

## **7. Basic Design of Solid Waste Collection/Street Sweeping System in Jakarta**



7. Basic Design of Solid Waste Collection & Street Sweeping System in Jakarta Pusat

7.1 Collection of Solid Waste in Jakarta Pusat

1) General

The general area conditions of Jakarta Pusat are shown in Table 7.1-1.

Table 7.1-1 General Area Conditions

Kecamatan	No. of Kelurahan	No. of RW	Area (ha)	Household		Population	
				1985	1995	1985	1995
Tanah Abang	7	71	931	57350	60100	268830	271390
Menteng	5	38	653	22550	30000	138280	139140
Senen	6	49	410	34620	32600	159030	151670
Campaka Putih	7	67	707	49870	53300	232230	236020
Sawah Besar	5	51	621	36580	40600	178370	182990
Gambir	6	47	760	35400	36000	155970	159390
Kemayoran	8	70	722	50630	57400	259390	259900
<b>Total</b>	<b>38</b>	<b>393</b>	<b>4808</b>	<b>287000</b>	<b>310000</b>	<b>1392100</b>	<b>1400500</b>

Administrative boundaries and RT boundaries of Jakarta Pusat are shown in Fig. 7.1-1.



## 2) Collection Systems

The present collection systems may be classified as follows:

- Handcart - Depot
- Handcart - Pool
- Communal concrete bin
- Open space
- Jali - Jali
- Large communal container
- Door - to - door
- (Small communal container)

The actual situation of collection according to the foregoing classification is shown in Table 7.1-2.

Table 7.1-2 Number of RWs for Present Collection System

	TANAH ABANG	MEN- TENG	SEKEN	CEMPAKA PUTIH	SAWAH BESAR	GAMBIR	KEMA- YORAN	TOTAL	%
HANDCART-DEPOT	29	6	0	4	21	10	4	74	19
HANDCART POOL	22	1	23	18	20	18	48	150	39
CONCRETE BIN	8	6	1	0	2	5	2	24	6
OPEN SPACE	0	1	0	0	0	0	0	1	0
LARGE CONTAINER	5	5	5	4	6	2	6	33	9
JALI-JALI	0	9	6	29	0	0	6	50	13
DOOR TO DOOR	1	9	11	4	1	10	4	40	10
SELF-MANAGING	6	0	0	8	0	0	0	14	4
TOTAL	71	37	46	67	50	45	70	386	100

The collection systems are classified by the dominant system represented in each RW. Accordingly, even when the door-to-door system is adopted along the surrounding roads of the area, the area as a whole is represented by some other system if that system is dominant.

Collection from specified facilities (large scale buildings or facilities) is classified under the category of door-to-door. Although small containers have begun to be introduced on the main streets and in the busy business districts, they have not yet been established as a collection system for the area, so that the system is not shown as such here. The locations where small containers are placed are shown in Fig. 7.1-3.

There are 10 depots in Jakarta Pusat, as shown in Fig. 7.1-2. The present status of these depots are shown in Table 7.1-3. The design configuration of these depots is shown in Appendix. Of these depots, the one at Sawah Besar will be abolished due to the planned extension of the railway.

LEGEND



NEW DEPOT

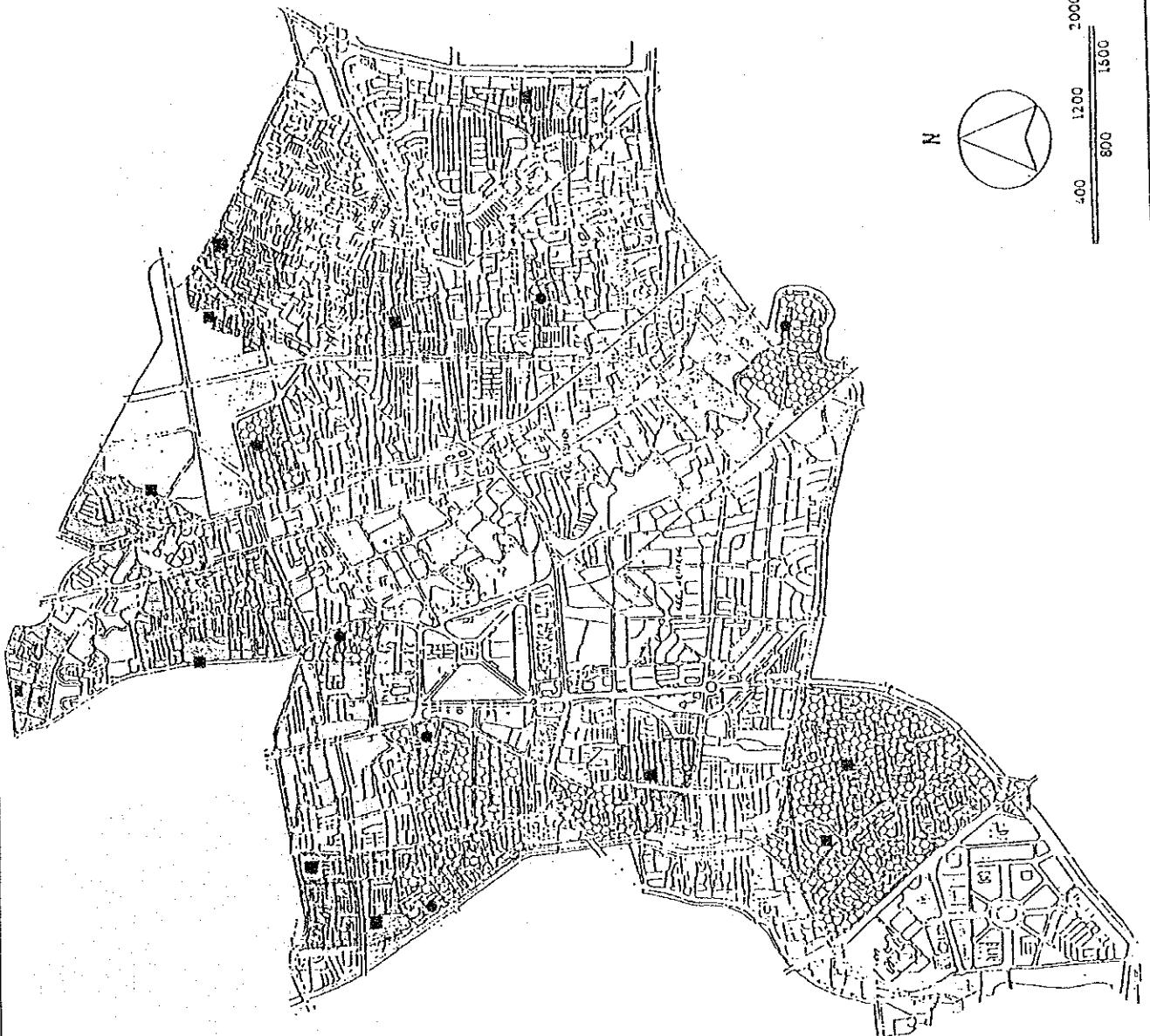


EXISTING DEPOT

Fig. 7.1-2

LOCATION OF DEPOT

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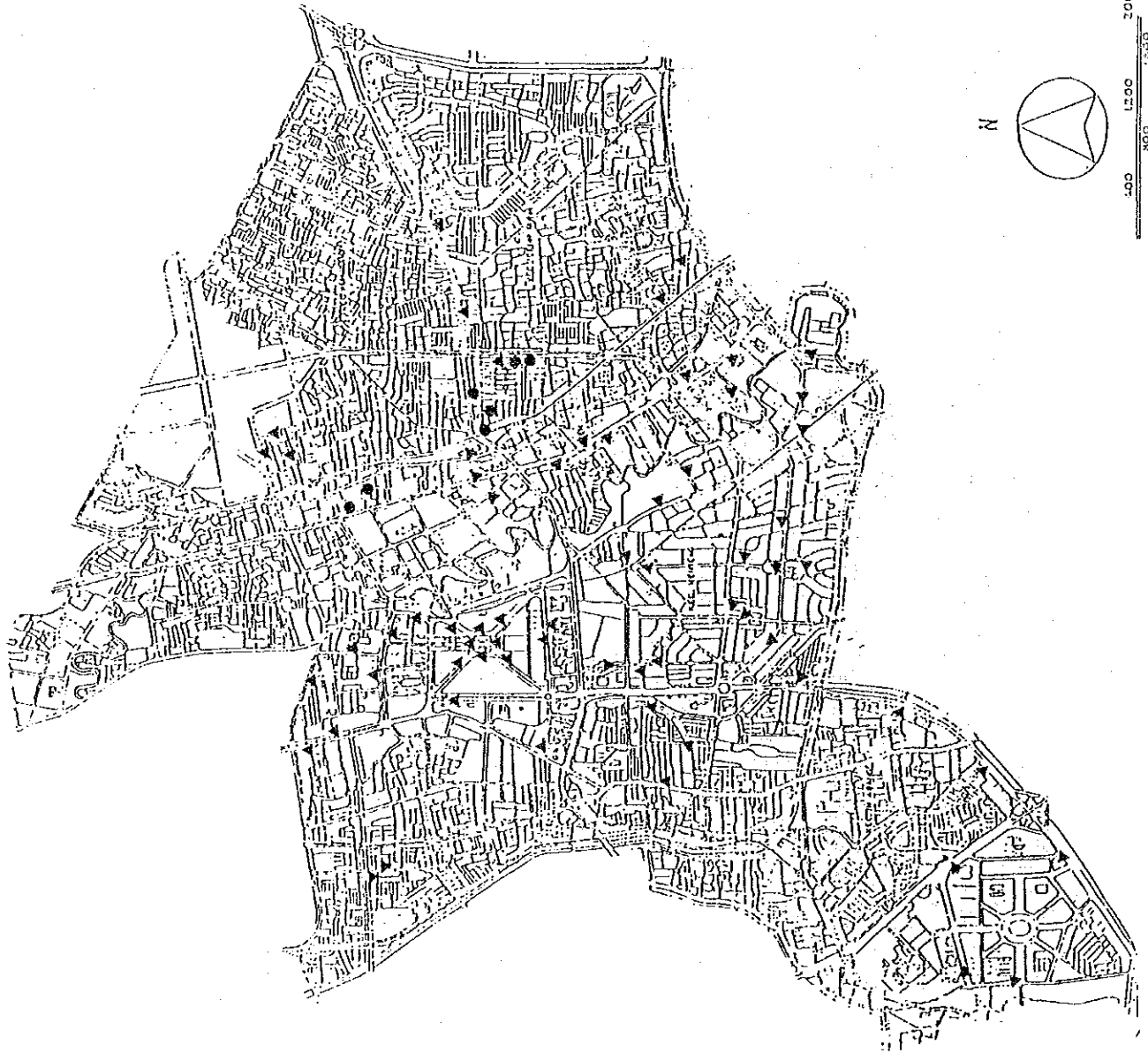
LEGEND

- ▲ 1 m<sup>3</sup> CONTAINER
- SMALL COMMUNAL CONTAINER

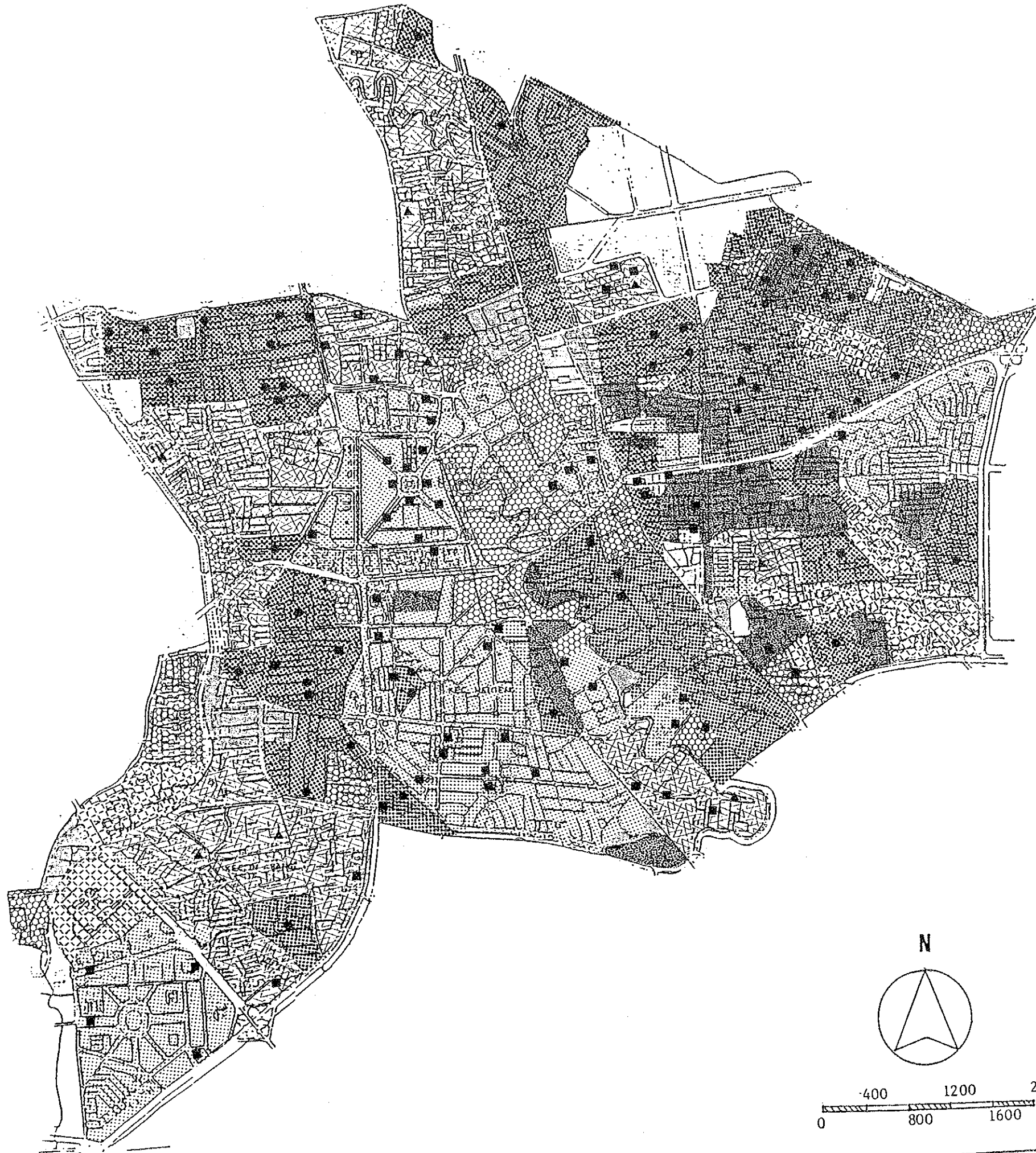
Fig. 7.1-3

LOCATION OF SMALL CONTAINER






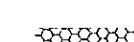
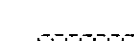
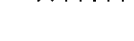

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LEGEND

-  ● HANDCART - POOL
-  DOOR TO DOOR
-  ▲ DEPOT
-  JALI-JALI
-  BAK
-  LARGE CONTAINER
-  ■ NOT SERVED BY DINAS
-  1 M<sup>3</sup> CONTAINER
-  SMALL CONTAINER

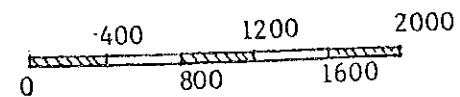
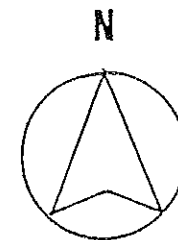


Fig.  
7.1-4

EXISTING SOLID WASTE  
COLLECTION SYSTEM

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Table 7.1-3 Present Depots

No	Kecamatan	Kelurahan	Jalan	Area(m <sup>2</sup> )	Waste Amount (m <sup>3</sup> )	Present Container	Required No. of Container at Depot	Remark
1	Gambir	Cideng	Jl. Tanjung Selor	305 (492)	60	Compactor Container	3	The Seksi Kebersihan office is adjacent to the Depot.
2	Gambir	Petojo Utara	Jl. Tanah Abang I	221	60	-	3	
3	Gambir	Kebon Kelapa	Jl. Pintu Atr II	328	60	-	3	
4	Tanah Abang	Kebon Kacang	Jl. Jati Baru	320	40	-	3	
5	Tanah Abang	Karet Tengsin	Jl. Mansyur	327	48	-	3	
6	Tanah Abang	Bendungan Hilir	Jl. Penjernihan	267	36	-	2	
7	Henteng	Pegangsaan	Jl. Matraman Dalam I	277	30	1*	2	
8	Cempaka Putih	Johar Baru	Jl. Johar Baru	185 (300)	18	-	2	
9	Kemayoran	Gunung Sahari Selatan	Jl. Kran	180	40	2	2	
10	Sawah Besar	Karang Anyar	Jl. Karang Anyar	279	220	Compactor Container	-	
			Total	2,689	612	5	23	

(\*) including front yard

\* Out of order

3) Collection equipment

The number of vehicles by type and by year of purchase is shown in Table 7.1-4. About 70% of the vehicles are open trucks and tipper trucks which are still remaining in service.

Table 7.1-4 Record for Preparation of Vehicles

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	TOTAL
OPEN CARGO	16		34	19					1						70
	(3)		(1)						(1)						(5)
SMALL			26			3					1				30
			(10)			(1)									(11)
TIPPER				1					3	2	4				10
SMALL											37				37
											(1)				(1)
COMPACTOR								1		1					22
								(1)							(1)
SMALL										7	11	5	2		23
										(2)					(2)
ARM-ROLL			5	3					1						9
SMALL											5				5
CRANE											2				2
PECK-UP			1	1											2
TOTAL	16		40	50		3		1	5	10	60	5	2	22	214
	(3)		(1)	(10)		(1)		(1)	(1)	(2)	(1)				(20)

$$\text{MECHANIZATION RATIO} = \frac{\text{NO. OF (COMPACTOR + ARM ROLL + TIPPER WITH WHEEL LOADER)}}{\text{TOTAL NO. OF VEHICLE}} = 29.4\%$$

Table 7.1-5 Waste Amount by Each Collection System by Kelurahan

KECAMATAN	KELURAHAN	A	B	C	D	E	F	G	H	合計	
SENEH	SENEH			0.55		3.23		2.10		5.88	
	KWITANG		3.58							9.95	
	KENARI		5.91				2.60	3.77		8.06	
	KRAMAT		12.82			0.39		1.76		17.18	
	PASEBAN		12.07			3.63		0.73		17.41	
KEMAYORAN	BUNGUR		4.33			3.72		1.62		14.98	
	SUB TOTAL	0	38.71	0.55	0	10.97	8.55	14.68	0	73.46	
	CEMPAKA BARU		10.73					3.66		14.39	
	SERDANG	0	6.86	0	0	0.44	3.06	0	0	10.36	
	KEBON KOSONG	0	8.77	0	0	2.28	0	0	0	11.05	
	UTAN PANJANG	0	9.41	0	0	0	1.59	0.69	0	11.69	
	GUNUNG SAHARI	4.89	3.84	0	0	2.04	0	0	0	10.77	
	SELATAN										
	KEMAYORAN	0	8.01	1.55	0	0	0	0	0	9.56	
	SUMUR BATU	0	5.36	0	0	1.42	0	0.73	0	7.51	
BAMBIR	HARAPAN MULYA	0	6.44	0.83	0	0	2.41	0	0	9.68	
	SUB TOTAL	4.89	59.42	2.38	0	6.18	7.06	5.08	0	85.01	
	CIDENG	15.25	3.81	0	0	1.45	0	1.76	0	22.27	
	PETOJO UTARA	0	18.45	0	0	0	0	3.78	0	22.23	
	KEBON KELAPA	16.04	0	0	0	0	0	0	0	16.04	
	BAMBIR	0	0	0	0	0	0	4.35	0	4.35	
	PETOJO SELATAN	1.28	10.48	0	0	0	0	13.27	0	25.03	
	DURI PULO	0	19.40	15.72	0	0	0	0	0	35.12	
	SUB TOTAL	32.57	52.14	15.72	0	1.45	0	23.16	0	125.04	
	TANAH ABAN	KAMPUNG BALI	8.62	4.01	0	0	1.28	0	0	0	13.91
KEBON KACANO		0	12.99	0	0	0	0	0	0	12.99	
KEBAN MELATI		4.70	9.36	13.96	0	3.25	0	0	0	31.27	
PETAMBURAN		0	5.99	0	0	0	0	0	11.75	17.74	
BENDUNGAN HILIR		18.56	0	0	0	0	0	0	0	18.56	
KARAT TENGSIN		27.92	0	0	0	0	0	0	0	27.92	
GELORA		0	0	1.85	0	1.96	0	1.37	0	5.18	
SUB TOTAL		59.80	32.35	15.81	0	6.49	0	1.37	11.75	127.57	
SAWAH		BESAMANGA DUASEL	3.99	17.52	0	0	7.23	0	0	0	28.74
		KARANG ANYAR	20.89	0	0	0	0	0	0	0	20.89
	PASAR BARU	0	4.99	3.81	0	2.60	0	0.55	0	11.95	
	GUN. SAHARI. U.	0	15.46	0	0	0	0	0	0	15.46	
	KARTINI	17.92	0	0	0	0	0	0	0	17.92	
	SUB TOTAL	42.80	37.97	3.81	0	9.83	0	0.55	0	94.96	
MENTENG	MENTENG	0	1.53	8.00	0	0	6.93	6.61	0	23.07	
	CIKINI	0	0	2.80	0	0	6.05	1.24	0	10.09	
	GONDANGDIA	0	0.48	0	0	0	0	5.74	0	6.22	
	KEBON SIRIH	0	0	1.97	0	8.04	7.23	1.86	0	19.10	
	PEGANGSAAN	13.11	0	4.20	3.40	0	0	0	0	20.71	
	SUB TOTAL	13.11	2.01	16.97	3.40	8.04	20.21	15.45	0	79.19	
CEMPAKA	PUCEM. PUTIH. TIM	0	5.33	0	0	0	2.30	4.41	0	12.04	
	SEM. PUTIH BAR.	0	15.06	0	0	0	1.68	0	0	16.74	
	RAWA SARI	0	0	0	0	2.14	1.30	0	7.17	10.61	
	JOHAR BARU	5.38	1.16	0	0	1.56	4.63	1.51	2.33	16.57	
	KAMPUNG RAWA	0	0	0	0	0	8.61	0	0	8.61	
	GALUR	0	1.58	0	0	0	5.99	0	0	7.57	
	TANAH TINGGI	0	1.11	0	0	0.99	15.78	0	0	17.88	
	SUB TOTAL	5.38	24.24	0	0	4.69	40.29	5.92	9.50	90.02	
	TOTAL	158.55	246.84	55.24	3.40	47.26	76.11	66.60	21.25	674.25	

A Handcart Depot  
 B Handcart Pool  
 C Concrete Bin  
 D Open Space  
 E Large Container  
 F Jali jali  
 G Door to door  
 H Self Managing

Table 7.1-6 Population Served by Each Collection System by Kelurahan

KECAMATAN	KELURAHAN	Popula- tion	A	B	C	D	E	F	G	H	
SEKEN	SEKEN	10,563	0	0	988	0	5,801	0	3,774	0	
	KWITANG	17,821	0	6,409	0	0	0	4,665	6,747	0	
	KENARI	14,434	0	10,591	0	0	690	0	3,153	0	
	KRAMAT	30,858	0	23,042	0	0	6,516	0	1,300	0	
	PASEBAN	31,272	0	21,691	0	0	6,678	0	2,903	0	
	BUNGUR	26,913	0	7,772	0	0	0	10,710	8,431	0	
	SUB TOTAL	131,861	0	69,505	988	0	19,685	15,375	26,308	0	
KEMAYORAN	CENPAKA BARU	36,875	0	27,491	0	0	0	0	9,384	0	
	SERDANG	26,557	0	17,585	0	0	1,122	7,850	0	0	
	KEBON KOSONG	28,297	0	22,461	0	0	5,836	0	0	0	
	UTAN PANJANG	29,966	0	24,126	0	0	0	4,069	1,771	0	
	GUNUNG SAHARI	27,638	12,532	9,858	0	0	5,248	0	0	0	
	SELATAN										
	KEMAYORAN	24,485	0	20,508	3,977	0	0	0	0	0	
	SUMUR BATU	19,240	0	13,740	0	0	3,629	0	1,871	0	
	HARAPAN MULYA	24,828	0	16,540	2,128	0	0	6,160	0	0	
	SUB TOTAL	217,886	12,532	152,309	6,105	0	15,835	18,079	13,026	0	
BAMBIR	CIDENG	22,889	14,194	3,914	0	0	2,978	0	1,803	0	
	PETOJO UTARA	22,870	0	18,981	0	0	3,889	0	22,800	0	
	KEBON KELAPA	16,498	16,498	0	0	0	0	0	0	0	
	BAMBIR	4,471	0	0	0	0	0	0	4,471	0	
	PETOJO SELATAN	25,756	1,322	10,781	0	0	0	0	13,653	0	
	DURI PULO	36,088	0	19,918	16,170	0	0	0	0	0	
	SUB TOTAL	128,572	32,014	53,594	16,170	0	6,867	0	19,927	0	
TANAH ABAN	KAMPUNG BALI	24,200	14,996	6,974	0	0	2,230	0	0	0	
	KEBON KACANO	22,584	0	22,584	0	0	0	0	0	0	
	KEBAN MELATI	54,421	8,153	16,326	24,286	0	5,656	0	0	0	
	PETAMBURAN	30,866	0	10,420	0	0	0	0	0	20,446	
	BENDUNGAN HILIR	32,304	32,304	0	0	0	0	0	0	0	
	KARAT TENGSIN	48,612	48,612	0	0	0	0	0	0	0	
	GELORA	8,993	0	0	3,214	0	3,403	0	2,376	0	
	SUB TOTAL	221,980	104,065	56,304	27,500	0	11,289	0	2,376	20,446	
		BESAMANGA DUASEL	45,278	6,279	27,606	0	0	11,393	0	0	0
		KARANG ANYAR	32,893	32,893	0	0	0	0	0	0	0
	PASAR BARU	18,842	0	7,872	6,004	0	4,093	0	873	0	
	GUN. SAHARI. U.	24,367	0	24,367	0	0	0	0	0	0	
	KARTINI	28,199	28,199	0	0	0	0	0	0	0	
	SUB TOTAL	149,579	67,371	59,845	6,004	0	15,486	0	873	0	
MENTENG	MENTENG	33,665	0	2,163	11,277	0	0	10,914	9,311	0	
	CIKINI	14,241	0	0	3,953	0	2,848	5,688	1,752	0	
	CONDANGDIA	8,762	0	673	0	0	0	0	8,089	0	
	KEBON SIRIH	26,973	0	0	2,780	0	11,335	10,199	2,659	0	
	PEGANGSAAN	29,198	18,498	0	5,910	4,790	0	0	0	0	
	SUB TOTAL	112,839	18,498	2,836	23,920	4,790	14,183	26,801	21,811	0	
CENPAKA	PUCEM. PUITH. TIM	25,801	0	11,416	0	0	0	4,921	9,464	0	
	SEM. PUTIH BAR.	35,853	0	32,249	0	0	0	3,604	0	0	
	RAWA SARI	22,729	0	0	0	0	4,584	2,781	0	15,364	
	JOHAR BARU	35,454	11,510	2,482	0	0	3,342	9,917	3,215	4,988	
	KAMPUNG RAWA	18,421	0	0	0	0	0	18,421	0	0	
	GALUR	16,219	0	3,381	0	0	0	12,838	0	0	
	TANAH TINGGI	38,253	0	2,372	0	0	2,115	33,766	0	0	
	SUB TOTAL	192,730	11,510	51,900	0	0	10,041	86,248	12,679	20,352	
	TOTAL	1,155,447	245,990	446,293	80,687	4,790	93,386	146,503	97,000	40,798	

