालय द्वारा समय - समय पर जारी आदेश/दिशा निर्देशों के अनुरूप किया जावे।
 13. निर्माण कार्य के पूर्व स्थल मानचित्र तथा स्ट्रक्चरल डिजाईन निकाय स्तर से तैयार कराया जाना सुनिश्चित करें।
 14. किसी भी स्ट्रक्चर निर्माण हेतु soil bearing capacity अनुसार ही फाउन्डेशन कार्य का डिजाईन तैयार किया जावे, जिसकी पूर्ण जिम्मेदारी मुख्य नगर पालिका अधिकारी एवं संबंधित उप अभियंता की होगी।
 15. यह सुनिश्चित किया जावे कि किसी भी निर्माण कार्य के दौरान यातायात या अन्य गतिविधियों में अवरोध/बाधा उत्पन्न न हो। अन्य शासकीय एवं अर्द्धशासकीय विभाग के कार्य क्षेत्र में कार्य प्रस्तावित होने पर संबंधित विभाग से अनापत्ति प्रमाण पत्र प्राप्त करने के उपरांत ही अग्रेतर कार्यवाही की जावेगी।
 16. निविदा आमंत्रित करने के पूर्व निविदा प्रारूप का अनुमोदन सक्षम प्राधिकारी से प्राप्त किया जावे।
 17. यह तकनीकी स्वीकृति इसके बाद की निविदा में प्रभावशील होगी।
 18. प्रस्तावित निर्माण कार्य क्षेत्र में विद्युत लाईन होने पर भूमि विकास अधिनियम 1984 में उल्लेखित मापदण्ड का पालन किया जावे।
- संलग्न :- प्राक्कलन।

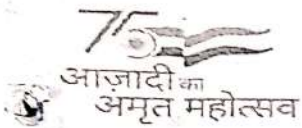

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NAGAR PANCHAYAT BHAKHARA, CHHATTISGARH



Ministry of Housing and Urban Affairs
Government of India



VOL - I

Swachh Bharat Mission-Urban 2.0



NAGAR PANCHAYAT REPORT UNDER
SRM 2.0 FOR SWM, NAGAR PANCHAYAT
BHAKHARA, CHHATTISGARH

25, SOUTH
RAIPUR



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Abbreviations

CC	Conventional Composting
C&D	Construction and Demolition
C/N	Carbon/Nitrogen Ratio
CPCB	Central Pollution Control Board
CPHEEO	Central Public Health & Environmental Engineering Organization
DPR	Detailed Project Report
EIA	Environmental Impact Assessment
EPA	Environment Protection Act (1986)
FCO	Fertilizer (Control) Order, 1985
GCV/CV	Gross Calorific Value
Ha	Hectare
ISWM	Integrated Municipal Solid Waste Management
Kcal	Kilo Calories
MCX	Municipal Corporation/Committee/Council XXXX
MOEF&CC	Ministry of Environment and Forests and Climate Change
MOUD	Ministry of Urban Development (Govt. of India)
MRV	Monitoring Reporting and Verification
MSW	Municipal Solid Waste
NGOs	Non-Governmental Organisations
PCC	Pollution Control Committee
PPE	Personal Protective Equipment
PPP	Public Private Partnership
PROM	Phosphate Rich Organic Manure
RC	Reinforced Concrete
RDF	Refuse Derived Fuel
RFP	Request for Proposal
SPCB	State Pollution Control Board
SLB	Service Level Benchmark
SLF	Sanitary Landfill
SOP	Standard Operating Procedure
SWM	Solid Waste Management
TPD/TPA	Tons per Day / Tons per Annum
ULBs	Urban Local Bodies

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Executive Summary

The state of Chhattisgarh currently generates about 2520 Tonnes per day (TPD) of Municipal Solid Waste and this quantity is likely to be more than 3000 TPD by 2026, assuming the rate of increase of per capita waste generation is in proportion to increase in urban population. State Urban Development Authority (SUDA), in its endeavour to provide people safe, clean and healthy environment, has proposed to set up Solid waste management facilities in the ULBs of Chhattisgarh on EPC mode. The government of India through Solid Waste Management Rules, 2016 has set the baseline for the modus operandi of SWM in the country.

Based on factors such as existing treatment facilities, additional machines and equipment required to attain saturation to ensure 100% scientific waste processing, availability of land parcel, optimal waste transport distance and project area the technical feasibility report has been prepared for Bhakhara. The Bhakhara ULB currently generates about 2.99 TPD of waste which is likely to increase to 3.05 TPD by 2026.

This report describes a possible design solid waste management system in Bhakhara ULB and identifies feasible technologies for processing and disposal of MSW. Based on the analysis and all the studies, it is proposed that processing of MSW into compost and RDF and recovery of recyclables through Compost and MRF plant is the most feasible technology based on quantity of waste generation, land availability, waste characteristics and volume reduction of waste.

The overall project has been designed considering the year 2026 which accounts for the time taken in bid process management, bid finalization, construction & commissioning of the plant and year on year expansion in population growth and subsequently in waste generation quantity which will be approximately 3.05 TPD for Bhakhara ULB (assuming 2% YOY increase in population and 300 g/capita waste generation). The total capital cost for up-gradation of SLRM centre to MRF plant and compost plant has been estimated to be INR 31.24 Lacs.

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1. Introduction

Waste generation encompasses activities in which materials are identified as no longer being of value (being in the present form) and are either thrown away or gathered for disposal. Solid Waste Management Rules, 2016 (MSW Rules 2016) define Municipal Solid Waste (MSW) as commercial and residential wastes generated in a municipal or notified area in either solid or semi-solid form excluding industrial hazardous wastes but including treated bio-medical wastes.

Solid Waste Management (SWM) is a vital service provided by Urban Local Bodies (ULBs) to its citizens to ensure a healthier environment, standard of living, health and sanitation facilities. Although an obligatory function, SWM service has been an area of concern for urban centers of all sizes especially with changing patterns of lifestyle and behavior. With increasing population and urbanization, SWM in India has emerged as a priority not only because of the environmental and aesthetic concerns but also because of the quantities generated every day.

A typical SWM value chain comprises of the following steps:

- Waste generation and storage
- Segregation, reuse, and recycling at the household level
- Primary waste collection and transport to a transfer station or community bins
- Street sweeping and cleansing of public places
- Management of the transfer station or community bin
- Secondary collection and transport to the waste disposal site/ processing facility
- Processing of waste using appropriate technologies
- Scientific and safe disposal of inert/ residual waste

Recognizing the importance of solid waste management, the Government of Chhattisgarh has initiated steps to improve SWM in the state of Chhattisgarh by planning setting up of new solid waste management facilities and upgradation/revamping of existing SLRM centers to achieve saturation and attain 100% scientific processing of MSW. This task is entrusted with the SUDA, Government of Chhattisgarh. There are 188 Urban Local Bodies (ULBs) in the state of Chhattisgarh with a population of about 59.89 lakhs as per Census 2011. These ULBs generate about 2514 TPD of MSW and this quantity is likely to be more than 3000 TPD by 2026. It has been proposed to setup new and upgrade/revamp existing SWM system in each of the ULBs. Such an infrastructure shall be designed in a manner that assures economical service delivery and establishes cost recovery mechanisms for long term sustainability. Further, it shall maximize resource recovery and minimize environmental impact.

1.1 Role of Urban Local Bodies (ULBs)

As per the Constitution of India, SWM is a state subject, and it is the primary responsibility of state governments to ensure that appropriate solid waste management practices are introduced in all the cities and towns in the state. Though SWM is a state subject, it is basically a municipal function and as such urban local bodies are directly responsible for performing this important activity. The 74th amendment of the constitution also envisages the urban local bodies to shoulder this responsibility.

The urban local bodies in the country are, therefore, responsible and required to plan, design, operate, and maintain the solid waste management system in their respective cities/towns. The ULBs may promote private sector participation to ensure solid waste management by deciding to set up treatment facilities and doorstep collection service with the private sector participation on suitable terms and

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conditions for which standard concession agreements/formats may be drawn up with legal assistance to ensure protection of ULB interest.

1.2 Regulatory Landscape

Solid Waste Management Rules, 2016

The Ministry of Environment and Forests (MoEF, later rechristened as Ministry of Environment, Forests and Climate Change (MoEFCC)), Government of India, enacted the "Municipal Solid Waste (Management and Handling) Rules 2000" (*MSW Rules 2000*) in conformance with Sections 3, 6 and 25 of the Environment Protection Act, 1986. These rules were aimed at standardization and enforcement of SWM practices in the ULBs. The rules mandated every municipal authority to, within the territorial area of the municipality, be responsible for the implementation of the provisions of these rules and infrastructure development for collection, storage, segregation, transportation, processing and disposal of municipal solid wastes. In addition, the CPCB would coordinate with State Pollution Control Boards (SPCBs) and Pollution Control Committees (PCCs) in the matters of MSW disposal and its management and handling.

Central Public Health and Environmental Engineering Organization (CPHEO), a department under the Ministry of Urban Development (MoUD) has developed a manual based on these rules to provide operational guidelines to ULBs for an efficient MSW management system.

Further, the MoEFCC has published the "The Solid Waste Management Rules, 2016" to supersede "The Municipal Solid Wastes (Management and Handling) Rules, 2000". The salient features of these rules include:

- The term "municipal solid waste" has been replaced by solid waste; solid waste encompasses domestic waste including sanitary waste, commercial waste, institutional waste, catering and market waste and other non-residential wastes, street sweepings, silt removed or collected from the surface drains, horticulture waste, construction and demolition waste and treated bio-medical waste excluding industrial hazardous waste, bio-medical waste and e-waste.
- Inclusion of a separate chapter on construction & demolition waste management with roles and responsibilities of various stakeholders defined including Bureau of Indian Standards
- Separate standards for organic compost and phosphate rich organic manure; stringent standards for incineration
- Removal of term 'municipal authority'; new stakeholders have been identified. The functions of MoEFCC, MoUD, Ministry of Chemicals and Fertilizers, CPCB, SPCB, Pollution Control Committees for Union Territories, municipal administration, state governments and urban local bodies
- Provision for incentives to decentralized waste treatment facilities.

The rules have enlisted duties of various stakeholders:

- The waste generators are mandated to segregate and store waste generated by them in three separate streams namely bio-degradable, non-bio-degradable and domestic hazardous waste in suitable bins and handover these segregated wastes to authorized waste collectors. Further, construction and demolition waste shall be disposed of as per the Construction & Demolition Waste Management Rules, 2016.

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- Ministry of Environment, Forest and Climate Change shall be responsible for overall monitoring and implementation of these rules in the country. A Central Monitoring Committee shall be setup to monitor and review implementation of these rules.
- Ministry of Urban Development formulated the national policy and strategy on solid waste management including a policy on waste-to-energy in consultation with stakeholders, promote research and development in the sector and undertake training and capacity building of local bodies and other stakeholders.
- Department of Fertilizers, Ministry of Chemicals and Fertilizers shall provide market development assistance on city compost.
- Ministry of Agriculture, Government of India shall endeavor to provide flexibility in Fertilizer Control Order for manufacturing and sale of compost.
- Ministry of Power shall decide tariff for power generated from waste-to-energy plants and compulsorily purchase power generated from such waste-to-energy plants.
- Ministry of New and Renewable Energy shall facilitate infrastructure creation and provide subsidy or incentives for waste-to-energy plants.
- District Magistrate/ District Collector/ Deputy Commissioner shall facilitate identification and allocation of suitable land for setting up solid waste management facilities.

Service Level Benchmarks

In order to set minimum performance standards for public services, a Service Level Benchmarks (SLBs) programme has been undertaken by the Ministry of Urban Development (MoUD) since 2009 emphasising on an increased focus on delivery of service outcomes. The programme covers vital services offered by the ULBs that include water supply, wastewater and solid waste management. The minimum set performance parameters for SWM services include:

1. Household Level Coverage - 100%
2. Efficiency in Collection of Solid Waste - 100%
3. Extent of Segregation of MSW - 100%
4. Extent of MSW Recovered - 80%
5. Extent of Scientific Disposal of MSW - 100%
6. Extent of Cost Recovery - 100%
7. Efficiency in Collection of SWM Charges - 90%
8. Efficiency in addressing of Customer Complaints - 80%

Performance-related funds were earmarked under the 15th Finance Commission for improvements in SLBs including SWM. The focus is to achieve 100% source segregation, efficient door-to-door collection, minimize manual handling of waste and increase efficacy of covered transportation.

Regulatory landscape for SWM is summarized below.

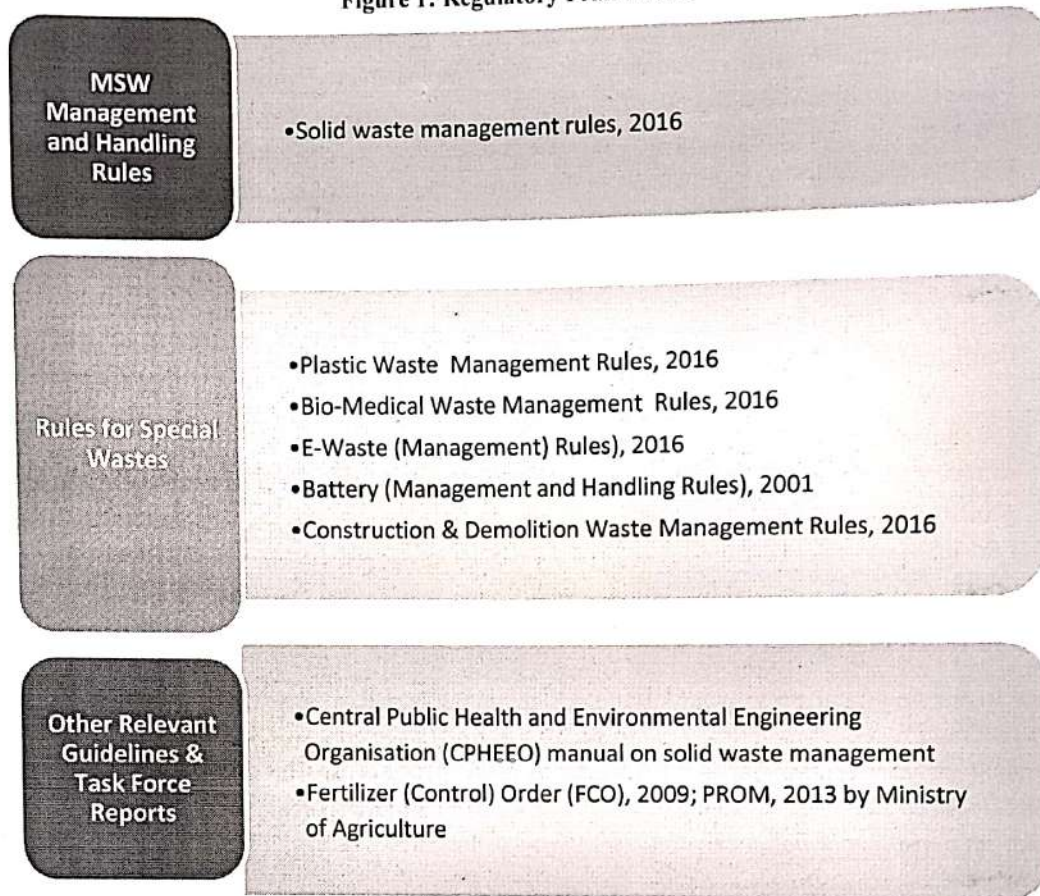
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Figure 1: Regulatory Framework



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2. Project Development

MSW can be managed through a centralized approach, a decentralized approach, or a combination of the two. Waste management services under each approach in turn can be delivered by the ULBs themselves or in association with the private sector or the local community. In India, both centralized and decentralized systems are in practice in different cities/towns. These two approaches have been briefly discussed below.

a. Centralized approach

The centralized approach to waste management, also termed as Integrated Solid Waste Management, is a technology-driven waste management system for handling bulk wastes at a central processing facility. With respect to the MSW value chain, in a centralized waste management system, the implementing agency (either the ULB or a private entity) collects wastes from household or community bins and transports it to a processing facility. Thereafter, composting techniques and/or waste to energy technologies like incineration, palletisation, Refuse Derived Fuel (RDF), plasma gasification, bio-methanation are used to derive value from the wastes. These waste-to-energy technologies are more common in developed countries and have been applied in a few waste management projects in India.

A Solid Waste Management System (SWM) envisages provisioning of all aspects of waste management i.e. collection, transportation, processing and disposal of waste by one or two large entities. Application of state-of-the-art technologies, reaping economies of scale and ensuring commercial viability of projects are the main reasons for bundling up of all segments of the waste value chain. Moreover, coordination between the ULB and the private entity is relatively better in the ISWM framework when compared to a scenario where multiple entities are engaged in different segments of the waste management process.

b. Decentralized approach

The decentralized method of managing a city's waste involves management of municipal waste by various small waste management centres within the locality. In technical parlance, such centres are called Integrated Resource Recovery Centres (IRRC) which can be either profit-making or not-for profit organizations engaged in collecting, transporting and processing around 2 to 20 metric tons of waste from the surrounding locality. The micro-entrepreneurs owning for-profit IRRCs generally engage informal workers for collection and transportation of wastes through hand-held carts or other small vehicles. Composting is undertaken to convert organic waste into manure whereas recyclables like metal, glass, plastics etc. are either sold to the recycling industry or recycled by the organization itself. The refuse is collected by the ULBs and transported to the sanitary landfill sites.

The system is based on door-to-door waste collection and provides training to households in segregation of wastes. The system provides daily door-to door collection services using cycle-carts operated by a team of two informal waste workers in uniforms and with safety equipment like hand gloves, boots and masks. The collected wastes are transported to the MRF where it is manually segregated, and organic waste is composted. Sieved compost is enriched with nitrogen, phosphorous and potassium to make organic

The differences between the two approaches are highlighted below:

Table 1: Centralized & decentralized waste management

Parameter	Centralized approach	Decentralized approach
Processing	Collection & treatment of the combined waste at one location	Collection & treatment of the waste at ward/ zone level. – Dry & Wet
Land required	Less number of sites, NIMBY syndrome restricted to few locations	More number of sites, Public opposition possible
Transportation	High	Less
Scale of economies	Scale of economies work in processing	Helps recycling of waste in trade lines
Disposal	More waste going to SLF (as per the SWM Rules 2016 not more than 20% of the incoming Waste stream can be send to landfill)	Less waste going to SLF

The centralized waste management and the decentralized waste management systems have their own advantages and disadvantages and cannot be uniformly applied to ULBs of all sizes and locations. Both the waste management mechanisms – centralized and decentralized – when deployed in circumstances suited to the mechanism, can result in efficient solid waste management. Neither has been shown to be superior to the other on all parameters in all conditions, and hence, the question that needs to be answered is under which conditions should a centralized model of waste management be adopted, and when to adopt the decentralized model. The choice of a particular approach depends on several factors like financial and human resource capacity of the concerned ULB, socio-economic-cultural profile of city/town, status of service delivery, quantity and quality of waste generated, availability of land, among others.

2.1 Basis of Project Development

The quantity and composition of MSW generated in the ULB is essential for determining collection, processing and disposal options that could be adopted. They are dependent on the population, demographic details, principal activities in the city/ town, income levels and lifestyle of the community. In order to assess the sufficiency of the existing and potential MSW treatment capacity of the State of Chhattisgarh, the following stepwise process has been followed:

- Data on current MSW generation from non-industrial (domestic, commercial) and industrial sectors has been collected from ULBs.
- Population projections have been made taking population of 2011 as the base figures and considering 2% YoY increase in urban areas (CPHEEO manual, 2015)
- Future MSW generation from domestic, commercial and industrial sectors is estimated using sector specific growth factors.
- Treatment capacity of all functioning treatment plants and potential treatment capacity of identified land pockets have been estimated.

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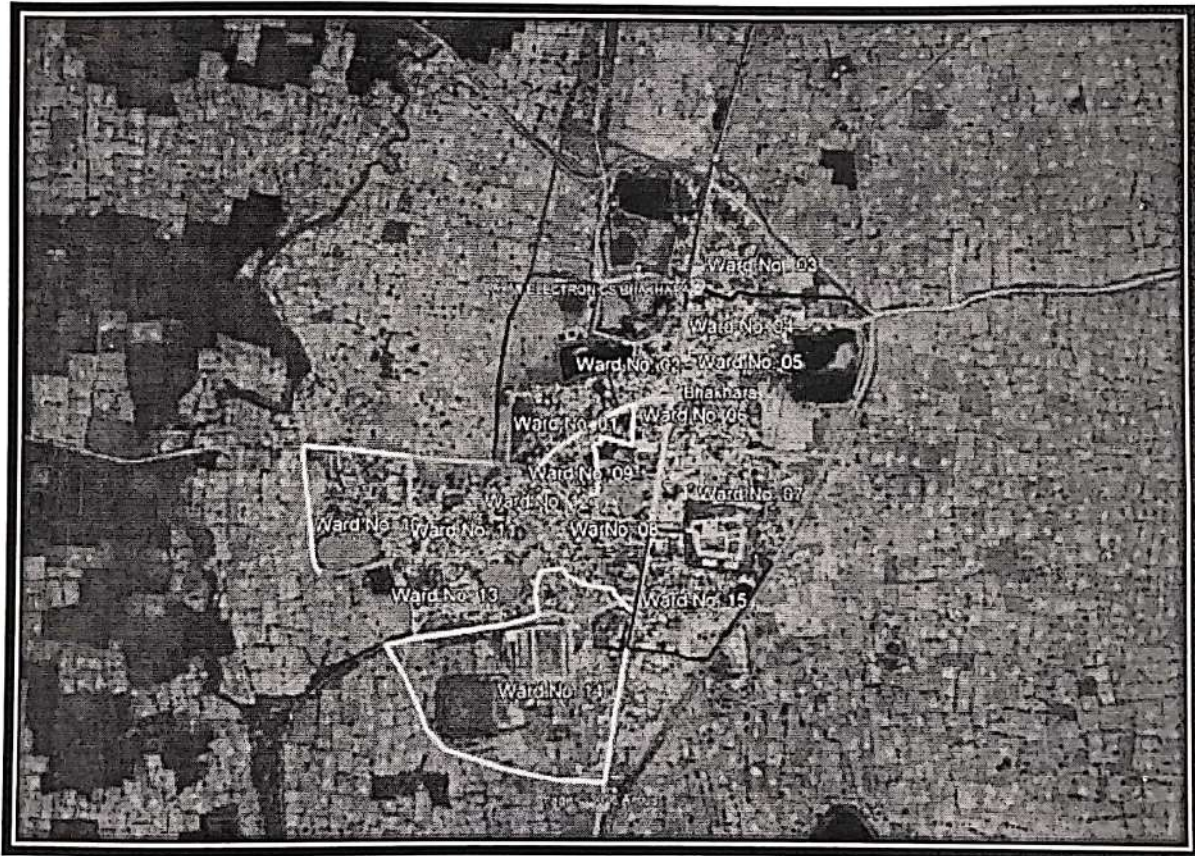
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2.2 Project Area

Bhakhara is a Nagar Panchayat city in district of Dhamtari, Chhattisgarh. The Bhakhara city is divided into 15 wards for which elections are held every 5 years. The Bhakhara Nagar Panchayat has population of 7,547 of which 3,802 are males while 3,745 are females as per report released by Census India 2011. In Bhakhara Municipality, Population of Children with age of 0-6 is 896 which is 11.87 % of total population of Bhakhara (NP). In Bhakhara Nagar Panchayat, Female Sex Ratio is of 985 against state average of 991. Moreover Child Sex Ratio in Bhakhara is around 902 compared to Chhattisgarh state average of 969.. Currently, Bhakhara Municipality has total administration over 2275 houses hold, 50 institutions, 1791 commercial establishments to cater this MSW project.

Figure 2: Project Area



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Following are the ward details of the Bhakhara ULB.

Table 2: Bhakhara Ward Details

Ward No.	Ward Name	Population as per census 2011
Ward No. 1	Shahid Bhagat Singh	544
Ward No. 2	Swami Vivekanand	549
Ward No. 3	Guru Ghasidas	378
Ward No. 4	Pt. Narayan Rao Meghawale	486
Ward No. 5	Pt. Deendayal Upadhyay	358
Ward No. 6	Mahatma Gandhi	575
Ward No. 7	Pandhrrao Kridatt	461
Ward No. 8	Chandi Mandir	467
Ward No. 9	Netaji Subhashchandra Boss	565
Ward No. 10	Danteshwari	355
Ward No. 11	Dr. Shyamaprasad Mukharji	516
Ward No. 12	Minimata	618
Ward No. 13	Lal Bahadur Shastri	586
Ward No. 14	Babu Chhotelal Shrivastav	616
Ward No. 15	Chandra Shekhar Azad Ward	473
	Total	7547

The details about the population and waste generation for ULB is as follows

Table 3: Population and Waste Generation Detail

ULB Code	ULB	Population projection for 2026	Waste generation in 2026 (Tons per day)	Wet Waste Generation (TPD) in 2026	Dry Waste Generation (TPD) in 2026
802048	Bhakhara	10151	3.05	1.67	1.07

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3. Existing Scenario of MSW Management

Currently, the ULB is responsible for collection, transportation, treatment, and disposal of all solid waste generated in the respective ULB, except untreated bio-medical waste and hazardous industrial waste. Brief summary of existing scenario for MSW management in the Bhakhara ULB is given below.

Table 4: Summary of Existing Structure

ULB	Collection and Transportation	Processing and Disposal
Bhakhara Nagar Panchayat	<ul style="list-style-type: none"> Municipal Solid Waste of Bhakhara ULB collected by 2 Tricycle, 6 E-Rikshaw and 3 Auto Tippers. 	<ul style="list-style-type: none"> There is 1 SLRM Center in ULB to process dry waste and compost pits plant to process wet waste.

The primary sources of solid waste generation in Bhakhara are from the households, markets, commercial establishments/ shops, hotels & restaurants, institutions, function/marriage halls, Offices, Hospitals etc.

Source Segregation

Waste should be segregated by waste generators into two fractions – wet fraction (green container) and dry fraction (blue container). The list of different waste bins is provided below:

Table 5: Waste bins for source segregation of waste

Wet Waste (Green Bin)	Dry Waste (Blue bin)			
	With further sub-segregation			
Food wastes of all kinds, cooked and uncooked, including eggshells and bones, flower and fruit wastes including juice peels and house plant wastes, soiled tissues, food wrappers, paper towels	Paper, cardboard, and cartons	Containers and packaging of all kinds, excluding those containing hazardous material, compound packaging of all kinds	Rags, rubber, wood, discarded clothing, furniture	Metals, glass (all kinds), Inert, house sweeping,

Collection of wet and dry waste separately enhances the potential of cost-effective treatment of such wastes cost effectively and ensure optimum advantage from the recyclable material fed into the system. Segregated waste must be stored on-site in separate containers for further collection and should be kept separate during all steps of waste collection, transportation, and processing.

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3.1 Storage and Collection

All residents are encouraged through information and education campaign to;

- Keep the food waste, kitchen waste and other bio-degradable waste as and when generated, in the domestic waste container as prescribed by ULB
- Keep recyclable and non-biodegradable waste in the waste container prescribed by ULB.

3.2 Collection & Transportation

Bhakhara is collecting municipal solid waste on daily basis with 3 Auto Tippers, 6 E -Rikshaw and 2 Tricycle. There are 54 Swachhata Didi working on collection, transportation, and processing of municipal solid waste. ULB is getting around 60% of solid waste in segregated manner.

3.2.1 Primary Collection

Primary collection refers to the process of collecting waste from households, markets, institutions, and other commercial establishments and taking the waste to processing plants. ULB is collecting waste through the use of E-Rickshaw and Auto-Tippers. The waste is collected in the morning hours before 12 noon.

Vehicles and equipment

Light commercial vehicles with hydraulic tipping containers: These vehicles are suitable for door-to-door collection from lanes of width less than 5 meters with a total pay load capacity of nearly 600 – 900 kilograms per trip. For The Bhakhara ULB, as a conservative estimate a capacity of 600 kg per trip is considered. This is equivalent to a carrying capacity of about 1.2 cum of waste per trip. Each light commercial vehicle may collect waste from 700 households.

3.2.2 Litter Bins

The main objective of the litter bins system commercial and public area is to store the waste temporarily and transport it as early as possible. Waste is temporarily stored in the litter bins prior its transportation disposal site.

ULB aspires to follow the two bins system at each 100 m distance in commercial and public area. Organic waste bins are proposed to be in green colour and inorganic or non-biodegradable waste bins are proposed to be in blue colour.

Waste from the commercial areas is collected between 10.00 am and 4 pm. Vegetable market waste is collected in non-peak hours either early morning or late in the afternoon or at night.

3.2.3 PPE Kits

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The PPE are mandatory requirement for the safety and hygiene purpose for workers at the SLRM Centre/ MRF Plant. The PPE requirements for all the manpower handling MSW are gloves, shoes, uniforms covering the entire body etc. Following table provides the detailed specifications, along with applicable codes of practice.

Table 6: Specifications for PPE





Name of PPE	Image/Picture	Specification	Standards
Nose Mask (Surgical)		<ul style="list-style-type: none"> - Size (L x W) 5.5" x 3.5" - Blue Colour - Plain Cloth Fabric - Cotton (10% Poplin) cloth - Non-irritant, anti-allergenic and Skin friendly - Breathable without restriction and environment friendly - 50 to 150 GSM of Fabric - Soft stretch elastic earloops - Foldable 	IS: 9473-2002 IS: 15323-2003
Safety goggles		<ul style="list-style-type: none"> - Polycarbonate lens with soft PVC frame & body. - Fully adjustable headband attached to fit most users. - Light, resilient, durable & over the glass protective eyewear for all day wears. - Anti-fog lens coating - 4-point venting system that circulates air yet prevents dust, splashes. - Scratch resistant lens - Lens provides medium velocity impact & splash protection around the eyes. - Universal fit soft nose bridge conforms to facial contours to ensure a comfortable fit. 	EU 86/686/EFC EN166/2002 and ANSI/SEA Z87.1-2010 or equivalent

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Name of PPE	Image/Picture	Specification	Standards
Chemical resistant gloves, multi-use		<ul style="list-style-type: none"> - CE Marked fully nitrile rubber hand gloves (In pair) shall have inside soft cotton flocked lining. - It shall be able to resist acid, alkali & solvent while providing solid protection against snags, abrasion, puncture & cuts. - Nitrile rubber hand glove should meet requirement of the overall length of the gloves shall not be less than 12 Inches (from middle finger to end of the sleeve). 	IS: 4770-1991 EN-388 & EN-374 (2016)
Safety (High visibility/ warning) Jacket		<ul style="list-style-type: none"> - 100% mesh polyester - Reflective Tape: High gloss - Tape Width: 2 inches 	IS: 15809 - 2017
Bouffant Caps		<ul style="list-style-type: none"> - Bouffant caps are lightweight. - Water repellent - Help protect the user against germs and bacteria. 	IS: 2925-1984 CE-EN-397 ANSI Z891-2003
Safety shoes		<ul style="list-style-type: none"> - Safety footwear must be as per ISO. - The standard outlines the minimum and optional requirements for safety footwear. - A protective toecap that can withstand a 200-joule impact. - Antistatic protection, midsole penetration protection, energy absorption, water resistance insulation against cold and heat. 	IS: 5852-2004 IS: 15298 (Part 2)-2011

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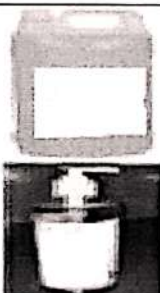

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Name of PPE	Image/Picture	Specification	Standards
Ear Plugs		<ul style="list-style-type: none"> - Ear plug for protection against noise (NRR to be minimum 29db) - Made of soft sponge material or silicone - Polyurethane, non-allergic, smooth, comfortable, tapered shape to fit into the ear canal closely, longer length to facilitate fitting. - Removable point, attached with nylon thread packed in good quality self-sealing plastic pouch. 	IS: 6229-1980
Hand Sanitizers		<ul style="list-style-type: none"> - Ethanol + Chlorhexidine, isopropanol 20% - Shelf life 36 month from date of manufacturing 	IS: 4117-2008
Apron		<ul style="list-style-type: none"> - Apron to be used in by personnel performing works procedures with high risk of contamination. - Thickness: 150-300 microns. 	IS: 4501-1981

Note: If apron having reflective stripe are available in market that will be preferable, instead of separate Apron & Safety jacket

3.3 Processing Facilities

There is 1 SLRM centre available in Bhakhara in which dry waste is processing and selling to Kabadiwala by Swachhata Didi. There is 1 compost plant available in ward no. 02 which is operational.

