LOCAL GOVERNMENT & COMMUNITY DEVELOPMENT DEPARTMENT

PC - I

for

Provision of Machienry & Equipment For Improvement of Solid Waste Management in Daska City.

ESTIMATED COST: **192.308 MILLION**

UNIT DASKA (DISTRICT COUNCIL SIALKOT)

PC-I FORM
for
Provision of Machinery & Equipment for improvement of Solid Waste Management in Daska City

Project Serial Number

Sector :Local Government &Community Development Department
Sub Sector: Social

1. Name of the project	**Provision of Machinery & Equipment for improvement of Solid Waste Management in Daska City under Punjab Cities Program**
2. Location	**Location** Daskais located Daska is located in the north-west of Sialkot. It is linked with the district headquarters by two metallic roads passing through Ghunike and Sambrial. It is located at an equidistance of 24 Km from the surrounding towns of Gujranwala, Sialkot, Pasrur and Sambrial. The city is about 125 km (78 mi) north-west of Lahore.It's bearings are32.338779 74.353065. It is connected with entire province through road links. Recently, it has been connected with M-11 Lahore-Sialkot Motorway through Jam Key Cheema Interchange. Location map and city description has been given in **Annexure-A**
3. Authorities responsible for:	
i- Sponsoring	World Bank funding through loan for Punjab Cities Program administered by PMDFC.
ii- Execution	Unit Daska (Defunct MC Daska) , District Council Sialkot under the oversight of PMDFC
iii- Operation and Maintenance	Unit Daska (Defunct MC Daska), District Council Sialkot
iv-Concerned Provincial Department	Punjab Local Government and Community Development Department
4a.Plan Provision	
i. If the project is included in medium term/five year plan, specify actual allocation	The Technical Assistance (TA) Component of the Punjab Cities Program (PCP)has been funded in ADP 2020-21at Serial No-1922 with an allocation of Rs180 million. The subproject under this PC-I is one of the projects being planned and executed under Punjab Cities program.
ii- If not included in the current plan, what warrants its inclusion and how it is now proposed to be accommodated	PCP is a World Bank funded Program and as per policy of Government of Punjab, Foreign Funded Programs /projects are not reflected in the ADP. However, as indicated above, the Technical Assistance (TA) Component of PCP has been reflected in ADP 2020-21 at Serial No 1922 with an allocation of Rs 180 million and the sub project under this PC-I is one of the subprojects being implemented under PCP.
iii- If the project is proposed to be financed out of block provisionindicate.	No; the Program is not funded under the Block Allocation.

4 Provision in the current year PSDP/ADP	Rs. 180million have been allocated under ADP 2020-21at Sr. No-1922 under the caption of Technical Assistance (TA) Component for Punjab Cities Program.
5. Project objectives and its relationship with sector objectives	**Sector Objectives** The sector objectives included in the Annual Development Program 2020-21 as ***Strategic Intervention (2020-21)***are given below: 1) Construction of wastewater treatment plant at Sahiwal and Sialkot will be initiated under Asian Development Bank assisted project"Punjab Intermediate Cities Investment Improvement Program (PICIIP). 2) To Rehabilitate / Improve Water Supply & Sewerage System in Sahiwal project amounting Rs. 9,290 Million will be launched under PICIIP. 3) To Rehabilitate / Improve Water Supply & Sewerage System in Sialkot project amounting Rs. 6,560 Million will be launched under PICIIP. 4) To conserve historical Lahore Fort and to improve tourism in walled City of Lahore and AFD assisted project amounting Rs. 3,600 Million. 5) Performance Based Grants amounting Rs. 7,000 million to 16 cities for improvement of Municipal services under DLI based World Bank Funded "Punjab Cities Program". 6) Development Package amounting Rs. 300 million for Provision of Basic infrastructure at the Local level. 7) CRVS project will be launched for integration of death and birth **Objectives of Sub-Project** • Provision of new improved, economical, efficient and cost effective Solid Waste Collection and Transportation machinery & Equipment for improving the efficiency of collection and disposal of solid waste and the sanitary and hygienic conditions in the city. • Raising the service delivery level in the sector of Solid Waste Management for reduction of the vector and water borne diseases to improve general health standards of the citizen. **Scope of the Sub-project** The scope of the subproject includes : 1) Provision of equipment and machinery for primary collection of the solid waste in effective manner. 2) Provision of machinery for sweeping of roads & streets. 3) Provision of machinery for secondary collection and safe transportation of the solid waste to dumping sites. 4) Provision of machinery for excavation, re-handling and compaction of the solid waste in dumping sites. 5) Provision of motor bikes for easy mobility of the sanitation supervisory staff. 6) Provision of mobile workshop for at site and speedy repairs of the equipment and machinery for reducing the breakdown periods and increasing the efficiency of these machines. Hence, the objectives of the project are in line with the sector objectives given at Sr.No-5 given above.
6. Description, justification, technical parameters and technology transfer aspects (enclose feasibility study for projects costing Rs.300 million and above	
i. Present Condition	Existing situation of solid waste management in the city is given in **Annexure-B**

<table>
<tr><td>ii. Description of the subproject-</td><td>Description of the project including the planning, design and the proposed scope of work has been given as under:
Section-I Design Criteria: Annexure-C
Section-II Project Proposal: Annexure-D</td></tr>
<tr><td>iii. Provide details of civil works, equipment, machinery and other physical facilities required for the project</td><td>The details of the machinery and equipment to be procured by UNIT DASKA (DEFUNCT MC DASKA) under the project are given below:
<table>
<tr><th>S.N.</th><th>Detail of machinery & equipment</th><th>Nos</th></tr>
<tr><td>1</td><td>Garbage compactor 8.0 cubic meter capacity</td><td>3</td></tr>
<tr><td>2</td><td>Garbage container 0.8 cubic meters capacity</td><td>272</td></tr>
<tr><td>3-a</td><td>Handcart / waste tipping trolley</td><td>17</td></tr>
<tr><td>3-b</td><td>Conventional three wheeled handcarts</td><td>157</td></tr>
<tr><td>4</td><td>Front blade tractor</td><td>1</td></tr>
<tr><td>5</td><td>Front end loader</td><td>2</td></tr>
<tr><td>6</td><td>Truck mounted suction sweeper</td><td>1</td></tr>
<tr><td>7</td><td>Mini tipper 1.0 cubic meter</td><td>4</td></tr>
<tr><td>8</td><td>Water bowsers with spray system</td><td>1</td></tr>
<tr><td>9</td><td>Dump truck 10 cubic meter</td><td>1</td></tr>
<tr><td>10</td><td>Wheel Excavator</td><td>1</td></tr>
<tr><td>11</td><td>Motor bike 72 cc</td><td>3</td></tr>
</table></td></tr>
<tr><td>iv. Indicate governess issues of the sector relevant to the project and strategy to resolve them</td><td>• UNIT DASKA (DEFUNCT MC DASKA) has a number of sections that deal with the service delivery, however for design, planning, marketing, and regulating the services UNIT DASKA (DEFUNCT MC DASKA) needs strengthening of certain sections in terms of additional manpower as well as diverse skills. It should have the financial and technical capacity to operate and maintain the existing and additional infrastructure being provided under the project.
• Presently all UNIT DASKA (DEFUNCT MC DASKA) s in Punjab are short of manpower required for the collection and disposal of waste because of the ban imposed on recruitment of staff since long. The population has increased whereas the manpower has been reduced because of death and retirement of number of skilled and non-skilled workers. Hence even the provision of most efficient machinery and equipment for solid waste collection and disposal will not bring about targeted results if the required manpower is not provided to the UNIT DASKA (DEFUNCT MC DASKA) s.
• UNIT DASKA (DEFUNCT MC DASKA) Officers and workers responsible for the solid waste management will have to be trained for operation and maintenance of the machinery and equipment and will have to be monitored for at least Program implementation period to derive the best possible efficiency.</td></tr>
<tr><td>7- Capital Cost of Project</td><td>The total costs of the machinery & equipment has been worked out in the abstractgiven in the table below:
(All figures are in million rupees)
<table>
<tr><td>1</td><td>Group-A</td><td></td></tr>
<tr><td></td><td>Vehicles chassis</td><td>60.678</td></tr>
<tr><td>2</td><td>Group-B</td><td></td></tr>
<tr><td></td><td>Super structure of the vehicles</td><td>110.094</td></tr>
<tr><td>3</td><td>Group-C</td><td></td></tr>
</table></td></tr>
</table>

	Three years HR cost for operation of Solid Waste Machinery	19.62
4	**Group-D**	
	Cost of purchase of the Vehicle Tracking System including 5 % PST	1.113
	Service charges for 3 years including 16 % PST	0.803
	Total cost	192.308

The specifications and standards for manufacturing the machinery & equipment have been given in **Annexure-E**

For cost effectiveness, the chassis of the vehicles will be procured directly from the manufacturers and handed over to the fabricating vendors for construction of the super structure. This will save middle man's profit.

The details of the cost estimates have been given in **Annexure -F**

i- Indicate date of estimation of the project cost

The project estimates have been framed during the month of April, 2021. Re-costing has been done in March, 2022.

ii- Basis of determining the estimates be provided.

The cost estimates have been framed on the basis of standards and specifications and bill of quantities derived from the planning and design of the equipment and machinery as per population of the city duly taking into consideration the machinery and equipment already available with UNIT DASKA (DEFUNCT MC DASKA) .

The cost estimation has been based on the market rates for which quotations from the manufacturers have been obtained and included in the PC-I. The quotations provided by the manufacturers for truck chassis have validity period of only 45 days. The rates may change after this period and the PC-I may need revision due to change in these rates.

ii-Provide year wise estimation of physical activities

The physical and financial requirements, year wise are included in the following table:

A. Physical Phasing

S. #	Items of work	Total	Year 2020-21	Year 2021-22
1	Vehicles chassis	100 %	30%	70%
2	Vehicles super structure	100%	0	100%
3	HRCost for 3 years	100%	From 2020-21 to 2022-23	
4	Monitoring & vehicle tracking system	100%	From 2020-21 to 2022-23	

v- Phasing of capital cost on the basis of each item of work.

The phasing of capital cost of the project is included in the following table:

B. Financial Phasing
(All figures are in million rupees)

S. #	Items of work	Total	Year 2020-21	Year 2021-22
1	Vehicles chassis	60.678	0	60.678
2	Vehicles super structure	110.094	0	110.094
3	HRCost for 3 years	19.62	0	19.62
4	Monitoring & vehicle tracking system	1.9156	0	1.9156
	Total	**192.308**	0	**192.308**

8- Annual recurrent cost after completion of the project and source of financing	**i. Annual recurring cost of the project** Annual operation and maintenance cost of existing manpower, POL & repair and maintenance of machinery & equipment is quite higher because of the inefficient and non-cost effective machinery like tractors which consume much higher POL as compared with the trucks. The POL consumption in case of new machinery will be lower but as 100% efficiency of the solid waste management is targeted hence it may exceed but not so appreciably. Further lower manpower is required in case of compactor trucks than tractors trolleys as it carries almost triple quantity of waste as compared to the tractor trolleys whereas only one vehicle driver is needed as compared with three drivers in case of tractor trolleys. Hence the cost incurred on the vehicle drivers may reduce. Hence it is estimated that the cost presently incurred on O&M of the solid waste machinery and equipment will almost remain the same **(ii). Source of Financing** UNIT DASKA (DEFUNCT MC DASKA) is already bearing cost of operation and maintenance of this municipal service and will finance the O & M cost of the facility out of its own resources in future as well. However the cost of HR for 03 years has been included in the PC-I.
9- Demand & Supply Analysis i-Existing Capacity of services	**I. Existing supply level** • UNIT DASKA (DEFUNCT MC DASKA) is unable to render satisfactory service to the entire area of city due to shortage of efficient equipment and manpower. Some areas are reasonably served whereas others are deprived of the required level of the service and are served once or twice a week. In present scenario, most of the areas are poorly served and heaps of solid waste accumulated in these areas are only removed when the tolerance level of inhabitants of the area exceeds. • The level of service in different areas of the city is given as under; Muhallas and colonies wherein full service is presently being rendered — 20 Nos Muhallas and colonies wherein partial service is presently being rendered. — 22 Nos Muhallas and colonies wherein no service is presently being rendered — 12 Nos • The details of the muhallahs and colonies has been included in Existing Situation Analysis given in **Annexure-B**. **II. Capacity of machinery & equipment** • The existing equipment and machinery is being operated at its full capacity but still it is not possible to attain full service efficiency due to low efficiency of equipment consuming larger time and money in its operation. • The tractor trolleys are slow moving and consuming large fuel and time but carry only one third of the waste to dumping sites as compared to the compactor trucks. • Similarly the container carriers haul only one container carrying 3.4 m3 of waste to the dumping site. These carriers are also hauled by tractors having slow speed, high fuel consumption and very low efficiency. • Both of these secondary collection systems are having very poor efficiency and also require larger manpower. The UNIT DASKA (DEFUNCT MC DASKA) 's administration feels that they require much more manpower as compared to the existing sanitation establishment. • The proposition of continued use of this equipment with enhanced number of manpower will not cure the problem. Rather it will increase the operation and maintenance cost with very little improvement of the service delivery level. **III. Capacity of the dumping sites**

	• The present open dumping site is located at near Bhonkanwala at distance 9 km from City and is big health hazard as its producing obnoxious smell and deteriorating and degrading the environment. • UNIT DASKA (DEFUNCT MC DASKA) will continue to dump the waste in the present dumping site and its hopeful that Government would allocate additional land in the vicinity. **IV. Efficiency of the service** As described in the situation analysis, the present waste collection and disposal efficiency is not more than 50 % which shows a large gap between supply and demand.
ii-Projected Demand for 10 years	• The municipal service requires radical improvement to enhance the efficiency of the service to increase service delivery to a satisfactory level. For this purpose the presently available equipment and machinery with poor efficiency will have to be replaced by a much more efficient one to reduce the operating costs, increase the efficiency, consume lesser manpower and result in satisfactory service delivery level. • Sanitary landfill for safe and sanitary dumping of the waste is required to eliminate the present insanitary conditions around the present dumping sites and reduce vector diseases. **Equipment and machinery** The demand of the equipment, machinery for the next 5 years has been worked out and given in Serial No-7 of this PC-I (Capital cost of the Project). **Parking area for the vehicles** The solid waste and other vehicles of Unit Daska (Defunct MC Daska) Daska are being parked in an UNIT DASKA (DEFUNCT MC DASKA) Office having area measuring 2Kanals. This is unpaved area not equipped with any type of sheds and all the vehicles are exposed to sever weather conditions. All required facilities remain to be provided in this area. A separate PC-I will be drawn for the development of this Parking Area wherein all facilities and sheds will be provided. The development of this area will be done simultaneously with the manufacture of the machinery and equipment and the development will be completed before the machinery is received in the UNIT DASKA (DEFUNCT MC DASKA) . The facilities so provided in this parking areas will include: • Parking sheds • Office room • Workshop • Vehicle washing & inspection deck • Toilet • Guard room • Approach road • Boundary wall & gate
iii Capacity of other similar projects being implemented in public/private sector -	No other project of this nature is being implemented in public as well as private sector.
iv-Supply and Demand gap	The nature of supply and demand gap has been explained in the preceding paras which concludes that; • The existing equipment and machinery has poor efficiency. • It is consuming more time, fuel and requires excessive manpower to operate. • The overall delivery level of the service is not satisfactory. • Numerous public complaints are the talk of the day.

	• The overall efficiency of collection of waste is 50% instead of 95% to 100%. • Waste dumps site is located within the city and is a big health hazard. • No proper parking area for the sanitation vehicles and equipment exists in UNIT DASKA (DEFUNCT MC DASKA) . • Hence there is a large gap between the supply and demand which is to be bridged by provision of latest more efficient collection and transportation equipment & machinery and construction of vehicle parking area.
v. Designed capacity and output of the project	The machinery & equipment has been designed to fill-up the above mentioned gaps between supply and demand by the provision of much more efficient machinery and equipment. Upon completion of the project; • The present efficiency (50%) of solid waste management will be raised to 95 to 100% provided required manpower is sanctioned by the competent authority and UNIT DASKA (DEFUNCT MC DASKA) is allowed to recruit that manpower by lifting the ban on recruitment. • The operation and maintenance cost of the machinery and equipment will remain almostthe same although entire city area will be covered. The cost of human resource for operation of this machinery for 3 years has been included in the PC-I. • The parts of the city presently receiving poor service or no service at all, will get satisfactory service. • The entire city will have cleaner look with improved environments. • The health hazards presently generated by the waste heaps lying in the city will be eliminated. • The vector diseases generated because of the present insanitary conditions inside the city will be eliminated.

10. Financial Plan- Sources of financing

a) Equity

(All figures are in million rupees)

Source	Local	FEC	Total
World Bank loan	-	153.8464	153.8464
Co-financing by UNIT DASKA (DEFUNCT MC DASKA) @ 20%	38.4616	-	38.4616
Total	38.4616	153.8464	192.308

b) Debt Indicate the local and foreign debt	Nil
c) Grants	The loan of Rs 153.8464 million from World Bank will trickle down to UNIT DASKA (DEFUNCT MC DASKA) as Grant.
d) Weighted cost of capital	Nil

11-Project benefits and analysis

i. Financial: Income to the project with assumption	It is a social sector project and the capital cost of the project is not intended to be recovered. UNIT DASKA (DEFUNCT MC DASKA) has not levied any sanitation fee or tax so far but ultimately to recover the operation & maintenance cost of the machinery & equipment UNIT DASKA (DEFUNCT MC DASKA) will have to levy this fee.

<table>
<tr><td>ii. Social: Quantify benefits to the target group</td><td>The completion of the project will result in the following benefits:
Improvement in the environment of the city;
The efficiency of the waste collection and transportation system will increase to 95-100% provided required manpower is sanctioned by the competent authority and recruited by UNIT DASKA (DEFUNCT MC DASKA) .
The service delivery level will be improved.
Present health hazards generated in the form of vectors and vector generated diseases because of the waste heaps in the city, will be eliminated.
General public health standards will be improved.
Public mental tension, frustration will be minimized;
Obnoxious smell because of poor service delivery and open heaps will be eliminated.
Reduction in the water borne and vector diseases will reduce the expenditure on medicine and hence effect savings in the national economy</td></tr>
<tr><td>iii. Environmental Impact negative/positive</td><td>There will be no negative impact because of procurement and operation of the machinery & equipment. Rather positive impacts because of improvement of the environment in the city will be observed and present health hazards will be eliminated. Hence overall positive impacts due to operation of the project will be experienced.</td></tr>
<tr><td>12. Project Analysis</td><td></td></tr>
<tr><td>i. Quantifiable project outputs</td><td>The project outputs which can be quantified are given below;
A. Vector diseases will be reduced/eliminated because of improvement of the environments due to safe and sanitary waste collection and transportation. This will result in;
Improvement of general public health standards.
Reduction in the expenditure on curative medicine
Saving in the man days of the inhabitants.
Improvement in the local, district and national economy.
B. With the use of efficient, fast and speedy transportation vehicles under mentioned results will be achieved;
Lesser fuel consumption and lesser deployment of labor will give saving in O&M charges.
Fast and efficient transportation will improve the efficiency of the service and improve the service delivery level.
Efficient working of machinery will have lesser repair and maintenance cost.
C. Elimination of double handling of waste will result in;
Efficient service delivery.
Lesser labor deployment.
Saving in manpower cost.
Safety of the workers.
Elimination of health hazards associated with body to waste contact.</td></tr>
<tr><td>ii. Unit Daska (Defunct MC Daska) cost analysis</td><td>The Unit Daska (Defunct MC Daska) cost analysis is produced below;<table><tr><td>Project capital cost</td><td>Rs. 192.308 million</td></tr><tr><td>Projected population in year 2026</td><td>226,263 persons</td></tr><tr><td>Unit Daska (Defunct MC Daska) capital cost per capita</td><td>Rs. 850</td></tr></table></td></tr>
</table>

iii. Employment generation (direct and indirect)	**Employment Analysis** ***Direct Employment*** The manufacture of the machinery and equipment will require skilled and non-skilled labor. ***Indirect Employment*** Indirect employment for production, marketing and transportation of steel will be generated
iv. Impacts of delays on project cost and viability	• The impact of delay in project implementation will result in increased cost due to escalation in cost of material and labor. • The targeted benefits to the general public will also be delayed for the period the projects remains unexecuted

13-Implementation Schedule

i- Indicate starting and completion date of the project	The project is anticipated to commence by start of December 2021 and to be completed by May 2022 with project implementation period of 6 months
ii- Item wise/year wise schedule in line chart	The chassis of the vehicles will be directly procured from the manufacturers for cost effectiveness in the year 2022. The supper structures on these chassis will be built by the vendors within 3 months. The supply to be effected in each month cannot be estimated at this stage as it will depend upon the availability of the truck chassis from the truck manufacturers which cannot be predicted.

14. Management Structure and manpower requirements

i- Administrative arrangements for the implementation of the project	The project will be executed by Unit Daska (Defunct MC Daska) Daska (Defunct MC Daska), District Council Sialkot through Municipal Officer (Infrastructure and Services) being the Engineer in Charge and supervised by the Supervision Consultants which will be hired and deployed by PMDFC.
ii-The manpower requirements by skills during execution and operation of the project	**i. Planning and design** The planning and design of the project has been done by PCP Infrastructure Wing which has got its own recruited staff under the management of PCP. The resident supervision of the project will be done by the Supervision Consultants. The staff deployed for both activities is as under:

S #	Designation	Nr of slots	Qualification	Experience
A	**Planning & design**			
1	Senior Program Officer (Infr. Dev.)	1	BSc. Civil Engg.	50 years
2	Program officer (ID)	1	BSc. Civil Engg	15 years
3	CAD operator	1	Diploma in draftsman	10 years
4	Accounts officer	1	MBA (Finance)	10 years
B	**Project supervision**			
1	Senior engineer	1	BSc. Mechanical Engg.	20 years
2	Supervisory engineer	1	BSc. Mechanical Engg	10 years
3	Inspector	1	Diploma in Associate Engineer	10 years
4	Accounts officer	1	MBA (Finance)	10 years

ii-Manufacturing staff

Manufacturer's technical staff will comprise of various skilled labor for cutting, drilling, fabrication, welding, cleaning, painting, galvanizing and transportation along with electrical/ mechanical engineers & managers.

iii The job description, qualification, experience, age and salary of each post -	**a. Unit Daska (Defunct MC Daska) Daska, District Council Sialkot** Municipal Officer (I&S) will be the Project Manager / Engineer in Charge for execution of the project and the project will be executed under his management. He will be assisted by his support staff who are qualified engineers and sub engineers. All of these engineers are regular employees of Unit Daska (Defunct MC Daska) Daska or provincial government. **iii. Operation and Maintenance** After completion the machinery & equipment will be operated and maintained by Unit Daska (Defunct MC Daska) Daska through its regular staff. The additional staff as and when so required, will be recruited by UNIT DASKA (DEFUNCT MC DASKA) the cost of which for three years has been included in the PC-I.
15-Additional projects /decisions required to optimize the investment being undertaken	Unit Daska (Defunct MC Daska) Daska is facing sanitation manpower shortage for rendering service to the entire city. For accruing the targeted benefits from the project, vehicle drivers and other allied staff needs to be recruited by UNIT DASKA (DEFUNCT MC DASKA) for which sanction of the competent authority is required. Present ban on the recruitment needs to be lifted for this recruitment.
16-Certificate	Certified that the project proposal has been prepared on the basis of guidelines provided by the Planning Commission for the preparation of PC-I for social sectors projects

Prepared by		**Checked by**	
Name	M Uzair Arshad	Name	Qaiser Ameen Warraich
Designation	Municipal Engineer (I&S) Unit Daska (Defunct MC Daska) Daska	Designation	Chief Officer Unit Daska (Defunct MC Daska) Daska
Signature		Signature	

Annexure-A
City Background

1. City Status

Daska city is a Tehsil Headquarter of Daska Tehsil under Sialkot District and is administered by a Municipal Committee.It is situated at an elevation of 217 m(712 ft).

1.1. Location

Daska is located in the south-west of Sialkot. It is linked with the district headquarters by two metalled roads passing through Ghunike and Sambrial. It is located at an equidistance of 24 Km from the surrounding towns of Gujranwala, Sialkot, Pasrur and Sambrial. The city is about 125 km (78 mi) north-west of Lahore located at coordinates of 32.338779North and 74.353065 East.It connected with entire province through road links.Recently, it has been connected with M-11 Lahore-Sialkot Motorway through JamKey Cheema Interchange.

1.2. Climate

a) Weather

The climate of Daska is usually warm and dry. The coldest months are December to February, when temperatures may drop to 1 °C, with moderate to lightrainfall. The city has extremes of climate. The summer season starts from the month of April and continues till October. May and June are the hottest months with day temperature usually ranging from 33 to 47 degree centigrade. The winter season begins from the month of November and continues till March. Towards the end of June monsoon conditions appear and during the following two and half months spell of rainy season alternates with intervals of sultry weather.

b) Rain fall

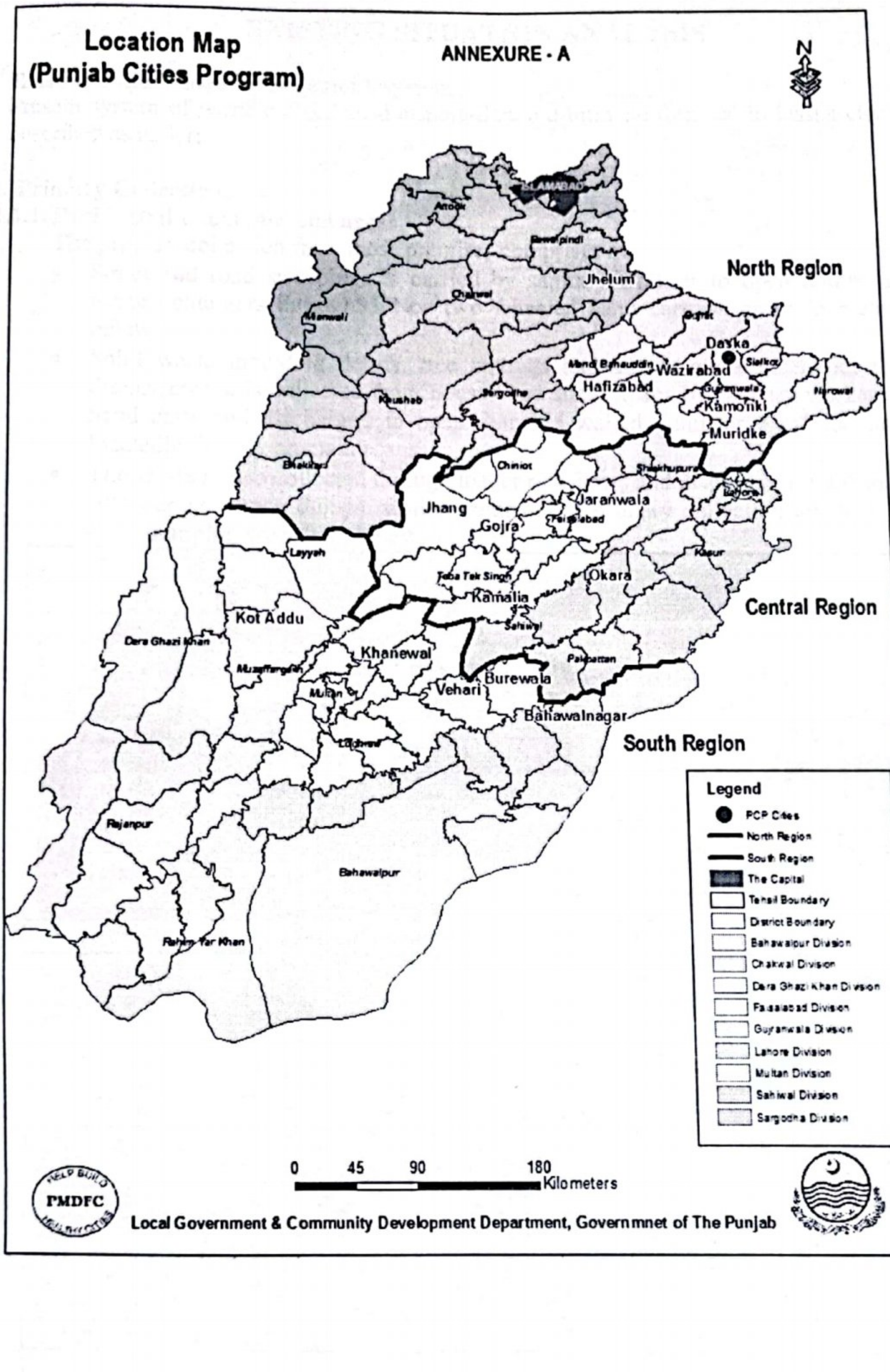
Most of rain falls in July, August and September during summer months and in January, February and March during the winter months.