A Handcart Depot  
 B Handcart Pool  
 C Concrete Bin  
 D Open Space  
 E Large Container  
 F Jali jali  
 G Door to door  
 H Self Managing

Table 7.1-7 Number of Household by Each Collection System by Kelurahan

KECAHATAN	KELURAHAN	HOUSE-HOLD	A	B	C	D	E	F	G	H
SEKEN	SEKEN	2,949	0	0	276	0	1,619	0	1,054	0
	KWITANG	4,430	0	1,593	0	0	0	1,160	1,677	0
	KENARI	3,566	0	2,616	0	0	171	0	779	0
	KRAMAT	6,636	0	4,954	0	0	1,402	0	280	0
	PASEBAN	3,929	0	2,725	0	0	839	0	365	0
	BUNGUR	6,084	0	1,757	0	0	0	2,421	1,906	0
	SUB TOTAL	27,594	0	13,645	276	0	4,031	3,581	6,061	0
KEMAYORAN	CEMPAKA BARU	4,141	0	2,921	0	0	0	0	1,220	0
	SERDANG	5,365	0	3,548	0	0	247	1,570	0	0
	KEBON KOSONG	5,846	0	4,520	0	0	1,326	0	0	0
	UTAN PANJANG	5,502	0	4,730	0	0	0	510	262	0
	GUNUNG SAHARI	5,447	2,254	2,136	0	0	1,057	0	0	0
	SELATAN									
	KEMAYORAN	4,802	0	4,074	728	0	0	0	0	0
	SUMUR BATU	4,046	0	2,964	0	0	704	0	378	0
	HARAPAN MULYA	5,069	0	3,342	442	0	0	1,285	0	0
	SUB TOTAL	40,218	2,254	28,235	1,170	0	3,334	3,365	1,860	0
BAMBIR	CIDENG	6,028	3,766	1,011	0	0	832	0	419	0
	PETOJO UTARA	5,201	0	4,355	0	0	846	0	0	0
	KEBON KELAPA	4,148	4,148	0	0	0	0	0	0	0
	BAMBIR	858	0	0	0	0	0	0	858	0
	PETOJO SELATAN	6,673	349	2,756	0	0	0	0	3,568	0
	DURI PULO	8,461	0	4,021	4,440	0	0	0	0	0
	SUB TOTAL	31,369	8,263	12,143	4,440	0	1,678	0	4,845	0
TANAH ABAN	KAMPUNG BALI	4,793	3,057	1,342	0	0	394	0	0	0
	KEBON KACANO	4,238	0	4,238	0	0	0	0	0	0
	KEBAN MELATI	10,417	1,703	2,495	5,053	0	1,166	0	0	0
	PETAMBURAN	6,503	0	2,326	0	0	0	0	0	4,177
	BENDUNGAN HILIR	5,459	5,459	0	0	0	0	0	0	0
	KARAT TENGSIN	9,139	9,139	0	0	0	0	0	0	0
	GELORA	1,744	0	0	698	0	791	0	255	0
	SUB TOTAL	42,293	19,358	10,401	5,751	0	2,351	0	255	4,177
SAWAH	BESAMANGA DUASEL	8,783	1,149	4,967	0	0	2,667	0	0	0
	KARANG ANYAR	5,884	5,884	0	0	0	0	0	0	0
	PASAR BARU	2,669	0	1,196	841	0	484	0	148	0
	GUN. SAHARI. U.	4,130	0	4,130	0	0	0	0	0	0
	KARTINI	4,761	761	0	0	0	0	0	0	0
	SUB TOTAL	26,227	11,794	10,293	841	0	3,151	0	148	0
MENTENG	MENTENG	5,842	0	332	2,158	0	0	2,191	1,171	0
	CIKINI	2,182	0	0	615	0	431	798	338	0
	GONDANGDIA	1,554	0	159	0	0	0	0	1,395	0
	KEBON SIRIH	3,283	0	0	271	0	1,563	1,362	87	0
	PEGANGSAAN	5,443	3,447	0	1,016	980	0	0	0	0
	SUB TOTAL	18,304	3,447	481	4,060	980	1,994	4,351	2,991	0
CEMPAKA	PUCEM. PUTIH. TIM	5,325	0	2,100	0	0	0	1,019	2,206	0
	SEM. PUTIH BAR.	5,411	0	4,858	0	0	0	553	0	0
	RAWA SARI	4,957	0	0	0	0	1,000	612	0	3,345
	JOHAR BARU	7,843	2,512	702	0	0	921	1,987	616	1,105
	KAMPUNG RAWA	3,386	0	0	0	0	0	3,386	0	0
	GALUR	3,499	0	1,027	0	0	0	2,472	0	0
	TANAH TINGGI	7,921	0	464	0	0	421	7,036	0	0
	SUB TOTAL	38,342	2,512	9,151	0	0	2,342	17,065	2,822	4,450
	TOTAL	224,347	47,628	84,349	16,538	980	18,881	28,362	18,982	8,627

A Handcart Depot  
B Handcart Pool  
C Concrete Bin  
D Open Space  
E Large Container  
F Jali jali  
G Door to door  
H Self Managing

## 7.2 Street Sweeping in Jakarta Pusat

The current status of street sweeping is shown in Table 7.2-1 and Fig. 7.2-1. The targets of street sweeping is the Protocol and Economy Streets, but the sweeping service is also extended to other streets in Menteng, since this is an important residential area.

### 1) Actual situation of Street Sweeping

In planning street sweeping, the structural design of each streets should will be adequately taken into consideration. The structural design of streets may be classified into the following types.

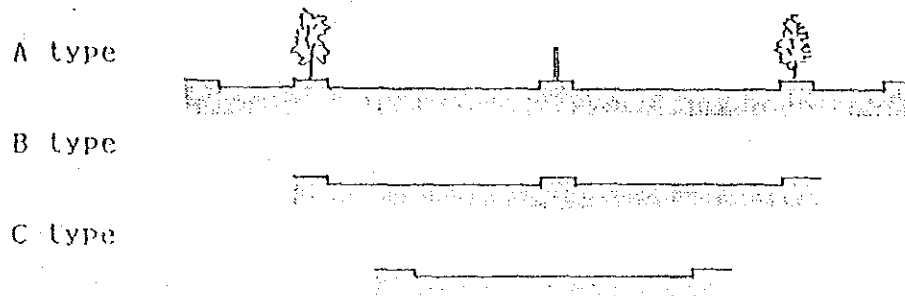


Fig. 7.2-2 Types of Roads for Street Sweeping

The conditions of streets eligible for street sweeping classified by the foregoing types are as shown in the Main Report, Part III. Project Plan, 3.2.

Table 7.2-1 Current Status of Street Sweeping

(Unit: m)

			Gambir	Menteng	Sawah Besar	Senen	Tanah Abang	Kemayoran	Cempaka Putih	Total	
P U S A T	T O T A L	PROTKOL	35,690	37,074	13,479	15,624	35,690	11,638	19,159	168,354	
		ECONOMY									
		OTHERS	52,174	33,667	25,010	19,717	43,725	20,459	58,410	253,162	
	TOTAL		87,864	70,741	38,489	35,341	79,415	32,097	77,569	421,516	
	S W E E P I N G	PROTKOL	35,690	37,074	13,479	15,624	35,690	11,638	19,159	168,354	
		ECONOMY									
OTHERS		23,358	33,667	2,700	16,116	7,700	5,000	1,100	89,641		
TOTAL		59,048	70,741	16,179	31,740	43,390	16,638	20,259	257,995		

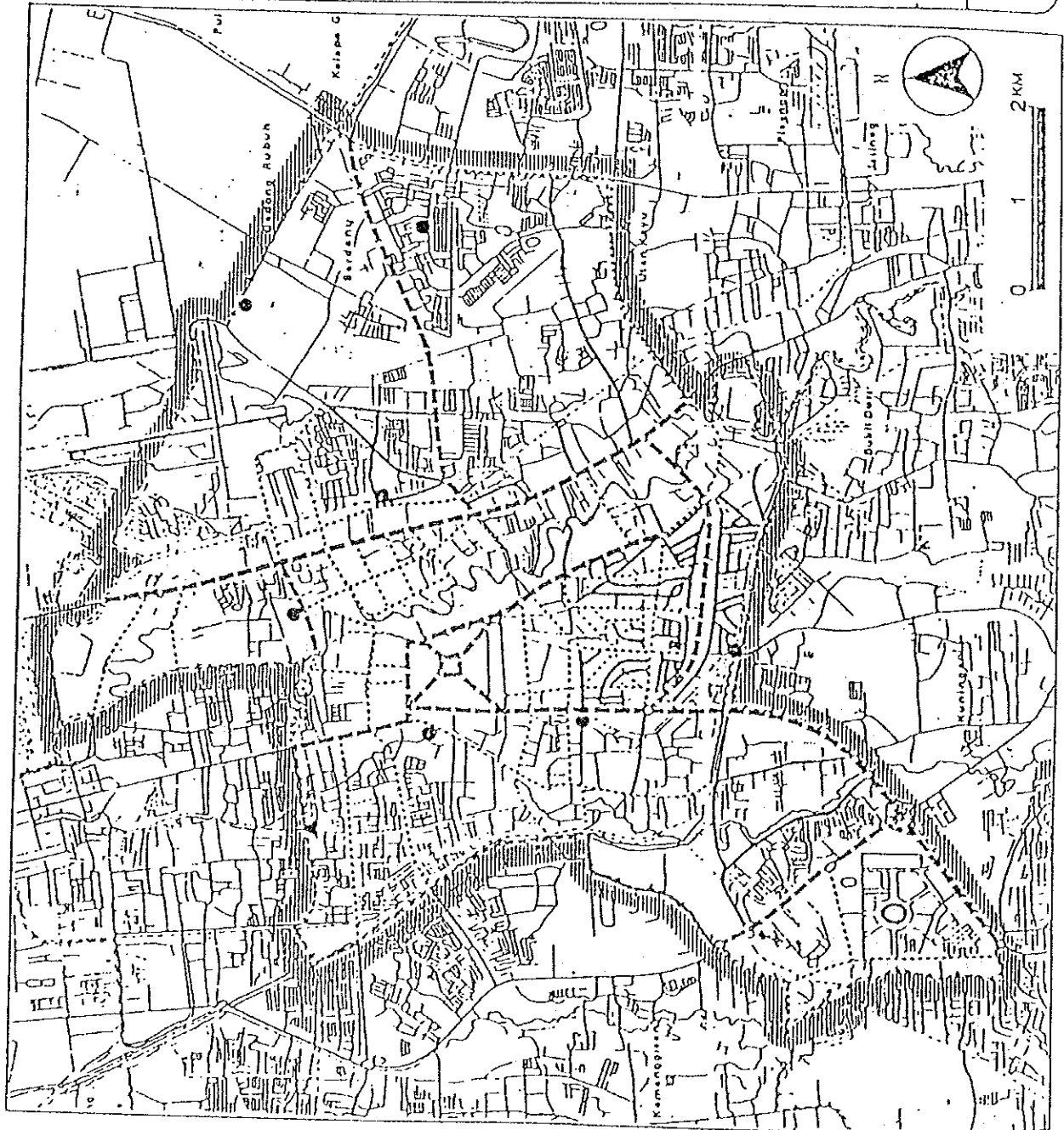


Fig. 7.2-1

Current State of Street Sweeping

Solid Waste Management System Improvement Study In The City Of Jakarta



### 7.3 Major Facilities in Jakarta Pusat

Considering the possibility and necessity for the special collection of waste, as well as direct fee collection, major facilities which are regarded as large amount dischargers in Jakarta Pusat should be specified. Herewith, some proposed 600 facilities for the above purpose have been picked out according to the following criteria:

1. Factories, Hospitals, Schools and Mosques  $\geq 1,000 \text{ m}^2$
2. Offices, Shops (Shopping Centers), Hotels  
and Restaurants  $\geq 4$  floors
3. Markets  $\geq 2$  floors
4. Others - Gambir railway station  
- Senen railway station  
- Senayan Complex  
- Monas  
- Jakarta Fair

Note: In principle, most waste from factories and hospitals should not be collected by Dinas Kebersihan in the future.

The number of major facilities are shown in the following table. Their locations (excluding schools) are shown in the next figure.

Table 7.3-1 Large Amount Discharger in Jakarta Pusat

( ) : Number of the interviewed discharger  
 - : Not applicable

Kecamatan	Factory		Hospital		School		Hotel/Restaurant		Office		Market		Miscellaneous		Total
	1000 m <sup>2</sup>	2	1,000 m <sup>2</sup>	2	School Mosque	1,000 m <sup>2</sup>	Shopping Center	4F	4F	2F	2F	Park/Stadium	Station		
1. Gambir	3 (3)	4 (4)	30 (2)	11 (6)	72 (35)	2 (2)	3 (3)	125 (55)							
2. Sawah Besar	32 (7)	2 (2)	26 (1)	6 (4)	22 (7)	2 (1)	4 (3)	94 (25)							
3. Kemayoran	1 (1)	0 -	33 (0)	0 -	0 -	0 -	0 -	34 (1)							
4. Senen	0 -	6 (3)	51 (6)	2 (1)	14 (4)	1 (1)	1 (1)	75 (16)							
5. Cempaka Putih	3 (1)	1 (0)	52 (0)	2 (1)	6 (1)	1 (0)	0 -	65 (3)							
6. Menteng	0 -	6 (5)	45 (6)	12 (5)	35 (10)	0 -	2 (1)	100 (27)							
7. Tanah Abang	13 (2)	4 (2)	54 (1)	6 (6)	17 (13)	2 (1)	1 (1)	97 (26)							
Whole Jakarta Pusat	52	23	291	39	166	8	11	590							

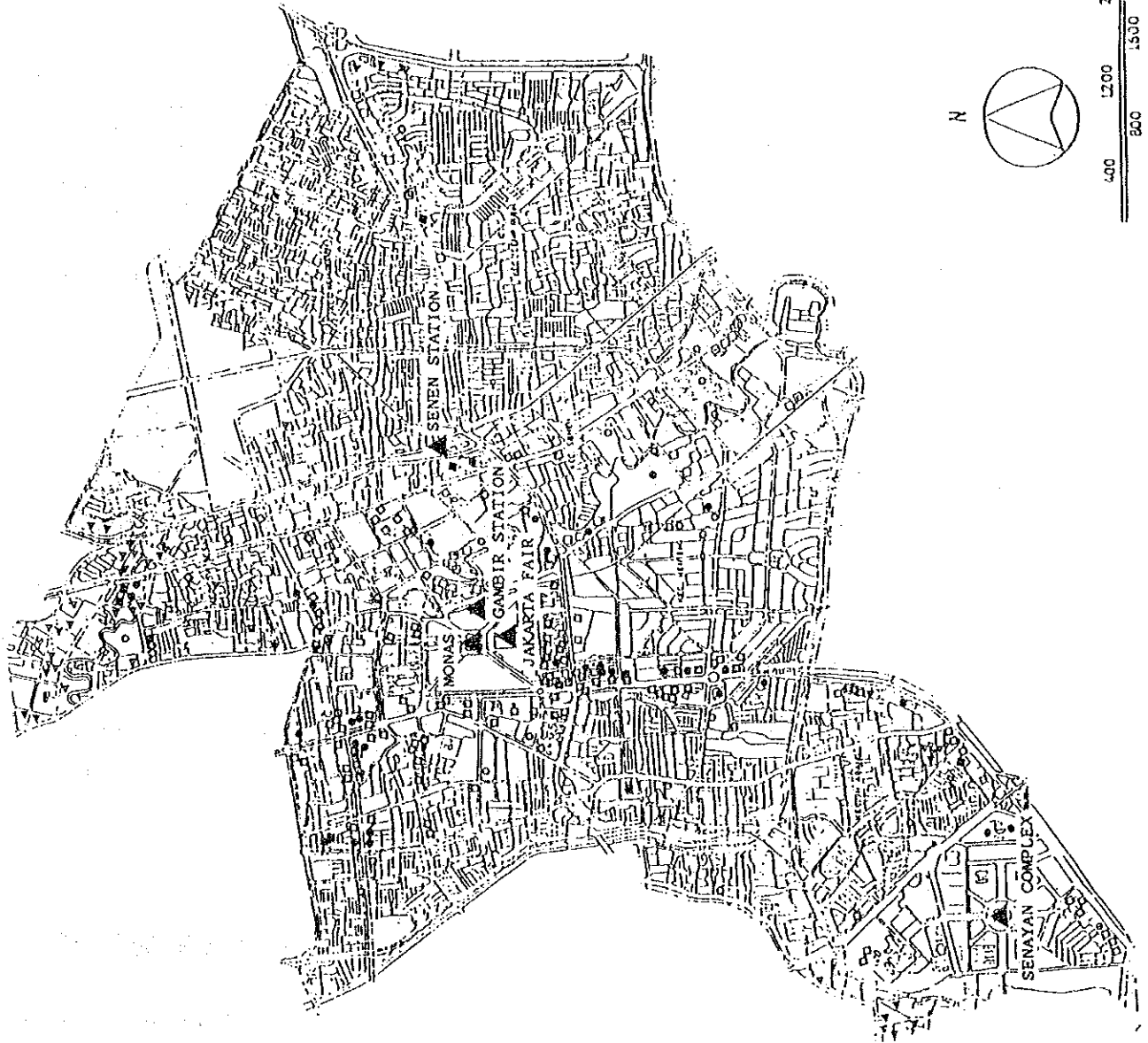
LEGEND :

- ▲ FACTORY
- COMMERCIAL (HOTEL, RESTAURANT SHOPPING CENTER )
- / □ OFFICE
- HOSPITAL
- MARKET
- ▲ OTHERS

Fig. 7.3-1

LOCATION OF LARGE AMOUNT DISCHARGER

Solid Waste Management System Improvement Study in the City of Jakarta



#### 7.4 Distribution of Solid Waste Amount to be Collected by Dinas Kebersihan

In the whole of Jakarta Pusat approximately 1,050 tons of solid waste was generated per day in 1986. Most of this was handled by Dinas Kebersihan as detailed below.

- Household waste	450 ton/day
- Market waste	60 ton/day
- Commercial waste	200 ton/day
- Industrial waste	60 ton/day
<hr/>	
Total	770 ton/day

In formulating the improvement plan for solid waste management system in Jakarta Pusat, it is necessary to calculate the distribution of waste according to the proposed collection system (Ordinary Collection and Special Collection).

The distribution of waste for both collection systems was estimated as follows:

- Waste for ordinary collection system

Household waste x 100%

Commercial waste x 50%

Industrial waste --- existing amount to be handled by Dinas Kebersihan

- Waste for special collection system

Commercial waste x 50%

Market waste --- existing amount to be handled by Dinas Kebersihan

Results of the distribution by proposed collection system and Kecamatan are shown in the following tables. The estimate of waste for the ordinary collection system was broken down by RW, as shown in Table 7.4-1 and Table 7.4-2.

The current status of waste collection for large amount dischargers is as shown in Table 7.4-3.

The amount is calculated as 146 ton/day using  $0.3 \text{ t/m}^3$  of density of waste.

Table 7.4-1 Waste Amount for Ordinary Collection by Kecamatan

Hhd: Household Cmr: Commercial Ind: Industrial

Unit: ton/day

Kecamatan	1986			1995		
	Hhd.	Cmr.	Ind.	Hhd.	Cmr.	Ind.
1. Gambir	60	50	15	60	70	15
	125			145		
2. Sawah Besar	60	25	10	70	40	10
	95			120		
3. Kemayoran	80	5	0	90	10	0
	85			100		
4. Senen	50	20	5	60	30	5
	75			95		
5. Cempaka Putih	80	10	0	90	10	0
	90			100		
6. Menteng	50	25	5	50	40	5
	80			95		
7. Tanah Abang	90	15	25	100	20	25
	130			145		
Jakarta Pusat	470	150	60	520	220	60
	680			800		

Table 7.4-2 Waste Amount for Special Collection by Kecamatan

Kecamatan	Cmr: Commercial Mkt: Market		Unit: ton/day	
	1986		1995	
1. Gambir	Cmr.	Mkt.	Cmr.	Mkt.
	50	10	70	15
	60		85	
2. Sawah Besar	Cmr.	Mkt.	Cmr.	Mkt.
	25	10	40	20
	35		60	
3. Kemayoran	Cmr.	Mkt.	Cmr.	Mkt.
	5	5	10	10
	10		20	
4. Senen	Cmr.	Mkt.	Cmr.	Mkt.
	20	5	30	10
	25		40	
5. Cempaka Putih	Cmr.	Mkt.	Cmr.	Mkt.
	10	10	10	15
	20		25	
6. Menteng	Cmr.	Mkt.	Cmr.	Mkt.
	25	-	40	5
	25		45	
7. Tanah Abang	Cmr.	Mkt.	Cmr.	Mkt.
	15	20	20	25
	35		45	
Jakarta Pusat	Cmr.	Mkt.	Cmr.	Mkt.
	150	60	220	100
	210		320	

Table 7.4-3 Report of Collection Amount of Large Amount Dischargers  
(Source: Suku Dinas and Sekesi Kebersihan in Jakarta Pusat)

	Number of enterprises				Reported number (Estimated number)			
	Volume of waste				(m <sup>3</sup> /month)			
	O	S	P	M	F	HO	H	Total
1. Jakarta Pusat	15(0) 532	2(0) 360	1(0) 60	0 0	0 0	2(0) 420	22(0) 495	22(0) 1,867
2. Tanah Abang	6(0) 140	0 0	3(0) 165	6(0) 1,779	0 0	2(0) 70	5(0) 312	22(0) 2,466
3. Menteng	19(0) 229	10(0) 129	9(0) 144	3(0) 486	0 0	2(0) 150	6(0) 146	49(0) 1,284
4. Senen	-	-	-	-	-	-	-	-
5. Cempaka Putih	4(0) 88	1(0) 30	1(0) 15	4(0) 1,860	2(0) 80	1(0) 40	0 0	13(0) 2,113
6. Sawah Besar	6(3) 125	0(2) 0	2(0) 285	3(0) 180	8(1) 311	2(0) 110	0 0	21(7) 1,011
7. Gambir	11(11) 574	3(1) 252	3(1) 260	4(1) 410	0(2) 0	0 0	2(1) 62	23(17) 1,558
8. Kemayoran	8(0) 240	0 0	3(0) 61	3(0) 690	1(0) 60	0 0	2(0) 16	17(0) 1,067
Total	69(14) 1,928	16(3) 771	22(1) 990	23(1) 5,405	11(3) 451	9(0) 790	17(2) 1,031	167(24) 11,366

(No data was reported from Senen.)

F Factory  
S Shops  
P Public Facilities  
M Market  
O Office  
HO Hospital  
H Hotel

## 7.5 Improvement Project for Waste Collection in Jakarta Pusat

### 1) Project Area

The target area of the project will be the entire Wilayah of Jakarta Pusat. In order to enforce integrated control of cleansing activities in Pusat, other administrative areas will not be included in the project area. This project will not be predicated on the reorganization of Wilayahs planned in the Jakarta Master Plan 2005.

### 2) Process for Selecting Collection System

The process for selecting collection system which have been described in the Master Plan are reiterated here.

#### (1) Classification of collection modes

In accordance with the pattern of waste generation, the waste collection modes will be classified into the following three.

- a. Ordinary collection ..... Collection of domestic and commercial waste which is discharged in small amounts.
- b. Special collection ..... In the event of a large amount of waste being generated, a special collection separate from ordinary collection will be made.
- c. Bulky waste collection .. Collection of bulky waste (trees, etc.) generated at irregular intervals from households and commercial facilities.



(2) Process for selecting applicable collection system

a. Ordinary collection

Handcart pools, concrete bins and open spaces will be abolished entirely and will more efficient collection systems established.

