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MUNICIPALITY OF POZNAN
MINISTRY OF PHYSICAL PLANNING AND CONSTRUCTION
THE REPUBLIC OF POLAND

THE STUDY
ON
THE SOLID WASTE MANAGEMENT
FOR
POZNAN CITY

FINAL REPORT
VOLUME IV: DATA BOOK

MAY 1993

KOKUSAI KOGYO Co.Ltd.,
PACIFIC CONSULTANTS INTERNATIONAL

THE REPUBLIC OF POLAND
THE STUDY ON THE SOLID WASTE MANAGEMENT FOR POZNAN CITY
VOLUME IV: DATA BOOK
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MAY 1993

JAPAN INTERNATIONAL COOPERATION AGENCY(JICA)

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In this report, project cost is estimated at January 1993 price and at an exchange rate of 1 US$ = ¥ 125 = 15,700 Zl.

THE STUDY
ON
THE SOLID WASTE MANAGEMENT
FOR
POZNAN CITY

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A. Survey Data of Waste Composition

A1. in June 1992

Solid Waste Testing Methods

34 samples were supplied for laboratory analyses in order to determine waste moisture content and physical composition, each cubic capacity of 30 litres, prepared and averaged at Morasko landfill site personally supervised by the Japanese group.

The samples were taken from 5 sources :

I) PEC - from flats with central heating (housing estates)

2) INST. - from institutions

3) NO PEC. - from flats without central heating

4) MARKET - from fruit and vegetable market

5) COMMERC.- from commercial district

They were collected one after another in the period between IOth June, I992 and I7th June, I992, excluding I4th of June (Sunday).

Wet (not dried) samples weight ranged from 2.5 to I2.3 kg, and after drying it ranged from about I.9 to 7.0 kg, depending on the composition and water content.

Wet samples were dried for 3 days and nights in temperature of IOO ^{o}C, according to the accepted testing methods.
After the time had passed they were weighed again , determining so-called "waste dry base", that is waste weight after drying in temperature of IOO ^{o}C.

After drying all samples were segregated manually into following components :

I) vegetable and animal residue

2) paper

3) fabric

4) plastic
5) grass and wood
6) leather and rubber
7) metal
8) glass
9) stones, sand, soil, china
I0) other.

Content of particular waste fractions was related to the "waste dry base" and expressed by percentage, the results shown in table : "Physical Composition".

After determining the physical composition the samples were prepared for further tests : ash content, calorific value and elementary analysis.
To that end adequate quantities of six flammable components of the dried waste :
I) vegetable and animal residue
2) paper
3) fabric
4) grass and wood
6) leather and rubber
were milled in the same proportion as they had in the "waste dry base" and in quantity allowing to receive a sample weighing 500 g.

There were 34 samples of prepared that way milled components of flammable waste, each weighing 500 g.

About I00 g of each was given for the elementary chemical analysis and about I00 g - for ash content and calorific value determination.
The remaining 300 g samples are kept as archival at the BPWM laboratory in Poznań.

Special Form 3-------- Wet base waste

No	Sample name	Date	Weather	Vacant weight /kg/	Full weight /kg/	Weight, /kg/	Remark
1	PEC.	6/10	sun	1,57	11,53	9,96	
2	INST.	6/10	sun	1,56	4,13	2,57	
3	NO PEC.	6/10	sun	1,56	13,87	12,31	
4	MARKET	6/10	sun	1,56	8,74	7,18	
5	COMMERC.	6/10	sun	1,56	8,89	7,33	
6	INST.	6/11	sun	1,56	4,77	3,21	
7	NO PEC.	6/11	sun	1,56	9,73	8,17	
8	COMMERC.	6/11	sun	1,56	9,25	7,69	
9	PEC.	6/11	sun	1,56	10,33	8,77	
10	MARKET	6/11	sun	1,56	12,25	10,69	
11	PEC.	6/12	sun	1,56	9,27	7,71	
12	INST.	6/12	sun	1,56	7,03	5,47	
13	NO PEC.	6/12	sun	1,56	7,44	5,88	
14	MARKET	6/12	sun	1,56	11,24	9,68	
15	COMMER.	6/12	sun	1,56	13,88	12,32	
16	PEC.	6/13	sun	1,57	10,58	9,01	
17	INST.	6/13	sun	1,56	5,77	4,21	
18	NO PEC.	6/13	sun	1,57	12,67	11,10	
19	MARKET	6/13	sun	1,57	9,75	8,18	
20	COMMERC.	6/13	sun	1,57	13,08	11,51	
21	PEC.	6/15	sun	1,57	10,84	9,27	
22	INST.	6/15	sun				
23	NO PEC.	6/15	sun	1,56	13,25	11,69	
24	MARKET	6/15	sun	1,57	8,41	6,84	
25	COMMERC.	6/15	sun	1,56	11,64	10,08	
26	PEC.	6/16	sun	1,56	13,13	11,57	
27	INST.	6/16	sun	1,56	4,50	2,94	
28	NO PEC.	6/16	sun	1,56	10,03	8,47	
29	MARKET	6/16	sun	1,56	10,89	9,33	
30	COMMERC.	6/16	sun	1,57	12,84	11,27	
31	PEC.	6/17	sun	1,56	9,92	8,36	
32	INST.	6/17	sun	1,56	5,06	3,50	
33	NO PEC.	6/17	sun	1,57	9,26	7,69	
34	MARKET	6/17	sun	1,56	10,91	9,35	
35	COMMERC.	6/17	sun	1,56	11,62	10,06	

Poznań, 1992-06-22

BIURO PROJEKTÓW WODNYCH
Starszy [illegible]
mgr chemii Andrzej Wi[illegible]

Special Form 4---------- dry base waste -1'-

No	Sample name	Date	Weather	Vacant weight, /kg/	Full weight, /kg/	Weight, /kg/	Remark
1	PEC.	6/10	sun	1,57	6,10	4,53	
2	INST.	6/10	sun	1,56	3,52	1,96	
3	NO PEC.	6/10	sun	1,56	10,05	8,49	
4	MARKET	6/10	sun	1,56	4,02	2,46	
5	COMMERC.	6/10	sun	1,56	6,06	4,50	
6	INSTITUT	6/11	sun	1,56	4,22	2,66	
7	NO PEC.	6/11	sun	1,56	5,90	4,34	
8	COMMERC.	6/11	sun	1,56	7,41	5,85	
9	PEC.	6/11	sun	1,56	6,16	4,60	
10	MARKET.	6/11	sun	1,56	4,87	3,31	
11	PEC.	6/12	sun	1,56	6,28	4,72	
12	INST.	6/12	sun	1,56	5,15	3,59	
13	NO PEC.	6/12	sun	1,56	4,98	3,42	
14	MARKET	6/12	sun	1,56	4,02	2,46	
15	COMMERC.	6/12	sun	1,56	7,45	5,89	
16	PEC.	6/13	sun	1,57	7,60	6,03	
17	INST.	6/13	sun	1,56	4,72	3,16	
18	NO PEC.	6/13	sun	1,57	7,66	6,09	
19	MARKET	6/13	sun	1,57	3,64	2,07	
20	COMMERC.	6/13	sun	1,57	6,89	5,32	
21	PEC.	6/15	sun	1,57	7,02	5,45	
22	INST.	6/15	sun				
23	NO PEC.	6/15	sun	1,56	7,47	5,91	
24	MARKET	6/15	sun	1,57	3,38	1,81	
25	COMMERC.	6/15	sun	1,56	7,58	6,02	
26	PEC.	6/16	sun	1,56	8,54	6,98	
27	INST.	6/16	sun	1,56	3,79	2,23	
28	NO PEC.	6/16	sun	1,56	7,28	5,72	
29	MARKET	6/16	sun	1,56	4,94	3,38	
30	COMMERC.	6/16	sun	1,57	8,26	6,69	
31	PEC.	6/17	sun	1,56	6,53	4,97	
32	INST.	6/17	sun	1,56	4,62	3,06	
33	NO PEC.	6/17	sun	1,57	7,24	5,67	
34	MARKET	6/17	sun	1,56	4,42	2,86	
35	COMMERC.	6/17	sun	1,56	7,88	6,32	

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SPECIAL FORM 5----------PHYSICAL COMPOSITION /dry base/

No	Sample name	Date	Weather	animal and vegetable residue	paper	fabric	plastic	grass and wood	leather and rubber	metal	glass	china stone, sand, soil	other	total
1	PEC	6/10	sun	1690	860	350	200	40	-	150	900	-	340	4530 g
				37,3	19,0	7,7	4,4	0,9	-	3,3	19,9	-	7,5	100%
2	INST.	6/10	sun	30	1540	10	90	50	-	40	160	40	-	1960 g
				1,5	78,6	0,5	4,6	2,6	-	2,0	8,2	2,0	-	100%
3	NO PEC.	6/10	sun	1300	1130	70	210	70	390	270	1200	3770	80	8490 g
				15,3	13,3	0,8	2,5	0,8	4,6	3,2	14,1	44,5	0,9	100%
4	MARKET	6/10	sun	10	810	10	160	1110	-	60	300	-	-	2460 g
				0,4	33,0	0,4	6,5	45,1	-	2,4	12,2	-	-	100%
5	COMMERC	6/10	sun	210	1890	-	30	-	-	610	1760	-	-	4500 g
				4,7	42,0	-	0,7	-	-	13,5	39,1	-	-	100%
6	INST.	6/11	sun	20	2190	20	160	20	-	240	-	10	-	2660 g
				0,7	82,4	0,7	6,0	0,7	-	9,1	-	0,4	-	100%
7	NO PEC.	6/11	sun	270	720	620	240	940	90	450	1010	-	-	4340 g
				6,2	16,6	14,3	5,5	21,7	2,1	10,3	23,3	-	-	100%
8	COMMERC.	6/11	sun	390	1930	-	150	-	-	190	3120	70	-	5850 g
				6,7	33,0	-	2,6	-	-	3,2	53,3	1,2	-	100%
9	PEC.	6/11	sun	1660	940	400	400	50	-	200	950	-	-	4600g
				36,1	20,4	8,7	8,7	1,1	-	4,3	20,7	-	-	100%
10	MARKET.	6/11	sun	1680	970	-	160	120	-	80	170	130	-	3310 g
				50,7	29,3	-	4,8	3,6	-	2,5	5,2	3,9	-	100%
11	PEC.	6/12	sun	1460	1100	506	462	31	-	213	790	168	-	4720 g
				30,7	23,3	10,7	9,8	0,6	-	4,5	16,7	3,7	-	100%
12	INST.	6/12	sun	607	1800	62	135	88	-	108	530	260	-	3590 g
				16,9	50,1	1,7	3,7	2,4	-	3,0	14,7	7,5	-	100%
13	NO PEC.	6/12	sun	102	798	231	255	1140	-	180	530	206	-	3420 g
				3,0	23,3	6,7	6,8	33,3	-	5,2	15,5	6,2	-	100%
14	MARKET	6/12	sun	1170	480	-	190	72	-	21	360	167	-	2460 g
				47,5	19,5	-	7,7	2,9	-	0,9	14,6	6,9	-	100%
15	COMMERC	6/12	sun	1490	1010	108	463	19	-	440	1080	780	-	5890 g
				33,7	17,2	1,8	7,9	0,3	-	7,5	18,3	13,3	-	100%
16	PEC	6/13	sun	1080	1050	78	602	107	-	372	2490	271	-	6050 g
				17,9	17,1	1,3	10,0	1,8	-	6,2	41,3	4,4	-	100%