1.3. Demographic status

The Census 2017 for the Punjab Cities show the population of 189,327persons for Daska city with an annual growth rate of 2.0 % which is expected to rise to 226,263persons in the year 2026 which is planning horizon for this subproject.

Location Map
(Punjab Cities Program)

ANNEXURE - A



Annexure-B

EXISTING SITUATION ANALYSIS

1. Existing solid Waste Management System

Present system of waste collection, transportation and ultimate disposal in Daska city is described as under;

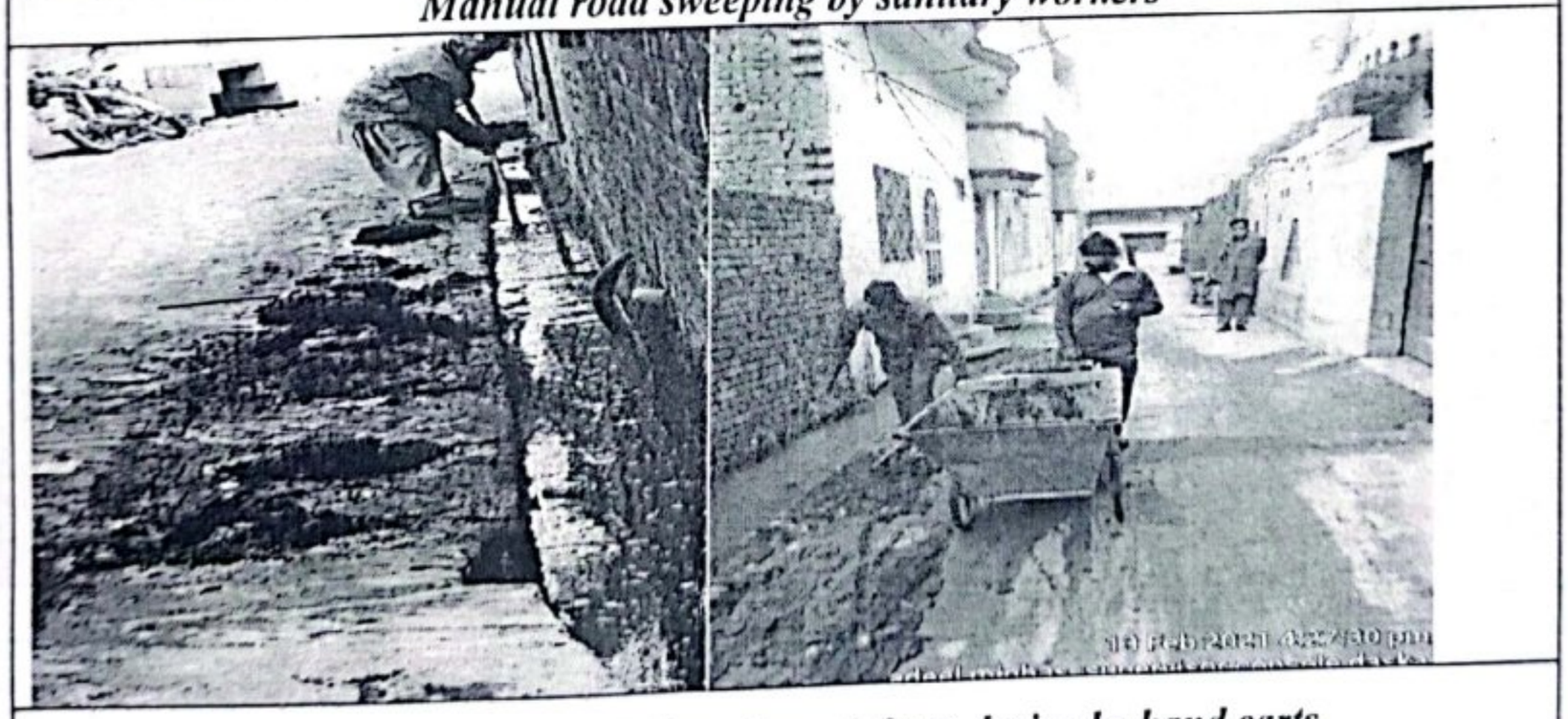
1.1. Primary Collection

1.1.1. Residential & commercial areas

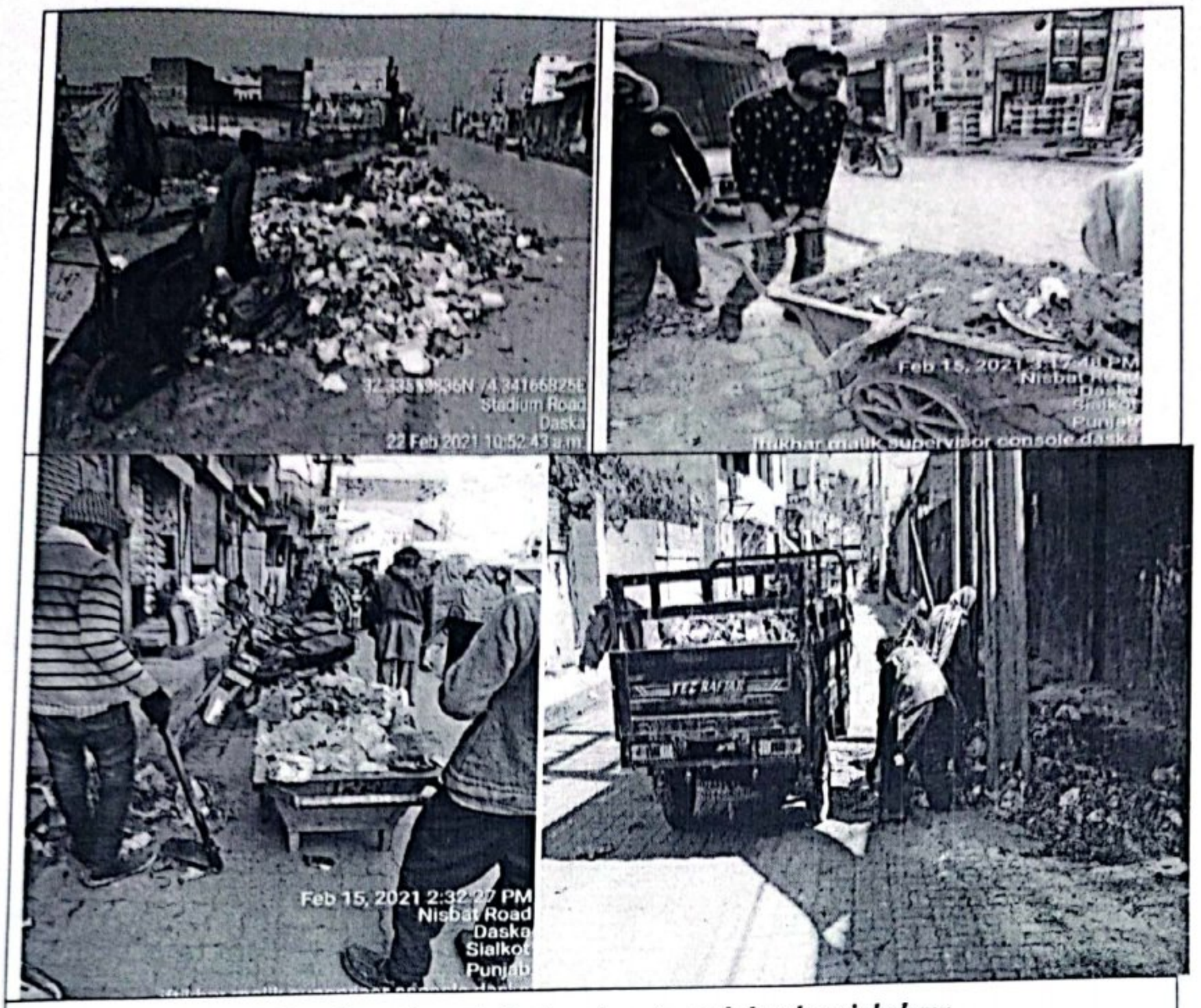
The primary collection from these premises comprises of;

- Street and road sweepings is carried by sanitary workers to open dumps and waste containers through85 Nos two wheeled hand cartsas shown in pictures below.
- Solid waste including debris, tree cuttings and silt & muck taken out from drains/sewers, is collected from houses and street heaps by sanitary workers, in hand carts and discharged in open dumps / walled dumpsor 5 m^3 containers locatedin the city on main roads.
- The waste is also collected through loader rickshaws and disposed of in the major filth depots / open dumps /walled dumps. The primary collection methods and open dumping are shown below;

Manual road sweeping by sanitary workers



Primary collection of silt and muck from drains by hand carts



Collection of waste by hand carts and loader rickshaw

- Sometimes the waste in open dumps is burnt thus polluting the air.

Waste collected in open heaps

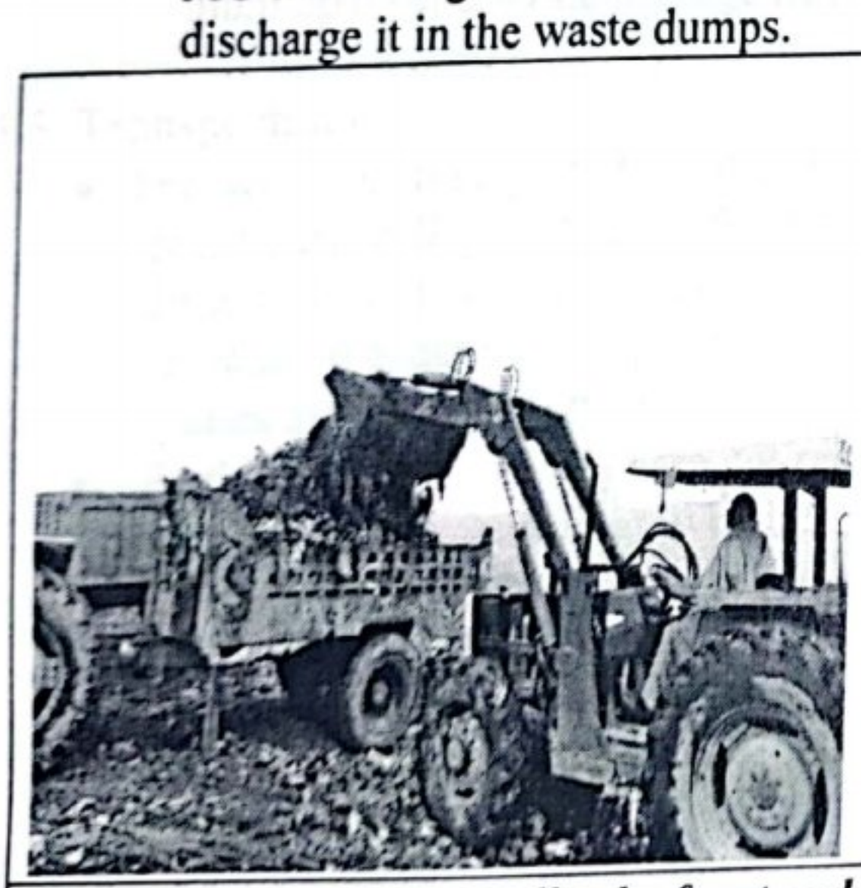
Waste collected in 5 m^3 containers

Waste collected in temporary walled dumps (filth depots)

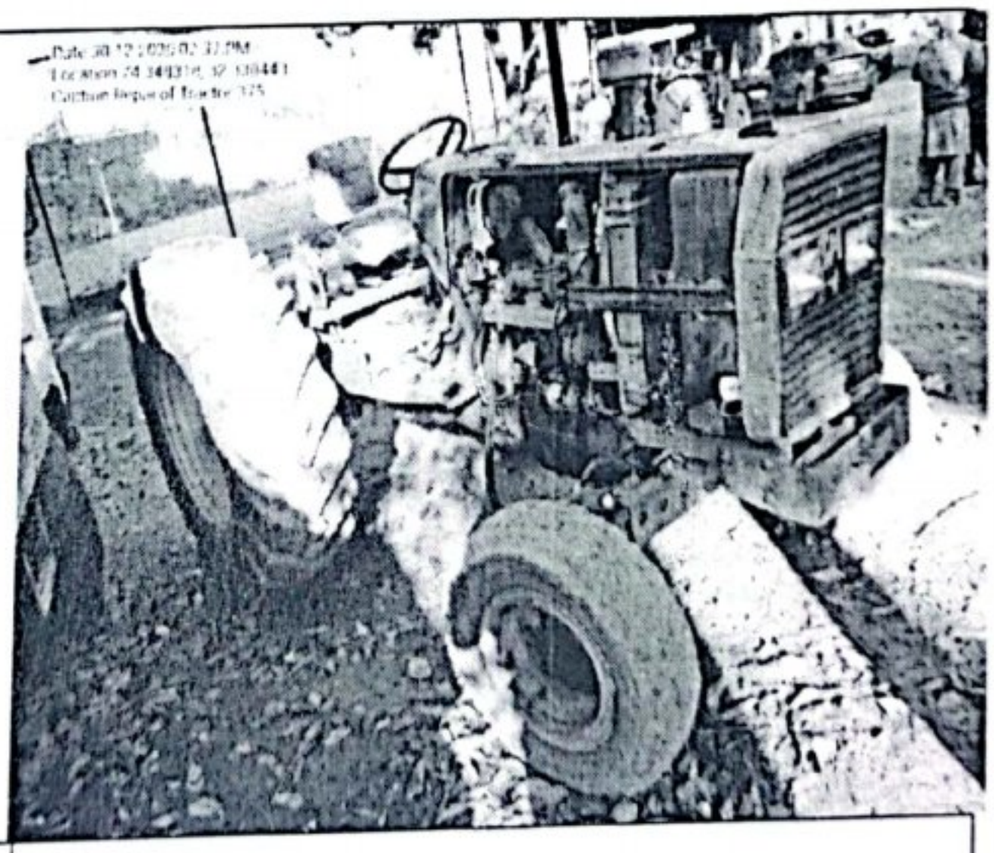
1.2. Secondary Collection System& disposal

1.2.1. Secondary collection from heaps/dumps, containers and filth depots

- It is accomplished through tractor-trolleys by either loading the trolleys by front end loader or by human labor. Presently 05tractors and 05trolleys have been deployed for this job which is equipped with jacks and the unloading is therefore automatic.One front end loader and three front blade tractors are used to load and collect waste.
- MC has placed eighteen5 m^3 waste containers out of which eleven are in operational condition but are totally worn out, rusted and damaged. These containers are transported to dumping site by one arm roll which is also in very poor condition. There are also 6 masonry / temporary sheets wastedumps for secondary storageas shown in Map M-1 (Existing Coverage of solid waste management). Remaining waste is dumped in open heaps.
- MC has also got 5 loader rikshaws which collect waste from the street heaps and discharge it in the waste dumps.

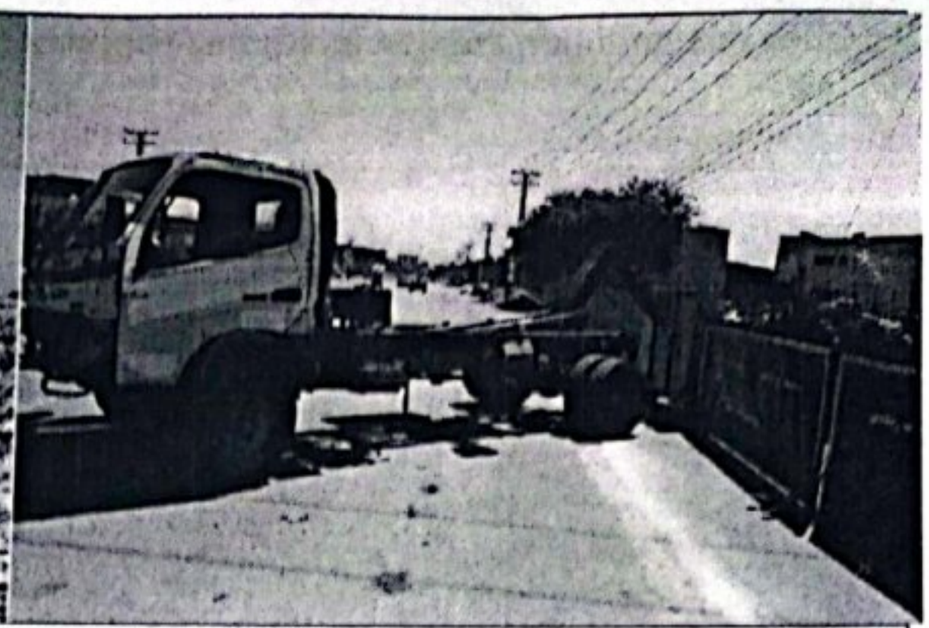


Waset being loaded in trolley by front end loader



Poor condition of the tractor

Waste being unloaded by arm roll on the dumping site



Arm rolls loading the container

1.2.2. Hospital wastes

The Tehsil Headquarter Hospital management has not installed any incinerator nor have got their own arrangement of waste disposal. As such all hazardous and other type of waste is being handled by MC Daska.This waste is directly loaded in tractor trolleys by MC sanitary staff through front end loader and is transported to the dumping site

1.2.3. Slaughter house wastes

The waste from the slaughter house is also managed by MC. It is lifted twice a week and is disposed-off through tractor trolleys to final disposal point.

1.2.4. Demolition and Construction Wastes

The construction material which is surplus of the requirement of dwellers remains on the streets/roads for extended periods. The collection and disposal is part of the municipal solid waste management function.

1.3. Transportation

- The waste is transported to the dumping site in quite insanitary manner through uncovered trolleys. Most of the trolleys have no back shutterand during hauling of these trolleys to dumping sites, some of the waste is scattered on roads. Apart from reducing the carrying capacity of these trolleys, the scattered waste on the roads creates highly insanitary environments.
- Further the tractor trolleys are not provided with any cover during hauling through the congested populated areas which not only spreads obnoxious smell but also gives shabby look and deteriorates the environments.
- The speed of the tractors is very slow as compared with the trucks and it consumes excessive POL apart from taking much more time in one trip.
- As such the transportation method is very inefficient, non-cost effective, insanitary and unhygienic.

2. Ultimate disposal of waste

The waste is being dumped in an area of 5 acres at Mongi Bangla Road 9.0 Km from city Centre near Bhonkanwala village(Map M-1). The dumping is being managed without any

earth cover. It is spreading litter, creating obnoxious smell and vectors,polluting sub soil water and spreading vector diseases.

Dumping site near Bhonkanwalaat distance 9 km from City

Compaction of waste

The waste is not being compacted in the dumping sites by any method. Mostly the placement of waste in the dumping site is in indiscriminate manner. Hence the waste is consolidating in its natural way.

The existing solid waste management system is included in the table below:

Present Solid Waste Management System

Primary Collection			Secondary Collection		Disposal
Waste producing areas	Street Sides		Transfer place	Transfer Vehicle	
	Storage	Collection			
Residential premises	Thrown in streets/roads	Handcarts & loader rickshaws	Waste dumps or containers	Tractor Trolleys/Arm Roll	Open and insanitary dumping near village Bhonkanwala at distance of 9 km from City center
Commercial premises					
Street sweepings / Drain muck	Street side heaps	Handcarts & loader rickshaws			

3. Available resources

a) Equipment & machinery

The existing machinery & equipment being used by MC Daska has been given as below:

S.No.	Description	Total Nos available	Year of manufacture	Serviceable		Un-serviceable	Present use
				Serviceable after Repairs	Average life after repairs		
1	2	3	4	5	6	7	8
1	Tractors	05	2002-2019	04	4 year	01	04
2	Trolleys	05	2002-2019	04	4 year	01	04
3	Front blade tractors	02	2007	02	5 year	0	02
4	Front end loaders	03	2005-07	03	5 year	0	03
5	Arm rolls	01	2012	01	4 year	0	01
6	Container (5 cu. m)	18	2012-19	11	3 year	18	11
7	Compactor trucks	-	-	-	-	-	-
8	Containers (1.0 /0.8 cu. meters)	-	-	-	-	-	-
9	Hand carts	120	2017	85	1 year	35	85
10	Mini tippers		-	-	-	-	-
11	Dumper trucks	-	-	-	-	-	-
12	Water bowsers (with Hinopak)	2	2010-2019	2	5 year	0	2
13	Mechanical sweepers (with Hinopak)	2	2014	1	3 year	1	1
14	Jetter machines(with Hinopak)	1	2012	1	5 year	0	1
16	Dewatering sets	20	2010	20	5 year	0	20
21	Loader Rikshaw (200CC)	3	2018	-	3 year	0	03

The existing machinery is neither sufficient nor cost effective and efficient giving rise to low efficiency of collection and disposal of the waste and as a result of that MC is facing increased waste management cost as well as complaints regarding the insanitary conditions in the city. Efficient and cost effective machinery is needed to increase the efficiency of collection and transportation for improving the sanitary conditions in the city and lowering down the operational and maintenance costs.

4. Solid waste Generation & Disposal

PMDFC is collecting the solid waste data from the MCs regularly. The solid waste management efficiency as calculated by PMDFC on the basis of data provided by MC for the month of July, 2020 is given below:

Transport vehicle	Capacity (Tons)	Trips per month	SW disposed per month	Avg. trips per day	Avg. SW disposed per day
Tractor Trolley No. 4	2.5	85	212.5	2.74	6.85
Tractor Trolley No. 1	2.5	80	200	2.58	6.45
Tractor Trolley No. 2	2.5	90	225	2.9	7.26

Arm Roll Truck	2.75	178	489.5	5.74	15.79
Tractor Trolley No-3	2.5	96	240	3.1	7.74
Average total waste lifted per day:		44.1 tons			
Estimated population:		207,908 persons			
Waste generation per Capita		0.4 Kg			
Estimated waste generation per day:		83.16 tons			
Percent waste disposedper day:		53 %			

Keeping in view the absence of back shutters of the trolleys and littering of waste on the roads during transportation, it can be easily estimated that the actual efficiency of the disposal of waste would not be not more than 50%.

5. Un-served and partially served areas

The entire city is not served daily with solid waste collection and disposal. The average efficiency of the service as given above is 50%.Following 12mohallas are un-served, 22 mohallas arepartially served and 20mohallas are fully served. There are no areas in The detail of these areas is given blow.

Daska City					
Mohallas Covered by Areas					
S.No.	Totally Served Areas	S.No.	Partially Served Areas	S.No.	Un Covered Areas
1	Rehmat Pura	1	Younas Abad	1	Village Bhrokey
2	New Abadi Sohawa	2	Tootianwala	2	Tariqabad
3	Muhammad Pura	3	Shafiq Town	3	Rehman Pura
4	Mughal Pura	4	Raham Colony	4	Ramzan Town
5	Mohallah Eid Gah	5	Qazi Town	5	Mohalla Sui Gas
6	Mohalla Sohawa	6	Nazirabad Colony	6	Mohalla Nadimadab
7	Mohalla Rajputta	7	Mohalla Shahab Pura	7	Mohalla Banwala
8	Mohalla Naqshbandiawala	8	Mohalla Shah Sharif	8	Mandran Wala
9	Mohalla Chudrian	9	Mohalla Peer Fateh Colony	9	Jasar Wala
10	Mohalla Bijli Ghar	10	Mohalla Mission Compound	10	Itehad Town
11	Mohalla Abadi Banwala	11	Mohalla Mandiwala	11	City Town
12	Mohalla Wahabpura	12	Mohalla Barkat Town	12	Bhatti Colony
13	Model Town	13	Mohalla Baghwala		
14	Islam Pura	14	Khalid Town		
15	Hameed Colony	15	Haq Pura		
16	Haji Pura	16	Haji Pura		
17	Habib Pura	17	Gulistan Villas		
18	Ghulsion Colony	18	Gulistan Colony		
19	Ghanipura	19	Gulberg City Town		
20	Daska Kalan	20	Chota Gaga		
		21	Canal View Town		
		22	Bara Gaga		

6. Ultimate disposal of waste

- MC has no proper sanitary landfill site and the waste is presently being dumped near Bhonkanwala at distance 9 km from City
- The haphazard dumping of waste is badly pollutingthe subsoil water resulting in water borne diseases as shallow water is being consumed by most of the city population.
- No earth cover is being provided on the waste and littering, obnoxious smell and breeding of vector is a common phenomenon thus creating vector diseases.
- MC has no land at present which can be utilized for development of a landfill site. Hence measures for acquiring the land for landfill will be required to be taken up by MC.
- Alternately Government of Punjab may go for construction of Regional Landfills wherein MC Daska can dump its waste. For this purpose a transfer station will be required to be built. Necessary steps will be taken by MC as per circumstances prevailing in future.

7. Parking area

The solid waste and other vehicles of MC Daska are being parked in an area measuring 2Kanals located at MC office. This is unpaved area not equipped with any type of sheds and all the vehicles are exposed to severe weather conditions. All required facilities remain to be provided in this area.

Current parking facility in MC Daska at MC office

8. Reasons for poor service

Resources available to handle the solid waste are limited to serve the whole area of city.

Limitations in resources are described here.

a) Shortage of sanitary workers and vehicle drivers.
b) Shortage of equipment and machinery.
c) Poor efficiency of the machinery and equipment as explained above.
d) Waste is temporarily collected in heaps in the streets giving insanitary conditions.

e) Spreading of the waste on to the roads during transportation due to absence of back shutter of trolleys.

f) Obnoxious smell and insanitary conditions in the city due to non-covering of waste during transportation.

g) Littering of the waste from dumping site and creating all sort of hazards say; pollution of underground water, vector and vector borne diseases, obnoxious smell and high insanitary conditions around the dumping site due to non-provision of the earth covers over the wasteand non-provision of impervious media under the waste bed.

Annexure-C

Description of the Project
Section-I Design Criteria

Below given design criteria has been established for Provision of Solid Waste Management machinery & equipment in 16 Program MCs. This design criteria covers below mentioned services /activities:

Provision of equipment & machinery for:

- Primary & secondary collection of solid waste
- Transportation of waste to the landfills or dumping sites
- Placement, compaction of waste in landfills or dumping sites and provision of earth covers.
- Mobile workshop for site repairs
- Motor bikes for mobility of the staff

The design criteria established for all above items is given below.

1. Population

The population of the Program Cities as per Census-2017 will be used to project it to the year 2026 on the given annual growth rate for designing the machinery and equipment required by Program Cities.

The population of the PCP cities a per Census-2017 and projected up to the year 2026 is given below;

Sr. No.	MC	Population (2017)	Growth Rate	Projected population year 2026
1	Bahawalnagar	199,367	2.24	243,355
2	Burewala	289,236	2.18	351,193
3	Daska	189,327	2.00	226,263
4	Gojra	180,951	1.82	212,843
5	Hafizabad	269,424	3.05	353,076
6	Jarranwala	230,162	2.57	289,212
7	Jhang	493,108	1.86	582,070
8	Jhelum	261,711	1.40	296,595
9	Kamalia	145,713	1.82	171,394
10	Kamoke	264,217	2.4	327,085
11	Khanewal	216,181	1.98	257,901
12	Kot Addu	179,730	2.26	219,772
13	Muridke	258,152	2.77	330,121
14	Okara	463,302	2.29	568,019

15	Vehari	175,042	2.18	212,537
16	Wazirabad	138,433	2.40	171,372
	Total	**3,954,056**		**4,812,808**

2. Planning horizon

The planning horizon for the subproject of *"Provision of Machinery and Equipment for improvement of solid waste management"* will be 5 years. After the passage of this period and at the end of closure of the program, the assessment of the machinery requirements of all the cities will be again made and the gap for the next 5 years will be filled up by supply of additional machinery and equipment required therein.

3. Waste Generation

3.1. Waste generation rate in various cities of Pakistan

Per capita quantity of municipal solid waste generated daily varies significantly from city to city and even from place to place within the city depending upon the life style which in turn depends upon the economic conditions of the people living in the particular locality. (World Resources Institute, 1996).