The basic collection systems to be applied for ordinary waste collection will be the Handcart-Depot-Container system and the Small Container system. The choice of the system will be in accordance with the criteria shown below.

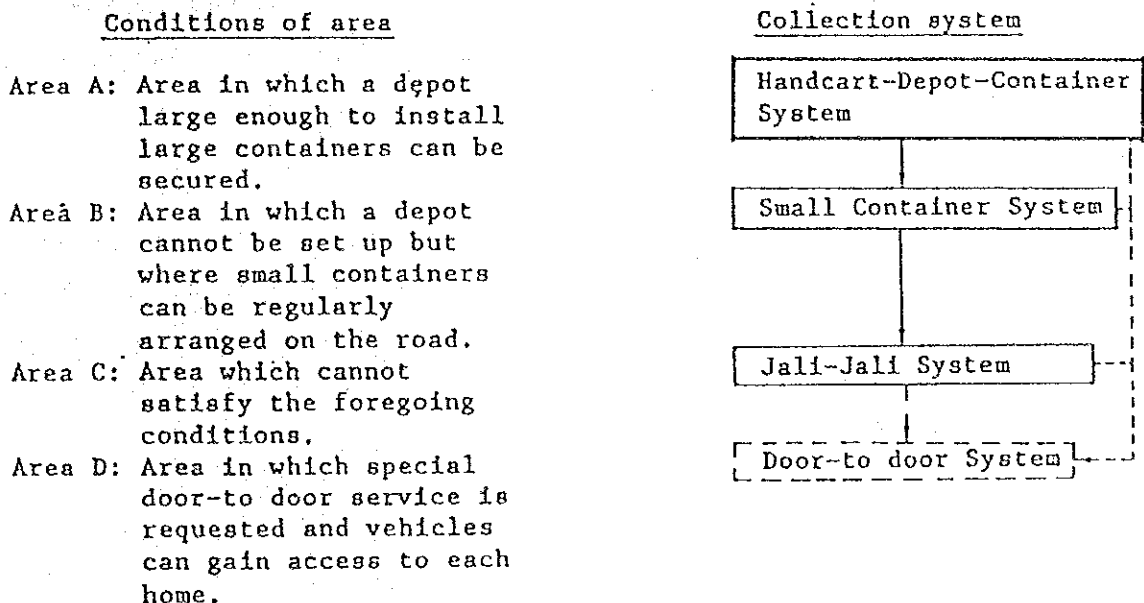


Fig. 7.5-1 Flow of Selection of Collection System

b. Special collection

A special door-to-door collection service will be applied to those which generate a large amount of waste. The applicable shall be selected according to the following criteria.

- Buildings with four stories or more
- Facilities with 1,000 m<sup>2</sup> or larger site area
- Facilities to which the application of the special collection service is judged appropriate by the Seksi Kecamatan Office in view of the amount of waste discharged.

To the facilities selected according to the foregoing criteria, one of the following three systems shall be applied according to the discharge characteristics of each waste source.

1. Ordinary discharge : Small container-compactor vehicle system  
Door-to-door system
2. Large-quantity discharger: Container - Arm-roll system

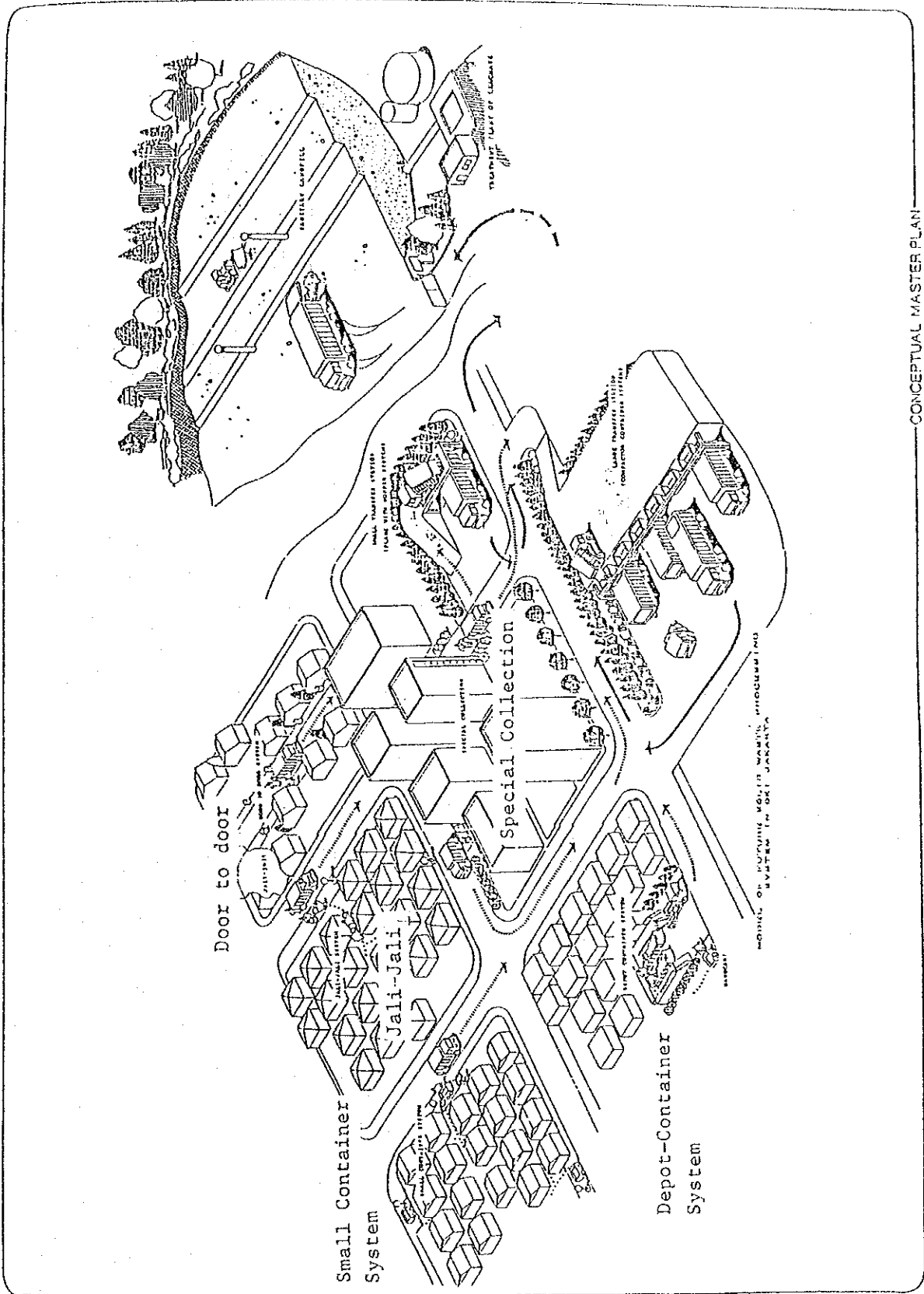
c. Bulky waste collection

Citizens shall be instructed to discharge bulky wastes generated at homes and shops once a month at the time of the district cleansing. (The future collection systems are shown on Fig. 7.5-2)

(3) Standard for improving depots

Each of the existing depots has a site of approx. 300 m<sup>2</sup>. It is surrounded by walls and is also provided with an office of some 20 m<sup>2</sup> in floor area. Those depots are mainly use as transfer stations for reloading wastes from handcart to collection vehicle, and some of the depots have large communal containers installed in them. These existing depots shall be remodeled to have the container yard, the platform for hauling in wastes and the water supply facilities as illustrated in Fig. 7.5-3 and Fig. 7.5-4.

Where sites can be secured, new depots will be constructed according to the standards shown in Table. 7.5-1.



CONCEPTUAL MASTER PLAN

Fig. 7.5-2 Illustration of Proposed Collection System

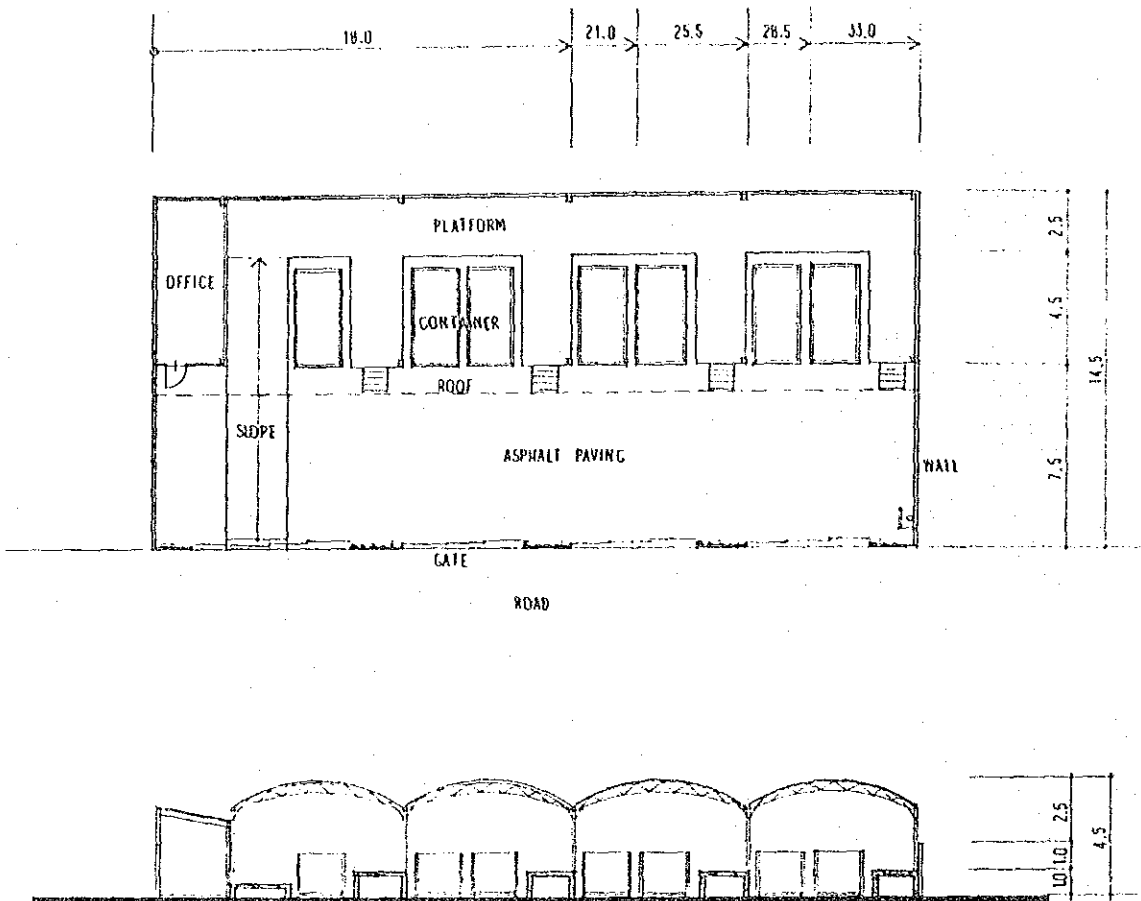


Fig. 7.5-3 Plan of Standard depot

Table 7.5-1 Standard Depot

Size of Depot (m <sup>2</sup> )	Area (m <sup>2</sup> )	No. of Container
60	310	3
80	380	4
100	420	5

(4) Improvement of collection equipment

To realize efficient collection, the introduction of more efficient collection vehicles than open cargo and dump trucks will be planned.

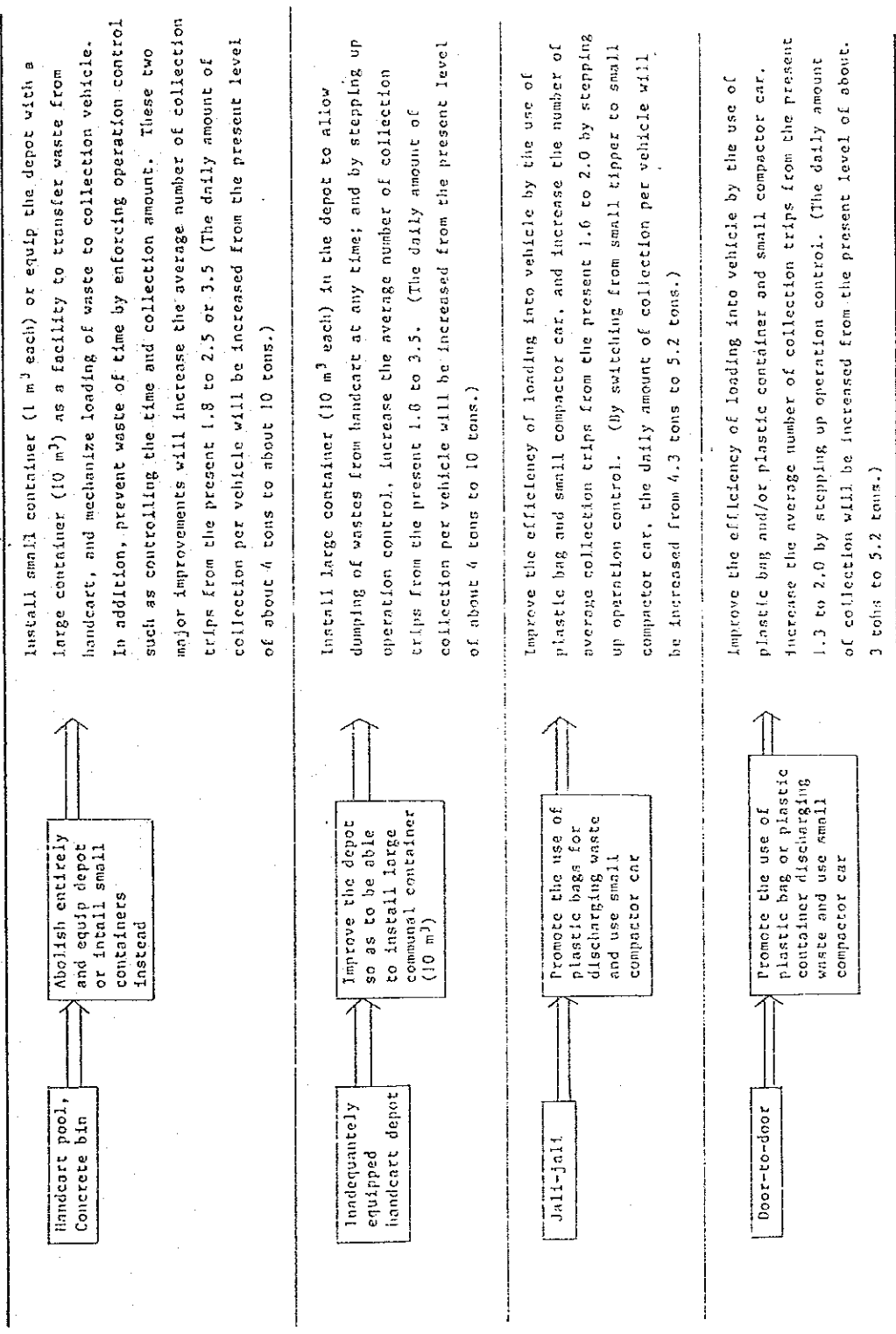
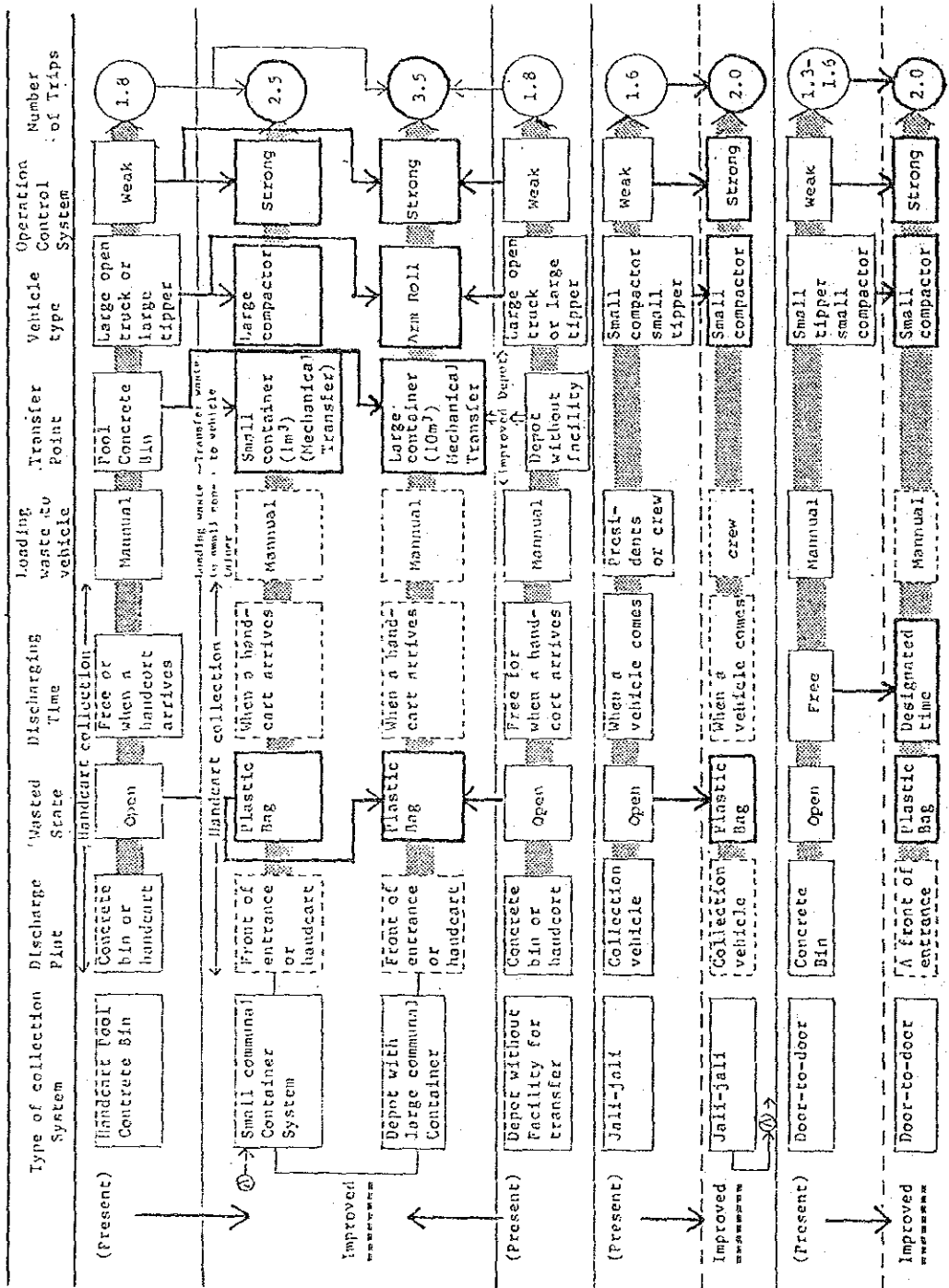


Fig. 7.5-4 Improvement in Collection System



(Notes)

- Indicates the flow of charges.
- ▭ of the improved item indicates not much change from the existing state and ▭ shows a change from the existing state.

Fig. 7.5-5 Contents of Improvement in Collection System

3) Future collection system

(1) Ordinary collection

a. Procedure

Applicable future collection systems for ordinary collection will be selected according to the following procedures.

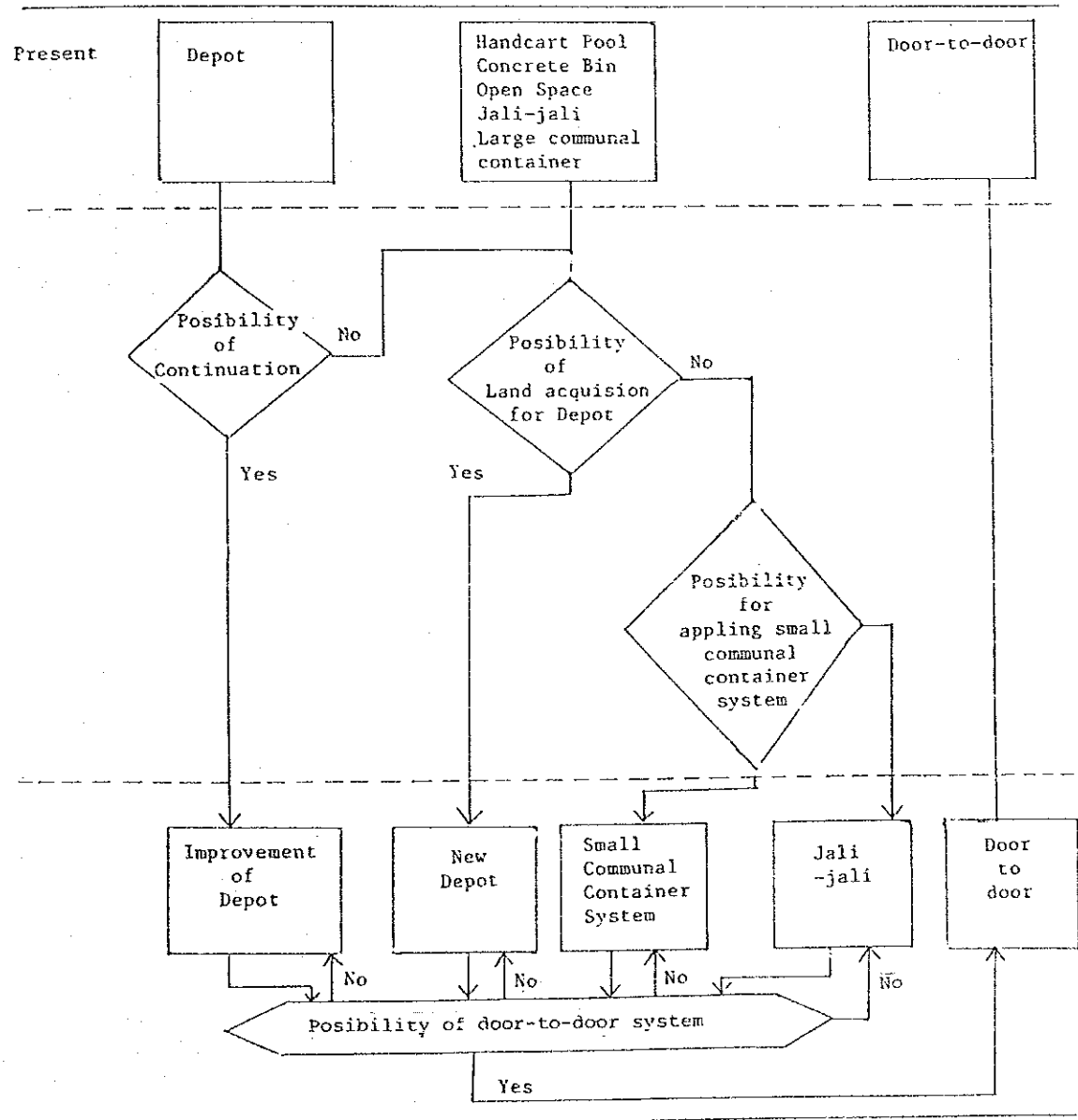


Fig. 7.5-6 Flow Chart for Selection of Collection System

Besides the collection systems classified above, the installation of small containers along the roads of commercial districts will be considered.

- b. Steps in reviewing the possibility of adopting Depot-container system  
 (The specific location and the size of the site will not be shown.)