Table 7: Existing SLRM Centre & Compost Plant Details Bhakhara

SLRM No./COMPOST PLANT	SLRM 1 OLD	COMPOST PLANT 1
Ward No.	2	2
Location Name	SWAMI VIVEKANAD WARD NO. 2 NEAR PIPARAH TALAB	
SLRM Plant Capacity (TPD)	4.95 TPD	2.5 TPD
Total No. of Wards Covered	15	15
Wards covered	01 TO 15	
Total Household covered	2275	
Weighing Machine Available (Yes/ No)	NO	
Bailer Machine Available (Yes/ No)	YES	NA
Fatka Machine Available (Yes/ No)	YES	NA
Compost Machine (Yes/ No)	NA	NO
Compost Pits Operational (Yes/ No)	NA	YES
Toilet Available (Yes/ No)	YES	NO
Civil Infrastructure Retrofitting required (Yes/ No)	YES	NA
SLRM Shed need to change (Yes/ No)	NEED REPAIRING	NEED REPAIRING
Boundary Wall Available (Yes/ No)	YES (REQUIRE MAINTENANCE OF SLRM)	REQUIRED
Water Availability (Yes/ No)	YES	NO
Electricity Available (Yes/ No)	YES	
Approach Road Available (Yes/ No)	YES	YES
CCTV Required (Yes/ No)	YES	

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3.4 Deficiency Analysis – Existing Solid Waste Management System

There is a considerable improvement in waste management in ULB, yet there are some issues in the existing system. There are issues that need to be addressed such as absence of segregation practice, absence of 100% door to door collection, systematic collection and absence of processing and treatment processes and scientific disposal facility. The issues identified with the current management system are highlighted in below table.

Solid Waste Management practices in Bhakhara town need improvements to make it more effective and efficient. The following aspects of the present system shall be addressed to establish a solid waste management system for the town.

Table8: Deficiency Analysis in present scenario of SWM in Bhakhara

Component	Remarks
Segregation at Source	<ul style="list-style-type: none"> lack of collection & segregation of waste at the source of generation.
Primary Collection	<ul style="list-style-type: none"> There is 90% door-to-door collection. Unhealthy and unhygienic waste disposal practices followed by the citizens.
Street Sweeping	<ul style="list-style-type: none"> Inefficient street sweeping operations. The current sweeping does not cover all the roads and streets.
Transportation	<ul style="list-style-type: none"> Lack of systematic disposal of waste and its transportation from entire town to processing plant and landfill site causing nuisance to the environment and sanitation system of the city.
Community Participation	<ul style="list-style-type: none"> Community participation is absent with some exceptions.
Public Awareness	<ul style="list-style-type: none"> Lack of significant educational programs, campaigns for public awareness on solid waste management, significance of recycling, reuse and segregation of MSW creating environmental and sanitation problems.
Processing and Disposal	<ul style="list-style-type: none"> Lack of waste processing practices.

Service level benchmarking has been assessed with respect to the performance indicators for the solid waste management of Bhakhara. The service levels of the existing performance indicators have been compared with benchmark values given by MoUD, GOI. Proposals have been framed with consideration of benchmark values given by MoUD under handbook of Service Level Benchmarking for solid waste management. Following table shows the existing scenario of Bhakhara town with reference to state level benchmark.

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Table 9: Deficiency in SWM with respect to state level benchmark

Sr. No.	Indicator	Unit	Value	Existing Scenario	Target for the year 2026
1	Household level coverage of SW services	As % of households and establishments that are covered by daily door-step collection system	100%	90%	100%
2	Efficiency of Collection of municipal solid Waste	As % of total waste collected by ULB and authorized service providers against waste generated within the project area (excluding the waste recycled through rag pickers)	100%	90%	100%
3	Extent of Segregation of municipal solid waste	As % of households and establishments that segregate their waste	100%	55%	100%
4	Extent of municipal solid waste recovered	Quantum of waste collected, which is either recycled or processed, expressed as %	80%	55%	80%
5	Extent of scientific disposal of solid waste	As % of waste disposed in a sanitary landfill site against total quantum of waste disposed in landfills and dumpsites	100%	0%	100%
6	Cost recovery in SWM services	Expressed as % recovery of all operating expenses related to SWM services that the ULB is able to meet from the operating revenues of sources related exclusively to SWM	100%	60%	100%
7	Efficiency in redressal of customer complaints	As a % of total number of SWM related complaints resolved against total number of SWM complaints received within 12-hour time period	80%	55%	80%
8	Efficiency in collection charges	Efficiency in collection is defined as-current year revenues collected, expressed as a % of the total operating revenues, for the corresponding time period	90%	30%	90%

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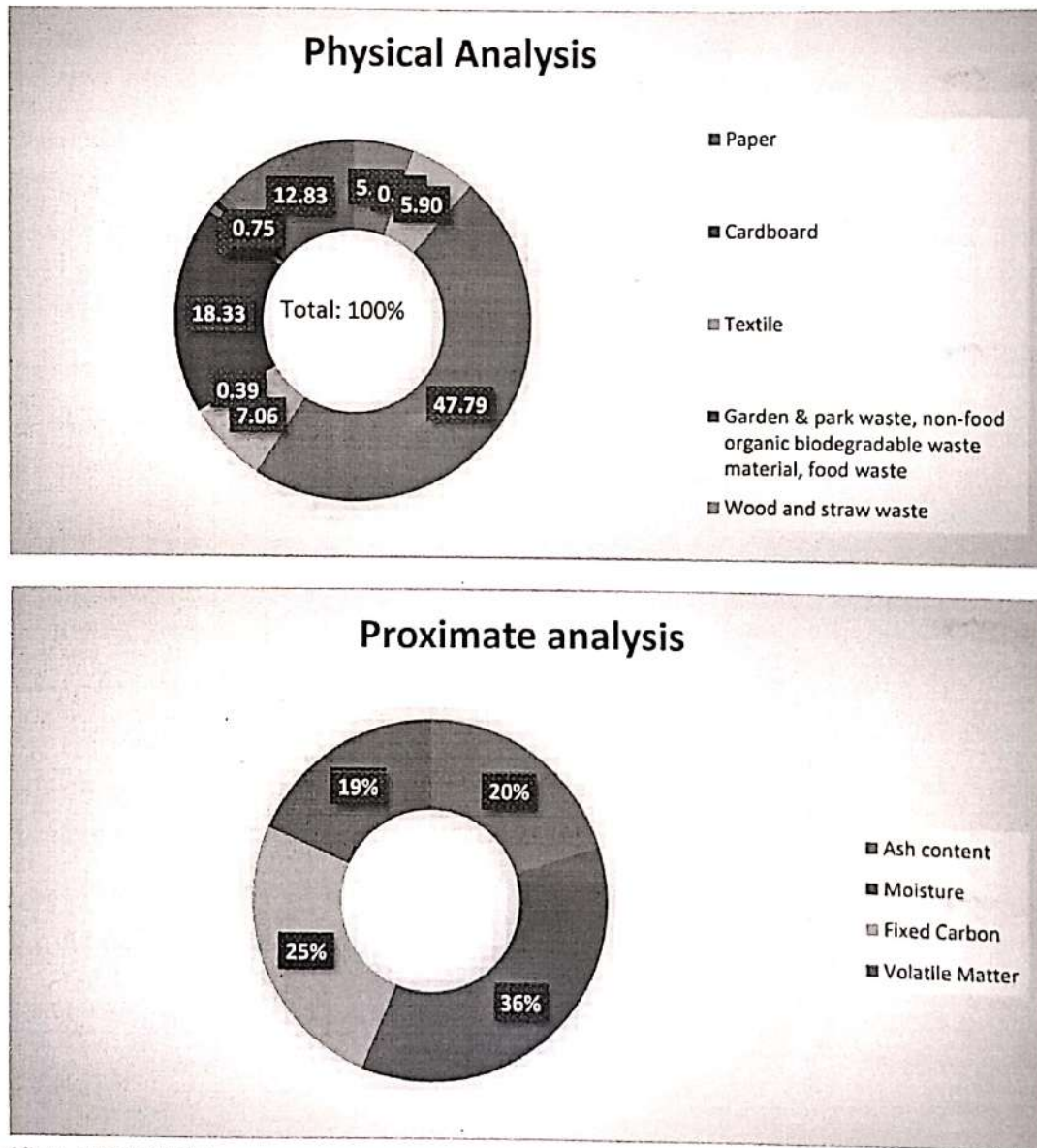


4. Proposed Studies

4.1 Waste Characterization

Solid waste is very heterogeneous in nature and its composition varies with place and time. Even samples obtained from the same place (sampling point) on the same day, but at different times may show totally different characteristics. Waste characterization has been done in all the ULBs to find out the physical and chemical components of MSW.

Figure 4: Waste characterization



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4.2 Geo-Technical Study

Geo-technical studies are conducted to analyse the strength and other characteristics of soil by making boreholes in the proposed site. Apart from a few on-site physical strength tests following parameters will be carried out in the laboratory:

Table 10: Tests for geo-technical studies

S. No.	Tests/Parameters
1.	Sieve analysis - soil texture type and classification, Particle size distribution etc.
2.	Hydrometer analysis
3.	Permeability
4.	Field moisture content
5.	Bulk & dry density
6.	Specific gravity
7.	Field moisture content and water retention capacity
8.	Liquid & plastic limit
9.	Strength parameters - safe bearing capacity, SPT etc.
10.	Chemical analysis – on subsoil water samples and on soil samples for pH, Chlorides, Sulphates, Carbonates

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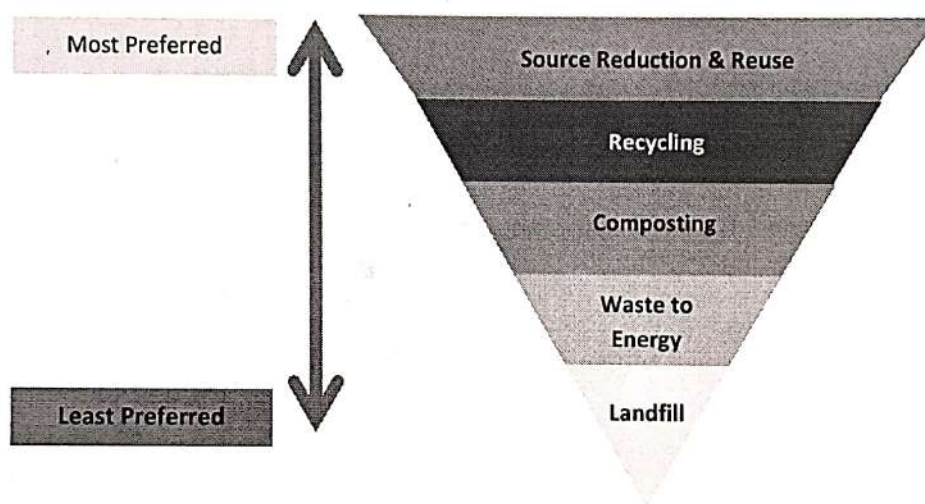
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5 Solid Waste Management Technologies

Solid Waste Management (SWM) proposes a waste management hierarchy with the aim to reduce the amount of waste being disposed, while maximizing resource conservation and resource efficiency. The SWM hierarchy ranks waste management operations according to their environmental, economic and energy impacts. Source reduction or waste prevention, which includes reuse, is considered the best approach (tier 1) followed by recycling (tier 2) and composting of organic matter of waste, resulting in recovery of material (tier 3). The components of waste that cannot be prevented or recycled can be processed for energy recovery (tier 4). Tier 5 is disposal of waste in sanitary landfill, which is the least preferred option. Moreover, solid waste management system shall be compliant with Solid Waste Management Rules, 2016 (and to amendments thereto).

Figure 5: Municipal solid waste management hierarchy



5.1 General Technologies & Trends

A judicious choice of technological options is mandatory to address treatment of municipal solid waste. A choice of more than one technology or combination of technologies (according to SWM) has many-a-times proved beneficial. The available technologies to treat MSW can be broadly categorized into 3 broad sections.

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Table11: MSW Treatment Technologies

Solid Waste Treatment Technologies		
Thermal Process Technologies <ul style="list-style-type: none"> ▶ Incineration ▶ Gasification ▶ Plasma Arc ▶ Pyrolysis 	Biological Processing Technologies <ul style="list-style-type: none"> ▶ Composting (aerobic processes) ▶ Vermicomposting ▶ Bio-methanation (Anaerobic Processes) 	Physical Processing Technologies <ul style="list-style-type: none"> ▶ RDF Technology

Thermal processing technologies

The thermal processing technologies involve thermal decomposition of waste into gaseous, liquid and solid conversion products with release of heat energy. These technologies operate at temperatures greater than 200°C and have higher reaction rates. They typically operate in a temperature range of 375°C to 5,500°C. Thermal technologies include advanced thermal recycling (a state-of-the-art form of waste-to-energy facilities) and thermal conversion (a process that converts the organic carbon-based portion of the MSW waste stream into a synthetic gas which is subsequently used to produce products such as electricity, chemicals, or green fuels).

The main thermal processing technologies adopted internationally for the treatment of municipal waste are:

▶ Incineration

Mass-burn systems are the predominant form of the MSW incineration. Mass-burn systems generally consist of either two or three incineration units ranging in capacity from 50 to 1,000 tons per day; thus, facility capacity ranges from about 100 to 3,000 tons per day. It involves combustion of unprocessed or minimally processed refuse. The major components of a mass burn facility include: (1) Refuse receiving, handling, and storage systems; (2) Combustion and steam generation system (a boiler); (3) Flue gas cleaning system; (4) Power generation equipment (steam turbine and generator); (5) Condenser cooling water system; and (6) Residue hauling and storage system.

▶ Pyrolysis

In pyrolysis, at high temperatures of 700°C to 1200°C, thermal degradation of organic carbon-based materials is achieved through the use of an indirect, external source of heat, in the absence or almost complete absence of free oxygen. This thermally decomposes and drives off the volatile portions of the organic materials, resulting in a syngas composed primarily of hydrogen (H₂), carbon monoxide (CO), carbon dioxide (CO₂), and methane (CH₄). Some of the volatile components form tar and oil, which can be removed and reused as a fuel. Most pyrolysis systems are closed systems and there are no waste gases or air emission sources (if the syngas is combusted to produce electricity, the power system will have air emissions through a stack and emission control system). After cooling and cleaning in emission control systems, the syngas

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can be utilized in boilers, gas turbines, or internal combustion engines to generate electricity or used as raw stock in chemical industries. The balance of the organic materials that are non-volatile or liquid that is left as a char material, can be further processed or used for its adsorption properties (activated carbon). Inorganic materials form a bottom ash that requires disposal, although some pyrolysis ash can be used for manufacturing brick materials.

Gasification

In the gasification process, thermal conversion of organic carbon based materials is achieved in the presence of internally produced heat, typically at temperatures of 660°C to 1800°C, and in a limited supply of air/oxygen (less than stoichiometric, or less than what is needed for complete combustion) to produce a syngas composed primarily of H₂ and CO. Inorganic materials are converted either to bottom ash (low-temperature gasification) or to a solid, vitreous slag (high temperature gasification that operates above the melting temperature of inorganic components). Some of the oxygen injected into the system is used in reactions that produce heat, so that Pyrolysis (endothermic) gasification reactions can initiate; after which, the exothermic reactions control and cause the gasification process to be self-sustaining. Most gasification systems, like Pyrolysis, are closed systems and do not generate waste gases or air emission sources during the gasification phase. After cooling and cleaning in emission control systems, the syngas can be utilized in boilers, gas turbines, or internal combustion engines to generate electricity, or to make chemicals.

Biological processing technologies

Biological treatment involves using microorganisms to decompose the biodegradable components of waste. Biological processing technologies operate at lower temperatures and lower reaction rates. Biological processing technologies are focused on the conversion of organics in the MSW. MSW consists of dry matter and moisture. The dry matter further consists of organics (i.e., whose molecules are carbon-based), and minerals, also referred to as the ash fraction. The organics can be further subdivided into biodegradables or refractory organics, such as food waste, and non-biodegradables, such as plastic. Biological technologies can only convert biodegradables component of the MSW. By-products can vary, which include electricity, compost, and chemicals.

Biological process can be aerobic and anaerobic. Biological technologies adopted for treatment of solid waste include:

Composting

Composting is a natural micro-biological process, where bacteria break down the organic fractions of the MSW stream under controlled conditions to produce a pathogen-free material called "Compost" that can be used for potting soil, soil amendments (for example, to lighten and improve the soil structure of clay soils), and mulch. The microbes, fungi, and macro-organisms that contribute to this biological decomposition are generally aerobic. A mixture of organic materials is placed into one or more piles (windrows), and the natural microbial action will cause the pile to heat up to 60 - 70°C, killing most pathogens and weed seeds. A properly designed compost heap will reach 70°C within 6 to 10 days, and slowly cool off back to ambient temperatures as the biological decomposition is completed. Systematic turning of the material, which mixes the different components and aerates the mixture, generally accelerates the process

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of breaking down the organic fraction, and a proper carbon/nitrogen balance (carbon to nitrogen or C/N ratio of 20:1) in the feedstock ensures complete and rapid composting. The composting process takes from 30 to 90 days.

There are two fundamental types of composting techniques: a) open or windrow composting, which is done out of doors with simple equipment and is a slower process, and b) enclosed system composting, where the composting is performed in some enclosure (e.g., a tank, a box, a container or a vessel).

➤ **Anaerobic digestion**

In anaerobic digestion, biodegradable material is converted by a series of decomposition processes by different bacterial groups into methane and CO₂. A first group breaks down large organic molecules into small units like sugar. This step is referred to as hydrolysis. Another group of bacteria converts the resulting smaller molecules into volatile fatty acids, mainly acetate, but also hydrogen (H₂) and CO₂. This process is called acidification. The last group of bacteria, the methane producers or methanogens, produce biogas (methane and CO₂) from the acetate and hydrogen and CO₂. This biogas can be used to fuel boilers or reciprocating engines with minimal pre-treatment. In addition to biogas, anaerobic bioconversion generates a residue consisting of inorganics, non-degradable organics, and bacterial biomass. If the feedstock entering the process is sufficiently free of objectionable materials like colourful plastic, this residue can have market value as compost. Anaerobic digestion process is also referred to as the Bio-methanation process.

➤ **Bioreactor landfill**

A bioreactor landfill is a wet landfill designed and operated with the objective of converting and stabilizing biodegradable organic components of the waste within a reasonable time frame, by enhancing the microbiological decomposition processes. The technology significantly increases the extent of waste decomposition, conversion rates and process effectiveness over what would otherwise occur in a conventional wet landfill. Stabilization in this context means that landfill gas and leachate emissions are managed within one generation (twenty to thirty years) and that any failure of the containment system after this time would not result in environmental pollution. There is better energy recovery including increased total gas available for energy use and increased greenhouse reduction from reduced emissions and increase in fossil fuel offsets. These factors lead to increased community acceptance of this waste technology. Management of a bioreactor landfill requires a different operating protocol to conventional landfills. Liquid addition and recirculation is the single most important operational variable to enhance the microbiological decomposition processes. Other strategies can also be used, to optimise the stabilization process, including waste shredding, pH adjustment, nutrient addition and temperature management.

Physical processing technologies

Physical technologies involve altering the physical characteristics of the MSW feedstock. The MSW is subjected to various physical processes that reduce the quantity of total feedstock, increase its heating value, and provide a feedstock. It may be densified or pelletized into homogeneous fuel pellets and transported and combusted as a supplementary fuel in utility boilers. These technologies are briefly

described below
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➤ **Refused Derived Fuel (RDF)**

The RDF process typically includes thorough pre-separation of recyclables, shredding, drying, and densification to make a product that is easily handled. Glass and plastics are removed through manual picking and by commercially available separation devices. This is followed by shredding to reduce the size of the remaining feedstock to about eight inches or less, for further processing and handling. Magnetic separators are used to remove ferrous metals. Eddy-current separators are used for aluminium and other non-ferrous metals. The resulting material contains mostly food waste, non-separated paper, some plastics (recyclable and non-recyclable), green waste, wood, and other materials. Drying to less than 12% moisture is typically accomplished through the use of forced-draft air. Additional sieving and classification equipment may be utilized to increase the removal of contaminants. After drying, the material often undergoes densification processing such as pelletizing to produce a pellet that can be handled with typical conveying equipment and fed through bunkers and feeders. The RDF can be immediately combusted on-site or transported to another facility for burning, alone or with other fuels. The densification is even more important when RDF is transported off-site to another facility, in order to reduce volume being transported. RDF is often used in waste to energy plants as the primary or supplemental feedstock, or co-fired with coal or other fuels in power plants, in kilns of cement plants, and with other fuels for industrial steam production.

➤ **Mechanical separation**

Mechanical separation is utilized for removing specific materials or contaminants from the inlet MSW stream as a part of the pre-treatment process. Contaminants may include construction and demolition (C&D) debris, tires, dirt, wet paper, coarse materials, and fine materials. Generally, MSW reaching the dumping sites is unsegregated and mixed, containing C&D debris and other contaminants. Therefore, it is essential to remove these contaminants from the incoming MSW by mechanical separation before processing the waste further by either biological, physical and thermal technologies (except Plasma Arc Technology).

➤ **Size reduction**

Size reduction is often required to allow for more efficient and easier handling of materials, particularly when the feed stream is to be used in further processes. Sizing processes include vibrating screens and trommels. To reduce the size of the entire stream, or portions of it, mechanical equipment, such as shredders, is utilized. This allows for other physical processes, such as dryers, magnetic and eddy current separators, and densification equipment to work more efficiently. Magnetic and eddy current separators may be installed both up and downstream of shredders to increase the recovery of metals.

The above technologies can be summarized as follows:

Table 12: Summary of MSW processing technologies

Thermal processing technologies		Pros	Cons
Incineration	Waste incineration is a treatment process that involves	✓ Reduction in volume of waste going to	✓ Release of harmful emissions in the air

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	the combustion of organic fraction of MSW to convert the same into ash, flue gases and heat.	✓ landfill ✓ Production of energy which could be used for various purposes ✓ Reduction in toxicity of waste and pathogens	✓ Treatment of the by-products is imperative ✓ Skilled operators are required ✓ NIMBY syndrome
Gasification	Gasification also involves the partial oxidation of carbon-based feedstock to generate syngas, which can be used as a fuel or for the production of chemicals.	✓ Limited air requirement which leads to less volume of flue gas for treatment	✓ Larger land requirement ✓ Requirement of pre-treatment of waste
Pyrolysis	Pyrolysis is a thermal process that uses high temperatures to break down any waste containing carbon.	✓ Less quantity of waste going to landfill	✓ Limited success stories
Biological processing technologies			
Composting	Controlled decomposition of organic matter by micro-organisms into stable humus. It can be done by either open/windrow composting or enclosed/in vessel composting.	✓ Relatively cost effective	✓ Discharge of leachate and phenols leading to water contamination ✓ Possible odour ✓ NIMBY syndrome
Biomethanation	Biodegradable material is broken down by bacteria into methane and CO ₂ in the absence of oxygen.	✓ Treatment at source ✓ Gas/ power generation	✓ Only applicable to organic fraction of MSW
Physical processing technologies			
Refuse Derived Fuel Technology	MSW may be separated, shredded and/or dried in a processing facility. The resulting material is referred to as Refuse Derived Fuel (RDF).	✓ Higher calorific value from for power generation ✓ Suitable for low input capacity	✓ Stringent air pollution monitoring is required for burning

5.2 Assessment of Technologies/Technology Selection Criteria

The selection of best available technology (BAT) for any waste processing facility depends upon a number of factors such as:

- Indian experience
- Nature of waste
 - Quantity of waste
 - Quality of waste
- Cost considerations
 - Capital investments required
 - Operating expenditure

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- Economy of operation
- Cost of end products
- ▼ Manpower Requirement
- ▼ Level of skill required
- ▼ The capability of the ULBs to manage such facility departmentally or through private sector participation
- ▼ Scale of operation
- ▼ Environmental impact of such technology
- ▼ Process aesthetics
- ▼ Compatibility of cycle of nature

The following criteria are to be considered to assess the suitability of technology in Indian context as per MSW CPEEHO Manual:

- ▼ Technology reliability
- ▼ Waste suitability
- ▼ Waste supply chain approach

Technology Reliability: The table below presents MSW treatment technologies with respect to potential reliability of operations.

Table 13: MSW treatment technology reliability

S.No.	Technology Category	Comments
1.	Composting	A number of installations have been satisfactorily working in India. The technology is simple and easy to scale up. This is one of the best suited technology due to techno-economical feature and composite climate of Indian cities.
2.	RDF	▶ With large scale operations in the US, the technology is well proven. A number of medium scale plants are in operation in India.
3.	Bio methanation	Large scale projects are operational in the Europe. Pilot projects are been taken up in India. Some projects include Melvishram Project taken up in Tamil Nadu. Accelerated R&D is taking place to use this method to treat segregated waste.
4.	Vermicomposting	▶ The technology is suitable for small scale plants as it requires high control of temperature and humidity. In India small scale plants are being taken up. Some plants worth mentioning are 100TPD plants at Mangalore and Eluru.

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Table 14: Selection criteria - one page reckoner as per MSW CPEEHO Manual¹

Element	Composting	MRF	Biomethanation	Incineration
Technically & economically feasible size of operation per day fresh waste	Pit composting (Honeycomb pit composting) for small scale and windrow for large scale	No constraint	1 TPD at small scale and above 50 TPD at larger scales of Pure organic waste	500 TPD and above due to high moisture in our waste. Suitable only for segregated waste. However sizes as small as 10 – 50 TPD of waste are available for commercial sale but not advisable due to high running costs.
Land required (for TPD)	6 Ha	3 Ha	4 Ha	4 Ha
Waste characteristics necessary for operation	Moisture Content > 50% Organic Matter > 40% C/N Ratio between 25-30	Moisture < 45% Volatile Matter > 40%	Moisture Content > 50%; Organic Matter > 40% C/N Ratio between 25-30	Moisture Content < 45% Net Calorific Value > 1200 KCal/kg
Volume reduction of waste	45-55 %	55-65 %	55-65 %	> 80 %
Environmental issues	Impurities in compost due to mixed waste, traces of heavy metals, leachate runoff	Problems in burning exhaust	Problems if mixed feedstock	Ash handling and Air pollution (emission of particulate matter, chlorinated compounds dioxins/ furans)
Technology reliability	Running successfully in India	Running successfully in integrated facilities	Small scale organic Treatment plant Operational but mixed waste large scale plants failed in India	Only Plant in India failed due to mismatch in waste quality. MSW 2000 has recommended for incineration of waste only after doing a waste suitability analysis, and providing adequate flue gas management
Limitation	Large land requirement, Sale of Compost	Fluff/Pellets can be used as fuel in large industries, e.g.	The technology requires segregated pre-homogenous	Expensive Technology, waste criteria must have low moisture content

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Element	Composting	MRF	Biomethanation	Incineration
		in cement kilns with necessary permissions from the PCBs and required pollution control measures	biodegradable waste as mixed waste retards efficiency of the process. Hence applicability is limited to highly organic and homogenous waste streams like market wastes	and high calorific value, which is not found in Indian Waste. Costly flue gas remediation methods to attain achievable outputs.

Waste suitability: Another important factor for selecting the waste processing technology is waste suitability. As Indian waste is mixed in nature without a segregation system in place. Indian waste is generally characterized with high organic content, low calorific value and high moisture content. The desirable range of parameters for technical viability of waste processing options:

Table 15: Suitability of waste for processing methods

Waste processing method	Important waste parameters	Desirable range
Thermal processing technologies	Moisture content	<45%
	Volatile Matter	>40%
	Inert Material	<35%
	Fixed Carbon	<15%
	Net Calorific Value	>1200Kcal/ kg
Biological processing Technologies	Moisture Content	>50%
	Organic Matter	>40%
	C/N Ratio	25-30

Waste supply chain approach: The third approach that plays a key role in selection of a suitable MSW technology is waste supply chain approach. Indian waste is mixed in nature and in most cases needs to be suitably segregated before treatment. The identified technologies are classified according to the levels of segregation necessary:

Table 16: Different technologies based on level of pre-processing required

S.No.	Technology category	Comments
1.	Composting	Requires pre-processing of waste. Can accept mixed waste but the final product will be poor. Post processing of the compost is necessary for better quality; however compost enrichment with neem cake etc. may further increase the quality of MSW compost.
2.	MRF cum RDF	Requires pre sorting and pre-processing of waste to segregate and separate the recyclables into different categories either manually or mechanical. The technology also involves physical processing of waste to make it combustible and involves segregation, drying, shredding and densification of waste. The poor processing of waste may lead to lower calorific value and higher emissions due to combustion; are the main limiting factor for this technology.
3.	Biomethanation	Requires high degree of preprocessing of waste which calls for highly

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S.No.	Technology category	Comments
		efficient source segregation calling for high investments for waste collection.
4.	Incineration	Segregation of glass, metal and large size materials is required. Because of low calorific value of Indian waste sorting is important to bring the waste to a threshold calorific value. Shredding and densification will increase the combustion efficiency. The poor processing of waste may lead to lower calorific value and higher emissions due to combustion; are the main limiting factor for this technology.

5.3 Recommended Technologies

The limitations of the individual conventional technologies can be mitigated by bringing together a mix of technologies by integrating them together to provide a holistic solution for the treatment of urban waste. An integration of technology so carried out would have the following benefits:

- It treats various components of urban waste in an efficient manner so as to provide optimum utilization of waste to produce compost, biogas, power and building materials.
- It leads to optimization of cost by treating larger quantities at the same place, sharing infrastructure and variable costs.
- It is environmentally desirable, as the rejects of one process becomes inputs for the other process.

Considering the indian scenario, an economically and environmentally sustainable solid waste management system will only be effective if it follows an integrated approach i.e. refining of mixed waste in a series of mechanical sorting, shredding and drying stages followed by density separation to separate the combustibles, organic and inerts out of mixed waste and giving treatment to each fraction that would be most suitable and efficient for it. The unprocessed combustible material thus separated out from the MSW is known as segregated combustible fraction (SCF).

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6 Proposed Solid Waste Management Project

The quantity and composition of MSW generated in the ULB is essential for determining collection, processing and disposal options that could be adopted. They are dependent on the population, demographic details, principal activities in the city/town, income levels and lifestyle of the community. Waste generation encompasses activities in which materials are identified as no longer being of value (being in the present form) and are either thrown away or gathered for disposal. Following Figure depicts various sources of solid waste.

Figure 6: Sources of MSW generation



The primary generators of solid waste are local households, commercial establishments, industries, markets, hotels, restaurants, and hospitals. Apart from MSW, a lot of e-waste as well as bio-medical waste (hospital sector) is generated.

6.1 Proposed MSW Processing Technology

The plant is designed to process approx. 3.05 TPD municipal solid waste (MSW) on per day basis and can process different kind of waste types. MSW processing unit would comprise of the following:

- A. Composting facility

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i. Elements of composting facility

The elements of composting facility which has been mentioned above, would be further explained here.

a. Yard Management System

The <100 mm fraction of MSW will be manually segregated in the pre-processing section which is conveyed to the designated areas of compost pad for windrow preparation. In windrow type aerobic composting system, the fresh MSW is stacked in the form of trapezoidal heaps called 'windrows'. *Sufficient quantity of decomposing microbial cultures (inoculum & sanitizer*) will be inoculated at this point with sprayer to reduce odour and repel vectors. Moisture will also be supplemented at required levels before windrow preparation. The thoroughly mixed waste is then made to windrows of convenient dimensions and kept for the biologic decomposition.

The windrows are periodically turned (normally once a week) using hydraulic excavators to provide proper aeration and temperature control. The composting heap is stabilized in about 6 weeks, when it is shifted to the screening plant for removal of the inert and non-composted matter.

In some of the plants, particularly, in high rain-fall areas, a shed is provided called 'rain shed' or 'monsoon shed'. In this case the material is shifted to the rain-shed after about 4 weeks and kept there for a further period of 2 weeks.

- *1. After windrowing, water is added to windrow using water tanker to maintain requisite moisture level.
2. Just after windrowing, bacterial activity starts within 2-3 days. Inside temperature of the windrow may go up to 65°C.

b. Curing system

Material coming out of the coarse segregation section is stored in curing section for 15 days for further stabilization and moisture control. Some additives, such as, as rock phosphate may be added at this stage to improve quality of final product. Curing area can hold up to 20 days of material coming to the curing section on daily basis.

c. Refinement system

As per compost quality norms nationally (FCO) and internationally, the compost should be below 6 mm average particle size and it should not contain impurities such as glass, plastic, other inert material etc. which spoils the overall appearance and creates suspicion in the mind of the end user about quality of the final product.

High quality organic manure is then passed through the packing spout and final packing of the product takes place.

d. Packing and storage system

The mechanized packing section can do the bagging, weighment and stitching of 50 kg bags and finally stacked in the finished product store by using a stacking conveyor.

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c. Leachate, litter and odour management system

During composting a dark brown/black coloured fluid may get generated. This fluid is known as 'leachate'. It is collected through lined drains or concrete drains at the leachate tank. Managing leachate from composting yards is crucial to protect soil and water resources while exploring its reuse potential. Considering the low quantities of leachate generated from the decentralized composting facilities in the state, it is safely being managed in situ. The following practices are adopted:

- Collection Systems

Leachate is collected in lined pits or concrete tanks using HDPE liners or concrete structures to prevent seepage into the ground. This is especially important in areas with shallow groundwater levels.

- Leachate Recirculation

Recirculating leachate into compost piles helps maintain moisture and enhances microbial activity, reducing the need for additional water and minimizing leachate volume.