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SPECIAL FORM 5---------PHYSICAL COMPOSITION /dry base/

No	Sample name	Date	Weather	animal and vegeta-ble residue	paper	fabric	plastic	grass and wood	leather and rubber	metal	glass	china stone, sand, soil	other	total
17	INST.	6/15	sun	150	2080	19	170	107	-	111	420	105	-	3160 g
				4,7	65,8	0,6	5,4	3,4	-	3,5	13,3	3,3	-	100%
18	NO PEC	6/15	sun	495	805	559	401	1890	18	372	860	690	-	6090 g
				8,1	13,2	9,2	6,6	31,0	0,3	6,1	14,1	11,4	-	100%
19	MARKET	6/15	sun	903	686	-	146	85	-	102	65	83	-	2070 g
				43,6	33,1	-	7,0	4,1	-	4,9	3,1	4,2	-	100%
20	COMMERC.	6/15	sun	1370	1080	19	464	18	-	146	1900	323	-	5320 g
				25,7	20,3	0,3	8,7	0,3	-	2,7	35,7	6,3	-	100%
21	PEC.	6/15	sun	2230	1250	190	577	186	342	255	294	148	-	5450 g
				40,9	22,9	3,5	10,6	3,4	6,3	4,3	5,4	2,7	-	100%
22	INST.	6/15	sun	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-
23	NC PEC	6/15	sun	2380	770	386	426	158	559	401	353	497	-	5910 g
				40,2	13,0	6,5	7,2	2,7	9,4	6,8	5,6	8,6	-	100%
24	MARKET	6/15	sun	707	857	-	173	37	-	-	-	36	-	1810 g
				39,0	47,3	-	9,6	2,0	-	-	-	2,1	-	100%
25	COMMERC.	6/15	sun	1070	1060	534	304	14	104	676	2200	58	-	6020 g
				17,8	17,6	8,9	5,0	0,2	1,7	11,2	36,5	1,1	-	100%
26	PEC	6/15	sun	1580	1260	978	459	59	514	658	1830	572	-	8910 g
				22,6	18,0	14,0	6,6	1,0	4,5	12,3	16,2	4,8	-	100%
27	INST.	6/16	sun	55	1825	190	105	20	-	12	-	23	-	2230 g
				2,5	81,9	8,5	4,7	0,9	-	0,5	-	1,0	-	100%
28	NO PEC.	6/16	sun	1150	1170	607	618	550	-	387	1380	58	-	5720 g
				20,1	20,4	10,6	10,8	6,1	-	6,8	24,1	1,1	-	100%
29	MARKET	6/16	sun	874	803	-	-	1050	123	61	61	124	-	3360 g
				25,9	23,7	-	8,5	31,0	3,6	1,8	1,8	3,7	-	100%
30	COMMERC.	6/16	sun	1700	1020	-	470	26	-	615	2750	151	-	6690 g
				25,4	15,2	-	7,1	0,4	-	9,2	40,8	1,9	-	100%
31	PEC.	6/17	sun	1120	1040	912	242	345	639	250	406	58	-	4990 g
				22,5	20,9	18,3	4,9	7,0	12,8	4,6	8,1	0,9	-	100%
32	INST.	6/17	sun	96	2215	195	142	28	-	37	520	27	-	3060 g
				3,1	72,3	6,4	4,6	0,9	-	1,2	10,5	1,0	-	100%

SPECIAL FORM 5 ---------- PHYSICAL COMPOSITION / dry base/

No	Sample name	Date	Weather	animal and vegetable residue	paper	fabric	plastic	grass and wood	leather and rubber	metal	glass	china, stone, sand, soil	other	total
33	NO PEC.	6/17	sun	290	905	1310	317	706	-	116	236	1790	-	5670 g
				5,1	16,0	23,1	5,6	12,5	-	2,0	4,1	31,6	-	100%
34	MARKET	6/17	sun	1340	823	-	222	107	-	148	173	47	-	2860 g
				46,8	28,8	-	7,8	3,7	-	5,2	6,1	1,6	-	100%
35	COMMERC.	6/17	sun	482	1050	67	397	1030	-	834	2460	-	-	6320 g
				7,8	16,6	1,2	6,0	16,3	-	13,2	38,9	-	-	100%

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[illegible] Instytut Ekologii
Starszy [illegible]
mgr chemii Andrzej Wichłacz

2.3. CHEMICAL ANALYSIS

Four samples, each 100 g, of earlier obtained 35 samples were taken for chemical analyses after drying, grinding to ϕ 0.5 mm graining and averaging according to the JICA method, i.e. 100 g for elementary analysis and 100 g for components analysis: solid, volatile and ash content.

The other two samples, each 100 g, are preserved as archival ones by "BUD-EKO" company until the survey is completed and accepted by the Japanese side.

The results obtained are gathered in the table below :

No of sample	Uptake date	Solid subst. content (%)	Volatile subst. content (%)	Ash content (%)
Uptake place: PEC				
1	06.10	45.48	90.10	9.90
9	06.11	52.45	89.23	10.77
11	06.12	61.21	85.90	14.10
16	06.13	66.92	88.16	11.84
21	06.15	58.79	78.02	21.98
26	06.16	60.32	84.89	15.11
31	06.17	59.44	90.50	9.50
Uptake place: INSTIT.				
2	06.10	76.26	90.02	9.98
6	06.11	82.86	90.64	9.36
12	06.12	65.63	91.54	8.46
17	06.13	75.05	88.10	11.90
22	06.15	-	-	-
27	06.16	75.85	90.60	9.40
32	06.17	87.42	90.21	9.79

No of sample	Uptake date	Solid subst. content (%)	Volatile subst. content (%)	Ash content (%)
Uptake place: No PEC				
3	06.I0	68.96	87.75	I2.25
7	06.II	53.I7	89.09	I0.9I
I3	06.I2	58.I6	82.26	I7.74
I8	06.I3	62.I6	80.43	I9.57
23	06.I5	50.55	80.80	I9.20
28	06.I6	67.53	93.38	6.62
33	06.I7	73.73	87.20	I2.80
Uptake place: MARKET				
4	06.I0	34.26	90.66	9.34
I0	06.II	30.69	75.4I	24.59
I4	06.I2	25.4I	82.60	I7.40
I9	06.I3	25.30	8I.56	I8.44
24	06.I5	26.46	84.80	I5.20
29	06.I6	36.22	72.84	27.I6
34	06.I7	30.58	86.I8	I3.82
Uptake place: COMMERC.				
5	06.I0	6I.39	94.74	5.26
8	06.II	76.07	9I.40	8.60
I5	06.I2	47.80	87.II	I2.89
20	06.I3	46.22	87.76	I2.76
25	06.I5	59.72	89.43	I0.57
30	06.I6	59.36	88.80	II.20
35	06.I7	62.82	83.55	I6.45

The analyses were made acc. to methodics given by J.Cebulę and E.Kempę in : "Laboratory tests of solid wastes and composts"

("Laboratoryjne badania odpadów stałych i kompostów") published by Politechnika Wrocławska, 1982.

2.3.2. Lower heating value of municipal waste

The determination of lower heating value was performed according to Polish Standard PN-81 G-04513 "Determination of combustion heat and calculation of the heating value"
The method is based on a complete combustion of the weighed amount of solid dry waste in the atmosphere of oxygen under presure in a calorimeter bomb (at a constant volume) in an isothermic or adiabatic system, and on measuring a temperature increase of the water in a calorimetric vessel.
The method take into account the heat emission during the formation and dissolution of sulphuric and nitric acid. The lower heating value of the waste materials was determined for samples of 1.5 g. in mass. The measured lower heating values of municipial wastes are completed in the table below.

Lower heating value of municipal waste (Poznań 06/10-17/1992)

Sample number	Sample name	Date of sampling	Lower heating value	
			kJ/g	kcal/g
1	PEC	6/10/1992	21.9	5.22
9	PEC	6/11/1992	22.3	5.32
11	PEC	6/12/1992	23.5	5.61
16	PEC	6/13/1992	24.4	5.82
21	PEC	6/15/1992	22.2	5.30
26	PEC	6/16/1992	22.5	5.38
31	PEC	6/17/1992	20.0	4.77
2	INSTITUTION	6/10/1992	18.8	4.50
6	INSTITUTION	6/11/1992	19.5	4.66
12	INSTITUTION	6/12/1992	21.9	5.23
17	INSTITUTION	6/13/1992	27.2	6.49
22	INSTITUTION	6/15/1992	-	-
27	INSTITUTION	6/16/1992	18.2	4.35
32	INSTITUTION	6/17/1992	20.0	4.78
3	NO PEC	6/10/1992	15.1	3.60
7	NO PEC	6/11/1992	22.1	5.27
13	NO PEC	6/12/1992	20.8	4.96
18	NO PEC	6/13/1992	18.8	4.48
23	NO PEC	6/15/1992	20.2	4.82
28	NO PEC	6/16/1992	21.2	5.06
33	NO PEC	6/17/1992	20.0	4.78

Lower heating value of municipal waste (Poznań 06/10-17/1992)
(continuation)

Sample number	Sample name	Date of sampling	Lower heating value	
			kJ/g	kcal/g
4	MARKET	6/10/1992	19.2	4.58
10	MARKET	6/11/1992	16.9	4.04
14	MARKET	6/12/1992	19.3	4.61
19	MARKET	6/13/1992	17.5	4.18
24	MARKET	6/15/1992	18.1	4.32
29	MARKET	6/16/1992	18.1	4.32
34	MARKET	6/17/1992	20.6	4.91
5	COMMERC.	6/10/1992	20.4	4.87
8	COMMERC.	6/11/1992	19.9	4.75
15	COMMERC.	6/12/1992	22.9	5.46
20	COMMERC.	6/13/1992	22.6	5.39
25	COMMERC.	6/15/1992	23.8	5.68
30	COMMERC.	6/16/1992	23.4	5.59
35	COMMERC.	6/17/1992	21.7	5.19

2.3.3. Elementary analysis of municipal wastes

2.3.3.1. CHNO analysis

Determinations were performed in a way analogous to that applied in Polish Standard PN-85 G-04549 "High-speed method of carbon and hydrogen content determination by an automatic Perkin-Elmer analyzer". In the applied method the properties of Model 2400 automatic Perkin-Elmer analyzer are taken into account.

The mass of samples to be subject to analysis in this type of analysers may range from 1.5 to 4 mg. The elementary analysis of the received waste requires a proper preparation of this sample so that the amount taken for analysis would be representative for the whole sample. The waste samples obtained for analysis were inhomogenous both in the size and the specific weight of particular particles. So beside particles approximately cubic in shape there were many particles in the form of fiber (fabric, paper, plastics). The waste due to its inhomogenity could be analyzed by methods appropriate for weighted portions not smaler than 1g.

A procedure of averaging the size of analyzed samples of the waste and adjusting their form to applied analytical apparatus, has been developed.