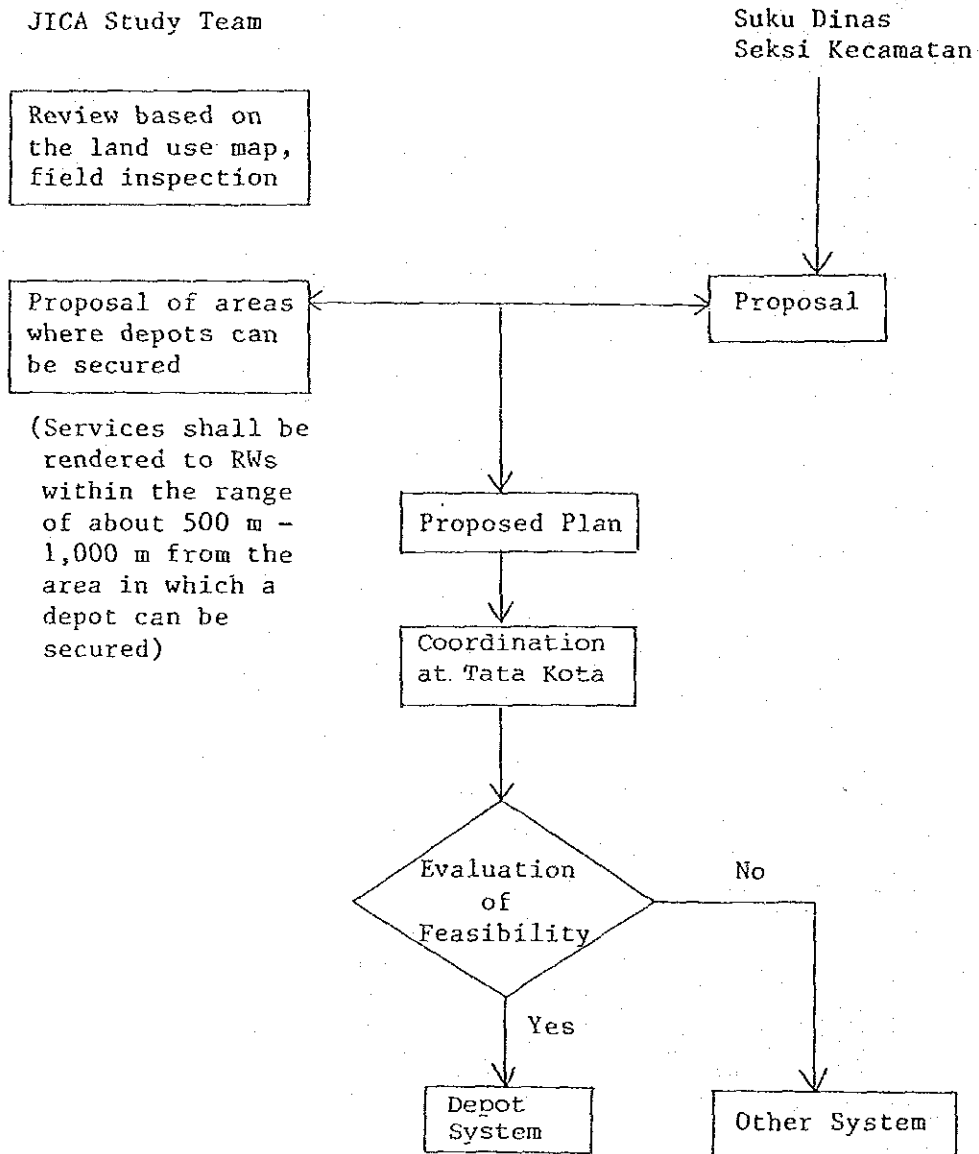


Fig. 7.5-7 Flow Chart for Selection of Depot Container System



c. Steps in reviewing the possibility of adopting the Small container system

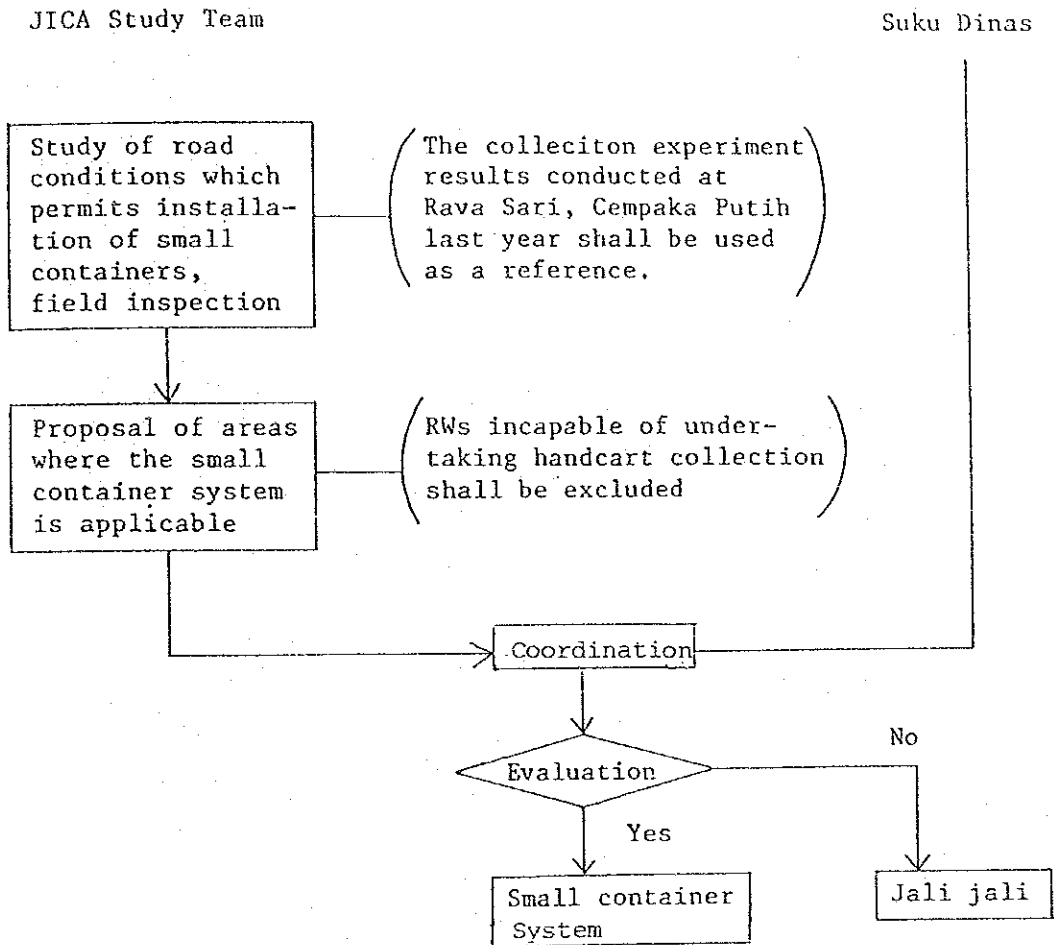


Fig. 7.5-8 Flow Chart for Selection of Small Communal Container System

d. Proposed plan

The plan proposed by the JICA Study Team is shown in Table 7.5-2 and Fig. 7.5-9.

The new depots proposed are as per Table 7.5-3.

LEGEND


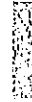

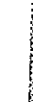

-  DEPOT - CONTAINER
-  NEW - DEPOT CONTAINER
-  1 M<sup>3</sup> CONTAINER
-  JALI - JALI
-  NEW DOOR TO DOOR

Fig. 7.5-9

Fig. 3.2-9  
PROPOSED SOLID WASTE  
COLLECTION SYSTEM

Solid Waste Management  
System Improvement Study  
in The City of Jakarta

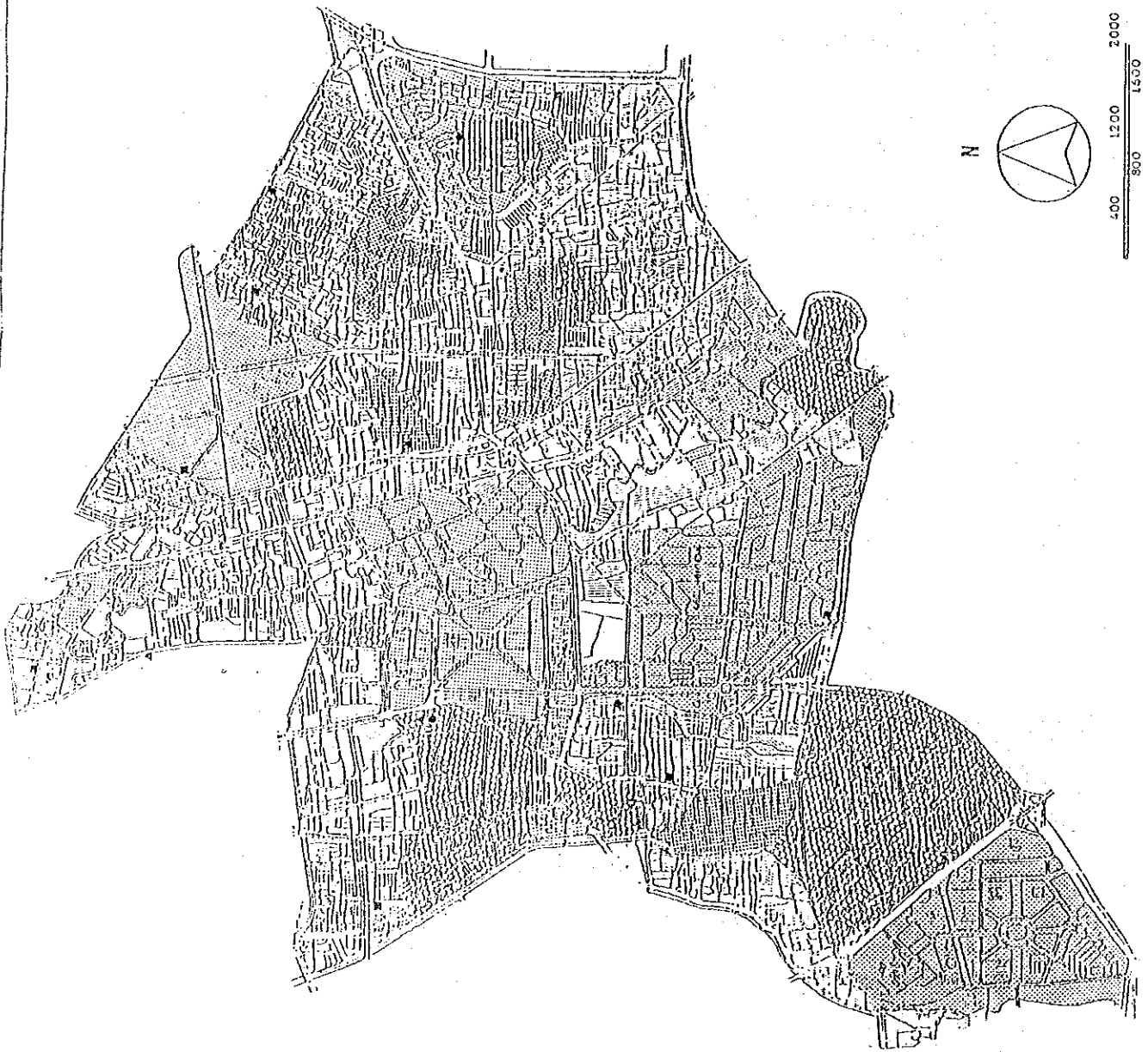


Table 7.5-2 Number of Rws for Proposed Collection System

	TANAH ABANG	MEN- TENG	SEZEN	CEMPAKA PUTIH	SAWAH BESAR	GAMBIR	KEMA- YORAN	TOTAL	%
DEPOT-CONTAINER	32	7	0	7	9	23	32	110	28
SMALL CONTAINER	32	19	42	43	37	18	26	217	55
JALI-JALI	5	3	3	12	0	0	10	33	8
DOOR TO DOOR	2	9	4	5	5	6	2	33	8
TOTAL	71	38	49	67	51	47	70	393	100

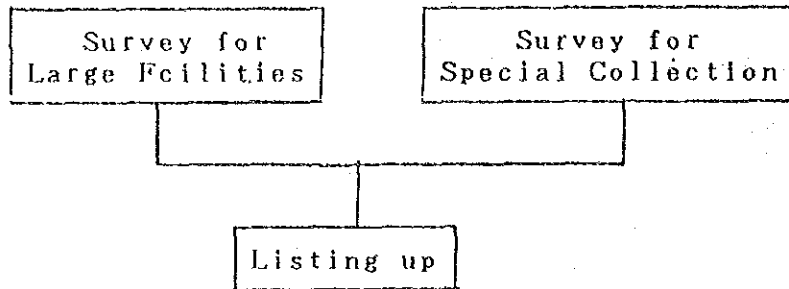
Table 7.5-3 Planned New Depots

No.	Kecamatan	Kelurahan	Jalan	No. of RW	Required Area (m <sup>2</sup> )	Remark
A	Gambir	Duri Pulo	Jl. Kompa	8	380	Present Suku Site
B	"	Cideng	Jl. Hasyim Ashhari	3	270	
C	Tanah Abang	Kebon Melati	Jl. Mas Mansyur	7	270	
D	Sawah Besar	Mangga Dua-Selatan	Jl. Mangga Dua Paser	6	380	
E	"	Gunung Sahari-Utara	Jl. Rajawali Selatan	3	270	
F	Cempaka Putih	Cempaka Putih-Timur	Jl. Cempaka- Putih Timur	3	270	
G	Kemayoran	Harapan Mulya	Jl. Harapan Mulya	9	420	
H	"	Serdang	Jl.	7	310	
I	"	Kebon Kosong	Jl.	7	270	
			Total	53	2,840	

(2) Special collection

a. Procedure

The facilities which discharge a large amount of waste were selected according to the following procedure.



b. Results

The facilities listed up are shown in Fig. 7.3-1. The number of installation by type is as per Table 7.3-1.

(3) Bulky waste collection

No special system will be considered but citizens will be instructed to discharge bulky wastes once a month, at the time of district cleansing, as is the current practiced.

Table 7.5-4 Planned Collection Amount by Each Collection System by Kelurahan (1995)

KECAMATAN	KELURAHAN	HOUSE HOLD	a	b	c	d
SEKEN	SEKEN	4,299	0	2,763	0	1,536
	KWITANG	5,220	0	3,244	0	1,976
	KENARI	3,973	0	2,760	0	1,213
	KRAMAT	6,357	0	6,089	0	268
	PASEBAN	7,531	0	6,832	0	699
	BUNGUR	6,734	0	4,258	2,038	438
	SUB TOTAL	34,114	0	25,946	2,038	6,130
KEMAYORAN	CEMPAKA BARU	5,910	2,359	0	1,810	1,741
	SERDANG	7,657	7,657	0	0	0
	KEBON KOSONG	8,344	2,978	5,366	0	0
	UTAN PANJANG	7,852	0	6,919	559	374
	GUNUNG SAHARI	7,774	7,206	568	0	0
	SELATAN					
	KEMAYORAN	6,852	0	4,780	2,072	0
BAMBIR	SUMUR BATU	5,776	0	5,000	0	776
	HARAPAN MULYA	7,234	7,234	0	0	0
	SUB TOTAL	57,399	27,434	22,633	4,441	2,891
	CIDENG	7,990	6,359	875	0	756
	PETOJO UTARA	8,350	8,350	0	0	0
	KEBON KELAPA	3,380	1,194	2,186	0	0
	BAMBIR	370	0	0	0	370
TANAH ABAN	PETOJO SELATAN	7,850	1,552	2,101	0	4,197
	DURI PULO	8,058	4,267	3,791	0	0
	SUB TOTAL	35,998	21,722	8,953	0	5,323
	KAMPUNG BALI	3,429	1,332	2,097	0	0
	KEBON KACANO	17,550	11,172	6,378	0	0
	KEBAN MELATI	12,681	0	8,512	4,169	0
	PETAMBURAN	7,210	0	7,210	0	0
SAWAH	BENDUNGAN HILIR	5,470	5,470	0	0	0
	KARAT TENGSIN	11,360	11,360	0	0	0
	GELORA	2,401	0	1,089	0	1,312
	SUB TOTAL	60,101	29,334	25,286	4,169	1,312
	BESAMANGA DUASEL	9,708	4,628	4,512	0	568
	KARANG ANYAR	7,020	0	7,020	0	0
	PASAR BARU	9,699	0	8,736	0	963
MENTENG	GUN. SAHARI. U.	4,830	1,890	2,940	0	0
	KARTINI	9,339	0	9,339	0	0
	SUB TOTAL	40,596	6,518	32,547	0	1,531
	MENTENG	12,541	0	5,324	4,703	2,514
	CIKINI	2,221	0	1,676	0	545
	GONDANGDIA	1,169	0	136	0	1,033
	KEBON SIRIH	5,940	0	5,783	0	157
CEMPAKA	PEGANGSAAN	8,131	5,791	2,340	0	0
	SUB TOTAL	30,002	5,791	15,259	4,703	4,249
	PUCEM. PUITH. TIM	8,370	3,985	0	1,602	2,783
	SEM. PUTIH BAR.	13,859	0	13,297	0	562
	RAWA SARI	4,000	0	4,000	0	0
	JOHAR BARU	10,230	3,277	6,606	0	347
	KAMPUNG RAWA	1,920	0	0	1,920	0
TOTAL	GALUR	3,889	0	3,889	0	0
	TANAH TINGGI	11,030	0	7,921	3,109	0
	SUB TOTAL	53,298	7,262	35,713	6,631	3,692
	TOTAL	311,508	98,061	166,337	21,982	25,128

Table 7.5-6 Planned Number of Served Household by Each Collection System by Kelurahan (1995)

KECAMATAN	KELURAHAN	POPULATION	a	b	c	d
SEKEN	SEKEN	20,010	0	12,861	0	7,149
	KWITANG	24,270	0	15,082	0	9,188
	KENARI	16,318	0	11,335	0	4,983
	KRAMAT	34,734	0	33,270	0	1,464
	PASEBAN	35,115	0	31,855	0	3,260
	BUNGUR	33,466	0	21,161	10,130	2,175
	SUB TOTAL	163,913	0	125,564	10,130	28,219
KEMAYORAN	CEMPAKA BARU	43,987	18,362	0	14,431	11,194
	SERDANG	31,677	31,677	0	0	0
	KEBON KOSONG	33,754	13,307	20,447	0	0
	UTAN PANJANG	35,744	0	30,883	2,749	2,112
	GUNUNG SAHARI	32,967	29,967	3,000	0	0
	SELATAN					
	KEMAYORAN	29,205	0	20,544	8,661	0
SUMUR BATU	22,951	0	19,489	0	3,462	
HARAPAN MULYA	29,617	29,617	0	0	0	
SUB TOTAL	259,902	122,930	94,363	25,841	16,768	
BAMBIR	CIDENG	35,380	27,519	4,368	0	3,493
	PETOJO UTARA	36,979	0	36,979	0	0
	KEBON KELAPA	14,980	5,116	9,864	0	0
	BAMBIR	1,600	0	0	0	1,600
	PETOJO SELATAN	34,750	7,274	9,056	0	18,420
	DURI PULO	35,700	21,969	13,731	0	0
	SUB TOTAL	159,389	61,878	73,998	0	23,513
TANAH ABAN	KAMPUNG BALI	15,470	5,972	9,498	0	0
	KEBON KACANO	79,239	49,402	29,837	0	0
	KEBAN MELATI	57,259	0	39,347	17,912	0
	PETAMBURAN	32,570	0	32,570	0	0
	BENDUNGAN HILIR	24,701	24,701	0	0	0
	KARAT TENGSIN	51,290	51,290	0	0	0
	GELORA	10,859	0	4,109	0	6,750
SUB TOTAL	271,388	131,365	115,361	17,912	6,750	
SAWAH	BESAMANGA DUASEL	43,729	19,248	21,545	0	2,936
	KARANG ANYAR	31,659	0	31,659	0	0
	PASAR BARU	43,730	0	38,555	5,175	0
	GUN. SAHARI. U.	21,781	7,372	14,409	0	0
	KARTINI	42,089	0	42,089	0	0
	SUB TOTAL	182,988	26,620	148,257	5,175	2,936
MENTENG	MENTENG	58,159	0	23,219	18,855	16,085
	CIKINI	10,300	0	8,292	0	2,008
	GONDANGDIA	5,430	0	882	0	4,548
	KEBON SIRIH	27,548	0	24,832	0	2,716
	PEGANGSAAN	37,701	26,311	11,390	0	0
	SUB TOTAL	139,138	26,311	68,615	18,855	25,357
CEMPAKA	PUCEM. PUTH. TIM	37,059	16,912	0	7,068	13,079
	SEM. PUTH BAR.	61,360	0	59,149	0	2,211
	RAWA SARI	17,701	0	17,701	0	0
	JOHAR BARU	45,319	14,712	28,838	0	1,769
	KAMPUNG RAWA	8,501	0	0	8,501	0
	GALUR	17,230	0	17,230	0	0
	TANAH TINGGI	48,850	0	34,293	14,557	0
SUB TOTAL	236,020	31,624	157,211	30,126	17,059	
	TOTAL	1,412,738	400,728	783,369	108,039	120,602

Table 7.5-5 Planned Served Population by Each Collection System by Kelurahan (1995)

KECAMATAN	KELURAHAN	WASTE AMOUNT	a	b	c	d
SEKEN	SEKEN	7.47	0	4.80	0	2.67
	KWITANG	12.58	0	7.82	0	4.76
	KENARI	10.19	0	7.08	0	3.11
	KRAMAT	21.82	0	20.90	0	0.92
	PASEBAN	22.09	0	20.04	0	2.05
	BUNGUR	19.09	0	9.20	5.82	4.07
	SUB TOTAL	93.24	0	69.84	5.82	17.58
KEMAYORAN	CEMPAKA BARU	16.97	7.09	0	0	9.88
	SERDANG	12.22	12.22	0	0	0
	KEBON KOSONG	13.02	5.13	7.89	0	0
	UTAN PANJANG	13.80	0	11.92	1.06	0.82
	GUNUNG SAHARI	12.72	11.56	1.16	0	0
	SELATAN					
	KEMAYORAN	11.27	0	7.93	3.34	0
	SUMUR BATU	8.84	0	7.51	0	1.33
HARAPAN MULYA	11.43	11.43	0	0	0	
	SUB TOTAL	100.27	47.43	36.41	4.40	12.03
BAMBIR	CIDENG	25.80	20.06	3.19	0	2.55
	PETOJO UTARA	25.78	0	25.78	0	0
	KEBON KELAPA	18.60	6.35	12.25	0	0
	BAMBIR	5.10	0	0	0	5.10
	PETOJO SELATAN	29.04	6.08	7.56	0	15.40
	DURI PULO	40.69	25.04	15.65	0	0
		SUB TOTAL	145.01	57.53	64.43	0
TANAH ABAN	KAMPUNG BALI	15.57	6.01	9.56	0	0
	KEBON KACANO	14.53	9.06	5.47	0	0
	KEBAN MELATI	35.00	0	24.05	10.95	0
	PETAMBURAN	19.86	0	19.86	0	0
	BENDUNGAN HILIR	20.78	20.78	0	0	0
	KARAT TENGSIN	31.27	31.27	0	0	0
	GELORA	5.79	0	2.19	0	3.60
		SUB TOTAL	142.80	67.12	61.13	10.95
SAWAI	BESAMANGA DUASEL	36.20	15.94	17.83	0	2.43
	KARANG ANYAR	26.31	0	26.31	0	0
	PASAR BARU	15.08	0	13.29	0	1.79
	GUN. SAHARI. U.	19.51	6.60	12.91	0	0
	KARTINI	22.57	0	22.57	0	0
		SUB TOTAL	119.67	22.54	92.91	0
MENTENG	MENTENG	28.39	0	11.32	9.21	7.86
	CIKINI	12.02	0	9.68	0	2.34
	GONDANGDIA	7.39	0	1.20	0	6.19
	KEBON SIRIH	22.76	0	20.52	0	2.24
	PEGANGSAAN	24.63	17.20	7.43	0	0
		SUB TOTAL	95.19	17.20	50.15	9.21
CEMPAKA	PUCEM. PUITH. TIM	13.38	6.11	0	2.55	4.72
	SEM. PUTIH BAR.	18.57	0	17.90	0	0.67
	RAWA SARI	11.70	0	11.70	0	0
	JOHAR BARU	18.37	5.97	11.69	0	0.71
	KAMPUNG RAWA	9.56	0	0	9.56	0
	GALUR	8.40	0	3.40	0	0
	TANAH TINGGI	19.83	0	13.92	0	5.91
		SUB TOTAL	99.81	12.08	63.61	12.11
	TOTAL	795.99	223.90	438.48	42.49	91.12

Table 7.5-7 Planned Collection System and Population by RW (1995) (1/8)

KECAMATAN	KELURAHAN	HOUSEHOLD	POPULATION	PRESENT COLLECTION METHOD	APPLIED FUTURE COLLECTION METHOD	DEPOSIT-CONTAINER a	SMALL CONTAINER b	JALU-JALU c	DOOR TO DOOR d
KEMAYARAN	CEMPAKA BARU	464	3,759	B	a	3,759			
		488	3,966	B	a	3,966			
		748	5,542	B	a	5,542			
		659	5,095	B	a	5,095			
		681	4,950	B	d				4,950
		645	4,934	B	d				4,934
		564	4,547	B	d				4,547
		661	3,834	C	d				3,834
		1,080	7,380	C	d				7,380
		SUB TOTAL	5,910	43,985			18,361	0	0
SERDANG		906	3,787	F	a	3,787			
		1,335	5,576	F	a	5,576			
		1,360	5,684	B	a	5,684			
		1,250	5,225	B	a	5,225			
		1,236	5,087	B	a	5,087			
		1,217	4,980	B	a	4,980			
		353	1,338	E	a	1,338			
SUB TOTAL	7,657	31,678			31,678	0	0	0	
KEBON KOSONG		959	3,855	B	b		3,855		
		993	3,621	B	b		3,621		
		1,185	4,812	B	b		4,812		
		1,230	4,517	B	b		4,517		
		1,089	3,642	B	b		3,642		
		1,032	3,666	E	a	3,666			
		821	3,264	B	a	3,264			
		264	3,081	B	a	3,081			
		851	3,296	E	a	3,296			
		SUB TOTAL	8,344	33,753			13,306	20,447	0
UTAN PANJANG		972	3,953	B	b		3,953		
		841	3,456	B	b		3,456		
		913	3,877	B	b		3,877		
		963	4,541	B	b		4,541		
		1,042	4,239	B	b		4,239		
		932	3,812	B	b		3,812		
		559	2,749	B	c			2,749	
		374	2,112	G	d				2,112
		520	2,151	B	b		2,151		
		728	4,854	F	b		4,854		
SUB TOTAL	7,653	35,744			0	30,882	2,749	2,112	
GEMING SELATAN		568	3,000	A	b		3,000		
		849	3,431	B	a	3,431			
		913	4,671	A	a	4,671			
		1,165	4,263	B	a	4,263			
		1,035	4,065	B	a	4,065			
		1,112	4,293	A	a	4,293			
		806	3,132	E	a	3,132			
		702	3,128	E	a	3,128			
		624	2,984	A	a	2,984			
		0	0						
SUB TOTAL	7,774	32,967			29,967	3,000	0	0	
KEMAYARAN		671	2,789	C	b		2,789		
		735	3,911	C,B	b		3,911		
		736	3,113	B	c			3,113	
		615	2,081	B	b		2,081		
		732	3,209	B	b		3,209		
		627	4,090	B	c			4,090	
		731	3,423	B	b		3,423		
		668	2,808	B	b		2,808		
		628	2,524	B	b		2,524		
		799	1,458	B	c			1,458	
SUB TOTAL	6,852	29,206			0	20,545	8,661	0	
SIGUR BATU		936	4,435	B	b		4,435		
		1,239	5,908	B	b		5,908		
		1,263	2,837	B	b		2,837		
		540	2,232	G	d				2,232
		236	1,230	B	d				1,230
		557	1,980	B	b		1,980		
		1,095	4,329	E	b		4,329		
SUB TOTAL	5,775	22,950			0	19,488	0	3,462	
KAPAH MELAYU		625	2,900	F	a	2,900			
		347	1,750	B	a	1,750			
		831	3,222	B,F	a	3,222			
		708	2,631	B	a	2,631			
		685	2,707	B	a	2,707			
		524	2,837	F	a	2,837			
		711	3,008	B	a	3,008			
		1,260	5,077	B,C	a	5,077			
		1,273	5,485	B	a	5,485			
		SUB TOTAL	7,234	29,615			29,615	0	0
TOTAL		57,400	259,960			122,928	94,363	11,411	31,198
						47.3x	36.3x	4.4x	12.0x