The ministry of Environment Pakistan undertook a study during 1996 on "Data Collection for Preparation of National Study on Privatization of Solid Waste Management" in eleven selected cities of Pakistan. This study gave the under mentioned waste generation rate.

Solid Wastes Generation Rate in Different Cities

(Source: EPMC Estimates-1996)

Sr. Nr.	City	Kg/Capita/day	Sr. Nr.	City	Kg/Capita/day
1	Gujranwala	0.47	7	Quetta	0.38
2	Faisalabad	0.39	8	Sibi	0.28
3	Karachi	0.61	9	Mailsi	0.40
4	Hyderabad	0.56	10	Chakwal	0.45
5	Peshawar	0.49	11	Kasur	0.45
6	Bannu	0.44			

3.2. Waste generation rate for PCP Cities

Taking the case of two big cities (Faisalabad & Gujranwala) in Punjab, the waste generation rate varies from 0.39 to 0.47 Kg. The cities included in PCP have lesser population as compared to Faisalabad and Gujranwala and hence the rate of waste generation for these cities may be taken as 0.35 Kg per capita per day.

4. Selection of machinery and equipment for PCP Cities

4.1. Use of tractor trolleys

- Presently the principal method of collection and transfer of waste to the disposal site is by tractor trolley. However some of the MCs are using arm rolls along with 5.0 cubic meter capacity communal containers for this purpose. The transportation with

tractors and trolleys entails manual transfer of waste from collection points to the tractor trolley. This method is labor intensive, slow, inefficient and unhygienic, exposing personnel to unnecessary risks.

- The transfer of uncovered and un-compacted waste by tractor trolley results in increased littering during waste collection and transportation. Further most of the trolleys possessed by the MCs have no back shutter resulting in reduction of quantity of waste transported in one trip on one side and littering the roads on the other end. Significant odors are also associated with this method of transportation, affecting urban populations since tractor trolleys travel on main roads through urban centers.
- The slow speed of collection and travel in case of tractor trolley increases congestion on the main collection routes and consumes more fuel as compared to the arm rolls and compactor trucks.
- The payload of tractor trolleys is low compared to the compactor trucks. The densities of waste are typically 1.5-2.5 times higher in compactor trucks than in open, un-compacted trolleys. Allied with the greater capacity of medium to large-sized compactor trucks (for example, $8m^3$ or $13m^3$ as against 4-5 m^3 for trolleys) the waste load carried by compactor trucks is significantly higher than that carried by tractor trolleys. Further the payload is reduced to 2.5-3.5 cubic meters for the trolleys without back shutter making this method of transport still more inefficient
- Keeping in view the above mentioned facts & figures, the use of tractor trolleys is known to be the least cost-effective method of collecting and transferring waste as they have the highest cost for waste transportation on a per ton basis.
- Therefore it has been proposed not to use the tractor trolleys after procurement of most cost effective and efficient machinery for use in Program MCs and the capacity of the existing tractor trolleys will be neglected while assessing the total waste to be transported.

4.2. Proposed transportation machinery

Below given machinery and equipment has been proposed to be procured for MCs to collect and transport the waste generated in the entire city.

4.2.1. Arm rolls

Arm rolls are being used in some of the MCs with 5 cubic meter capacity communal containers. These vehicles will be continued to be used in transportation of the waste and the capacity handled by them will be subtracted while working out the number of compactor trucks and o.8 cubic meter capacity containers.

4.2.2. Compactor trucks

It is proposed to use the garbage compactor trucks with 0.8 cubic meter capacity containers which is the most efficient method of collection & transportation of waste.

However for smaller streets mini tippers with 1.0 cubic meter payload will be used. The mini tippers will discharge the waste in the compactor trucks or containers placed on main roads whatever is the situation at that time.

a) Capacity of the compactor trucks

Compactor trucks are available in various capacities like 4.0, 7.0, 8.0, 11.0 & 13.0 cubic meters compacted waste. Compactor truck with 4.0 cubic meter capacity is not as efficient as no significant POL reduction as compared to 8 cubic meter compactor truck for the same travel distance, has been observed. Further the manpower used in both cases is the same. The only merit of this size of the truck is that it is pliable on smaller roads for which the mini tippers are proposed.

The compactor trucks of 11.0 and 13.0 cubic meter capacities are too large for plying on the roads and streets of intermediate and smaller cities. Hence compactor trucks with intermediate capacity of 8.0 cubic meter compressed waste will be efficient and pliable on these roads and this will be used as a waste transportation vehicle.

b) Number of compactor trucks

- As stated above the waste from hand carts, mini tippers and containers will be discharged in the compactor trucks which will compact the waste in the ratio of 1:2 and transport the compacted waste to the landfills or dumping sites.
- The number of compactor trucks required for a particular city will depend upon the quantity of waste generated per day by that city.
- Further the distance of the landfill from the center of the cities varies drastically from city to city depending upon the location of the dumping sites. The number of trips traversed by the compactor per day will be calculated from the average distance of the dumping site from various points in the city and its speed which in turn will again depend upon the traffic intensity on the compactor routes to the dumping site and congestion on these roads. However and average speed of 25 Km/hour has been assumed keeping in view the open and the congested roads in various cities
- The total waste generated per day and the number of tips a compactor can make per day will form the basis for calculating the number of compactors required for a particular city.

4.3. Collection equipment & machinery

For primary collection under mentioned equipment & machinery will be used:

4.3.1. Hand carts

- Three wheeled hand carts of 0.25 cubic meter capacity will be used for door to door collection of waste and for street sweepings. During the site visits of various cities it has transpired that very few house hold discharge the waste directly into the containers placed at the main roads where compactors can ply and hence the waste discharged directly in containers is negligible.

- Hence the entire quantity of waste will be handled by the hand carts for discharge either in the containers or in the mini tippers and the number of hand carts will be designed to handle 100%of the waste.
- The sanitary workers have to throw the waste on the ground and then handle it again manually to throw it in the containers. This involves double handling of the waste which requires additional labor and time. In order to eliminate the double handling, a hand cart will be designed with adjustable height to make it compatible with container for discharging the waste directly in the container without double handling. Initially 10% of the hand carts will be piloted to see the performance and functionality. If the performance is found to be satisfactory then all the hand carts will be replaced by the newly designed carts after their perishing. Rest of 90% will be conventional three wheeled hand carts.

4.3.2. Mini tippers

- These vehicles are basically meant to collect waste from the narrow streets where the compactor trucks cannot ply. Most of the cites included in PCP are of intermediate and smaller size not having a higher living style and are having large number of streets ranging from 6 feet to 20 feet. Hence adequate number of mini tippers will be required to collect solid waste from these streets. Further use of these vehicles will reduce the plying distance of the hand carts thus improving the waste collection efficiency.
- The mini tipper requires manual loading of waste whereas waste can be discharged on ground, into the containers and into the hopper of the compactor trucks directly by the mini tipper by electro mechanical mechanism without manual handling.
- All of cities included in the Punjab Cities Program have number of smaller streets and the number and length of these streets varies from city to city. As such the exact quantity of waste collected from these streets will vary in Program Cities which will be calculated as given below.

a) Working out the requirement of mini tippers

- The roads on which compactors can ply will be determined and marked on the plan in red line whereas the roads and streets on which the mini tippers can ply will also be marked in black line.
- It has been observed from the site visits and interviews with the sanitary supervisors that a hand carts usually collects the waste and transports through a distance of 1000 feet. Hence it is assumed that the waste through the distance of 1000 feet on both sides of the roads on which the compactors can travel, will be handled by hand carts and discharged directly into the containers but the waste beyond that distance will be handled by the mini tippers.
- In this way the city areas directly covered by the handcarts discharging into the containers directly will be worked out and subtracted from the total inhabited area of the city.
- After visiting some of the cities and conducting interviews with the waste managers, it has been estimated that the mini tippers can traverse 12 to 15 trips

per day depending upon the distance traversed and the congestion on the roads and streets. Hence the round trips of the mini tippers will also be worked out on the basis of the collection time and the round trip time.

- After working out the population density & area covered and in turn the total population covered by the mini tippers and the number of trips mini tippers can traverse per day, the requirement of number of mini tippers will be worked out for a particular city.

4.3.3. Containers for compactor trucks

Most of the waste from entire area of the cities will be collected in the containers of 0.8 cubic meters capacity being the size of hopper of the compactor trucks as the hand carts and mini tipper will, most of the time, discharge waste into these containers except for the time when the compactor in being loaded with waste in the area where the mini tipper is plying and it can directly discharge the waste in the hopper of the compactors. Hence the number of containers will be worked out according to the total waste generated by the city.

5. Density of the solid waste

The density of waste in various countries is given below;

Zone	Country	Density in Kg per meter cube
Industrialized countries	United Kingdom	150
	USA	100
Middle income countries	Singapore	175
	Tunisia	175
	Hong Kong	233
	Egypt	330
Low income countries	Bangladesh	600
	Burma	400
	China	476
	India	300-560
	Indonesia	250-400
	Nepal	350-600
	Pakistan	210-500
	Sri Lanka	400
	Thailand	290-390

Source: Jindal et al (1998), Mutt Amara et al (1994), Habitat

Under the light of above mentioned waste densities the assessment of numbers / quantity of equipment and machinery will be based on the following densities:

Density of waste in waste bins, handcarts, mini tippers and 0.8 m^3 containers 400 Kg/cubic meter

Density of waste in 5.0 m^3 containers	500 Kg / cubic meter
Density of waste in compactor trucks	800 Kg / cubic meter

6. Disposal points and travel distance

The landfills or dumping sites of various cities are located at a distance ranging from 6 to 15 Km from center of the cities. As described above the trips traversed by a compactor truck or arm rolls will be worked out as under:

The compactor trucks will take more time for loading the 0.8 cubic meters waste containers from various points for one trip whereas the arm rolls will load only one 5.0 cubic meter container only from one site.

6.1. Collection time for compactors

The waste collection time depends upon the capacity of the compactor. The collection time for various capacity compactors is given below:

4 m^3	0.6	hours
7 m^3	1.0	hours
8 m^3	1.2	hours
11 m^3	1.75	hours
13 m^3	2.5	hours

Hence the waste collection time for the 8.0cubic meter capacity compactor in general will be taken as 1.2 hours.

6.2. Collection time for arm roll

The arm roll will collect only one container of 5.0 cubic meters by placing an empty container at that site. Hence the collection time of the arm roll will not be more than 30 minutes. However the speed of the arm roll is generally lower than the compactor truck because of the detached pay load which requires lower speed for travelling.

6.3. Round trips of compactors and arm rolls

The round trip time for the compactors and the arm rolls from collection points to the dumping sites and back will vary from city to city and will comprise of the under mentioned components.

- Waste collection time
- Travelling time to dumping site
- Waste un-loading time
- Travelling time to the next collection point

For working out the number of trips per day for compactors and arm rolls, the round trip time for these vehicles will be worked out for each city. The average working time of the sanitary staff per day is 8 hours and the requirement of the compactor trucks for a particular city will be worked out accordingly.

7. Other machinery requirements

7.1. Life of existing machinery & vehicles

The standard life of movable machinery and equipment is taken as 10 years. Life of existing machinery & vehicles to be considered as usable in next 5 years will be taken as 6 years meaning thereby that all vehicles having age of more than 6 years will be considered as discarded for calculation of the demand of any city in next 5 years.

7.2. Truck mounted suction type road sweepers

The number of suction sweepers used for sweeping the roads in any city will depend on the length of main roads required to be swept which in turn will vary from city to city. The length of such roads to be swept will be worked out in consultation with the MCs. The number of sweepers required for a particular city will be worked out as under:

Average speed of the suction sweeper	12 km/hour
Total working hours per day	8 hours
Recess time	30 minutes
Travel time from and to parking area	45minutes
Waste emptying time from place to place intermittently	45 minutes
Net sweeping time	6 hours
Length of roads swept on single side	72 Km
Length of roads swept on both sides	36 Km

The requirement of sweepers for a particular city will be worked out accordingly.

7.3. Other machinery & equipment

The requirement of other kinds of machinery & equipment has been based on the population of the cities. The estimated quantity and number of machinery and equipment according to population is worked out in below given table;

S N.	Population	150,000	200,000	250,000	300,000	400,000	500,000	600,000
1	Front blade tractor (One for 200,000 population with minimum as one)	1	1	1	2	2	2	3
2	Front end loaders (One for 150,000 population with minimum as one)	1	1	2	2	2	3	4
3	Water bowsers ((One for 150,000 population with minimum as one Nos)	1	1	2	2	2	3	4
4	Dumper trucks	1	1	1	1	2	2	2
5	Excavators	1	1	1	1	1	1	1

6	Mobile workshop	1	1	1	1	1	1	1
7	Motor bikes (one for 75000 population)	2	2	3	4	5	6	8

8. Parking areas

For parking the proposed and existing machinery & equipment, parking sheds along with allied facilities will be constructed. The space for this purpose will be provided by the MCs and under mentioned facilities will be provided in these areas:

1) Boundary wall & gate
2) Parking sheds
3) Small office
4) Toilets and waste water disposal arrangements
5) Vehicles washing and servicing pits
6) Arrangements of water for washing, toilets and drinking
7) Guard hut
8) Approach road

The land for the parking areas will be provided by MCs. However above mentioned facilities will be constructed under a separate project for which necessary surveys, measurement at site and detailed design will be got done by the Detailed Design Consultants.

9. Mobile work shop

9.1. Necessity for the mobile workshop

All MCs will have adequate machinery and equipment which will require repairs during working. Presently for repairs, washing and servicing of the vehicles, MCs have to rely on the contractors and vendors which delays the tasks resulting in adverse impacts on the service delivery. The process is further delayed because of the prior cost estimation, bidding and approval process. In order to improve the efficiency of municipal service delivery, mobile workshops may be established and maintained in every MC. By doing so we will;

- Save the time and expenditure of transportation of the machinery to workshop and back in case the major repairs are not involved.
- Add to the service credibility by speedy repairs/replacements and reducing the breakdown periods of the services.
- Improve service delivery level.
-

9.2. Requirements for establishment and operation of mobile workshop

The requirements for establishment and operation of the mobile workshops in MCs are as given below;

9.2.1. Manpower

Following staff will be sufficient to operate the workshop because the nature of at site repairs/replacements does not call for more than this staff.

Mechanic	01 slot
Helper	01 slot
Vehicle driver	01 slot
Electrician	01slot

The mobile workshop may be used by the mechanics or electrician and helper according to the nature of repairs needed.

9.2.2. Vehicle

The mobile workshop will be fabricated on a Right Hand Drive 4x2 Diesel, 4 stroke, 4 cylinders inline, water cooled, direct injection, turbocharged with intercooler 120 ~ 140 PS powertruck chassis with GVW of 8800 to 9000 Kg. The truck shall have a compact cabin fitted as per given specifications.

The mobile workshop truck shall be furnished with all necessary tools required to carry out multiple tasks in the field for all vehicles described above. The mobile workshop container shall contain, inter-alia, the following items suitably mounted in the cabinets inside the container:

1) Diesel driven Generator 5 kVA with alternator for electrically powered tools
2) Diesel/petrol generator driven welding machine. The generator for welding machine shall be suitable for operating the machine without any overload with a minimum margin of +10% above the rated load.
3) Angle Grinder with complete set of grinding discs
4) Hand drill machine with drill bit set
5) Air compressor: Industrial heavy-duty working pressure 8 bar and Air Tank of 100 liters capacity
6) Control panel
7) Spare wheels (7.00-16-14 PR) - 2 Nos.
8) Fire Hose Reel with coupler for swift connection
9) Heavy Duty Battery, min. 65 AH, each – 2 Nos.
10) Welding Rods (E 6013) - 5 packs of 5 kg each
11) Mechanical Grease Pumps - 2 nos.
12) Lube Oil -5 gallons
13) Dry Chemical Fire Extinguishers, 5 kg - 5 nos.
14) Lighting - 8 nos.
15) Foldable Aluminum Ladder – 1 no.
16) PPEs (Gloves, Shoes, Helmets) – 4 sets
17) Crane 1.5-ton including workshop crane rail system from outside to inside of workshop
18) Plastic Storage Bins–3 nos.
19) HydraulicJack, 10Tons Capacity–2 nos.
20) **Technicians Tool kit including:**

S. Nr.	Detail	Unit	Quantity
A	**For mechanical tasks**		
1	Double operating wrench set(spanner/chabi set) packed in box	Set	1

2	Ring spanners set (Pana set 8 to 32 mm) packed in box	Set	1
3	Socket wrench set complete (Goti set) packed in box	Set	1
4	Screw wrench set (6", 8",10",12" & 18" sizes) packed in box	Set	1
5	Pipe wrench set (12" & 18" sizes)	Set	1
6	L-key sets (30 pieces) packed in box	Set	1
7	Flat File set (6",8"10" & 12" size)	Set	1
8	Round file set (6",8"10" & 12" size)	Set	1
9	Chain wrench set (12 size)	Nr	1
10	Chain wrench set (18" size)	Nr	1
11	Chain wrench set (24" size)	Nr	1
12	Vice	Nr	1
13	Dye set ½" to 2"	Nr	1
14	Dye set 2" to 4"	Nr	1
16	Hammer set (½lb, 2 lbs& 5 lbs)	Set	1
17	Chisel complete set (6",8",12")	Set	1
18	MS rod (bari) 4 feet long	Nr	2
19	Chain pulley block 5 tons	Nr	1
20	Bearing puller set (Nr- 6,8,10,12,16)	Set	1
21	Hack saw including packet of blades	Nr	1
22	MS pan	Nr	1
23	GI funnel (I Kg)	Nr	1
24	Electric cutter	Nr	1
25	Screw driver flat big size	Nr	1
26	Screw driver star end big size	Nr	1
B	**For electrical Tasks**		
1	Grip pliers set (main pliers, Nose pliers & cutter pliers)	set	1
2	Cable cutter	Nr	1
3	Tong tester (Amperes, volts, ohms & continuity (Germany or English made)	Nr	1
4	Simple touch tester	Nr	1
5	Thimble presser/punch	Nr	1
6	Electric drill (Germany)	Nr	1
7	Electric blower	Nr	1
8	Screw driver set imported except china	Set	1
9	Screw driver set flat	Nr	1
10	Screw driver set star	Nr	1

Annexure-D

Description of the Project

Section-II Project Proposal

1. Machinery & equipment

The design of machinery will be based on the design criteria mentioned in **Annexure-C**andthe quantity of the machinery & equipment required for this city is worked out as below;

1.1. Total waste generated

Total population of the city as per 2017 census	Persons	189,327
Annual growth rate (P)	%	2.0
Projected population in the year 2026 = Population in 2017 x(1+ P/100)^9	Persons	226,263
Rate of waste generation per capita per day	Kg	0.35
Total waste generated per day	Kgs	79,192
Density of un-compacted waste per cubic meter	Kg/cub-m	400
Volume of un-compacted waste generated per day	cubic meters	198

1.2. Requirement of Compactor trucks

1.2.1. Number of trips of the compactor trucks per day

The distance of various remote and shortest routes of the proposed compactor trucks were actually measured at site in Daska city which are given below and at Map M-3.

Near Daska Park, By Pass Road to dumping site	26
Near PSO Sambrial Road to dumping site	24
Near DPS School Daska,Sialkot Roadto dumping site	36
Near Clothing Shop,Chota Gaga Jamke Roadto dumping site	22
Total distance for 4 points to dumping sites	108
Average compactor route length	27
Average speed of the compactor for plying in congested areas of the city and on open roads	25 km/hour
Average time of travel from various points in the city to dumping site (round trip) including unloading of waste at dumping site	1.08 hour
Collection time as given in the design criteria	1.2 hours
Total time of round trip	2.28hours
Working hours / day	8 hours
Maximum possible number of compactor trucks trips per day	4 Nos

1.2.2. No of compactor trucks required

No of arm rollsavailable with MC (this arm rill is very old and not serviceable now)	01
Total waste generated per day	198 m^3
Waste to be handled by compactor trucks	198 m^3
Compacted waste carried by compactor truck	8 m^3
Compression ratio	2
Quantity of loose waste carried by compactor truck	16 m^3
Trips per day	4 No
No of compactor trucks required	3 No
Already available with MC	Nil
Net requirement	3 Nos

Proposed Compactor Zones in Daska are shown in Map M-4 Compactors Waste Collection Zones

1.3. Requirement of mini tippers

1.3.1. Number of trips of mini tippers per day

Average waste collection time per trip	15 minutes
Average round trip travel time	17 minutes
Total round trip time	32 minutes
Working hours	8 hours
Average round trips per day	15 Nos

The number of mini tippers required for MC Daska base on 15 round trips per day, have been worked out as below;

1.3.2. No of mini tippers required

The requirement of mini tippers will be worked out on the basis of quantity of waste to be collected through these vehicles. It has been observed that the waste can be collected by hand carts and discharged into the containers up to a maximum distance of 1000 Rft beyond which mini tippers will be used. The roads on which the compactors can ply have been marked on the plan in red color and the area served by the containers directly through hand carts has been shown as hatched. The total inhabited area of the city and the hatched area has been worked out and therefrom the quantity of waste handled through the mini tippers in the remaining area has been calculated as under and also graphically shown in Map M-2

Total inhabited area of the city	25.0Sq. Km
Service length of hand carts directly discharging waste in the containers	1000 Rft
Area served by discharging the waste directly by hand carts into the containers	17.0 Sq. Km
Area served by mini tippers	8.0 Sq. Km

% area served by mini tippers	32%
Total waste handled by mini tippers per day	64 m^3
Capacity of the mini tippers	1.0 m^3
Trips per day	15 No
Total Nos of mini tipper required	4Nos
Already available with MC	Nil
Net requirement	4 Nos

1.4. Truck mounted suction sweepers

Roads in Daska to be swept by the sweeper	
1-Sialkot-Daska Road 2x3 Km =6 Km	6.0 Km
2- CollegeRoad=2x2 Km= 4 Km	4.0 Km
3-Gujranwala Road –KachehryRoad=2x4.0 Km = 8.0 Km	8.0 Km
4- Stadium Road = 1x1km = 1.0 Km	1.0 Km
5- Sambrial Road = 3x3.0 Km = 6.0 Km	6.0 Km
6- By PassRoad = 1x1 Km =1.0 Km	1.0 Km
7-CircularRoad = 4X2Km=80 Km	8.0 Km
8-JamkeRoad = 1X2.0 Km= 2 Km	2.0 Km
9- By Pass Road = 1X3.0 Km= 3 Km	3.0 Km
10- Awami Road = 1X2.0 Km= 2 Km	2.0 Km
11- MianWali Bangla Road = 1X3.0 Km= 3 Km	3.0 Km
Total length to be swept on both sides of road	**49.0 Km**
Total length on one side	98.0 Km
Speed of sweeper truck	10-12 Km/hour
Working hours per day	8 hours/day
Time required for travel to site and back to parking area, emptying the payload and recess	2 hours/day
Actual working time	6 hours/day
Roads swept per day (one side)	72 Km
No. of sweeper trucks required	One

MC Daska has two mechanical sweepers procured 6 years back but are not vacuum typ. So, one vacuum type mechanical sweeper is proposed.

1.5. Requirement of other machinery & equipment

S.N.	Detail of machinery & equipment	Total requirement as per design criteria			Existing machinery & Equipment			Add. required
		Description	Unit	Qty	Nos existing	Age in years	Usable	
1	0.8 m^3 containers	Total waste generated per day	m^3	198	-	-	-	-
		Capacity of the container (un-compacted waste) in cub-m	m^3	0.8	-	-	-	-
		Total Nos of containers with 10% as standby	No	272	0	0	0	272
2	Hand carts	Waste to be handled by hand carts = 100% as per design criteria	m^3	198	-	-	-	-
		Capacity of hand cart (un-compacted waste)	m^3	0.25	-	-	-	-
		Total Nos of hand carts with 5 trips (Existing carts not catered for)= 158 x 1.1	No	174	85	5	0	174
		85 hand carts available with MC have perished as the hand carts have an average life of 2-3 years						
		10 % of the hand carts will be constructed with adjustable height for piloting to make them compatible with the garbage containers for direct discharge of waste in these containers. 90% will be conventional hand carts.						
		Hand carts compatible with containers	No					17
		Conventional three wheeled hand carts	No					157
3	Front blade tractor (One for 200,000 population with minimum as one)		No	1	2	13	0	1
4	Front end loaders (One for 150,000 population with minimum as one)		No	2	1	13	0	2
					1	15	0	
5	Water bowsers ((One for 150,000 population with minimum as one Nos)		No	2	2	1 & 10	1	1
6	Dumper trucks (one for 300,000 persons with minimum as one)		No	1	0	0	0	1
7	Excavator		No	1	0	0	0	1
8	Motor bikes (one for 75000 population)		No	3	0	0	0	3

2. Summary of scope of work

According to the above mentioned design calculations below given machinery & equipment will be procured.

S.N.	Detail of machinery & equipment	Nos
A	**Solid waste management machinery**	
1	Compactor trucks	3
2	0.8 m^3 containers	272
3-a	Three wheeled hand carts with adjustable height as per containers	17
3-b	Conventional three wheeled hand carts	157
4	Mini tippers	4
5	Water bowsers with spray system	1
6	Front blade Tractor	1
7	Front End Tractor	2
8	Truck mounted vacuum sweeper	1
9	Dumper truck 10 m^3	1
10	Wheel Excavator	1
11	Motor bike 70 cc	3

3. Ultimate disposal of waste

- MC has no proper sanitary landfill site and the waste is presently being dumped near Bhonkanwalavillage located at a distance 9 km from City.
- No earth cover is being provided on the waste and noimpervious lining has been provided beneath the waste which is creating health hazards as described in the existing situation.
- MC has no land at present which can be utilized for development of a landfill site. Hence measures for acquiring the land for landfill will be required to be taken up by MC.
- Alternately Government of Punjab may go for construction of Regional Landfills wherein MC Daska can dump its waste. For this purpose a transfer station will be required to be built. Necessary steps will be taken by MC as per circumstances prevailing in future.

4. Parking area

- The solid waste and other vehicles of MC Daska are being parked at MC office having two Kanal area. This is unpaved area not equipped with any type of sheds and all the vehicles are exposed to sever 'weather conditions. All required facilities remain to be provided in this area.

  A separate PC-I will be prepared and got approved for provision of all required facilities in the parking area. The design of the parking area will comprise of under mentioned features:

  - Boundary wall & gate
  - Parking sheds
  - Small office
  - Small workshop
  - Arrangements of water for washing, toilets and drinking

- Toilets and waste water disposal arrangements
- Vehicles washing and servicing pits
- Guard hut
- Approach road

ANNEXURE-E

Punjab Cities Program

STANDARDS AND SPECIFICATIONS FOR SOLID WASTE MACHINERY & EQUIPMNT

Provision of Equipment and Machinery for solid waste management to Program MCs

Abbreviations

ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
CC	Cubic Centimeters
CEN	European Committee for Standardization
CFC	Chlorofluorocarbon
DIN	German Institute for Standardization
DFT	Dry Film Thickness
EN	European Norms; European Standards
FHD	Full High Definition
GVW	Gross Vehicle Weight
HDMI	High Definition Multimedia Interface
HP	Horsepower
HCFC	hydro chlorofluorocarbons
ISO	International Organization for Standardization
LED	Light Emitting Diode
LPM	Liter Per Minute
m	Meter
min.	Minimum
mm	Millimeters
NFPA	National Fire Protection Association
PLC	Programmable Logic Controller
PS	Pferdestrke: Unit for Vehicle Power 1PS = 0.986 Horsepower
PTO	Power Takeoff
RHD	Right Hand Drive
SAE	Society of Automotive Engineers
VTMS	Vehicle Tracking Monitoring System
VDU	Video Display Unit

PUNJAB CITIES PROGRAM (PCP)

Provision of Machinery & Equipment
For
Improvement of Solid Waste Management in MC DASKA

Specifications and Standards

The scope of services for this project includes designing, manufacturing / fabrication as per applicable international standards mentioned hereunder, inspection / testing at manufacturer's works, supplying at designated site, testing at site, training to the Client's designated personnel for operation and maintenance, one (01) year's warranty, maintenance of the equipment/machinery for one (1) year during defect liability period (DLP) of each item of equipment / machinery whose specification and standards are given in this chapter

Vehicle Chassis

The Vehicle's Chassis on which the superstructures are required to be fabricated or built, will be procured directly by the client and handed over to the successful bidder /contractor for construction / fabrication of superstructures as per Standards and Specifications given herein. The Vehicle's Chassis will be inspected by the contractor/super structure manufacturer at the time of taking over from the client or the vehicle manufacturer and a certificate be given by the contractor/super structure manufacturer that every component is intact and the Vehicle's Chassis is suitable for the construction / fabrication of the specified superstructure on it. Any defect / shortcoming so observed, will be pointed over by the contractor/super structure manufacturer which will be got rectified by the client from the vehicle manufacturer. The handing over / taking over inventory will be prepared in duplicate and signed by the client and the contractor/super structure manufacturer, and a copy retained by both parties. One copy of that will be submitted to PMDFC for record.