- Evaporation Ponds

Leachate collection tanks can also double up as solar drying tank when designed for the same. Instead of making a deep tank, the ULBs are advised to develop tanks with large surface areas and depth not exceeding 1 m. These are effective for reducing leachate volume. These should be properly lined and monitored, especially during the monsoon season, to prevent overflow or contamination.

- Treatment Units

Urban composting facilities can adopt biological treatment systems such as constructed wetlands or anaerobic digesters. These reduce organic load and pathogens. Physio-chemical methods like filtration and coagulation can be used as secondary treatment before discharge or reuse.

- Dilution for Use as Liquid Fertilizer

Treated or partially treated leachate can be diluted with water and used as a liquid fertilizer, especially for:

- Non-edible crops (e.g., ornamental plants, green belts).
- Soil enrichment in barren or degraded lands.
- Nurseries and forestry plantations.

Before application, it is essential to:

- Test for heavy metals, pathogens, and nutrient content.
- Dilute appropriately (commonly 1:20 or more, depending on quality).
- Comply with FCO (Fertilizer Control Order) standards.

The air-borne litter is controlled by providing a high wire mesh. A green belt is proposed around the plant wherever possible.

ii. Process monitoring & control systems

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a. **Yard management**

Yard management process needs to be monitored in order to achieve proper digestion and obtaining right quality finished product. For aerobic composting, proper temperature, moisture and aeration is required in the windrows. Temperature in the core of the windrow should reach up to 65-75° C and a moisture level of 35 – 40 % should be maintained in the windrows. These will ensure proper growth of the bacteria and thus proper stabilization. An operator will take temperature readings of the windrows and also check the moisture level. C: N ratio of the waste must also be checked by sampling, so that corrective measures can be taken at the initial stage if the ratio is found not in-line with the requirement. If heavy metals are found in the waste with the values exceeding the stated ones, the waste material should be removed from the windrows and not used for food crops.

b. **Removal of recyclables & processing rejects**

Recyclables will be sold to authorized recyclers and combustibles fraction will be balled and sold to industries. Rejects from the compost plant must be regularly removed. These would be loaded in dumpers or tractor trolleys and directed to designated landfill site.

iii. **Design considerations of Bhakhara ULB compost plant**

The design, construction, and operation of Bhakhara ULB compost plant has been planned, keeping in view the present MSW compliance and quality requirements (as per the Solid waste management rules, 2016 and expectations of the market. The proposed plan for design, construction and operation of Bhakhara ULB Compost Plant has four stages –

- (1) Pre-processing
- (2) Windrow composting
- (3) Processing
- (4) Refinement of the stabilized material

The compost process and the material balance are worked out for -100mm fraction of incoming municipal solid waste every day. The basic design of the Bhakhara ULB compost plant is based on open windrow aerobic composting of organic (biodegradable) component of solid waste, utilising the usable facilities in the existing compost plant. The basic parameters considered for design of the Bhakhara ULB compost plant are:

- Best utilisation of the land available
 - Smooth flow of material
 - Ensure the output standards to meet the Solid Waste Management Rules, 2016 (MoEF, Govt)
- iv. **Compost process and material flow**

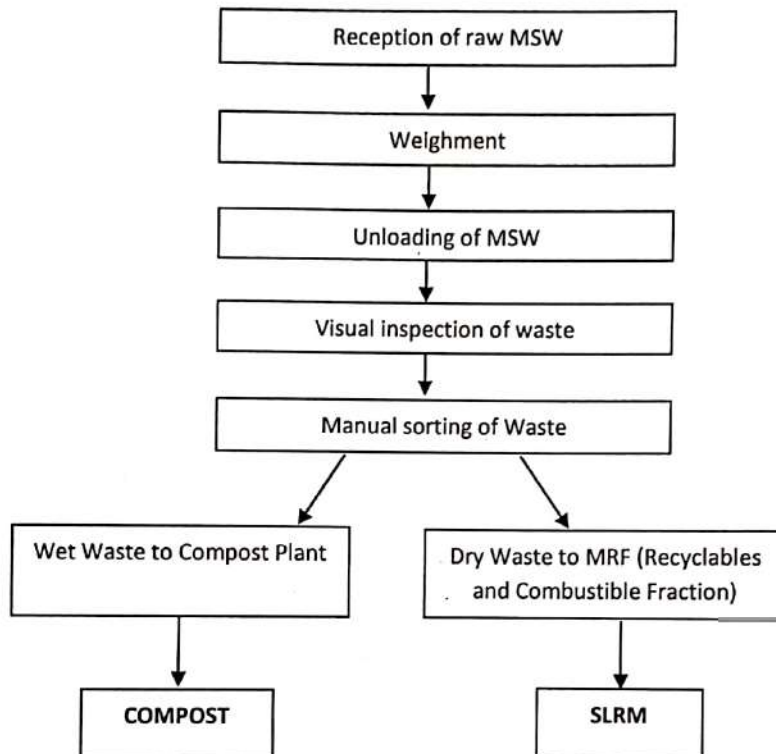
The complete process has been designed with the following steps:

- (i) <100 mm to compost pad
- (ii) Preparation of windrows & addition of decomposing microbial cultures & required moisture
- (iii) Periodic Turning of Windrows
- (iv) Process Monitoring and Controlling activities
- (v) After four turnings, shifting of material to Monsoon Shed and air drying

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- (vii) Screening of compost from 6 mm sieve
- (viii) The screened compost then stored in bulk
- (ix) Packing of the screened compost for further utilisation/sale
- (x)

Figure 7: Process flow at the processing facility



C. MRF/SLRM

The MRF processing unit would receive the segregated dry waste through following process:

- i. Collected dry waste from the sources will be received through an auto tipper/other vehicle, which will be weighed on the weigh bridge.
- ii. Vehicles will be unloaded at the tipping area. The dumpster bags, gathari etc will be unbundled and oversized materials will be taken out physically for further handling and disposal.
- iii. The waste will be segregated into at least 8 categories i.e., Wood, Steel, Paper, Cardboard, Plastic (High Density and Low Density), Cloth, Glass, Rubber, etc. (Separate section for recyclables and RDF)
- iv. Fine fraction would generally contain inert, multi layered, plastics etc. Mid-size recyclable materials and oversize particle materials contain multi- layer package materials, paper and cardboards etc.
- v. Workers would physically sort this waste on conveyor belts. Non-recyclable components and inert will be sent to sanitary landfill.
- vi. Potential hazardous, such as batteries, aerosol cans, etc would also be removed physically. Other Domestic Hazardous Waste (DHW), such as empty paint cans, empty vials of injections,

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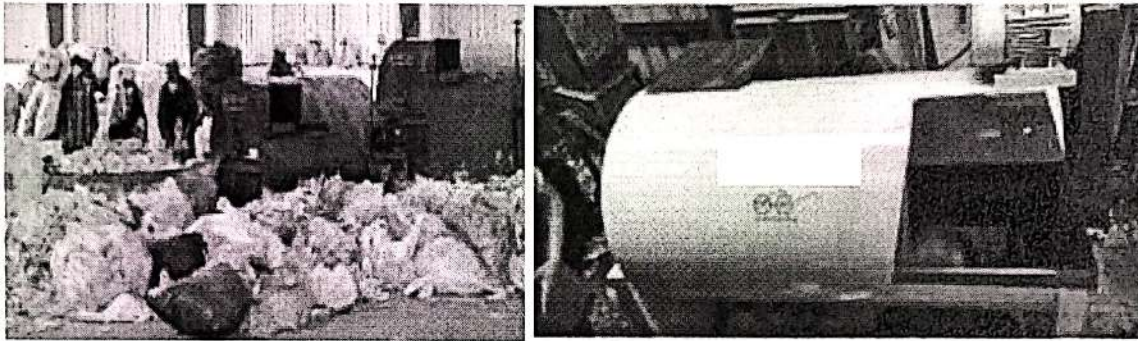
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- discarded/expired medicines, etc. are segregated.
- vii. DHW would be sent to common facilities for hazardous wastes and bio-medical wastes to Bio Medical Processing Plant.

Plastic waste has a significant portion in total municipal solid waste. However, there is a proper collection system of waste in city. Municipal Corporation could be recycled plastic waste at Material Recovery Facility Centre with the help of below machines.

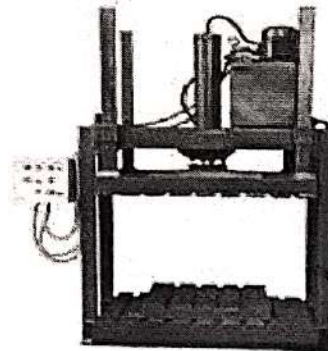
Fatka Machine – This machine will be used for cleaning the dust from waste plastic which having.

Figure 8: Fatka Machine



Baling Machine: This machine will be used to reduce the volume of plastic waste by compacting, so that storage and transportation becomes relatively easier. Baling is a suitable option for both plastic and bottles, providing a reduction in volume that aids storage, transportation and management of the waste plastics.

Figure 9: Baling Machine



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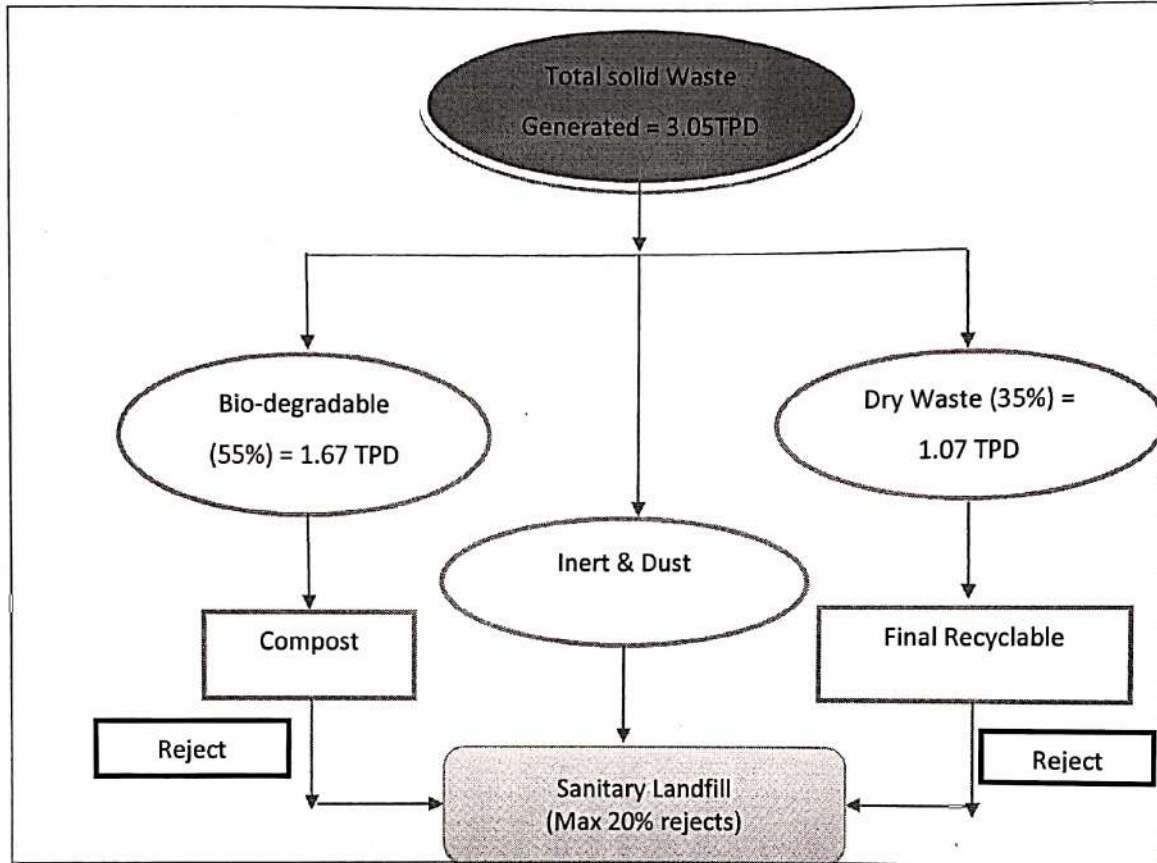
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6.2 Mass Balance

The MSW processing facility can be summarised in the following mass balance flow chart:

Figure 10: Flow Chart – Material Balance of 3.05 TPD Bhakhara ULB MSW Plant



The overall project has been designed considering the year 2026 which accounts for the time taken in bid process management, bid finalization, construction & commissioning of the plant and year on year expansion in population growth and subsequently in waste generation quantity which will be approximately 3.05 TPD for Bhakhara ULB (assuming 2% YOY increase in population and 300 g/capita waste generation). Accordingly, the cost estimation of collection, transportation as well as processing facility is considered for the year 2026.

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6.3 Proposed Solid Waste Management Scheme

Following facility up gradation required in terms of retrofitting of civil infrastructure/ proposing new civil infrastructure/ machine to process 100% waste generated in 2026.

Table 17: SLRM /Compost Plant Proposal Details

Cost Estimate For Solid Waste Management At Nagar Panchayat Bhakhara, Dhamtari (C.G.)			
A	Swami Vivekanand, Ward - 02		
	COST OF SLRM CENTRE	Quantity	Dimention
	Part - I SOR ITEM		
	PROPOSED CIVIL WORK		
1	SLRM Revamping Work	1	-
2	Boundary Wall Revamping Work	1	83.0 M
3	Rain Water Harvesting	1	-
4	Plumbing & Sanitary Work	1	-
	Part - II NON-SOR ITEM		
5	Conveyor Belt	1	
6	HDPE Wheel Container (10 Nos.)	10	
7	Weigh Bridge	1	
8	Bale Trolley (03 Nos.)	3	
9	Surveillance Camera	1	
10	Turbine Ventilator	6	
	Swami Vivekanand, Ward - 02		
	COST OF WINDROW COMPOST PLANT	Quantity	Dimention
	Part - I SOR ITEM		
	PROPOSED CIVIL WORK		
1	Windrow Compost Plant 2 TPD	1	-
2	Storage Room	1	11.50 M X 5.0 M
3	Leachate Tank	1	5.0 X 2.0X 1.5 M
4	C.C. Flooring	1	160.00 SQN
5	Boundary Wall With Fencing	1	71.00 M
	Part - II NON-SOR ITEM		
6	Wheel Barrow	2	
7	Compost Sieve Machine	1	

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7 Information, Education and Communication (IEC)

An efficient waste management program, regardless of the strategy, requires significant cooperation from waste generators and active community participation. IEC is a multi-level tool for promoting and sustaining risk-reducing behaviour change in individuals and communities. The rationale for IEC is to undertake holistic interventions in addressing SWM issues and hence to enable workable communication among different stakeholders that participate at the different stages of the SWM hierarchy. The IEC plan can include both a short term plan and a long term plan. The short term plan will focus on issues of immediate importance whereas the long term plan will have a holistic and comprehensive outlook. Some strategies for implementation of IEC are as follows:

- ▶ Sensitization cum workshop for different stakeholders
These workshops shall be aimed at sensitization of different stakeholders and take their feedback on municipal solid waste management practices. This workshop shall also be utilized to identify volunteers dedicated to the cause of MSWM.
- ▶ Interpersonal Communication (IPC), contacting every household through identified leaders and volunteers. These volunteers shall tell the message to every household and take their feedback as well.
- ▶ Message dissemination by involving religious leaders, SHGs, youth clubs, mahilamandals, RWA and with pre-recorded religious & cultural program me
- ▶ Involvement of institutions academicians for the environment and atmosphere building by school/college student as school rallies, slogan writing, essay competition etc.

Information

Table 18: Template for information to stakeholders

Stakeholders	Content of Information	Methods to convey the information(Methodology)
Households	Collection & segregation and possible treatment	Interpersonal Communication (IPC) along with poster, leaflet, brochure, advertisements, social media
Community	Collection & segregation and possible treatment	workshops, advertisements
Mass level	All aspects of SWM practices	Print media, electronics media, poster, hoardings, workshops, trainings, advertisements on public transport
ULBs	All aspects of SWM practices	Technical manual, brochure
Institutions	All aspects of SWM practices	Rallies, quiz competition, debate, incorporation of concept of SWM in school curriculum, SWM oath at school

Education

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Education at individual level:

Education at individual level is aimed to make the people aware about all aspects of solid waste management and health hazards of solid waste due to improper handling and management. IPC at HHs level shall be designed to assess the sanitation facilities, solid waste management and handling practice and mobilize them for proper waste management and handling practices and to adopt the good sanitation and hygiene practices. IPC shall also introduce 3 R concepts and sensitize them.

Public education at group/community level:

The elements of group education may be taken as followings:

- ▶ Workshop
- ▶ Exhibition
- ▶ Lecture Series
- ▶ Panel discussion
- ▶ Group meeting/Community meeting

Mass education:

The elements of mass education may be taken as followings:

- ▶ Use of print media, electronic media, social media etc.
- ▶ Street plays, puppet shows
- ▶ Poster, pamphlet, hoardings, use of public transport system
- ▶ Incorporate the SWM into primary school curriculum
- ▶ Involvement of Nehru Yuva Kendra (NYK), National Cadet Corps (NCC), National Service Scheme (NSS), Scouts guide etc.
- ▶ Involvement of religious leader
- ▶ Improvement of medical practitioners to focus on health impacts of solid waste
- ▶ Involvement of Mahila Mandal (MM)/SHGs
- ▶ Involvement of Resident Welfare Association (RWA).

Communication:

Some means of communication for sustainable approach of SWM practices and handlings:

- ▶ Poster, pamphlet, banner, hoarding, leaflet and brochure
- ▶ Technical manual on SWM
- ▶ Slogan, standee display on steps of process of SWM
- ▶ Material on SWM for the school curriculum
- ▶ Display board at the site wherever underground waste bins are installed (How to use)
- ▶ Materials convergence with religious content on SWM
- ▶ Audio and video clipping for electronic media (e.g. AIR, FM, DD etc)

Capacity Building:

Capacity building is defined as the creation of an enabling environment with appropriate policy and legal framework for institutional development, including community participation, human resources development

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and strengthening of managerial systems. It is a long-term, continuing process, in which all stakeholders participate.

The approach to capacity building in SWM shall not be only about technology and economics but also about:

- ▶ Understanding the administration systems for waste management and related activities (multidisciplinary and cross-sectoral)
- ▶ Understanding the need for human resource development to achieve better results in SWM
- ▶ Focus on building sound institutions and good governance for attaining improved SWM
- ▶ Delineating strategies for sustenance of achievement

Broadly, the target audience can be categorized as waste generators, waste collectors and waste managers. The program shall be designed to spell out the problem 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. Various publicity tools will be used as under:

- ▶ Focus Group Discussions (FGDs)
- ▶ Interpersonal communications
- ▶ Creating watchdog committees comprising of local influential people, RWA members and important stakeholders, societies
- ▶ Printed materials and audio-visual aids
- ▶ Other locally popular media
- ▶ Other tools like newspapers, media/radio, and skit/street plays, billboards / print medium may be used for creating awareness

Training:

The basic approach of training of managing staff is to create effectiveness of the SWM system and its operational efficiency of sanitary staff. Training programs shall be designed to sensitize the key stakeholders with working knowledge of the benefits of waste reduction, segregation and management and to impart skills about the respective roles from generator to waste managers. A core group of trainers shall be organized for continuous in-house training of the manpower to be deployed and other sanitation staff.

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8. Cost Estimates

Assuming a 2% YOY increase in population and 300 per capita waste generation per day, the waste generation of the Bhakhara Nagar Palika Parishad at the end of the concession period, i.e. 2026, has been estimated to be 3.05 TPD. Therefore, considering the waste generation an up-gradation of compost plant and MRF/SLRM plant has been proposed with provision to enhance the capacity in future. The machines and equipment requirement, civil infrastructure required for the project along with cost estimations is as given below:

Following table shows capital cost required for processing the wet and dry waste under SBM 2.0 scheme.

Table 19: Capital Cost for Processing of solid waste management

DETAILED ESTIMATE FOR PROPOSED WORK OF " WINDROW COMPOST PLANT AT SWAMI VIVEKANAND WARD NO - 02 " NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)					
A	SWAMI VIVEKANAND , WARD - 02				
	COST OF SLRM CENTRE				
	Part - I SOR ITEM	QTY.	UNIT.	RATE	AMOUNT (RS.)
	CIVIL WORK				
1	SLRM Revamping Work	-	-	-	466190.25
2	Bounday Wall Revamping Work	-	-	-	216580.54
3	Rain Water Harvesting	-	-	-	32001.00
4	Plumbing & Sanitary Work	-	-	-	47635.00
	Total I				714771.80
	Part - III NON-SOR ITEM	QTY.	UNIT.	RATE	AMOUNT (RS.)
4	Flat Conveyor Belt - approx. 7 m long, 700 mm wide, 800 mm high, flat roller type. (Detailed Specification as per Annexure A)	1	Nos.	155000.00	155000.00
5	HDPE Wheeled Container 100 L HDPE container, durable, 440 kg load capacity, wheeled design. (Detailed Specification as per Annexure B)	10	Nos.	1375.00	13750.00

6	Weigh Bridge - 10 Ton electronic pitless weighbridge with digital load cells and auto calibration. (Detailed Specification as per Annexure C)	1	Nos.	225000.00	225000.00
7	Bale Trolley 250 kg MS trolley, manual, with polymer wheels, rust-proof design. (Detailed Specification as per Annexure D)	3	Nos.	6800.00	20400.00
8	Surveillance Camera - Min. 6 No. of CCTV Cameras at each plant with 5 MP cameras, DVR, night vision, and real-time monitoring. (Detailed Specification as per Annexure E)	1	Set	17813.00	17813.00
9	Turbine Ventilator Wind-driven turbine ventilator, 1500-2500 CFM airflow, no electricity required. (Detailed Specification as per Annexure F)	6	Nos.	2500.00	15000.00
Total					446963.00
18% GST					80453.34
Total -II					527416.34
Total Of Part (I+II)					1242188.14

B	SWAMI VIVIEKANAND , WARD - 02				
	COST OF WINDROW COMPOST PLANT				
	Part - I SOR ITEM	QTY.	UNIT.	RATE	AMOUNT (RS.)
	CIVIL WORK				
1	Windrow Compost Plant 2 TPD	-	-	-	861522.60
2	Storage Room	-	-	-	501222.37
3	Leachate Tank	-	-	-	27355.76

4	C.C. Flooring	-	-	-	136710.00
5	Boundary Fencing	-	-	-	167741.70
6	Entrance Gate	-	-	-	59348.98
	Total I				1753901.42
	Part - III NON-SOR ITEM	QTY.	UNIT.	RATE	AMOUNT (RS.)
5	Wheel Barrow - 140 L wheelbarrow, 450 kg capacity, MS body with rubber tyre. (Detailed Specification as per Annexure G)	2	Nos.	5500.00	11000.00
6	Compost Sieve Machine Manual compost sieve, 200-300 kg/hr, portable MS/SS machine. (Detailed Specification as per Annexure H)	1	Nos.	47500.00	47500.00
	Total				58500.00
	18% GST				10530.00
	Total -II				69030.00
	Total Of Part (I+II)				1822931.42
	Total Capital Cost (I+II)				3065119.55
	Contingency @ 1%				24686.73
	Consultancy @ 1.16%				34499.98
	Grand Total				3124306.26

9. Operation & Maintenance

The Operations and Maintenance (O&M) costs for the processing plant have been estimated based on the following key components:

- Water Consumption
- Electricity Charges
- Civil Infrastructure Maintenance
- Electrical and Mechanical Maintenance
- Fire fighting Equipment and Safety Provisions

In alignment with the operational model adopted by the Mission Clean City in Chhattisgarh, Self-Help Groups (Swachhata Didi's) are responsible for the collection and transportation of segregated waste. These same groups are also engaged in the operation and management of Material Recovery Facilities (MRFs) and composting plants. As a result, human resource costs are embedded within the collection and transportation budget and are not included in the O&M costs of the processing plant.

Additionally, the cost of water usage at composting and MRF/SLRM centres is significantly minimized due to the availability of groundwater through existing borewells at the processing sites.

Summary of O&M Costs (5-Year Projection)

A detailed summary of the projected O&M costs over a five-year period is provided in the table below (to be inserted from DPR data).

Table 20: O&M Details

S.No.	Description	O&M Cost (In Lakh)
1	Civil Maintenance	6.60
2	Electrical + Mechanical Maintenance Equipment	5.70
3	Firefighting Equipment	2.85
4	Electricity Consumption	2.40
	Total O&M Cost for Processing Plant (5 Years)	17.55

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10. Conclusion

For the horizon year 2026, the projected population of Bhakhara Urban Local Body (ULB) is estimated to be 10151. Based on standard per capita waste generation rates, this translates to a solid waste generation of approximately 3.05 TPD.

To effectively manage this increasing waste load and ensure 100% processing of generated waste, it is imperative to upgrade and augment the existing waste processing infrastructure. After a comprehensive assessment of:

- Current waste generation trends,
- Waste characterization studies, and
- The existing solid waste management practices in the ULB,

It is proposed to undertake the following infrastructure enhancements:

- Up gradation of the existing compost plant to enhance its processing capacity and operational efficiency.
- Conversion of the existing SLRM (Solid and Liquid Resource Management) center into a full-fledged Material Recovery Facility (MRF) to improve segregation, recycling, and resource recovery.

These interventions are critical to achieving saturation of processing capacity, ensuring environmental compliance, and aligning with the objectives of Swachh Bharat Mission 2.0.

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& GOVT. APPROVED VALUER
25, SOLE AGENT BY PILLIWAR & Associates
RAIPUR (C.G.) 75 107711 2755743 107874

उप अभियंता
नगर पंचायत भखारा-भठेली
जिला-भखारा (छ.प्र.)

मुख्य नगर पालिका अधिकारी
नगर पंचायत भखारा



References

- Municipal solid waste management manual (Draft): Central Public Health & Environmental Engineering Organization (CPHEEO)-May 2014
- Municipal solid waste management manual: Central Public Health & Environmental Engineering Organization (CPHEEO) - 2000
- Toolkit for Solid Waste Management Jawaharlal Nehru National Urban Renewal Mission
- CPCB Guidelines and Check-list for evaluation of MSW Landfills proposals with Information on existing landfills, 2008
- Municipal Solid Wastes (Management and Handling) Rules, 2000
- Environment (Protection) Act, 1986
- Handbook of Service Level Benchmark (MoUD)
- CPCB-Guidelines and Check-list for evaluation of MSW Landfills proposals with Information on existing landfills (2012)
- CPCB-Protocol for Performance Evaluation and Monitoring of the Common Hazardous Waste Treatment Storage and Disposal Facilities including Common Hazardous Waste Incinerators
- Report of the Task Force on Waste to Energy - Planning commission
- Toolkit for Solid Waste Management- Jawaharlal Nehru National Urban Renewal Mission

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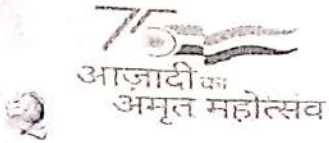
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जिला - धमतरी (छ.ग.)

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NAGAR PANCHAYAT BHAKHARA, CHHATTISGARH



Ministry of Housing and Urban Affairs
Government of India



VOL - II

Swachh Bharat Mission-Urban 2.0



NAGAR PANCHAYAT REPORT UNDER
SBM 2.0 FOR SWM, NAGAR PANCHAYAT
BHAKHARA, CHHATTISGARH

**DETAILED ESTIMATE FOR PROPOSED WORK OF
" WINDROW COMPOST PLANT AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

A	SWAMI VIVIEKANAND , WARD - 02				
	COST OF SLRM CENTRE				
	Part - I SOR ITEM	QTY.	UNIT.	RATE	AMOUNT (RS.)
	CIVIL WORK				
1	SLRM Revamping Work	-	-	-	466190.25
2	Bounday Wall Revamping Work	-	-	-	216580.54
3	Rain Water Harvesting	-	-	-	32001.00
4	Plumbing & Sanitary Work	-	-	-	47635.00
	Total I				714771.80
	Part - III NON-SOR ITEM	QTY.	UNIT.	RATE	AMOUNT (RS.)
4	Flat Conveyor Belt - approx. 7 m long, 700 mm wide, 800 mm high, flat roller type. (Detailed Specification as per Annexure A)	1	Nos.	155000.00	155000.00
5	HDPE Wheeled Container 100 L HDPE container, durable, 440 kg load capacity, wheeled design. (Detailed Specification as per Annexure B)	10	Nos.	1375.00	13750.00
6	Weigh Bridge - 10 Ton electronic pitless weighbridge with digital load cells and auto calibration. (Detailed Specification as per Annexure C)	1	Nos.	225000.00	225000.00
7	Bale Trolley 250 kg MS trolley, manual, with polymer wheels, rust-proof design. (Detailed Specification as per Annexure D)	3	Nos.	6800.00	20400.00
8	Surveillance Camera - Min. 6 No. of CCTV Cameras at each plant with 5 MP cameras, DVR, night vision, and real-time monitoring. (Detailed Specification as per Annexure E)	1	Set	17813.00	17813.00
9	Turbine Ventilator Wind-driven turbine ventilator, 1500-2500 CFM airflow, no electricity required. (Detailed Specification as per Annexure F)	6	Nos.	2500.00	15000.00
	Total				446963.00
	18% GST				80453.34
	Total -II				527416.34
	Total Of Part (I+II)				1242188.14

PILLIWAR & ASSOCIATES
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& GOVT. APPROVED VALUER
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जिला - धमतरी (छ.प.)

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नगर पंचायत भवारा

B SWAMI VIVIEKANAND , WARD - 02					
COST OF WINDROW COMPOST PLANT					
Part - I SOR ITEM	QTY.	UNIT.	RATE	AMOUNT (RS.)	
CIVIL WORK					
1 Windrow Compost Plant 2 TPD	-	-	-		861522.60
2 Storage Room	-	-	-		501222.37
3 Leachate Tank	-	-	-		27355.76
4 C.C. Flooring	-	-	-	70560.00	136710.00
5 Boundary Fencing	-	-	-		167741.70
6 Entrance Gate	-	-	-		59348.98
Total I					1753901.42
					1687751.41
Part - III NON-SOR ITEM	QTY.	UNIT.	RATE	AMOUNT (RS.)	
5 Wheel Barrow - 140 L wheelbarrow, 450 kg capacity, MS body with rubber tyre. (Detailed Specification as per Annexure G)	2	Nos.	5500.00		11000.00
6 Compost Sieve Machine Manual compost sieve, 200-300 kg/hr, portable MS/SS machine. (Detailed Specification as per Annexure H)	1	Nos.	47500.00		47500.00
Total					58500.00
18% GST					10530.00
Total -II					69030.00
Total Of Part (I+II)					1822931.42
					1756781.41
Total Capital Cost (I+II)					3065119.55
Contingency @ 1%					24686.73
Consultancy @ 1.16%					34499.98
Grand Total					3124306.26

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नगर पंचायत भवारा



**DETAILED ESTIMATE FOR PROPOSED WORK OF
" WINDROW COMPOST PLANT AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

S. No.	Location Name	Cost of SOR Items (A)	18 % GST on SOR Items (B)	Cost of NON SOR Items (C)	18 % GST on NON SOR Items (D)	Total
COMPOST PLANT						
1	SWAMI VIVEKANAND WARD - 02	1687751.41 1753901.42	-	58500.00	10530.00	1822931.42 1756781.41
SLRM/MRF PLANT						
2	SWAMI VIVEKANAND WARD - 02	714771.80	-	446963.00	80453.34	1242188.14
TOTAL		2468673.21 2402523.21	-	505463.00	90983.34	3065119.55 2998969.55
2402523.21 Total of SOR (A)						2468673.21
Total of NON-SOR (C)						505463.00
2907986.21 Sub Total (E)						2974136.21
Total GST (F)						90983.34
2998969.55 Total (G)						3065119.55
24025.23 Add Contingency 1% @ A						24686.73
33432.84 Add Consultancy 1.16% @ E						34499.98
Grand Total						3124306.26
Say in Lakh						31.24

Technically Approved for Rs. 30.57 Lakh
In Words Rs. Thirty lakh & fifty seven thousand
is Here By Accorded for Works on 17/04/2026

ULB Name Bhakhara Dist. Dhamtari
Vide T.S No. 314 Date 17.04.2026

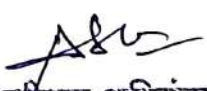
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Sub. Engineer


Administration & Development
(Tech. Cell) Raipur (C.G.)


Executive Engineer

Urban Administration & Development
(Tech. Cell) Raipur (C.G.)


अधीक्षक अभियंता
नगरीय प्रशासन एवं विकास
रायपुर (छ.ग.)