Table 7.5-7 Planned Collection System and Population by RW (1995) (2/8)

KECAMATAN	KELURAHAN	HOUSEHOLD	POPULATION	PRESENT	APPLIED	DEPOT-	SMALL	JALI-JALI	DOOR TO
				COLLECTION	FUTURE	CONTAINER	CONTAINER		DOOR
				METHOD	COLLECTION	a	b	c	d
SEKEN	SEKEN	1,556	7,149	G	d				7,149
		818	3,808	E	b		3,808		
		557	2,591	E	b		2,591		
		986	4,590	E	b		4,590		
		492	1,872	C	b		1,872		
	SUB TOTAL	4,300	20,010			0	12,861	0	7,149
	KUTANG	591	2,766	F,G	b,d		1,373		1,373
		667	3,103	F,G	b,d		1,551		1,551
		758	3,429	F	b		3,429		
		468	2,176	B,G	b,d		1,088		1,088
		437	2,032	B,G	b,d		1,016		1,016
		834	3,879	B,G	b,d		1,939		1,939
		581	2,703	B,G	b,d		1,352		1,352
		530	2,464	B	b		2,464		
		374	1,738	B,G	b,d		869		869
SUB TOTAL		5,220	24,270			0	15,062	0	9,188
KENARI	632	2,939	B,G	b,d		1,469		1,469	
	578	2,688	B,G	b,d		1,344		1,344	
	899	4,133	B	b		4,133			
	777	3,613	B	b		3,613			
	369	1,675	B,G	d				1,675	
	440	2,044	E,G	d				2,044	
	0	0	G	d				0	
	381	1,771	B	b		1,771			
	543	2,527	B	b		2,527			
	SUB TOTAL	4,609	21,390			0	14,858	0	6,532
KRAMAT	1,607	7,486	E	b		7,486			
	801	3,732	E,G	b,d		1,866		1,866	
	1,180	5,496	B	b		5,496			
	1,281	5,965	B	b		5,965			
	1,317	6,136	B	b		6,136			
	1,346	6,269	B	b		6,269			
	892	4,152	B	b		4,152			
	1,085	5,054	B	b		5,054			
	SUB TOTAL	9,510	44,290			0	42,424	0	1,866
	PASEBAN	552	2,566	B	b		2,566		
484		2,252	E	b		2,252			
787		3,661	B,G	b,d		1,830		1,830	
453		2,108	B	b		2,108			
474		2,203	B	b		2,203			
689		3,203	B	b		3,203			
421		1,959	E	b		1,959			
380		1,768	B	b		1,768			
SUB TOTAL		4,240	19,720			0	17,690	0	1,830
BUNGUR		940	4,674	F	c				4,674
	572	2,845	F	b		2,845			
	396	1,968	F	c				1,968	
	497	2,470	B	b		2,470			
	702	3,488	B	c				3,488	
	746	3,707	B	b		3,707			
	875	4,350	G	b,d		2,175		2,175	
	771	3,830	F	b,d		1,915		1,915	
	569	2,829	G	b,d		1,414		1,414	
	467	3,305	G	b,d		1,653		1,653	
SUB TOTAL	4,730	21,950			0	16,178	10,131	7,157	
TOTAL		32,600	151,670			0	119,292	10,131	33,723
						0.0%	78.7%	6.7%	22.2%

Table 7.5-7 Planned Collection System and Population by RW (1995) (3/8)

KECAMATAN	KELURAHAN	HOUSEHOLD	POPULATION	PRESENT	APPLIED	DEPOT-	SMALL	JULI-JULI	DOOR TO
				COLLECTION	FUTURE	CONTAINER	CONTAINER		DOOR
				METHOD	METHOD	a	b	c	d
GAMBIR	CIDENG	1.103	4.603	A,E	a,d	2.302			2.302
		1.078	3.557	A	a	3.557			
		774	4.171	A	a	4.171			
		1.106	3.864	A	a	3.864			
		990	4.455	B	a	4.455			
		920	4.318	A	a	4.318			
		875	4.360	A	b		4.360		
		190	1.263	A	a	1.263			
		205	1.192	G	d				1.192
		699	3.189	B,G	a	3.189			
		SUB TOTAL	7.990	35.380			27.518	4.360	0
PETORO UTARA		1.037	3.777	B	b		3.777		
		859	3.405	B	b		3.405		
		1.089	5.221	B	b		5.221		
		914	4.682	B	b		4.682		
		1.125	4.945	B	b		4.945		
		904	3.889	B	b		3.889		
		1.064	4.972	B	b		4.972		
		1.358	6.288	E	b		6.288		
SUB TOTAL	8.350	36.980			0	36.980	0	0	
KEBOH KELAPA		975	4.531	A	b		4.531		
		657	2.828	A	b		2.828		
		574	2.505	A	b		2.505		
		1.194	5.116	A	a	5.116			
SUB TOTAL	3.390	14.980			5.116	9.864	0	0	
GAMBIR		225	778	G	d				778
		85	456	G	d				456
		24	138	G	d				138
		36	228	G	d				228
		SUB TOTAL	370	1.600			0	0	0
PETORO SELATAN		1.049	4.361	B	b		4.361		
		1.052	4.695	B	b		4.695		
		411	1.784	A	a	1.784			
		1.141	5.490	B	a	5.490			
		1.156	4.227	G	d				4.227
		889	3.153	G	d				3.153
		1.086	6.314	G	d				6.314
		933	4.081	G	d				4.081
		133	595	G	d				595
SUB TOTAL	7.850	34.750			7.274	9.056	0	18.421	
DURI PILO		408	1.886	B	a	1.886			
		437	2.202	B	a	2.202			
		776	3.042	B	a	3.042			
		680	3.110	B	a	3.110			
		534	2.692	B	a	2.692			
		526	3.604	B	a	3.604			
		1.163	3.993	C	b		3.993		
		1.016	3.936	C	b		3.936		
		837	3.081	C	b		3.081		
		437	2.265	C	a	2.265			
		469	3.168	B	a	3.168			
775	2.721	C	b		2.721				
SUB TOTAL	8.060	35.700			21.969	13.731	0	0	
TOTAL		36.000	159.390			61.876	73.999	0	23.514
						38.6%	46.4%	0.0%	14.8%

Table 7.5-7 Planned Collection System and Population by RW (1995) (4/8)

KECAMATAN	KELURAHAN	HOUSEHOLD	POPULATION	PRESENT	APPLIED	DEPT-	SMALL	JALI-JALI	DOOR TO
				COLLECTION	FUTURE	CONTAINER	CONTAINER	c	DOOR
				METHOD	COLLECTION	a	b		d
SAWAR BESAMANGA DUA SEL.		879	3.156	B	b				
		725	3.118	B	b			3.156	
		684	3.110	B	b			3.118	
		599	3.169	B	b			3.110	
		443	3.123	B	b			3.169	
		788	3.361	A	a	3.361		3.123	
		482	2.703	A	a	2.703			
		528	2.808	B	b			2.808	
		654	3.061	E	b			3.061	
		568	2.936	E	d				2.936
		886	4.371	B	a	4.371			
		746	3.807	B	a	3.807			
		900	3.236	E	a	3.236			
		826	1.770	E	a	1.770			
	SUB TOTAL		9.710	43.730			19.250	21.514	0
KAPANG ANYAR		832	3.524	A	b			3.524	
		700	2.736	A	b			2.736	
		503	1.974	A	b			1.974	
		581	2.439	A	b			2.439	
		1.040	5.260	A	b			5.260	
		871	3.897	A	b			3.897	
		658	3.253	A	b			3.253	
		739	3.184	A	b			3.184	
		464	1.898	A	b			1.898	
		660	3.494	A	b			3.494	
	SUB TOTAL		7.020	31.660			0	31.660	0
PASAR BARU		1.334	6.350	E	b			6.350	
		1.439	5.786	B	b			5.786	
		1.359	6.633	C	b			6.633	
		1.697	7.301	C	b			7.301	
		1.465	7.107	B	b			7.107	
		1.217	4.122	B	b			4.122	
		225	1.256	B	b			1.256	
		0	0						
		538	2.026	G	d				2.026
		425	3.149	E	d				3.149
SUB TOTAL		9.700	43.730			0	38.554	0	5.176
GUN. SAHARI V.		648	4.082	B	b			4.082	
		821	3.751	B	a	3.751			
		723	3.437	B	b			3.437	
		787	3.558	E	b			3.558	
		465	2.286	B	b			2.286	
		585	1.494	B	a	1.494			
		484	2.127	B	a	2.127			
		317	1.046	B	b			1.046	
SUB TOTAL		4.830	21.780			7.371	14.409	0	0
KARTINI		920	4.457	A	b			4.457	
		1.273	4.649	A	b			4.649	
		1.277	4.551	A	b			4.551	
		1.602	3.820	A	b			3.820	
		1.608	4.685	A	b			4.685	
		798	5.167	A	b			5.167	
		1.193	5.797	A	b			5.797	
		1.087	5.911	A	b			5.911	
		781	3.052	A	b			3.052	
SUB TOTAL		9.348	42.090			0	42.090	0	0
TOTAL		40.660	182.990			26.621	148.257	0	8.112
						14.5x	81.0x	0.0x	4.6x

Table 7.5-7 Planned Collection System and Population by RW (1995) (5/8)

KECAMATAN	KELURAHAN	HOUSEHOLD POPULATION		PRESENT COLLECTION METHOD	APPLIED FUTURE COLLECTION METHOD	DEPOT-CONTAINER	SMALL CONTAINER	JALU-JALI	DOOR TO DOOR	
		a	b							c
TANAH ARAH KAMPUNG BALI		214	1,390	A	a	1,390				
		547	2,511	A	b		2,511			
		311	1,355	A	a	1,355				
		308	1,103	A	b		1,103			
		454	1,964	A	a	1,964				
		353	1,263	A	a	1,263				
		385	1,654	B	b		1,654			
		310	1,469	B	b		1,469			
		265	1,335	B	b		1,335			
		282	1,426	E	b		1,426			
	SUB TOTAL	3,430	15,470			5,972	9,498	0	0	
	KEBEN KACANG		1,371	5,428	B	b		5,428		
			1,367	7,817	B	b		7,817		
		1,880	9,995	B	b		9,995			
		1,760	7,395	B	b		7,395			
		1,561	6,684	B	a	6,684				
		1,636	9,705	B	a	9,705				
		1,333	8,098	B	a	8,098				
		1,536	5,835	B	a	5,835				
		1,810	7,698	B	a	7,698				
		1,656	5,898	B	a	5,898				
		1,640	5,084	B	a	5,084				
SUB TOTAL		17,550	79,240			49,402	29,838	0	0	
KEBAN MELATI			377	3,188	B	b		3,188		
		542	2,011	E	b		2,011			
		549	2,342	E	b		2,342			
		329	1,595	E	b		1,595			
		764	4,028	B	b		4,028			
		519	2,885	B	b		2,885			
		643	3,657	B	b		3,657			
		734	3,420	B	b		3,420			
		712	4,192	C	b		4,192			
		1,147	5,287	C	b		5,287			
		1,046	3,297	C	b		3,297			
		1,150	3,442	C	b		3,442			
		622	2,748	C	c			2,748		
		936	3,755	C	c			3,755		
		538	2,831	C	c			2,831		
		655	3,898	A	c			3,898		
	874	3,269	A	c			3,269			
	0	0								
	0	0								
	514	1,411								
SUB TOTAL	12,680	57,260			0	39,347	16,502	0		
PETAMPURAN		798	3,441	B	b		3,441			
		708	2,840	B	b		2,840			
		1,072	4,715	B	b		4,715			
		881	4,057	H	b		4,057			
		944	5,224	H	b		5,224			
		528	2,856	H	b		2,856			
		446	2,277	H	b		2,277			
		824	3,474	H	b		3,474			
		1,009	3,686	H	b		3,686			
	SUB TOTAL	7,210	32,570			0	32,570	0	0	
BENDANGAN HILIR		628	3,149	A	a	3,149				
		599	3,090	A	a	3,090				
		512	3,221	A	a	3,221				
		812	3,520	A	a	3,520				
		545	2,967	A	a	2,967				
		825	3,256	A	a	3,256				
		908	3,238	A	a	3,238				
		541	2,260	A	a	2,260				
	SUB TOTAL	5,470	24,700			24,700	0	0	0	
	KARAI TENGIN		615	5,235	A	a	5,235			
		808	2,980	A	a	2,980				
		921	3,643	A	a	3,643				
		912	4,632	A	a	4,632				
		1,487	6,000	A	a	6,000				
		1,160	4,680	A	a	4,680				
		1,487	6,000	A	a	6,000				
		1,377	5,937	A	a	5,937				
		527	3,077	A	a	3,077				
		163	588	A	a	588				
		692	3,640	A	a	3,640				
		1,024	4,266	A	a	4,266				
		159	612	A	a	612				
SUB TOTAL		11,360	51,290			51,290	0	0	0	
GELOPA		961	3,881	C	d				3,881	
		1,089	4,109	E	b		4,109			
		351	2,869	G	d				2,869	
	2,460	10,860			0	4,109	0	6,751		
TOTAL	60,100	271,390			131,364	145,362	16,502	6,751		
					48.4%	42.5%	6.1%	2.5%		

Table 7.5-7 Planned Collection System and Population by RW (1995) (6/8)

KECAPATAN	KELURAHAN	HOUSEHOLD	POPULATION	PRESENT	APPLIED	DEPOT-	SMALL	JALI-JALI	DOOR TO		
				COLLECTION	FUTURE	CENTAINER	CONTAINER	JALI-JALI	DOOR		
				METHOD	METHOD	a	b	c	d		
MENTENG	MENTENG	1,874	7,843	F	c			7,843			
		1,400	6,071	C	b		6,071				
		1,475	6,235	C	b		6,235				
		638	4,108	G	d				4,108		
		1,337	8,054	G	d				8,054		
		691	3,737	B	b		3,737				
		539	3,923	G	d				3,923		
		1,636	6,444	F	c			6,444			
		1,758	7,176	C	b		7,176				
		1,193	4,568	F	c			4,568			
		<b>SUB TOTAL</b>	<b>12,540</b>	<b>58,160</b>			<b>0</b>	<b>17,148</b>	<b>11,012</b>	<b>16,086</b>	
		CIKINI	CIKINI	409	2,632	F	b		2,632		
				439	2,060	E	b		2,060		
626	2,859			C	b		2,859				
344	1,267			G	d				1,267		
403	1,482			F	b,d		741		741		
<b>SUB TOTAL</b>	<b>2,220</b>	<b>10,300</b>			<b>0</b>	<b>8,292</b>	<b>0</b>	<b>2,058</b>			
GONDANGDIA	GONDANGDIA	247	1,160	G	d				1,160		
		272	1,763	G	b,d		882		882		
		181	861	G	d				861		
		230	812	G	d				812		
		239	834	B,G	d				834		
<b>SUB TOTAL</b>	<b>1,170</b>	<b>5,430</b>			<b>0</b>	<b>882</b>	<b>0</b>	<b>4,548</b>			
KEBON SIRIH	KEBON SIRIH	157	2,716	G	d				2,716		
		637	2,628	F	b		2,628				
		856	3,022	F	b		3,022				
		400	2,117	F	b		2,117				
		572	2,649	F	b		2,649				
		827	3,504	E	b		3,504				
		490	2,839	C	b		2,839				
		678	2,588	E	b		2,588				
		572	2,711	E	b		2,711				
		751	2,774	E	b		2,774				
<b>SUB TOTAL</b>	<b>5,940</b>	<b>27,550</b>			<b>0</b>	<b>24,834</b>	<b>0</b>	<b>2,716</b>			
PEGANGSAAN	PEGANGSAAN	1,518	7,631	C	b		7,631				
		822	3,759	A	b		3,759				
		672	2,163	A	a	2,163					
		508	1,172	A	a	1,172					
		620	3,241	A	a	3,241					
		1,464	6,185	D	a	6,185					
		1,338	6,344	A	a	6,344					
		1,189	7,206	A	a	7,206					
		<b>SUB TOTAL</b>	<b>8,130</b>	<b>37,700</b>			<b>26,310</b>	<b>11,390</b>	<b>0</b>	<b>0</b>	
<b>TOTAL</b>		<b>30,000</b>	<b>139,140</b>			<b>26,310</b>	<b>62,545</b>	<b>11,012</b>	<b>25,358</b>		
						<b>18.9%</b>	<b>45.0%</b>	<b>7.9%</b>	<b>18.2%</b>		

Table 7.5-7 Planned Collection System and Population by RW (1995) (7/8)

KECAMATAN	KELURAHAN	HOUSEHOLD POPULATION		PRESENT COLLECTION METHOD	APPLIED FUTURE COLLECTION METHOD	DEPOT-CONTAINER a	SMALL CONTAINER b	JALAN-JALAN c	DOOR TO DOOR d	
CENPAKA PUCUH, PUTIH TIM.	1.030	2.103	B	a	2.103					
	1.471	8.885	B	a	8.885					
	1.484	5.924	G	a	5.924					
	1.602	7.068	F	c			7.068			
	795	3.035	G	d					3.035	
	619	2.420	G	d					2.420	
	800	5.409	B	d					5.409	
	569	2.215	G	d					2.215	
	SUB TOTAL	8.370	37.050			16.912	0	7.068		13.680
	CEM. PUTIH BAR.	1.878	6.156	B	b		6.156			
1.416		6.168	F	b		6.168				
1.124		4.422	B	b,d		2.211		2.211		
1.545		5.292	B	b		5.292				
1.614		6.586	B	b		6.586				
643		4.003	B	b		4.003				
1.322		5.720	B	b		5.720				
622		4.857	B	b		4.857				
1.132		3.522	B	b		3.522				
763		4.973	B	b		4.973				
SUB TOTAL	13.660	61.360			0	59.149	0	2.211		
PAWA SARI	483	1.872	E	b		1.872				
	324	1.698	E	b		1.698				
	238	1.284	H	b		1.284				
	512	2.386	H	b		2.386				
	494	2.166	F	b		2.166				
	583	1.293	H	b		1.293				
	423	2.497	H	b		2.497				
	487	2.374	H	b		2.374				
	456	2.721	H	b		2.721				
	SUB TOTAL	4.060	17.700			0	17.700	0	0	
JERAR BARU	912	4.682	F,G	b		4.682				
	1.079	4.875	A	a	4.875					
	1.220	5.059	A	a	5.059					
	631	3.009	A	a	3.009					
	916	3.175	B	b		3.175				
	871	4.088	F	b		4.088				
	1.264	6.247	F	b		6.247				
	1.201	4.272	E	b		4.272				
	697	2.866	H	b		2.866				
	694	3.538	A,G	a,d	1.769				1.769	
SUB TOTAL	10.230	45.320			14.713	28.638	0	1.769		
KAPPANG PAMA	227	931	F	c				931		
	259	1.088	F	c				1.088		
	274	1.175	F	c				1.175		
	320	1.597	F	c				1.597		
	289	1.361	F	c				1.361		
	158	682	F	c				682		
	223	1.014	F	c				1.014		
	120	743	F	c				743		
SUB TOTAL	1.920	8.500			0	0	8.500	0		
GALUR	421	2.063	F	b		2.063				
	461	2.216	F	b		2.216				
	354	1.923	F	b		1.923				
	1.142	3.592	B	b		3.592				
	521	2.444	F	b		2.444				
	548	2.646	F	b		2.646				
	442	2.346	F	b		2.346				
SUB TOTAL	3.890	17.230			0	17.230	0	0		
TANAH TINGGI	799	3.191	F	b		3.191				
	646	3.029	B	c			3.029			
	1.067	3.382	F	b		3.382				
	1.133	5.469	F	b		5.469				
	738	3.217	F	b		3.217				
	663	3.115	F	c			3.115			
	1.214	5.712	F	c			5.712			
	1.135	4.860	F	b		4.860				
	837	3.804	F	b		3.804				
	1.340	6.126	F	b		6.126				
SUB TOTAL	11.030	48.850			0	34.293	14.557	0		
TOTAL		53.300	236.020			31.625	157.210	30.125	17.060	
						13.4K	66.6K	12.8K	7.2K	

Table 7.5-7 Planned Collection System and Population by RW (1995) (8/8)

KECAMHATAN	KELURAHAN	HOUSEHOLD POPULATION	PRESENT COLLECTION METHOD	APPLIED FUTURE COLLECTION METHOD	DEPOT-CONTAINER	SMALL CONTAINER	JALI-JALI	DOOR TO DOOR
					a	b	c	d
GRAND TOTAL		310.000	1.400.500		401.822 28.7%	773.155 55.2%	79.399 5.7%	146.117 10.4%

## 7.6 Depot Plan

### 1) Area to be covered by depots and amount of waste

For area A, where ordinary collection by depot is conducted, existing depots at 9 places (of the 10 existing depots, 1 depot will be abolished because its land must be returned) will be improved and new depots will be built at 9 places for use in this Project. New depots will be located where there is high possibility of land acquisition. The location of all these depots and areas to be covered by each of these depots are shown in Figure 7.6-1. The area to be covered by each depot will be limited to within a radius of 1.5 km.

The amount of waste to be transferred at each depot is shown in Table 7.7-1 and is 223.8 tons/day according to available statistics. To handle this amount, total 59 units of 10 m<sup>3</sup> containers will be required, assuming waste will be collected twice a week, with a fluctuation rate of 3/4 and the number of container collection, twice a day.

### 2) Transfer method

Waste is manually transferred from handcarts to a container. to facilitate this work, platforms will be built. Handcarts are wheeled onto the platform and their load is transferred to the container at its side.

To turn around containers twice a day, a container truck (equipped with an arm roll for loading and unloading containers) will deliver empty containers to the platform and carry back loaded containers. When the container truck delivers empty containers, handcart collectors transfer waste from already collected handcarts to empty containers and then go for the second collection with emptied handcarts.



3) Size and specification of depots

The size of each depot is determined based on the number of containers to be handled. The minimum standard size will be defined as follows:

Table 7.6-1 Standard Size of Depot

No. of Container	No. of Container berth	Area(m <sup>2</sup> )
2	3	270
3	4	310
4	5	380
5	6	420
6	7	480
7	8	530

The specification for the depot is as follows:

Specification for Depot

- Platform : Reinforced Concrete
- Roof : Structure -- Steel  
Roof ----- Galvanized steel corrugated sheet roofing
- Pavement : Asphalt
- Office : Structure -- Concrete block  
Floor ----- Concrete + Mortar  
Wall ----- Mortar + Paint  
Roof ----- Galvanized steel corrugated sheet roofing  
Door ----- Wood
- Drainage : Open ditch with cover
- Water Supply : Piping, tap
- Electricity : Lighting, Electricity Supply
- Wall : Concrete block with R.C. frame H=2m
- Gate : Steel with wheel and rail

## 7.7 Number of Required Vehicles

### 7.7.1 Ordinary collection

#### 1) Calculation method

This number of required vehicles can be obtained from the following expression:

$$\text{No. of required} = \frac{\text{Amount of waste} \times \text{Fluctuation ratio}}{\text{Loading capacity of truck} \times \text{No. of trips}}$$

#### 2) Amount of waste

The amount of waste by area and collection method is as follows:

Table 7.7-1 Amount of Waste for Ordinary Collection in 1985

(ton/day)

	Depot Container	Jali- jali	Door-to door	Small Container	Total
Gambir	57.5	0	23.1	64.4	145.0
Sawah Besar	22.5	0	4.2	92.9	119.6
Kemayoran	47.4	4.4	12.0	36.4	100.3
Senen	0	5.8	17.6	69.8	93.2
Campaka Putih	12.1	12.1	12.0	63.6	99.8
Menteng	17.2	9.2	18.6	50.2	95.2
Tanah Abang	67.1	11.0	3.6	61.1	142.8
Total	223.8	42.5	91.1	438.4	795.9

(Note: There is a little margin of error.)

### 3) Fluctuation factor

The amount of waste seasonally varies. The biggest fluctuation factor in waste collection is the frequency of collection. In the case of ordinary collection, the frequency was set as follows:

Table 7.7-2 Frequency of Ordinary Collection

Depot Container	6 times/week (Handcart Collection 2 times/week)
Jali-jali	2 times/week
Door-to-door	2 times/week
Small Container	3 times/week

Consequently, the variation factor will become as follows:

- Depot Container	$4/3 = 1.333$
- Jali-jali	$4/3 = 1.333$
- Door-to-door	$4/3 = 1.333$
- Small Container	$3/2 = 1.50$

### 4) Loading capacity

The loading capacity by type of vehicle is as follows:

Table 7.7-3 Loading Capacity by Type of Vehicle

	Capacity	Payload
Arm Rool	$10\text{m}^3$	3.0ton
Small Compactor	$4\text{m}^3$	2.6ton
Large Compactor	$10\text{m}^3$	5.1ton

5) Number of trips

The number of trips can be obtained from the following expression:

$$\text{No. of trips} = \frac{\text{Actual work hours}}{\text{Time required per trip}}$$

Actual work hours refers to the time excluding daily inspection, cleaning and rest and is set at 6 hours. The trip schedule will be made so that waste will be collected on 2 shifts of 3 hours each for morning and afternoon on Fridays. The time required for one trip covers movement from the garage to the service area, collection of waste in the service area and return from the service area to the transfer station. Under this Project, the distance between the garage to the service area and that between the service area and the transfer station is nearly equal. Consequently, the time required to cover each of these 2 sections in the trip is also equal.

The distance from the transfer station to the center of each area is as shown below, and the required time to cover this distance is given under the right-hand column in the table.