The samples to be analyzed were ground and averaged in the following four stages:

a. Preliminary grinding and averaging

An average sample of 4 g. in mass was taken from the supplied waste and mixed with 16 g. of silica for chromatographic purposes, of particle size distribution 60 - 120 mesh (MN-Kieselgel 60 Macherey & Nagel - Duren, Germany). The applied silica had satisfactory homogeneity in particle size distribution and satisfactory chemical purity. The mixture of silica and waste was stirred and ground in mortar for about 2 hours. In the process of grinding silica with grains of sharp edges and grater hardness than the components of the waste samples helps in breaking up the long and elastic fibres. The SiO_2 powder produced upon grinding deposits on the particles of the ground sample, thus preventing repeated agglomeration.

b. Refinement

From a sample prepared according to a procedure described in -a-, an average sample of 5 g. in mass was taken following the generally accepted rules. Refinement was also performed by grinding in a mortar, as in 1, for 1 hour.

c. Refinement at the temperature of liquid nitrogen

From a sample prepared according to a procedure given in -b-, an average sample of 1 g. in mass was taken following the generally accepted rules. This sample, though nicely refined, still contained small fibres and pieces of plastics. Further refinement was carried out at the temperature of liquid nitrogen, at wich most of the substances, and in particular polymers of plastics become fragile. The averaged 1 g. sample was placed in mortar cooled in liquid nitrogen, then flooded with liquid nitrogen, and ground for 20 min. The nitrogen evaporated during refinement wasconstantly made-up.

d. Final powdering and drying

From a sample prepared according to a procedure described in -c-, an average sample of 300 mg in mass was taken following generally accepted rules. The average sample was further refined in liquid nitrogen in an agate mortar for about 20 minutes. Then the refined sample was dried at 105°C. A sample prepared for analysis in the above way contained 20% of the analyzed waste and 80% of silica. Results of CHNO analysis in municipial wastes are listed in table at the end of paragraph 2.3.3.

2.3.3.2. Determination of sulphur content

Determination of sulphur content was carried out according to the Polish Standard PN-76 G-04514, "Determination of total sulphur content by a high-temperature combustion method".

The method involves combustion of the weighed amount of the substance in oxygen stream at temperatures 1250 - 1350 °C, absorption of the yielded sulphuric oxide in hydrogen peroxide solution, and acid-base titrimetric determination of the formed sulphuric acid. The method allows for correcting the amount of chlorine by employing titration method with solution of mercuric nitrate against diphenylcarbazone. The sulphur content in the studied waste materials was determined for samples of 1.5 - 2 g.

in mass.

Results of sulphur determinations in municipial wastes are listed in the table at the end of paragraph 2.3.3.

2.3.3.3. Determination of chlorine content

The determination of chlorine content was performed using a method described in Polish Standard PN-78 G-04534 "Determination of chlorine content".

The method involves a complete combustion of the analyzed sample in the presence of the Eschka-mixture in a calorimetric bomb, in the atmosphere of oxygen, and determination of chlorine content in the combustion products by the Volhard method. The chlorine content in the waste materials was determined for samples of 1 - 1.5 g. in mass.

Results of chlorine determinations in municipial wastes are listed in table below.

Results of elementary analysis of municipal waste (Poznań 06/10-17/1992)

Sample number	Sample name	Date of sampling	CARBON [%]	HYDROGEN [%]	NITROGEN [%]	OXYGEN [%]	SULPHUR [%]	CHLORIDE [%]
1	PEC	6/10/1992	46.3	9.5	2.0	31.9	0.02	0.84
9	PEC	6/11/1992	43.3	9.5	2.8	33.3	0.14	0.45
11	PEC	6/12/1992	41.5	9.2	2.1	32.4	0.05	0.92
16	PEC	6/13/1992	46.8	10.2	1.3	29.6	0.02	1.13
21	PEC	6/15/1992	38.7	8.3	1.2	29.6	0.21	0.45
26	PEC	6/16/1992	45.8	10.1	2.5	25.9	0.04	1.40
31	PEC	6/17/1992	47.3	9.4	2.7	31.0	0.14	0.35
2	INSTITUTION	6/10/1992	38.4	9.4	0.3	41.7	0.13	0.32
6	INSTITUTION	6/11/1992	43.0	9.7	0.3	37.4	0.09	0.44
12	INSTITUTION	6/12/1992	42.2	9.5	0.3	39.3	0.13	0.35
17	INSTITUTION	6/13/1992	40.6	8.9	0.6	37.7	0.09	0.45
22	INSTITUTION	6/15/1992	-	-	-	-	-	-
27	INSTITUTION	6/16/1992	40.1	9.8	0.3	40.2	0.06	0.25
32	INSTITUTION	6/17/1992	43.3	9.4	0.8	36.5	0.07	0.34
3	NO PEC	6/10/1992	38.8	9.7	1.6	37.1	0.14	1.64
7	NO PEC	6/11/1992	47.6	10.6	2.9	27.5	0.11	1.05
13	NO PEC	6/12/1992	45.9	9.4	1.8	24.9	0.13	0.24
18	NO PEC	6/13/1992	46.4	9.2	1.2	23.2	0.00	0.51
23	NO PEC	6/15/1992	40.8	9.8	2.1	27.4	0.29	0.47
28	NO PEC	6/16/1992	48.8	10.6	1.0	32.6	0.15	0.43
33	NO PEC	6/17/1992	45.8	9.4	2.8	28.8	0.34	0.19

Results of elementary analysis of municipal waste (Poznań 06/10-17/1992) - continuation

Sample number	Sample name	Date of sampling	CARBON [%]	HYDROGEN [%]	NITROGEN [%]	OXYGEN [%]	SULPHUR [%]	CHLORIDE [%]
4	MARKET	6/10/1992	43.6	9.8	0.9	36.1	0.15	0.24
10	MARKET	6/11/1992	39.8	9.0	1.0	25.1	0.15	0.41
14	MARKET	6/12/1992	36.0	8.6	1.8	35.7	0.11	1.06
19	MARKET	6/13/1992	38.6	8.7	1.3	32.4	0.18	1.06
24	MARKET	6/15/1992	45.6	10.3	1.4	27.7	0.14	0.79
29	MARKET	6/16/1992	39.2	8.6	1.3	23.4	0.21	1.07
34	MARKET	6/17/1992	44.9	10.1	1.6	29.9	0.04	0.45
5	COMMERC.	6/10/1992	43.7	9.9	0.5	40.1	0.04	0.42
8	COMMERC.	6/11/1992	45.2	10.3	0.7	35.4	0.09	0.34
15	COMMERC.	6/12/1992	47.0	9.6	1.5	28.2	0.14	0.57
20	COMMERC.	6/13/1992	46.1	10.2	2.0	28.3	0.06	0.37
25	COMMERC.	6/15/1992	47.5	10.1	1.4	29.8	0.01	0.68
30	COMMERC.	6/16/1992	48.7	10.2	2	27.8	0.04	0.63
35	COMMERC.	6/17/1992	41.2	8.9	0.9	33.1	0.07	0.44

A2. in December 1992

2. WASTE COMPOSITION ANALYSIS

2.1. Sampling methods

Samples for waste composition analysis were taken from samples collected during waste amount survey in the perio between 4th of December, 1992 and 11th of December,1992 in 5 predetermined categories. Additionally, there was one sample taken from waste transported in a container by "TECH-KOM" truck from Osiedle Zwycięstwa to Suchy Las. Together, there were 6 samples taken every day for 7 days (except Sunday), and 42 samples were gathered for analysi

Each of the samples taken was divided using the quarter division method (according to the programme worked out by the JICA representatives) until proper amount of waste was obtained.

2.2. Number of samples for testing

The number of samples for testing and the sources they came from are presented in the Table 2-1.

Table 2-1. Composition of wastes taken for analysis from some chosen collection points in Poznań

Collection points	No of sam. daily	Sampling days	Chemical anal.	Physical anal.	Sample name
Apartments with central heating	1	7	7	7	V. PEC
Apartments without c.h.	1	7	7	7	III.NO-PEC
Fruit and vegetable markets	1	7	7	7	VI.MARKET
Shops/Bars	1	7	7	7	II.COMMERC
Offices	1	7	7	7	I.OFFICES or INSTITUTION
TECH -KOM	1	7	7	7	IV.TECH-KOM
TOTAL	6	42	42	42	

2.3. Phisical analysis

1) Total number of samples for physical analysis is 42. The analysis covers waste composition determination with division into 10 different types and moisture content determination.

2) Waste composition was analysed in natural state, without drying.

3) The composition was determined according to following types of components :

- garbage
- paper
- textile
- plastic
- grass and wood
- leather and rubber
- metal
- glass
- ceramic and soil
- other

4) Method of waste composition analysis

Each sample was segregated into 10 types of components listed above /3)/, weighed and the result was written into a table.

Every day, there were 6 samples segregated into 10 components and then weighed 3 times becouse of different way of drying:

- in natural state (wet - Table 2-3.1)

Spesial Form ⑩·····Physical Composition, wet waste

Table 2-3.1

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	04.12	550 g	3560 g	410 g	190 g	20 g	- g	30 g	280 g	- g	50 g	5090 g
II.COMMERC	04.12	4690 g	2280 g	110 g	640 g	180 g	- g	320 g	1640 g	- g	30 g	9890 g
III.No-PEC	04.12	4480 g	1070 g	380 g	390 g	50 g	20 g	210 g	530 g	- g	7120 g	14250 g
IV.TECH-KO	04.12	7580 g	2510 g	250 g	740 g	350 g	- g	320 g	890 g	1380 g	670 g	14690 g
V. PEC	04.12	7450 g	1140 g	1000 g	360 g	30 g	220 g	80 g	340 g	- g	180 g	10800 g
VI.MARKET	04.12	2760 g	2840 g	130 g	650 g	2310 g	- g	10 g	120 g	390 g	- g	9210 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

A2-4

Spesial Form ⑩·····Physical Composition, after 3 days of drying

Table 2-3.2

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	04.12	490 g	3030 g	390 g	180 g	10 g	- g	20 g	280 g	- g	40 g	4440 g
II.COMMERC.	04.12	4430 g	2100 g	70 g	590 g	160 g	- g	310 g	1620 g	- g	30 g	9310 g
III.NO-PEC	04.12	4270 g	1000 g	350 g	380 g	30 g	10 g	210 g	530 g	- g	6940 g	13720 g
IVTECH-KOM	04.12	7230 g	2330 g	200 g	700 g	290 g	- g	310 g	890 g	1330 g	590 g	13870 g
V. PEC	04.12	7140 g	1060 g	960 g	350 g	20 g	220 g	80 g	340 g	- g	180 g	10350 g
VI.MARKET	04.12	2600 g	2670 g	110 g	600 g	2090 g	- g	10 g	110 g	350 g	- g	8540 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

A2-5

Spesial Form ⑩……Physical Composition of dry waste (24 h at 100°C)

Table 2-3.3

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	04.12	190g	2600 g	290g	180 g	10g	- g	20g	280 g	- g	40 g	3610 g
II.COMMERC	04.12	2150 g	1330 g	60g	490 g	140g	- g	300g	1600 g	- g	20 g	6090 g
III.NO-PEC	04.12	1630 g	690 g	340g	350 g	30g	10 g	200g	530 g	- g	6170 g	9950 g
IVTECH-KOM	04.12	4310 g	1590 g	180g	620 g	190g	- g	310g	890 g	1140 g	410 g	9640 g
V. PEC	04.12	3420 g	780 g	830g	280 g	20g	210 g	80g	350 g	- g	140 g	6110 g
VI.MARKET	04.12	710 g	1510 g	100g	450 g	800g	- g	10g	110 g	260 g	- g	3950 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