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मुख्य नगर पंचायत भवारा
नगर पंचायत भवारा

SLRM CENTRE AT SWAMI VIVEKANAND, WARD NO - 02

PILLIWAR & ASSOCIATES
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**DETAILED ESTIMATE FOR PROPOSED WORK OF
" SLRM CENTRE AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

A SWAMI VIBEKANAND WARD NO. - 02					
COST OF SLRM CENTRE					
	Part - I SOR ITEM	QTY.	UNIT.	RATE	AMOUNT (RS.)
	CIVIL WORK				
1	SLRM Revamping Work	-	-	-	466190.25
2	Bounday Wall Revamping Work	-	-	-	216580.54
3	Rain Water Harvesting	-	-	-	32001.00
4	Plumbing & Sanitary Work				47635.00
	Total I				762406.80
	Part - III NON-SOR ITEM	QTY.	UNIT.	RATE	AMOUNT (RS.)
4	Flat Conveyor Belt - approx. 7 m long, 700 mm wide, 800 mm high, flat roller type. (Detailed Specification as per Annexure A)	1	Nos.	155000.00	155000.00
5	HDPE Wheeled Container 100 L HDPE container, durable, 440 kg load capacity, wheeled design. (Detailed Specification as per Annexure B)	10	Nos.	1375.00	13750.00
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8	Surveillance Camera - Min. 6 No. of CCTV Cameras at each plant with 5 MP cameras, DVR, night vision, and real-time monitoring. (Detailed Specification as per Annexure E)	1	Set	17813.00	17813.00
9	Turbine Ventilator Wind-driven turbine ventilator, 1500-2500 CFM airflow, no electricity required. (Detailed Specification as per Annexure F)	6	Nos.	2500.00	15000.00
	Total				446963.00
	18% GST				80453.34
	Total -II				527416.34
	Total Of Part (I+II)				1289823.14

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नगर पंचायत भखारा

**DETAILED ESTIMATE FOR PROPOSED WORK OF
" SLRM CENTRE AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

(Building SOR Items) W.E.F. - 01/01/2015

S NO.	ITEM NO.	DESCRIPTION	NO.	L	B	H/D	QTY	UNIT	RATE	AMOUNT
SLRM ROOFING										
1	(BUILDING SOR ITEM NO.- 3.3.3/23)	16.17 Dismantling G.I. sheet roofing including ridges hips, valleys and gutters etc. and stacking the material with 50 m lead								
		(BUILDING SOR ITEM NO.- 3.3.3/23)	2	5.5	15	-	165			
							165	SQM	33.50	5527.50
2	(BUILDING SOR ITEM NO.- 10.12/91)	10.12 Supply and fixing of polymer pre-coated galvalume profile sheets (PPGL) of approved size, shape and pitch of corrugation, total coated thickness (TCT) 0.60 mm +/- 5%, epoxy primer on both side of the sheet and colour polyester top coat 18-20 microns and 6-7 microns on bottom. Sheet should have protective guard film of 25 microns minimum to avoid scratches while transportation and should be supplied in single length upto 12 metre or as desired by Engineer-in-charge. The sheet shall be fixed using self drilling /self tapping screws of size (5.5x 55mm) with EPDM seal or with polymer coated J or L hooks, bolts and nuts 8mm diameter with bitumen and G.I. limpet washers or with G.I. limpet washers filled with white lead complete upto any pitch in horizontal/ vertical or curved surfaces excluding the cost of purlins, rafters and trusses and including cutting to size and shape wherever required.								
		SLRM Roof Shed Sheet	2	5.5	15.0	-	165			
							165	SQM	693	114345.00
3	(BUILDING SOR ITEM NO.- 10.16/91)	10.16 Providing and fixing pre-coated galvanised steel sheet roofing accessories 0.50 mm +/- 5% total coated thickness (TCT), Zinc coating 120gsm as per IS: 277 in 240mpa steel grade, 5-7 microns epoxy primer on both side of the sheet and polyester top coat 15-18 microns using self drilling/ self tapping screws or with polymer coated J or L hooks, bolts and nuts and or G.I. seam bolts and nuts, G.I. plain and bitumen washers complete :								
		10.16.6 Gutter. (600 mm over all girth)	2	27.00			54.00	MTR	629.00	33966.00
		10.16.1 Ridges plain (500-600mm)	1	27			27	MTR	552.00	14904.00

SLRM FLOORING WORK

4	(BUILDING SOR ITEM NO.- 12.49/118)	25 mm thick KOTA stone slab flooring over 20mm (Average) thick base of cement mortar 1:4 laid over and jointed with grey cement slurry mixed with pigment to match the shade of the slab including grinding rubbing and polishing etc. complete (Area of slab to be over 0.20 SQ.M and upto 0.50 SQ.M)								
			1.00	23.40	9.60	-	224.64			
			2.00	3.00	3.00	-	18.00			
			1.00	3.20	3.00	-	9.60			
		Add 10% Extra					22.46			
							274.70	SQ.M	897.00	246409.49

SLRM PAINTING WORK

5	As per Amendment no 08, 05/05/2025 item no.16.62	Providing and applying Acrylic washable Distemper or lite economy Plastic emulsion paint having VOC content less than 50gms/ lit Minimum two coats up to final finish applied @ 1.25 Kg/ 10Sqm as per relevant L.S. Code 428:2000 (product such as Tractor Uno, Dulux Duval, Berger Bison, Opus Style/lite economy emulsion product such as Asian Tactor Spark Dulux Pomise sheen, Neroloc Lital Master, Berger Bison Lite, Nippon Superio.) inclusive of providing abro tape on edges and article and cleaning of door, windows, floor and surface as required with all tools tackles and labour complete for the work.								
		Office & Store Area								
			3	9.6			3	86.40		
			6	3	-	3	54.00			
		Door Deduct	-3	0.9	-	2.1	-5.67			
		Window Deduct	-3	1.2	-	1.2	-4.32			
		SLRM Wall	2	23.6	-	1.2	56.64			
			1	9.6	-	1.2	11.52			
		Gate Deduct	-1	3	-	1.2	-3.60			
							Total	194.97	Sqm	64.00
									12478.08	

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नगर पंचायत भक्कल

S NO.	ITEM NO.	DESCRIPTION	NO.	L	B	H/D	QTY	UNIT	RATE	AMOUNT
6	As per Amendment no 08, 05/05/2025 item no.14.67	Providing and applying on exterior surface with ECONOMY Exterior Emulsion paint of required shades to give protective and water proof finish minimum three coats applied @ 1.43 lit / 10Sqm up to final finish as per relevant I.S. Code 15489:2013 Type -2 Class D,C (Glossy /Semi Glossy finish) (Product such as Asian Ace,Dulux Promise Exterior Berger Wall Mastn ,Nerolac Suraksha Plus , Nippon Shogun Opus, One Style Power Bright) inclusive of providing abro tape on edges and article and cleaning of door, windows, floor and surface as required with all tools tackles and labour etc. complete for the work (With 2 Year Warranty)								
		Office & Store Area	1	10	-	3.1	31.00			
			2	3.4	-	3.1	21.08			
		SLRM Wall	2	23.6	-	1.3	61.36			
			1	10	-	1.3	13.00			
		Gate Deduct	-1	3	-	1.3	-3.90			
						Total	122.54	Sqm	70.00	8577.80
7	As per Amendment no 08, 05/05/2025 item no.14.74	Providing and applying priming coat on steel work with red Oxide/ zinc phosphate primer applied @ 0.50 lit /Sqm as per relevant code 3536:1999 (product such as Asian Zinc phosphate , Dulux Steel primer, Burger Red oxide primer) with all tools tackles and labour etc. complete for the work								
		Premium synthetic enamel paint								
		On Steel	2.00	27	5.50		297.00			
		SLRM side jali	2.00	23.6	1.20		56.64			
			1.00	9.6	1.20		11.33			
							364.97	Sqm	35.00	12773.88
8	As per Amendment no 08, 05/05/2025 item no.14.76	Providing and applying Aluminium paint minimum 2 coats in all metal surface applying @ 0.75 li/ 10 Sqm up to required finish as per relevent I.S. code 2932: 2013 of (Product such as Asian Apcolite aluminium paint, Dulux Aliminium paint, Burger Superior Aluminium Paint) with all tools tackle and labour etc. complete for the work					364.97	sqm	43.00	15693.62
DEMOLISH WORK										
9	(BUILDING SOR ITEM NO.- 16.3.3/146)	Demolishing brick masonry including arches, stacking of serviceable material disposal of unserviceable material within 50 metres lead. In cement mortar.								
		Wash and Store Area Wall	2.00	12.00	0.20	1.20	5.76			
							5.76	SQ.M	263.00	1514.88
TOTAL										466190.25

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नगर पंचायत भखारा

**DETAILED ESTIMATE FOR PROPOSED WORK OF
" SLRM CENTRE AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

ESTIMATE FOR CHAINLINK FENCING

SN	DESCRIPTION	No.	L	W	H/D	QTY	Rate	U	Amount
1	16.3 Demolishing brick masonry including arches, stacking of serviceable material disposal of unserviceable material within 50 metres lead. 16.3.3 In cement mortar								
		1	83.00	0.23	0.60	11.45			
	(BUILDING SOR ITEM NO.- 16.3.3)					11.45	CUM	263.00	3012.00
2	16.31 Dismantling steel work in built-up section in angles, channels, flats I section and T-section including all gusset plates, bolts, nuts, cutting rivets, welding etc., including dismembering and stacking within 50 metres lead.								
		1	83	-	1.20	5000.00	KG	1.00	5000.00
	(BUILDING SOR ITEM NO.- 16.31)								
3	16.42 Demolishing R.C.C. work including stacking of steel bars and disposal of unserviceable material within 50 metre lead.								
		1	83	0.20	0.30	4.98			
	(BUILDING SOR ITEM NO.- 16.42)					4.98	CUM	768.00	3825.00
4	Excavation for all types and sizes of foundations, trenches and drains or for any other purpose including disposal of excavated stuff upto 1.5 m lift and lead upto 50m (at least 5m away from the excavated area), including dressing and leveling of pits. In all types of soil PWD S.O.R.-P-09/I-1.1.1 Main Wall Along Road	1	83.00	0.50	0.80	33.20			
	total					33.20	185.00	cum	6142.00
5	Filling from available excavated stuff (Excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20cm in depth consolidating each deposited layer by ramming and watering with a lead upto 50 M. and lift upto 1.5 M .PWD S.O.R.-P-09/I-1.17								
	Excavated Qty.					33.20			
	Deduction								
	Sand Filling					-4.15			
	Pcc Area					-4.91			
	Brick Work					-12.45			
						11.69	65.00	cum	759.80

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जिला - धमतरी (छ.ग.)

सचिव
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SN	DESCRIPTION	No.	L	W	H/D	QTY	Rate	U	Amount
6	Providing and filling in plinth with sand/ Crusher dust and hard moorum under floor in layers not exceeding 20cm in depth consolidating each deposited layer by ramming and watering, including dressing etc. complete. Building sor 2015 Item no. 1.18								
	below pcc	1	83.00	0.50	0.10	4.15	371.00	cum	1539.65
7	Providing and laying nominal mix cement concrete with crushed stone aggregate using concrete mixer in foundation, plinth and at ground level excluding cost of form work. 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40mm nominal size). PWD S.O.R.-P-23/I-3.1.3 Main Wall Along Road	1	83.00	0.50	0.10	4.15			
	Concrete For Angle Iron Post	35	0.20	0.20	0.55	0.76			
	total					4.91	2970.00	cum	14585.18
8	7.5 Brick work with modular flyash lime bricks (FaLG Bricks) confirming to IS:12894-2002 of class designation 4.0 in foundation and plinth in: 7.5.4 Cement Mortar 1:6 (1 cement : 6 coarse sand) PWD S.O.R.-P-45/I-7.5.4								
	up-to Ground Level								
	Main Wall Along Road	1	83.00	0.30	0.30	7.47			
		1	83.00	0.20	0.30	4.98			
	total					12.45	3263.00	cum	40624.35
9	7.5 Brick work with modular fly-ash lime bricks (FaLG Bricks) confirming to IS:12894-2002 of class designation 4.0 in foundation and plinth in: 7.5.4 Cement Mortar 1:6 (1 cement : 6 coarse sand) PWD S.O.R.-P-45/I-7.5.4								
	Above Ground Level Main Wall Along Road	1	83.00	0.20	0.55	9.13			
	Deduct								
	Angle Iron Post Area	35	0.20	0.20	0.55	-0.76			
	total					8.37	3263.00	cum	27308.59
10	Providing and laying damp proof course (upto 50mm thick) with plain cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded crushed stone aggregate 20mm nominal size) including form work. PWD S.O.R.-P-24/I-3.1.3								
	PWD S.O.R.-P-24/I-3.1.3								
	Main Wall Along Road	1	83.00	0.20	0.05	0.83			
	total					0.83	4237.00	cum	3516.71
11	12mm thick cement plaster of mix: In Cement Mortar No. 1:2:4 PILLAI & ASSOCIATES ENGINEER, ARCHITECT PLANNER : 6 line sand. CONSULTANT PWD S.O.R.-P-23/I-1.2.4.1.1 25 SOUTH AVENUE, CHOBAY COLONY, MADURAI-625 004, TEL: 045743 401874, Subtotal								

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SN	DESCRIPTION	No.	L	W	H/D	QTY	Rate	U	Amount
	Inner Plaster Area	1	1	83.00		0.60	49.80		
	total						49.80	91.50 sqm	4556.70
12	Providing and making 15mm thick cement plaster on the rough side of single or half brick wall of mix:								
	In Cement Mortar 1:6 (1 cement : 6 fine sand)								
	(Page No.- 103, Item No.- 11.3.4)								
	Outer Plaster Area	1	1	83.00		0.60	49.80		
	Top	1	1	83.00	0.20		16.60		
							66.40	107.00 sqm	7104.80
13	Providing and applying on exterior surface with ECONOMY Exterior Emulsion paint of required shades to give protective and water proof finish minimum three coats applied @ 1.43 lit / 10Sqm up to final finish as per relevant I.S. Code 15489:2013 Type -2 Class D,C (Glossy /Semi Glossy finish) (Product such as Asian Ace,Dulux Promise Exterior Berger Wall Masta ,Nerolac Suraksha Plus , Nippon Shogun Opus, One Style Power Bright) inclusive of providing abro tape on edges and article and cleaning of door, windows, floor and surface as required with all tools tackles and labour etc. complete for the work (With 2 Year Warranty) no 08, 05/05/2025 item no.14.67 As per Ammendment no 08, 05/05/2025 item no.14.67								
	As Per Item No. 8 & 9						116.20	70.00 sqm	8134.00
14	Providing and placing in position angle iron post and strut of required size including bottom to be split and bent at right angle in opposite direction for required length and drilling holes upto 10 mm dia as per requirement including priming coat with red oxide zinc chromate primer and placing the post/ strut in cement concrete block.								
	[S.O.R. Page no. 85 I-9.45]								
	M S 40X40 x4.00 mm Th. Post @ 4.09kg/ Rmt	35	2.35			4.09	332.40		
	M S Frame 20x20x2.80 mm Th. partition pipe @ 1.56 kg/ Rmt	35	7.70			1.56	266.29		
	Bottom /Side	12	35	0.05		1.56	32.37		
							631.06	69.50 Kg	43858.63
15	Providing and fixing in position chain linked steel wire fabric made of 4 mm dia G.I. wire of required width in mesh to concrete/ wooden/ angle iron posts including securing and screwing with 2mm dia wire & staples (CLAU) nails or steel pins etc. CONDUCTANT PWD S.O.R. No. 4321 Aperture 575 SOUTH AVENUE, CHOBAY COLONY, KADAPPAH (C.G.) 76 (0771) 2255743 407674.	35	2.20			1.65	125.54		
							125.54	331.00 Sqm	41552.91

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SN	DESCRIPTION	No.	L	W	H/D	QTY	Rate	U	Amount
16	Providing and applying priming coat on steel work with red Oxide/ zinc phosphate primer applied @ 0.50 lit /Sqm as per relevant code 3536:1999 (product such as Asian Zinc phosphate , Dulux Steel primer, Burger Red oxide primer) with all tools tackles and labour etc. complete for the work								
	Satin synthetic enamel paint								
	As per Ammendment no 08, 05/05/2025 item no.14.74								
	M S 40X40 x4.00 mm Th. Post @ 4.09kg/ Rmt	35	1.75		0.16	9.68			
	M S Frame 20x20x2.80 mm Th. partition pipe @ 1.56 kg/ Rmt	35	7.70		0.08	21.30			
	Bottom /Side	12	35	0.05	0.08	1.66			
						32.65	35.00	Sqm	1142.63
17	Providing and applying Glossy finish Enamel paint mimimum 2 Coats in al surface applying @ 0.75 lit/ 10 Sqm up to required finish as per relevent I.S. code 2932: 2013 of (Product such as Asian Apcolite Premium Enamel Dulux Promise Premium Enamel Nerolac Synthatic Enamel, Opus Prime enamel) inclusive of providing abro tape on edges and article and cleaning of door, windows, floor and surface as required with all tools tackle and labour etc. complete for the work.								
	As per Ammendment no 08, 05/05/2025 item no.14.72								
	As Per Item No.	16				32.65	120.00	Sqm	3917.60
Total									216580.54

PILLIWAR & ASSOCIATES
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जिला -धमतरी(छ.ग.)

गजेश
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नगर पंचायत भवारा

**DETAILED ESTIMATE FOR PROPOSED WORK OF
" SLM CENTRE AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

" RAIN WATER HARVESTING (1.00X1.00X1.20 M) "

S.No.	PARTICULAR	NO.	L	B	H/D	QTY.	UNIT	RATE (in Rs.)	AMOUNT (in Rs.)
1	Excavation for all types and sizes of foundations, trenches and drains or for any other purpose including disposal of excavated stuff upto 1.5 m lift and lead upto 50m (at least 5m away from the excavated area), including dressing and leveling of pits. In all types of soil								
	(BUILDING SOR ITEM NO.-1.1.1/9)	1	1.40	1.40	1.20	2.35	CUM	185.00	434.75
2	Providing and laying nominal mix reinforced cement concrete with crushed stone aggregate using concrete mixer in all works upto plinth level excluding cost of form work. 1:1½:3 (1 cement : 1½ coarse sand : 3 graded stone aggregate 20mm nominal size).								
	bottom Beam-	2	1.40	0.20	0.20	0.11			
		2	1.00	0.20	0.20	0.08			
	Top Slab-	1	1.40	1.40	0.10	0.20			
	(BUILDING SOR ITEM NO.-3.9/24)					0.39	CUM	4163.00	1623.57
3	Providing and placing in position reinforcement for R.C.C. work including straightening, cutting, bending, binding etc. complete as per drawings including cost of binding wire all complete: 3.12.1 Thermo-Mechanically treated bars FE 415								
		Qty. as per Item No.-3.2.1				0.39			
	(SOR ITEM NO.-3.12.1/24)	50 kg/cum				19.5	KG	54.50	1062.75
4	Brick work with modular fly-ash lime bricks (FaLG Bricks) conforming to IS:12894-2002 of class designation 4.0 in foundation and plinth in: 7.5.4 Cement Mortar 1:6 (1 cement : 6 coarse sand)								
	(BUILDING SOR ITEM NO.-7.5.4/45)	1	4.80	0.20	1.40	1.34	CUM	3263.00	4385.47
5	Supplying, filling, spreading & leveling stone boulders/ Gravels/ Coarse sand, in recharge pit, in the required layers and thickness, for all leads & lifts, all complete as per direction of Engineer-in-charge. (excavation of pit will be paid separately)								
	Stone boulders of size range 5 cm to 20 cm, in recharge pit	1	1.00	1.00	0.40	0.40	CUM	863.00	345.20
	Gravels of size range 5 mm to 10 mm, over the existing layer of boulders	1	1.00	1.00	0.30	0.30	CUM	806.00	241.80
	Coarse sand of size range 1.5 mm to 2 mm over existing layer of gravel	1	1.00	1.00	0.20	0.20	CUM	471.00	94.20
	(BUILDING SOR ITEM NO.-21.14/201)								
	PIPELINE-								
6	Excavation for all types and sizes of foundations, trenches and drains or for any other purpose including disposal of excavated stuff upto 1.5 m lift and lead upto 50m (at least 5m away from the excavated area), including dressing and leveling of pits. In all types of soil	1	50.0	0.30	0.30	4.50	CUM	185.00	832.50
	(BUILDING SOR ITEM NO.-1.1/9)								
7	Filling from available excavated stuff (Excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20cm. In depth consolidation each deposited layer by ramming and watering with a lead upto 50M. And lift upto 1.5M.								
	50% of Item No 1	-	-	-	-	2.25	CUM	65.00	146.25
	(BUILDING SOR ITEM NO.-1.17/11)								
8	Providing and filling in open area with sand /crusher dust and hard moorum under floor in layers not exceeding 20 cm in depth and consolidating each deposited layer by ramming and watering, including dressing etc. complete.								
	50% of Item No 1 - Pipe Dia	-	-	-	-	2.25	CUM	371.00	834.75
	(BUILDING SOR ITEM NO.-1.18/11)								
9	Providing and fixing on wall face or under floor UV stabilized Unplasticised Rigid PVC pipes (single socketed) having 3.2mm wall thickness conforming to IS : 13592 (4kg/sqcm) including required couplers, jointing with seal ring conforming to IS : 5382 leaving 10 mm gap for thermal expansion etc complete.								
	150 mm dia	1	50.00	-	-	50.00	RM	440.00	22000.00
	(BUILDING SOR ITEM NO.-18.76.3/170)								
TOTAL									32001.00

PILLIWAR & ASSOCIATES
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मुख्य नगर पालिका कार्यालय
नगर पंचायत भवारा

**DETAILED ESTIMATE FOR PROPOSED WORK OF
" SLRM CENTRE AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

" PLUMBING & SANITARY WORK "

S.No.	PARTICULAR	NO.	L	B	H/D	QTY.	UNIT	RATE (in Rs.)	AMOUNT (in Rs.)
1	Providing and fixing vitreous china water closet (European type W.C. 18.4.2 Coloured pedestal type	1	-	-	-	1.00	EACH	3592.00	3,592.00
	(BUILDING SOR ITEM NO.-18.4/161)								
2	18.1 Providing and fixing water closet squatting pan (Indian type W.C. Coloured Orissa pattern W.C. pan of size 580x440 mm	1	-	-	-	1.00	EACH	3545.00	3,545.00
	(BUILDING SOR ITEM NO.-18.1/160)								
3	Providing and fixing 10 litre capacity P.V.C. low level flushing cistern 18.7.2 Coloured	2	-	-	-	2.00	EACH	837.00	1,674.00
	(BUILDING SOR ITEM NO.-18.7/161)								
4	Providing and fixing vitreous china wash basin with C.I. brackets, 32 Coloured Size 550x450 mm	1	-	-	-	1.00	EACH	1894.00	1,894.00
	(BUILDING SOR ITEM NO.-18.17/162)								
5	Providing and fixing on wall face or under floor UV stabilized 18.76.1 75 mm dia pipe.	1	5.00	-	-	5.00	MTR	182.00	910.00
	18.76.2 110 mm dia pipe.	1	5.00	-	-	5.00	MTR	267.00	1,335.00
	(BUILDING SOR ITEM NO.-18.76/170)								
6	Providing and fixing on wall face UV stabilized Unplasticised - PVC moulded fittings/ accessories having 3.2mm wall thickness for Rigid PVC pipes conforming to IS : 13592 (heavy) jointing with seal ring conforming to IS : 5382 leaving 10 mm gap for thermal expansion.								
	Tee/ Tee with door/ Bend 45°/ Bend 90° 18.77.1.1 75 mm	5	-	-	-	5.00	EACH	113.00	565.00
	18.77.1.2 110 mm	5	-	-	-	5.00	EACH	154.00	770.00
	Vent cover 18.77.3.1 75 mm	4	-	-	-	4.00	EACH	34.00	136.00
	18.77.3.2 110 mm	4	-	-	-	4.00	EACH	44.00	176.00
	Access door cap 18.77.4.1 75 mm	10	-	-	-	10.00	EACH	49.50	495.00
	18.77.4.2 110 mm	10	-	-	-	10.00	EACH	59.00	590.00
	18.77.6 Nahani Trap 110	10	-	-	-	10.00	EACH	90.50	905.00
	(BUILDING SOR ITEM NO.-18.77/170)								
7	Providing and fixing UV stabilized Unplasticised PVC pipe clips of approved design to Rigid PVC pipes by means of 50 x 50 x 50 mm hard wood plugs, screwed with M.S. screws of required length including cutting brick work and fixing in cement mortar 1:4 (1 cement : 4 coarse sand) and making good the wall etc. complete.								
	18.78.1 75 mm	10	-	-	-	10.00	EACH	57.00	570.00
	18.78.2 110 mm	10	-	-	-	10.00	EACH	61.00	610.00
	(BUILDING SOR ITEM NO.-18.78/171)								
8	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes. 19.5.1 15 mm nominal outer dia. Pipes.	1	5.00	-	-	5.00	MTR	133.00	665.00
	19.5.2 20 mm nominal outer dia. Pipes.	1	5.00	-	-	5.00	MTR	167.00	835.00
	(BUILDING SOR ITEM NO.-19.5/176)								
9	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes. 19.4.3 25 mm nominal outer dia. Pipes.	1	5.00	-	-	5.00	MTR	199.00	995.00
	19.4.4 32 mm nominal outer dia. Pipes.	1	5.00	-	-	5.00	MTR	271.00	1,355.00
	19.4.5 40 mm nominal outer dia. Pipes.	1	5.00	-	-	5.00	MTR	362.00	1,810.00
	(BUILDING SOR ITEM NO.-19.5/176)								
10	Providing and fixing on wall surface G.I. pipes medium class complete 19.7.6 50 mm dia. nominal bore	1	5.00	-	-	5.00	MTR	471.00	2,355.00
	(BUILDING SOR ITEM NO.-19.7/177)								
11	Providing and fixing 15 mm nominal bore C.P. brass fittings of approved 19.14.1 Bib cock (400 grams)	2	-	-	-	2.00	EACH	382.00	764.00
	19.14.6 Stop cock (concealed) (600 grams)	2	-	-	-	2.00	EACH	494.00	988.00
	19.14.4 Pillar Cock (400 grams)	2	-	-	-	2.00	EACH	398.00	796.00
	19.14.14 Soap dish plate	2	-	-	-	2.00	EACH	163.00	326.00
	(BUILDING SOR ITEM NO.-19.14/179)								
12	Providing and fixing flexible P.V.C. waste pipe for sink or wash basin 18.25.2 40 mm dia	4	-	-	-	4.00	EACH	88.50	354.00
	(BUILDING SOR ITEM NO.-18.25.2/164)								
13	Providing and fixing 600x450 mm beveled edge 4mm mirror of superior (BUILDING SOR ITEM NO.-18.29/164)	2	-	-	-	2.00	EACH	599.00	1,198.00
14	Providing and fixing mirror of superior glass (of approved quality) and 18.30.1 5mm thick mirror	2	0.60	0.60	-	0.72	SQ.M	2016.00	1,452.00
	(BUILDING SOR ITEM NO.-18.30/164)								
15	Making connection of G.I. distribution branch in G.I. main of following 19.10.4 50 mm nominal bore	5	-	-	-	5.00	EACH	347.00	1,735.00
	(BUILDING SOR ITEM NO.-19.10/178)								
16	Providing and fixing brass/ gun metal gate valve with C.I. wheel of 19.16.4 50 mm nominal bore	2	-	-	-	2.00	EACH	762.00	1,524.00
	(BUILDING SOR ITEM NO.-19.16/179)								

25, SOUTH AVENUE, CHOBEY COLONY,
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S.No.	PARTICULAR	NO.	L	B	H/D	QTY.	UNIT	RATE (in Rs.)	AMOUNT (in Rs.)
17	(BUILDING SOR ITEM NO.-19.16/179) Providing, laying and jointing glazed stoneware pipes grade 'A' with 20.1.1 100 mm diameter	1	10.00	-	-	10.00	MTR	162.00	1,620.00
18	(BUILDING SOR ITEM NO.-20.1/189) Providing and constructing brick masonry chamber for underground pipe 20.28.1 Inside dimensions 455x610 mm and 45 cm deep for single pipe	1	-	-	-	1.00	EACH	3796.00	3,796.00
19	(BUILDING SOR ITEM NO.-20.28/194) Providing and placing on terrace (at all floor levels) polyethylene water	1.00	-	-	-	1000.00	LTR	7.30	7,300.00
	(BUILDING SOR ITEM NO.-19.42/184)								
Total Rs.									47,635.00

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**DETAILED ESTIMATE FOR PROPOSED WORK OF
" SLMR CENTRE AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

ANNEXURE A - DETAILED SPECIFICATION OF FLAT CONVEYOR BELT

PARAMETER	SPECIFICATIONS/DESCRIPTION
Length of Conveyor	Approx. 7 m from End to End of conveyor
Width of Conveyor Belt	700 mm
Height of Conveyor	800 mm
Type	Flat roller type belt conveyor
Motor	3.75 kW (5 HP), 1440 RPM, TEFC (Totally Enclosed Fan Cooled) copper wire conforming to IS : 13730, 3- phase, 4- pole
Inclination	0°
Size of belt	1000 mm wide (working width 800 mm)
Belt Specification	Plain rubber belt, 3 ply, 3 mm top, 1.5 mm bottom rubber covering, total plain belt thickness 08 mm, nylon cord conforming to M 24 grade
Drive pulley for conveyor	320 mm OD with crowning surface with 65 mm shaft with rubber coating and hearing bone design
Rear pulley for conveyor	320 mm OD with crowning surface with 65 mm shaft with rubber coating and hearing bone design
Side Guard	2 mm thick MS sheet with supporting structure
Side guard skirting	2 mm thick rubber belt
Conveyor body	Manu. From IS 2062, 4 mm thickness plate framing structure
Rear pulley cover	2 mm thick MS sheet
Bearing for roller	6205 2RS type
Shaft	Precise Machined from EN-24 grade material
Guide rollers	60 mm pipe with bright bar spindle and sealed with single roll anti friction deep grooved ball bearing
Carrying & return roller	76.1 mm ID ERW pipe with CI housing, bright bar spindle and sealed with single roll anti friction deep grooved ball bearing
Bearing	Angular contact type with fitted in split housing
Idler Spacing confirming to IS 9295-1983	Carrying Idler – 600 to 800 mm, Return Idler - 1200 to 1500 mm
Belt join	Endless type belt
Scrappers	Driver side: Flat Scraper Rear Pulley: V plough type
Take up	Screw type take up design at front side of Conveyor
Gear Box	Worm type, 20:1 ratio, Hollow input & output
Belt speed	1.2 m/sec
Pulley RPM	72 RPM
Conveyor direction	Uni- directional (One side)
Speed Control	VFD suitable for speed control of conveyor belt motor ranging from 50% to 100% of rated speed
Speed Control	0.6 to 1.2 m/sec (using gear & VFD)

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**DETAILED ESTIMATE FOR PROPOSED WORK OF
" SLRM CENTRE AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

ANNEXURE B - DETAILED SPECIFICATION OF HDPE CONTAINER

PARAMETER	SPECIFICATIONS/DESCRIPTION
Capacity	1100 litre
Size of Container (A x B x C)	1354 x 1373 x 1073 mm ('A' Height x 'B' Width x 'C' Depth)
Upper edge comb (D)	1206 mm
Wheel base width (E)	750 mm
Wheel base depth (F)	880 mm
Wheel base Diameter (G)	200 mm
Material	High Density Polyethylene (HDPE)
Type	Material Injection molded
High resistance to	Heat, chemicals and radiation
Dead weight	50 kg
Pay load	440 kg
Confirming Standards	EN 840-1: 2020
Legs support	4 nos
Hand Grips	Yes

PILLIWAR & ASSOCIATES
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नगर पंचायत भखारा



**DETAILED ESTIMATE FOR PROPOSED WORK OF
" SLRM CENTRE AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

ANNEXURE C - DETAILED SPECIFICATION OF WEIGH BRIDGE

PARAMETER	SPECIFICATIONS/DESCRIPTION
Bridge Type	Electronic Pitless Type
Platform material & Size	1. High Tensile Structural Steel as per IS:2062:2011
	2. Should be anti-skid type.
	3. Thickness of platform plate not less than 10 mm
	4. Size 6.6 metre and 2.5 metre (length X width)
Weighing Capacity	10 Tonne
Load cell	4 Load cell
UPS	30 minute backup
Printer	Laser Printer
Display modes	a) Indicate weight
	b) Indicate calibration-Auto zero tracking
	c) Calibration to be checked automatically every 5 minutes
Readability	2 Kg
Type/capacity of load cell	Digital Double Ended Shear Beam load cells, pre-calibrated load cells – 5000/kg (04 No.) with mounting kits
Accessories of Junction Box (01 Set)	Cables: Home run cable 20 metre & inter connections cable between load cell and junction box & weighing electronics.
Electric supply	3 Phase (440 V 50Hz)
Surface finish on metal parts	Powder coating/ paint
Surface finish on metal parts	Powder coating/ paint

Note: Weighbridge must be capable of sharing real time data of weighment and integration with dashboard at ULB and State Level. Internet connection may be provided by the ULB.