Table 7.7-4 Time Required from Each Collection Area to the Transfer Station

	Distance	Allowance	Total	Time
Gambir	8.7km	2km	9.7km	25 min.
Sawah Besar	7.1	2	9.1	24
Kemayoran	3.3	2	5.3	14
Senen	5.5	2	7.5	20
Campaka Putih	7.7	2	7.9	21
Menteng	12.0	2	12.4	32
Tanah Abang	10.0	2	12.2	32

Average 42 min.

The time required per trip is as follows:

Table 7.7-5 Time Required Per Trip

	Depot Container	Jali-jali	Door-to-door		Small Container
	Arm Roll	Small Compactor	Small Compactor	Large Compactor	Large Compactor
Gambir	60min	130min	-min	-min	110min
Sawah Besar	548	128	128	160	108
Kemayoran	38	128	108	-	68
Senen	50	120	120	-	100
Campaka Putih	52	122	122	-	102
Menteng	74	144	-	174	124
Tanah Abang	74	144	144	-	124

Table 7.7-6 Standard Work Time for Collection

	Standard Work Time	Crew
Depot Container	10min	1
Jali-jali		
Small Container	80	3
Door-to-door		
Small Compactor	80	4
Large Compactor	110	5
Small Container		
Large Compactor	60	4

The largest possible number of trips is as follows:

Table 7.7-7 Largest Possible Number of Trips

	Depot Container	Jali-jali	Door-to-door		Small Container
	Arm Roll	Small Compactor	Small Compactor	Large Compactor	Large Compactor
Gambir	6.0	2.8	-	2.3	3.3
Sawah Besar	6.2	2.8	2.8	-	3.3
Kemayoran	9.5	3.3	3.3	-	5.3
Senen	7.2	3.0	3.0	-	3.6
Campaka Putih	6.9	3.0	3.0	-	3.5
Menteng	4.9	2.5	-	2.1	2.9
Tanah Abang	4.9	2.5	2.5	-	2.9

It is not advisable that the standard number of trips will vary from area to area. Instead, this number should be made uniform. It is also desirable that the standard number of trips be set at the number below the largest possible number of trips. In this Project, the standard number of trips has been set with much allowance in time as follows:

Table 7.7-8 Standard No. of Trips

Depot Container	Arm Roll	3.5
Jali-jali	S.Compactor	2.0
Door-to-door	S.Compactor	2.0
	L.Compactor	2.0
Small Container	L.Compactor	2.5

This standard number of trips has been set with much allowance in time, taking existing local practice into consideration. Thus, we believe this standard can be met without difficulty so long as operation control is properly performed.

5) Number of required vehicles

The number of required vehicles can be obtained from calculation as shown in the following table:

Table 7.7-9 Number of Required Vehicles

	Depot Container	Jali-jali	Door to door		Small Container	Total
	Arm Roll	S.Compactor	S.Compactor	L.Compactor	L.Compactor	
Gambir	7.3 ⇒ (8)	0	0	3.0 ⇒ (3)	7.6 ⇒ (8)	19
Sawah Besar	2.9 ⇒ (3)	0	1.0 ⇒ (1)	0	10.9 ⇒ (11)	15
Kemayoran	6.0 ⇒ (6)	1.1 ⇒ (1)	3.1 ⇒ (3)	0	4.3 ⇒ (5)	15
Senen	0	1.5 ⇒ (1)	4.5 ⇒ (5)	0	8.2 ⇒ (8)	14
Campaka Putih	1.5 ⇒ (2)	3.1 ⇒ (3)	3.1 ⇒ (3)	0	7.5 ⇒ (8)	16
Menteng	2.2 ⇒ (2)	2.4 ⇒ (3)	0	2.4 ⇒ (3)	7.0 ⇒ (7)	15
Tanah Abang	8.5 ⇒ (9)	2.8 ⇒ (3)	0.9 ⇒ (1)	0	7.2 ⇒ (7)	20
Stand by	(5)	(4)			(11)	20
Total	(35)	(28)			(71)	134

In calculating the number of vehicles, fractions of 0.2 and below were cut away and fractions of 0.3 and above were rounded to the whole number. The number of stand by vehicles was obtained as 15% of the required size of the fleet.

6) Number of small containers

Small containers (each with 1 m<sup>3</sup> capacity) must be allocated to the area where the collection system with such containers is introduced. The number of required containers can be obtained as follows:

$$\text{No. of containers} = \frac{\text{Volume of garbage} \times \text{variation factor}}{\text{Storage capacity}}$$

where variation factor: To be defined as  $4/3 = 1.5$

storage capacity:  $1 \text{ m}^3 \times 0.3 \text{ ton/m}^3 \times 1.15 = 0.35 \text{ ton}$   
(at compactor ratio of 1.15)

Table 7.7-10 Required Number of Small Containers

KECAMATAN	KELURAHAN	WASTE AMOUNT	SMALL CONTAINERS
SEKEN	SEKEN	4.80 (t/d)	21
	KWITANG	7.82	34
	KENARI	7.08	31
	KRAMAT	20.90	90
	PASEBAN	20.04	86
	BUNGUR	9.20	40
	SUB TOTAL	69.84	302
KEMAYORAN	CEMPAKA BARU	0	0
	SERDANG	0	0
	KEBON KOSONG	7.89	34
	UTAN PANJANG	11.92	51
	GUNUNG SAHARI	1.16	5
	SELATAN		
	KEMAYORAN	7.93	34
	SUMUR BATU	7.51	32
	HARAPAN MULYA	0	0
	SUB TOTAL	36.41	157
BAMBIR	CIDENG	3.19	14
	PETOJO UTARA	25.78	111
	KEBON KELAPA	12.25	53
	BAMBIR	0	0
	PETOJO SELATAN	7.56	33
	DURI PULO	15.65	67
	SUB TOTAL	64.43	278
TANAH ABAN	KAMPUNG BALI	9.58	41
	KEBON KACANO	5.47	24
	KEBAN MELATI	24.05	103
	PETAMBURAN	19.86	86
	BENDUNGAN HILIR	0	0
	KARAT TENGSIN	0	0
	GELORA	2.19	10
	SUB TOTAL	61.15	264
SAWAH	BESAMANGA DUASEL	17.83	77
	KARANG ANYAR	26.31	113
	PASAR BARU	13.29	57
	GUN. SAHARI. U.	12.91	56
	KARTINI	22.57	97
	SUB TOTAL	92.91	400
MENTENG	MENTENG	1.32	49
	CIKINI	9.68	42
	GONDANGDIA	1.20	6
	KEBON SIRIH	20.52	88
	PEGANGSAAN	7.20	74
	SUB TOTAL	59.92	259
CEMPAKA	PUCEM. PUITH. TIM	0	0
	SEM. PUTIH BAR.	17.90	77
	RAWA SARI	11.70	51
	JOHAR BARU	11.69	51
	KAMPUNG RAWA	0	0
	GALUR	8.40	36
	TANAH TINGGI	13.92	60
	SUB TOTAL	63.61	275
	TOTAL	448.25	1,935



## 7.7.2 Special collection

### 1) Market

- A market discharges 100 tons/day of waste.
- Waste is collected even on Sundays.
- Waste is collected twice a day, in the morning and afternoon.
- Collection trucks will make 2 trips for each of the two services.
- The container capacity is  $1 \text{ m}^3$ .

No. of required trucks =  $100/2 / 10.2 \text{ tons/unit} = 4.9 \Rightarrow 5 \text{ units}$

No. of required containers =  $50 / 0.30 \text{ ton} = 167 \text{ pieces}$

### 2) Other facilities

#### a) Collection twice a day (department stores, shopping centers, hotels, etc.)

- Waste amount is estimated at 109 tons/day.
- Large compactor trucks will be used.
- Trucks will make 2 trips.
- The container capacity is  $1 \text{ m}^3$ .

No. of required trucks =  $109/2 / 10.2 = 5.3 \Rightarrow 6 \text{ units}$

No. of required containers =  $54.5 / 0.3 = 182 \text{ pieces}$

#### b) Daily collection (except for holidays, for office buildings)

- Waste amount is estimated at 111 tons/day. The variation factor of 7/6 will be used.
- Large compactors will be used.
- Trucks will make 2 trips.
- The container capacity is  $1 \text{ m}^3$ .

No. of required trucks =  $136 / 10.2 = 12.7 \Rightarrow 13 \text{ units}$

No. of required containers =  $130 / 0.3 = 433 \text{ pieces}$

c) Daily collection (stadiums, exhibition squares)

- Waste amount:  $0.6 \text{ m}^3/\text{month} \times 11 \text{ places}$
- Large container capacity ( $8 \text{ m}^3$ )
- Truck with arm roll will be used.
- Arm roll truck : 1 unit
- Large container: 11 pieces

3) No. of required vehicles

Table 7.7-11 Required No. of Vehicles and Containers

	L-Compactor	Arm Roll	S-Container ( $1\text{m}^3$ )	L-Container ( $8\text{m}^3$ )
Market	5	0	167	0
Others	19	1	615	11
Stand-by	4		-	-
Total	28	1	782	11

7.7.3 Bulky waste collection

The amount of bulky waste was estimated at 2% of the total waste discharges. This amount is not a value that was not obtained by deducting waste from waste discharge in ordinary collection, but instead is only an estimate.

- This 2% of discharge is equivalent to 22 tons/day.
- For collection, a  $4 \text{ m}^3$  truck with tipper will be used. (loading capacity 1.44 ton)

$$\text{No. of required vehicles} = 22 / 2.88 = 7.6 \Rightarrow 8 \text{ units}$$

#### 7.7.4 Collection by handcart

Handcarts will be supplied to the area where depot-container system is introduced for waste collection. Handcarts of the type that is currently in use will continue to be used. Handcarts will make 2 trips a day from the collection area to the depot.

Table 7.7-12 Required No. of Handcart

	Waste Amount	No. of handcart
Gambir	57.5(t/d)	112
Sawah Besar	22.5	44
Kemayoran	47.4	92
Senen	0	0
Campakaputih	12.1	24
Menteng	17.2	34
Tanah Abang	67.1	131
<b>Total</b>	<b>223.9</b>	<b>437</b>

Fluctuation:  $7 / 6 = 1.167$

Waste amount x fluctuation / (0.3 ton x 2)

#### 7.7.5 Street sweeping

Mechanical sweepers will be introduced for street sweeping. Daily sweeping distance will be set at 50 km for 5 working hours at an average speed of 10 km/hour. The total extension for sweeping is as follows:

Protocol type A street	121.8 km
Protocol type B street	54.4 km
Economy type B street	51.1 km

The sweeping frequency is as follows:

Protocol type A street	Daily
Protocol type B street	Daily
Economy type B street	3 times a week

The number of required sweepers is as follows:

Table 7.7-13 Number of Required Sweepers

Protocol type A/B road	3.5 units
Economy type B road	0.5 unit
Sub-total	4.0 units
Stand by	1 unit
Total	6 units

## 7.8 Number of Required Personnel

### 7.8.1 Collectors

#### 1) Ordinary collection

The crew for each type of vehicle will be organized as follows:

Table 7.8-1 Crew Size

		Driver	Collector
Depot Container	Arm Roll	1	0
Jali jali	S. Compactor	1	2
Door to door	S. Compactor	1	3
	L. Compactor	1	4
Small Container	L. Compactor	1	3

The number of crew members for each area can be obtained from the number of vehicles as shown below. The number of stand by crew members will be set at 10% of the number of drivers and collectors.

Table 7.8-2 No. of Crew for Ordinary Collection

	Driver	Collector	Assistant	Total
GAMBIR	19	36	6	61
SAWAH BESAR	15	36	5	56
KEMAYORAN	15	26	4	45
SEKEN	14	41	6	61
CAMPAKA PUTIH	16	39	6	61
MENTENG	15	39	5	59
TANAH ABANG	20	30	5	55
<b>TOTAL</b>	<b>114</b>	<b>247</b>	<b>37</b>	<b>398</b>

2) Special collection

The crew for special collection will be as follows:

11 units x 2 shifts x 4 persons = 88 persons	
13 units x 1 shift x 4 persons = 52 persons	
<u>1 unit x 1 shift x 1 person = 1 person</u>	
<b>Total</b>	<b>141 persons</b>

Table 7.8-3 No. of Crew for Special Collection

Driver	Collector	Assistant	Total
36	105	14	155

3) Bulky waste collection

To each unit of truck, 2 collectors will be assigned.

$$8 \text{ units} \times 3 = 24 \text{ persons}$$

Table 7.8-4 No. of Crew for Bulky Waste Collection

Driver	Collector	Assistant	Total
8	16	3	27

4) Staff of each Kecamatan office

The staff of each office will be organized as follows:

Table 7.8-5 No. of Staff in Kecamatan Office

Chief	1
Secretary	2
Typist	1
Inspector chief	1
Inspector	1(per Kelurahan)

7.8.2 Street sweeping

The number of required manual sweepers can be obtained from the total sweeping extension and standard work volume per sweeper. The total sweeping extension is as follows:

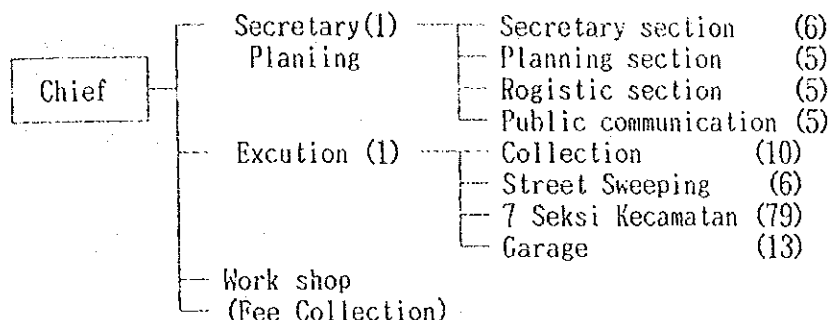
Table 7.8-6 Total Length of Street Sweeping

		GAMBIR	MENTENG	SAWAH	TANAH	KEMAYO	CAMPAK	SEKEN	TOTAL
		BESAR	ABANG	PUTIH					
Total Length		63.7 (30.0) *	86.8 (25.2)	19.6 (8.0)	49.6 (20.2)	28.6 (8.0)	26.0 (14.0)	24.4 (11.0)	298.7 (116.4)
Required Sweeper	Sweeper	47	66	14	35	18	20	18	218
	Handcart	24	33	7	18	9	10	9	110
	Collector								
	Assistant	7	10	22	5	3	3	3	53
Total		78	109	43	58	30	33	30	381
Inspector		5	7	2	4	2	2	2	24

\* Figure in ( ) indicates a sweeping frequency of twice a day. One inspector will be assigned to every 15 sweepers. Six drivers will be required for mechanical sweepers.

### 7.8.3 Suku Dinas

The waste collecting and street sweeping organization of Suku Dinas is as given below.



Note: The figures in Parenthesis indicate the number of personnel.

Fig. 7.8-1 Organization for Waste Collection and Street Sweeping

Table 7.8-7 No. of Personnel for Waste Collection and Street Sweeping

	High	Middle	Low	Technician	Worker	TOTAL
Chief	1	0	0	0	0	1
Secretary						
Chief	1	0	0	0	0	1
Secretary	0	1	2	2	1	6
Planning						
Planning	0	1	3	2	1	7
Logistic	0	1	3	2	1	7
Public Communication	0	1	3	2	1	7
Excation						
Collector						
Chief	1	0	0	0	0	1
First	0	1	4	4	2	11
Secont	0	1	4	4	2	11
Street Sweeping						
First	0	1	2	2	2	7
Second	0	1	2	2	2	7
Seksi Kecamatan	0	7	28	68	14	117
Garage						
Vehicle	0	1	2	2	2	7
Special Collection	0	1	4	5	2	12
<b>TOTAL</b>	<b>3</b>	<b>17</b>	<b>57</b>	<b>93</b>	<b>30</b>	<b>200</b>

Driver 166  
 Collector 429  
 Sweeper Collector 369

## 7.9 Project Cost for Waste Collection and Street Sweeping

### 7.9.1 Collection cost

#### 1) Unit price of collection equipment and materials

Unit prices of collection equipment and materials are as given below.

Table 7.9-1 Unit Cost of Equipment for Collection

		(10 <sup>3</sup> Rp)
Tipper	S	23,000
	L	43,000
Compactor	S(4m <sup>3</sup> )	43,000
	L(10m <sup>3</sup> )	70,000
Arm Roll	S	32,000
	L	50,000
Big Container		2,500
Small Container(1m <sup>3</sup> )		300
Handcart		370
Micro Compactor		20,000

#### 2) Collecting equipment and material purchasing fund

Table 7.9-2 Collecting Equipment and Material Purchasing Fund

		(10 <sup>6</sup> Rp)
Tipper	S	184
	L	6,930
Compactor	S(4m <sup>3</sup> )	1,204
	L(10m <sup>3</sup> )	1,800
SUB TOTAL		10,118
Big Container		175
Small Container(1m <sup>3</sup> )		815
Handcart		162
Micro Compactor		48
TOTAL		11,318



3) Maintenance of Depot

As shown in 7.5, Rp. 332 billion will be required for improving 9 depots, and Rp. 284 billion will be needed for constructing 9 new depots. The total will be Rp. 616 billion.

4) Annual cost

a. Depreciation

Maintenance cost x (1 - Ratio of residual value) / Durable years.

Residual value and durable years for each equipment and facility are obtained as follows.

Table 7.9-3 Service Life of Equipment

	Ratio of residual value	Durable years
Vehicle	0.1	7
Container	0.1	4
Handcart	-	4
Computer	0.1	5
Depot	-	25

b. Repair cost

Vehicle repair cost includes the personnel and spare parts cost. The repair cost, as a desirable level in Indonesia, is estimated at 40% of purchasing cost. Accordingly, the annual repair costs are calculated as follows.

Repair cost = Vehicle purchasing cost x 0.4 / Durable years.

c. Fuel cost

For each vehicle operated, 30 liters of fuel per day will be needed. The cost of fuel is set at Rp. 200 per liter.

Fuel cost = Number of vehicles x 30 liter x Rp. 200

d. Personnel cost

Personnel cost is allocated separately to the staff, drivers and collectors. Average monthly salary is set as follows.

Staff	Rp. 140,000
Driver	Rp. 140,000
Collector	Rp. 80,000

e. Annual expenses

Annual expenses calculated on the basis of above methods of calculation reach the following amounts.

Table 7.9-10 Annual Expense for Collection

Item	Annual Expenses (10 <sup>6</sup> Rp)
Deprecia- Depot	24.6
tion cost Vehicle	1,300.9
Container	222.8
Handcart	40.5
Computer	8.6
Sub total	1,597.4
Repair cost	578.2
Fuel cost	316.2
Personnel cost	910.1
Total	3,401.9
Cost per ton	8,324 (Rp/ton)

7.9.2 Street sweeping

1) Unit cost of equipment and materials needed for Street Sweeping

Table 7.9-11 Unit Cost of Equipment for Street Sweeping

Handcart/Handbarrow	370,000 Rp
Mechanical sweeper	120,000,000 Rp

2) Equipment purchasing cost

Table 7.9-12 Purchasing Fund of Equipment for Street Sweeping

	Quantity	Cost (Billion Rp.)
Handcart/Handbarrow	114	42.2
Mechanical sweepers	6	720.0
Total		762.2

3) Cost

a. Depreciation

Table 7.9-13 Service Life (Durable Years)

	Durable years	Ratio of residual value
Handcarts	4 years	0%
Mechanical sweepers	7 years	10%

b. Repair costs

- \* Repair cost is estimated only for mechanical sweepers.
- \* The repair costs are set at 40% of purchasing costs. Annual repair costs are calculated as follows:

$$\text{Repair costs} = \text{Purchasing costs} \times 0.4 / 7$$

c. Fuel costs

- \* Fuel consumption is estimated at 30 liters per vehicle per day.
- \* The cost of 1 liter is set at Rp. 200.
- \* The annual operating days are set at 310 days.

d. Material costs

\* Materials consist of brooms, uniforms and so forth, and a sweeper will require Rp. 100,000 per year. The material cost, therefore, becomes as follows.

$$\text{Annual cost of materials} = \text{Number of sweepers} \times \text{Rp. 100,000}$$

e. Personnel costs

Sweeper	Rp. 800,000 per month
Driver	Rp. 1,400,000 per month
Staffer	Rp. 1,400,000 per month

f. Annual expenses of street sweeping

Table 7.9-14 Annual Expenses of Street Sweeping

	(10 <sup>6</sup> Rp)
Depreciation	103.1
Repair	41.1
Fuel	11.2
Materials	36.1
Personnel	397.0
Total	588.5

7.10 Effect of Collection Improvement

The collecting cost will be reduced along with improvement of the collecting system. The table below gives the difference between the improved and present systems.

Table 7.10-1 Effect of Collection Improvement

	Present system	Improved system
Personnel Collector	625	374
Driver	258	160
No. of vehicle	324	172
Collection cost	11,081Rp/ton	8,096Rp/ton

Improvement of the collecting system will save Rp. 1,215 billion per years.

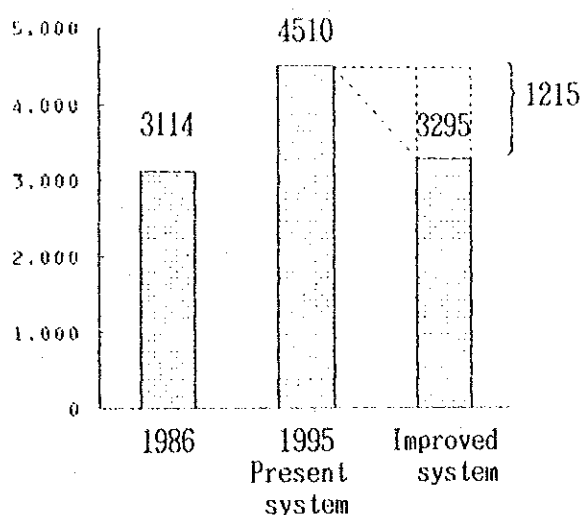


Fig. 7.10-1 Effect of Collection Improvement

The 1995 cost can be held down to the scale about equal to that of 1986. In addition, it will become possible to cope with the cleaning service without increasing the number of vehicles and personnel being employed as of 1986.

### 7.11 Effect of Street Sweeping Improvement

Through improvement of the street sweeping system, personnel and equipment will be as follows.

Table 7.11-1 Effect of Improvement of Street Sweeping

	Present	Improvement
Sweeper	987 (25)	339 (25)
Driver	2	5
Handcart	180	114
Mechanical Sweeper	2	5

As is shown in the table, introduction of mechanical sweepers and reinforcement of control system for sweeping frequency will reduce the number of sweepers. Surplus sweepers can be assigned to future extended street sweeping.

Through such improvement, annual expenses will be as follows.

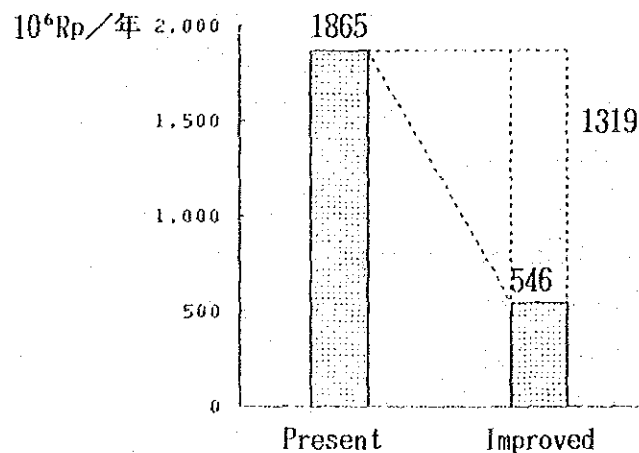


Fig 7.11-1 Effect of Improvement of Street Sweeping

## 7.12 Collecting Cost without Transfer Station

Comparison between the costs of the proposed system with the transfer station and the direct haulage from each collection area to Bekasi disposal site without a transfer station, is made.

The distance from Pusat to Bekasi disposal site is about 40 km. Time required for a round trip between each area and Bekasi is about 140 to 200 minutes. Since waste collection time normally takes 60 to 90 minutes, the maximum time needed for one trip would be about 5 hours. On this condition, vehicle can make only one trip. Number of vehicles and personnel needed on the basis of one trip as calculated as follows.

Table 7.12-1 Comparison of Required No. of Vehicle and Personnel of Collection Systems with and without Transfer Station

		A	B	C
Vehicle	Compactor L	99	244	0
	S	28	56	147
	Arm Roll	35	125	122
	Tipper S	8	15	396
Sub total		71	423	665
Big Container		70	70	78
Small Container		2,717	2,717	0
Handcart		437	437	3,408
Personnel	Staff	138	165	342
	Driver	158	362	566
	Collector	430	814	1,165
Total		726	1,341	2,073

Also, annual cost is as follows.

Table 7.12-2 Comparison of Cost of Collection Systems with and without Transfer Station

	A	B	C
Depot	616	616	0
Vehicle	10,118	24,906	21,539
Container	990	963	194
Handcart	162	162	1,259
Computer	48	48	0
<b>Total</b>	<b>11,934</b>	<b>26,079</b>	<b>22,992</b>
Depreciation	1,619.0	3,493.6	3,127.7
Repair	586.2	1,423.2	1,230.8
Fuel	320.0	787.3	1,237.5
Personnel	916.8	1,753.8	2,644.1
<b>Total</b>	<b>3,442.0</b>	<b>7,457.9</b>	<b>8,240.1</b>
<b>Cost per ton (Rp./ton)</b>	<b>8,420</b>	<b>18,243</b>	<b>20,157</b>

A: Proposed Collection system with transfer station  
 B: Proposed Collection system with the transfer station  
 C: Present Collection system without the transfer station  
 (direct haulage to the disposal site)

The cost of direct haulage (without a transfer station) will amount Rp. 18,423, which is much higher than Rp. 8,420, the cost of the proposed system with the transfer station.