Spesial Form ⑩·····Physical Composition, wet waste

Table 2-3.1

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	05.12	300 g	1920 g	10 g	580g	20 g	- g	400 g	830 g	230 g	50 g	4340 g
II.COMMERC	05.12	1930 g	990 g	40 g	750g	- g	- g	460 g	- g	130 g	- g	4300 g
III.NO-PEC	05.12	2650 g	2780 g	720 g	590g	110 g	- g	390 g	1180 g	- g	170 g	8590 g
IV.TECH-KO	05.12	3680 g	1240 g	160 g	740g	610 g	40 g	1050 g	2050 g	- g	1920 g	11490 g
V. PEC	05.12	1170 g	1310 g	390 g	510g	170 g	110 g	230 g	1220 g	- g	100 g	5210 g
VI.MARKET	05.12	7090 g	2000 g	150 g	490g	1150 g	- g	430 g	1480 g	- g	320 g	13110 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

A2-7

Spesial Form ⑩·····Physical Composition after 3 days of drying

Table 2-3.2

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	05.12	240g	1860 g	10g	580 g	20g	- g	400g	830 g	230 g	40 g	4210 g
II.COMMERC	05.12	1790g	890 g	30g	680 g	- g	- g	430g	- g	130 g	- g	3950 g
III.NO-PEC	05.12	2450g	2590 g	680g	560 g	70g	- g	380g	1180 g	- g	150 g	8060 g
IV.TECH-KO	05.12	3490g	1380 g	140g	720 g	590g	40 g	1040g	2030 g	- g	1840 g	11270 g
V. PEC	05.12	1070g	1390 g	330g	530 g	250g	110 g	230g	1220 g	- g	80 g	5210 g
VI.MARKET	05.12	6780g	1930 g	110g	450 g	1010g	- g	420g	1470 g	- g	250 g	12420 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

A2-8

-9-

Spesial Form ⑩·····Physical Composition, dry waste (24 h at 100°C)

Table 2-3.3

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	05.12	80g	1680 g	10g	560 g	20g	- g	380g	800 g	230g	20 g	3780 g
II.COMMERC	05.12	1050g	750 g	30g	650 g	- g	- g	400g	- g	130g	- g	3010 g
III.NO-PEC	05.12	1010g	1740 g	650g	500 g	40g	- g	370g	1170 g	- g	140 g	5620 g
IV.TECH-KC	05.12	1680g	1020 g	130g	660 g	540g	40 g	1040g	2020 g	- g	1730 g	8860 g
V. PEC	05.12	530g	1080 g	280g	480 g	140g	110 g	230g	1220 g	- g	70 g	4140 g
VI.MARKET	05.12	3570g	1190 g	100g	410 g	420g	- g	420g	1470 g	- g	190 g	7770 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

Spesial Form ⑩……Physical Composition, wet waste

Table 2-3.1

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	07.12	580 g	2250 g	290 g	370 g	70 g	- g	90 g	- g	- g	- g	3650 g
II.COMMERC	07.12	3150 g	1120 g	20 g	920 g	60 g	- g	290 g	2120 g	- g	40 g	7720 g
III.NO-PEC	07.12	3340 g	1750 g	720 g	610 g	100 g	390 g	140 g	370 g	- g	640 g	8060 g
IVTECH-KOM	07.12	3310 g	1240 g	210 g	680 g	480 g	250 g	640 g	360 g	- g	640 g	7810 g
V. PEC	07.12	4000 g	1620 g	290 g	880 g	30 g	40 g	390 g	1930 g	- g	30 g	9210 g
VI.MARKET	07.12	4130 g	2360 g	150 g	1000 g	2020 g	- g	260 g	400 g	- g	- g	10320 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

Spesial Form ⑩·····Physical Composition of waste after 3 days of drying

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	07.12	520g	2210 g	160g	370 g	70g	- g	80 g	- g	- g	- g	3410 g
II.COMMERC	07.12	2890g	970 g	20g	830 g	30g	- g	280 g	2110 g	- g	40 g	7170 g
III.NO-PEC	07.12	3150g	1690 g	710g	610 g	110g	410 g	150 g	390 g	- g	600 g	7820 g
IV.TECH-KO	07.12	3180g	1140 g	190g	640 g	430g	250 g	640 g	360 g	- g	640 g	7470 g
V. PEC	07.12	3820g	1700 g	210g	850 g	20g	40 g	370 g	1930 g	- g	30 g	9030 g
VI.MARKET	07.12	3920g	2140 g	110g	910 g	1770g	- g	250 g	400 g	- g	- g	9500 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

Spesial Form ⑩·····Physical Composition, dry waste (24 h at 100°C)

Table 2-3.3

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	07.12	210 g	1970 g	170 g	350 g	60 g	- g	80 g	- g	- g	- g	2840 g
II.COMMERC	07.12	860 g	710 g	10 g	700 g	20 g	- g	260 g	2100 g	- g	30 g	4690 g
III.NO-PEC	07.12	1160 g	1300 g	590 g	480 g	60 g	380 g	130 g	370 g	- g	460 g	4930 g
IV.TECH-KO	07.12	1420 g	790 g	180 g	560 g	270 g	230 g	600 g	350 g	- g	620 g	5020 g
V. PEC	07.12	1190 g	1200 g	240 g	760 g	20 g	40 g	360 g	1930 g	- g	30 g	5770 g
VI.MARKET	07.12	1110 g	1360 g	100 g	770 g	640 g	- g	220 g	400 g	- g	- g	4600 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

Spesial Form ⑩·····Physical Composition, wet waste

Table 2-3.1

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	08.12	340 g	2830 g	60 g	460 g	- g	- g	80 g	1640 g	- g	10 g	5420 g
II.COMMERC	08.12	1000 g	1610 g	50 g	880 g	30 g	- g	330 g	560 g	- g	- g	4460 g
III.NO-PEC	08.12	2450 g	1430 g	490 g	840 g	30 g	- g	170 g	410 g	- g	380 g	6200 g
IV.TECH-KO	08.12	4770 g	2460 g	360 g	650 g	530 g	- g	420 g	1810 g	- g	420 g	11420 g
V. PEC	08.12	5740 g	1130 g	590 g	700 g	140 g	170 g	370 g	1300 g	- g	190 g	10330 g
VI.MARKET	08.12	3410 g	1800 g	680 g	410 g	2070 g	- g	290 g	3690 g	- g	- g	12350 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

Spesial Form ⑩·····Physical Composition of waste after 3 days of drying 2-3.2

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	08.12	280g	2720 g	70g	470 g	- g	- g	70g	1640 g	- g	10 g	5260 g
II.COMMERC	08.12	880g	1570 g	50g	790 g	20 g	- g	320g	560 g	- g	- g	4190 g
III.NO-PEC	08.12	2290g	1350 g	470g	810 g	20 g	- g	170g	410 g	- g	350 g	5870 g
IV.TECH-KO	08.12	4520g	2350 g	350g	610 g	460 g	- g	300g	1810 g	- g	390 g	10790 g
V. PEC	08.12	5120g	1110 g	560g	660 g	100 g	160 g	360g	1290 g	- g	150 g	9510 g
VI.MARKET	08.12	3140g	1630 g	610g	350 g	1840 g	- g	290g	3670 g	- g	- g	11530 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

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Spesial Form ⑩·····Physical Composition of dry waste (24 h at 100°C)

Table 2-3.3

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	08.12	120g	2430g	30 g	390g	- g	- g	70 g	1640g	- g	10 g	4690 g
II.COMMERC	08.12	400g	1040g	40 g	730g	20 g	- g	300 g	560 g	- g	- g	3090 g
III.NO-PEC	08.12	780g	1150g	420 g	710g	20 g	- g	170 g	400 g	- g	340 g	3990 g
IV.TECH-KC	08.12	1970g	1820g	340 g	560g	310 g	- g	380 g	1800 g	- g	300 g	7480 g
V. PEC	08.12	2460g	890g	510 g	540g	40 g	160g	360 g	1280 g	- g	140 g	6380 g
VI.MARKET	08.12	520g	940g	500 g	310g	670 g	- g	280 g	3640 g	- g	- g	6860 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

Spesial Form ⑩·····Physical Composition , wet waste

Table 2-3.1

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	09.12	440g	3440 g	110g	210 g	10g	- g	50 g	2230 g	- g	- g	6490 g
II.COMMERC	09.12	850g	2230 g	110g	1200 g	10g	- g	650 g	3690 g	- g	- g	8740 g
III.NO-PEC	09.12	4010g	860 g	580g	860 g	20g	120 g	70 g	1800 g	- g	190 g	8510 g
IVTECH-KON	09.12	1810g	2160 g	830g	760 g	120g	40 g	170 g	1260 g	- g	180 g	7330 g
V. PEC	09.12	3990g	1370 g	230g	700 g	180g	- g	450 g	2150 g	- g	- g	9070 g
VI.MARKET	09.12	1230g	1840 g	190g	1110 g	2040g	- g	190 g	1390 g	- g	- g	7990 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

Spesial Form ⑩·····Physical Composition of waste after 3 days of drying Table 2-3.2

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	09.12	370g	3370 g	100g	200 g	10g	- g	50g	2230 g	- g	- g	6330 g
II.COMMERC	09.12	730g	2060 g	100g	1090 g	10g	- g	640g	3680 g	- g	- g	8310 g
III.NO-PEC	09.12	3720g	770 g	500g	780 g	10g	110 g	70g	1780 g	- g	150 g	7890 g
IV.TECH-KO	09.12	1640g	1950 g	790g	720 g	60g	40 g	170g	1040 g	- g	150 g	6560 g
V. PEC	09.12	3800g	1250 g	200g	660 g	120g	- g	450g	2140 g	- g	- g	8620 g
VI.MARKET	09.12	1130g	1640 g	90g	1100 g	1820g	- g	190g	1390 g	- g	- g	7360 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

Spesial Form ⑩……Physical Composition of dry waste (24 h at 100°C)

Table 2-3.3

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	09.12	140g	2940 g	50g	190 g	10g	- g	40 g	2220 g	- g	- g	5590 g
II.COMMERC	09.12	280g	1350 g	80g	970 g	10g	- g	630 g	3670 g	- g	- g	5360 g
III.NO-PEC	09.12	1390g	630 g	500g	730 g	10g	100 g	70 g	1770 g	- g	130 g	5330 g
IV.TECH-KO	09.12	800g	1410 g	730g	640 g	30g	30 g	170 g	1030 g	- g	120 g	4960 g
V. PEC	09.12	1720g	1010 g	180g	540 g	40g	- g	450 g	2140 g	- g	- g	6080 g
VI.MARKET	09.12	280g	950 g	70g	710 g	450g	- g	160 g	1370 g	- g	- g	3990 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

Spesial Form ⑩·····Physical Composition of wet waste

Table 2-3.1

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	10.12	690 g	2500 g	20 g	300 g	130 g	- g	290 g	1950 g	- g	- g	5880 g
II.COMMERC	10.12	2140 g	1050 g	10 g	950 g	10 g	- g	820 g	2330 g	- g	- g	7310 g
III.NO-PEC	10.12	1800 g	1590 g	530 g	550 g	40 g	180 g	210 g	3510 g	- g	440 g	8850 g
IVTECH-KOM	10.12	4790 g	1790 g	140 g	680 g	180 g	50 g	370 g	1220 g	- g	20 g	9240 g
V. PEC	10.12	2720 g	1620 g	360 g	480 g	620 g	210 g	150 g	1210 g	- g	200 g	7570 g
VI.MARKET	10.12	2750 g	1350 g	10 g	680 g	930 g	170 g	300 g	460 g	- g	2560 g	9210 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

Spesial Form ⑩·····Physical Composition of waste after 3 days of drying Table 2-3.2