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नगर पंचायत भखारा

**DETAILED ESTIMATE FOR PROPOSED WORK OF
" SLRM CENTRE AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

ANNEXURE D - DETAILED SPECIFICATION OF BALE TROLLY

PARAMETER	SPECIFICATIONS/DESCRIPTION
Carrying Capacity	250 kg (Minimum)
Size	40" L X 20" W x 10" Height of Toe (Minimum)
Trolley Material	Mild Steel
Wheels	2 Nos to 4 Nos
Wheel Material	High quality polymer wheels (8-10 Inch dia)
Surface Finish	Powder Coated or Painted (Rust-proof)
Operating Type	Manual (Hand-operated)2
Shape	Rectangular or L-type
Load Platform Height	Approx. 10" to 12" from ground level

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**DETAILED ESTIMATE FOR PROPOSED WORK OF
" SLRM CENTRE AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

ANNEXURE E - DETAILED SPECIFICATION OF SURVEILLANCE CAMERA

PARAMETER	SPECIFICATIONS/DESCRIPTION
No. of CCTV Camera at Plant	Min. 6 No. of CCTV Cameras at each plant
8 Channel DVR	8 channels and 1 HDD DVR, Up to 12 IP cameras can be connected, Efficient compression technology
5 MP Built in Mic Bullet Camera	5 MP, 2560 × 1944 resolution, Audio over coaxial cable, built-in mic, Smart IR, up to 25 m IR distance, 4 in 1 video output (switchable TVI/AHD/CVI/CVBS)
5 MP Built in Mic Dome Camera	5 MP, 2560 × 1944 resolution, Smart IR, upto 20m, IR distance, Audio over coaxial cable, built-in mic, 4 in 1 video output (switchable TVI/AHD/CVI/CVBS)
Hard Disk 1 TB	Full Surveillance Hard Disk With 2 Year Warranty
3+1 Solid Copper Cable	Full Solid Copper, 90 Meter
Power Supply Ch-8	Burning Warranty claim
PVC Box 4x4	Solid PVC
BNC Connector	Per Camera 2 Pcs Required
DC Connector	Per Camera 1 Pcs Required

Note: CCTV surveillance system must be capable of sharing real time AV feeds, data and integration with dashboard at ULB and State Level. Internet connection may be provided by the ULB.

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**DETAILED ESTIMATE FOR PROPOSED WORK OF
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NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

ANNEXURE F - DETAILED SPECIFICATION OF TURBINE VENTILATOR

PARAMETER	SPECIFICATIONS/DESCRIPTION
Turbine Diameter	24" to 36" (610 mm to 915 mm)
Number of Vanes	30 to 48
Bearings	Double Ball Bearing or bearing-less spider frame
Base Plate Material	FRP (Fiber Reinforced Plastic), Polycarbonate, or Galvanized Iron (GI)
Airflow Capacity	1500–2500 CFM per unit (depends on wind speed and size)
Wind Resistance	Up to 180 km/h
Operating Principle	Wind-driven + thermal convection (no electricity required)
Roof Compatibility	RCC, metal, asbestos, GI sheet roofs
Mounting Method	Bolted or riveted with waterproof sealant

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WINDROW COMPOST PLANT AT SWAMI VIVEKANAND, WARD NO - 02

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नगर पंचायत भखारा



DETAILED ESTIMATE FOR PROPOSED WORK OF " WINDROW COMPOST PLANT AT SWAMI VIVEKANAND WARD NO - 02 " NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)					
B	SWAMI VIVIEKANAND , WARD - 02				
	COST OF WINDROW COMPOST PLANT				
	Part - I SOR ITEM	QTY.	UNIT.	RATE	AMOUNT (RS.)
	CIVIL WORK				
1	Windrow Compost Plant 2 TPD	-	-	-	861522.60
2	Storage Room	-	-	-	501222.37
3	Leachate Tank	-	-	-	27355.76
4	C.C. Flooring	-	-	-	136710.00
5	Boundary Fencing	-	-	-	167741.70
6	Entrance Gate	-	-	-	59348.98
	Total I				1753901.42
	Part - III NON-SOR ITEM	QTY.	UNIT.	RATE	AMOUNT (RS.)
7	Wheel Barrow - 140 L wheelbarrow, 450 kg capacity, MS body with rubber tyre. (Detailed Specification as per Annexure G)	2	Nos.	5500.00	11000.00
8	Compost Sieve Machine Manual compost sieve, 200-300 kg/hr, portable MS/SS machine. (Detailed Specification as per Annexure H)	1	Nos.	47500.00	47500.00
	Total				58500.00
	18% GST				10530.00
	Total -II				69030.00
	Total Of Part (I+II)				1822931.42

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**DETAILED ESTIMATE FOR PROPOSED WORK OF
" WINDROW COMPOST PLANT AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

DETAILED ESTIMATE FOR CONSTRUCTION OF WINDROW SHED

Based on C. G. P.W.D BUILDING S.O.R. IN FORCE FROM 1 JAN 2015

SN	SOR No.	DESCRIPTION OF ITEM	NO		MEASUREMENT			QTY	RATE	UNI	AMOUNT
					L	B	H/D				
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	1.1	Excavation for all types and sizes of foundations, trenches and drains or for any other purpose including disposal of excavated stuff upto 1.5 m lift and lead upto 50m (at least 5m away from the excavated area), including dressing and level									
		1.1.1 In all types of soils.									
		F1(1500X1500)		12	1.50	1.50	1.70	45.90			
		Beam below GL									
		X-X Wall		4	2.80	0.30	0.30	1.01			
				3	2.70	0.30	0.30	0.73			
		Y-Y Wall		2	5.00	0.30	0.30	0.90			
7		total						48.54	185.00	cum	8979.35
8											
2	1.18	Providing and filling in plinth with sand/ Crusher dust and hard moorum under floor in layers not exceeding 20cm in depth consolidating each deposited layer by ramming and watering, including dressing etc complete.									
		Footing									
		F1(1500X1500)		12	1.50	1.50	0.10	2.70			
		Beam below GL									
		X-X Wall		4	4.00	0.30	0.10	0.48			
				6	3.90	0.30	0.10	0.70			
		Y-Y Wall		2	6.20	0.30	0.10	0.37			
		For Floor Base		1	21.10	6.40	0.20	27.01			
		total						31.26	371.00	cum	11598.20
3	3.1	Providing and laying nominal mix plain cement concrete with crushed stone aggregate using concrete mixer in all works upto plinth level excluding cost of form work.									
	3.1.3	1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40mm nominal size).									
		Footing									
		F1(1500X1500)		12	1.50	1.50	0.10	2.70			
		Beam below GL									
		X-X Wall		4	4.00	0.30	0.10	0.48			
				6	3.90	0.30	0.10	0.70			
		Y-Y Wall		2	6.20	0.30	0.10	0.37			
		For Floor Base		1	21.10	6.40	0.10	13.50			
		total						17.76	2970.00	cum	52741.26
4	3.2	Providing and laying nominal mix reinforced cement concrete with crushed stone aggregate using concrete mixer in all works up to plinth level excluding cost of form work									
		1:3:6 (1 cement : 3 coarse sand : 3 graded stone aggregate 20mm nominal size).									

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SN	SOR No.	DESCRIPTION OF ITEM	NO		MEASUREMENT			QTY	RATE	UNIT	AMOUNT
					L	B	H/D				
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
		PCC		10	1.50	1.50	0.10	-2.25			
		RCC		10	1.30	1.30	0.30	-5.07			
		C1(300X300)		10	0.30	0.30	1.20	-1.08			
							total	35.25	65.00	cum	2291.25
8	12.3	Cement concrete flooring with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm) finished with a floating coat of neat cement.									
	12.3.2	50 mm thick		1	21.10	6.40		135.04			
		total						135.04	254.00	sqm	34300.16
9	7.5	Brick work with modular fly-ash lime bricks (FaLG Bricks) confirming to IS:12894-2002 of class designation 4.0 in foundation and plinth in:									
	7.5.3	Cement Mortar 1:4 (1 cement : 4 coarse sand)									
		Wall									
		X-X Wall		4	4.00	0.20	0.60	1.92			
				6	3.90	0.20	0.60	2.81			
		total						4.73	3452.00	cum	16321.06
10	11.2	Providing and making 12mm thick cement plaster of mix:									
	11.2.4	In Cement Mortar 1:6 (1 cement : 6 fine sand)									
		Internal wall (X-X Wall)		4	4.00		0.60	9.60			
				6	3.90		0.60	14.10			
		C1(300X300)	2	10	0.10		0.60	1.20			
		total						24.90	91.50	sqm	2278.35
11	11.3	Providing and making 15mm thick cement plaster on the rough side of single or half brick wall									
	11.3.3	In Cement Mortar 1:5 (1 cement : 5 fine sand)									
		External Wall (X-X Wall)		2	21.50		0.60	25.80			
		total						25.80	113.00	sqm	2915.40
12	As per Ammendment no 08, 05/05/2025 item no.14.62	Providing and applying Acrylic washable Distemper or lite economy Plastic emulsion paint having VOC content less than 50gms/ lit Minimum two coats up to final finish applied @ 1.25 Kg/ 10Sqm as per relevant L.S. Code 428:2000 (product such as Tractor Uno, Dulux Duval, Berger Bison, Opus Style/lite economy emulsion product such as Asian Tactor Spark Dulux Pomise sheen, Neroloc Lital Master, Berger Bison Lite, Nippon Superio.) inclusive of providing abro tape on edges and article and cleaning of door, windows, floor and surface as required with all tools tackles and labour complete for the work.									
		Area of Internal Plaster (From S.No. 10)			24.90			24.90			
		total						24.90	64.00	sqm	1593.60

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SN	SOR No.	DESCRIPTION OF ITEM	NO		MEASUREMENT			QTY	RATE	UNIT	AMOUNT
					L	B	H/D				
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
14	As per Amendment no 08, 05/05/202 5 item no.14.67	Providing and applying on exterior surface with ECONOMY Exterior Emulsion paint of required shades to give protective and water proof finish minimum three coats applied @ 1.43 lit / 10Sqm up to final finish as per relevant I.S, Code 15489:2013 Type -2 Class D,C (Glossy /Semi Glossy finish) (Product such as Asian Ace,Dulux Promise Exterior Berger Wall Masta ,Nerolac Suraksha Plus , Nippon Shogun Opus, One Style Power Bright) inclusive of providing abro tape on edges and article and cleaning of door, windows, floor and surface as required with all tools tackles and labour etc. complete for the work (With 2 Year Warranty)									
		Area of External Wall (From S.No. 11)									
					25.80			25.80			
		total						25.80	70.00	sqm	1806.00
15	9.3	Steel work in tubular (round, square or rectangular hollow tubes etc.) structure in built-up sections, trusses and frame work including cutting, hoisting, fixing in position upto a height of 5m above plinth level, consisting of columns trusses, roof and bottom purlins, base plate, holding down bolts, wind ties bracing (if required), bolts, nuts and washers for fastening etc. complete with applying a priming coat of red oxide zinc chromate primer.									
	9.3.1	Electric resistance or induction butt welded tubes Grade-250									
		Pole @21.30 kg/meter 150 mm Dia	6.00	2	4.00	@	21.30	1022.40			
		Purlins 40mm dia @ 3.56Kg/meter	14.00	1	21.50	@	3.56	1071.56			
		Rafter 50mm dia @5.03Kg/meter	6.00	2	4.56	@	5.03	275.24			
		bottom chord 50mm dia @6.19Kg/meter	6.00	1	8.80	@	5.03	265.58			
		Post NB 50	6.00	2	1.20	@	5.03	72.43			
		Post NB 40	6.00	2	0.87	@	3.56	37.17			
		Post NB 40	6.00	2	0.53	@	3.56	22.64			
		Post NB 40	6.00	2	0.19	@	3.56	8.12			
		webs 32mm dia @3.10Kg/meter	6.00	2	1.45	@	3.10	53.94			
			6.00	2	1.26	@	3.10	46.87			
			6.00	2	1.13	@	3.10	42.04			
		Wind tie 32x5mm	8.00	1	21.50	@	3.10	533.20			
								3451.19			
		Gusset Plate, Fixing Bolt and Base Plate Etc 12%	0.12					414.14			
								3865.33	93.50	Kg	361408.66

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SN	SOR No.	DESCRIPTION OF ITEM	NO		MEASUREMENT			QTY	RATE	UNIT	AMOUNT
					I	B	H/D				
1	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
16	10.12	Supply and fixing of polymer precoated galvalume profile sheets (PPGL) of approved size, shape and pitch of corrugation, total coated thickness (TCT) 0.60 mm +/- 5%, epoxy primer on both side of the sheet and colour polyester top coat 18-20 microns and 6-7 microns on bottom. Sheet should have protective guard film of 25 microns minimum to avoid scratches while transportation and should be supplied in single length upto 12 metre or as desired by Engineer-in-charge. The sheet shall be fixed using self drilling /self tapping screws of size (5.5x 55mm) with EPDM seal or with polymer coated J or L hooks, bolts and nuts 8mm diameter with bitumen and G.I. limpet washers or with G.I. limpet washers filled with white lead complete upto any pitch in horizontal/ vertical or curved surfaces excluding the cost of purlins, rafters and trusses and including cutting to size and shape wherever required.									
		Roofing		2	22.50	4.56		205.20			
		total						205.20	693.00	sqm	142203.60
17	10.16	Providing and fixing precoated galvanised steel sheet roofing accessories 0.50 mm +/- 5% total coated thickness (TCT), Zinc coating 120gsm as per IS: 277 in 240mpa steel grade, 5-7 microns epoxy primer on both side of the sheet and polyester top coat 15-18 microns using self drilling/ self tapping screws or with polymer coated J or L hooks, bolts and nuts and or G.I. seam bolts and nuts, G.I. plain and bitumen washers complete :									
	10.16.1	10.16.1 Ridges plain (500-600mm)		1	22.50			22.50			
		Ridge						22.50	552.00	mtr	12420.00
18	10.16.6	10.16.6 Gutter. (600 mm over all girth).									
		Gutter		2	22.50			45.00			
		total						45.00	629.00	mtr	28305.00
19	As per Ammendment no 08, 05/05/2025 item no.14.76	Providing and applying Aluminium paint minimum 2 coats in all metal surface applying @ 0.75 li/ 10 Sqm up to required finish as per relevent I.S. code 2932: 2013 of (Product such as Asian Apcolite aluminium paint, Dulux Aliminium paint, Burger Superior Aluminium Paint) with all tools tackle and labour etc. complete for the work									
		On Steel Structure									
		Pole @21.30 kg/meter 150 mm Dia	6	2	4.00	@	0.50	24.00			
		Purlins 40mm dia @ 3.56Kg/meter	14	1	21.50	@	0.13	39.13			
		Rafter 50mm dia @5.03Kg/meter	6	2	4.56	@	0.16	8.76			
		bottom chord 50mm dia @6.19Kg/meter	6	1	8.80	@	0.16	8.45			
		Pole @21.30 kg/meter 150 mm Dia	6	2	1.20	@	0.16	2.30			
		Purlins 40mm dia @ 3.56Kg/meter	6	2	0.87	@	0.13	1.36			
		Rafter 50mm dia @5.03Kg/meter	6	2	0.53	@	0.13	0.83			

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SN	SOR No.	DESCRIPTION OF ITEM	NO		MEASUREMENT			QTY	RATE	UNIT	AMOUNT
					I	B	H/D				
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
		Post NB 40	6	2	0.19	@	0.13	0.30			
		webs 32mm dia @3.10Kg/meter	6	2	1.45	@	0.10	1.74			
			6	2	1.26	@	0.10	1.51			
			6	2	1.13	@	0.10	1.36			
		Wind tie 32x5mm	8	1	21.50	@	0.32	55.04			
								144.77			
		20% Extra For Miscellenious	0.20					28.95			
								173.72	43.00	sqm	7469.90
20	18.76	Providing and fixing on wall face or under floor UV stabilized Unplasticised Rigid PVC pipes (single socketed) having 3.2mm wall thickness conforming to IS : 13592 (4kg/sqcm) including required couplers, jointing with seal ring conforming to IS : 5382 leaving 10 mm gap for thermal expansion etc complete.									
	18.76.2	110 mm dia pipe.									
		Rain water Pipe		4	4.00			16.00			
		total						16.00	267.00	mtr	4272.00
										Total	797706.11
										Add 8% Electrical and Plumbing Work	
										63816.49	
										Grand Total for 1 Windrow Shed	
										861522.60	

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नगर पंचायत भूरा. क



**DETAILED ESTIMATE FOR PROPOSED WORK OF
" WINDROW COMPOST PLANT AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

STORAGE AREA FOR BALED & RECYCLABLE MATERIAL (11.50X5.00 M.)

S. No	SOR	PARTICULARS	NO.	L	B	H/D	QTY.	UNIT	RATE	AMOUNT
1	1.2	Surface dressing of the ground including removing vegetation and making up undulations and inequalities not exceeding 15 cms in depth/ height including disposal of rubbish upto 1.5 m lift and lead upto 50m (at least 5m away from the dressed area).								
		Plot Area	1	13.50	7.00	-	94.50			
						Total	94.50	Sqm	7.20	680.00
2	1.1	Excavation for all types and sizes of foundations, trenches and drains or for any other purpose including disposal of excavated stuff upto 1.5 m lift and lead upto 50m (at least 5m away from the excavated area), including dressing and leveling of pits.								
	1.1.1	In all types of soil								
		Footing								
		F1	8	1.20	1.50	1.50	21.60			
		Ground Beam								
		X-X Wall	4	2.56	0.30	0.20	0.61			
7			2	2.58	0.30	0.20	0.31			
8		Y-Y Wall	2	3.10	0.30	0.20	0.37			
		For Stair	2	1.60	0.60	0.20	0.38			
						Total	23.27	Cum	185.00	4306.00
3	1.18	Providing and filling in plinth with sand/ Crusher dust and hard moorum under floor in layers not exceeding 20cm in depth consolidating each deposited layer by ramming and watering, including dressing etc. complete.								
		F1	8	1.20	1.50	0.10	1.44			
		Ground Beam								
		X-X Wall	4	3.56	0.30	0.10	0.43			
			2	3.58	0.30	0.10	0.21			
		Y-Y Wall	2	4.20	0.30	0.10	0.25			
		For Stair	2	1.60	0.60	0.10	0.19			
		Floor Area	1	11.10	4.60	0.20	10.21			
						Total	12.73	Cum	371.00	4723.00

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जिला -धमतरी(उ.प्र.)

Prish
मुख्य नगर पालिक नगरपालिका
नगर पंचायत भक्खारा



S.No	SOR	PARTICULARS	NO.	L	B	H/D	QTY.	UNIT	RATE	AMOUNT
4	3.1	Providing and laying nominal mix plain cement concrete with crushed stone aggregate using concrete mixer in all works upto plinth level excluding cost of form work.								
	3.1.3	1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40mm nominal size).								
		Below Footing								
		F1	8	1.20	1.50	0.10	1.44			
		Ground Beam								
		X-X Wall	4	3.56	0.30	0.10	0.43			
			2	3.58	0.30	0.10	0.21			
		Y-Y Wall	2	4.20	0.30	0.10	0.25			
		For Stair	2	1.60	1.00	0.10	0.32			
		Floor Area	1	11.10	4.60	0.10	5.11			
						Total	7.76	Cum	2970.00	23035.00
5	3.2	Providing and laying nominal mix reinforced cement concrete with crushed stone aggregate using concrete mixer in all works upto plinth level excluding cost of form work.								
	3.2.1	1:1½:3 (1 cement : 1½ coarse sand : 3 graded stone aggregate 20mm nominal size).								
		Footing								
		F1	8	1.00	1.30	0.30	3.12			
		Column (Upto Ground Level)								
		C1	8	0.20	0.40	1.00	0.64			
		Column(Ground Lvl to Plinth Lvl)								
		C1	8	0.20	0.40	0.30	0.19	3.95		
		Column (Abv. Plinth Top to GF Slab Top)								
		C1	8	0.20	0.40	3.10	1.98			
		Ground Beams								
		Outer at Ground Lvl								
		X-X Wall	4	3.56	0.20	0.30	0.85			
			2	3.58	0.20	0.30	0.43			
		Y-Y Wall	2	4.20	0.20	0.30	0.50			
		Lintel Beam								
		X-X Wall	4	3.56	0.20	0.15	0.43			
			2	3.58	0.20	0.15	0.21			
		Y-Y Wall	2	4.20	0.20	0.15	0.25			
		Chajja								
		For Door & Window								
		X-X Wall	5	1.40	0.60	0.075	0.32			
		Slab Beam								
		X-X Wall	4	3.56	0.20	0.40	1.14			
			2	3.58	0.20	0.40	0.57			
			4	4.20	0.20	0.40	1.34			

PILLIWAR & ASSOCIATES
ENGINEER, ARCHITECT, PLANNER
CONSULTANT
2 GOVT. APPROVED VALUER
25, SOUTH AVENUE, CHOBEY COLONY,
RAIPUR (C.G.) PIN (0771) 2745743 401874.

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8/3/8h
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नगर पंचायत भवन

S. No	SOR	PARTICULARS	NO.	L	B	H/D	QTY.	UNIT	RATE	AMOUNT
		All Area	1	11.50	5.00	0.125	7.19			
						Total	19.16	Cum	4163.00	79763.00
6	1.17	Filling from available excavated stuff (Excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20cm in depth consolidating each deposited layer by ramming and watering with a lead upto 50 M. and lift upto 1.5 M.								
		Footing Excavated Qty.					21.60			
		Deduction								
		Sand Filling					-1.44			
		Footing P.C.C. Area					-1.44			
		Footing Area					-3.95			
						Total	14.77	Cum	65.00	960.00
7	3.12	Providing and placing in position reinforcement for R.C.C. work including straightening, cutting, bending, binding etc. complete as per drawings including cost of binding wire in foundation and plinth all complete:								
	3.12.1	Thermo-Mechanically treated bars FE 415								
		As per Item No-	1	19.16	-	-	19.16			
						Total	19.16	Cum		
		@ 100kg /Cum of Concrete	1	19.16	x	100.00	1916.00			
						Total	1916.00	Kg	54.50	104422.00
8	2.1	Providing and fixing form work including centring, shuttering, strutting, staging, propping bracing etc. complete and including its removal at all levels, for:								
	2.1.1	Foundations, footings, bases of columns plinth beam, curtain wall in any shape and size and all type of wall below plinth level.								
		Footing								
		F1	8	4.60	-	0.30	11.04			
		Column (Upto Ground Level)								
		C1	8	1.20	-	1.00	9.60			
		Column(Ground Lvl to Plinth Lvl)								
		C1	8	1.20	-	0.30	2.88			
		Ground Beams								
		Outer at Ground Lvl								
		X-X Wall	8	3.56	-	0.30	8.54			
			4	3.58	-	0.30	4.30			
		Y-Y Wall	4	4.20	-	0.30	5.04			
						Total	41.40	Sqm	139.00	5755.00

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नगर पंचायत भवारा



S. No	SOR	PARTICULARS	NO.	L	B	H/D	QTY.	UNIT	RATE	AMOUNT
	2.1.5	Columns, Pillars, Piers and likes- rectangular or square in shape								
		Column (Abv. Plinth Top to GF Slab Top)								
		C1	8	1.20	-	3.10	29.76			
						Total	29.76	Sqm	297.00	8839.00
	2.1.13	Weather shade, chhajja, Cornices and mouldings								
		For Door & Window								
		X-X Wall	5	1.40	0.60	-	4.20			
		Side	5	2.60	-	0.075	0.98			
						Total	5.18	Sqm	294.00	1523.00
	2.1.8	Beams, lintels, cantilevers & walls								
		Lintel Beam								
		X-X Wall	8	3.56	-	0.15	4.27			
			4	3.58	-	0.15	2.15			
		Y-Y Wall	4	4.20	-	0.15	2.52			
		Slab Beam								
		X-X Wall	8	3.56	-	0.40	11.39			
			4	3.58	-	0.40	5.73			
		Y-Y Wall	8	4.20	-	0.40	13.44			
						Total	39.50	Sqm	202.00	7979.00
	2.1.7	Suspended floors, roofs, access platform, balconies (plain surfaces) and shelves (cast in situ)								
		Slab								
		All Area	1	11.50	5.00	-	57.50			
						Total	57.50	Sqm	235.00	13513.00
	2.1.4	Edge of slab, breaks in floor and walls upto 200mm								
		Slab Edges at Slab Lvl	1	33.00	-	-	33.00			
						Total	33.00	Rm	34.00	1122.00
9	7.5	Brick work with modular fly-ash lime bricks (FALG Bricks) confirming to IS:12894-2002 of class designation 4.0 in foundation and plinth in:								
	7.5.4	Cement Mortar 1:6 (1 cement : 6 coarse sand)								
		For Stair								
			2	1.60	0.50	0.10	0.16			
			2	1.60	0.25	0.10	0.08			
						Total	0.24	Cum	3263.00	783.00
10	7.5	Brick work with modular fly-ash lime bricks (FaLG Bricks) confirming to IS:12894-2002 of class designation 4.0 in foundation and plinth in:								

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मुख्य नगर पंचायत भवारा



S. No	SOR	PARTICULARS	NO.	L	B	H/D	QTY.	UNIT	RATE	AMOUNT
	7.5.4	Cement Mortar 1:6 (1 cement : 6 coarse sand)								
	7.6	Extra for brick work in superstructure above plinth level for every floor or part thereof in addition to rate for foundation and plinth:								
		Above Plinth								
		X-X Wall	4	3.56	0.20	3.00	8.54			
			2	3.58	0.20	3.00	4.30			
		Y-Y Wall	2	4.20	0.20	3.00	5.04			
		Deduction								
		D	2	1.20	0.20	2.10	-1.01			
		W	3	1.20	0.20	1.20	-0.86			
						Total	16.01	Cum	3384.00	54178.00
11	11.1	Providing and making 6mm thick cement plaster of mix:								
	11.1.2	In Cement mortar 1:4 (1 cement : 4 fine sand)								
		Slab Area	1	11.10	4.60		51.06			
		Add Extra 10 %					5.11			
						Total	56.17	Sqm	87.00	4886.00
12	11.2	Providing and making 12mm thick cement plaster of mix:								
	11.2.4	In Cement Mortar 1:6 (1 cement : 6 fine sand)								
		Inner Area								
		X-X Wall	2	11.10		3.00	66.60			
		Y-Y Wall	2	4.60		3.00	27.60			
		For Column	8	0.20		3.00	4.80			
		Deduction								
		D	2	1.20		2.10	-5.04			
		W	3	1.20		1.20	-4.32			
						Total	89.64	Sqm	91.50	8202.00
13	11.3	Providing and making 15mm thick cement plaster on the rough side of single or half brick wall of mix:								
	11.3.4	In Cement Mortar 1:6 (1 cement : 6 fine sand)								
		Outer Plaster								
		X-X Wall	2	11.50	-	3.10	71.30			
		Y-Y Wall	2	5.00	-	3.10	31.00			
		Deduction								
		D	2	1.20		2.10	-5.04			
		W	3	1.20		1.20	-4.32			
						Total	92.94	Sqm	107.00	9945.00
14	12.3	Cement concrete flooring with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone)								
		finished with a 10mm thick bed of neat cement								

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S. No	SOR	PARTICULARS	NO.	L	B	H/D	QTY.	UNIT	RATE	AMOUNT
	12.3.2	50 mm thick	1	11.10	4.60		51.06	Sqm	254.00	12969.24
15	As per Ammend ment no 08, 05/05/20 25 item no.14.57	Providing and applying 2mm thick white cement based Acrylic grade putty with minimum 3 coats applied @ 4.0 kg/ 10Sqm as per relevant IS code 7545:2021 (Product such as Asian rucare, Berger Happy walls Putty Birla Opus One pro smooth) to make the urface smooth and even with all tools tackles and labour etc. complete for the work . (This Item to be use in heigher grade painting works Item No. 14.65)								
		As per item No-	11	-	-	-	56.17			
		As per item No-	12	-	-	-	89.64			
		As per item No-	13	-	-	-	92.94			
						Total	238.75	Sqm	95.00	22681.00
16	As per Ammend ment no 08, 05/05/20 25 item no.14.62	Providing and applying Acrylic washable Distemper or lite economy Plastic emulsion paint having VOC content less than 50gms/ lit Minimum two coats up to final finish applied @ 1.25 Kg/ 10Sqm as per relevant L.S. Code 428:2000 (product such as Tractor Uno, Dulux Duval, Berger Bison, Opus Style/lite economy emulsion product such as Asian Tactor Spark Dulux Pomise sheen, Neroloc Litol Master, Berger Bison Lite, Nippon Superio.) inclusive of providing abro tape on edges and article and cleaning of door, windows, floor and surface as required with all tools tackles and labour complete for the work.								
		As per item No-	11	-	-	-	56.17			
		As per item No-	12	-	-	-	89.64			
						Total	145.81	Sqm	64.00	9332.00

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S. No	SOR	PARTICULARS	NO.	L	B	H/D	QTY.	UNIT	RATE	AMOUNT
17	As per Ammend ment no 08, 05/05/20 25 item no.14.67	Providing and applying on exterior surface with ECONOMY Exterior Emulsion paint of required shades to give protective and water proof finish minimum three coats applied @ 1.43 lit / 10Sqm up to final finish as per relevant I.S, Code 15489:2013 Type -2 Class D,C (Glossy /Semi Glossy finish) (Product such as Asian Ace,Dulux Promise Exterior Berger Wall Masta ,Nerolac Suraksha Plus , Nippon Shogun Opus, One Style Power Bright) inclusive of providing abro tape on edges and article and cleaning of door, windows, floor and surface as required with all tools tackles and labour etc. complete for the work (With 2 Year Warranty)								
		As per item No-	13	-	-	-	92.94			
						Total	92.94	Sqm	70.00	6506.00
18	4.21	Providing post water proofing treatment against dampness & Seepage in roof, terraces, sunken floor of toilets with reinforced acrylic breathable (polymer content 35%, elongation at break at > 100%) coating consisting of following operations: i) Removing loose material and cleaning the surface. ii) Priming in one coat with water based acrylic emulsion. iii) Three coats with reinforced acrylic breathable polymer								
		Slab Area	1	11.50	5.00		57.50			
						Total	57.50	Sqm	611.00	35133.0

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नगर पंचायत भवारा



S. No	SOR	PARTICULARS	NO.	L	B	H/D	QTY.	UNIT	RATE	AMOUNT
19	9.18	Providing and fixing in position doors, windows and ventilators frames made of cold rolled pressed steel sheet framed profiles made from commercial M.S. Sheets conforming to I.S. 513 of 1973 and as per general specifications of I.S. 4351 including hinges jamb, lock jamb, steel butt hinges, base tie, joints mitred and welded with 10cm long legs of size 15x3mm M.S. flat, embedded in cement concrete blocks 15x10x10cm size of grade M-10 or rawl plugs and screws or with fixing clips or with bolts and nuts including neatly compacted filling M-10 cement concrete in profile section applying a priming coat of red oxide zinc chromate primer.								
	9.18.4	Single rebate/ mullion 100mmx50mm size, 1.6mm thick sheet.								
		Door	2	6.60			13.20			
							13.20	Metre	474.00	6256.80
20	9.15	Providing and fixing M.S. grill of approved pattern made of M.S. flats or square or round bars welded to steel frame of windows etc. including applying a priming coat welded to frame with all necessary fitting complete including applying a priming of red oxide zinc chromate primer.								
		Window	3	1.20	-	1.20	4.32			
							4.32	Sqm		
		For Qty of steel= Area x 30.00 kg/Sqm	1	4.32	x	30.00	129.60			
						Total	129.60	kg	67.50	8748.00
21	9.13	Providing and fixing steel door/ window with M.S. sheet 1mm thick, frame of angle iron, diagonal braces of angle/ flat iron of suitable size, 3.00 mm M.S. gusset plates at junctions and corners, all necessary fittings complete including applying a priming coat of red oxide zinc chromate primer.								
		Door	2	1.20		2.10	5.04			
		Window	3	1.20		1.20	4.32			
							9.36			

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S. No	SOR	PARTICULARS	NO.	L	B	H/D	QTY.	UNIT	RATE	AMOUNT
		For Qty of steel= Area x 30.0 kg/Sqm		9.36	x	30.00	280.80	kg	75.00	21060.00
22	As per Amendment no 08, 05/05/20 25 item no.14.72	Providing and applying Glossy finish Enamel paint minimum 2 Coats in all surface applying @ 0.75 lit/ 10 Sqm up to required finish as per relevant I.S. code 2932: 2013 of (Product such as Asian Apcolite Premium Enamel Dulux Promise Premium Enamel Nerolac Synthatic Enamel, Opus Prime enamel) inclusive of providing abro tape on edges and article and cleaning of door, windows, floor and surface as required with all tools tackle and labour etc. complete for the work.								
		On Steel work								
		Door	4	1.20		2.10	10.08			
		Window	6	1.20	-	1.20	8.64			
						Total	18.72	Sqm	120.00	2246.00
23	9.37	Providing and fixing M.S. fan clamp/ hook for ceiling fan made out of 16 mm dia M.S. bar bent to shape with hooked ends in R.C.C. slabs, beams during laying including painting the exposed portion of loop.								
			3	-	-	-	3.00			
						Total	3.00	Each	97.00	291.0
Total Rs.										459837.04
9% Extra for Electrification Work Rs.										41385.33
Grand Total Rs.										501222.37

PILLIWAR & ASSOCIATES
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नगर पंचायत पञ्जारा-महेली
जिला-धनतरी(उ.प्र.)