## **APPENDIX**



LEGEND

CONTAINER

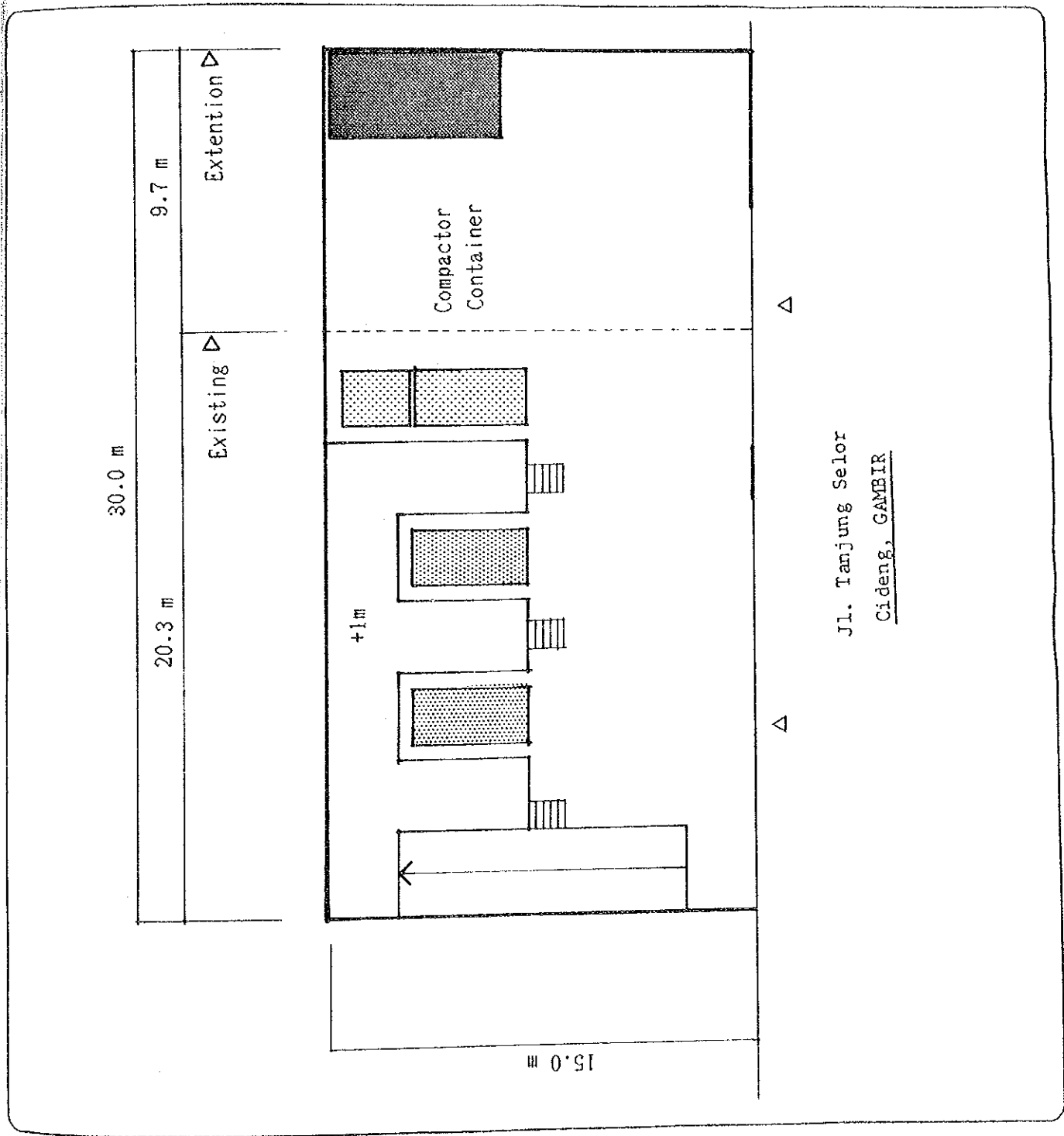
OFFICE

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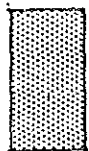
Fig. S7-1

Proposed Improvement of Depot

Solid Waste Management System Improvement Study in The City of Jakarta



LEGEND



CONTAINER



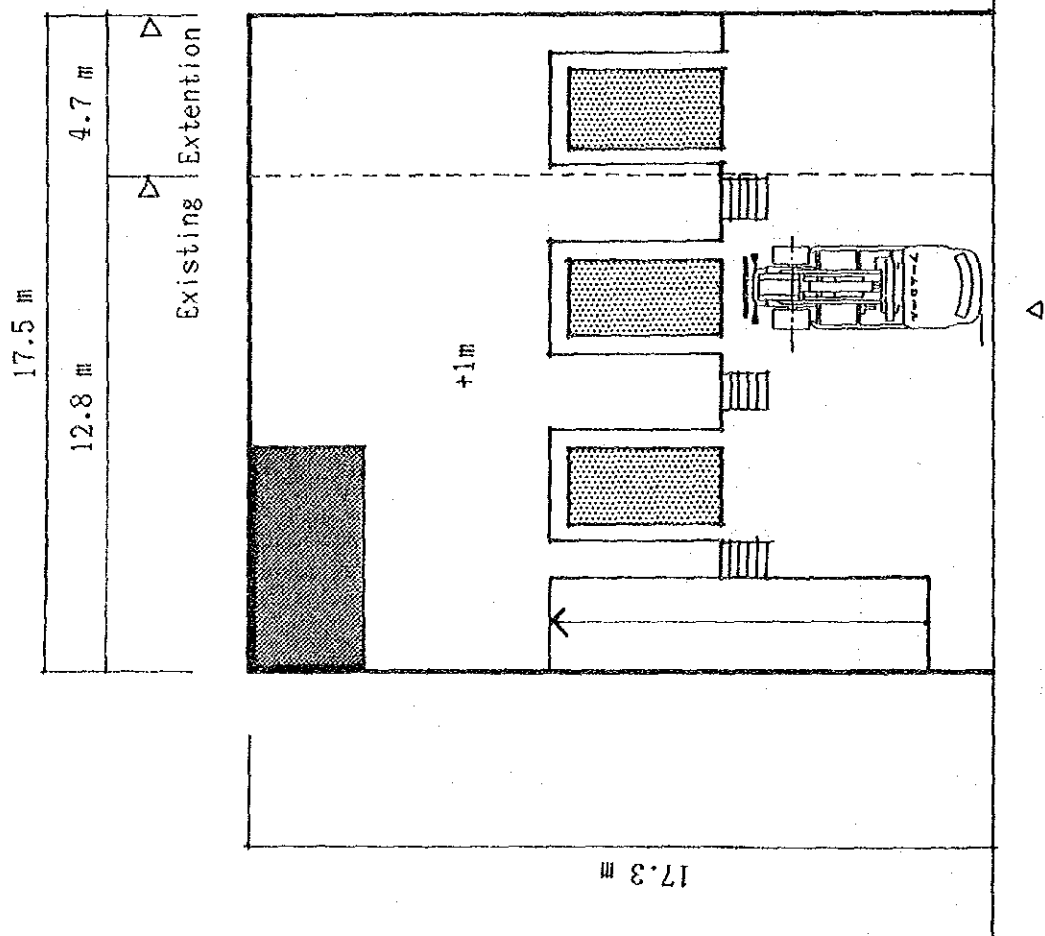
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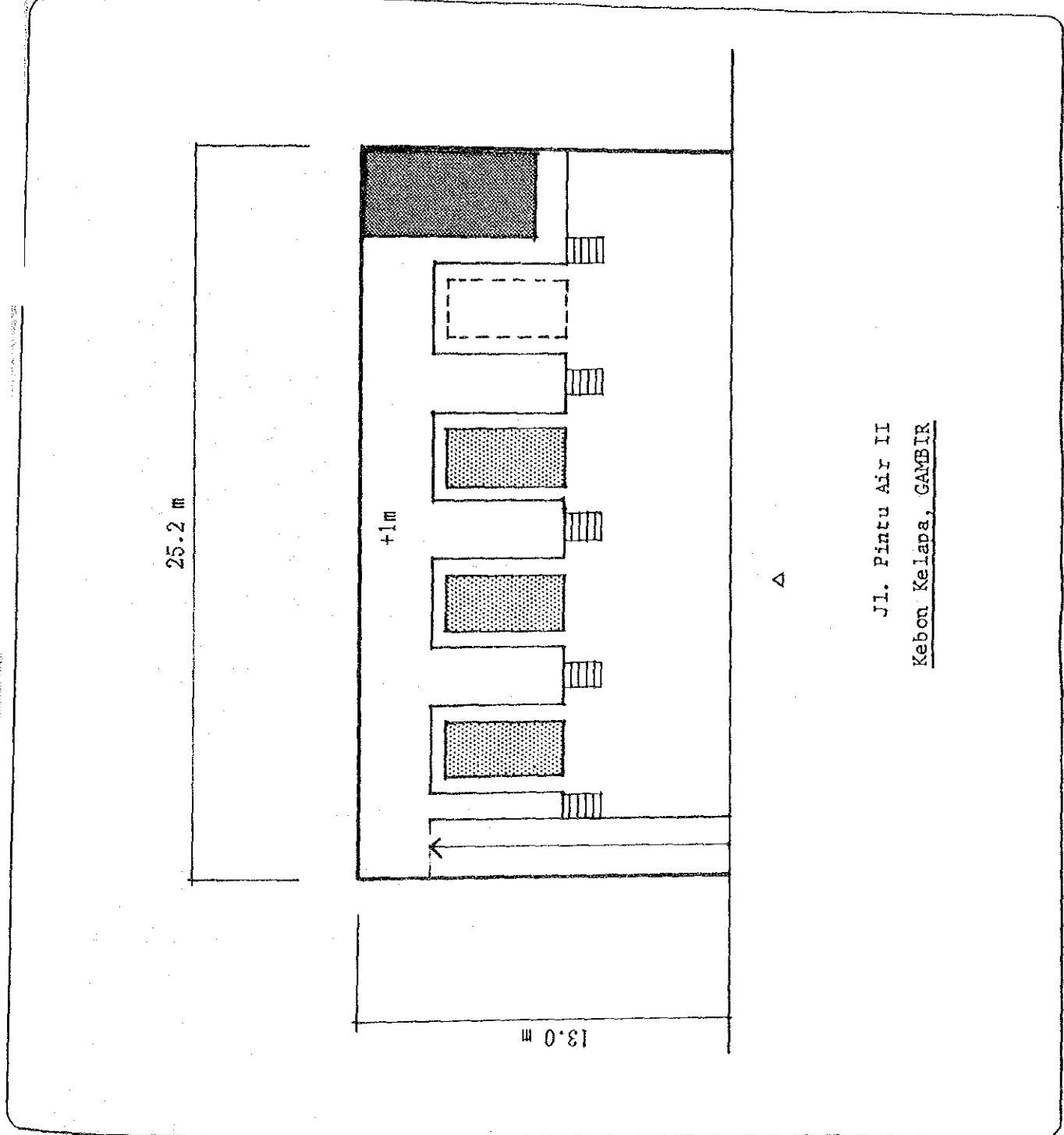
Fig. S7-2

Proposed Improvement  
of Depot

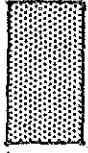
Solid Waste Management  
System Improvement Study  
in The City of Jakarta



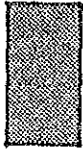
Jl. Tanah Abang I  
Gambir, Petojo Utara



LEGEND



CONTAINER



OFFICE

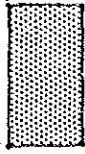
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Fig. S7-3

Proposed Improvement  
of Depot

Solid Waste Management  
System Improvement Study  
in The City of Jakarta

LEGEND



CONTAINER



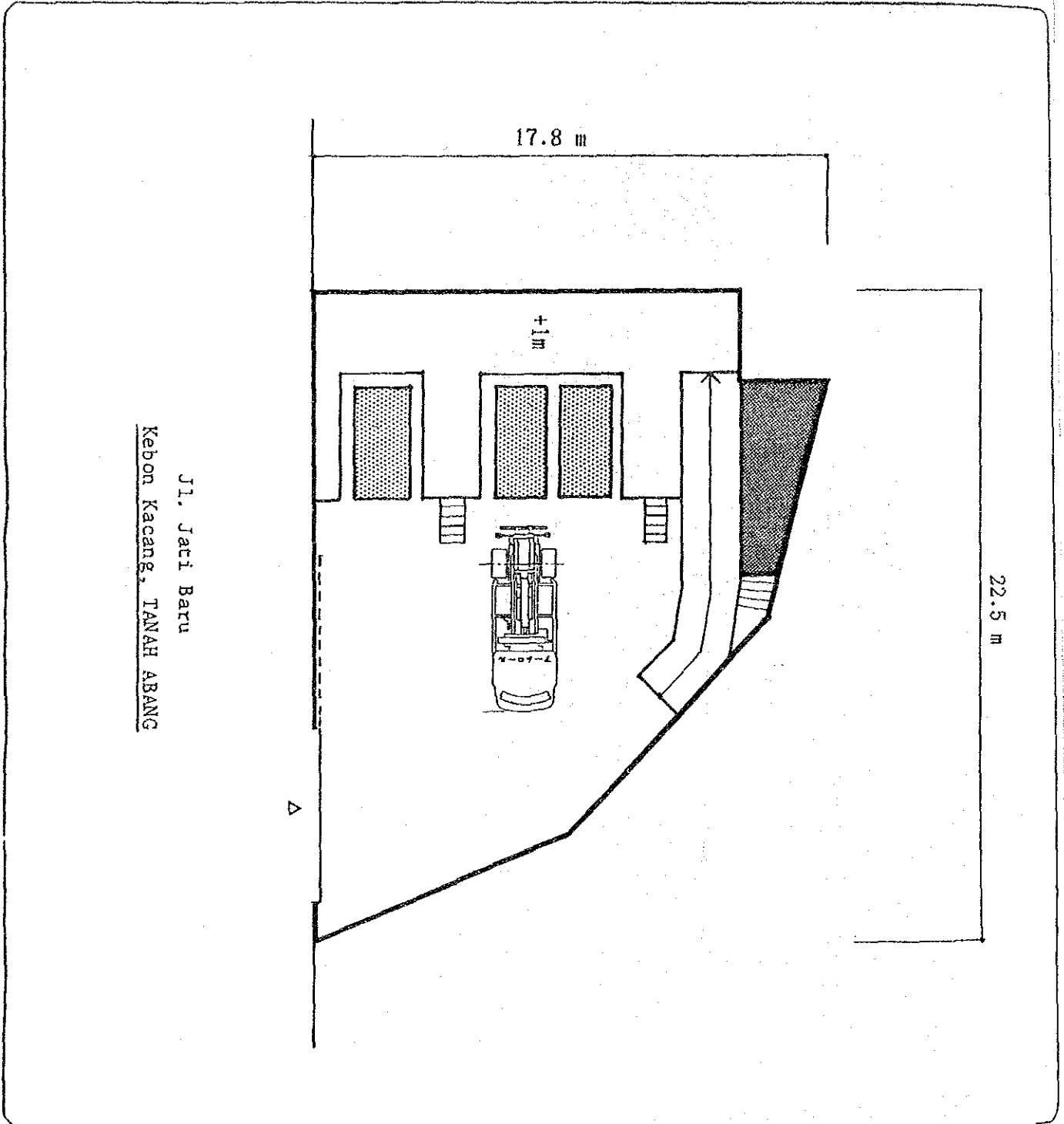
OFFICE

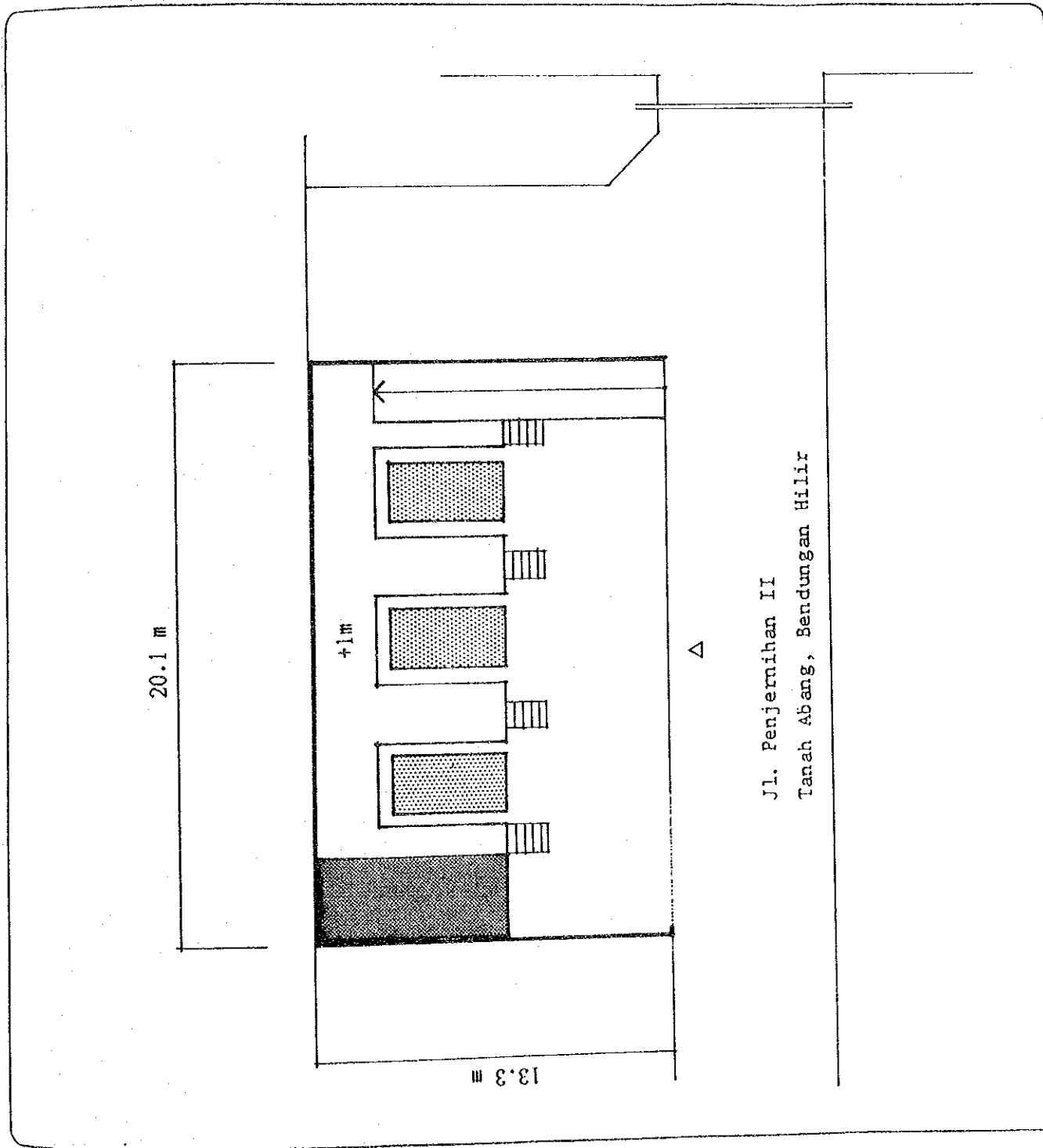
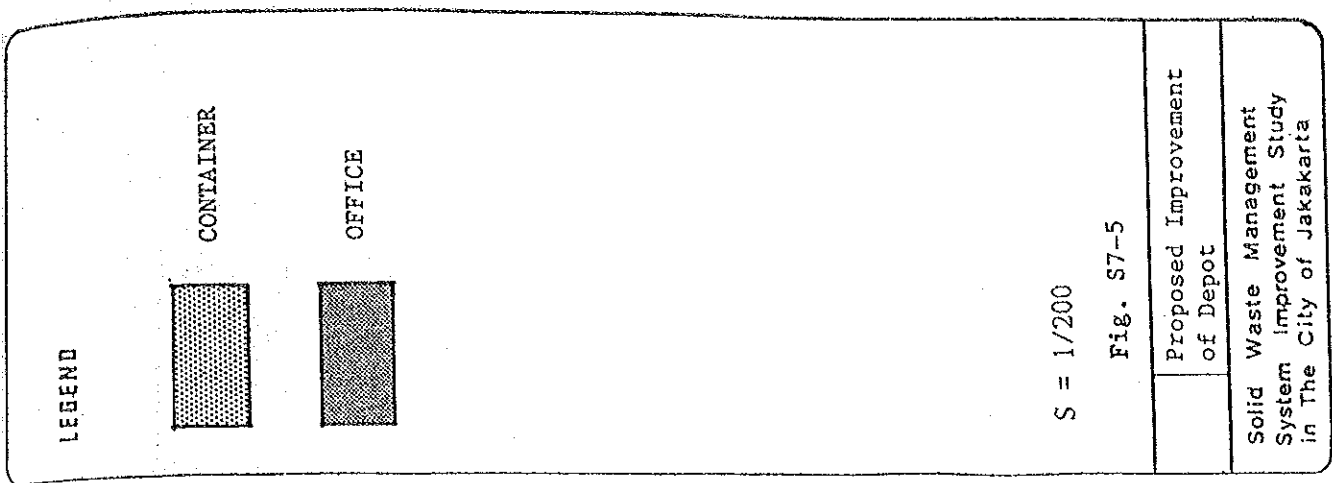
S = 1/200

Fig. S7-4

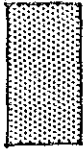
Proposed Improvement  
of Depot

Solid Waste Management  
System Improvement Study  
in The City of Jakarta





LEGEND



CONTAINER



OFFICE

S = 1/200

Fig. S7-6

Proposed Improvement  
of Depot

Solid Waste Management  
System Improvement Study  
in The City of Jakarta

30.0 m

+1m

10.9 m

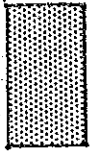
△

Jl. Mansyur

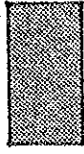
Karet Tengsin, TANAH ABANG



LEGEND



CONTAINER



OFFICE

S = 1/200

Fig. S7-7

Proposed Improvement  
of Depot

Solid Waste Management  
System Improvement Study  
in The City of Jakarta

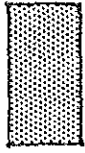
25.9 m

+1m

10.7 m

Jl. Matraman Dalam I  
Pegangsaan, MENTENG

LEGEND



CONTAINER



OFFICE

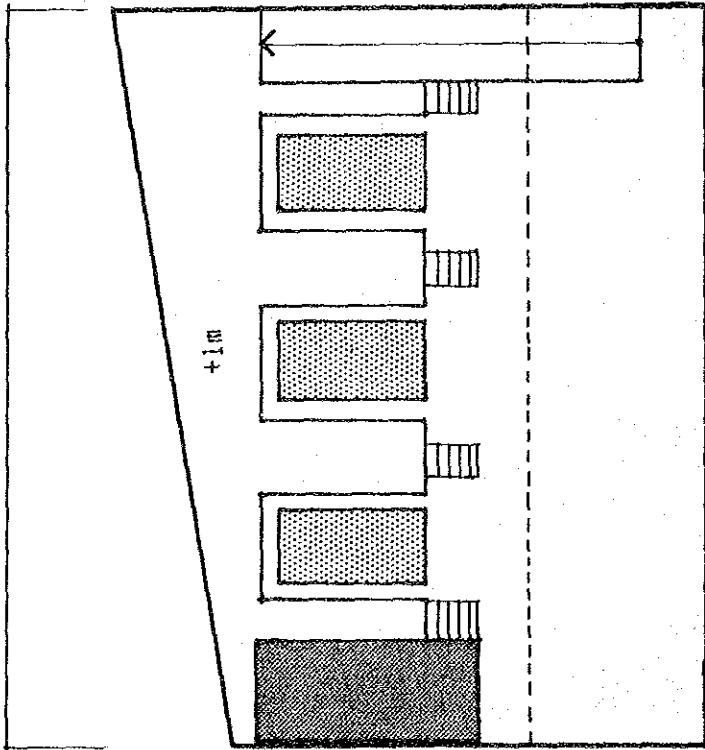
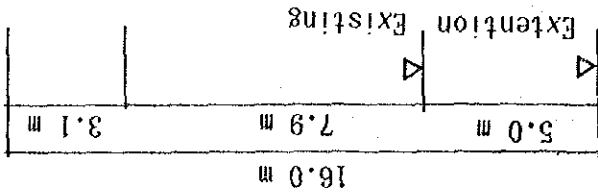
S = 1/200

Fig. S7-8

Proposed Improvement  
of Depot

Solid Waste Management  
System Improvement Study  
in The City of Jakarta

19.6 m

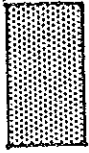


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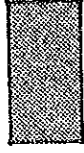
Jl. Johar Baru

Johar Baru, CEMPAKA PUTIH

LEGEND



CONTAINER



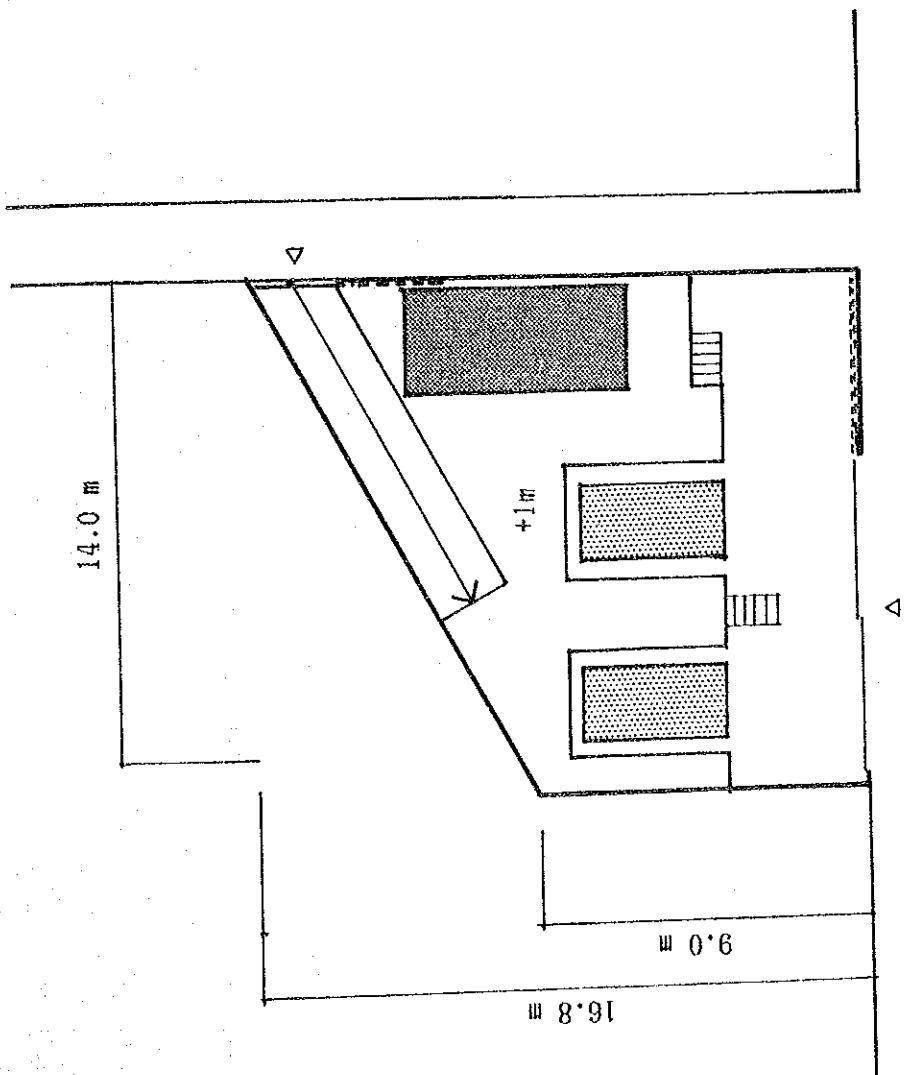
OFFICE

S = 1/200

Fig. S7-9

Proposed Improvement  
of Depot

Solid Waste Management  
System Improvement Study  
in The City of Jakarta



Jl. Kran  
Gunung Sahari Selatan, KEMAYORAN



## **8. Basic Design of Sunter Transfer Station**



## 8. Basic Design of Sunter Transfer Station

### 8.1 Planning Condition

The transfer station will be composed of the following facilities.