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	10.12	570g	2340 g	10g	290g	110g	- g	280 g	1950 g	- g	- g	5550 g
II.COMMERC	10.12	1910g	890 g	10g	860g	10g	- g	800 g	2310 g	- g	- g	6790 g
III.NO-PEC	10.12	1680g	1500 g	510g	540g	30g	180g	210 g	3500 g	- g	410g	8560 g
IV.TECH-KO	10.12	4530g	1610 g	60g	630g	150g	50g	360 g	1200 g	- g	10g	8600 g
V. PEC	10.12	2570g	1570 g	330g	450g	550g	210g	150 g	1200 g	- g	150g	7180 g
VI.MARKET	10.12	2590g	1180 g	10g	590g	750g	160g	290 g	460 g	- g	2520g	8550 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

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Spesial Form ⑩……Physical Composition of dry waste (24 h at 100°C)

Table 2-3.3

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	10.12	410 g	2250 g	10 g	280 g	100 g	- g	260 g	1950 g	- g	- g	5260 g
II.COMMERC	10.12	680 g	690 g	10 g	820 g	10 g	- g	760 g	2300 g	- g	- g	5270 g
III.No-PEC	10.12	790 g	750 g	490 g	480 g	30 g	150 g	210 g	3500 g	- g	410 g	6810 g
IV.TECH-KO	10.12	1580 g	1410 g	60 g	590 g	110 g	30 g	340 g	1200 g	- g	10 g	5330 g
V. PEC	10.12	1040 g	1360 g	330 g	450 g	210 g	210 g	140 g	1190 g	- g	140 g	5070 g
VI.MARKET	10.12	620 g	550 g	10 g	480 g	410 g	160 g	290 g	450 g	- g	2520 g	5490 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

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Spesial Form ⑩……Physical Composition of wet waste

Table 2-3.1

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	11.12	230g	3430 g	20g	630 g	40g	- g	90 g	500 g	- g	- g	4940 g
II.COMMERC	11.12	730g	970 g	370g	910 g	140g	- g	970 g	2730 g	- g	- g	6820 g
III.NO-PEC	11.12	3140g	950 g	1640g	430 g	320g	680g	290 g	1800 g	- g	370 g	9620 g
IV.IECH-KC	11.12	3280g	1270g	690g	450 g	140g	520g	350 g	2680 g	- g	- g	9380 g
V. PEC	11.12	3930g	930g	510g	580 g	190g	220g	140 g	1880 g	- g	- g	8380 g
VI.MARKET	11.12	2130g	1910g	160g	590 g	630g	- g	280 g	1450 g	- g	- g	7150 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

Spesial Form ⑩……Physical Composition of waste after 3 days of drying

Table 2-3.2

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	11.12	180g	3420 g	20g	580 g	30 g	- g	90g	500 g	- g	- g	4820 g
II.COMMERC	11.12	490g	900 g	220g	700 g	110 g	- g	880g	2710 g	- g	- g	6010 g
III.NO-PEC	11.12	2940g	860 g	1590g	410 g	260 g	660 g	290g	1790 g	- g	320g	9120 g
IV.TECH-KO	11.12	3070g	1160 g	630g	410 g	110 g	510 g	340g	2670 g	- g	- g	8900 g
V.REC	11.12	3920g	900 g	450g	550 g	140 g	210 g	140g	1860 g	- g	- g	8170 g
VI.MARKET	11.12	1990g	1900 g	130g	560 g	50 g	- g	270g	1440 g	- g	- g	6790 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

Spesial Form ⑩·····Physical Composition of dry waste (24 h at 100°C)

Table 2-3.3

Sample name	Date	garbage	paper	textile	plastic	grass and wood	leather and rubber	metal	glass	ceramic and soil	other	total
I.OFFICES	11.12	140g	3040 g	10 g	510 g	30 g	- g	70g	490 g	- g	- g	4300 g
II.COMMERC	11.12	480g	840 g	280 g	790 g	10 g	- g	870g	2700 g	- g	- g	5970 g
III.NO-PEC	11.12	1560g	770 g	1340 g	380 g	220 g	620g	290g	1780 g	- g	300g	7260 g
IV.TECH-KO	11.12	1370g	1020 g	580 g	380 g	90 g	490g	340g	2660 g	- g	- g	6930 g
V..PEC	11.12	1810g	790 g	460 g	360 g	60 g	200g	130g	1840 g	- g	- g	5650 g
VI.MARKET	11.12	460g	640 g	100 g	540 g	160 g	- g	260g	1440 g	- g	- g	3600 g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g
		g	g	g	g	g	g	g	g	g	g	g

- after 3 days of drying under the roof (Table 2-3.2
- after 24 hours of drying in a dryer at 100°C temperature (Table 2-3.3)

5) The moisture content was determined separately for each sample of weight difference of initial weight and weight after drying. The results are given in Tables 2-3.4.

2.4. Chemical analysis

It was carrie out on 42 samples marked as it was given in the Table 2-1.

2.4.1. Every day of the 7 sampling days with samples taken from 6 sampling point types combustibles (by combustion) and residue after combustion (ash) were determined. The results obtained are given in Tables 2-4.

Special Form ⑬·····Combustibles and Ash Contents

Date: 4.12.1992 Weather: Cloudy Table 2-4

Sample Name	Combustibles(%)	Ash (%)	Total (%)
I Offi-ces	87.9	12.1	100 %
II Com-merce	91.1	8.9	100 %
III No-Pec	82.2	17.8	100 %
IV Tech-Kom	82.7	17.3	100 %
V Pec	85.3	14.7	100 %
VI Market	80.8	19.2	100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %

Special Form ⑬·····Combustibles and Ash Contents

Date: 5.12.1992 Weather: Cloudy Table 2-4

Sample Name	Combustibles(%)	Ash (%)	Total (%)
I Offi-ces	90.4	9.6	100 %
II Com-merce	92.6	7.4	100 %
III No-Pec	90.9	9.1	100 %
IV Tech-Kom	84.9	15.1	100 %
V Pec	89.5	10.5	100 %
VI Market	84.3	15.7	100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %

Special Form ⑬·····Combustibles and Ash Contents

Date: 7.12.1992 Weather: Cloudy Table 2-4

Sample Name	Combustibles(%)	Ash (%)	Total (%)
I Offices	89.9	10.1	100 %
II Commerce	93.7	6.3	100 %
III No-Pec	90. 1	9.9	100 %
IV Tech-Com	87.9	12.1	100 %
V Pec	91.6	8.4	100 %
VI Market	86.3	13.7	100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %

Special Form ⑬·····Combustibles and Ash Contents

Date: 8.12.1992 Weather: Cloudy Table 2-4

Sample Name	Combustibles(%)	Ash (%)	Total (%)
I Offi-ces	92.1	7.9	100 %
II Com-merce	91.9	8.1	100 %
III No-Pec	93.1	6. 9	100 %
IV Tech-Kom	84.2	15.8	100 %
V Pec	91.5	8.5	100 %
VI ~~Market~~	86.2	13.8	100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %

Special Form ⑬……Combustibles and Ash Contents

Date: 9.12,1992 Weather: Cloudy Table 2-4

Sample Name	Combustibles(%)	Ash (%)	Total (%)
I Offi-ces	89.9	10.1	100 %
II Com-merce	92.2	7.8	100 %
III No-Pec	88.4	11.6	100 %
IV Tech-Kom	86.4	13.6	100 %
V Pec	90.7	9.3	100 %
VI Market	88.2	11.8	100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %

Special Form ⑬·····Combustibles and Ash Contents

Date: 10.12.1992 Weather: Clouoly Table 2-4

Sample Name	Combustibles(%)	Ash (%)	Total (%)
I Offi-ces	89.9	10.1	100 %
II Com-merce	91.3	8.7	100 %
III No-Pec	88.7	11.3	100 %
IV Tech-Kom	90.3	9.7	100 %
V Pec	87.2	12.8	100 %
VI Market	89.6	10.4	100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %

Special Form ⑬·····Combustibles and Ash Contents

Date: 11.12.1992 Weather: Cloudy Table 2-4

Sample Name	Combustibles(%)	Ash (%)	Total (%)
I Offices	89.7	10.3	100 %
II Commerce	92.5	7.5	100 %
III No-Pec	85.5	14.5	100 %
IV Tech-Kom	88.7	11.3	100 %
V Pec	86.4	13.6	100 %
VI Market	91.2	8.8	100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %
			100 %

2.4.2 DETERMINATION OF NET CALORIFIC VALUE OF MUNICIPAL WASTES

The determination of net calorific value was performed according to Polish Standard PN-81 G-04513, "Determination of combustion heat and calculation of the heating value"
The method is based on a complete combustion of the weighed amount of solid dry waste in the atmosphere of oxygen under presure in a calorimetric bomb (at a constant volume), in an isothermic or adiabatic system, and on measuring a temperature increase of the water in a calorimetric vessel.
This method provides for making corrections for the heat emitted upon the formation and dissolution of sulphuric and nitric acid during combastion process.
To determination the net calorific value of the city waste samples of 1.5 g in mass were taken.
The determination results of net calorific value are compiled in table 2.4.2.

Table 2.4.2.
Net calorific value of municipal waste (Poznań 12/4-11/1992)

Sample number	Sample name	Date of sampling	Net calorific value (n.c.v.)	
			kJ/kg	kcal/kg
I	INSTITUTION	12/4/1992	22270	5319
		12/5/1992	23200	5541
		12/7/1992	20809	4970
		12/8/1992	21610	5161
		12/9/1992	23765	5676
		12/10/1992	21448	5123
		12/11/1992	25200	6019
II	COMMERC.	12/4/1992	24306	5805
		12/5/1992	24522	5857
		12/7/1992	27348	6532
		12/8/1992	27920	6669
		12/9/1992	25155	6008
		12/10/1992	24930	5954
		12/11/1992	27987	6685
III	NO PEC	12/4/1992	21530	5142
		12/5/1992	25741	6148
		12/7/1992	24100	5756
		12/8/1992	23130	5525
		12/9/1992	22452	5363
		12/10/1992	24330	5811
		12/11/1992	24108	5758

Table 24.2. (continuation)
Net calorific value of municipal waste (Poznań 12/4-11/1992)

Sample number	Sample name	Date of sampling	Net calorific value (n.c.v.)	
			kJ/kg	kcal/kg
IV	TECH.-KOM.	12/4/1992	20800	4967
		12/5/1992	21420	5116
		12/7/1992	22230	5309
		12/8/1992	24660	5890
		12/9/1992	22805	5447
		12/10/1992	23160	5532
		12/11/1992	20935	5000
V	PEC	12/4/1992	22572	5391
		12/5/1992	23603	5637
		12/7/1992	24670	5892
		12/8/1992	22300	5326
		12/9/1992	23280	5560
		12/10/1992	23400	5589
		12/11/1992	23100	5517
VI	MARKET	12/4/1992	20675	4938
		12/5/1992	19750	4717
		12/7/1992	20520	4901
		12/8/1992	21930	5238
		12/9/1992	21276	5081
		12/10/1992	22504	5375
		12/11/1992	22045	5265