मुख्य नगर पञ्जारा
नगर पंचायत पञ्जारा

**DETAILED ESTIMATE FOR PROPOSED WORK OF
" WINDROW COMPOST PLANT AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

" PROPOSED LEACHATE TANK 1.20X1.20X1.20 M "

S.No.	PARTICULAR	NO.	L	B	H/D	QTY.	UNIT	RATE (in Rs.)	AMOUNT (in Rs.)
1	Excavation for all types and sizes of foundations trenches and drains or for any other purpose including disposal of excavated stuff upto 1.5 m lift and lead upto 50m (at teats 5m away from the excavated area), including dressing and leveling of pits. 1.1.1) In all types of soil								
	(BUILDING SOR ITEM NO.-1.1/9)	1	1.90	1.90	1.65	5.96	CUM	185.00	1101.95
2	Filling from available excavated stuff (Excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20cm. In depth consolidation each deposited layer by ramming and watering with a lead upto 50M. And lift upto 1.5M.								
	Excavated Area-	2	1.90	0.15	1.50	0.86			
	Deduction Tank Area-	2	1.60	0.15	1.50	0.72			
	(BUILDING SOR ITEM NO.-1.17/11)					1.58	CUM	65.00	102.38
3	Providing and filling in plinth with sand/ Crusher dust and hard moorum under floor in layers not exceeding 20cm in depth consolidating each deposited layer by ramming and watering, including dressing etc. complete.								
	(BUILDING SOR ITEM NO.- 1.18/11)	1	1.90	1.90	0.15	0.54	CUM	371.00	200.90
4	Providing and laying nominal mix cement concrete with crushed stone aggregate using concrete mixer in foundation, plinth and at ground level excluding cost of from work. 3.1.3) 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40mm nominal size).								
	(BUILDING SOR ITEM NO.- 3.1.3/23)	1	1.90	1.90	0.15	0.54	CUM	2970.00	1608.26
5	Providing and laying nominal mix plain cement concrete with crushed stone aggregate using concrete mixer in all works upto plinth level excluding cost of form work.								
7	1:1½:3 (1 cement : 1½ coarse sand : 3 graded stone aggregate 20mm nominal size).								
8	PCC	1	1.60	1.60	0.15	0.38			
	(BUILDING SOR ITEM NO.- 3..1.5/23)					0.38	CUM	4073.00	1564.03
6	Providing and fixing formwork including centering, shuttering, strutting, staging, propping bracing etc. complete and including its removal at all levels, for: Foundations, footings, bases of columns plinth beam, curtain wall in any shape and size and all type of wall below plinth level.								
	Bottom Slab-	1	6.40	-	0.15	0.96			
	(BUILDING SOR ITEM NO.- 2.1.1/16)					0.96	SQ.M	139.00	133.00
7	Brick work with modular fly-ash lime bricks & GOVT. APPROVED VALUER								
25	GOVT. APPROVED VALUER IS:12894-2002 of								
RA	Class designation 40mm foundation and plinth in:								
	(SOR. ITEM NO.- 7.5.4/45)								

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S.No.	PARTICULAR	NO.	L	B	H/D	QTY.	UNIT	RATE (in Rs.)	AMOUNT (in Rs.)
	Cement Mortar 1:6 (1 cement : 6 coarse sand)								
	Extra for brick work in superstructure:								
	(SOR. ITEM NO.- 7.6/45)								
	Leachate Tank Wall	2	1.60	0.20	1.20	0.77			
		2	1.20	0.20	1.20	0.58			
						1.34	CUM	3384.00	4548.10
8	Providing and making 12mm.thick cement plaster of mix : In Cement Mortar 1:6 (1 Cement : 6 fine Sand)								
	(BUILDING SOR. ITEM NO.-11.2/103)								
	11.1.2) In Cement mortar 1:4 (1 cement : 4 fine sand)								
	Inside Plaster	4	1.20		1.20	5.76			
						5.76	SQM	91.50	527.04
9	Providing and laying nominal mix reinforcement cement concrete with crushed stone aggregate using concrete mixer in all works upto floor five level excluding cost of reinforcement and form work. 3.2.1) 1:1½:3 (1 cement : 1½ coarse sand : 3 graded stone aggregate 20mm nominal size).								
	Precast Slab	1	1.80	1.80	0.15	0.49			
	(BUILDING SOR ITEM NO.- 3.2.1/23)					0.49	CUM	4163.00	2023.22
10	Extra for precast PCC/ RCC work of any mix including form work, hoisting and fixing in Cement Mortar. 1:2 (1 Cement : 2 coarse sand) and finishing with cement plaster in Cement Mortar 1:3 (1 Cement : 3 coarse sand) but excluding reinforcement.								
	Precast Slab					0.49			
	(BUILDING SOR ITEM NO.-3.9/24)					0.49	CUM	469.00	227.93
11	Providing and placing in position reinforcement for R.C.C. work including straightening, cutting bending binding etc. complete as per drawings including cost of binding wire all complete: Thermo-Mechanically treated bars FE 415								
	Precast Slab	Qty.as per item no. 5				0.49			
	(BUILDING SOR ITEM NO.-3.12.1/24)	80 kg/cum				38.88	KG	54.50	2118.96
12	Providing and fixing on wall face or under floor UV stabilized Unplasticised Rigid PVC pipes (single socketed) having 3.2mm wall thickness conforming to IS : 13592 (4kg/sqcm) including required couplers, jointing with seal ring conforming to IS : 5382 leaving 10 mm gap for thermal expansion etc complete. 150 mm dia pipe.								
	Leachate Drain Pipeline	1	30.00	-	-	30.00	MTR	440.00	13200.00
	(BUILDING SOR ITEM NO.- 18.76/170)								
	PILLAI & ASSOCIATES ENGINEER ARCHITECT PLANNER GIS CONSULTANT & GOVT. APPROVED VALUER 25, SOUTH AVENUE, CHOBAY COLONY, RAIPUR (C.G.) PIN (07711) 2245743 401874.								
Cost of 1 Leachate Tank Rs.									27355.76

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नगर पंचायत भवन



**DETAILED ESTIMATE FOR PROPOSED WORK OF
" WINDROW COMPOST PLANT AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

" EXTERNAL C.C. FLOORING "

S.No.	PARTICULAR	NO.	L	B	H/D	QTY.	UNIT	RATE (in Rs.)	AMOUNT (in Rs.)
1	52 mm thick cement concrete flooring with under layer of 40mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) and top layer of 12 mm thick cement metallic hardener concrete mix 1:2 (1 cement hardener mix : 2 stone aggregate of 6 mm size by volume) with metallic hardening compound of approved quality mixed with cement in ratio of 4:1 (4 cement : 1 metallic floor hardening compound by weight) including finishing etc. complete.								
		1.00	160.00		-	160.00			
	(BUILDING SOR ITEM NO.12.4/111)				Total	160.00	SQ.M	441.00	70560.00
								Total Rs.	70560.00

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जिला -धमतरी(छ.ग.)

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नगर पंचायत भक्षारा



**DETAILED ESTIMATE FOR PROPOSED WORK OF
" WINDROW COMPOST PLANT AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

ESTIMATE FOR CHAINLINK FENCING

SN	DESCRIPTION	No.	L	W	H/D	QTY	Rate	U	Amount
1	Excavation for all types and sizes of foundations, trenches and drains or for any other purpose including disposal of excavated stuff upto 1.5 m lift and lead upto 50m (at least 5m away from the excavated area), including dressing and leveling of pits. In all types of soil PWD S.O.R.-P-09/I-1.1.1 Main Wall Along Road								
	total	1	68.00	0.50	0.80	27.20			
						27.20	185.00	cum	5032.00
2	Filling from available excavated stuff (Excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20cm in depth consolidating each deposited layer by ramming and watering with a lead upto 50 M. and lift upto 1.5 M PWD S.O.R.-P-09/I-1.17								
	Excavated Qty.					27.20			
	Deduction								
	Sand Filling					-3.40			
	Pcc Area					-4.02			
	Brick Work					-10.20			
						9.58	65.00	cum	622.48
7	Providing and filling in plinth with sand/ Crusher dust and hard moorum under floor in layers not exceeding 20cm in depth consolidating each deposited layer by ramming and watering, including dressing etc. complete. Building sor 2015 item no. 1.18								
8	below pcc	1	68.00	0.50	0.10	3.40	371.00	cum	1261.40
4	Providing and laying nominal mix cement concrete with crushed stone aggregate using concrete mixer in foundation, plinth and at ground level excluding cost of form work. 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40mm nominal size). PWD S.O.R.-P-23/I-3.1.3 Main Wall Along Road	1	68.00	0.50	0.10	3.40			
	Concrete For Angle Iron Post	28	0.20	0.20	0.55	0.62			
	total					4.02	2970.00	cum	11949.30
5	7.5 Brick work with modular flyash lime bricks (FaLG Bricks) confirming to IS:12894-2002 of class designation 4.0 in foundation and plinth in: 7.5.4 Cement Mortar 1:6 (1 cement : 6 coarse sand) PWD SPILLWATER & ASSOCIATES ENGINEER ARCHITECT PLANNER up-to Ground Level Main Wall Along Road VALUER 25, SOUTH AVENUE, CHOBAY COLONY, RAIPUR (C.G.) PIN- 492011 2245713 483474	1	68.00	0.30	0.30	6.12			
		1	68.00	0.20	0.30	4.08			

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8/3/18
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नगर पंचायत भखारा

SN	DESCRIPTION	No.	L	W	H/D	QTY	Rate	U	Amount
	total					10.20	3263.00	cum	33282.60
6	7.5 Brick work with modular fly- ash lime bricks (FaLG Bricks) conforming to IS:12894-2002 of class designation 4.0 in foundation and plinth in: 7.5.4 Cement Mortar 1:6 (1 cement : 6 coarse sand) PWD S.O.R.-P-45/I-7.5.4								
	Above Ground Level Main Wall Along Road	1	68.00	0.20	0.55	7.48			
	Deduct								
	Angle Iron Post Area	28	0.20	0.20	0.55	-0.62			
	total					6.86	3263.00	cum	22373.30
7	Providing and laying damp proof course (upto 50mm thick) with plain cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded crushed stone aggregate 20mm nominal size) including form work. PWD S.O.R.-P-24/I-3.13								
	PWD S.O.R.-P-24/I-3.13								
	Main Wall Along Road	1	68.00	0.20	0.05	0.68			
	total					0.68	4237.00	cum	2881.16
8	12mm thick cement plaster of mix: In Cement Mortar 1:6 (1 cement : 6 fine sand) PWD S.O.R.-P-103/I-11.2.4 Main Wall Along Road Subtotal								
	Inner Plaster Area	1	1	68.00	0.60	40.80			
	total					40.80	91.50	sqm	3733.20
9	Providing and making 15mm thick cement plaster on the rough side of single or half brick wall of mix: In Cement Mortar 1:6 (1 cement : 6 fine sand) (Page No.- 103, Item No.- 11.3.4)								
	Outer Plaster Area	1	1	68.00	0.60	40.80			
	Top	1	1	68.00	0.20	13.60			
						54.40	107.00	sqm	5820.80

PILLIWAR & ASSOCIATES
ENGINEER, ARCHITECT, PLANNER
GIS CONSULTANT
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25, SOUTH AVENUE, CHOBAY COLONY,
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नगर पंचायत भवारा



SN	DESCRIPTION	No.	L	W	H/D	QTY	Rate	U	Amount
10	Providing and applying on exterior surface with ECONOMY Exterior Emulsion paint of required shades to give protective and water proof finish minimum three coats applied @ 1.43 lit / 10Sqm up to final finish as per relevant I.S, Code 15489:2013 Type -2 Class D,C (Glossy /Semi Glossy finish) (Product such as Asian Ace,Dulux Promise Exterior Berger Wall Masta ,Nerolac Suraksha Plus , Nippon Shogun Opus, One Style Power Bright) inclusive of providing abro tape on edges and article and cleaning of door, windows, floor and surface as required with all tools tackles and labour etc. complete for the work (With 2 Year Warranty) no 08, 05/05/2025 item no.14.67 As per Ammendment no 08, 05/05/2025 item no.14.67								
	As Per Item No. 8 & 9					95.20	70.00	sqm	6664.00
11	Providing and placing in position angle iron post and strut of required size including bottom to be split and bent at right angle in opposite direction for required length and drilling holes upto 10 mm dia as per requirement including priming coat with red oxide zinc chromate primer and placing the post/ strut in cement concrete block.								
	[S.O.R. Page no. 85 I- 9.45]								
	M S 40X40 x4.00 mm Th. Post @ 4.09kg/Rmt	28	2.35		4.09	272.33			
	M S Frame 20x20x2.80 mm Th. partition pipe @ 1.56 kg/ Rmt	28	7.70		1.56	218.17			
	Bottom /Side	12	28	0.05	1.56	26.52			
						517.01	69.50	Kg	35932.37
12	Providing and fixing in position chain linked steel wire fabric made of 4 mm dia G.I. wire of required width in mesh to concrete/ wooden/ angle iron posts including securing and screwing with 2mm dia G.I. wire, G.I. staples, G.I.U-nails or steel pins etc., complete. PWD S.O.R.-P-84/I-9.43 9.43.1 Aperture 50x50mm	28	2.20		1.65	102.85			
						102.85	331.00	Sqm	34043.35
13	Providing and applying priming coat on steel work with red Oxide/ zinc phosphate primer applied @ 0.50 lit /Sqm as per relevant code 3536:1999 (product such as Asian Zinc phosphate , Dulux Steel primer, Burger Red oxide primer) with all tools tackles and labour etc. complete for the work								

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8/3/25
मुख्य नगर पालिका-धमतरी
नगर पंचायत भवारा

SN	DESCRIPTION	No.	L	W	H/D	QTY	Rate	U	Amount
	Satin synthetic enamel paint								
	As per Ammendment no 08, 05/05/2025 item no.14.74								
	M S 40X40 x4.00 mm Th. Post @ 4.09kg/ Rmt	28	1.75		0.16	7.93			
	M S Frame 20x20x2.80 mm Th. partition pipe @ 1.56 kg/ Rmt	28	7.70		0.08	17.45			
	Bottom /Side	12	28	0.05	0.08	1.36			
						26.75	35.00	Sqm	936.13
14	Providing and applying Glossy finish Enamel paint minimum 2 Coats in al surface applying @ 0.75 lit/ 10 Sqm up to required finish as per relevent I.S. code 2932: 2013 of (Product such as Asian Apcolite Premium Enamel Dulux Promise Premium Enamel Nerolac Synthatic Enamel, Opus Prime enamel) inclusive of providing abro tape on edges and article and cleaning of door, windows, floor and surface as required with all tools tackle and labour etc. complete for the work.								
	As per Ammendment no 08, 05/05/2025 item no.14.72								
	As Per Item No.	13				26.75	120.00	Sqm	3209.60
Total									167741.70

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25, SOUTH AVENUE, CHOBAY COLONY,
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8/3/24
मुख्य नगर पालिका कार्यालय
नगर पंचायत भवना



**DETAILED ESTIMATE FOR PROPOSED WORK OF
" WINDROW COMPOST PLANT AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

As Per PWD Building SOR w.e.f- 01-01-2015

SNO	SOR	PARTICULARS	NO	L	B	H/D	QTY	UNIT	RATE	AMOUNT
1	1.1	Excavation for all types and sizes of foundations, trenches and drains or for any other purpose including disposal of excavated stuff upto 1.5 m lift and lead upto 50m (at least 5m away from the excavated area), including dressing and leveling of pits.								
	1.1.1	In all types of soils.								
			2	1.50	1.50	1.50	6.75			
						Total	6.75	Cum	185.00	1249.00
2	1.7	Filling from available excavated stuff (Excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20cm in depth consolidating each deposited layer by ramming and watering with a lead upto 50 M. and lift upto 1.5 M								
		60% For Excavated qty.				Total	4.05	Cum	65.00	263.25
3	1.18	Providing and filling in plinth with sand/ Crusher dust and hard moorum under floor in layers not exceeding 20cm in depth consolidating each deposited layer by ramming and watering, including dressing etc. complete.								
		below pcc	2	1.50	1.50	0.10	0.45	Cum	371.00	166.95
7										
8	3.1	Providing and laying nominal mix plain cement concrete with crushed stone aggregate using concrete mixer in all works upto plinth level excluding cost of form work.								
	3.1.3	1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40mm nominal size).								
			2	1.50	1.50	0.10	0.45			
						Total	0.45	Cum	2970.00	1337.00
5	3.2	Providing and laying nominal mix reinforced cement concrete with crushed stone aggregate using concrete mixer in all works upto plinth level excluding cost of form work.								
	3.2.1	1:1½:3 (1 cement : 1½ coarse sand : 3 graded stone aggregate 20mm nominal size).								
		Footing	2	1.20	1.20	0.30	0.86			
		Column upto GL	2	0.20	0.30	1.00	0.12	0.98		
		Beam	1	3.00	0.20	0.30	0.18			
		Column	2	0.20	0.30	2.80	0.34			
						Total	1.50	Cum	4163.00	6244.50
6		PROVIDING AND LAYING FORM WORK INCLUDING Scaffolding, strutting, staging, propping and including its removal								

PILLIWAR & ASSOCIATES

ENGINEERS & ARCHITECTS

25, SOUTH STREET, CHENNAI - 600 086

RAIPUR (C.G.)

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SNO	SOR	PARTICULARS	NO	L	B	H/D	QTY	UNIT	RATE	AMOUNT
	2.1.1	Foundations, footings, bases of columns plinth beam, curtain wall in any shape and size and all type of wall below plinth level.								
		Footing	2	4.8		0.30	11.52			
		Column upto GL	2	1.00		1.00	2.00			
		Beam	2	3.00		0.30	1.80			
						Total	15.32	sqm	139.00	2129.48
	2.1.5	Columns, Pillars, Piers and likes- rectangular or square in shape								
			2	1.00	-	2.80	5.60			
						Total	5.60	Sqm	297.00	1663.20
7	3.12	Providing and placing in position reinforcement for R.C.C. work including straightening, cutting, bending, binding etc. complete as per drawings including cost of binding wire in foundation and plinth all complete:								
	3.12.1	Thermo-Mechanically treated bars FE 415 @ 80 kg per cum of concrete	1	1.50	x	80	120.00	Kg	54.50	6540.00
8	11.2	12mm thick cement plaster of mix:								
	11.2.4	In Cement Mortar 1:6 (1 cement : 6 fine sand)								
							5.60			
						Total	5.60	Sqm	91.50	512.40
9	As per Ammendment no 08, 05/05/20 25 item no.14.67	Providing and applying on exterior surface with ECONOMY Exterior Emulsion paint of required shades to give protective and water proof finish minimum three coats applied @ 1.43 lit / 10Sqm up to final finish as per relevant I.S, Code 15489:2013 Type -2 Class D,C (Glossy /Semi Glossy finish) (Product such as Asian Ace,Dulux Promise Exterior Berger Wall Masta ,Nerolac Suraksha Plus , Nippon Shogun Opus, One Style Power Bright) inclusive of providing abro tape on edges and article and cleaning of door, windows, floor and surface as required with all tools tackles and labour etc. complete for the work (With 2 Year Warranty)								
			-	-	-	-	5.60	Sqm	70.00	392.00
10	9.3	Steel work in tubular (round, square or rectangular hollow tubes etc.) structure in built-up sections, trusses and frame work including cutting, hoisting, fixing in position upto a height of 5m above plinth level, consisting of columns trusses, roof and bottom purlins, base plate, holding down bolts, wind ties bracing (if required), bolts, nuts and washers for fastening etc. complete with applying a priming coat of red oxide zinc chromate primer.								
		Steel work in tubular (round, square or rectangular hollow tubes etc.) structure in built-up sections, trusses and frame work including cutting, hoisting, fixing in position upto a height of 5m above plinth level, consisting of columns trusses, roof and bottom purlins, base plate, holding down bolts, wind ties bracing (if required), bolts, nuts and washers for fastening etc. complete with applying a priming coat of red oxide zinc chromate primer.								
		Gate (3.00x2.4=7.20 Sqm) 60 Kg /Sqm	1	7.20	@	60.00	432.00			
						Total	432.00	kg	88.50	38232.00

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SNO	SOR	PARTICULARS	NO	L	B	H/D	QTY	UNIT	RATE	AMOUNT
11	As per Ammend ment no 08, 05/05/20 25 item no.14.76	Providing and applying Aluminium paint minimum 2 coats in all metal surface applying @ 0.75 li/ 10 Sqm up to required finish as per relevent I.S. code 2932: 2013 of (Product such as Asian Apcolite aluminium paint, Dulux Aliminium paint, Burger Superior Aluminium Paint) with all tools tackle and labour etc. complete for the work	2	3.00	-	2.4	14.40			
							14.40	Sqm	43.00	619.20
									Total	59348.98

PILLIWAR & ASSOCIATES
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**DETAILED ESTIMATE FOR PROPOSED WORK OF
" WINDROW COMPOST PLANT AT SWAMI VIVEKANAND WARD
NO - 02 "**

ANNEXURE G - DETAILED SPECIFICATION OF WHEEL BARROW

PARAMETER	SPECIFICATIONS/DESCRIPTION
Capacity of Wheel barrow	140 litre
Load carrying capacity	450 kg
Sheet Material	Steel sheets confirming to IS:2062
Sheet thickness	1.8 mm
Wheel material	Mild Steel with Solid or Cushioned rubber tyre
Type of bearing / bush	Cast iron bearing
Steel tube	not be drilled, light tubes confirming to IS:1239
Grey Iron Castings	Conform to IS:210
Finish of Metal parts	Two coats of black bituminous paint
Diameter of the Wheel	500 mm
Nominal width of tyre	50 mm
7	Yes
8	Yes

PILLIWAR & ASSOCIATES
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RAIPUR (C.G.) PIN 492001 2745743 4978744

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**DETAILED ESTIMATE FOR PROPOSED WORK OF
" WINDROW COMPOST PLANT AT SWAMI VIVEKANAND WARD
NO - 02 "**

**ANNEXURE H - DETAILED SPECIFICATION OF COMPOST SIEVE
MACHINE**

PARAMETER	SPECIFICATIONS/DESCRIPTION
Automation Grade	Manual
Material	Mild Steel with paint coating/ Stainless Steel
Screener Size/Mesh	4-6 mm
Capacity	200-300 kg per hour
Usage/Application	Any type of compost
Portability	Yes, Portable
Length	5 to 7 feet
Diameter	2 to 3 feet

7

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नगर पंचायत भवन

**DETAILED ESTIMATE FOR PROPOSED WORK OF
" SLRM CENTRE AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

ANNEXURE A - DETAILED SPECIFICATION OF FLAT CONVEYOR BELT

PARAMETER	SPECIFICATIONS/DESCRIPTION
Length of Conveyor	Approx. 7 m from End to End of conveyor
Width of Conveyor Belt	700 mm
Height of Conveyor	800 mm
Type	Flat roller type belt conveyor
Motor	3.75 kW (5 HP), 1440 RPM, TEFC (Totally Enclosed Fan Cooled) copper wire conforming to IS : 13730, 3- phase, 4- pole
Inclination	0°
Size of belt	1000 mm wide (working width 800 mm)
Belt Specification	Plain rubber belt, 3 ply, 3 mm top, 1.5 mm bottom rubber covering, total plain belt thickness 08 mm, nylon cord conforming to M 24 grade
Drive pulley for conveyor	320 mm OD with crowning surface with 65 mm shaft with rubber coating and hearing bone design
Rear pulley for conveyor	320 mm OD with crowning surface with 65 mm shaft with rubber coating and hearing bone design
Side Guard	2 mm thick MS sheet with supporting structure
Side guard skirting	2 mm thick rubber belt
Conveyor body	Manu. From IS 2062, 4 mm thickness plate framing structure
Rear pulley cover	2 mm thick MS sheet
Bearing for roller	6205 2RS type
Shaft	Precise Machined from EN-24 grade material
Guide rollers	60 mm pipe with bright bar spindle and sealed with single roll anti friction deep grooved ball bearing
Carrying & return roller	76.1 mm ID ERW pipe with CI housing, bright bar spindle and sealed with single roll anti friction deep grooved ball bearing
Bearing	Angular contact type with fitted in split housing
Idler Spacing confirming to IS 9295-1983	Carrying Idler – 600 to 800 mm, Return Idler - 1200 to 1500 mm
Belt join	Endless type belt
Scrappers	Driver side: Flat Scraper Rear Pulley: V plough type
Take up	Screw type take up design at front side of Conveyor
Gear Box	Worm type, 20:1 ratio, Hollow input & output
Belt speed	1.2 m/sec
Pulley RPM	72 RPM
Conveyer direction	Uni- directional (One side)
Speed Control	VFD suitable for speed control of conveyor belt motor ranging from 50% to 100% of rated speed 1.2 m/sec (using gear & VFD)

PILLAI & ASSOCIATES
ENGINEER ARCHITECT PLANNER
CONVEYOR SPECIALIST
& GOVT. APPROVED VALUER
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जिला - धमतरी (उ.प्र.)

मुख्य नगर पंचायत धमतरी
नगर पंचायत भक्करी



**DETAILED ESTIMATE FOR PROPOSED WORK OF
" SLRM CENTRE AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

ANNEXURE B - DETAILED SPECIFICATION OF HDPE CONTAINER

PARAMETER	SPECIFICATIONS/DESCRIPTION
Capacity	1100 litre
Size of Container (A x B x C)	1354 x 1373 x 1073 mm ('A' Height x 'B' Width x 'C' Depth)
Upper edge comb (D)	1206 mm
Wheel base width (E)	750 mm
Wheel base depth (F)	880 mm
Wheel base Diameter (G)	200 mm
Material	High Density Polyethylene (HDPE)
Type	Material Injection molded
High resistance to	Heat, chemicals and radiation
Dead weight	50 kg
Pay load	440 kg
Confirming Standards	EN 840-1: 2020
Legs support	4 nos
Hand Grips	Yes

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**DETAILED ESTIMATE FOR PROPOSED WORK OF
" SLRM CENTRE AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

ANNEXURE C - DETAILED SPECIFICATION OF WEIGH BRIDGE

PARAMETER	SPECIFICATIONS/DESCRIPTION
Bridge Type	Electronic Pitless Type
Platform material & Size	1. High Tensile Structural Steel as per IS:2062:2011
	2. Should be anti-skid type.
	3. Thickness of platform plate not less than 10 mm
	4. Size 6.6 metre and 2.5 metre (length X width)
Weighing Capacity	10 Tonne
Load cell	4 Load cell
UPS	30 minute backup
Printer	Laser Printer
Display modes	a) Indicate weight
	b) Indicate calibration-Auto zero tracking
	c) Calibration to be checked automatically every 5 minutes
Readability	2 Kg
Type/capacity of load cell	Digital Double Ended Shear Beam load cells, pre-calibrated load cells – 5000/kg (04 No.) with mounting kits
Accessories of Junction Box (01 Set)	Cables: Home run cable 20 metre & inter connections cable between load cell and junction box & weighing electronics.
Electric supply	3 Phase (440 V 50Hz)
Surface finish on metal parts	Powder coating/ paint
Surface finish on metal parts	Powder coating/ paint

Note: Weighbridge must be capable of sharing real time data of weighment and integration with dashboard at ULB and State Level. Internet connection may be provided by the ULB.

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**DETAILED ESTIMATE FOR PROPOSED WORK OF
" SLRM CENTRE AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

ANNEXURE D - DETAILED SPECIFICATION OF BALE TROLLY

PARAMETER	SPECIFICATIONS/DESCRIPTION
Carrying Capacity	250 kg (Minimum)
Size	40" L X 20" W x 10" Height of Toe (Minimum)
Trolley Material	Mild Steel
Wheels	2 Nos to 4 Nos
Wheel Material	High quality polymer wheels (8-10 Inch dia)
Surface Finish	Powder Coated or Painted (Rust-proof)
Operating Type	Manual (Hand-operated)2
Shape	Rectangular or L-type
Load Platform Height	Approx. 10" to 12" from ground level

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**DETAILED ESTIMATE FOR PROPOSED WORK OF
" SLRM CENTRE AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

ANNEXURE E - DETAILED SPECIFICATION OF SURVEILLANCE CAMERA

PARAMETER	SPECIFICATIONS/DESCRIPTION
No. of CCTV Camera at Plant	Min. 6 No. of CCTV Cameras at each plant
8 Channel DVR	8 channels and 1 HDD DVR, Up to 12 IP cameras can be connected, Efficient compression technology
5 MP Built in Mic Bullet Camera	5 MP, 2560 × 1944 resolution, Audio over coaxial cable, built-in mic, Smart IR, up to 25 m IR distance, 4 in 1 video output (switchable TVI/AHD/CVI/CVBS)
5 MP Built in Mic Dome Camera	5 MP, 2560 × 1944 resolution, Smart IR, upto 20m, IR distance, Audio over coaxial cable, built-in mic, 4 in 1 video output (switchable TVI/AHD/CVI/CVBS)
Hard Disk 1 TB	Full Surveillance Hard Disk With 2 Year Warranty
3+1 Solid Copper Cable	Full Solid Copper, 90 Meter
Power Supply Ch-8	Burning Warranty claim
PVC Box 4x4	Solid PVC
BNC Connector	Per Camera 2 Pcs Required
DC Connector	Per Camera 1 Pcs Required

Note: CCTV surveillance system must be capable of sharing real time AV feeds, data and integration with dashboard at ULB and State Level. Internet connection may be provided by the ULB.