Design of the superstructure

The design shall provide maximum levels of reliability and user-friendly functionality, convenience of operation and maintenance, neat and orderly arrangements which shall consider the functional requirements of various systems/components and pleasing physical appearance of equipment & machinery.

The design shall keep in view load distribution for better performance of the vehicle as per recommendations of the manufacturer of Chassis and design/drawings shall be submitted to the Engineer in Charge for review/approval.

Quantity of the machinery & Equipment

The quantity shall be supplied as required in Bill of Quantities included in the Contract Agreement.

Photos shown in these specifications are for illustration purposes only.

Section-I Specifications, standards and other requirements

Item No	Manufacturing & fabrication Standards
1	The equipment/machinery shall conform to the applicable requirements of ANSI/ASTM/ISO/BS/EN/SAE standards and specifically mentioned standards hereunder shall be followed: • ANSI Z 245.1 – Mobile Refuse Collection and Compaction Equipment • ANSI B 56.1 – Safety Standard for Powered Industrial Trucks • AS 4123 – Mobile Waste Containers • ASTM A 36 – Standard Specification for Carbon Structural Steel • ASTM A 240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications • BS EN 280 – Mobile elevating work platforms – Design calculations, Stability criteria, Construction, Safety, Examinations and tests • BS EN 840 – Mobile Waste and Recycling Containers • BS EN ISO 1461 - Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods • DIN ST52- Standard Specification for Carbon Structural Steel • ISO 3691 – Industrial trucks — Safety requirements and verification • ISO 3834 – Quality Requirements for Fusion Welding of Metallic Materials • ISO 8501-1 – Preparation of steel substrates before application of paints and related products- Group A. Visual assessment of surface cleanliness • ISO 8503 – Preparation of steel substrates before application of paints and related products – Surface roughness characteristics of blast-cleaned steel substrates • ISO 8504 – Preparation of steel substrates before application of paints and related products — Surface preparation methods • ISO 5817 – Welding-Fusion welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections • ISO 3320 – Fluid power systems and components -Cylinder bores and piston rod diameters and area ratios – Metric series • ISO 5597 – Hydraulic fluid power — Cylinders —

	Dimensions and tolerances of housings for single-acting piston and rod seals in reciprocating applications • **ISO 6020 – Hydraulic Fluid Power – Mounting Dimension for Single Rod Cylinder, 16 Mpa (160 bars)** • **ISO 6022 – Hydraulic Fluid Power – Mounting Dimension for Single Rod Cylinder, 25 Mpa (250 bars) Series** • **ISO 6015 - Earth-moving machinery -- Hydraulic excavators and backhoe loaders – Methods of determining tool forces** • **ISO 9606 – Qualification Test of Welders – Fusion Welding** • **ISO 9906 – Rotodynamic pumps — Hydraulic performance acceptance tests** • **ISO 9692 – Welding and Allied Processes–Recommendations for Joint Preparation** • **ISO 9001 – Quality Management Systems** • **ISO 12117-2 –Earth-moving machinery – Laboratory tests and performance requirements for protective structures of excavators – Part 2: Roll-over protective structures (ROPS) for excavators of over 6 t** • **ISO 10262 – Earth-moving machinery - Hydraulic excavators – Laboratory tests and performance requirements for operator protective guards** • **ISO 14001 – Environmental Management Systems** • **ISO 17559 –Hydraulic Fluid Power – Electrically controlled Hydraulic Pumps- Test methods to determine performance characteristics** • **ISO 17559 –Hydraulic Fluid Power – Electrically controlled Hydraulic Pumps- Test methods to determine performance characteristics** • **ISO 4409 – Hydraulic Fluid Power – Positive Displacement Pumps, motors and integral transmissions- Determination of Steady State Performance** • **ISO 10100 – Hydraulic fluid power - Cylinders – Acceptance tests** • **ISO 21308 – Road vehicles — Product data exchange** • **between chassis and bodywork manufacturers (BEP) –-Part 2: Dimensional bodywork exchange parameters** • **SAE J517 – Hydraulic Hose Specifications** • **SAE J1334 – Hydraulic Cylinder Integrity Test** • **SAE J745 – Hydraulic Power Pump Test Procedure** • **SAE J1336 - Hydraulic Cylinder Leakage Test** • **SAE-J1374 – Hydraulic Cylinder Rod Seal Endurance Test Procedure** • **SAE J1335 - Hydraulic Cylinder No-Load Friction Test**

	• SAE J1097 – Hydraulic Excavator Lift Capacity Calculation and Test Procedure • JIS 3101 – Rolled Steel for General Structure • NFPA 22 – Standard for Water Tanks for Private Fire Protection • NFPA-T3.6.7 - Fluid power systems and products - Square head industrial cylinders - Mounting dimensions • SAE Recommended Practice and Ground Vehicle Standards International Trucks Body Installation / Mounting Directives • Any other applicable international standards duly approved by the Employer/Engineer.
2	**Submittal and Supplements**
	The Contractor shall submit electronic copies of the applicable international Standards (latest editions). The following documents/drawings and other submittals as required in both electronic and hard form shall be submitted for review and approval by the Engineer in Charge: However, the contractor will not be responsible for submission of any document relating the Vehicle's Chassis as these would be provided by the Client to the Contractor. • Shop drawings: General assembly, components, dimensions, thicknesses, weights and methods of assembly including material specifications. • Load distribution design/drawings of vehicles • Technical brochure • Detailed specifications • Operation/maintenance manual along with troubleshooting • Illustrated instruction book (one version English, one version Urdu language) covering the following: **A. Description of unit and component parts:** 1. Complete nomenclature and commercial number of replaceable parts 2. Metallurgy of Parts and their equivalence according to ASTM 3. Function, normal operating characteristics **B. Operating procedures:** 1. Start-up, break-in, normal and emergency operating instructions 2. Special operating instructions **C. Maintenance Procedures:** 1. Routine operations/maintenance (daily, weekly, monthly or annual) 2. Guide to "Trouble-shooting".

	3. Disassembly, repair and reassembly **D. Servicing and lubrication:** 1. List of lubricants with their equivalents and their schedule for applying. These lubricants shall be easily available in Pakistan. 2. Sketches indicating all points where lubricants are to be applied. **E.** Predicted life of parts subject to wear, list of original manufacturer's spare parts, and recommended quantities to be maintained in storage. **F.** Other data as required under pertinent sections of Specifications or as required by the Engineer in Charge. **G.** Additional requirements for operating and maintenance as given below and as deemed necessary. • Manufacturer/Supplier's Quality Assurance/Quality Control Performa • Manufacturer/Supplier's valid ISO 9001 Certificate • Manufacturer/Supplier's valid ISO 14001 Certificate • Original Equipment Manufacturer's authorization letters for all the equipment • Original Equipment Manufacturer certificate for all the equipment • Material Test Certificates of material used in the fabrication. • Test certificates and OEM certificates of Hydraulic equipment including pumps and cylinders as per standards mentioned in Item No. 2. • Import Documents including Bill of Lading and Goods • Declaration form for all import equipment. • End User's Certificates for minimum 8 years satisfactory operation in the Purchasers' country. • First aid kit and safety equipment as required according to • Pakistan legislation • Maintenance tool set required for each equipment/machinery.
3	**Warranty** All equipment/machinery except the Vehicle's Chassis provided by the Client, under each item to be furnished shall be guaranteed / warranted for a period of one (1) year from the date of Preliminary Acceptance against defective materials, design, performance or workmanship. Any deficiency shall be replaced or corrected by the Contractor as directed by the Engineer in Charge at no additional expense to the Employer.
	Defects Liability Period All equipment/machinery except the Vehicle's Chassis provided by the Client, shall have a defect liability period of one (1) year after taking over.
4	**After Sales Services** The contractor shall provide after sale service and repair facilities for all the equipment/machinery (except the Vehicle's Chassis provided by the Client), to be

	supplied by the Contractor. **Repair time** Maximum one (1) month time period in case that major faults[1] are detected and maximum 10 days period in case of minor repairs[2]. **Response time** On-site response by the end of next business day (17 hour), following the request for service
5	**Training** The contractor/manufacturer/supplier shall arrange training to the designated personnel for operation and maintenance of each equipment/machinery in MC jurisdiction as described herein below: • Two (2) days training for each equipment/machinery at Manufacturer's works/factory at supplier's cost for four (4) persons nominated by the Employer. • Three (3) days training (mainly outdoor) at the project location (MC jurisdiction) for each equipment/machinery to the workshop staff, drivers and co-drivers.
6	**Equipment and machinery** All the equipment/machinery/vehicles except the Vehicle's Chassis provided by the Client, mentioned herein below shall be designed, manufactured, fabricated and tested as per specified international standards i.e. ANSI/ASTM/ ISO/BS/EN/SAE. The latest edition and amendments shall apply in all cases. The Bidder shall state in his bid the standards and codes which he proposes for any equipment. The country of origin of manufacturing/fabrication of the machinery / equipment not manufactured in Pakistan shall be USA/Europe/Japan. However, the components of the Machinery /Equipment manufactured in Pakistan and requiring import, will also be imported from the above-mentioned parts of the world. The Contractor shall provide the name of country of origin for each equipment/machinery/vehicle or the components for approval of the Engineer in Charge. The specifications of the equipment / machinery / vehicles to be supplied by the Contractor are given herein below. The Contractor may submit alternate proposal having better performance and extended useful life of the equipment. However, for any alternate equipment, the approval of Engineer in Charge shall be mandatory.

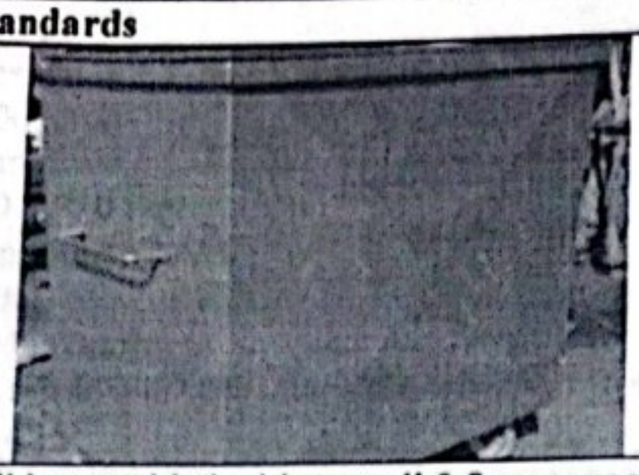
Explanations

[1]**Major faults** - cover any faults which do not allow functionality or operation of the equipment/machinery.

[2]**Minor repairs** – cover everything which hinders full functionality or operation of equipment, or limits safety and security of personnel operating equipment/machinery

Section-II

Specifications of the machinery and Equipment

No.	Description, Specifications, and Standards
1	**Garbage Container 0.8 m³ capacity** 
	The rectangular garbage container shall be provided with overall 0.8 m³ capacity. The material of the container shall be hot dip galvanized iron (GI) as per ISO 1461 or ASTM A123. Thickness of the main body shall not be less than 3 mm. The container dimensions shall be approximately 1200mm x 1200mm x 800mm (±5%). The top edges of the container used for lifting by the compactor levers will be fabricated with MS angle iron 1.5"x1.5"x ¼" size. The entire container after fabrication will be dipped in the hot zinc tank to provide galvanizing thickness of not less than 100 microns. The container shall be provided with six (6) nos. Teflon/steel replaceable wheels with NTN, SKF or FAG bearings and a wheel locking mechanism to prevent movement when placed at a location.
2	**TRUCK MOUNTED GARBAGE COMPACTOR 8.0 m³** 
	Chassis **Type** Right Hand Drive 4x2 **GVW** 8800 ~ 9000 kg on 6 tires **Engine** **Emission standards:** Euro II or III **Type:** Diesel, 4 stroke, 4 cylinders inline, water cooled, direct injection, turbocharged with intercooler **Power:** 120 ~ 140 PS **Torque:** 25 ~ 40 kgf-m **Displacement:** 3500~4500 cc **Clutch** Dry single plate diaphragm type, hydraulic control **Transmission** min. 5 forward & 1 reverse

Axle	**Front:** Reverse Elliot "I" section beam
	Rear: Full floating type
Brakes	**Service:** Hydraulic with dual circuit
	Exhaust: Vacuum operated
	Parking: Mechanical expanding type on shaft
Dimensions	**Wheel base:** 3800 ~ 4000 mm
	Width: 1900 ~ 2100 mm
	Ground clearance: 200 ~ 210 mm
Electrical	**Batteries:** 2 x 12 V, minimum 65 AH
	Generator: 24 V Steering RHD
Suspension	Semi-elliptic, laminated leaf springs, hydraulic double acting telescopic type shock absorbers on front and rear
Wheels	Tire size: 7.50-16 with 14 PR
	No. of tires: 7 including one spare
Fuel tank Capacity	Minimum 100 liters
Cab	Rigid cab all structural steel welded construction reinforced with beams in doors including air conditioning.
	The cabin shall be factory built, beautifully designed, elegantly styled and comfortable finished. It shall have seating capacity for 3 persons (including driver).
Frame	Ladder-shaped "[" channel section made of high strength structural steel

- Authority letter from chassis manufacture describing that it is in operation in Purchaser's country for at least eight (8) years shall be attached with the bid.

Superstructure

The Compactor shall be of Pack Plate Type Compactor with a minimum Compaction ratio of 1:2 The hopper loading height shall not be more than 900-950 mm and system-working pressure for compaction shall be about 160 to 180 bars.

The body design shall be of independent construction and mounted to meet the Health and Safety of the working personnel.

The superstructure's assembly shall be according to the truck's superstructure installation directives. The superstructure shall be mounted with rigid connection at rear, and flexible connection in front to provide the required elasticity.

The design shall keep in view equal load distribution for better performance of the vehicle.

All steel surfaces shall be applied with two coats of Zinc-rich Epoxy primers to give protection against rust and corrosion to enhance the design life, and one final coat outer side using 2- component polyurethane paint of min. 200 microns DFT in the color shade approved by Employer/Engineer. The paint shall be applied after sand/shot blasting according to SA 2.5.

The garbage compactor equipment shall conform to following specifications:

Body of the Garbage compactor truck

Capacity	8.0 m^3 Excluding Hopper
Body Material	DIN ST52, JIS SS 400, equivalent or better grade steel
Body floor	4.00~6.00 mm

If steel grade used is of yield strength more than 340Mpa, only then 4 mm thickness shall be allowed for Body floor. For DIN ST52 or equivalent material, 5.00 mm plate shall be used.

Body Roof	3.00 mm
Body Side Plate	4.00 mm

Stiffeners to be provided and these shall be full-seam welded on the body if required.

Hopper

Capacity 0.8 ~1.2 m^3. The hopper capacity shall be compatible with Mini Tipper/ Tipper Rickshaw.

Material	DIN S T 52, JIS SS400, equivalent or better grade steel
Side Plate	5.00 mm plate with reinforcing channels
Floor Plate	6.00 mm plate covered with 3 mm plate (Dual cover Structure if required)
Press Plate	5.00 mm plate covered with 3 mm plate

Press plate shall be able to collect loose garbage inside the body via a sweeper shovel being pushed into the body by two double acting jacks.

If steel grade used is of yield strength more than 340Mpa, thicknesses less than specified may be allowed. However, these shall be used only after approval by the Employer/Engineer.

Bin Lifter

Lifting capacity at least 600 kg capable to lift 0.8 m^3 Garbage container.

Safety Bars Locking & Sealing

2 Nos. Safety Bars under the hopper for maintenance. Hydraulic locking by means of two hydraulic tailgate lifting cylinders which shall also prevent the leakage of the wastewater.

Safety Bars Locking & Sealing

2 Nos. Safety Bars under the hopper for maintenance. Hydraulic locking by means of two hydraulic tailgate lifting cylinders which shall also prevent the leakage of the wastewater.

Control Valves

Solenoid/Electromechanical valve with safety relief valve for operation from hopper side for press & pack cylinders and on driver side of chassis for Dumping / Ejection Operation.

PTO

2 Gear type operated through Electro-vacuum actuator from Cab. This shall be close coupled with Hydraulic Pump.

Hydraulic Pump

Pump shall be close-coupled with PTO 50-55 cc / rev. Piston type. The operating pressure shall be minimum 180 bars and Max. Pressure 350 bars.

Hydraulic Cylinder Double Acting Type

There shall be 8 units of hydraulic double acting cylinders; 4 Nos for Press & Pack plate, 2 Nos for hopper lift and 2 Nos for Bin lift with honed tube and chrome plated rod as

per applicable ISO and SAE Standards. The dimensions of cylinders shall be designed to accomplish the stipulated cycle times and compaction ratio. The cylinder shall be warranted for 02 years.

Hydraulic Oil Tank

Hydraulic Tank. Capacity min. 75 liters, equipped with line return filter, suction filter, level & temperature gauge & breather cap.

Hydraulic Hoses

All high pressure hydraulic oil hoses shall be double braided according to SAE and shall have a burst pressure rating 2 times the working pressure. The hoses in motion are covered and Protected by steel wire.

Operation

Auto Cycle with Electro microprocessor control with manual option shall be provided. The system shall be equipped with emergency stop for safety. The operational control shall be placed on driver side with proper weather protection. Following options shall be available:

Auto Continuous: With this option the hopper operation shall continuously operate un till stopped.

Manual: With this operation each action can be done separately by push buttons.

Manual override. Manual override shall be provided in each valve for operation.
The system shall be controlled from the PLC control box, which enables start, stop, 1 cycle, continuous cycles, and rescue activities. Tailgate and ejector controls shall be in front side of the body. All devices for loading control shall be mounted on tailgate right side, and all shall be manual control for safety purposes. Compaction shall be controlled electrically via push buttons, and manually whenever required. An emergency stop button shall be provided on each side of the truck on the control panel.

Ejection / Hopper Lift Operation

Solenoid operational Control be placed on driver side of body with emergency shut off for safety.

Water Tank

One tank of minimum 100 liters capacity under the hopper and other tank of minimum 70 liters capacity under the floor with discharge facility complete in all respects.

Mudguards

Two steel mudguards with rubber flaps at rear ends.

Foot board

Two foldable type rear footboards for crew to stand.2

Handles

One handle at each side ¾" pipe handle for the crews to grasp.

Service and maintenance

An authorized sales and service point for the truck brand shall be nominated.

Frame Compactor

- Sub frame should be integral part of the container floor reducing total body weight.
- Oil tank shall be built into the compactor container for modern look and reduced build length.
- Container and compacting parts shall be made of high grade steel for intensive use.
- Hopper construction should be made from hard Steel wear plates with high strenght and high hardness such as Hardox, Abrazo or equivalent. The ejector plate slides shall be special heavy duty sliding blocks for smooth operation and low maintenance cost.
- Water tight sealing shall be provided between body and tailgate.
- Self-cleaning function shall be present in hopper during unloading.
- Drain valves shall be available for convenient emptying of waste liquids from the body and the hopper.
- The following items shall also be provided in the vehicle:
- Integrated sewage tank
- Rear lights mounted on body.
- Automatic release/engage tailgate lock.
- Both sides emergency shut-off switches.

Garbage Compactor Exterior

- Color of truck: As approved by the Employer
- Labelling: Logo, Motives and other labelling in both English and Urdu on both sides of the truck as per approval of the Employer.
- Front mirror and Kerb mirror if not fitted with the chassis will be fitted by the contractor.

Lights

- Two (2) standard revolving beacons on cab roof left and right; yellow;
- One (1) Standard revolving beacon on roof back side of vehicle; yellow
- Protective grid: Hazard-warning lamps; synchronic blinking

Safety Equipment and Drive

- According to Pakistan Law on technical conditions of vehicles.

Supplements

- First aid kit and safety equipment as required according to Pakistan legislation
- Side and rear protection for truck.

3	**Mini tipper 1.0 cubic meter capacity**	

The mini tipper shall be designed to dump the waste directly in to the road side containers or hopper of garbage compactor. The tipper shall be designed to complete operation with double action cylinder. Two hydraulic stabilizers shall be provided to cater for uneven roads. Design shall be maintenance friendly and allow sanitary worker to directly load garbage into it. The design shall be ideal for door to door collection of waste in combination with Garbage Compactors. The mini tipper equipment shall conform to following specifications:

Chassis

Type	RHD
Engine	800~1000 CC (+/- 10 %) Petrol, EFI delivering 30~45 HP Emission Standard: Euro II or III
Length	3200~3300 mm +/- 10%
Width	1400~1500 mm +/- 10%
Height	1600~1700 mm +/- 10%
Transmission	4 forward & 1 reverse 2
Fuel Tank	Minimum 35 Liters
Tires	4.50 - 12

Authority letter from chassis manufacture describing that it is in operation in Purchaser's country for at least eight (8) years shall be attached with the bid

Container Volume	1 Cubic Meter (Approx.)
Tipping Angle	Not less than 70 degrees

- Body Sides shall be made from minimum 3 mm thick of material ASTM A 36, equivalent or better grade steel sheets corrugated for additional strength without increasing the weight of the body. The container shall have round profile near the floor joint to avoid corrosion and to assist the emptying of the container.
- Body Floor shall be made from minimum 4 mm thick of material ASTM A 36, equivalent or better grade steel. The floor shall be single piece for corrosion protection and built-in cab protector shall also be provided.
- Floor Stiffeners shall be minimum 3 mm thick of material ASTM A 36, equivalent or

better grade steel "U" profile stiffeners shall be provided throughout the length of the floor for strengthening the floor.

- 5 mm thick Robust Hydraulic cylinder mounting brackets duly reinforced with mounting bracket plate (to avoid point load on the container) shall be provided.
- Two pivot brackets duly reinforced with 5mm thick Gussets shall be provided.
- All steel surfaces shall be applied with two coats of Zinc-rich Epoxy primers to give protection against rust and corrosion to enhance the design life, and one final coat outer side using 2- component polyurethane paint of min. 200 microns DFT in the color shade approved by Employer/Engineer. The paint shall be applied after sand/shot blasting to SA 2.5.

Sub Frame:

Rectangular Pipes 1.5 x 3 inch having thickness of 5 mm, suitably mounted on the pickup chassis. The Frame shall be mounted on the same cargo deck brackets originally installed by OEM to maintain strength of the chassis. Sub frame shall be attached to the chassis with High Tensile strength Nuts and Bolts. The canvas rubber Padding shall be provided.

- **Sub Frame Pivot Brackets** 8mm thick of material ASTM A 36, equivalent or better grade steel brackets shall be provided with Bi-Metallic Bushes for retaining lubrication. All lifting pins shall be equipped with grease nipples and spiral grease pathways to increase the productivity and design life of the structure.

- **Tipping Angle** shall be minimum 70 degrees which shall allow complete emptying of the container.

- **Tipping Height** of the body shall allow the waste to be emptied into a standard hopper of the compactor of 8.0 cubic meter capacity

- **Paint**: All steel surfaces shall be applied with two coats of Zinc-rich Epoxy primers to give protection against rust and corrosion to enhance the design life, and one final coat outer side using 2-component polyurethane paint of min.
  200 microns DFT in the color shade approved by Employer/Engineer. The paint shall be applied after sand/shot blasting to SA 2.5.

Hydraulic System

Hydraulic Power Pack

Hydraulic Pump: 2.1~2.5 cc/rev., DC Motor 1500 w, Tank Capacity = 7~10 Liters (+/- 10%)
Operating Pressures: 100~140 bars
Hydraulic Fittings: High quality galvanized hydraulic fittings for leak free operations.

- Hydraulic Hoses: Double Braided SAE 100 R2 (min.) hydraulic hoses with burst pressure twice as much as the working pressure.

- Hydraulic Lifting Capacity: 1200 Kg minimum using a hydraulic double acting cylinder.

Hydraulic Lifting System

- Lifting Cylinders: Double acting hydraulic cylinders made from hard chromed rods and honed tubes shall be provided. Hydraulic seals suitable for local 14abeling14 shall be provided for efficient and long life of the cylinders. All Hydraulic Cylinders shall be

equipped with hose burst protection; by means of Pilot operated check valves.

- Stabilizing Cylinders: 2 Nos. Double Acting Hydraulic Cylinders made from Hard Chromed Rods and Honed Tubes with hydraulic Seals for efficient and long life of the cylinders.
- The honed tubes, chromed rods, hoses and hydraulic seals shall be as per applicable ISO and SAE Standards

Electrical System

- 12 Volt DC Electrical System, Weather Proof Control Panel with high quality imported switches with Single action tipping operation.
- Operating Buttons placed on side of the vehicle

Accessories

Mudguards: Two MS mudguards with rubber flaps at the rear end. Reflective strips on the rear end of the mudguards.

- **Rotating Beacon:** One Rotating Beacon Light on the cabin.
- **Working Light:** One working light for night time operations. Grill shall be provided for Rear Lights for protection.

Color: As per Employer/Engineer's approval

Visibility: Color and Labelling in English and Urdu on front and sides with Logo, Motive, slogan and city name as per Employer's approval.

4	**Water bowser with spray system**	

The water tanker shall conform to the following specifications:

Truck chassis

Type	Right Hand Drive 4x2
GVW	8800 ~ 9000 kg on 6 tires
Engine	Emission standards: Euro-II or III Type: Diesel, 4 stroke, 4 cylinders inline, water cooled, direct injection, turbocharged with intercooler Power: 120 ~ 140 PS Torque: 25 ~ 40 Kgf-m Displacement: 3500~4500 cc
Clutch	Dry single plate diaphragm type, hydraulic control

Transmission	Min. 5 forward & 1 revers
Axle	Front: Reverse Elliot "I" section beam Rear: Full floating type
Brakes	Service: Hydraulic with dual circuit Exhaust: Vacuum operated Parking: Mechanical expanding type on shaft
Dimensions	Wheel base: 3800 ~ 4000 mm Width: 1900 ~ 2100 mm Ground clearance: minimum 200 ~ 210 mm
Electrical	Batteries: 2 x 12 V, minimum 65 AH Generator: 24 V
Steering	RHD
Suspension	Semi-elliptic, laminated leaf springs, hydraulic double acting telescopic type shock absorbers on front and rear
Wheels	Tire size: 7.50-16 with 14 PR No. of tires: 7 including one spare
Fuel tank Capacity	Minimum 100 liter
Cab	Rigid cab all structural steel welded construction reinforced with beams in doors including air conditioning. The cabin shall be factory built, beautifully designed, elegantly styled and comfortable finished. It shall have seating capacity for 3 persons (including driver).
Frame	Ladder-shaped "[" channel section made of high strength structural steel. Authority letter from chassis manufacture describing that it is in operation in Purchaser's country for at least eight (8) years shall be attached with the bid.
Main Frame	C Channel 100 x 200 x 100 mm of 6.0 mm thick Mild Steel
Bowser Tank	Mounted on Sub-frame of C channel of size 100 x 200 x 100 x 6.0 mm thick through 100 mm x 100 mm x 6.0 mm thick angle supports Size ~5000 Liters Material of tank Stainless Steel SS 304 Thickness of tank 4.00 mm minimum

Flow control valves	**Ball valves**
Top Manhole	**500 mm with pipe inlets**
Pump	**3"x3" Honda or equivalent Petrol driven Pump Set for filling of water from water reservoir of about 1000 lpm with suction lift more than 5 meters and discharge head more than 15 meters**
Discharge	**3" delivery by force with Pump.**
Sprinkler discharge by gravity on either side.	
Accessories	**3" Hose Pipe 100' x 2 nos.** **3" Suction Pipe 10' x 2 nos.**
Paint	All steel surfaces shall be applied with two coats of Zinc-rich Epoxy primers to give maximum protection against rust and corrosion to enhance the design life, and one final coat outer side using 2-component polyurethane paint of min. 200 microns DFT in the color shade approved by Employer/Engineer. The paint shall be applied after sand/shot blasting to SA 2.5.
Cab Exterior	• Color of Cab: As approved by the Employer • Labelling: Logo, Motives and other labeling in both English and Urdu on both sides of the tank as per approval of the Employer. • Front mirror • Kerb mirror
Cab Interior	• Driver's seat with spring loaded type, seat belt and Co-drivers seats for 2 persons. • Instruments: All standard & necessary instruments and meters for safe operation of the vehicle.
Lights	• Standard twin headlights for right-hand traffic • Two (2) standard revolving beacons on cab roof left and right; yellow; • One (1) Standard revolving beacon on roof back side of vehicle; yellow • Protective grid: Hazard-warning lamps; synchronic blinking
Safety Equipment and Drive	• According to Pakistan Law on technical conditions of vehicles.
Supplements	• First aid kit and safety equipment as required according to Pakistan legislation • Tool set (jack and spanner for change of wheel) • Side and rear protection for truck. • A Spare wheel (mounted on suitable place on the truck chassis

steel sections to give a very robust shall be painted with approved color with 200 microns DFT min.