2.4.3 ELEMENTARY ANALYSIS OF MUNICIPIAL WASTES

2.4.3.1 Determination of the content of C, H, N, O.

Determinations were performed in a way analogous to that applied in Polish Standard PN-85 G-04549 "High-sped method of carbon and hydrogen content determination by an automatic Perkin-Elmer analyzer".
The Automatic Perkin-Elmer analyzer Model 2400 was used.
In this type of analyzers the mass of samples to be subject to analysis may range from 1.5 to 4 mg.
The waste samples obtained for analysis were inhomogeneous both in the size and specific weight of particular particles. The elementary analysis of the received waste requires a proper preparation of the samples so that the amount taken would be representative for the whole sample.
In order to adjust the form of the analyzed sample to the requirements of the applied apparatus, the following procedure of grinding and averaging the analyzed samples of the waste was applied:

a) Preliminary grinding and averaging

An average sample of 4 g. in mass was taken from the supplied waste and mixed with 16 g. of silica for chromatographic purposes, of particle size distribution 60 - 120 mesh (MN-Kieselgel 60 Macherey & Nagel - Duren, Germany). The applied silica had satisfactory homogeneity in particle size distribution and satisfactory chemical purity. The mixture of silica and waste was stirred and ground in mortar for about 2 hours. In the process of grinding silica with grains of sharp edges and grater hardness than the components of the waste samples helps in breaking up the long and elastic fibres. The SiO_2 powder produced upon grinding deposits on the particles of the ground sample, thus preventing repeated agglomeration.

b) Refinement

From a sample prepared according to a procedure described in -a-, an average sample of 5 g. in mass was taken following the generally accepted rules. Further refinement was also performed by grinding in a mortar, as in 1, for 1 hour.

c) Refinement at the temperature of liquid nitrogen

From a sample prepared according to a procedure given in -b-, an average sample of 1 g. in mass was taken following the generally accepted rules. This sample, though nicely refined, still contained small fibres and pieces of plastics. Further refinement was carried out at the temperature of liquid nitrogen, at which most of the substances, and in particular polymers of plastics become fragile. The averaged sample was placed in a mortar cooled in liquid nitrogen, then flooded with liquid nitrogen, and ground for 20 min. The nitrogen evaporated during refinement was constantly made-up.

d) Final powdering and drying

From a sample prepared according to a procedure described in -c-, an average sample of 300 mg in mass was taken following the generally accepted rules. The average sample was further refined in liquid nitrogen in an agate mortar for about 20 minutes. Then the refined sample was dried at 105°C. Thus prepared sample for analysis contained 20% of the analyzed waste and 80% of silica.
In the calculations the amount of moisture the sample contained prior to its additional powdering, was taken into account.
Results of CHNO analysis in municipial wastes are listed in table 2, 3, 1/2

2.4.3.2 Determination of sulphur content

Determination of sulphur content was carried out according to the Polish Standard PN-76 G-04514, "Determination of total sulphur content by a high-temperature combustion method".
The method involves combustion of the weighed amount of the

substance in oxygen stream at temperatures 1250 - 1350 °C, absorption of the yielded sulphuric oxide in hydrogen peroxide solution, and acid-base titrimetric determination of the formed sulphuric acid. The method allows for making corrections for the amount of chlorine by employing titration method with solution of mercuric nitrate against diphenylcarbazone. The sulphur content in the studied waste materials was determined for samples of 1.5-2 g. in mass.
Results of sulphur determinations in municipial wastes are listed in the table 2.4.3.1/2.

2.4.3.3 Determination of chlorine content

The determination of chlorine content was performed using a method described in Polish Standard PN-78 G-04534 "Determination of chlorine content".
The method involves a complete combustion of the analyzed sample in the presence of the Eschka-mixture in a calorimetric bomb, in the atmosphere of oxygen, and determination of chlorine content in the combustion products by the Volhard method. The chlorine content in the waste materials was determined for samples of 1 - 1.5 g. in mass.
Results of chlorine content determinations in municipial wastes are listed in table 2.4.3.1/2

Table 2.4.3 1/2 Results of elementary analysis of municipal waste (Poznań 12/4-11/1992)

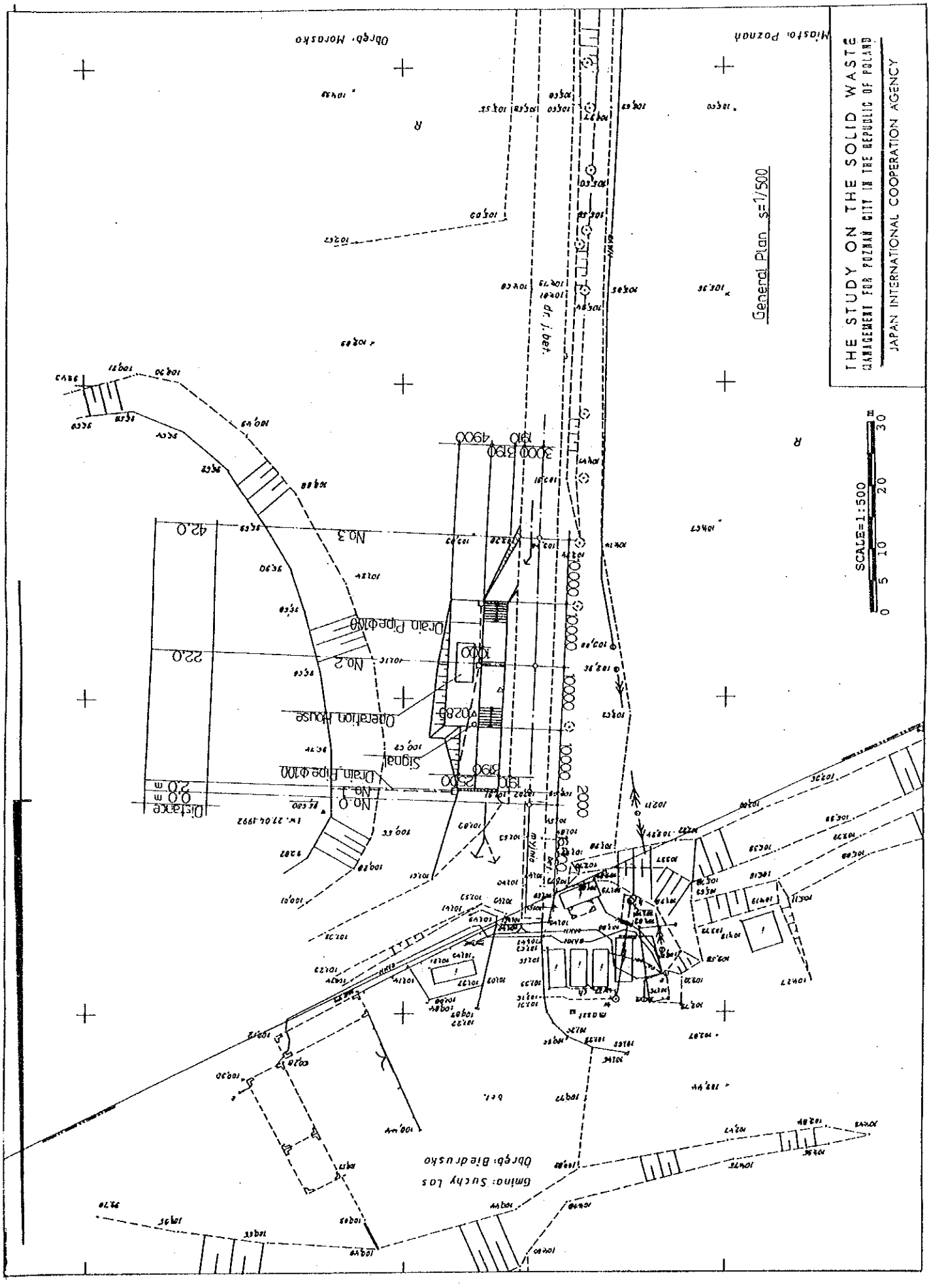
Sample number	Sample name	Date of sampling	CARBON [%]	HYDROGEN [%]	NITROGEN [%]	OXYGEN [%]	SULPHUR [%]	CHLORIDE [%]
I	INSTITUTION	12/4/1992	42.1	9.8	0.8	34.6	0.07	0.25
		12/5/1992	39.5	9.3	1.3	40.3	0.06	0.15
		12/7/1992	39.0	10.3	0.6	40.1	0.09	0.19
		12/8/1992	37.4	9.9	0.6	43.8	0.09	0.13
		12/9/1992	41.1	10.0	0.5	37.0	0.08	0.19
		12/10/1992	41.9	10.2	0.5	37.4	0.08	0.21
		12/11/1992	40.2	9.9	0.9	38.5	0.07	0.14
II	COMMERC.	12/4/1992	41.9	10.0	0.8	38.4	0.00	0.96
		12/5/1992	45.6	10.3	2.3	34.4	0.04	0.98
		12/7/1992	39.6	8.9	1.2	44.0	0.01	1.02
		12/8/1992	46.8	10.4	2.9	31.8	0.02	2.19
		12/9/1992	43.4	10.5	1.1	37.2	0.02	0.88
		12/10/1992	44.2	10.4	2.8	33.9	0.03	2.03
		12/11/1992	45.1	9.8	2.5	35.1	0.01	2.13
III	NO PEC	12/4/1992	39.9	10.0	1.9	30.4	0.05	0.44
		12/5/1992	46.6	10.8	2.4	31.1	0.29	0.38
		12/7/1992	44.9	9.6	1.4	34.2	0.31	0.43
		12/8/1992	38.0	9.9	1.2	44.0	0.29	0.65
		12/9/1992	45.5	9.4	1.1	32.4	0.11	0.39
		12/10/1992	45.0	9.6	1.6	32.5	0.25	0.42
		12/11/1992	47.8	10.8	0.9	26.0	0.00	0.61

Table 2.4.3/2 (continuation). Results of elementary analysis of municipal waste (Poznań 12/4-11/1992)

Sample number	Sample name	Date of sampling	CARBON [%]	HYDROGEN [%]	NITROGEN [%]	OXYGEN [%]	SULPHUR [%]	CHLORIDE [%]
IV	TECH-KOM	12/4/1992	48.5	8.5	2.1	23.6	0.03	0.98
		12/5/1992	42.5	8.5	2.6	31.3	0.27	0.36
		12/7/1992	47.5	8.8	1.3	30.3	0.01	0.99
		12/8/1992	39.7	8.9	1.7	33.9	0.03	0.66
		12/9/1992	46.9	9.2	1.8	28.5	0.08	0.70
		12/10/1992	44.4	9.6	1.4	34.9	0.06	1.05
		12/11/1992	47.9	8.4	1.6	30.8	0.00	0.49
V	PEC	12/4/1992	46.0	10.4	1.1	27.8	0.00	2.71
		12/5/1992	38.1	8.4	1.0	42.0	0.28	1.59
		12/7/1992	45.6	9.6	1.7	34.7	0.08	1.45
		12/8/1992	45.1	10.2	2.2	34.0	0.25	1.52
		12/9/1992	42.6	9.7	2.3	36.1	0.05	1.73
		12/10/1992	46.5	9.6	2.1	29.0	0.01	2.79
		12/11/1992	40.8	9.4	1.7	34.5	0.03	1.06
VI	MARKET	12/4/1992	37.6	9.2	1.8	32.2	0.00	1.83
		12/5/1992	38.1	9.1	1.7	35.4	0.00	1.25
		12/7/1992	43.7	10.6	2.1	29.9	0.03	1.76
		12/8/1992	42.4	10.1	1.2	32.5	0.06	1.88
		12/9/1992	38.7	9.3	1.2	39.0	0.04	1.49
		12/10/1992	36.0	9.7	2.4	41.5	0.11	1.68
		12/11/1992	35.0	9.1	2.6	44.5	0.05	1.73