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**DETAILED ESTIMATE FOR PROPOSED WORK OF
" SLRM CENTRE AT SWAMI VIVEKANAND WARD NO - 02 "
NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

ANNEXURE F - DETAILED SPECIFICATION OF TURBINE VENTILATOR

PARAMETER	SPECIFICATIONS/DESCRIPTION
Turbine Diameter	24" to 36" (610 mm to 915 mm)
Number of Vanes	30 to 48
Bearings	Double Ball Bearing or bearing-less spider frame
Base Plate Material	FRP (Fiber Reinforced Plastic), Polycarbonate, or Galvanized Iron (GI)
Airflow Capacity	1500–2500 CFM per unit (depends on wind speed and size)
Wind Resistance	Up to 180 km/h
Operating Principle	Wind-driven + thermal convection (no electricity required)
Roof Compatibility	RCC, metal, asbestos, GI sheet roofs
Mounting Method	Bolted or riveted with waterproof sealant

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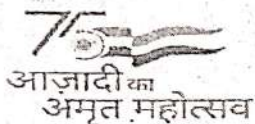
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NAGAR PANCHAYAT BHAKHARA, CHHATTISGARH



Ministry of Housing and Urban Affairs
Government of India



VOL - III

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NAGAR PANCHAYAT REPORT UNDER
SRM 2.0 FOR SWM, NAGAR PANCHAYAT
BHAKHARA, CHHATTISGARH

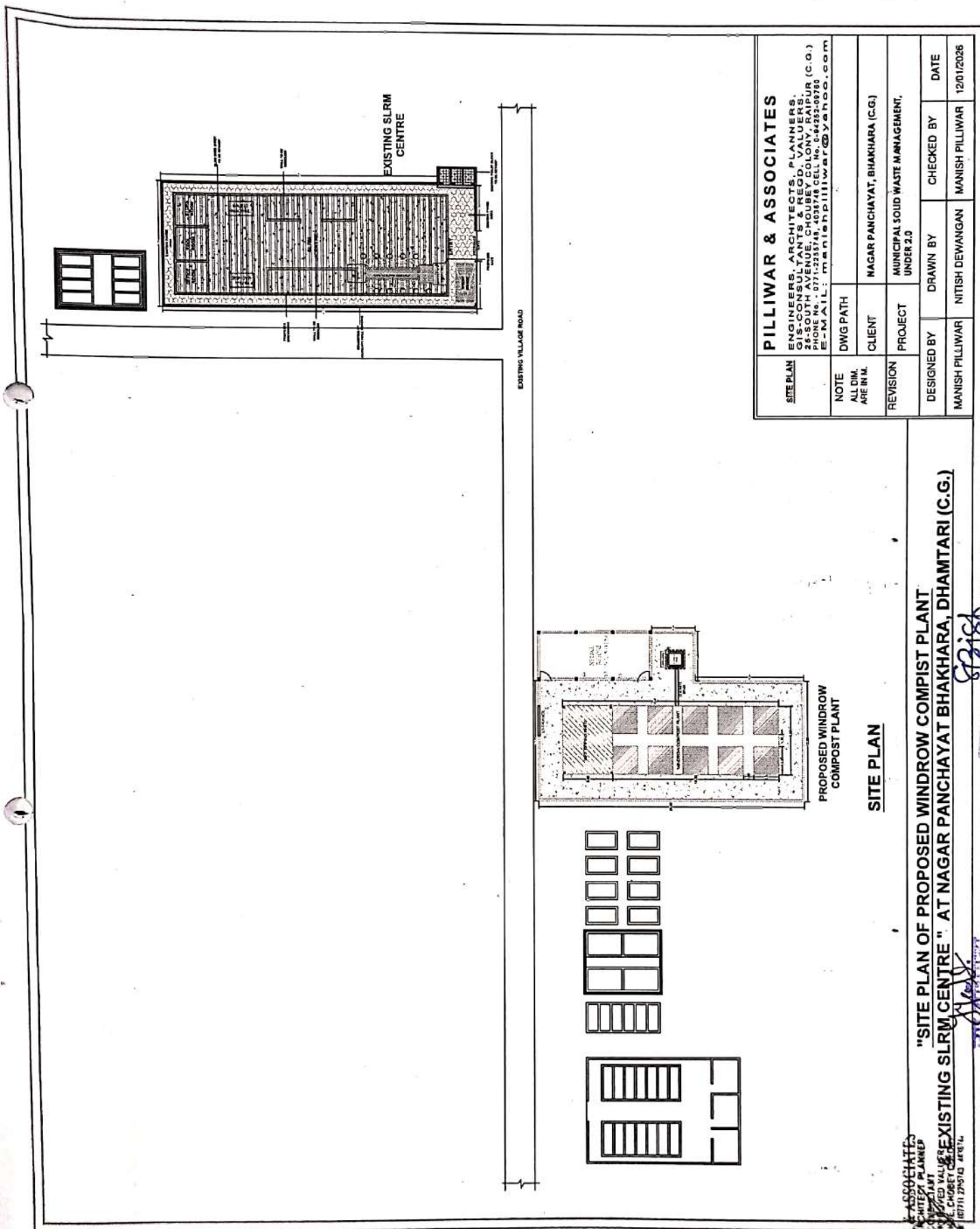
SLRM CENTRE AT SWAMI VIVEKANAND, WARD NO - 02

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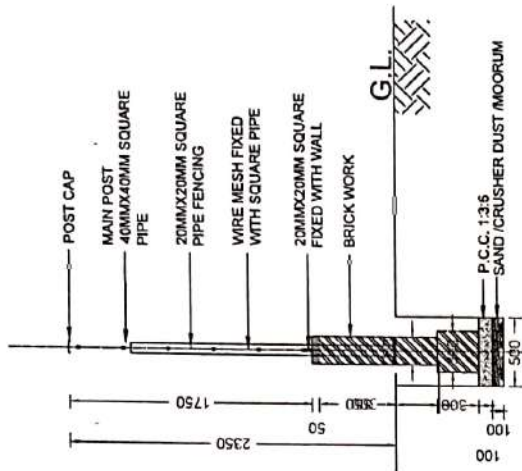
SITE PLAN	PILLIWAR & ASSOCIATES		
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ALL DIM. ARE IN M.		PROJECT	MUNICIPAL SOLID WASTE MANAGEMENT, UNDER 2.0
REVISION		DESIGNED BY	DRAWN BY
		MANISH PILLIWAR	NITISH DEWANGAN
		CHECKED BY	DATE
		MANISH PILLIWAR	12/01/2026

SITE PLAN

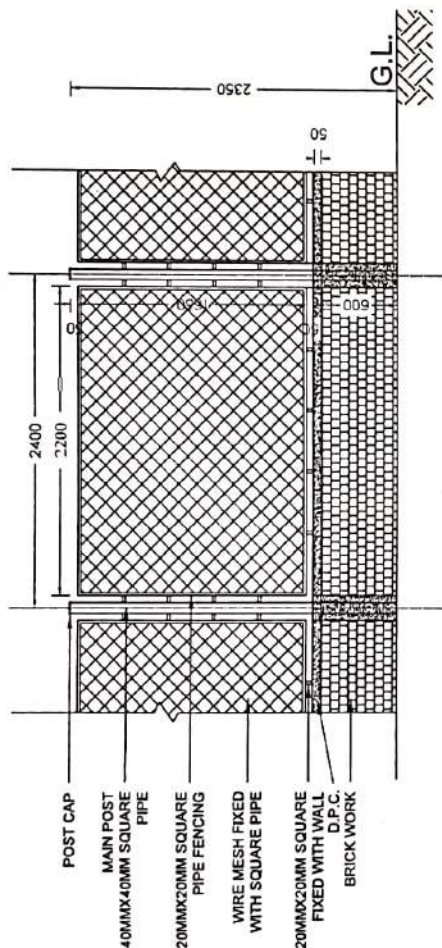
"SITE PLAN OF PROPOSED WINDROW COMPOST PLANT
AT NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)"

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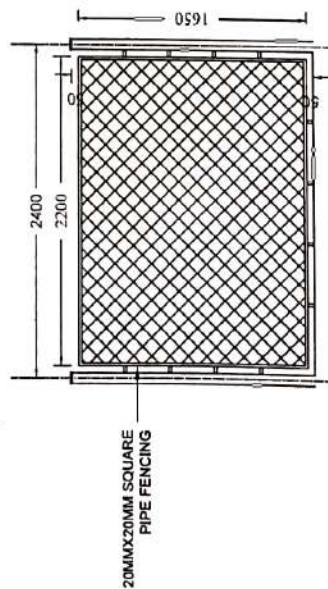
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CROSS SECTION OF CHAIN LINK FENCING



TYPICAL ELEVATION OF FENCING



TYPICAL PLAN OF FENCING

BOUNDARY FENCING	PILLIWAR & ASSOCIATES ENGINEERS, ARCHITECTS, PLANNERS, GIS-CONSULTANTS & REGD. VALUERS, 25-SOUTH AVENUE, CHOUBEY COLONY, RAIPUR (C.G.) PHONE NO. 1-877-1225745-4038911 CELL NO. 94254-89786 E-MAIL: MANISH.PILLIWAR@PILLIWAR-INDIA.COM			
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	ALL DIM. ARE IN M.		PROJECT	MUNICIPAL SOLID WASTE MANAGEMENT, UNDER 2.0
	DESIGNED BY	DRAWN BY	CHECKED BY	DATE
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BOUNDARY FENCING

"SITE PLAN OF PROPOSED WINDROW COMPOST PLANT & EXISTING SLRM CENTRE" AT NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)

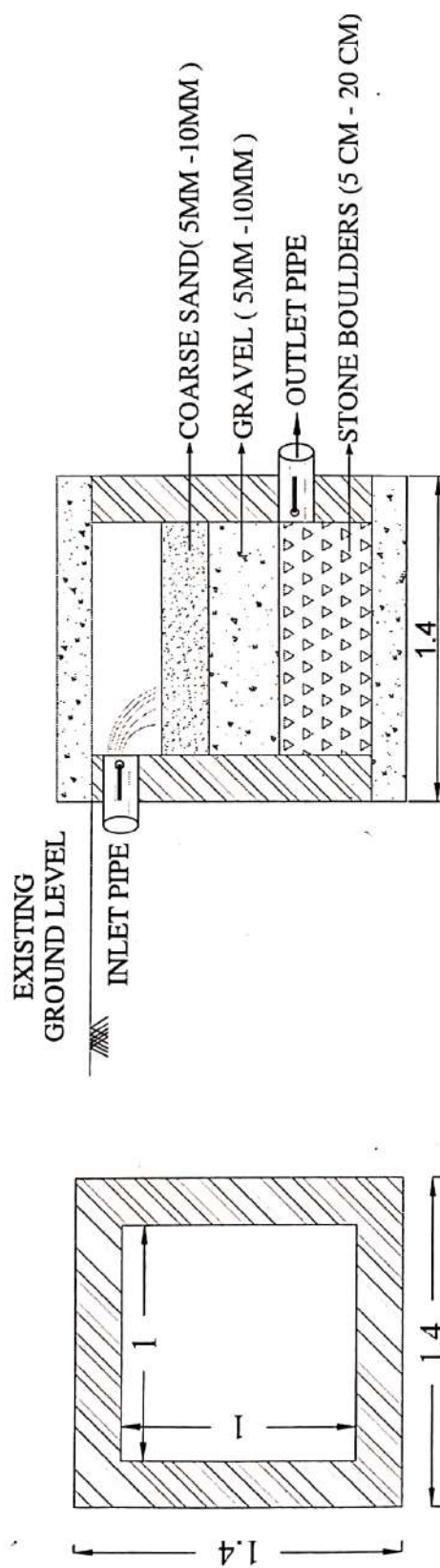
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SECTION OF RAIN WATER HARVESTING

PLAN OF RAIN WATER HARVESTING

"SITE PLAN OF PROPOSED WINDROW COMPOST PLANT
& EXISTING SLRM CENTRE "
& AT NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)

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NOTE ALL DIM. ARE IN M.	DWG PATH	CLIENT	NAGAR PANCHAYAT, BERLA (C.G.)	
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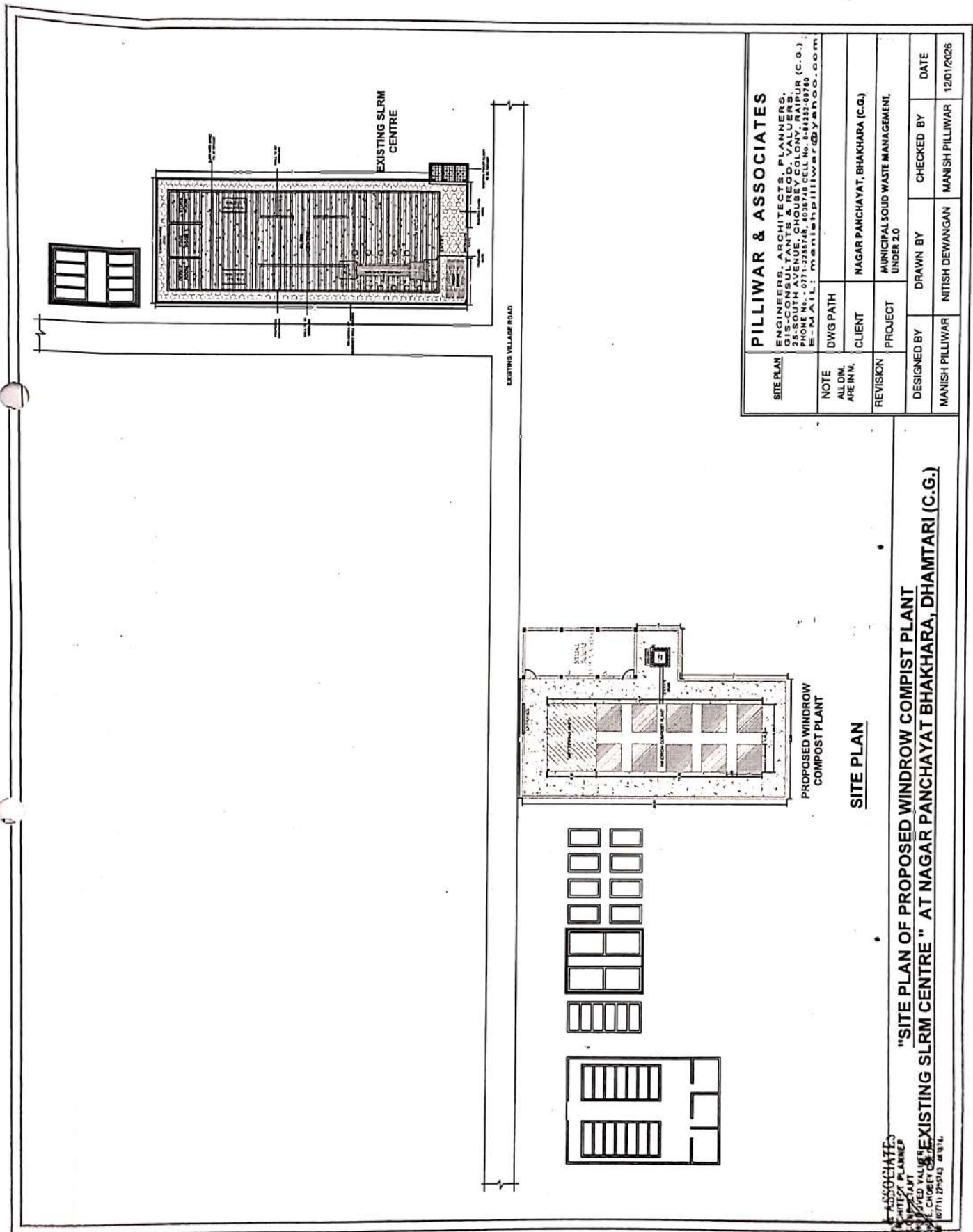
WINDROW COMPOST PLANT AT SWAMI VIVEKANAND, WARD NO - 02

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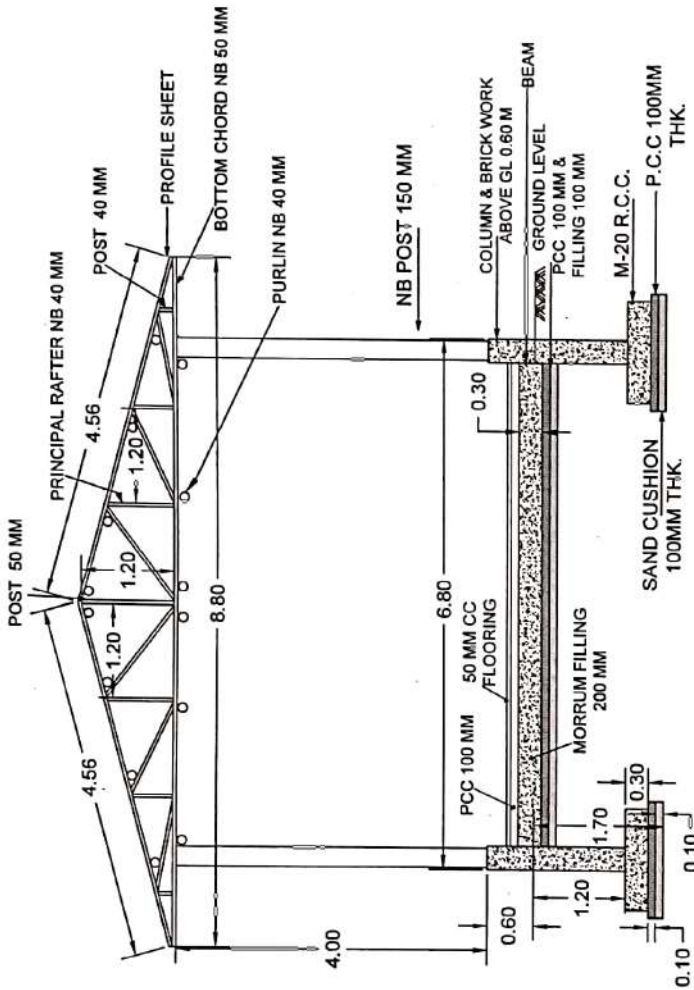
SITE PLAN	PILLIWAR & ASSOCIATES ENGINEERS, ARCHITECTS, PLANNERS, 25-SOUTH AVENUE, CHOUBEY COLONY, RAIPUR (C.G.) PHONE No. - 0771-2255748, 4038748 CELL No. 94252-99760 E-MAIL: manishpilliwar@yahoo.com		
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"SITE PLAN OF PROPOSED WINDROW COMPOST PLANT
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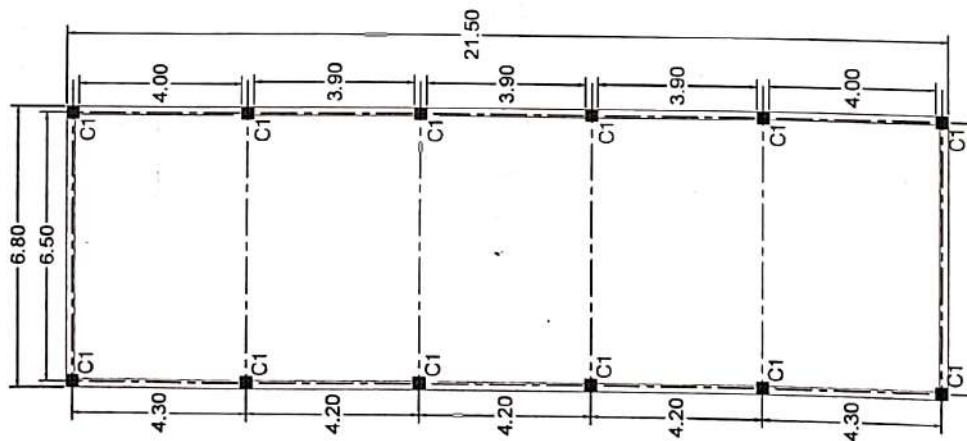
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COLUMN DETAILS					
COL. TYPE	COLUMN SECTION				
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UPTO PLINTH	ABOVE PLINTH				
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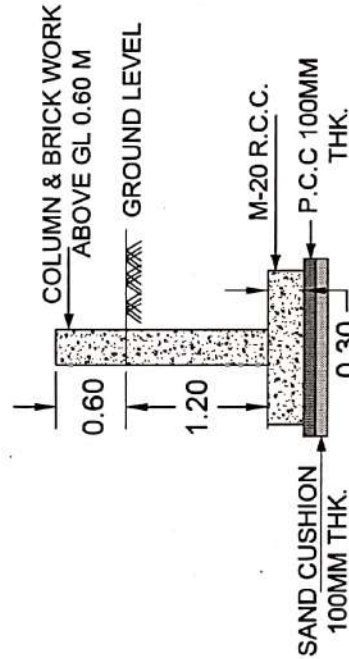
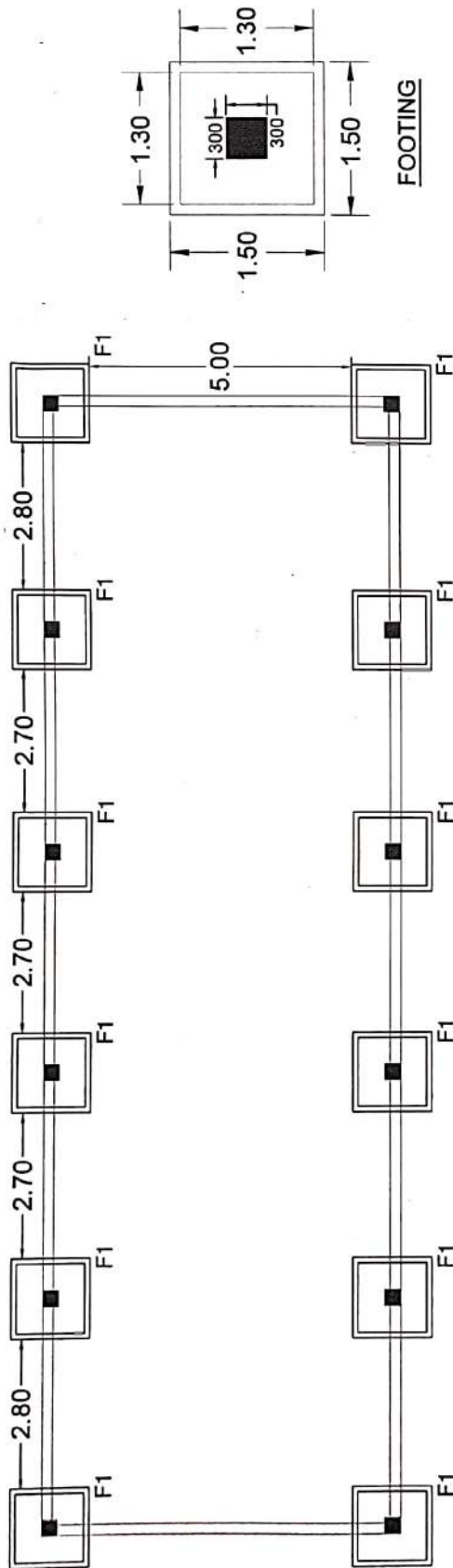
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**"SITE PLAN OF PROPOSED WINDROW COMPOST PLANT
AT EXISTING SLRM CENTRE" AT NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

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WINDROW COMPOST PLANT	NOTE	DWG PATH	CLIENT	NAGAR PANCHAYAT, BERLA (C.G.)
REVISION	REVISION	PROJECT	PROJECT	MUNICIPAL SOLID WASTE MANAGEMENT, UNDER 2.0
DESIGNED BY	DESIGNED BY	DRAWN BY	CHECKED BY	DATE
MANISH PILLIWAR	MANISH PILLIWAR	NTTISH DEWANGAN	MANISH PILLIWAR	13/02/2028



FOOTING DETAILS						
SN	FOOTING NO.	FOOTING DETAILS			REINFORCEMENT DETAILS	
		L	B	D	ALONG B	ALONG L
1	F1	1500	1500	1700	T12@150 C/C	T12@150 C/C

FOOTING DETAILS

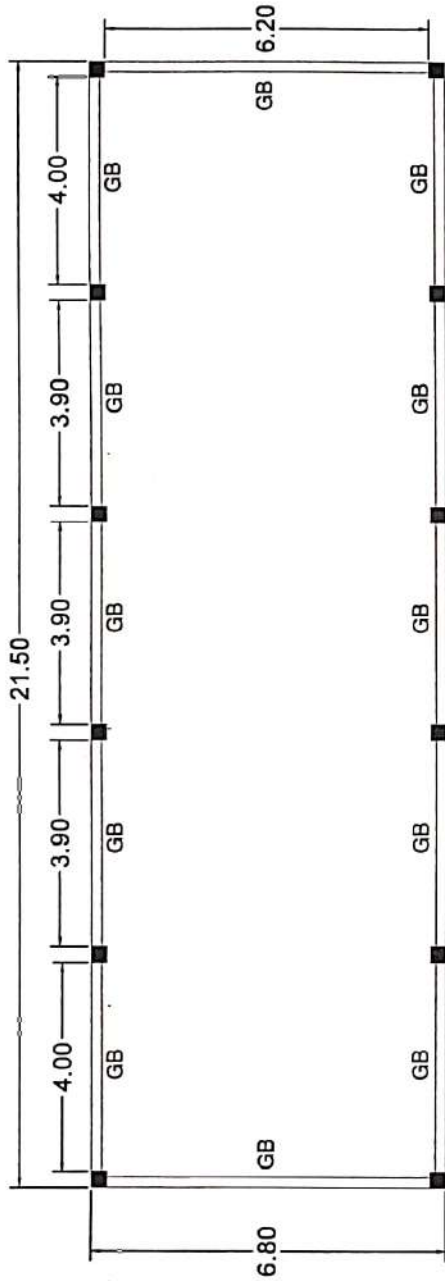
PILLIWAR & ASSOCIATES		ENGINEERS, ARCHITECTS, PLANNERS.	
WINDROW COMPOST PLANT		3/45, 1ST FLOOR, ANAND NAGAR, CHOLAR, COLOMBIA (C.G.)	
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ALOM		E-MAIL - pilliwar@yahoo.com	
AS IN		DWG PATH	
REVISION		CLIENT	
DESIGNED BY		PROJECT	
MANISH PILLIWAR		MUNICIPAL SOLID WASTE MANAGEMENT, UNDER 25	
DRAWN BY		CHECKED BY	
NTISH DEWANGAN		DATE	
13/02/2026			

"SITE PLAN OF PROPOSED WINDROW COMPOST PLANT
AT NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)"

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GROUND BEAM SCHEDULE (M20:Fe500) (TYPICAL GROUND BEAM DETAILS) SEE FIG.-2

BEAM NUMBERS	SIZE		BOTTOM REINFORCEMENT		TOP REINFORCEMENT	SHEAR STIRRUPS		
	B	D	BOTTOM R/F (THRU.)	BOTTOM R/F EXTRA AT MID SPAN	TOP R/F (THRU.)	TOP EXTRA R/F AT LEFT SUPPORT	TOP EXTRA R/F AT RIGHT SUPPORT	RIGHT
GB	200	300	2-T12	1-T12	2-T12	1-T12	1-T12	2L-T8@150
								2L-T8@150

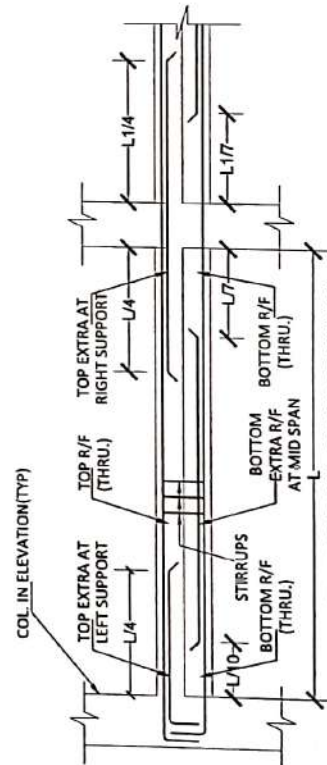


FIG. 2: TYPICAL DETAIL OF BEAM

BELOW GROUND BEAM DETAILS

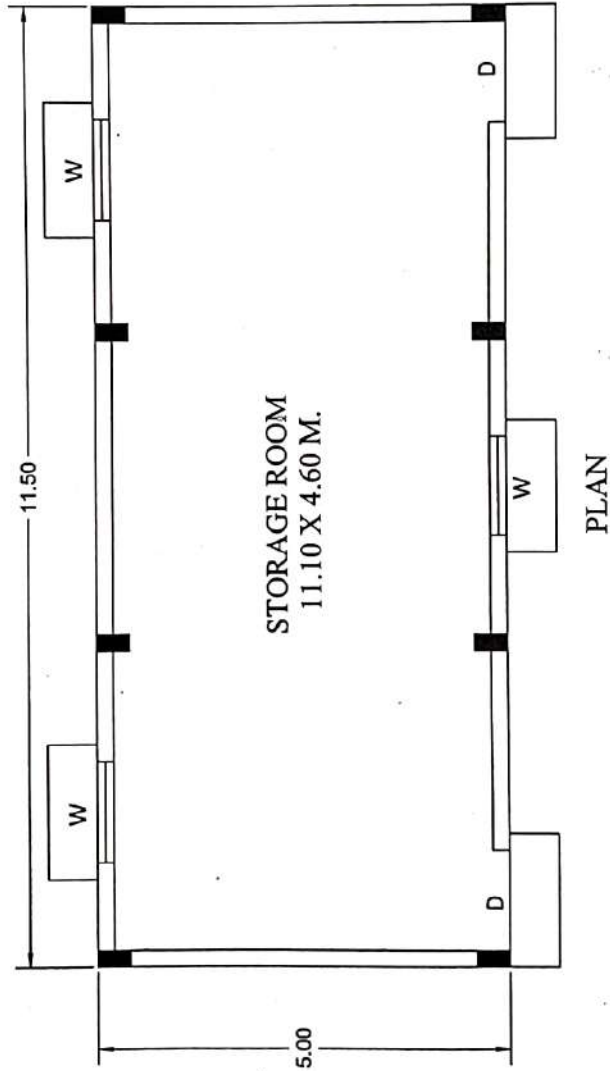
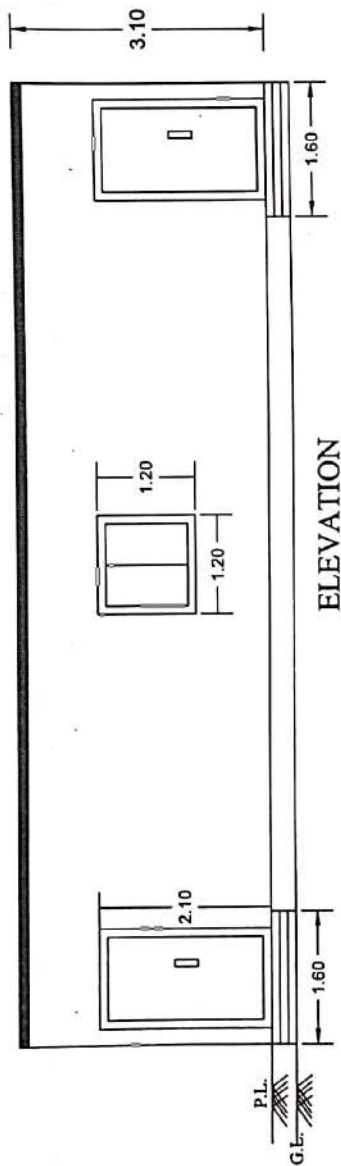
WINDROW COMPOST		PILLIWAR & ASSOCIATES	
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NOTE: ALL DIM. ARE IN M.		CLIENT	
REVISION		PROJECT	
DESIGNED BY		DRAWN BY	
MANISH PILLIWAR		NITISH DEWAN	
CHECKED BY		DATE	
MANISH PILLIWAR		13/02/2018	

"SITE PLAN OF PROPOSED WINDROW COMPOST PLANT" AT NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)

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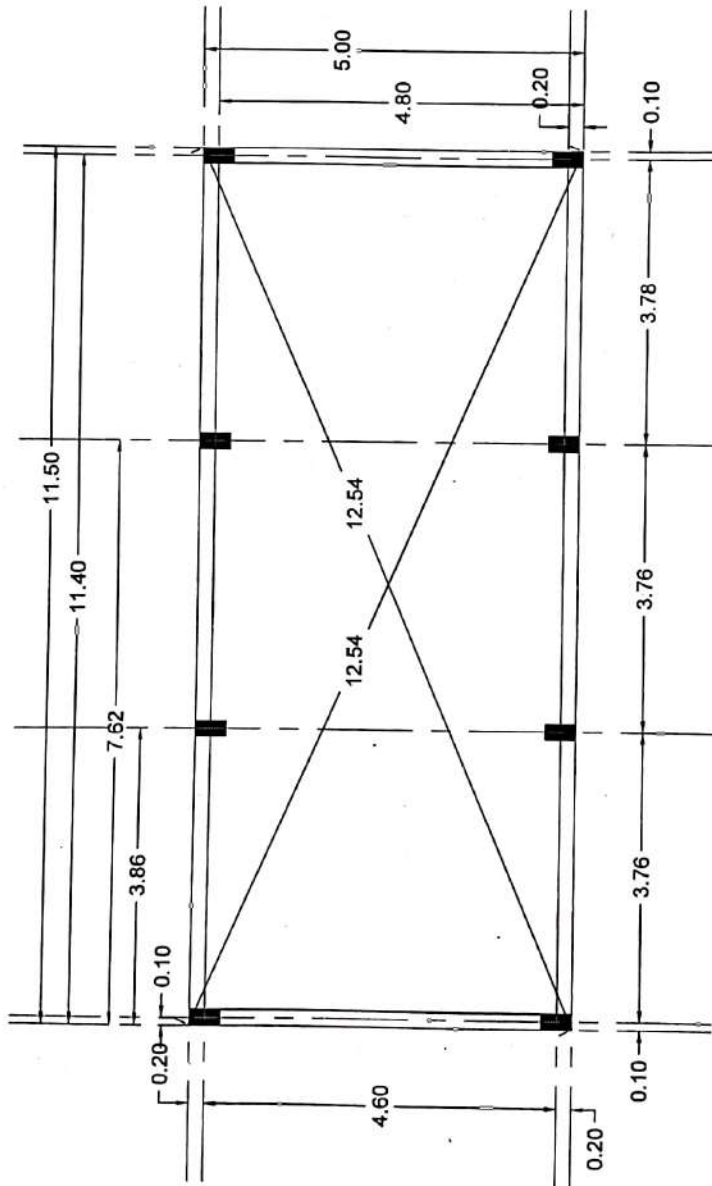
STORAGE ROOM	PILLIWAR & ASSOCIATES			
NOTE	ENGINEERS, ARCHITECTS, PLANNERS, DESIGNERS, INTERIORS, LANDSCAPERS, 3D/4D VIRTUAL REALITY, CHAIRMAN COLONY, RAIPUR (C.G.) PHONE No. - 0771-335748, 4038744 CELL No. 964282-28760 E-MAIL: manishpiliwar@yahoo.com			
ALL DIM. ARE IN M.	DWG PATH	CLIENT	NAGAR PANCHAYAT, BERLA (C.G.)	
REVISION	PROJECT	PROJECT	MUNICIPAL SOLID WASTE MANAGEMENT, UNDER 2.0	
DESIGNED BY	DRAWN BY	CHECKED BY	DATE	
MANISH PILLIWAR	NTTISH DEWANGAN	MANISH PILLIWAR	13.02.2025	

**"SITE PLAN OF PROPOSED WINDROW COMPOST PLANT
EXISTING SLRM CENTRE" AT NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

PILLIWAR & ASSOCIATES
ENGINEERS, ARCHITECTS, PLANNERS,
DESIGNERS, INTERIORS, LANDSCAPERS,
3D/4D VIRTUAL REALITY, CHAIRMAN COLONY, RAIPUR (C.G.)
PHONE No. - 0771-335748, 4038744 CELL No. 964282-28760
E-MAIL: manishpiliwar@yahoo.com

उप निदेशिका
नगर पंचायत भक्करा-भठेली
जिला - राय (C.G.)

मुख्य नगर पालिका अधिकारी
नगर पंचायत भक्करा



CENTRE LINE PLAN

उप निदेश
नगर पंचायत भखारा-भठेली
जिला - धमतरी (छ.ग.)