A cubical bucket made of ABS Plastic/HDPE of about 20 liters capacity shall be provided with the handcart. A holding grating shall be welded with the handcart to hold the basket.

b) Conventional hand carts

As decided in the DDSC meeting of LG & CD Department, the hand carts will conform to the TEVTA model. These can be procured from TEVTA but under the limitations given in the PPRA Rules. Two options are discussed below:

Model-1 (Used by Gujranwala Waste management company)

Pan	The pan will be made of MS sheet of 16 SWG with MS frame of 1.25"x1.25"x1/8" angle iron on all 4 sides of the pan.
Wheels	2 Nos 15" diameter MS double ring wheels with steel hub and suitable bearings, having strong collars at the periphery to house the 8-ply rubber ring with ribbed wearing surface complete in all respect. The rubber ring will be robust, strong with long wearing period. The wheels will be provided with robust and strong MS spokes welded with outer periphery ring of the wheels and hub and will not break or yield during the design life of the cart. The MS hub will be made of suitable thickness to house the bearing and strong enough to bear the stresses produced during hauling of the cart on undulated, paved or non-paved surfaces.
Axel	MS axel made of 30" long 1.0" dia. MS bar provided with bearings and split pins on both sides to eliminate the chances of disengagement of wheels from the axel.
Handle	Made of MS pipe 16 SWG thickness, 24 inches long 1.5" diameter welded with the hand cart substructure frame.
Coating	All structure of the hand cart including the handle and pan will be powder coated in suitable color as approved by the Engineer in Charge.

Model-2 (Used by Municipal Corporation Kamoke)

Pan	The pan will be made of MS sheet of 16 SWG with MS frame of 1.25"x1.25"x3/8" angle iron on all 4 sides of the pan.
Wheels	2 Nos 18" diameter MS double ring wheels with steel hub and ball bearings No 6304, having strong collars at the periphery to house the 8-ply rubber ring with ribbed wearing surface complete in all respect. The rubber ring will be robust, strong with long wearing period. The wheels will be provided with robust and strong MS spokes welded with outer periphery ring of the wheels and the hub and will not break or yield during the design life of the cart. The MS hub will be made of suitable thickness to house the bearing and strong enough to bear the stress produced during hauling of the cart on undulated paved or non-paved surfaces.

5	**Handcart/ waste tipping trolley**	**Conventional Hand Cart** These hand carts will be as per TEVTA design as decided in the DDSC meeting of LG & CD Department. Two options are available for these hand carts. The MC may adopt any of the two options.	 Concept sketch of three wheeled adjustable hand cart

The handcart shall be provided for household waste collection. Capacity of the cart shall be 0.25 m^3 and it shall be suitable for handling by single person.

a) **Three wheeled hand carts with adjustable height for their compatibility with 0.8 cubic meter container** (concept sketch is given above and the manufacturer may have any other design but it will have an excellent functionality as given below:

These hand carts will be built with adjustable height for discharging the waste directly into the 0.8 cubic meter container (4.0 feet height). The hand cart will be provided with a mechanical jack operable by a handle and the substructure will be fabricated so as to enable the pan / bucket to be easily lifted, by turning the jack handle, to a height where the pan / bucket can be easily tilted and the entire waste, in the bucket, can be tipped into the o.8 m^3 garbage container, the specifications of which have been described in the above sections of this table. The mechanism for tipping will be purely mechanical, user friendly and robust at the same time and no hydraulic mechanism will be used for this purpose. The balance of the trolley will be maintained during the tipping of waste into the container and inbuilt mechanism will be provided for that purpose.

A pilot model of the hand cart will be fabricated originally and got tested to conform to the above-mentioned specifications. Rest of the carts will only be fabricated after testing, removal of bugs and approval of the client.

The material of the handcart shall be galvanized iron as per BS EN ISO 1461 or ASTM A123. Thickness of the sheet shall not be less than 2 mm. The bucket / pan shall be supported with stiff suitable size frame made from angle iron fames of ¼" thickness and the substructure will also be fabricated from the same thickness of angle iron with suitable size to make it robust and sturdy. The superstructure shall be hot dip galvanized iron (GI) as per BS EN ISO 1461 or ASTM A123 in one go to give a uniform galvanizing thickness of not less than 100 microns. No paint of any kind will be admissible on any member of the superstructure.

Handle shall be made from GI pipe of light quality & weight with minimum diameter of 25 mm. Two Nos. wheels with rigid rubber tire having minimum diameter of 550 mm and one (1) No. jockey wheel of about 300 mm diameter shall be provided. The solid axle rod diameter shall be 30 ~ 35 mm. The substructure should be fabricated with suitable mild

		Axel	MS axel made of 30" long 1.25" dia. MS bar provided with ball bearings No-6304 and split pins on both sides to eliminate the chances of disengagement of wheels from the axel.
		Handle	Made of MS pipe 16 SWG thickness, 24 inches long 1.5" diameter welded with the hand cart substructure frame.
		Coating	All structure of the hand cart including the handle and pan will be powder coated in suitable color as approved by the Engineer in Charge.
6			

Option-1
Suzuki Bolan

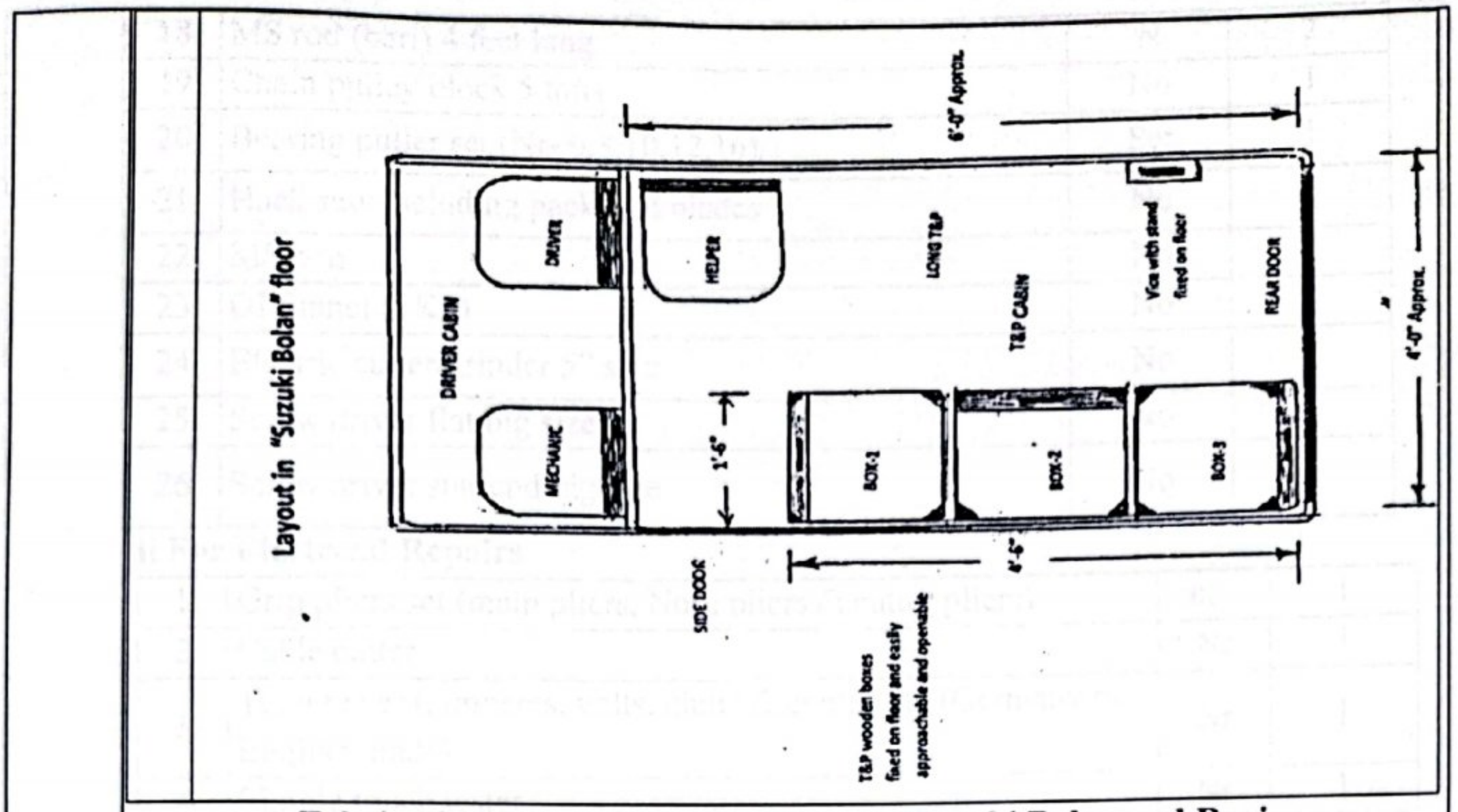
Option-II
Suzuki Ravi

Option-III
Toyota Hilux single cabin

A. Vehicle's specifications

1	**Body type**	**Option-1 Suzuki Bolan** Cabin type body with sliding door on the left and complete rear door. Rear door openable with jack / shock absorber. Wheelbase = 1840 to 1900 mm Minimum overall height = 1845 mm **Option-2 Suzuki Ravi** (pick-up with open body) Wheelbase = 1840 to 1900 mm Minimum overall height = 1845 mm The workshop cabin can be constructed with height suitable to the tools and plants to be accommodated in it. **Option-III Single Cabin Toyota Hilux** MCs can directly procure this vehicle if they find it suitable for mobile workshop. The workshop cabin can be fabricated as per requirement of the tools and plants to be accommodated and the persons to be seated.
B	**Specifications of Suzuki Bolan & Ravi Chassis**	
1	Performance	Maximum horse power 37.0 to 40.0 at 5000 rpm
2	Maximum torque	62 to 65 Nm at 3000 rpm
3	Engine	Type Water cooled, HC & EFI Number of cylinders = 3 Emission Euro II or III Displacement = 750 to 800 cc

	4	Power transmission	4-Forward all synchromesh, 1 reverse
	5	Wheels and tires	Wheel rim steel, wheel size 12" Tire size (tubeless, radial) 145/70/R12C
	6	Suspension	Front Strut Rear Leaf springs
	7	Steering	Turing radius 4 to 4.2 meters
	8	Safety & comfort	Seat belts Front Seats vinyl
	9	Capacity	Seating capacity 5 persons in case of Bolan and two persons in case of Ravi Engine oil 2.5 to 3.0 liters Fuel tank 36 to 40 liters
C	**Workshop cabin**		
	1) Two seats at the front including driver 2) One seat at the rear of the driver seat as shown in the sketch. 3) The interior of the entire rear cabin, except the driver cabin, will be will be lined with 1.5" thick hard wood machined planks along walls and floor up to bottom of the windows. 4) Three wooden boxes of equal length, for smaller T&P as shown in the sketch , will be made of seasoned 1.5" thicks planks of hard wood. These boxes will be fitted along left side wall with equal length as per length of the wall except the sliding door and will have clear height of 1.5 feet. The box at the front will be openable from front side, the box at the rear will be openable from rear side and the box at the centre will be openable from its right side. All boxes will be lockable. 5) A vice will be installed along the right-side wall with wooden or metallic robust supports to take all sort of bending moments, torsional, shear & impact loads due to threading of the piping.		
	Fabrication of the interior The fabrication of interior for Suzuki Bolan and Ravi are given in the sketch below. The fabrication configuration in the Toyota Hilux can be got done by MCs as per requirement as per tools and plants to be housed in the cabin.		



Fabrication of interior of the cabin for Suzuki Bolan and Ravi

D	**Tools & Plants**		
i	***For mechanical repairs***		
S. N.	**Detail**	**Unit**	**Quantity**
1	Double operating wrench set (spanner/chabi set) packed in box	Set	1
2	Ring spanners set (Pana set 8 to 32 mm) packed in box	Set	1
3	Socket wrench set complete (Goti set) packed in box	Set	1
4	Screw wrench set (6", 8",10",12" & 18" sizes) packed in box	Set	1
5	Pipe wrench set (12" & 18" sizes)	Set	1
6	L-key sets (30 pieces) packed in box	Set	1
7	Flat File set (6",8"10" & 12" size)	Set	1
8	Round file set (6",8"10" & 12" size)	Set	1
9	Chain wrench set (12 size)	No	1
10	Chain wrench set (18" size)	No	1
11	Chain wrench set (24" size)	No	1
12	Vice	No	1
13	Dye set ½" to 2"	No	1
14	Dye set 2" to 4"	No	1
15	AC Dry welding plant small size with all accessories	Set	1
16	Hammer set (½ lb, 2 lbs & 5 lbs)	Set	1
17	Chisel complete set (6",8",12")	Set	1

18	MS rod (bari) 4 feet long	N	2
19	Chain pulley block 5 tons	No	1
20	Bearing puller set (Nr- 6,8,10,12,16)	Set	1
21	Hack saw including packet of blades	No	1
22	MS pan	No	1
23	GI funnel (I Kg)	No	1
24	Electric cutter/grinder 5" size	No	1
25	Screw driver flat big size	No	1
26	Screw driver star end big size	No	1

ii For Electrical Repairs

1	Grip pliers set (main pliers, Nose pliers & cutter pliers)	set	1
2	Cable cutter	Nr	1
3	Tong tester (Amperes, volts, ohms & continuity (Germany or English made)	Nr	1
4	Simple touch tester	Nr	1
5	Thimble presser/punch	Nr	1
6	Electric drill (Germany)	Nr	1
7	Electric blower	Nr	1
8	Screw driver set imported except china	Set	1
9	Screw driver flat big size	Nr	1
10	Screw driver star end 15	Nr	1

7	**Wheel Excavator**	

The wheel excavator shall have main frame of welded-box construction braced with members of high strength steel and reinforced at critical points. It shall have ample strength and rigidity to withstand the imposed strains of the excavator continuously operating at its maximum capacity as well as strains imposed by its travel over irregular ground, and unimproved roads.

The excavator shall conform to the following specifications as a minimum:

Engine

Power (minimum) 85 kW, 4-cylinder, direct injection, diesel engine, displacement 3800~5200 cc, Torque 380~520 N·m. The engine shall be equipped with one-touch low idle control to reduce engine speed if no operation is performed, maximizing fuel efficiency and reducing sound levels.

Other Accessories/Dimensions

Bucket capacity	Minimum 0.7 m^3
Reach at Ground Level	Minimum 7.5 m
Digging Depth	Minimum 4.5 m
Digging Height	Minimum 7.5 m
Travel Speed	~30 km/hr
Tires	9.00-20-14PR
Maximum Gradeability	60~70%
Ground Clearance	350~400 mm
Swing Radius	~2500 mm
Counterweight Clearance	1300~1500 mm
Cab Height	3000~3200 mm

Service Refill Capacities

Fuel Tank	Minimum 200 Liters
Cooling	Minimum 15 Liters
Engine Oil	Minimum 10 Liters
Rear Axle Housing	10~20 Liters
Front Steering Axle	10~15 Liters
Hydraulic System	minimum 200 Liters (including tank

Hydraulics

The state-of-the-art load-sensing hydraulic system combined with a separate dedicated swing pump shall be provided giving fast cycle times, increased lift capacity and high bucket and stick forces.

a) Dedicated Swing Pump: A dedicated variable displacement piston pump and fixed displacement piston motor to power the swing drive to maximize swing performance without reducing power to the other hydraulic functions, resulting in smoothe. combined movements.
b) Heavy Lift Mode: To maximize lifting performance by boosting the lifting capability of the excavator.
c) Adjustable Hydraulic Sensitivity to allow the operator to adjust the aggressiveness of the machine according to the application.
d) Proportional Auxiliary Hydraulics Versatility of the hydraulic system to utilize a wide variety of hydraulic work tools using multiple valve options as follows:
    - The Multi-Combined Valve allowing the operator to select up to ten preprogrammed work tools from the monitor. These preset hydraulic parameters support either one-way or two-way flow. The joystick sliding switches allow modulated control of the work tool.
    - The Medium Pressure Function Valve providing proportional flow for tilting buckets or rotating tools.
    - High Pressure valve in combination with the Multi- Combined Valve to operate the machine with work tools or in applications requiring a third auxiliary hydraulic function, such as a tilting/rotating work tool.

e) Hydraulic Tank Capacity 120~140 L
f) Maximum Pressure
g) Implement Circuit Normal: 300~350 bar, Heavy Lift: 350~375 bar

h) Travel Circuit 300~350 bar
i) Auxiliary Circuit High Pressure: 300~350 bar, Medium Pressure: 150~190 bar, Swing Mechanism: 275~300 bars
j) Maximum Flow Implement/Travel Circuit: 200~225 L/min, Auxiliary Circuit: High Pressure 200~225 L/min, Medium Pressure 40~50 L/min, Swing Mechanism: 75~100 L/min

Serviceability

For increased safety, all daily maintenance points shall be accessible from ground level. A centralized greasing system shall be provided allowing lubrication of critical points.

Operator Comfort

- The auto-weight adjusted air-suspension seat with heated and cooled ventilated cushions shall be provided to improve operator comfort. The color monitor and standard rear-mounted camera shall be provided to enhance the safety.
- The operator station shall be provided with maximum space and designed for simplicity and functionality. Frequently used switches shall be centralized and situated on the right-hand switch console. The left-hand seat console shall control dozer blade and/or outriggers, and tilt-able for easy access to the cab. The fully automatic climate control shall be provided to adjust temperature and air flow for exceptional operator comfort.
- **Viewing Area**: To maximize visibility, all glass shall be affixed directly to the cab, eliminating the use of window frames. Choice of fixed or easy to open split front windshield shall be provided to meet operator preference and application conditions.

Monitor

A compact color monitor shall display information in local language that is easy to read and understand. Functions shall include:

- Programmable "Quick Access" buttons for one-touch selection of favorite functions.
- Filter and oil change warnings displayed when the number of hours reach the maintenance interval.
- Tool select function to allow the operator to select up to 6~10 predefined hydraulic work tools.
- Adjustable braking characteristics to enable the operator to select different levels of travel motor retarder aggressiveness when releasing the travel pedal.
- Provides a rear camera view activated through the monitor menu.

Rearview Camera

The rearview camera shall display on the operator monitor. Together with the best in class visibility to the front, up, left and right, the rearview camera shall ensure the safe operation of the

machine and fulfill the requirements of ISO 5006/EN474.

Undercarriage

Undercarriage and axle design shall provide maximum strength, flexibility and mobility on wheels.

- Heavy-Duty Axles: and Stabilizers providing rigidity and long life. Effective hydraulic line routing, transmission protection and heavy-duty axles to make the undercarriage perfect for wheel excavator applications. The front axle shall offer wide oscillating and steering angles. The transmission shall be mounted directly on the rear axle for protection and optimum ground clearance.
- Advanced Disc Brake System: The disc brake system shall act directly on the hub instead of the drive shaft to avoid planetary gear backlash to minimize the rocking effect associated with working free on wheels.
- Fenders: The fenders for excellent coverage of the front and rear tires, protecting the machine from mud and dirt. These fenders shall avoid water splashing up on the windscreen or cooler. The fenders further protect the machine from stones and debris being thrown up by the tires, providing additional safety for the machine, other vehicles and personnel working close to the excavator.

Booms and Sticks

- Designed for maximum flexibility to keep production high on all jobs, booms and sticks shall be of welded, box section structures with thick, multi plate fabrications in high stress areas, for rugged performance and long service life.
- Flexibility The choice of different booms and sticks for right balance of reach and digging forces for all applications i.e. variable adjustable boom, one-piece boom and, offset boom for working in tight quarters, lifting heavy loads truck loading and digging, dig along walls, over obstacles, to grade while driving, and to dig under laid tubes without damaging them sticks such as short, medium and long sticks for maximum breakout force, lifting capability and reach requirements etc.

Work Tools

A wide variety of Work Tools to help optimize performance.

- Quick Couplers to enable the operator to simply release one work tool and connect to another, of hydraulic and spindle quick coupler versions.
- Buckets: specialized buckets, each designed and tested to function as an integral part of excavator. Buckets featuring the Ground Engaging Tools such as Excavation, Extreme Excavation, Excavation Leveling, Ditch Cleaning etc.

Electrical

- Alternator minimum 70 Amp
- Batteries: 2 x 12 V, minimum 65 AH
- Boom working light
- Cab interior light
- Two front Road lights and Two rear lights
- Rotating beacon on cab
- Working lights, cab mounted (front and rear)
- Main shut-off switch
- Maintenance free batteries
- Signal/warning horn

8 DUMP TRUCK 10.0 m³

The dump truck shall be used for transporting loose material in bulk. The dump truck shall be equipped with a mild steel body hinged at the rear and equipped with hydraulic rams to lift the front, allowing the material in to be dumped on the landfill Site.

The Contractor shall be responsible to design/manufacture the dump truck compatible with front end loaders already existing at site.

The dump truck of minimum 10.0 m³ capacity shall have equipment conforming to the following specifications:

Truck Chassis

Driver Cabin — Rigid cab all structural steel welded construction reinforced with beams in doors.

The cabin shall be factory built, beautifully designed, elegantly styled and comfortable finished. It shall have seating capacity for 3 persons (including driver).

Drive	4x2 Right Hand Drive
Horse Power	200 ~ 240 PS GVW
	17000 to 18000 kg
Wheel Base	4600 to 4700 mm
No. of Tires	07 including one spare
Torque	50 ~ 80 Kgf.m
Emission Standard	Euro II or III
Fuel Tank Capacity	200 ~400 Liters
Gear	6 forward 1 reverse
Clutch	Hydraulic controlled, Dry single plate

Hydraulic Cylinder	Double action Hydraulic cylinder Chromed Rods as per applicable ISO and SAE Standards
Pressure Safety	To prevent hose bursting valve
Oil Reservoir	With level & temperature gauge Tank Capacity 50~60 Liters
Filters	On line return filter, Suction Filter and Breather cap with strainer
Governor	Full hydraulic speed governor shall be provided to adjust the engine speed according to system pressure.
Paint	All steel surfaces shall be applied with two coats of Zinc-rich Epoxy primers to give maximum protection against rust and corrosion to enhance the design life, and one final coat outer side using 2-component polyurethane paint min. 200 microns DFT in the color shade approved by Employer/Engineer. The paint shall be applied after sand/shot blasting to SA 2.5.

Cab Exterior

- Color of Cab: As approved by the Employer
- Labelling: Logo, Motives and other labelling in both English and Urdu on both sides of the tank as per approval of Employer.
- Front mirror
- Kerb mirror

Cab Interior

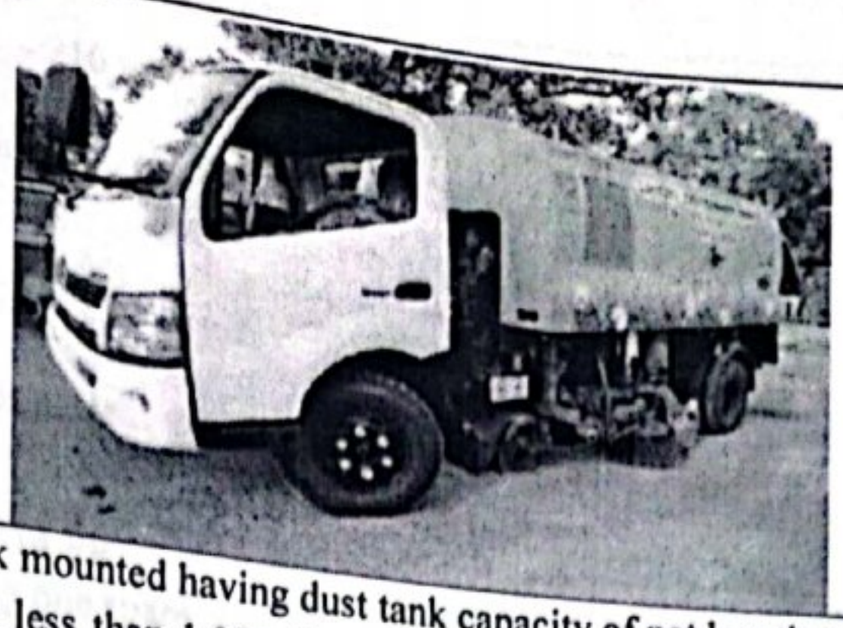
- Driver's seat with spring loaded type, seat belt and Co-drivers seats for 2 persons.
- ***Instruments:*** All standard and necessary instrument and meters for assuring the safe operation of the vehicle will be provided.

Lights

- Standard twin headlights for right-hand traffic
- Two (2) standard revolving beacons on cab roof left and right; yellow;
- One (1) Standard revolving beacon on roof back side of vehicle; yellow
- Protective grid: Hazard-warning lamps; synchronic blinking

Safety Equipment and Drive

According to Pakistan Law on technical conditions of vehicles.

9	**Truck Mounted Vacuum Road Sweeper**	

The road sweeper unit shall be truck mounted having dust tank capacity of not less than 4,000 liters and water tank capacity of not less than 1,000 liters. The sweeping system shall operate through an auxiliary engine. Sweeping devices shall be installed at suitable place. Vacuum suction device shall be installed at rear of truck for suctioning of dust and avoid pollution. The sweeping device shall be able to retract manually when blocked to protect the device from damage during operation.

The road sweeper shall have features of wide sweeping, efficient suctioning and easy maintenance. The tank material shall be stainless steel to prevent corrosion.

The sweeper shall be able to avoid raising dust and spreading dust pollution during operation.

The truck mounted vacuum road sweeper equipment shall conform to following specifications

Truck Chassis

Type	Right Hand Drive 4x2
GVW	8800 ~ 9000 kg on 6 tires
Engine	Emission standards: Euro II or-III Type: Diesel, 4 stroke, 4 cylinders, inline overhead valve, water cool, direct injection, turbocharged, intercooler Power: 120 ~ 140 PS Torque: 25 ~ 40 kgf-m Displacement: 3500~4500 cc
Clutch	Dry single plate diaphragm type, hydraulic control
Transmission	min. 5 forward & 1 reverse
Axle	Front: Reverse Elliot "I" section beam Rear: Full floating type
Brakes	Service: Hydraulic with dual circuit Exhaust: Vacuum operated Parking: Mechanical expanding type on shaft
Dimensions	Wheel base: 3800 ~ 4000 mm

Width: 1900 ~ 2100 mm
Ground clearance: 200 ~ 210 mm

Electrical Batteries: 2 x 12 V, minimum 65 AH
Generator: 24 V

Steering RHD

Suspension Semi-elliptic, laminated leaf springs, hydraulic double acting telescopic type shock absorbers on front and rear.

Wheels Tire size: 7.50-16 with 14 PR
No. of tires: 7 including one spare

Fuel tank Capacity liters Minimum 100

Cab Rigid cab all structural steel welded construction reinforced with beams in doors including air conditioning.

The cabin shall be factory built, beautifully designed, elegantly styled and comfortable finished. It shall have seating capacity for 3 persons (including driver)

Authority letter from chassis manufacture describing that it is in operation in Purchaser's country for at least eight (8) years shall be attached with the bid

General

The controls shall be provided at right side, vacuum shall be at both sides and monitoring system shall be provided for the driver to see the sides better.