- 1) Rampway and receiving facility
- 2) Platform and dumping facility
- 3) Compacting and loading facility
- 4) Container yard and moving facility
- 5) Hauling-out facility
- 6) Ancillary facilities

Basic Condition is as follows:

- a. Waste amount to be treated: 1730 t/d
- b. Design Capacity : 2310 t/d
- c. Waste amount at peak hour : 420 t/hr

### 8.2 Facility Plan

#### 1) Rampway

The rampway will basically be of one lane, but in the section up to the receiving facility, two lanes will be provided, one of them as a passing-by lane. The width of one lane will be 4.75 m and the width of two lanes, 7.50 m. The design speed will be 20 km/h, curve radius 15 m or more, and longitudinal curve length, 15 m or more.

The ascending slope will be 8% or less, and the descending slope, 10% or less. The necessary length therefore will be 115 m for ascending and 95 m for descending.

$$\text{Ascending} : 8 \text{ m} / 0.08 + 15 \text{ m} = 115 \text{ m}$$

$$\text{Descending} : 8 \text{ m} / 0.10 + 15 \text{ m} = 95 \text{ m}$$

2) Receiving facility

No. of vehicles hauling in waste during peak hours is estimated on the basis of the loading weight of 3.8 t in average.

$$420 \text{ t/h} / 3.8 \text{ t/unit} = 110 \text{ units/hour}$$

Time for receiving will be 1 min./unit.

$$1 \text{ min./unit} = 60 \text{ units/hour}$$

No. of truck scales:

$$110 \text{ units} / 60 \text{ units/hour} = 1.8 \dots 2 \text{ units}$$

Specifications: Max. 20 t, load cell type, with data processing equipment

Weighing shed            Width : 2.5 m  
                                 Length: 8.0 m

3) Platform and Dumping facility

a) Platform

Width        : 18 m

Extension: 60 m

b) Hopper

One hopper will be provided for each compacting machine and each respective compacting machine will be fed by two vehicles.

No. of hopper        : 6 units

No. of inlet holes: 12 place

Hopper capacity is prepared for 0.3 hour storage.

$$\text{Density of waste} = 0.3 \text{ t/m}^3$$

$$420 \text{ t/h} \times 0.3 \text{ hr} / 0.3 \text{ t/m}^3 = 420$$

$$420 \text{ m}^3 / 6 \text{ unit} = 70 \text{ m}^3/\text{unit}$$

Size of hopper :

7.5 m x 4.5 m



4) Compacting and loading facility

a) Compacting machine

Specifications : Design load:  $500 \text{ m}^3/\text{hour}$

Efficiency : 0.5

Compacting machine capacity:

$$500 \text{ m}^3/\text{h} \times 0.3 \text{ t/m}^3 \times 0.5 = 75 \text{ t/h}$$

No. of units :  $420 \text{ t/h} / 75 \text{ t/h} = 5.6 \dots\dots 6 \text{ units}$

b) Treatment building

First floor : Compacting machine room, Maintenance Room, etc.

Second floor: Hopper Room, Control Room, Office Room

5) Container yard and moving facility

a) Container yard

Number of containers 64 unit

Container yard  $W=112.5 \text{ m}, L=100\text{m}$

b) Moving equipment

Container is moved by prime-movers in the transfer station.

Cycle time 10 min/container

Required number of movement 18 container

Number of movers 3 unit

6) Hauling-out facility

Semi-trailor with  $40 \text{ m}^3$  container is used.

Cycle time of haulage 2.5 hour

Number of trips 3 trips/unit

Number of tractors 32 unit

Number of container 64 unit

7) Ancillary facilities

The following facilities will be provided.

a) Fueling facility

Fueling facility will be on-the-ground tanks type.

b) Car wash

A space for accommodating two vehicles will be secured for car wash.

c) Maintenance facility

Repair works other than simple maintenance work on trailers and tractors will be consigned to outsiders. Machinery and facilities necessary for routine periodical check-up will be provided, and necessary parts and components which are used frequently will be kept in storage.

d) Waste water treatment facility

Waste water from transferring, car washing and other facilities will be treated and then discharged. The treatment facility will be placed outdoors. The quantity of waste water is 96 t/day.

d-1) Treatment capacity 96 t/d

Source of waste water

- Waste water from compactor
- Washing floor
- Washing container
- Others

d-2) Water quality

Water quality item	Untreated water	Treated water
pH	4 - 6	6 - 8
BOD	10,000 ppm	120 ppm
COD	2,500 ppm	-
SS	2,000 ppm	150 ppm
T-N	180 ppm	-

Note) - Indicates that the item is not the object of treatment.

d-3) Treatment Flow

The BOD value of the waste water at the transfer station is very high and, therefore, the dilution of the waste water and the return of the treated water to dilute the original waste water will be conducted. The volume of returned treated water will be 1,600 m<sup>3</sup>/day, resulting in a discharge amount of treated water of 396 m<sup>3</sup>/day. Treatment flow is shown in Fig. 8-1.

d-4) Facilities

Untreated water adjustment tank (pre aeration)	100 m <sup>2</sup>
Rotary disk	8 unit
Sedimentation tank	120 m <sup>2</sup>

e) Other facilities

A guard house will be provided at the entrance of the transfer station.

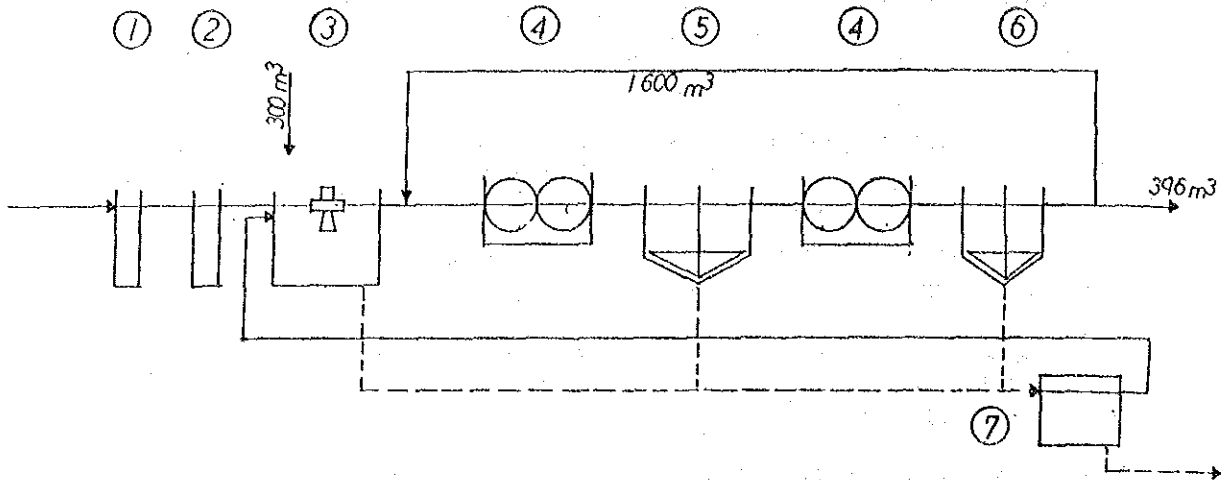


Fig.8-1

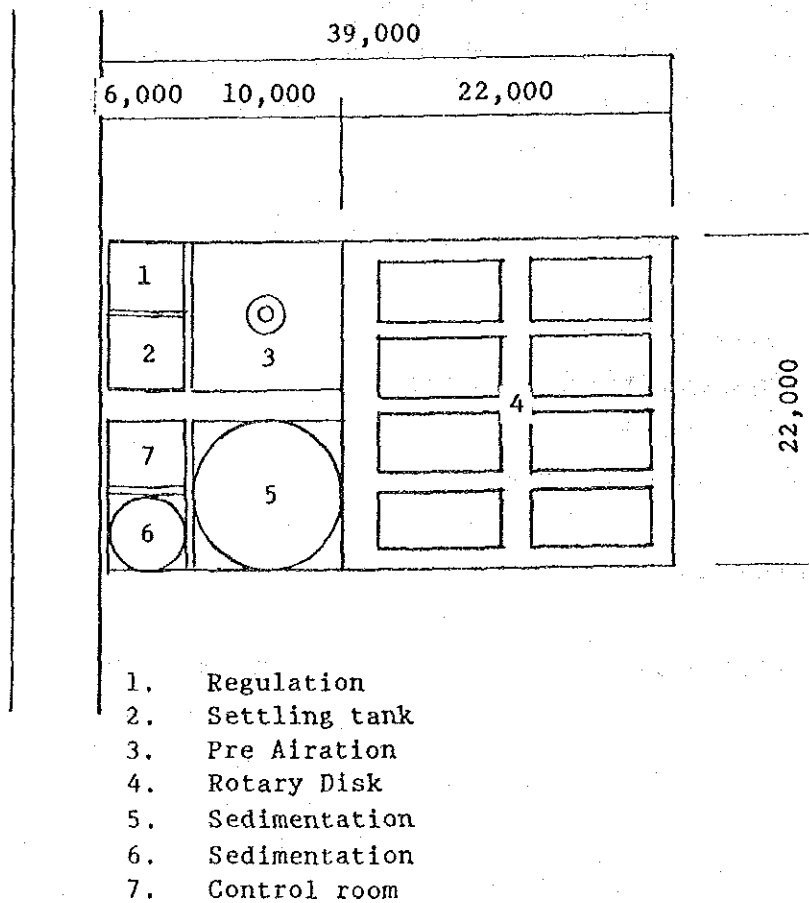
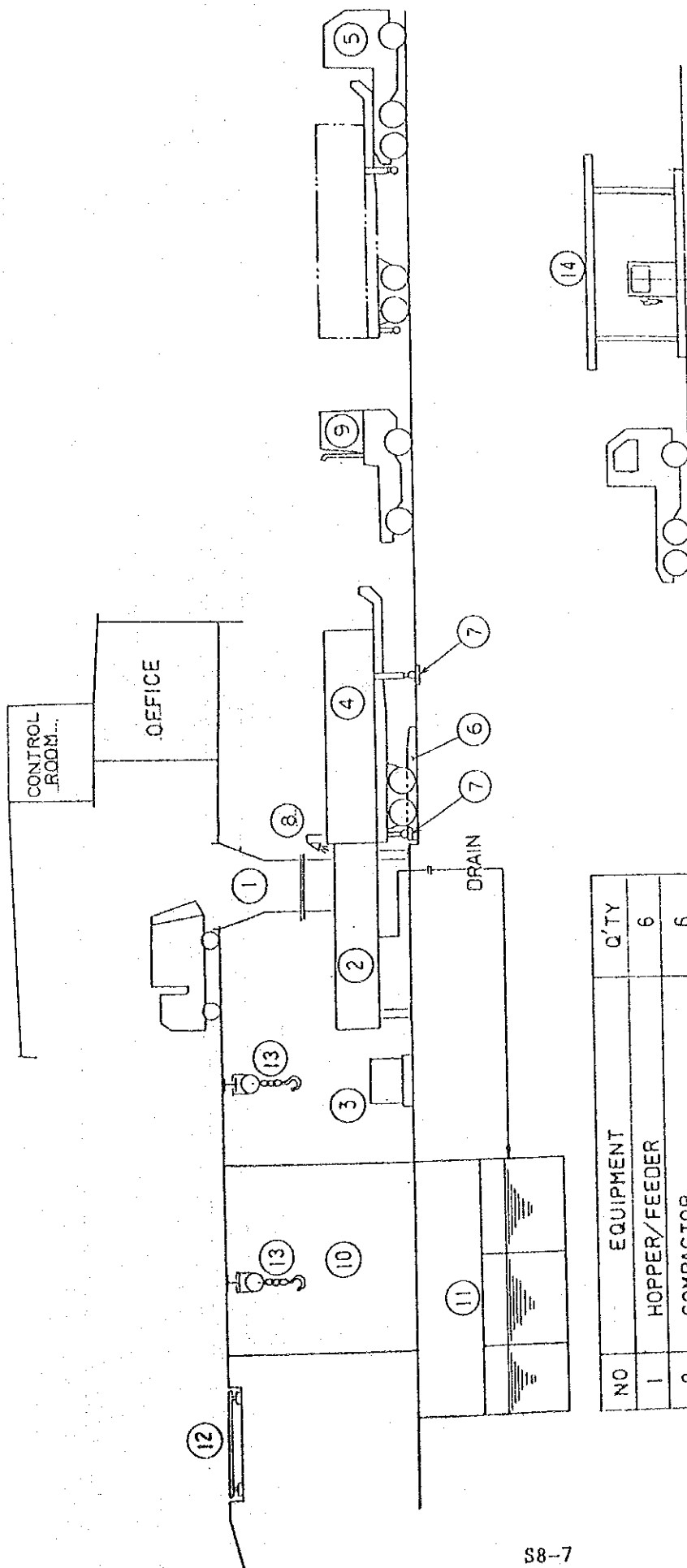


Fig. 3-1 Waste Water Treatment Flow



NO	EQUIPMENT	Q'TY
1	HOPPER/FEEDER	6
2	COMPACTOR	6
3	HYDRAULIC UNIT	6
4	CONTAINER AND SEMI-TRAILER	
5	TRACTOR	
6	RUN-UP SUPPORT	6
7	WEIGHT SCALE	6
8	FLUSHING SYSTEM	2
9	PRIME MOVER	3
10	WORKSHOP	1
11	WASTE WATER TREATMENT EQUIPMENT	1
12	WEIGHBRIDGE	2
13	CHAIN HOIST	2
14	FUEL STATION	1

Fig. 8-2 Outline of Transfer Station



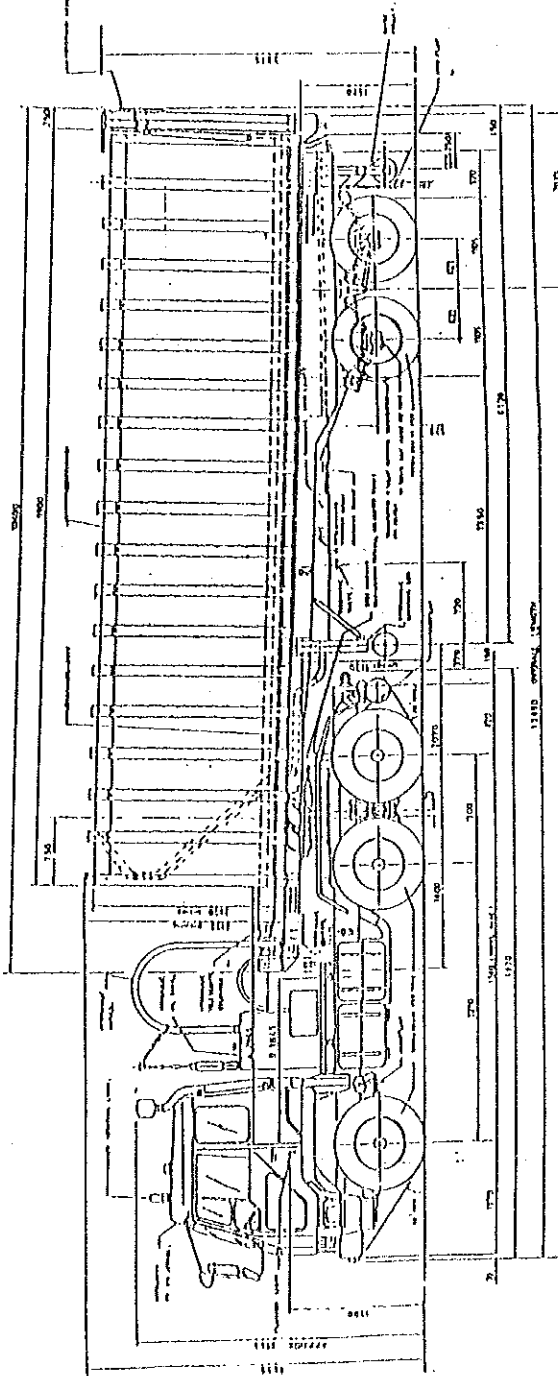
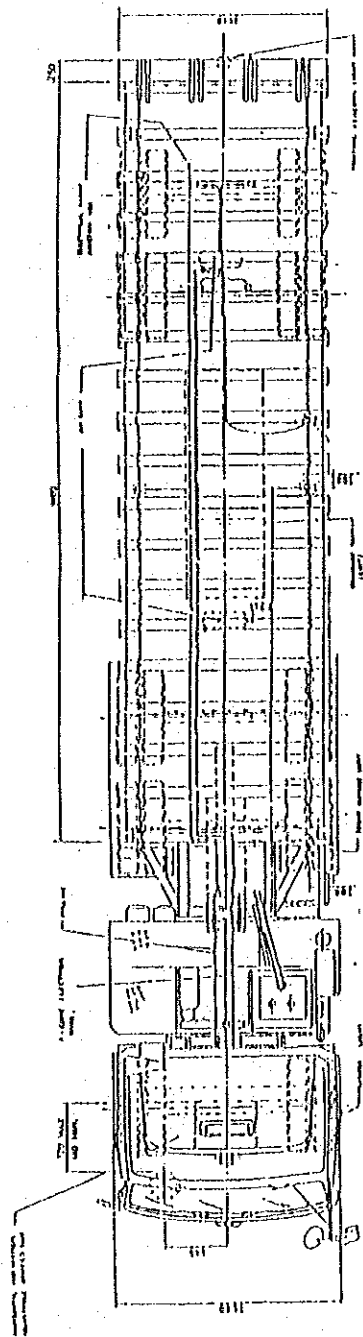
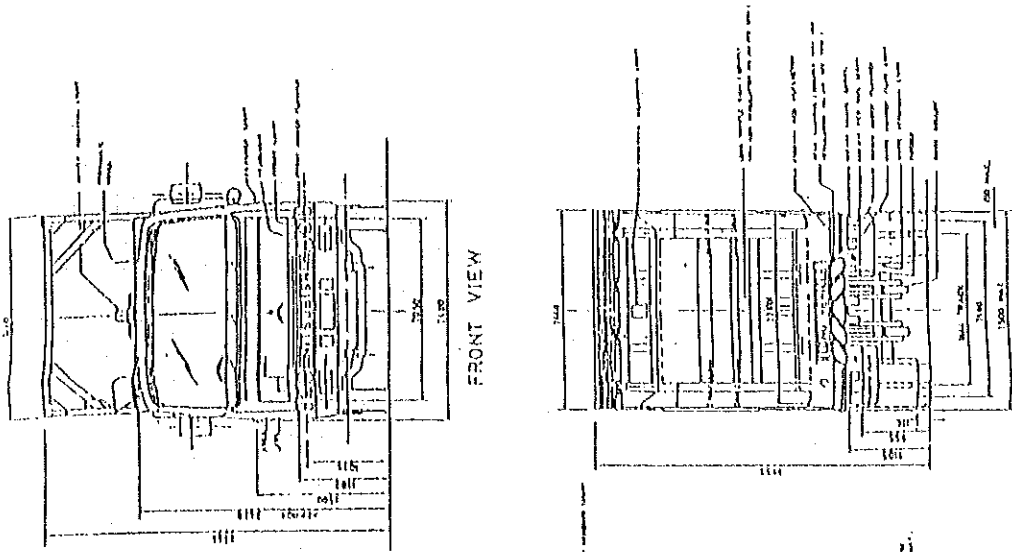


Fig. 8-4 Semi-Trailer for Haulage

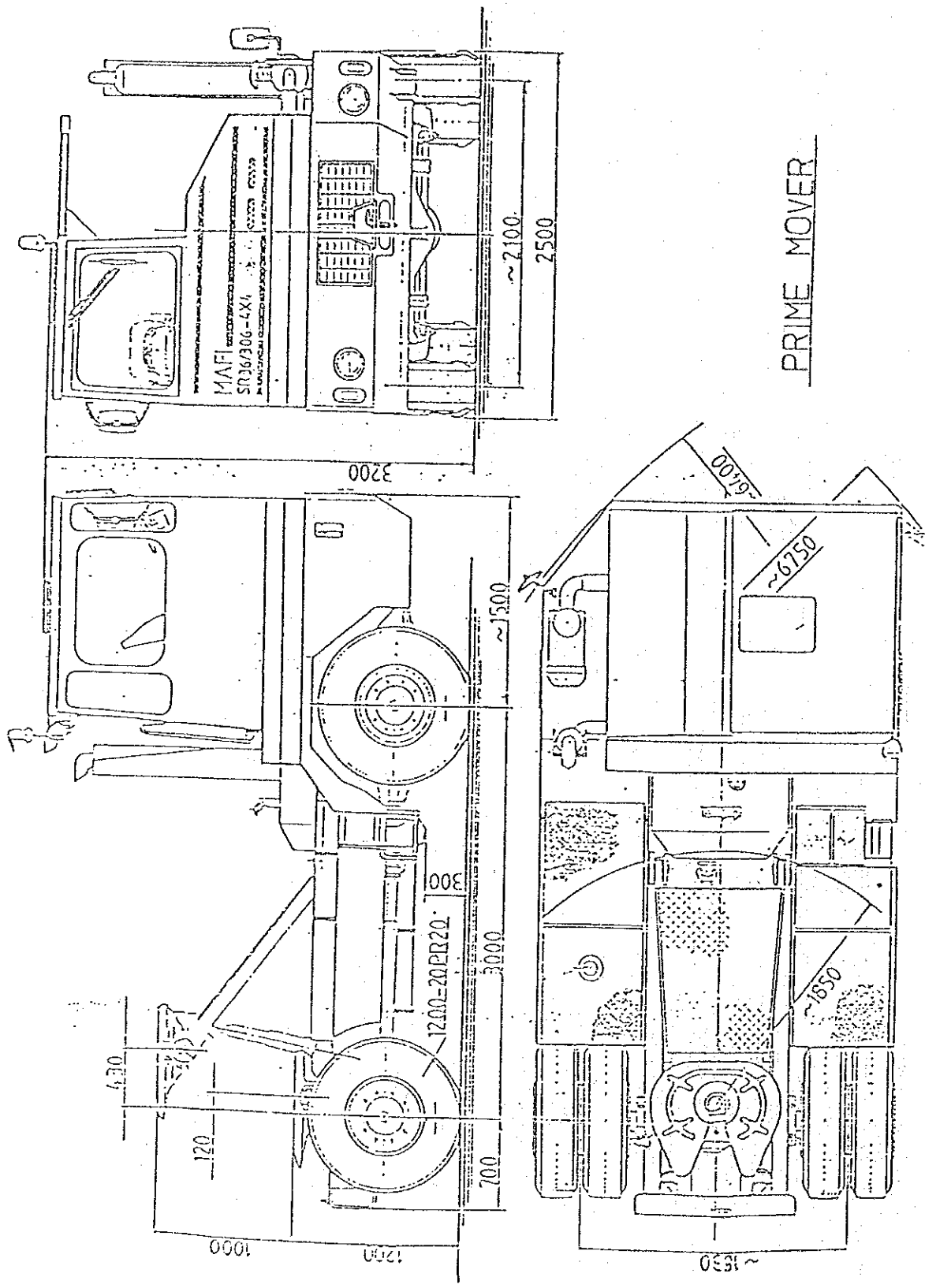


Fig. 8-5 Prime Mover