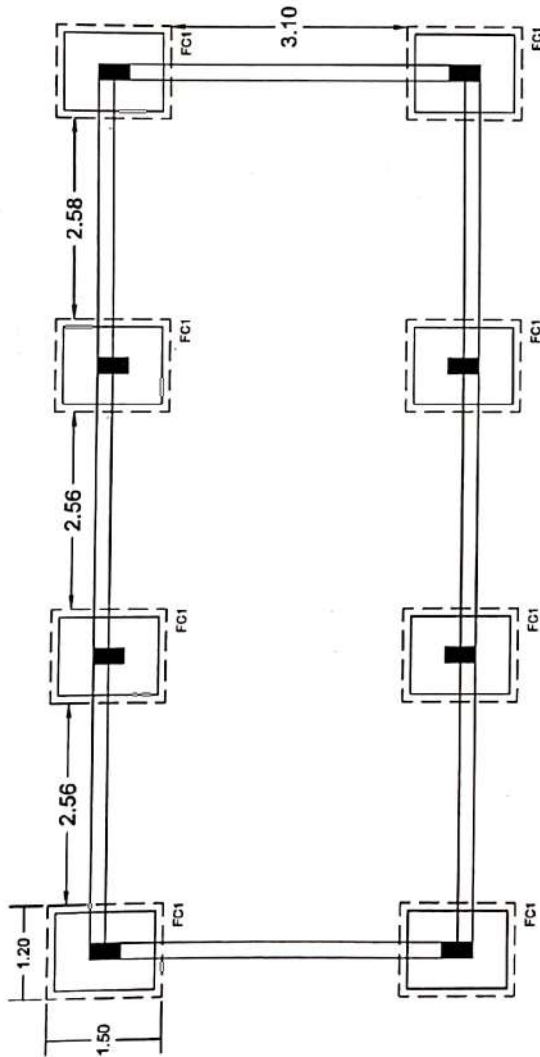
मुख्य नगर पालिका अधिकारी
नगर पंचायत भखारा

UP TO GROUND FLOOR	M20 : F6500
LINKS	16@150c/c
	400 50MM 200+
	6-112
COLUMN SIZE	200X400
COLUMN MARKED	C1

STORAGE ROOM	PILLIWAR & ASSOCIATES ENGINEERS, ARCHITECTS, PLANNERS, GIS CONSULTANTS & R&D EXPERTS 25 SOUTH AVENUE, CHOURVY COLONY, RAIPUR (C.G.) PHONE NO. 97711235745, 4038744 CELL NO. 946152-38745 E-MAIL: manishpilliwad@gmail.com		
NOTE	DWG PATH		
ALL DIM. ARE IN M.	CLIENT	NAGAR PANCHAYAT, BERLA (C.G.)	
REVISION	PROJECT	MUNICIPAL SOLID WASTE MANAGEMENT, UNDER 2.0	
DESIGNED BY	DRAWN BY	CHECKED BY	DATE
MANISH PILLIWAR	INITISH DEWANGAN	MANISH PILLIWAR	13/02/2026

"SITE PLAN OF PROPOSED WINDROW COMPOST PLANT
EXISTING SLRM CENTRE " AT NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)

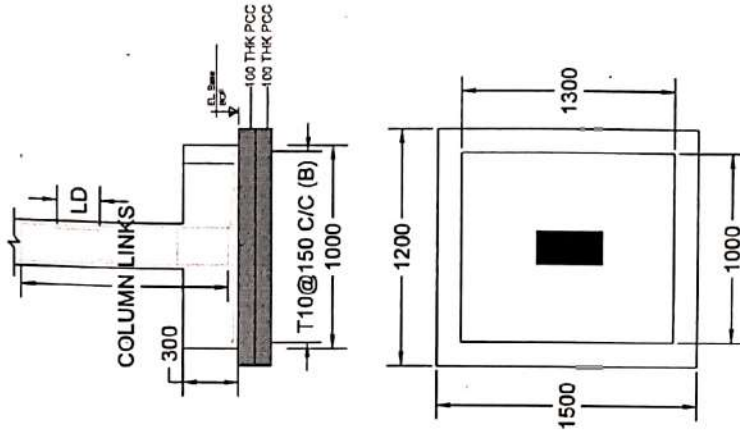
PILLIWAR & ASSOCIATES
ENGINEERS, ARCHITECTS, PLANNERS,
GIS CONSULTANTS
& R&D EXPERTS
25 SOUTH AVENUE, CHOURVY COLONY,
RAIPUR (C.G.) PHONE NO. 97711235745, 4038744
CELL NO. 946152-38745



FOOTING DETAILS

FOOTING SCHEDULE (M20:Fe500)

FOOTING NUMBERS	EXCAVATION SIZE				FOOTING DIMENSION				FOOTING REINFORCEMENT			
	L		B		D/H		L		BOTTOM		TOP	
	1.20	1.50	1.50	1.50	1.50	1.50	1.00	1.30	300	T10@150 C/C	ALONG L	ALONG B
FC1	1.20	1.50	1.50	1.50	1.50	1.50	1.00	1.30	300	T10@150 C/C	ALONG L	ALONG B



COLUMN FOOTING SECTION 1-1

DETAIL OF FOOTING FC1

"SITE PLAN OF PROPOSED WINDROW COMPOST PLANT & EXISTING SLRM CENTRE " AT NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)

PILLIWAR & ASSOCIATES
ENGINEERS, ARCHITECTS, PLANNERS,
GIS CONSULTANTS & PHOTOGRAMMETRISTS
25-SOUTH AVENUE, CHOURBAY COLONY, RAIPUR (C.G.)
PHONE NO.: 0771-2353748, 4038748 CELL NO. 94232-08780
E-MAIL: manishpilliwara@yahoo.co.in

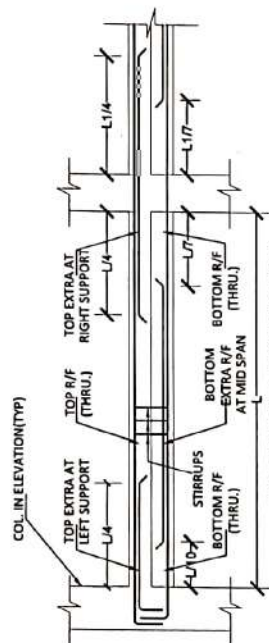
PILLIWAR & ASSOCIATES

ENGINEERS, ARCHITECTS, PLANNERS,
GIS CONSULTANTS & PHOTOGRAMMETRISTS
25-SOUTH AVENUE, CHOURBAY COLONY, RAIPUR (C.G.)
PHONE NO.: 0771-2353748, 4038748 CELL NO. 94232-08780
E-MAIL: manishpilliwara@yahoo.co.in

STORAGE ROOM	NOTE	DWG PATH	CLIENT	NAGAR PANCHAYAT, BERLA (C.G.)
ALL DIM. ARE IN M.	REVISION	PROJECT	MUNICIPAL SOLID WASTE MANAGEMENT, UNDER 2.0	DESIGNED BY
MANISH PILLIWAR	DRAWN BY	CHECKED BY	DATE	13/02/2023

उप निरीक्षक
नगर पंचायत भखारा-भठेली
जिला - धमतरी (उ.प्र.)

मुख्य नगर पालिका अधिकारी
नगर पंचायत भखारा



BEAM SCHEDULE (M20:Fe500) (TYPICAL GROUND BEAM DETAILS) SEE FIG.-2

BEAM NUMBERS	SIZE		BOTTOM REINFORCEMENT		TOP REINFORCEMENT			SHEAR STIRRUPS		
	B	D	BOTTOM R/F (THRU.)	BOTTOM R/F EXTRA AT MID SPAN	TOP R/F (THRU.)	TOP EXTRA R/F AT LEFT SUPPORT	TOP EXTRA R/F AT RIGHT SUPPORT	LEFT	MID SPAN	RIGHT
GB	200	300	2-T12	1-T12	2-T12	1-T12	1-T12	2L-T8@150	2L-T8@150	2L-T8@150

GROUND BEAM DETAILS

**"SITE PLAN OF PROPOSED WINDROW COMPIST PLANT
& EXISTING SLRM CENTRE "
& AT NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.**

PILLIWAR & ASSOCIATES:
ENGINEERS, ARCHITECTS, PLANNERS,
GIS-CONSULTANTS & GEO-VALUERS
218-SOUTH AVENUE, CHICURE COLONY, RAIPUR (C.G.)
PHONE No. : 8771-2233748, 4026748 CELL No. 944233-98760
E-MAIL: manishpillerwar@yahoo.com

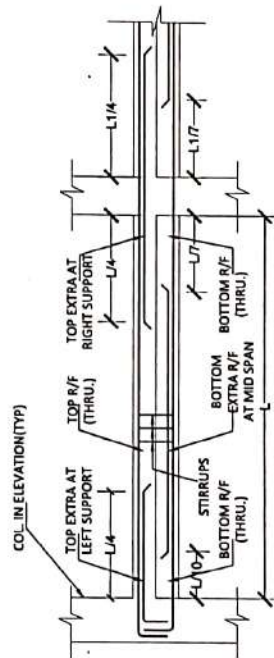
NOTE	DWG PATH	
ALL DIMENSIONS IN MM	CLIENT	NAGAR PANCHAYAT, BERLA (C.G.)
REVISION	PROJECT	MUNICIPAL SOLID WASTE MANAGEMENT, PHASE - 2

DESIGNED BY	DRAWN BY	CHECKED BY	DATE
MANISH PILLIWAR	MITISH DEWANGAN	MANISH PILLIWAR	13/02/2026

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नगर पंचायत भखारा-भठेली
जिला -धमतरी(छ.ग.)

मुख्य नगर पालिका अधिकारी
नगर पंचायत भवारा

PILLIWAR & ASSOCIATES
ENGINEER, ARCHITECT, PLANNER
GIS CONSULTANT
& GOVT. APPROVED VALUER
23, SOUTH AVENUE, CHIDREY COLONY,
BANGALORE 560 016. TEL: 08711 7275742 4478741



BEAM SCHEDULE (M20:Fe500) (TYPICAL LINTEL BEAM DETAILS) SEE FIG.-2

LINTEL BEAM DETAILS

STORAGE DOORS	PILLIWAR & ASSOCIATES ENGINEERS, ARCHITECTS, PLANNERS, 28-ROBIN AVENUE, CHOURSEY COLONY, RAIPUR (C.G.) PHONE NO.- 8771-233742, 4838745 CELL NO. 844232-84748 E-MAIL: MANISH@PILLIWAR.COM			
NOTE ALL DIM. ARE IN M.	DWG PATH	CLIENT	NAGAR PANCHAYAT, BERLA (C.G.) MUNICIPAL LIQUID WASTE MANAGEMENT, UNDER 2.0	
REVISION	PROJECT	DRAWN BY	CHECKED BY	DATE
		NTISH DEWANGAN	MANISH PILLIWAR	13/02/2028
MANISH PILLIWAR				

**"SITE PLAN OF PROPOSED WINDROW COMPOST PLANT
& EXISTING SLRM CENTRE "
AT NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)**

PILLHAP & ASSOCIATES
ENGINEER, ARCHITECT, PLANNER
205-4-0000
8 GOVT. ASSOCIATED VALUER
221 SOUTH AVENUE, CHERRY COUNTRY
KANSAS CITY, MO. 64111 725-5121

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नगर पंचायत भवन-भठेली
जिला-धनगढ(छ.प्र.)

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नगर पंचायत भवारा

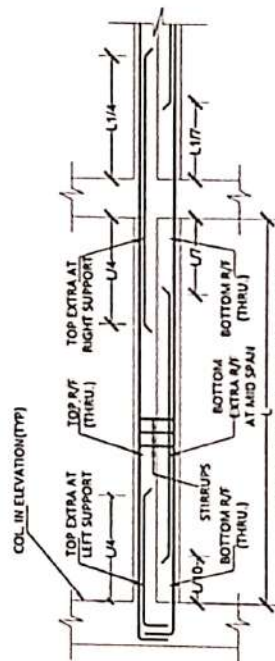
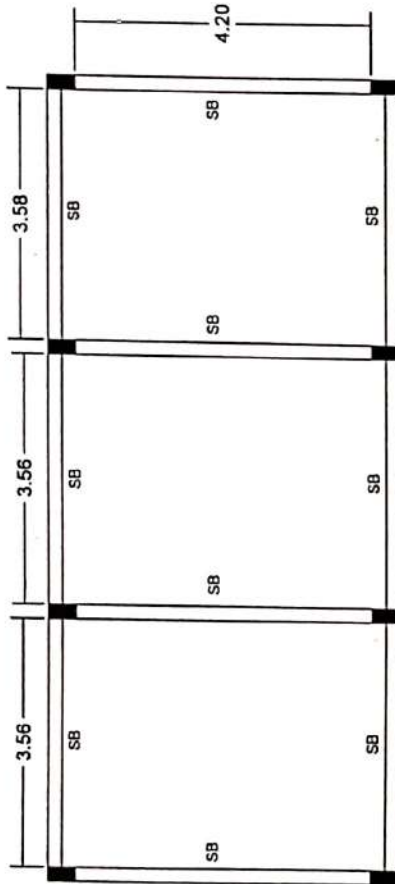


FIG. 2: TYPICAL DETAIL OF BEAM

BEAM SCHEDULE (M20/F6500) (TYPICAL SLAB BEAM DETAILS) SEE FIG.-2

BEAM NUMBERS	SIZE		BOTTOM REINFORCEMENT			TOP REINFORCEMENT			SHEAR STIRRUPS		
	B	D	BOTTOM R/F (THRU)	BOTTOM R/F EXTRA AT MID SPAN	TOP R/F (THRU)	TOP EXTRA R/F AT LEFT SUPPORT	TOP EXTRA R/F AT RIGHT SUPPORT		LEFT	MID SPAN	RIGHT
SB	0.20	0.40	2-T16	1-T16	2-T16	1-T12	2-T12		2L-T8@150	2L-T8@150	2L-T8@150

SLAB BEAM DETAILS

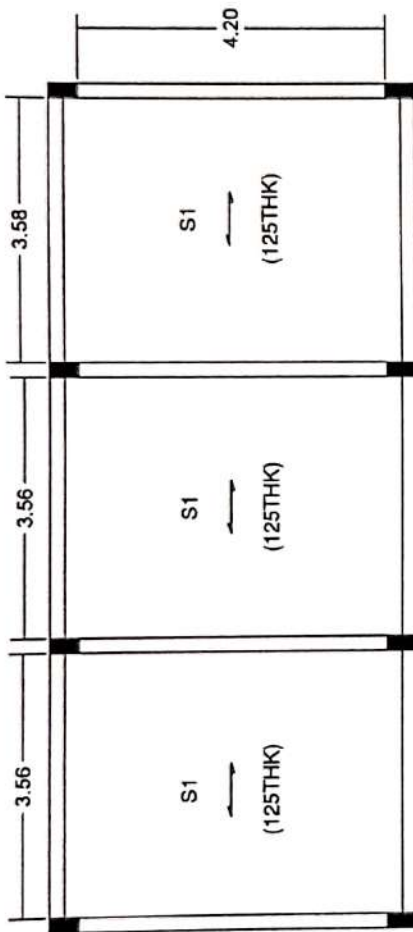
"SITE PLAN OF PROPOSED WINDROW COMPOST PLANT
& EXISTING SLRM CENTRE"
& AT NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)

PILLIWAR & ASSOCIATES
ENGINEERS, ARCHITECTS, PLANNERS
& GOVT. APPROVED VALUER
22, SOUTH AVENUE, CHOURSEY COLONY, RAIPUR (C.G.)
RAIPUR (C.G.) PIN-492008

STORAGE ROOM	PILLIWAR & ASSOCIATES ENGINEERS, ARCHITECTS, PLANNERS & GOVT. APPROVED VALUER 22, SOUTH AVENUE, CHOURSEY COLONY, RAIPUR (C.G.) RAIPUR (C.G.) PIN-492008									
NOTE	DND PATH									
REVISION	CLIENT									
DESIGNED BY	PROJECT									
MANISH PILLIWAR	DRAWN BY									
	CHECKED BY									
	DATE									

उपस्थिता
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जिला - धमतरी (छ.ग.)

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नगर पंचायत भखारा



NOTE : (1) IN SLABS, BENT UP BARS (OR EXTRA TOP BARS) SHALL BE EXTENDED UP TO 0.3L IN ADJACENT SPAN OVER CONTINUOUS SUPPORT.
 (2) AT MID-SPAN LOCATIONS, BARS NEAR THE BOTTOM FACE SHOULD BE PLACED SUCH THAT THE BARS ALONG SHORT SPAN ARE BELOW THE BARS ALONG LONG SPAN.
 (3) AT BEAM SUPPORT LOCATIONS, BARS NEAR THE TOP FACE SHOULD BE PLACED SUCH THAT THE BARS ALONG SHORT SPAN ARE ABOVE THE BARS ALONG LONG SPAN.
 (4) PROVIDE TORSION REINFORCEMENT, AS PER IS:456:2000.
 (5) GRADE OF CONCRETE : M20, GRADE OF STEEL : Fe500.

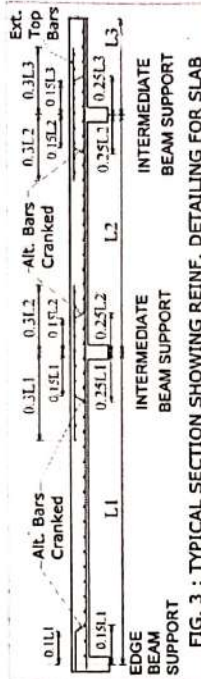


FIG. 3 : TYPICAL SECTION SHOWING REINF. DETAILING FOR SLAB

DETAILS OF TERRACE FLOOR SLAB REINFORCEMENT
 (SEE PG-3 FOR POSITIONING AND DETAILING OF SLAB REINFORCEMENT)

NAME OF SLAB	DEPTH OF SLAB IN mm	REINFORCEMENT ALONG SHORT DIRECTION		REINFORCEMENT ALONG LONG DIRECTION		DISTRIBUTION REINFORCEMENT	SLAB TYPE
		AT MID SPAN NEAR BOTTOM FACE	OVER BEAM SUPPORT NEAR TOP FACE	AT MID SPAN NEAR BOTTOM FACE	OVER BEAM SUPPORT NEAR TOP FACE		
S1	125mm	10mm # @ 150mm C/C	10mm # @ 150mm C/C	-	-	8 mm # @ 150mm C/C	1-WAY

SLAB DETAILS

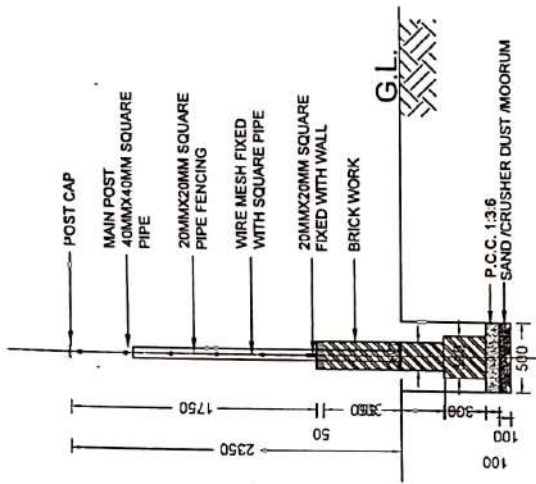
PILLIWAR & ASSOCIATES ENGINEERS, ARCHITECTS, PLANNERS, GIS-CONSULTANTS & REGD. VALUERS, 25-SOUTH AVENUE, CHOREY COLONY, KUPUR (C.G.) E-MAIL: manishpilliwari@yahoo.com	STORAGE ROOM	PILLIWAR & ASSOCIATES	
	NOTE	DWG PATH	CLIENT
	ALDIA	ALL IN A	NAGAR PANCHAYAT, NEELA (C.G.)
	REVISION	PROJECT	PROJECT
	DESIGNED BY	DRAWN BY	CHECKED BY
	MANISH PILLIWAR	NTTISH DEWANGAN	MANISH PILLIWAR
			DATE
			13/02/2025

"SITE PLAN OF PROPOSED WINDROW COMPOST PLANT
 & EXISTING SLRM CENTRE"
 AT NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)

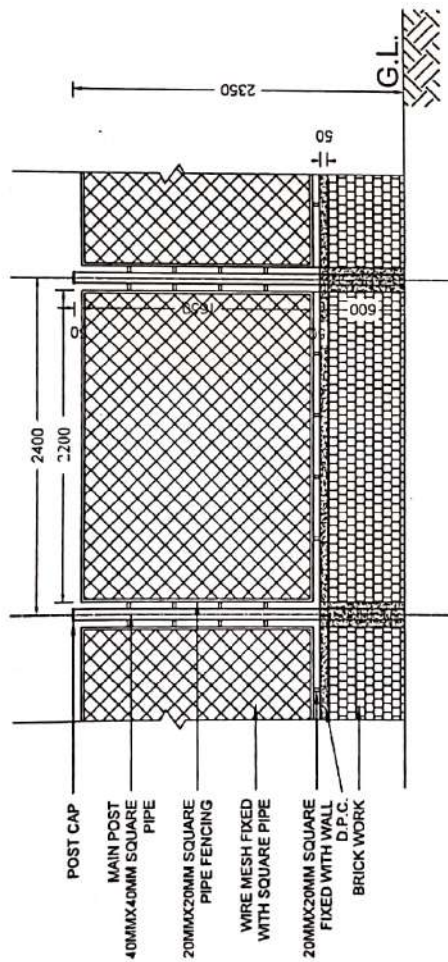
PILLIWAR & ASSOCIATES
 ENGINEER, ARCHITECT, PLANNER
 & GOVT. APPROVED VALUER
 25, SOUTH AVENUE, CHOREY COLONY,
 KUPUR (C.G.) E-MAIL: manishpilliwari@yahoo.com

उप निदेशिका
 नगर पंचायत भक्कल-भठेली
 जिला - धमतरी (उ.प्र.)

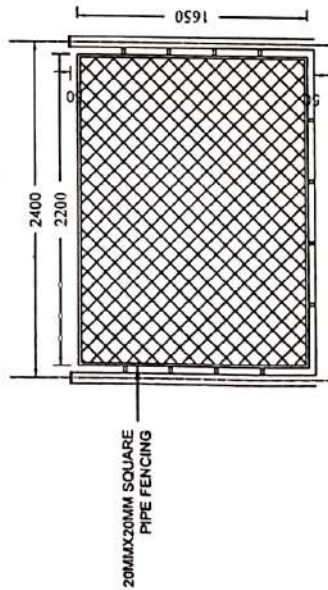
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 नगर पंचायत भक्कल



CROSS SECTION OF CHAIN LINK FENCING



TYPICAL ELEVATION OF FENCING



TYPICAL PLAN OF FENCING

BOUNDARY FENCING

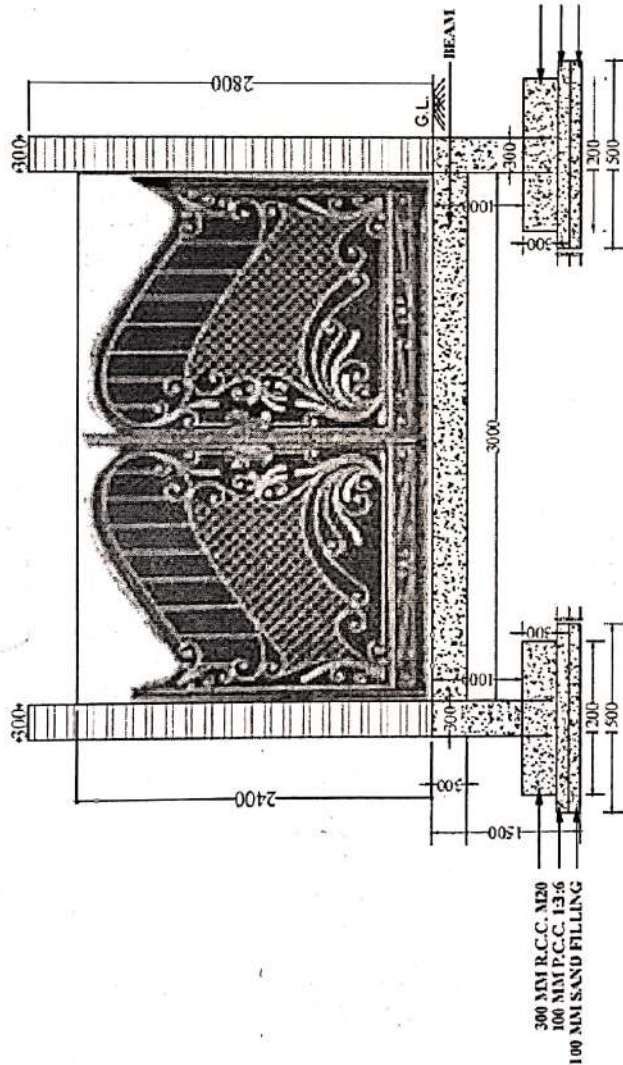
BOUNDARY FENCING	PILLIWAR & ASSOCIATES ENGINEERS, ARCHITECTS, PLANNERS, DESIGNERS, SURVEYORS, 3/15, GOVT. INDUSTRIAL COLONY, COLOSAR (C.G.) PHONE NO. - 0771-225718, 1038748 CELL NO. 994232-09760 E-MAIL: manishpilliwara@yahoo.com			
	NOTE ALL DIM. ARE IN M.	DWG PATH	CLIENT NAGAR PANCHAYAT, NAGRI (C.G.)	
	REVISION	PROJECT	MUNICIPAL SOLID WASTE MANAGEMENT, UNDER 20	
DESIGNED BY	DRAWN BY	CHECKED BY	DATE	
MANISH PILLIWAR	INITISH DEWANGAN	MANISH PILLIWAR	13/02/2026	

"SITE PLAN OF PROPOSED WINDROW COMPOST PLANT & EXISTING SLRM CENTRE" AT NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)

PILLIWAR & ASSOCIATES
ENGINEERS, ARCHITECTS, PLANNERS,
DESIGNERS, SURVEYORS,
3/15, GOVT. INDUSTRIAL COLONY,
COLOSAR (C.G.)
PHONE NO. - 0771-225718, 1038748
CELL NO. 994232-09760
E-MAIL: manishpilliwara@yahoo.com

उप निदेशिका
नगर पंचायत भवना - भवने ली
जिला - चमतरा (उ.प्र.)

मुख्य नगर पंचायत भवना
नगर पंचायत भवना



FOUNDATION DRAWING

ELEVATION

ENTRANCE GATE

DATE	PILLIWAR & ASSOCIATES ENGINEERS, ARCHITECTS, PLANNERS, QIS-CONSULTANTS & REGD. VALUERS. 10/1, 10/2, 10/3, 10/4, 10/5, 10/6, 10/7, 10/8, 10/9, 10/10, 10/11, 10/12, 10/13, 10/14, 10/15, 10/16, 10/17, 10/18, 10/19, 10/20, 10/21, 10/22, 10/23, 10/24, 10/25, 10/26, 10/27, 10/28, 10/29, 10/30, 10/31, 10/32, 10/33, 10/34, 10/35, 10/36, 10/37, 10/38, 10/39, 10/40, 10/41, 10/42, 10/43, 10/44, 10/45, 10/46, 10/47, 10/48, 10/49, 10/50, 10/51, 10/52, 10/53, 10/54, 10/55, 10/56, 10/57, 10/58, 10/59, 10/60, 10/61, 10/62, 10/63, 10/64, 10/65, 10/66, 10/67, 10/68, 10/69, 10/70, 10/71, 10/72, 10/73, 10/74, 10/75, 10/76, 10/77, 10/78, 10/79, 10/80, 10/81, 10/82, 10/83, 10/84, 10/85, 10/86, 10/87, 10/88, 10/89, 10/90, 10/91, 10/92, 10/93, 10/94, 10/95, 10/96, 10/97, 10/98, 10/99, 10/100, 10/101, 10/102, 10/103, 10/104, 10/105, 10/106, 10/107, 10/108, 10/109, 10/110, 10/111, 10/112, 10/113, 10/114, 10/115, 10/116, 10/117, 10/118, 10/119, 10/120, 10/121, 10/122, 10/123, 10/124, 10/125, 10/126, 10/127, 10/128, 10/129, 10/130, 10/131, 10/132, 10/133, 10/134, 10/135, 10/136, 10/137, 10/138, 10/139, 10/140, 10/141, 10/142, 10/143, 10/144, 10/145, 10/146, 10/147, 10/148, 10/149, 10/150, 10/151, 10/152, 10/153, 10/154, 10/155, 10/156, 10/157, 10/158, 10/159, 10/160, 10/161, 10/162, 10/163, 10/164, 10/165, 10/166, 10/167, 10/168, 10/169, 10/170, 10/171, 10/172, 10/173, 10/174, 10/175, 10/176, 10/177, 10/178, 10/179, 10/180, 10/181, 10/182, 10/183, 10/184, 10/185, 10/186, 10/187, 10/188, 10/189, 10/190, 10/191, 10/192, 10/193, 10/194, 10/195, 10/196, 10/197, 10/198, 10/199, 10/200, 10/201, 10/202, 10/203, 10/204, 10/205, 10/206, 10/207, 10/208, 10/209, 10/210, 10/211, 10/212, 10/213, 10/214, 10/215, 10/216, 10/217, 10/218, 10/219, 10/220, 10/221, 10/222, 10/223, 10/224, 10/225, 10/226, 10/227, 10/228, 10/229, 10/230, 10/231, 10/232, 10/233, 10/234, 10/235, 10/236, 10/237, 10/238, 10/239, 10/240, 10/241, 10/242, 10/243, 10/244, 10/245, 10/246, 10/247, 10/248, 10/249, 10/250, 10/251, 10/252, 10/253, 10/254, 10/255, 10/256, 10/257, 10/258, 10/259, 10/260, 10/261, 10/262, 10/263, 10/264, 10/265, 10/266, 10/267, 10/268, 10/269, 10/270, 10/271, 10/272, 10/273, 10/274, 10/275, 10/276, 10/277, 10/278, 10/279, 10/280, 10/281, 10/282, 10/283, 10/284, 10/285, 10/286, 10/287, 10/288, 10/289, 10/290, 10/291, 10/292, 10/293, 10/294, 10/295, 10/296, 10/297, 10/298, 10/299, 10/300, 10/301, 10/302, 10/303, 10/304, 10/305, 10/306, 10/307, 10/308, 10/309, 10/310, 10/311, 10/312, 10/313, 10/314, 10/315, 10/316, 10/317, 10/318, 10/319, 10/320, 10/321, 10/322, 10/323, 10/324, 10/325, 10/326, 10/327, 10/328, 10/329, 10/330, 10/331, 10/332, 10/333, 10/334, 10/335, 10/336, 10/337, 10/338, 10/339, 10/340, 10/341, 10/342, 10/343, 10/344, 10/345, 10/346, 10/347, 10/348, 10/349, 10/350, 10/351, 10/352, 10/353, 10/354, 10/355, 10/356, 10/357, 10/358, 10/359, 10/360, 10/361, 10/362, 10/363, 10/364, 10/365, 10/366, 10/367, 10/368, 10/369, 10/370, 10/371, 10/372, 10/373, 10/374, 10/375, 10/376, 10/377, 10/378, 10/379, 10/380, 10/381, 10/382, 10/383, 10/384, 10/385, 10/386, 10/387, 10/388, 10/389, 10/390, 10/391, 10/392, 10/393, 10/394, 10/395, 10/396, 10/397, 10/398, 10/399, 10/400, 10/401, 10/402, 10/403, 10/404, 10/405, 10/406, 10/407, 10/408, 10/409, 10/410, 10/411, 10/412, 10/413, 10/414, 10/415, 10/416, 10/417, 10/418, 10/419, 10/420, 10/421, 10/422, 10/423, 10/424, 10/425, 10/426, 10/427, 10/428, 10/429, 10/430, 10/431, 10/432, 10/433, 10/434, 10/435, 10/436, 10/437, 10/438, 10/439, 10/440, 10/441, 10/442, 10/443, 10/444, 10/445, 10/446, 10/447, 10/448, 10/449, 10/450, 10/451, 10/452, 10/453, 10/454, 10/455, 10/456, 10/457, 10/458, 10/459, 10/460, 10/461, 10/462, 10/463, 10/464, 10/465, 10/466, 10/467, 10/468, 10/469, 10/470, 10/471, 10/472, 10/473, 10/474, 10/475, 10/476, 10/477, 10/478, 10/479, 10/480, 10/481, 10/482, 10/483, 10/484, 10/485, 10/486, 10/487, 10/488, 10/489, 10/490, 10/491, 10/492, 10/493, 10/494, 10/495, 10/496, 10/497, 10/498, 10/499, 10/500, 10/501, 10/502, 10/503, 10/504, 10/505, 10/506, 10/507, 10/508, 10/509, 10/510, 10/511, 10/512, 10/513, 10/514, 10/515, 10/516,			
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"SITE PLAN OF PROPOSED WINDROW COMPOST PLANT
AT NAGAR PANCHAYAT BHAKHARA, DHAMTARI (C.G.)

PILLIWAR & ASSOCIATES
ENGINEERS & ARCHITECTS

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English
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