Auxiliary Engine

- 4 cylinder, minimum 100 HP engine shall be provided suitable to operate the sweeping without overloading.
  The air inlet of the suction filter of the engine shall be located on the top of the body to avoid suction of dusty air.
- If oil pressure drops, the engine shall shut down automatically and if an overheating occurs in the engine, the fan shall be disengaged and the engine shall be shifted to idle speed automatically.
- There shall be a fan cowling, which covers the engine and fan during operation. It shall be an integral part of the body and can be raised with the body to enable easy access to the engine and the fan. There shall be a sealing when in lowered position to avoid entry of dust to the auxiliary engine compartment. High-level vents shall be provided to obtain clear airflow for engine cooling. The cowling shall be lined with acoustic material to prevent noise propagation.
- The fan shall have a stainless steel, multi-vane and self- cleaning type impeller. It shall be driven by the auxiliary engine via a torque converter and a gearbox. The fan shall produce 14000 ~ 15000 m^3/h flow rate minimum.
- It shall create a powerful suction to suck stones of at least 1.5~2 kg. This drive shall

work continuously without any overheating problems and loss of power in the transmission.

Waste Tank

- Volumetric capacity of garbage tank shall not be less than 4.0 m^3.
- The floor of garbage tank shall be manufactured from AISI 304 Stainless Steel.
- Rear gate of garbage tank shall be closed from outside the cabin (button is near the rear gate) to avoid the possibility of any accidents.
- Telescopic cylinder shall be used in order to lift the garbage tank
- The water tank shall be manufactured from AISI 304 Stainless Steel and shall be integral with the waste tank.
- The water tank shall have a volume of not less than 1,000 liters.
- The tank shall be equipped with manhole and the mud, shall be cleaned thoroughly. It shall not create an obstruction to reach the components on the chassis.
- There shall be an electronic water level indicator inside the cab and warning light and buzzer for minimum water level.
- A water hose minimum 10 m, od suitable diameter shall be provided with automatic roller system near the rear door to properly wash inside of the tank.

Brushes

- Sweeping shall be performed by means of minimum three brushes i.e. two-disc brushes, one located on each side, and a third cylindrical middle brush.
- Sweeping width shall be about 2,500 ~ 3,000 mm, when any of the side brushes and the middle brush are operated together.
- The side brushes shall have diameter of approximately 800 mm and the tip and tines shall be made of steel.
- The side brushes shall be equipped with a kick-back protection mechanism and the pressure exerted by the brush on the ground shall be pneumatically or hydraulically adjustable. Side brushes shall be operated independently from the middle brush.
- Speed of all the brushes shall be adjustable.
- The brushes shall be raised and lowered by a pneumatic or hydraulic cylinder.
- All the brushes shall have a safety latch.The middle brush shall have a diameter of 400~450 mm and polypropylene tines.
- The middle brush shall be minimum 1200 ~ 1400 mm long.
- The pressure applied by the brush on the road shall be adjustable.
- The brush shall automatically turn to the side swept.
- The middle brush shall be specially designed to avoid conical wearing. It shall be carried not by the truck chassis directly, but by a 3-point bracket, 2 points of which shall be carried by the axle of the truck.

Suction Unit

- The suction nozzle shall be manufactured from aluminum and lined with rubber internally to avoid wear.
- It shall be carried by a couple of castor wheels and shall feature increasing the gap to the

ground by driver's control.

- The suction hose shall have a diameter of 230~250 mm and shall be 1~2 m in length.
- The wandering hose shall be flexible and easy to use with a diameter of 150 mm and a length of 4~5 meters. The wandering hoses shall be located on the rear part of the sweeper.
- There shall be water injection for dust control.

Water Spray System

- A water pump working pressure not less than 100 bar, with maximum 225 bars driven by hydraulic system shall be provided.
- Filter of suitable mesh shall be provided in suction line of water pump.
- Flow rate of spray system shall be adjustable from driver's cabin.
- All pumps, tubes, valves, fittings, filters and other equipment on waterways of spray system shall be of corrosion-resistant materials (such as bronze, copper, bell metal, peak and plastic etc.)
- Irrigation modules shall be provided at front of the truck, side (flank) brush, middle brush and vacuum suction nozzle. Those modules shall be able to work independently from each other, if required. Flow balance shall be arranged on each section through the instrumentality of regulator that has been set up on truck.
- Spray system shall be able to change its direction during the right or left side sweeping via automatic pneumatic valves which shall be fixed on the vehicle.

Electrical System

- The sweeper shall have a 12 Volt, 130~135 Ampere- hour battery, 2 units of flashlights at the rear-bottom sides of the body and 2 beacons at the rear top side of the body.
- For safety there shall be a main switch closing all electrical circuits on the superstructure when necessary.

Control Panel

A control panel to control operations of the sweeper shall be provided in the driver's cabin equipped with necessary warning lights.

Cab Exterior

- Color of Cab: As approved by the Employer
- Labelling: Logo, Motives and other labelling in both English and Urdu on both sides of the tank as per approval of Employer.

Front mirror

- Kerb mirror

Cab Interior

- Driver's seat with spring loaded type, seat belt and
  Co-drivers seats for 2 persons.
- Air conditioning system with temperature control without CFC and HCFC
- Instruments: Approved Tracking device, operational (fees paid) for the year in which

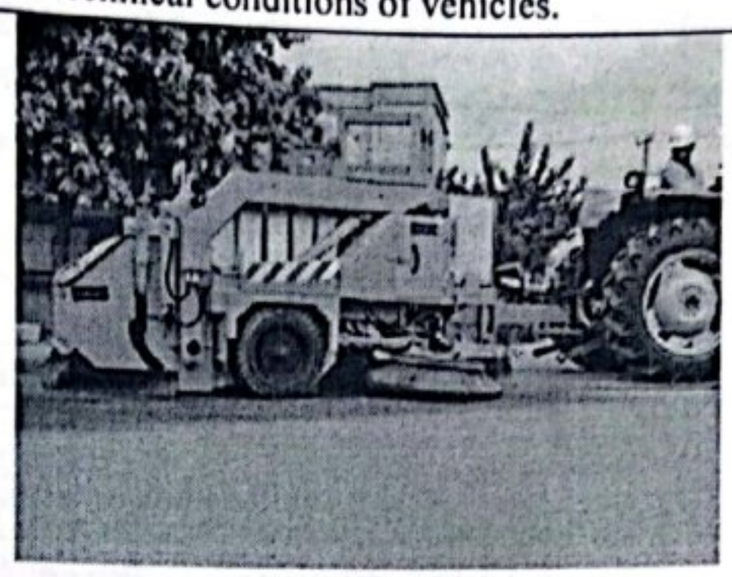
the unit will be supplied to the Employer, Fuel Level monitor, Battery Condition & Water Temperature, Routing transmitter for tracking system. The vehicle tracking system, as a minimum being capable to monitor speeding, harsh braking, mileage, etc

Lights

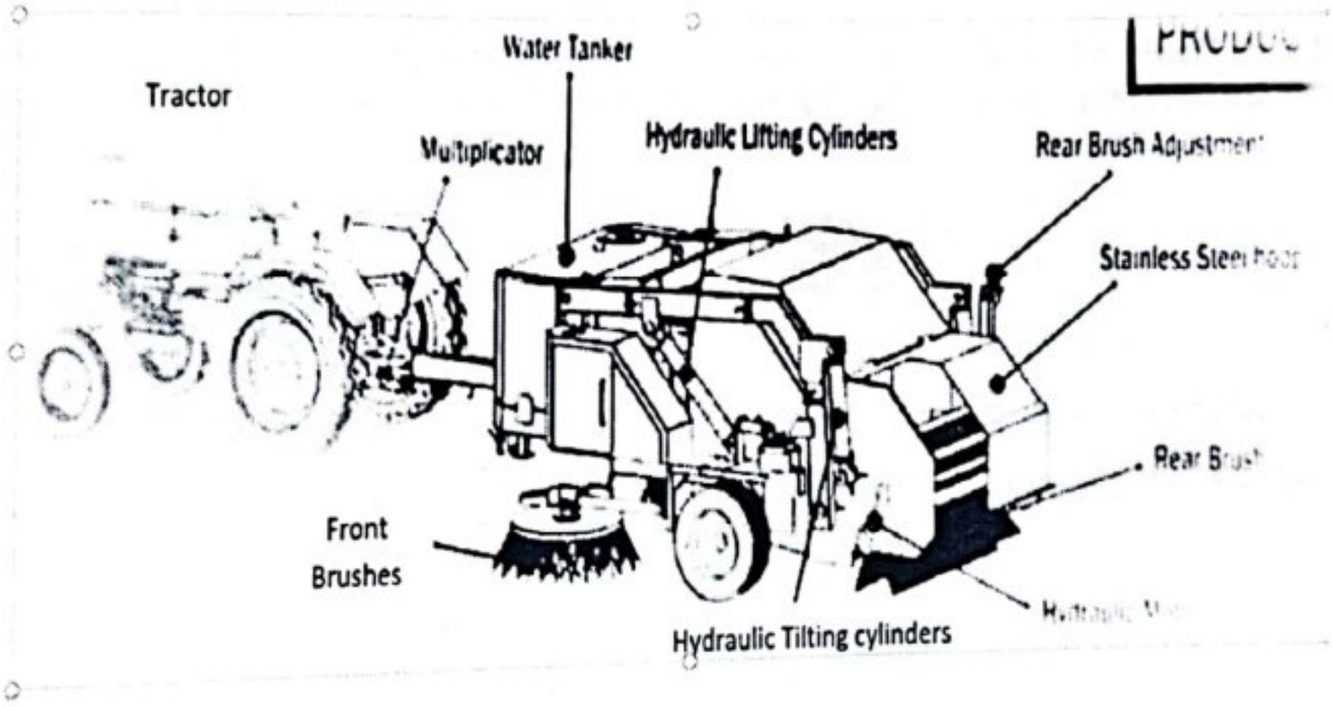
- Standard twin headlights for right-hand traffic
- Two (2) standard revolving beacons on cab roof left and right; yellow;
- One (1) Standard revolving beacon on roof back side of vehicle; yellow
- Protective grid: Hazard-warning lamps; synchronic blinking

Safety Equipment and Drive

- According to Pakistan Law on technical conditions of vehicles.

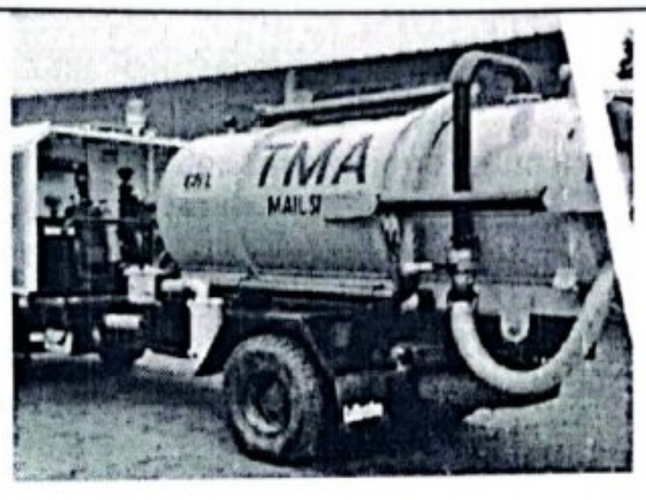
10	**Mechanical Road Sweeper**	

This type of road sweeper will be operated with tractor through PTO & Multiplicator. The main features of this sweeper are given below:



Specifications of Mechanical Road Sweeper

Maximum sweeping width	2200 to 2400 mm
Sweeping speed	8 to 10 Km/hour
Maximum speed	20 to 40 Km/hour
Water tank	370 to 400 Liters (SS 304 Grade)

		Dust hopper capacity	1000 -1200 liters (SS body)
		Hydraulic tank	60-70 Liters
		Oil cooler	Hydraulic oil water cooler
		Hydraulic pump	European origin
		Multiplicator	Tractor rear mounted on PTO
		Spraying nozzles	8 -10 Nos
		Hydraulic motors	European origin
		One spare set of brushes of all types used in the sweeper will also be provided.	
	Only mechanical sweeper will be procured which will be operated by the MCs owned tractors. The procurement of the tractor is not included in these specifications and BOQ.		
11	**Truck Mounted Suction Unit, 4500 Liters**		

The suction unit shall be designed to clean and clear sewerage lines by means of a powerful vacuum suction. The system shall be designed to suck all water plus mud from sewer main hole. The unit shall consist of the following:

- A sub frame connected to the vehicle
- A cylindrical tank 4500 liters for suction unit
- vacuum pump operated by PTO through hydraulic motor or auxiliary engine.

All the functions and the load distribution of the equipment shall be properly arranged to the technical specifications of the chassis on which it is mounted.

Sub Frame

The sub frame in the from of U profiles shall be made using 6 mm thick steel and mounted to the chassis with mounting brackets.

Vacuum Tank

Vacuum tank shall be of 5 mm (min.) thick steel Sheet cylindrical barrel type having capacity not less than 4500 liters, front & rear dish shall be fabricated from 8.0 mm thick sheet.

It shall have full dish opening hydraulically at rear end with honned steel tubes, chrome plated rods as per applicable ISO and SAE Standard and suitbale manual locking system.

The steel used shall be ASTM A 36, equivalent or better grade steel.

Vacuum Pump

Capacity	min. 9000 litre/minute
Pressure	1.5 bar (gauge) Max. Vacuum - 0.95 bar
Driven by	Side mounted PTO
	Or auxiliary engine of 45~50 HP

Sucker Unit Accessories

1) **Primary Protection**

   Located at Tank outlet for suction fitted with float type automatic shut off system to discontinue suction to avoid over filling.

2) **Secondary Protection**

   Secondary Protection for automatic suction shut off system to save pump in case of failure of Primary Protection.

3) **Filter**

   Air filter of suitable mesh shall be provided on suction line to ensure longer life of Vacuum Pump.

4) **Gauge**

   Compound pressure/suction gauge with dial showing working pressure mounted on suction pump indicating pressure during operation.

5) **Vacuum Safety Valve**

   Inbuilt safety valve to avoid over vacuum.

6) **3 Way Vacuum To Pressure Valve**

   Inbuilt valve for operating Vacuum pump for Vacuum or Pressure operation

7) **Silencer with Pre-Filter**

Paint

All steel surfaces shall be applied with two coats of Zinc-rich Epoxy primers to give maximum protection against rust and corrosion to enhance the design life, and one final coat outer side using 2-component polyurethane paint of min. 200 microns DFT in the colour shade approved by Employer/Engineer. The paint shall be applied after sand/shot blasting to SA 2.5.

Truck Chassis

Type	Right Hand Drive 4x2
GVW	8800 ~ 9000 kg on 6 tires
Engine	**Emission standards:** Euro II or III
	Type: Diesel, 4 stroke, 4 cylinders inline, water cooled, direct injection, turbocharged with intercooler
	Power: 120 ~ 140 PS
	Torque: 25 ~ 40 kgf-m
	Displacement: 3500~4500 cc

Clutch	Dry single plate diaphragm type, hydraulic control
Transmission	min. 5 forward & 1 reverse
Axle	**Front:** Reverse Elliot "I" section beam
	Rear: Full floating type
Brakes	**Service:** Hydraulic with dual circuit
	Exhaust: Vacuum operated
	Parking: Mechanical expanding type on shaft
Dimensions	**Wheel base:** 3800 ~ 4000 mm
	Width: 1900 ~ 2100 mm
	Ground clearance: minimum 200 ~ 210 mm
Electrical	**Batteries:** 2 x 12 V, minimum 65 AH
	Generator: 24 V Steering RHD
Suspension	Semi-elliptic, laminated leaf springs, hydraulic double acting telescopic type shock absorbers on front and rear
Wheels	Tire size: 7.50-16 with 14 PR
	No. of tires: 7 including one spare
Fuel tank	minimum 100 liters Capacity
Cab	Rigid cab all structural steel welded construction reinforced with beams in doors including air conditioning.
	The cabin shall be factory built, beautifully designed, elegantly styled and comfortable finished. It shall have seating capacity for 3 persons (including driver).
Frame	Ladder-shaped "[" channel section made of high strength structural steel

Authority letter from chassis manufacture describing that it is in operation in Purchaser's country for at least eight (8) years shall be attached with the bid

Cab Exterior

- Color of Cab: As approved by the Employer
- Labelling: Logo, Motives and other labelling in both English and Urdu on both sides of the tank as per approval of the Employer.
- Front mirror
- Kerb mirror

Cab Interior

- Driver's seat with spring loaded type, seat belt and Co-drivers seats for 2 persons.
- Air conditioning system with temperature control without CFC and HCFC
- Instruments: Approved Tracking device, operational (fees paid) for the year in which the unit will be supplied to the Employer, Fuel Level monitor, Battery Condition & Water Temperature, Routing transmitter for tracking system. The vehicle tracking system, as a minimum being capable to monitor speeding, harsh braking, mileage, etc. and other requirements as given in Item No. 9.

Other instruments: As per details given in Item No. 9.

Lights

- Standard twin headlights for right-hand traffic
- Two (2) standard revolving beacons on cab roof left and right; yellow;
- One (1) Standard revolving beacon on roof back side of vehicle; yellow
- Protective grid: Hazard-warning lamps; synchronic blinking

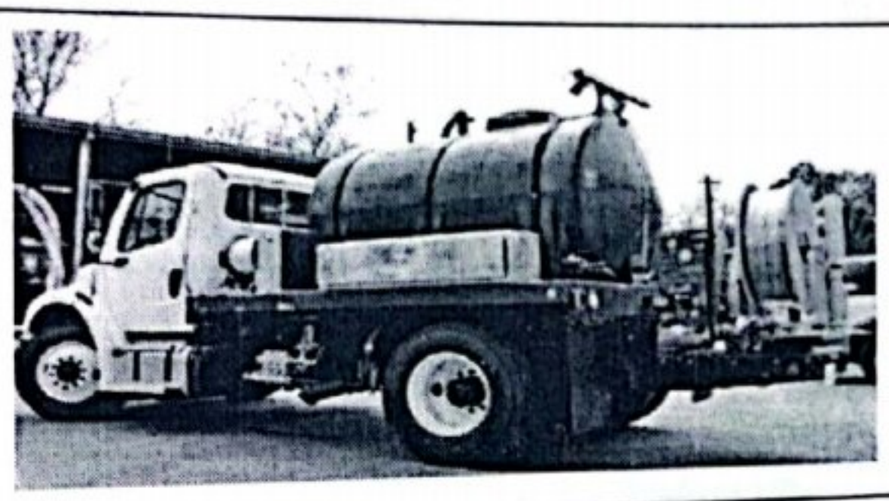
Safety Equipment and Drive

- According to Pakistan Law on technical conditions of vehicles.

Supplements

- First aid kit and safety equipment as required according to Pakistan legislation
- Tool set (jack and spanner for change of wheel)
- Side and rear protection for truck.
- A Spare wheel (mounted on suitable place on the truck chassis).

Truck Mounted Jetting Unit, 4500 Liters



The jetting unit shall be designed to clean and clear sewerage lines by means of a powerful water jet. The system shall have jetting nozzle designed to move in sewerage pipes to clean it and clear any blockage. The unit shall consist of the following:

- A sub frame connected to the vehicle
- Specially designed water tanks of steel sheet having total capacity 4500 liters for sewer jetting unit
- Jetting pump directly coupled with engine through flexible coupling.

All the functions and the load distribution of the equipment shall be properly arranged to the technical specifications of the chassis on which it is mounted.

Sub Frame

The sub frame in the from of U profiles shall be made using 6 mm thick steel and mounted to the chassis with mounting brackets.

Jetting Tank

Jetting tank of capacity minimum 4500 liters shall be made from steel Sheet of 5 mm thickness. The steel used shall be ASTM A 36, equivalent or better grade steel.

Jetting Pump

Flow 150~200 Liter / minute

Max. Pressure	190~200 bars
Working Pressure	150~170 bars
Driven by	90~100 HP Diesel auxiliary engine

Jetting Unit Accessories

Suction Connection: Two (2) inlet connections of 50~70 mm diameter.
Inlet water supply hose about 70~80 mm diameter to ensure adequate water supply to pump.
Discharge Connection: 2 x 1-1/4"

Water Filter

Filter to ensure complete removal of solid particles down to 300 microns and protect the wear parts in the High Pressure Pump.

Pressure Control & Regulator Valve

Two way design relief valve to prevent pump from over pressurization, regulate the operating pressure of the system and release excess water. The system shall be fitted with Safety Valves.

Pressure Gauge

Rated to about 250 bar, Glycerin filled, fitted with Snubber,
1/2" NPT Connection.

Hose Reel

Two hundred feet hydraulic powered hose-reel (Dia ¾") with hose feed guide with followings accessories:

- 1 no. 200 ft long high pressure hose
- 2 nos. ½" standard drain jets
- ½" drain jet extension

Paint

All steel surfaces shall be applied with two coats of Zinc-rich Epoxy primers to give maximum protection against rust and corrosion to enhance the design life, and one final coat outer side using 2-component polyurethane paint of min. 200 microns DFT in the colour shade approved by Employer/Engineer. The paint shall be applied after sand/shot blasting to SA 2.5.

Truck Chassis

Type	Right Hand Drive 4x2
GVW	8800 ~ 9000 kg on 6 tires
Engine	**Emission standards:** Euro II or III **Type:** Diesel, 4 stroke, 4 cylinders inline, water cooled, direct injection, turbocharged with intercooler **Power:** 120 ~ 140 PS **Torque:** 25 ~ 40 kgf-m **Displacement:** 3500~4500 cc
Clutch	Dry single plate diaphragm type, hydraulic control

Transmission	min. 5 forward & 1 reverse
Axle	**Front:** Reverse Elliot "I" section beam **Rear:** Full floating type
Brakes	**Service:** Hydraulic with dual circuit **Exhaust:** Vacuum operated **Parking:** Mechanical expanding type on shaft
Dimensions	**Wheel base:** 3800 ~ 4000 mm **Width:** 1900 ~ 2100 mm **Ground clearance:** minimum 200 ~ 210 mm
Electrical	**Batteries:** 2 x 12 V, minimum 65 AH **Generator:** 24 V Steering RHD
Suspension	Semi-elliptic, laminated leaf springs, hydraulic double acting telescopic type shock absorbers on front and rear
Wheels	Tire size: 7.50-16 with 14 PR No. of tires: 7 including one spare
Fuel tank Capacity	minimum 100 liters
Cab	Rigid cab all structural steel welded construction reinforced with beams in doors including air conditioning. The cabin shall be factory built, beautifully designed, elegantly styled and comfortable finished. It shall have seating capacity for 3 persons (including driver).
Frame	Ladder-shaped "[" channel section made of high strength structural steel

- Authority letter from chassis manufacture describing that it is in operation in Purchaser's country for at least eight (8) years shall be attached with the bid

Cab Exterior

- Colour of Cab: As approved by the Employer
- Labelling: Logo, Motives and other labelling in both English and Urdu on both sides of the tank as per approval of the Employer.
- Front mirror
- Kerb mirror

Cab Interior

- Driver's seat with sring loaded type, seat belt and Co- drivers seats for 2 persons.
- Air conditioning system with temperature control without CFC and HCFC
- Instruments: Approved Tracking device, operational (fees paid) for the year in which the unit will be supplied to the Employer, Fuel Level monitor, Battery Condition & Water Temperature, Routing transmitter for tracking system. The vehicle tracking system, as a minimum being capable to monitor speeding, harsh braking, mileage, etc. and other requirements as given in Item No. 9.
  Other instruments: As per details given in Item No. 9.

Lights

- Standard twin headlights for right-hand traffic

- Two (2) standard revolving beacons on cab roof left and right; yellow;
- One (1) Standard revolving beacon on roof back side of vehicle; yellow
- Protective grid: Hazard-warning lamps; synchronic blinking

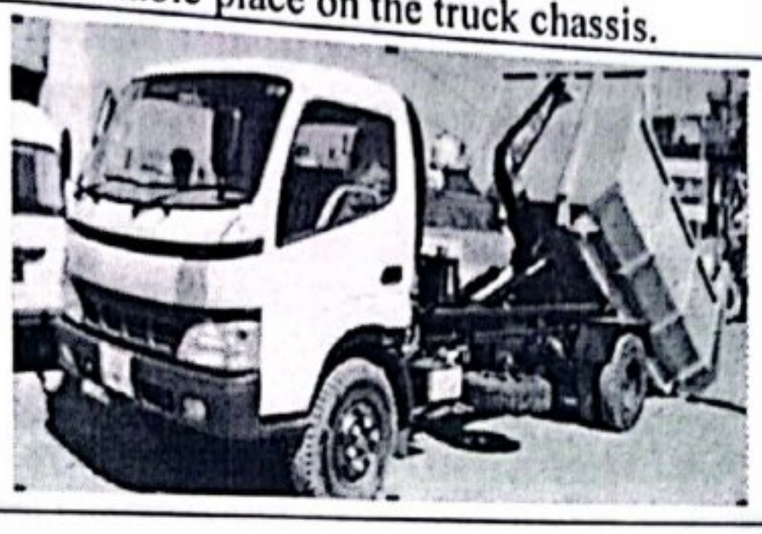
Safety Equipment and Drive

- According to Pakistan Law on technical conditions of vehicles.

Supplements

- First aid kit and safety equipment as required according to Pakistan legislation
- Tool set (jack and spanner for change of wheel)
- Side and rear protection for truck.
- A Spare wheel (mounted on suitable place on the truck chassis.

ARM ROLL TRUCK 5.0 m³



Truck Chassis

Type	Right Hand Drive 4x2
GVW	8800 ~ 9000 kg on 6 tires
Engine	**Emission standards:** Euro II & III **Type:** Diesel, 4 stroke, 4 cylinders, inline overhead valve, water cool, direct injection, turbocharged, intercooler **Power:** 120 ~ 140 PS **Torque:** 25 ~ 40 Kgf-m **Displacement:** 3500~4500 cc
Clutch	Dry single plate diaphragm type, hydraulic control Transmission min. 5 forward & 1 reverse
Axle	**Front:** Reverse Elliot "I" section beam **Rear:** Full floating type
Brakes	**Service:** Hydraulic with dual circuit **Exhaust:** Vacuum operated **Parking:** Mechanical expanding type on shaft
Dimensions	**Wheel base:** 3800 ~ 4000 mm **Width:** 1900 ~ 2100 mm **Ground clearance:** 200 ~ 210 mm
Electrical	**Batteries:** 2 x 12 V, minimum 65 AH **Generator:** 24 V

Steering	RHD
Suspension	Semi-elliptic, laminated leaf springs, hydraulic double acting telescopic type shock absorbers on front and rear
Wheels	Tire size: 7.50-16 with 14 PR No. of tires: 7 including one spare
Fuel tank Capacity	minimum 100 litres
Cab	Rigid cab all structural steel welded construction reinforced with beams in doors including air conditioning.

The cabin shall be factory built, beautifully designed, elegantly styled and comfortable finished. It shall have seating capacity for 3 persons (including driver).

Authority letter from chassis manufacture describing that it is in operation in Purchaser's country for at least eight (8) years shall be attached with the bid

Arm Roll Superstructure 5 m³

The superstructure of the Arm Roll unit shall be fixed on Chassis. The Structure shall be able to lift minimum 5-tons capacity containers. The superstructure shall have the following features:

Power Take-off (PTO): Electrical over Vacuum Type PTO able to be operated from inside or outside the cabin. Close Couple arrangements compatible with hydraulic pump.

Hydraulic Pump: Minimum 35 cc/rev. Piston type, with max. Pressure of 350 Kg/cm². The operating pressure shall not be less than 180 Kg/cm². (The pump shall be compatible with Close coupled PTO).

Control Valves: Solenoid double acting control valves with pressure relief valve, pipe and inner rods of hard chrome and manual override pin.

Lifting Jack: Minimum 2 Nos. double acting hydraulic cylinders jacks with honed Tube & Chromed Rods with Hydraulic seals as per applicable ISO and SAE Standards.

Sliding Jack: 1 No. double acting hydraulic cylinder, with honed Tube & Chromed Rods as per applicable ISO and SAE Standards.

Safety: Pressure relief valve built in Control Valve

Filters: On return Line with replaceable filter.

Hyd. Tank: Minimum 40 Litres hydraulic tank with Breather cap, inbuilt strainer, return Filter and Hydraulic Tank level gauge. (Tank with Strainer & Breather Cap).

Lifting Capacity: 5 Tons (min.)