B. Truck Scale

B1. Drawing of Truck Scale Foundation


THE STUDY ON THE SOLID WASTE
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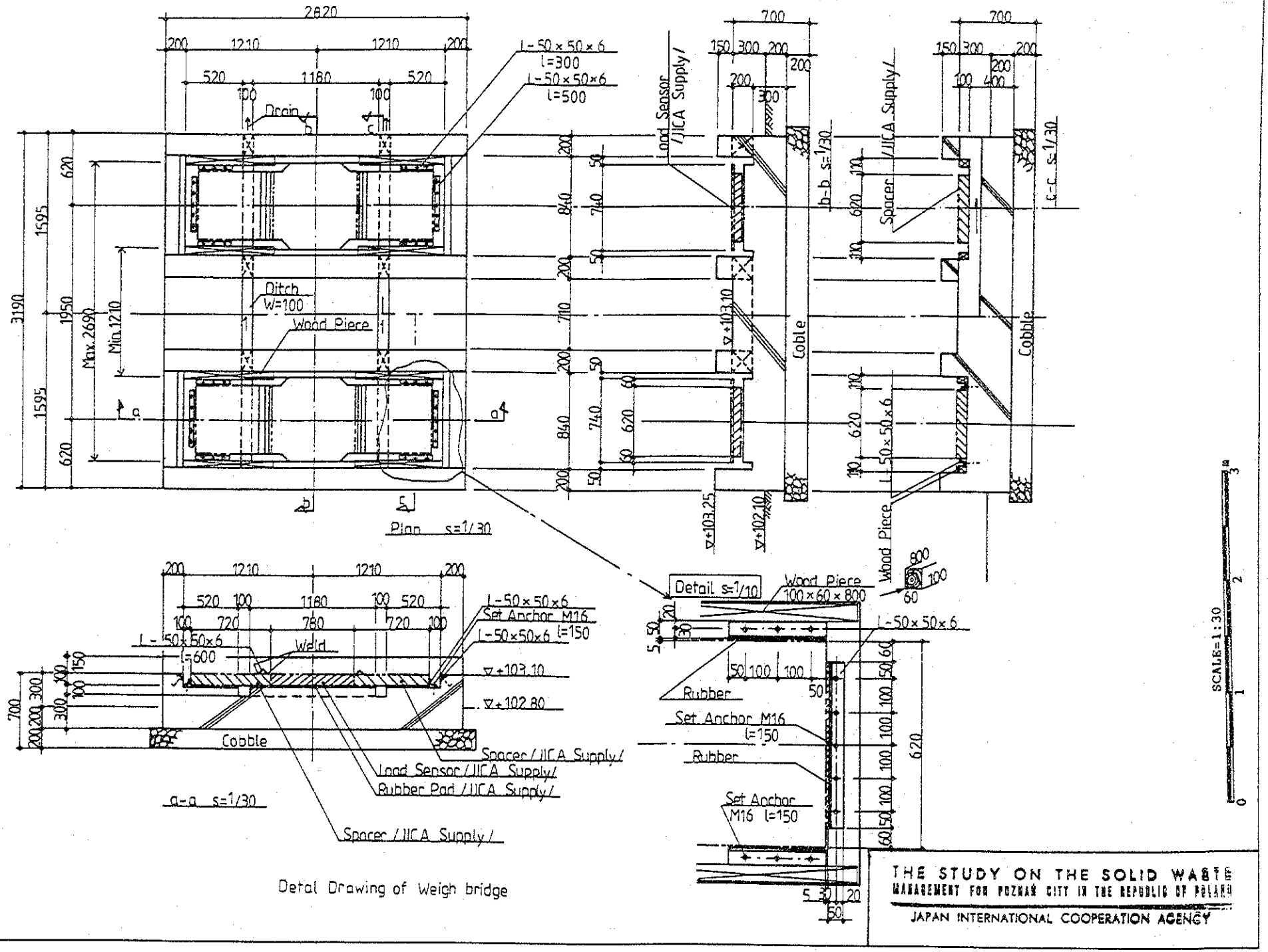
JAPAN INTERNATIONAL COOPERATION AGENCY
General Plan s=1/500
SCALE=1:500
0 5 10 20 30 m
No.1
No.2
No.3
Distance 20 m
Drain Pipe ϕ100
Drain Pipe ϕ100
Operation House
Signal
42.0
22.0
Obręb: Morasko
Miasto: Poznań
Gmina: Suchy Las
Obręb: Biedrusko



Detal Drawing of Weigh bridge

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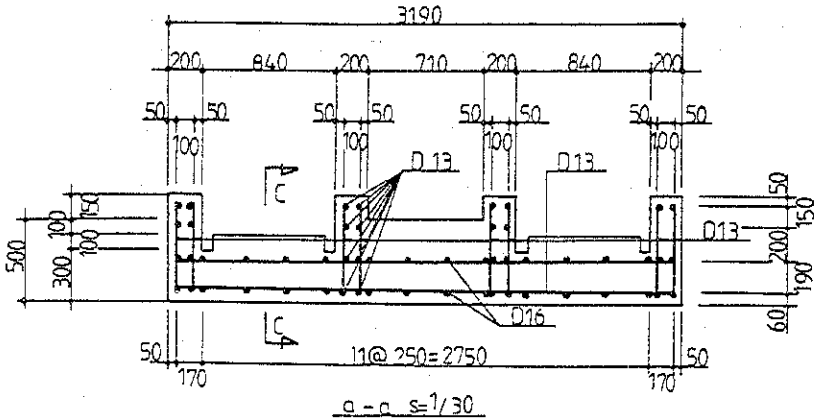
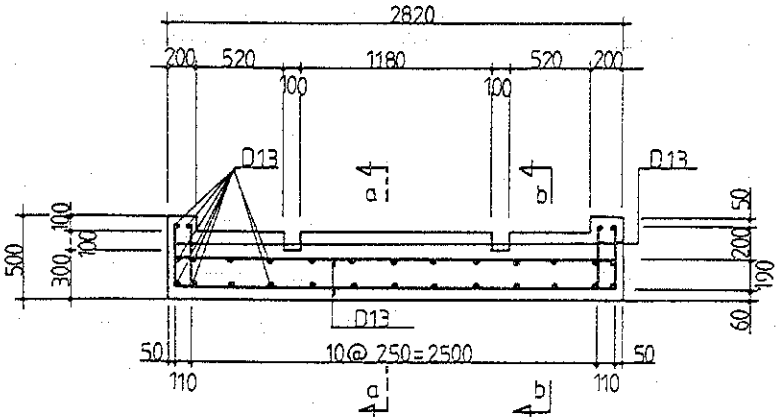
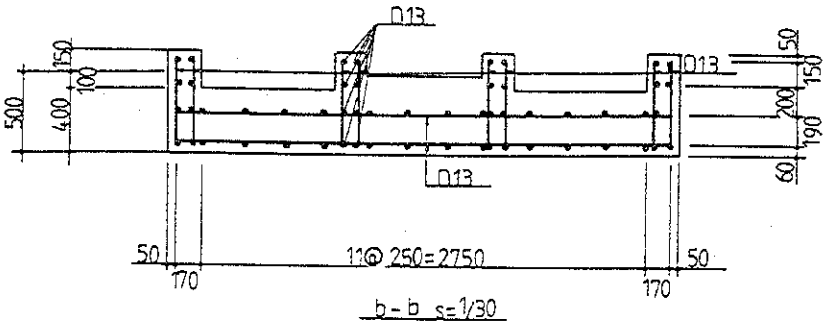


a - a s=1/30



c - c s=1/30



b - b s=1/30

Rainforcing bar arrangement s=1/30

SCALE=1:30

0 1 2 3 m

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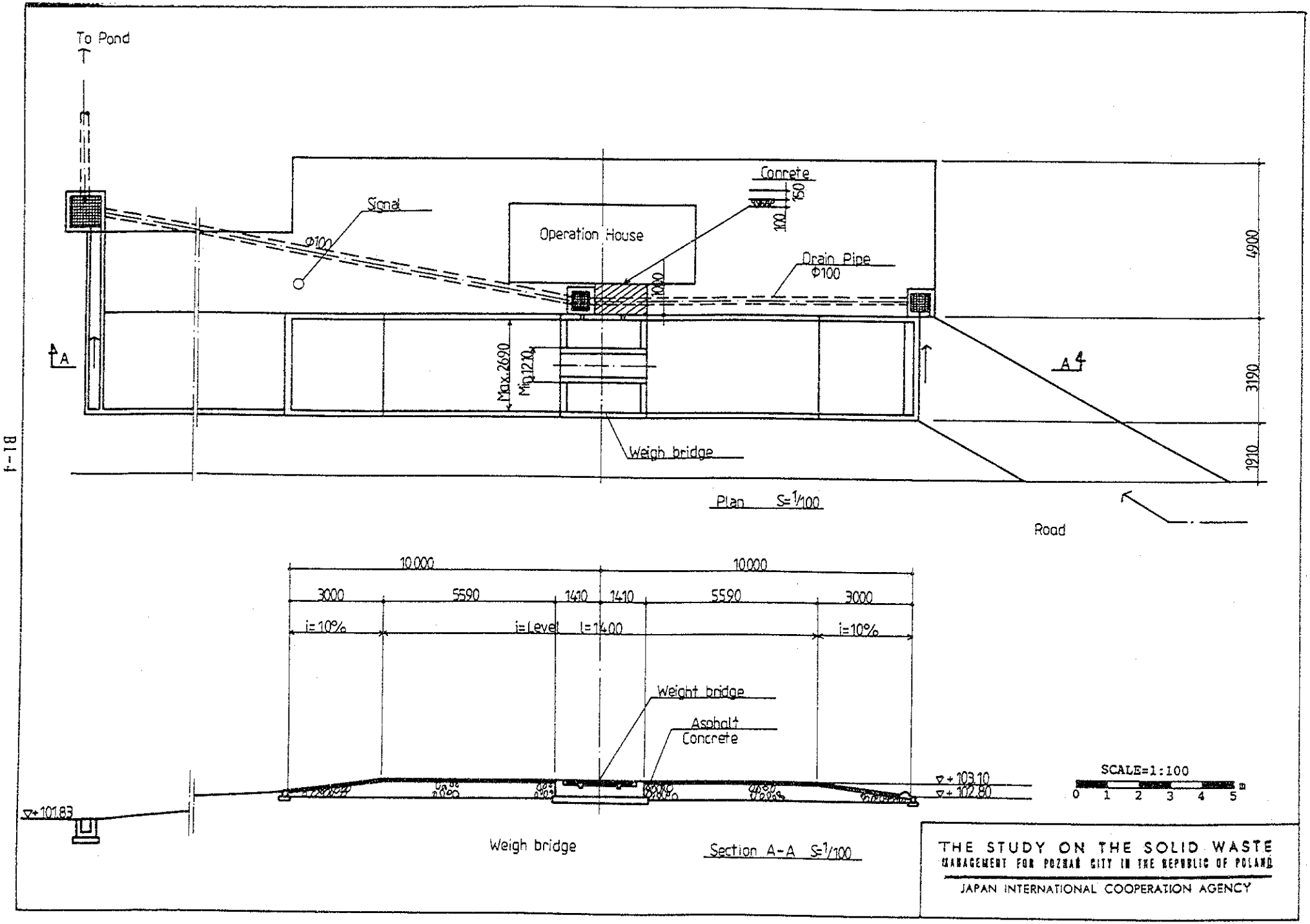
B1-3