Sub Frame: 8.00 mm (min.) Mild Steel

Cross Member: 8.00 mm (min.) Mild Steel

M Boom: 10.00 mm (min.) Mild Steel

L Boom: 8.00 mm (min.) Mild Steel

Lifting Arm (Swing): 5.00 mm (min.) Mild Steel

Guide Roller: 200 mm (min.) dia Steel cast

Pack Plate:10.00 mm (min.) Mild Steel

Safety Legs: 5.0 mm (min.) Mild Steel

Safety Wheels: 100 mm (min.) dia Steel cast.

All the steels used for sub-frame, cross-member, booms, arms and other structural parts shall be ASTM A36, equivalent or better grade steel.

Capacity: The superstructure shall be suitable for 5 cubic meters, structural steel container reinforced with U-Channel minimum 100x40 mm.

Cab Exterior

- Colour of Cab: As approved by the Employer
- Labelling: Logo, Motives and other labelling in both English and Urdu on both sides of the tank as per approval of Employer.
- Front mirror
- Kerb mirror

Cab Interior

- Driver's seat with spring loaded type, seat belt and Co-drivers seats for 2 persons.
- Air conditioning system with temperature control without CFC and HCFC
- Instruments: Approved Tracking device, operational (fees paid) for the year in which the unit will be supplied to the Employer, Fuel Level monitor, Battery Condition & Water Temperature, Routing transmitter for tracking system. The vehicle tracking system, as a minimum being capable to monitor speeding, harsh braking, mileage, etc. and other requirements as given in Item No. 9.

  Other instruments: As per details given in Item No. 9.

Lights

- Standard twin headlights for right-hand traffic
- Two (2) standard revolving beacons on cab roof left and right; yellow;
- One (1) Standard revolving beacon on roof back side of vehicle; yellow
- Protective grid: Hazard-warning lamps; synchronic blinking.

ARM ROLL CONTAINER 5.0 m³	

The 5 m³ Container shall be manufactured from steel and shall be compatible with Chain Arm Roll vehicle described in 7.3 above. The container shall have following minimum features:

Body Capacity: 5.0 m³

Material: ASTM A 36, equivalent or better grade

Body Type: Open type compatible with Arm Roll and with full opening of back door, to allow easy dumping.

Body Construction: All welded mild steel construction to match with Arm Roll Vehicle.

. Floor: Floor Fabricated with 6.0 mm thick sheet, reinforced by channels.

b. Sidewalls: Side walls fabricated from 3.0 mm thick sheet, duly reinforced by channels.

c. Back Door: Back Door fabricated from 3.0 mm thick sheet, duly reinforced by channels.

d. Front: Front side fabricated from 4.0 mm thick sheet, reinforced by channels.

Lifting Hook: Made from 50.0 mm dia, high carbon steel bar welded with brackets of 12 mm thick plate with min. capacity of 4 tons.

Hook Plate: Made from steel 10.0 mm thick.

Lifting Locks: The container shall be equipped with Locks to match Arm Roll Vehicle.

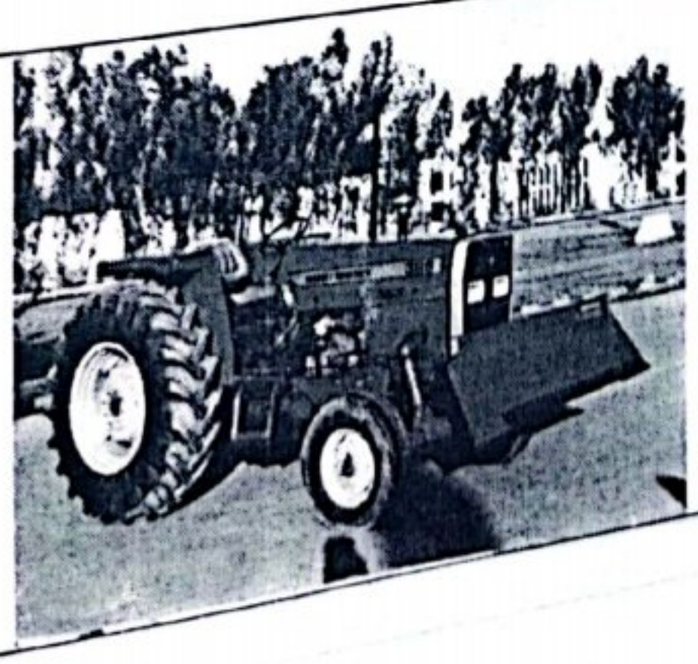
Main Frame: C Channel made from 7.0 mm thick

Support Channel: 50 x 100 x 50 mm (3 mm thick)

Wheels: Support caste steel wheels at rear end, dia 150 mm

Support Leg: Box Fabricated from 4.0 mm thick of material ASTM A 36, equivalent or better.

Color: One coat of Red Oxide primer with 2 coats of enamel approved by the Employer. Total dry film thickness of paint shall not be less than 200 microns to give maximum protection against corrosion.

Front blade tractors	

Tractor	4-Wheel Drive
Rate Engine Power	85 HP @ 2200 rev/min
Max Engine Torque	291 Nm @ 1600 rev/min
Transmission	8 forward, 2 reverse
Fuel Capacity	108 liters
Front End Blade	• Front blade for 85 BHP tractor • Blade size (7'x27") with cutting edge of 6"x1/2" of high carbon alloy steel • Ram type : Hydraulic Double acting
Max. lift of blade	21 inches
Max. depth below ground	4 inches
Accessories	• Pintle hook • Sun canopy • Standard toolkit

Front End loader

Tractor	4-Wheel Drive
Rated Engine Power:	85 HP @ 2200 rev/min
Max Engine Torque	291 Nm @ 1600 rev/min
Transmission	8 forward, 2 reverse
Fuel Capacity	108 liters
Front end loader	• Commercial for 85 BHP • Lifting capacity: 1300 Kg • Bucket: 5.5 feet • Bucket type: Close earth bucket with digging teeth with lift ram • Double acting pump • Rear weight box
Accessories	• Pintle hook • Sun Canopy • Standard tool kit

17	**Motor Cycle**	
	Motor cycle	**70 cc**
	Engine	4-Stroke Single Cylinder Air Cooled
	Displacement	72 cm^3
	Bore & Stroke	47.0 x 41.4 mm
	Compression Ratio	8.8 : 1
	Clutch	Multiple wet plates
	Transmission	4-speed Constant mesh
	Starting	Kick Start
	Frame	Backbone Type
	Ground Clearance	135-140 mm
	Petrol Capacity	8-10 Liters
	Tire at front	2.25 – 17 (4 PR)
	Tire at back	2.50 – 17 (4 PR)
	Dry Weight	80 – 90 Kg
18	**Paint and labeling** The paint on the truck chassis shall be applied by the truck chassis manufacturer as per applicable international standards. The paint on all other fabricated bodies and superstructure of vehicles described in Item No. 7 above, and handcart shall be applied after thorough sand/shot blasting to SA 2.5 and after achieving the appropriate surface profile for proper adherence of the paint. The surfaces shall be applied with two coats of Zinc-rich Epoxy primers to give maximum protection against rust and corrosion to enhance the design life, and one final coat outer side using 2-component polyurethane paint of min. 200 microns DFT in the color shade approved by Employer/Engineer. The paint shall be of internationally reputed paint manufacture such as Akzonobel, Jotun, Sherwin Williams or equivalent approved by the Employer/Engineer. The paint color, labeling i.e. logo, motives, slogans etc. on the vehicles, garbage container and hand cart etc. shall be applied after approval of the Employer	

19

Vehicle Tracking and Monitoring System

Scope of Work

The scope of works shall include the design, supply, installation, testing and commissioning of Vehicle Tracking Monitoring System (VTMS) complete with associated electrical and communication wiring works, control equipment, LED video display unit, works stations, mounting brackets and accessories. The Contractor shall be responsible for providing complete turnkey system solution including auxiliary equipment, and all such equipment with accessories shall be deemed to be included in the scope of Contractor and no extra payment shall be made to the Contractor for these. The system shall include Hardware and Software of Vehicle Tracking, wiring, termination, electrical boxes, and all other necessary material for a complete operating system in Control rooms. The bidders may raise the queries for any clarification, missing information or ambiguity if any, within one week after issuance of bidding documents. Any work to be carried out by the owner
/ Main contractor, should be mentioned clearly along with the bid, otherwise no claim against extra work shall be acceptable. Specification, Drawings and BOQ etc. should be read carefully to comply with specified loads, serving landings and other general and special safety features. Any deviation from specification / BOQ should be mentioned well in time before submission of bid.

The Hardware and Software of Vehicle Tracking and Monitoring System (VTMS) works are to be performed; the requirements given in the Technical Specification shall be fulfilled. The Contractor shall be responsible and provide the following:

- Hardware and Software of Vehicle Tracking, and Monitoring System (VTMS).
- Hardware and Software of Tracking, and Monitoring System (VTMS) to remotely control, and transmit information regarding status of each device from the Site to Control Room
- Operator Workstation with LED Video Display Unit at the Central Control Room
- All software packages shall be provided in original installation media along with their licenses
- Preparing an Engineering Design Report covering, at least, the following subsystems:

1) Detailed Construction Drawings and As-Built drawings for the Hardware and Software of Vehicle Tracking and Monitoring System (VTMS)
2) Schematics and interconnection diagrams showing Hardware and Software of Vehicle Tracking and Monitoring System (VTMS) controllers and other elements to monitor and control the processes outlined above
3) The exact quantities and types of hardware and software required
4) Technical details of the hardware and software of the complete systems
5) Schematic drawing of the complete systems
6) Layout drawings.
7) Cable schedules and routing plan.
8) Detailed description of the data acquisition software, user configurable functions and software features to be provided.
9) Complete details, brochures and pictures of the proposed area.
10) Installation, testing and commissioning procedures and methodology.

- Procure, transport and deliver equipment and hardware to site, after approval of the above report(s) by the Engineer.
- Design, install, test and commission of Hardware and Software of Vehicle Tracking

and Monitoring System (VTMS) in accordance with the procedures given in the engineering design report.

- Provide training to the minimum four personnel nominated by Employer for 15 days.
- Bidder shall submit with his bid the following Documents/Data for all system equipment including Hardware and Software of Vehicle Tracking and Monitoring System (VTMS).
- Brochures and data sheets of each equipment
- Block diagram of Hardware and Software of Vehicle Tracking and Monitoring System (VTMS)
- Test standards and design
- Backup calculations showing that Hard Disks shall be able to record data of all systems for a period of two years.
- International Standard Reports/Certificates

Standards

Materials/Equipment shall be designed, manufactured, tested and installed according to relevant IEC/ISO/ITU/EN/CE Recommendations. Where no such Recommendations have been issued to cover a particular subject then a recognized international standard shall be applied. The latest edition and amendments shall apply in all cases.

The Bidder shall state in his bid the standards and codes of practice which he proposes for any items of system or equipment not covered by IEC/ISO/ITU/EN/CE Recommendations. If required by the Employer, the Contractor shall submit two English language copies of any standard or code of practice. Equipment and design shall comply with international USA / European or Any ADB eligible member Country standards.

General Specifications

All the vehicles described above shall be equipped with a Vehicle Tracking and Monitoring System (VTMS), as a minimum being capable to monitor vehicle routes, speed of travel, distance covered harsh braking, mileage in Control room etc.

Through VTMS all the operational vehicles and their working shall be easily recorded and monitored. By using this web application, the Client shall be able to monitor the operational vehicle route and speed to keep a strict eye on the vehicles. The Vehicles shall be equipped with approved Tracking device operational (fees paid) for the year in which vehicle is supplied to the Employer, routing transmitter for tracking system, and other instruments such as for Fuel Level, Battery Condition &Water Temperature and Tachometer etc.

All the vehicles shall be equipped with air-conditioning system, weight sensors and wi-fi compatibility approved by the Engineer/Employer. All the equipment/machinery shall be equipped with Vehicle Trip Counting System (VTCS) being automatically operated without any human involvement. This web-based system shall be accessible through internet

Vehicles shall be equipped with a beacon light (yellow, commercial quality) on roof of driver's cab, to be operated from inside the cabin.

Warranty

The Contractor shall provide warranty for all equipment for a period of one (1) year through authorized local distributor commencing the hand-over and acceptance date to the Employer. No equipment shall be accepted without warranty certificate from the manufacturer (OEM). It shall cover all costs for warranty service, including parts replacement, labour, prompt field service,

pick-up, transportation, and delivery. No extra cost shall be admissible for Warranty services.

Functional Description

Vehicle Tracking System

The Vehicle tracking system shall be installed at every moving vehicle The Vehicle Tracking System should have the following features

- Fleet management solution
- Satellite tracking system (GPS) with enhance real time GPRS connectivity
- Solution with nationwide coverage
- 24x7 location on call
- Multiple users' logins
- Geo fence alert
- Battery disconnect alerts
- Vehicle immobilization in case of emergency
- Activity report
- Activity summary report
- Geo fence in/out report (multiple fences)
- Stop report
- Trip wise report
- Mileage report
- Harsh breaking report
- Over speed report
- Live status page (all vehicles live status on one page)
- Bird eye view (graphical reporting)
- Oil change alert (system generated intimation by email) based on tracker kilometers.
- Daily, weekly, monthly, yearly reporting
- Vehicle specific reporting
- Raw data availability (for in-house customized reporting/ data-processing)
- Route/geo-fence violations
- Data shall be provided to company in e-format, as per agreed standards & format
- Complete activity report
- Reports will be fetched against company, category, vehicle type, and town against given time period
- Summary option shall be for day, week, month
- Company geo fence defined in out report
- Trip report detail (during trip start from parking site till pick container then dump at dumping site) travel time, stop time, number of container pick, mileage and other fields
- Container visited summary
- Dumping site visited report
- Workshop visited report
- Continues driving report
- Area wise speed violation report

Fuel Kit

The fuel kit shall be installed at every moving vehicle. The Fuel Kit should have the following features

- Online fuel monitoring through web portal
- Fuel injection/refilling report (liters) & Fuel consumption vs driven km's report
- Fuel monitoring report
- Online dashboard

Operator Workstation

The minimum configuration of the Operator workstation PCs and the LED Monitors shall be an IBM compatible server computer based on the currently prevailing version of the Intel Core i7 microprocessor. One number Operator workstation shall be installed at control rooms. The minimum configuration of the server shall be as per the following minimum specifications:

- Core i7 8th Generation processor latest version
- Intel series chipset Q370
- 16GB RAM- DDR 4
- 1TB Internal Hard disk drive 7200 RPM 3.5inch
- HDMI port for connection to the High-quality monitor
- DVD/RW drive
- 24" LED monitor FHD with HDMI and VGA
- R/W combination CDR and DVD, Keyboard, Mouse and Peripheral Interface Cards
- Latest MS WINDOWS 10 Professional 64-bit pre- installed Operating System and associated software.
- All components/equipment shall be same brands and shall be OEM Manufacture

4K 55" LED VDU

The 4k 55'' LED VDU (video display unit) shall be used to show and monitor all the vehicle routes, speed of travel, distance covered, harsh braking, mileage etc. One number 4k 55'' LED VDU shall be installed at control rooms. The minimum configuration of the 4k 55'' LED VDU shall be as per the following minimum specifications

4k Resolution with HDR (High Dynamic Range),

- 8.3 Million Pixel RGB UHD,
- Quad Core Processor,
- Ethernet LAN Port with wireless Network Card built- in,
- All accessories, wall mounting brackets, Remote, user manual,
- Original manufacturer's with warranty card
- Vehicle Tracking and Monitoring System software shall be installed in Control Room.

EQUIPMENT DATA SHEET

he bidders are required to fill in the following form completely and clearly, for ach equipment/machinery/vehicle along with the units of measurement.

Item				Particulars
	Name of Equipment			
	Manufacturer Details with Country of Origin			
		Name		
		E-mail address of the concerned person		
		Phone No.		
		Certifications	ISO 9001	
			ISO 14001	
			OHSAS 18001	
	Service Interval (per operating hours / per km)			
	Average Fuel Consumption (per operating hours / per km)			
	Average Cost Per Service Interval (including fuel and scheduled maintenance)			

Punjab Cities Program

Revised Cost Estimate for Provision of Equipment & Machinery for Improvement of Solid Waste Management System in Daska City

Summary of cost

(All cost in million PKR)

	Group-A		
1	Vehicles chassis	Detail attached	**60.678**
	Group-B		
2	Super structure of the vehicles	Detail attached	**110.094**
	Group-C		
3	Three years HR cost for operation of Solid Waste Machinery		**19.620**
	Group-D		
4	Cost of purchase of the Vehicle Tracking System including 5 % PST		**1.113**
	Service charges for 3 years including 16 % PST		**0.803**
	Total cost		**192.308**

For cost effectiveness the vehicle chassis will be procured directly from the manufacturers and will be handed over to the vendors for fabrication of super structures. This will save the middle man's profit.

Sub Engineer
MC Daska

Municipal Offcier (I&S)
MC Daska

INTIAL PLANNING AND DESIGNING OF SOLID WASTE MACHINERY AND EQUIPMENT HAS BEEN PREPARED BY PMDFC-PCP INFRASTRUCTURE DEVELOPMENT TEAM WHICH WAS FINALIZED BY MC DASKA AS PER THEIR NEED AND DULY APPROVED BY DDNP. SPECIFICATIONS OF THIS MACHINERY AND EQUIPMENT HAS BEEN PREPARED BY PMDFC AND INCLUDED IN PC-I.

Program Officer-1
Infrastructure Development
Punjab Cities Program-Lahore
23/4/22

Senior Program Officer
Infrastructure Development
Punjab Cities Program

Punjab Cities Program

Cost Estimate for Provision of Equipment & Machinery for Improvement of Solid Waste Management System in Daska City (Comparative Statement)

Summary of cost

(All cost in million PKR)

Group-A	ORIGNAL ESTIMATE	REVISED ESTIMATE	DIFFERENCE
Vehicles chassis (Detail attached)	51.873	60.678	8.805
Group-B			
Super structure of the vehicles	88.466	110.094	21.628
Group-C			
Three years HR cost for operation of Solid Waste Machinery	19.62	19.620	0.000
roup-D			
st of purchase of the Vehicle Tracking System cluding 5 % PST	0.911	1.113	0.202
vice charges for 3 years including 16 % PST	0.932	0.803	-0.129
Total cost	161.802	192.308	30.506
	Revised Estimate 18.85 % above from Orignal Estimate		

cost effectiveness the vehicle chassis will be procured directly from the manufacturers will be handed over to the vendors for fabrication of super structures. This will save the lle man's profit.

Engineer
Daska

Municipal Officier (I&S)
MC Daska

TPL Trakker

Other Terms & Conditions

1. **Payment Terms:**
Payment will be made within week after invoicing.

2. **Delivery Time**
Dependent on quantity ordered, following will be delivery schedule from receipt of Purchase Order
Within 1-2 weeks any delays caused due to unavailability of vehicles shall be to your account. Secure location to install equipment to be provided at each site.

3. **Warranty**
The units installed shall be covered by a One (1) years warranty from date of original installation. However, damages due to vehicles' electrical system failure or poor maintenance and misuse or damage due to operator is not covered and shall be on chargeable basis.
Prior to installation our Technical team will inspect your vehicle's electrical system and provide information on requirement standard. This is essential due to the nature of your operations and a pre-requisite to proper operation of the equipment installed.

4. **Government Taxes**
All applicable taxes at time of offer have been included. Any new taxes imposed during the currency of the der shall be to your account and payable.

5. **Closure of Service**
In the event of invoices are not settled within 7 days from issuance, Trakker will deactivate tracker units on account of non-payment.

Forex Rates

Quotation is based on the current Forex rates which is (interbank rates of the day of quotation) and the applicable rates would be the date of receiving the confirm work order.

Transfer Charges

Unit can be transfer in other vehicle transfer charges will be Rs. 5,975/-

L Trakker Limited
.Mubashar Afzal
01-8489092
anager Sales

HINO

Quotation attached duly verified by Engineer Incharge

QUOTATION

(Budgetary)(ex)

MCN No.:	MKT-CA IIIR/01/0780
Dated:	January 06, 2022
Sales Region:	Central
Price Basis:	Ex-Plant Karachi
Validity:	15 Days
Delivery:	16~20 Weeks from order confirmation along with 100% Advance Payment
Color:	Hinopak's Standard
Payment:	100% advance through Pay Order/Bank Draft in favor of "Hinopak Motors Limited"
NTN #:	34-01-0815070-2
Income Tax Exempted #:	Under SRO 18 U/S. 153 (4)
Sales Tax #:	02-02-7610-003-73
ISO 9001:2015 #:	MER 19.184/UQ dated 22-08-2019
ISO 14001:2015 #:	MER 19.621/UE dated 23-01-2020
ISO 45001:2018 #:	MER 20.044/UOH dated 28-01-2021

...stomer:
...al Officer
...nicipal Committee Daska
...t. Gujranwala

...signee:
...bove

...DS & PRICES:

Products	Qty	Unit Price Rs.	Total Amount Rs.
HINO DUTRO XZU720R Truck Chassis Turbo Intercooled (Euro-III)	01	6,200,000/-	6,200,000/-

...nsportation ...ges: Transportation Charges of Rs. 100,000/- per unit, inclusive of transit insurance from Karachi to Daska will be charged separately.

...r Terms:

1. Manufacturer: Hinopak Motors Ltd.
2. Warranty of Chassis: 12 months or 100,000 km, whichever occurs first from delivery of vehicle.
3. Above price is inclusive of 17% General Sales Tax.
4. This proposal is subject to standard force majeure terms and conditions including any interruption in production / Supply / Assembly caused by lockdowns imposed by the Governments of Japan / or Pakistan. Delivery period may please increase due to change in supply chain schedule by COVID-19 pandemic.
5. The quoted price is based on prevailing exchange rate of Japanese Yen/US $ and fluctuation on current applicable duties, taxes and other government levies. In case of any levies or imposition of any new duties or taxes (Sales Tax, RGST, VAT, Flood Surcharge, Excise Duty etc.), at the time of delivery, our quoted prices will change accordingly which will be entirely on customer's account.

...offer is subject to availability of stocks and prior sale and the General Terms & Conditions as printed on reverse of Quotation.

...and on behalf of
...opak Motors Limited,

...ib Khalil
...tional Head – Area Central
...opak Motors Limited
...M Multan Road, Lahore
...il: saqib-khalil@hinopak.com
...No. 0302-8735292

HINO

Quotation attached duly verified by Engineer Incharge

QUOTATION

(Budgetary/Lot)

MCN No.:	MKT-CA-HIR/01/0181
Dated:	January 06, 2022
Sales Region:	Central
Price Basis:	Ex-Plant Karachi
Validity:	15 Days
Delivery:	16~20 Weeks from order confirmation along with 100% Advance Payment
Color:	Hinopak's Standard
Payment:	100% advance through Pay Order /Bank Draft in favor of "Hinopak Motors Limited".
NTN #:	34-01-08150/0-2
Income Tax Exempted #:	Under SRO 18 U/S. 153 (4)
Sales Tax #:	02-02-7610-003-73 .
ISO 9001:2015 #:	MER 19.184/UQ dated 22-08-2019
ISO 14001:2015 #:	MER 19.621/UE dated 23-01-2020
ISO 45001:2018 #:	MER 20.044/UOH dated 28-01-2021

tomer:
l Officer
nicipal Committee Daska
, Gujranwala

signee:
bove

DS & PRICES:

Products	Qty	Unit Price Rs.	Total Amount Rs.
HINO FG8JKLB Truck Chassis (Euro-II) Turbo Intercooled (Euro-II)	01	12,565,000/-	12,565,000/-

sportation ges: Transportation Charges of Rs. 100,000/- per unit, inclusive of transit insurance from Karachi to Daska will be charged separately.

r Terms:

1. Manufacturer: Hinopak Motors Ltd.
2. Warranty of Chassis: 12 months or 100,000 km, whichever occurs first from delivery of vehicle.
3. Above price is inclusive of 17% General Sales Tax.
4. This proposal is subject to standard force majeure terms and conditions including any interruption in production / Supply / Assembly caused by lockdowns imposed by the Governments of Japan / or Pakistan. Delivery period may please increase due to change in supply chain schedule by COVID-19 pandemic.
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offer is subject to availability of stocks and prior sale and the General Terms & Conditions as printed on reverse of Quotation.

nd on behalf of
opak Motors Limited,

ib Khalil
lonal Head – Area Central
opak Motors Limited
M Multan Road, Lahore
l: saqib-khalil@hinopak.com
No. 0302-8735292

BECO
Bilal
Engineering Co.

Manufacturers of Solid & Liquid
Waste Management Machinery &
Ground Support Equipment

BEC/MC-DK/337/22
March 10, 2022

Quotation attached duly verified by Engineer Incharge

The Chief Officer
Municipal Committee
Kaska

Sub:- Quotation For Solid Waste Machinery & Equipment Only Superstructure

Dear Sir,

With reference to your requirement of subject Solid Waste Machinery & Equipment Only Superstructure, please find below our best offers along with specifications given by MC:-

Solid Waste Machinery & Equipment Only Superstructure

#	Items Name	Unit Price
	Garbage Compactor 8- Cubic Meter Capacity	Rs=4,395,000/=
	Mini Tipper 1- Cubic Meter Capacity	Rs=700,000/=
	Water Truck Spray System	Rs=3,500,000/=
	Dump Truck 10- Cubic Meter Capacity	Rs=3,832,000/=
	Vacuum Sweeper 4-Cubic Meter Capacity	Rs=14,800,000/=
	Garbage Containers 0.8-Cubic Meter Capacity	Rs=86,000/=
	Hand Cart Waste Tipping Trolley	Rs=78,000/=
	Hand Cart Conventional	Rs=38,000/=

- Prices with All Taxes
- Above prices are valid for 3-Month.

For Bilal Engineering Co.

BILAL ENGINEERING CO.
G. T. Road (Opp. Rescue 1122 Office) Pindi Bypass, Gujranwala, Pakistan.
+92-55-3416075-76, +92-55-3416012-13
+92-55-3416077
info@beco.com.pk becopak@gmail.com

RIKANS

Head Office:
61-B Main Boulevard Bankers Town,
Near Ring Road, DHA Phase IV Interchange,
Lahore Pakistan.
Ph: (92-42) 35190631-32, Fax: (92-42)35190633,
Email: rikans.int@gmail.com, info@rikans.com,
www.rikans.com

:s/DSK/01

Date 17-03-2022

Quotation attached duly verified by Engineer Incharge

QUOTATION

o,
Chief Officer Unit Daska,
District Council, Sialkot.

/e are pleased to submit our offer against tender for PROCUREMENT OF WHEEL EXCAVATOR ith terms and conditions as described here under.

anufacturer	: Hyundai Doosan Infracore Co., Ltd Korea.
ountry of Origin	: South Korea.
ayment Terms	: As per bidding documents.
elivery Period	: 5 – 6 Months from the date of purchase order.
elivery	: F.O.R at Site (Daska).
arranty	: 01 Year or 2,000 working hours (whichever comes first).
alidity	: 90 days.

Description	Model & Specification	Qty	Unit Price FOR Daska
Wheel Excavator	Model: DX140W • Engine Power: 99 KW (132 HP) • Operating Weight: 13,750 Kg • Bucket Capacity: 0.76 m^3 (General Purpose) • Cabin with AC and Heater • Front Outriggers and Rear Dozer Blade • Piping for Hydraulic Breaker • PE3C/PERO Rotation Piping • Quick Coupler Attachment • Ditch Cleaning Bucket As per attached specifications.	01 No.	Rs. 38,870,000
Amount in words: Thirty Eight Million Eight Hundred Seventy Thousand Only			

anks & Regards

uhammad Ghufran
Manager Sales)

RIKANS

MILLAT TRACTORS LIMITED

P.E.T. Plot No. 12021 Shahkhupura Road Thokar Niaz Baig Lahore Pakistan

UAN: +92-42-111-200-700 Ext. 605 Tel: 37922299 Fax: [illegible]

E-mail: asma.mustafar@millat.com.pk, tms_sales@millat.com.pk

TÜV AUSTRIA MILLAT

BUDGETRY QUOTATION

The Office of the Municipal Committee Dasku, Sialkot	
Attention: Chief Officer	
Tel/Phone No: 00331-6516466	

MTL Reference	MTLR Sale/O/2022/83
	Date: 04/01/2022
Query Reference:	Letter No MCD-31/A/ 354 dated 04.01.2022

Quotation attached dully Verified by Engineer Incharge

Description	Base Price Ex - Factory Lahore (Rs.)	GST % Age	GST (Rs.)	Cost / Unit Ex - Factory Lahore (Rs.)	Qty. (Nos.)	Extension /Set Ex - Factory Lahore (Rs.)
Agricultural Tractor Model MF- 385 4WD with Standard Tool Kit	2,360,000	5%	118,000	2,478,000	3	7,434,000
Blade for MF 385 4WD Tractor	180,952	17%	27,362	188,314	1	188,314
Front End Loader for MF 385 4WD Tractor	884,286	17%	116,329	900,615	2	1,801,229
Hook (All Models)	27,180	17%	4,620	31,800	1	31,800
Shade	17,949	17%	3,051	21,000	3	63,000
Transportation, Insurance, Loading Unloading charges from Lahore to Dasku	25,000	16%	4,000	29,000	3	87,000
Total	(Nine million, four hundred five thousands and three hundred forty three only)					9,405,343

TERMS & CONDITIONS:	
Govt. Taxes & Duties:	Impact on price due to levy of additional Government Taxes, if any, shall be charged extra
Price etc.	Above are provisional prices. The prices actually payable will be those prevailing on the
Payment:	100% advance in shape of Demand Draft favoring Millat Tractors Limited, Lahore, along with confirmed Purchase Order clearly mentioning Sales Tax Registration or National Tax Numbers
Offer Validity:	Nil
Inspection:	If required, shall be carried out at our Factory Premises, Lahore, at your cost.
Force Majeure:	This offer is subject to "Force Majeure" Clause
Income Tax Deduction:	The institution may deduct Income Tax @ 4 % of the gross amount (inclusive all taxes) under section 153 (1) (a) and will deposit as Adjustable Tax with code 84060008. Certificate of Collection or Deduction of Income Tax under rule 42 of ITR 2002 is mandatory.
With GST Deduction:	As per Eleventh Schedule of the Sales Tax Act 1990, no deduction of GST is allowed.
Requirment of Booking	1- Purchase order . 2- NTN Certificate 3-Payment 4- Tax Deposit Certificate (CPR)
MTL NTN No	0801437-0 — MTL STRN No: 13-10-8707-002-82
Tentative Ex-factory Delivery Time (as of today):	After 06-08 weeks, from realization of 100% advance payment in MTL account.
Warranty:	a) For tractors a period of 12 months or 1200 hours which ever comes first. b) For implements a period of 06 months.
Note:	1. Payment/Booking/Delivery seniority will be determined, as per availability of tractors/goods & on first come first serve basis. 2. Transit insurance against each tractor will be charged at actual in shape of Cash at the time of delivery. 3. This quotation is being issued for local sales only & not for export purposes. 4. The company reserves the right to change the specifications, color, brand name, logo and identification etc. at any point of time without any prior notice 5. This quotation contains all terms and conditions of the transaction and no other term/condition not contained herein are applicable. 6. In case of fitment and usage of non-MTL /spurious tractor attachments/implements, warranty shall be void if damage occurs to the tractor. 7. We do not transport tractors from our factory to other locations. However, if transportation of your order is required at a desired destination then it will be charged extra at the time of delivery on freight to pay basis after receipt of your authority letter in favor of our concerned authorized area dealer or transporter. 8. The products will be provided on demand as per standard Millat Tractors Ltd specification only. 9. Conditional purchase / supply orders having terms & conditions other than those quoted above will not be accepted. 10. Warranty of implements will be void if not fitted with your tractor at MTL factory premises.

Yours faithfully,

Amir Muzaffar Dy. Manager (Marketing)
Corporate Sales (Tractors & Implements)

Date _____

Pre Receipt Invoice

ent Invoice for 4 Pcs of Suzuki Ravi, against your letter Ref No MC/D 21/A/202

OMER
fficer
ipal Committee Daska
ouse Chowk

DATE	5/1/2022
QUOTE #	1240
CUSTOMER ID	5240
VALID UNTIL	

:

Description	Unit Price	No of units	Amount
uki Ravi (Open Invoice) : Pak Suzuki Motor Co LTD Year: 2022 hassis No ngine No C 796 olor White	1,117,000	4	4468000 Quotation attached duily verified by Engineer Incharge
		Total	4705000

ND CONDITIONS

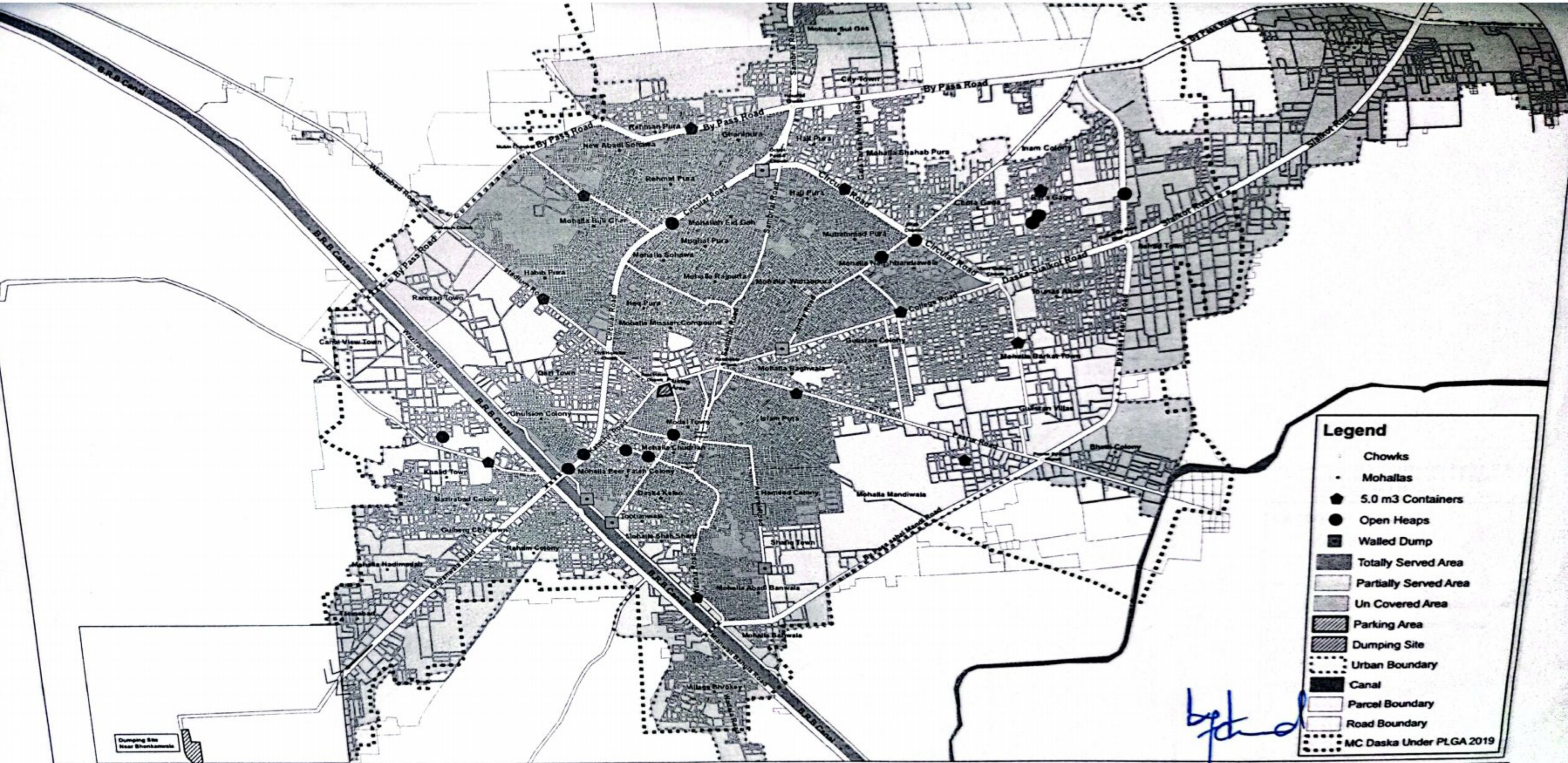
s car is open invoice payment will be made in favour of
i Motors Company Limited.

If you have any questions about this price quote, please contact
Mohsin Raza: 03006463094 Email:suzukidaska@gmail.com

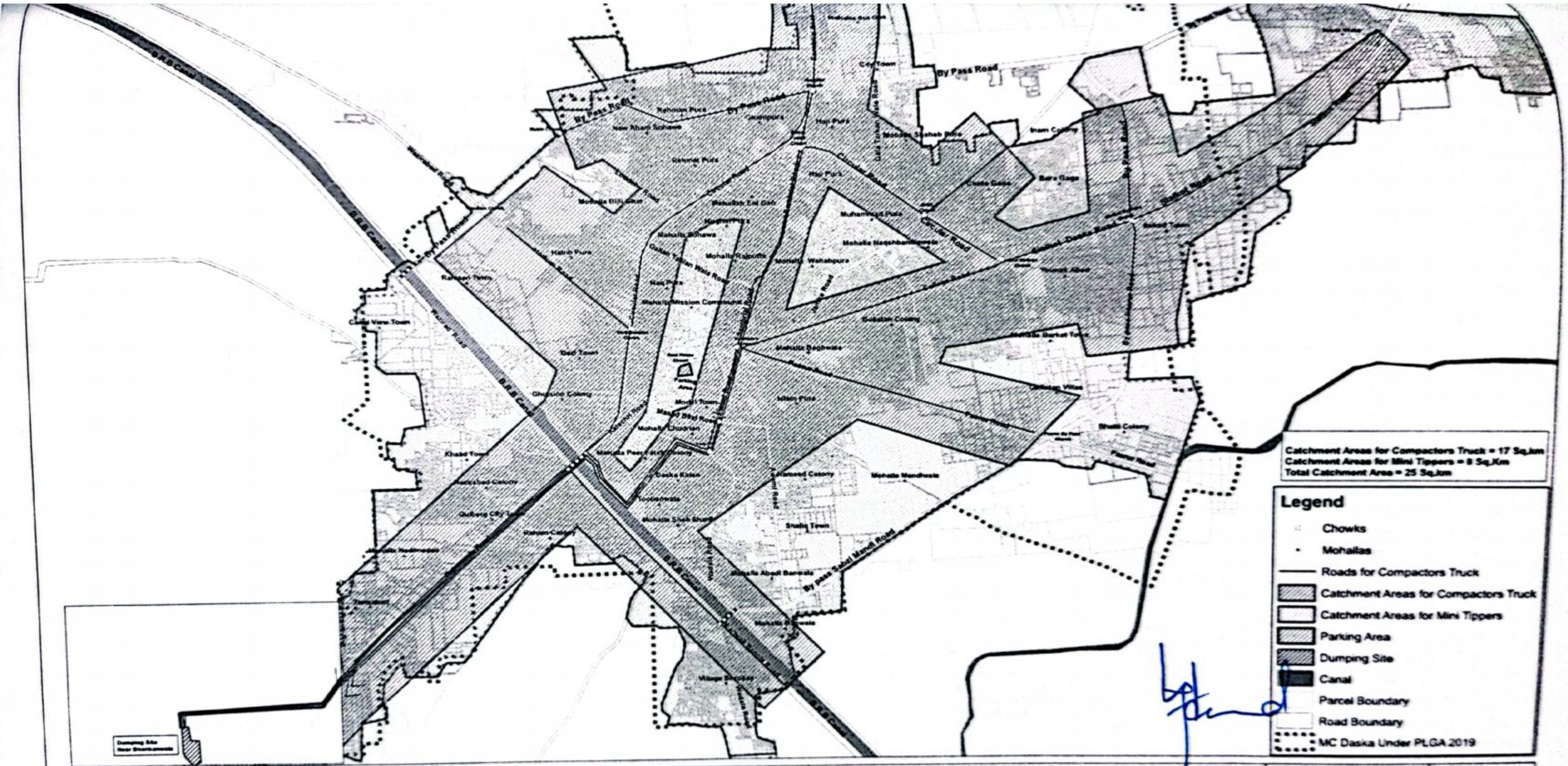
Thank You For Your Business!

SUZUKI DASKA MOTORS
YOUNAS ABAD. GAGA
DASKA

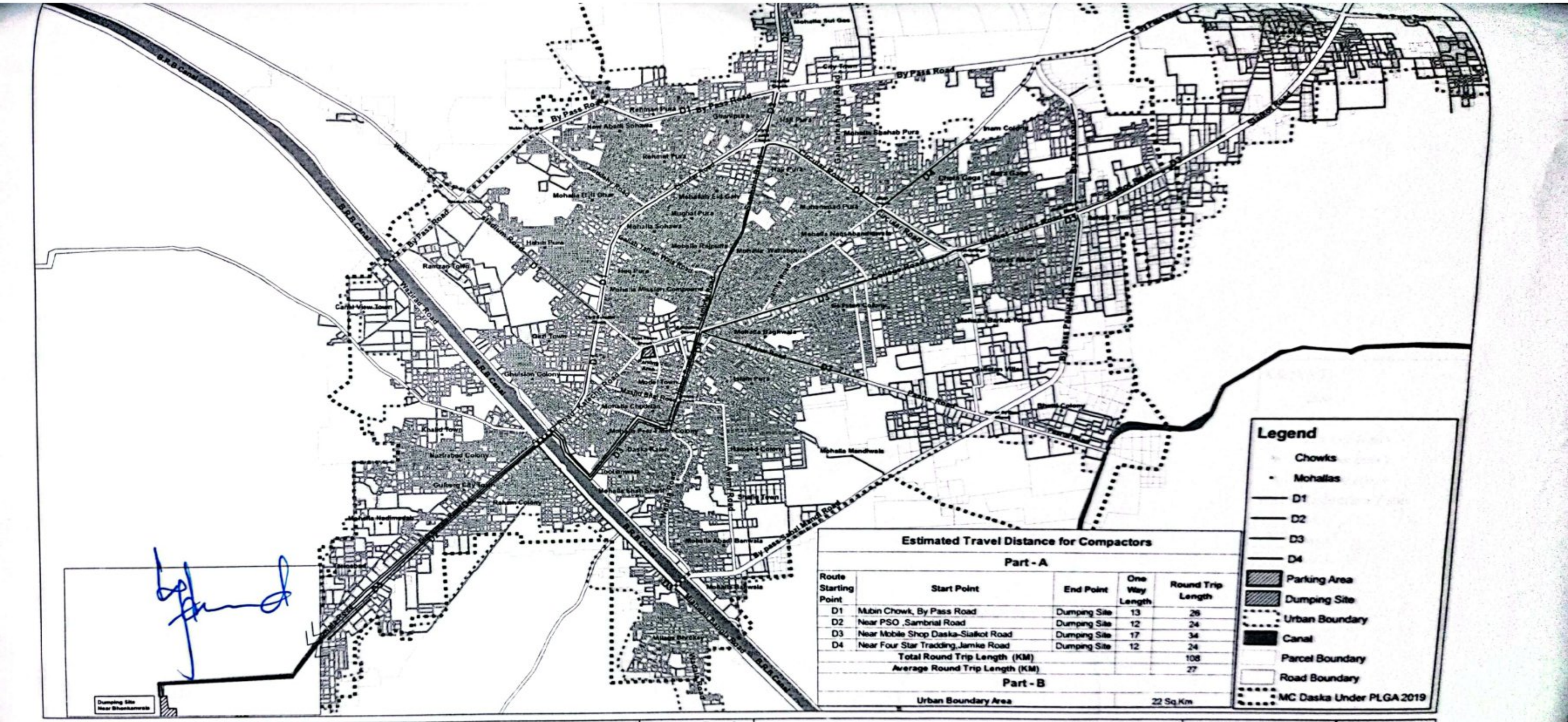
MAPS



PUNJAB MUNICIPAL DEVELOPEMENT FUND COMPANY	PROJECT: PUNJAB CITIES PROGRAM (PCP)	Map Code 0434010321	DISCLAIMER: INFORMATION IS PROVIDED BY MC, PHED & OTHER SOURCES.	Scale: 1:12,000	Date
		Map Version 1.1			March 2021



PUNJAB MUNICIPAL DEVELOPEMENT FUND COMPANY	PROJECT: PUNJAB CITIES PROGRAM (PCP)	Map Code 0434010321	DISCLAIMER:	Scale: 1:12,000	Date
		Map Version 1.1	INFORMATION IS PROVIDED BY MC, PHED & OTHER SOURCES.		March 2021



Estimated Travel Distance for Compactors

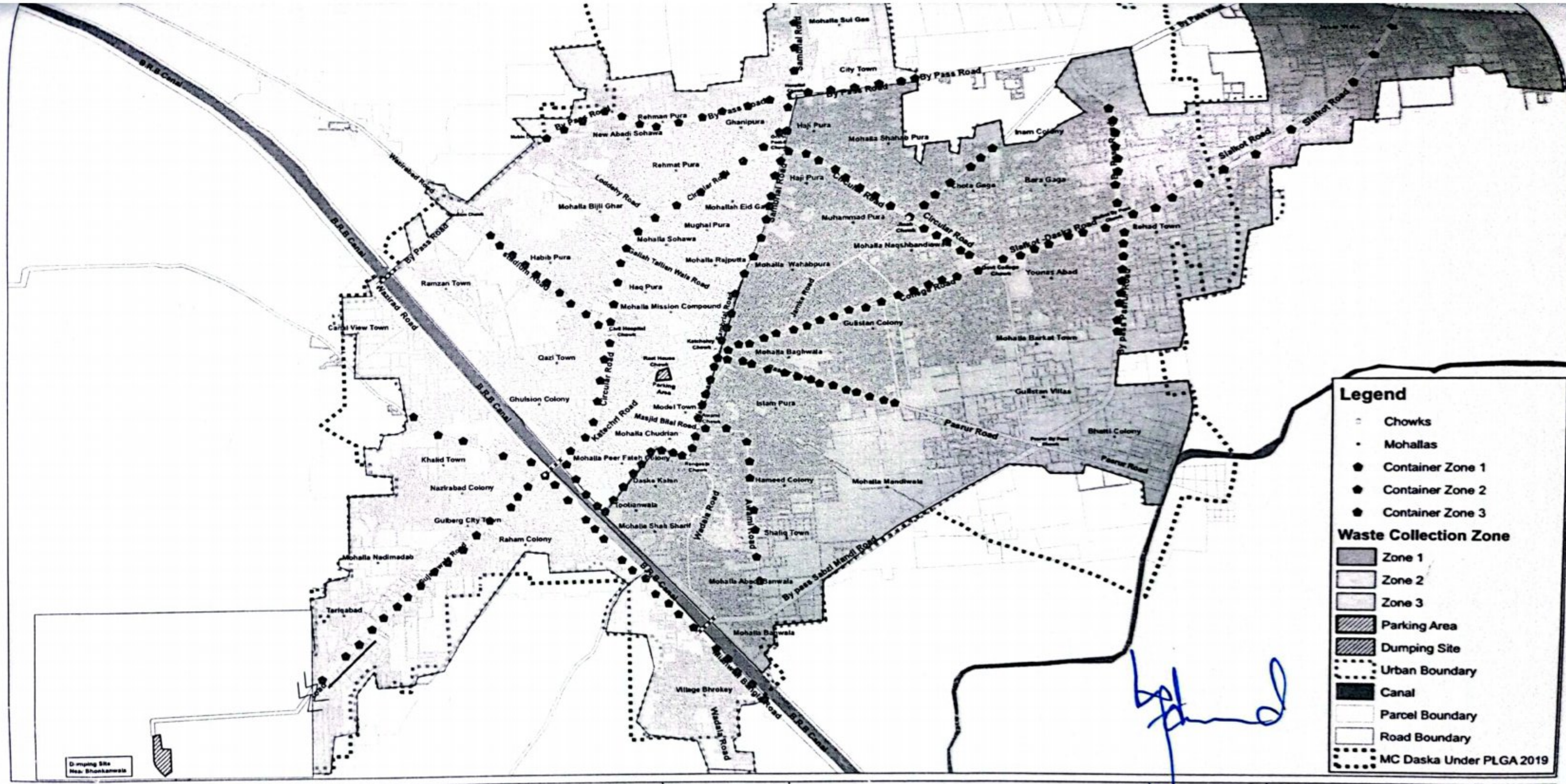
Part - A

Route Starting Point	Start Point	End Point	One Way Length	Round Trip Length
D1	Mubin Chowk, By Pass Road	Dumping Site	13	26
D2	Near PSO ,Sambrial Road	Dumping Site	12	24
D3	Near Mobile Shop Daska-Sialkot Road	Dumping Site	17	34
D4	Near Four Star Tradding,Jamke Road	Dumping Site	12	24
	Total Round Trip Length (KM)			108
	Average Round Trip Length (KM)			27

Part - B

Urban Boundary Area	22 Sq.Km

PUNJAB MUNICIPAL DEVELOPEMENT FUND COMPANY	PROJECT: PUNJAB CITIES PROGRAM (PCP)	Map Code 0434010321 / Map Version 1.1	DISCLAIMER: INFORMATION IS PROVIDED BY MC, PHED & OTHER SOURCES.	Scale: 1:12,000	Date: March 2021


Legend
Chowks
Mohallas
Container Zone 1
Container Zone 2
Container Zone 3
Waste Collection Zone
Zone 1
Zone 2
Zone 3
Parking Area
Dumping Site
Urban Boundary
Canal
Parcel Boundary
Road Boundary
MC Daska Under PLGA 2019
B.R.B Canal
Wazirabad Road
By Pass Road
Samanabad Road
Circular Road
Slatkot Road
Pasrur Road
Ramzan Town
Qazi Town
Ghulsion Colony
Model Town
Islam Pura
Gulistan Colony
Mohalla Baghwala
Mohalla Barkat Town
Younas Abad
Bahad Town
Mohalla Naqshbandiwala
Mohalla Wahabpura
Mohalla Rajputta
Mohalla Sohawa
Mughal Pura
Rehmat Pura
Rehman Pura
New Abadi Sohawa
Ghanipura
Haji Pura
Mohalla Shahab Pura
Inam Colony
Chota Gaga
Bara Gaga
Mohalla Bijli Ghar
Habib Pura
Haq Pura
Mohalla Mission Compound
Civil Hospital Chowk
Katchehry Chowk
Ketchehry Road
Janika Road
Circular Road
Ketachri Road
Masjid Bilal Road
Mohalla Chudrian
Mohalla Peer Fateh Colony
Daska Kalan
Hameed Colony
Mohalla Mandiwala
Tootianwala
Wadala Road
Mohalla Shah Sharif
Shalig Town
Nazirabad Colony
Gulberg City Town
Raham Colony
Mohalla Nadimadab
Tariqabad
Mohalla Abadi Sanwala
By pass Sabzi Mandi Road
Mohalla Bagwala
Village Bhrokey
Dumping Site
Near Bhonkanwala
PUNJAB MUNICIPAL DEVELOPEMENT FUND COMPANY
PROJECT:
PUNJAB CITIES PROGRAM (PCP)
Map Code
0434010321
Map Version
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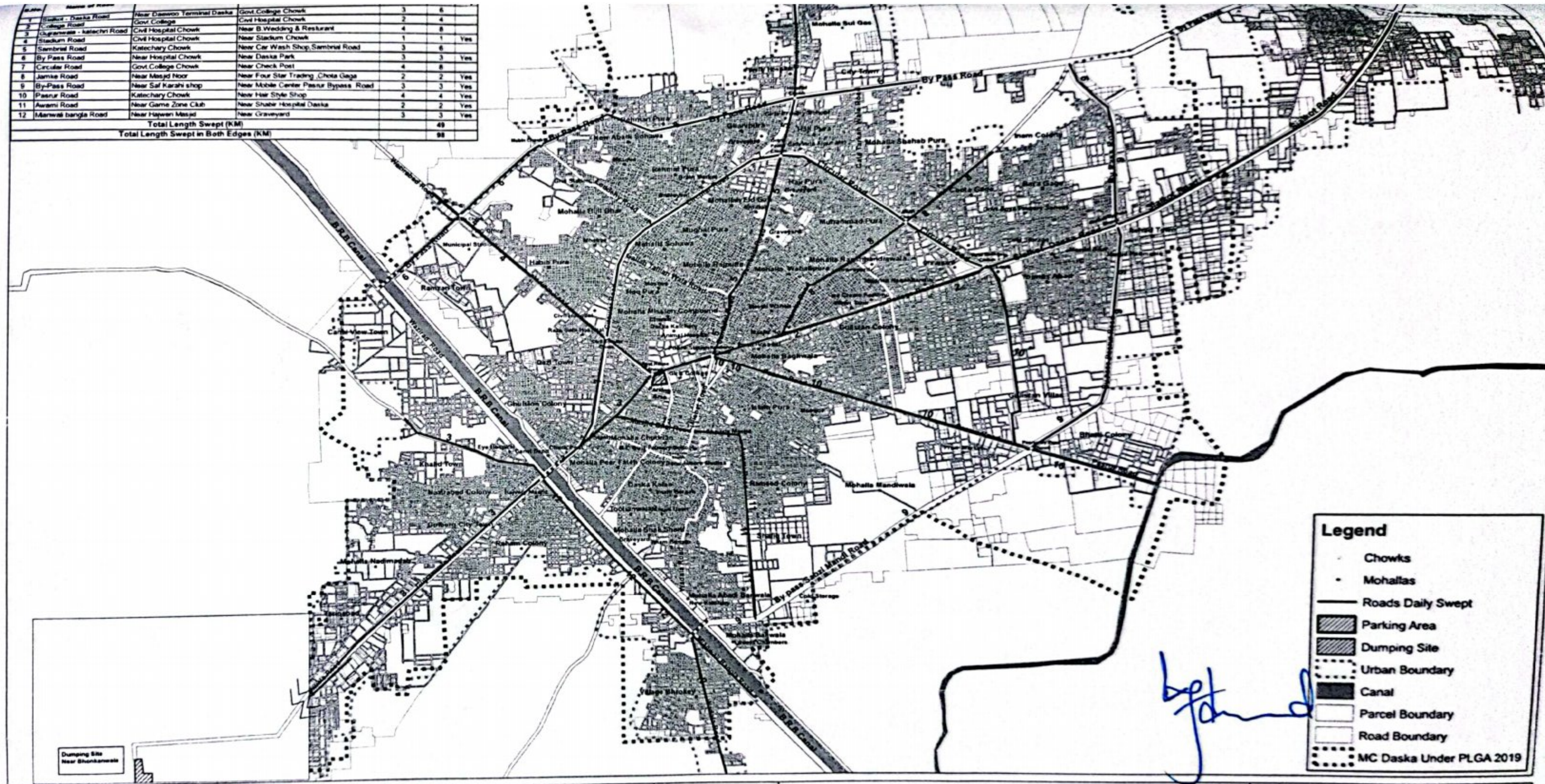
Scale:
1:12,000
Date
March 2021

	Name of Route					
1	Sialkot - Daska Road	Near Daewoo Terminal Daska	Govt.College Chowk	3	6	
2	College Road	Govt.College	Civil Hospital Chowk	2	4	
3	Gujranwala - katechri Road	Civil Hospital Chowk	Near B.Wedding & Resturant	4	8	
4	Stadium Road	Civil Hospital Chowk	Near Stadium Chowk	1	1	Yes
5	Sambrial Road	Katechary Chowk	Near Car Wash Shop,Sambrial Road	3	6	
6	By Pass Road	Near Hospital Chowk	Near Daska Park	3	3	Yes
7	Circular Road	Govt.College Chowk	Near Check Post	4	8	
8	Jamke Road	Near Masjid Noor	Near Four Star Trading ,Chota Gaga	2	2	Yes
9	By-Pass Road	Near Saf Karahi shop	Near Mobile Center Pasrur Bypass Road	3	3	Yes
10	Pasrur Road	Katechary Chowk	Near Hair Style Shop	4	4	Yes
11	Awami Road	Near Game Zone Club	Near Shaibe Hospital Daska	2	2	Yes
12	Marwat bangla Road	Near Hajveri Masjid	Near Graveyard	3	3	Yes
	Total Length Swept (KM)				49	
	Total Length Swept in Both Edges (KM)				98	



PUNJAB MUNICIPAL DEVELOPEMENT FUND COMPANY	PROJECT: PUNJAB CITIES PROGRAM (PCP)	Map Code 0434010221	DISCLAIMER:	Scale: 1:12,000
		Map Version 1.1	INFORMATION IS PROVIDED BY MC, PHED & OTHER SOURCES.	Date: February 2021