To Pond
Signal
Φ100
Operation House
Concrete
150
100
Drain Pipe
Φ100
1000
4900
3190
1910
A
A
Max.2690
Min.1210
Weigh bridge
Plan S=1/100
Road
10.000
10000
3000
5590
1410
1410
5590
3000
i=10%
i=Level l=1400
i=10%
Weight bridge
Asphalt
Concrete
▽+103.10
▽+102.80
▽+101.83
SCALE=1:100
0 1 2 3 4 5
Weigh bridge
Section A-A S=1/100
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B2. Computer Processing Program of Truck Scale Data

```
100 'SAVE "a:mainxx"
110 '=================================================================
120 'Suchy Las Landfill Site Weight Management Program (ver1.0)  IBM PS/55 BASIC

130 '            Copyright(C) by JICA Study Team H.Kato
140 '                   July/1992  Ver 1.0
150 '                              Ver 1.1 Polish
160 '=================================================================
170 CLS
180  CLS:PRINT:PRINT "=============================================================
="
190 PRINT "===        Suchy Las Landfill Site Weighing Program       ==="
200 PRINT "===        Japan Intrenational Cooperation Agency (JICA) ==="
210 PRINT "============================================================":PRINT
220 HATA=0
230 DIM A(500,8),TI$(500),B(500,8),TI2$(500)
240 HATA=1+HATA:IF HATA>=2 THEN CLS
250 INPUT "OPCJE: PRACA DZIENN-1, KONIEC PRACY-4";WORK
255 IF WORK=1 OR WORK=4 THEN 260 ELSE 250
260 IF WORK=1 THEN 340
270 IF WORK=2 THEN 250
280 IF WORK=3 THEN 250
290 IF WORK=4 THEN CLS
295 PRINT" Jesli to jest koniec pracy, wylacz komputer wylacznikiem."
300 PRINT" Sprawdz, czy dyskietka jest w komputerze. Napisz:run Nacisnij ENTER"
310 'PRINT"Jesli to jest koniec pracy, wylacz komputer wylacznikiem."
320 GOTO 660
330 '
340 CLS
350 RTP$="y"
360 FOR I=1 TO 500
370 CLS:PRINT"============= Daily Work ==================":PRINT USING "NR WAZE
NIA  #,###";I
380    A(I,1)=I
390 '  A(I,2)=TIME$
400    TI$(I)=TIME$
410    INPUT "TYP SAMOCMODU (KONIEC PRACY <999>)";A(I,3)
420    GOSUB 1560
430 '  IF A(I,3)=999 THEN GOTO 1300:'Make daily data:goto 10000
440    INPUT "OS PRZEDNIA(kg)";A(I,4)
450    INPUT "OS TYLNA   (kg)";A(I,5)
460    A(I,6)=A(I,4)+A(I,5)
470 '          GOTO 10000
480    A(I,8)=A(I,6)-A(I,7)
490    INPUT "POMIAR PRAWIDLOWY (n/t)";A$
495     IF A$="t" OR A$="n" THEN 500 ELSE 490
500    IF A$="n" THEN GOTO 410
510 IF A$="t" AND RTP$="y" THEN GOSUB 1370
520 '
530 NEXT I
540 '
550 '
560 '
570 LAST=I-1
580 'total Weight
590 TOW=0
600 FOR I=1 TO LAST
610    TOW=TOW+A(I,8)
620 NEXT I
630 GOSUB 670:'data write for FDD
640 GOSUB 910:'data output for printer
650 GOTO 240
660 END
670 '
680 '
```

```
690 '
700 '
710 '   Make Daily Data Files
720 '
730 '
740 DANAME$=LEFT$(DATE$,6)+RIGHT$(DATE$,2)
750 OPEN "a:"+DANAME$ FOR OUTPUT AS #1
760 WRITE #1,LAST,TOW
770  FOR II=1 TO LAST
780  NO=A(II,1):'No.
790    TI$=TI$(II):'time
800    TYPE=A(II,3):'vehicle type
810    FRONT=A(II,4):'weight of front axial
820    REAR=A(II,5):'Weight of rear axial
830    TOTAL=A(II,6):'total weight
840    TARE=A(II,7):'tare weight
850    WEIGHT=A(II,8):'waste weight
860    WRITE #1,NO,TI$,TYPE,FRONT,REAR,TOTAL,TARE,WEIGHT
870 NEXT II
880 ' WRITE #1,LAST,TOW
890 CLOSE #1
900 RETURN
910 '
920 '
930 '
940 '
950 'input "number of Vechicle"
960 '
970 'INPUT "Date (ex Month-Data-Year:07-21-92)";DANAME$:'dim b(500,8),t12$(500)
980 OPEN "a:"+DANAME$ FOR INPUT AS #1
990 INPUT #1,LAST,TOW
1000 PRINT "Date";DANAME$
1010 PRINT "Total Vehcile Numbers";LAST
1020 PRINT USING"Total Waste Weight(kg) ###,###,###,###";TOW
1030 FOR NU=1 TO LAST
1040    INPUT #1,NO,TI2$,TYPE,FRONT,REAR,TOTAL,TARE,WEIGHT
1050   B(NU,1)=NO:TI2$(NU)=TI2$:B(NU,3)=TYPE:B(NU,4)=FRONT
1060   B(NU,5)=REAR:B(NU,6)=TOTAL:B(NU,7)=TARE:B(NU,8)=WEIGHT
1070 NEXT NU
1080 CLOSE #1
1090 '
1100 ' Sub Print out
1110 '
1120 LPRINT CHR$(12):LPRINT:LPRINT:LPRINT:XX=0
1130 LPRINT "============================== Weighing Data ======================
="
1140 LPRINT
1150 'FOR NU=1 TO LAST
1160 LPRINT "Date :";DANAME$
1170 LPRINT USING "Total Number of Vehciles     ###,### (Nos.)";LAST
1180 LPRINT USING "Total Waste Weight        ###,###,### (kg)";TOW
1190 LPRINT "No.   Time    Type  Front(kg)   Rear(kg)  Total(kg)  Tare(kg)   Was
te weight(kg)"
1200 FOR NU=1 TO LAST
1210 LPRINT USING "### ";B(NU,1);:LPRINT TI2$(NU);:LPRINT USING "  ###     ##,###
    ##,###     ##,###     ##,###     ###,###";B(NU,3);B(NU,4);B(NU,5);B(NU,6);B
(NU,7);B(NU,8)
1220 XX=XX+1
1230 IF XX=50 THEN GOSUB 1280
1240 NEXT NU
1250 LPRINT CHR$(12)
1260 'LPRINT CHR$(12)
1270 RETURN
1280 '
1290 '
1300 ' Page make
```

```
1310 LPRINT CHR$(12):XX=0
1320 LPRINT:LPRINT:LPRINT:LPRINT "Date :";DANAME$
1330 LPRINT "Total Number of Vehciles";LAST
1340 LPRINT "Total Weight (kg)";TOW
1350 LPRINT "No.   Time  Type   Front(kg)   Rear(kg)  Total(kg)  Tare(kg)   Wast
e weight(kg)"
1360 RETURN
1370 '
1380 ' Sub Daily Print out
1390 '
1400 'LPRINT CHR$(12):LPRINT:LPRINT:LPRINT
1410 'LPRINT "============================== Weighing Data ======================
="
1420 'LPRINT
1430 COUNT=COUNT+1
1440 IF COUNT=1 THEN LPRINT "Date :";DATE$
1450 '
1460 '
1470 IF COUNT=1 THEN LPRINT "No.   Time    Type  Front(kg)   Rear(kg)  Total(kg)
  Tare(kg)   Waste weight(kg)"
1480 '
1490 LPRINT USING "### ";A(I,1);:LPRINT TI$(I);:LPRINT USING "  ###     ##,###
  ##,###      ##,###      ##,###      ###,###";A(I,3);A(I,4);A(I,5);A(I,6);A(I,7);A
(I,8)
1500 '
1510 IF COUNT=50 THEN GOTO 1540
1520 RETURN
1530 LPRINT CHR$(12)
1540 COUNT=0:LPRINT CHR$(12)
1550 RETURN
1560 '
1570 '
1580 '
1590 '    Sub weight
1600 '
1610 'Number 1 to 5
1620 IF A(I,3)=1 THEN A(I,7)=10500 : RETURN
1630 IF A(I,3)=2 THEN A(I,7)=10670 : RETURN
1640 IF A(I,3)=3 THEN A(I,7)=6311 : RETURN
1650 IF A(I,3)=4 THEN A(I,7)=9310 : RETURN
1660 IF A(I,3)=5 THEN A(I,7)=5320 : RETURN
1670 '
1680 '
1690 'Number 11 to 12
1700 '
1710 IF A(I,3)=11 THEN A(I,7)=8175 : RETURN
1720 '
1730 'Number 21 to 22
1740 IF A(I,3)=21 THEN A(I,7)=6311 :RETURN
1750 IF A(I,3)=22 THEN A(I,7)=5118 :RETURN
1760 IF A(I,3)=23 THEN A(I,7)=6043 :RETURN
1770 '
1780 ' Type 31 to 32
1790 '
1800 IF A(I,3)=31 THEN A(I,7)=6608 :RETURN
1810 IF A(I,4)=32 THEN A(I,7)=5118 :RETURN
1820 '
1830 ' Type 41 to 43
1840 '
1850 IF A(I,3)=41 THEN A(I,7)=6043 :RETURN
1860 IF A(I,3)=42 THEN A(I,7)=5118 :RETURN
1870 IF A(I,3)=43 THEN A(I,7)=1668 :RETURN
1880 '
1890 ' Type 101 to 108
1900 '
1910 IF A(I,3)=101 THEN A(I,7)=1463 :RETURN
```

```
1920 IF A(I,3)=103 THEN A(I,7)=1668 :RETURN
1930 IF A(I,3)=104 THEN A(I,7)=2000 :RETURN
1940 IF A(I,3)=105 THEN A(I,7)=5118 :RETURN
1950 IF A(I,3)=106 THEN A(I,7)=6043 :RETURN
1960 IF A(I,3)=107 THEN A(I,7)=7715 :RETURN
1970 IF A(I,3)=108 THEN A(I,7)=8310 :RETURN
1980 IF A(I,3)=999 THEN GOTO 540:'Make daily data
1990 '  Others
2000 '
2010 BEEP:BEEP:BEEP
2020 PRINT "==================== TEN TYP SAMOCHODV NIE JEST ZAREJESTROWANY =====
================== "
2030 PRINT ""
2040 PRINT "===================== WPROWADZ TARE (WAGE SAMOCHODU) ===============
============ "
2050 PRINT ""
2060 INPUT "TARE (kg)";A(I,7)
2070 INPUT "POMIAR PRAWIDLOWY (n/t)";B$
2075 IF B$="n" OR B$="t" THEN 2080 ELSE 2070
2080 IF B$="n" THEN GOTO 2020 ELSE RETURN
2090 '
2100 '
2110 ' Data Print Out
2120 '
2130 '
2140 '
2150 INPUT "DATA(MIESIAC-DZIEN-ROK:07-21-92)";DANAME$:'dim b(500,8),ti2$(500)
2160 OPEN "a:"+DANAME$ FOR INPUT AS #1
2170 INPUT #1,LAST,TOW
2180 PRINT "Date";DANAME$
2190 PRINT "Total Vehcile Numbers";LAST
2200 PRINT USING"Total Waste Weight(kg) ###,###,###,###";TOW
2210 FOR NU=1 TO LAST
2220   INPUT #1,NO,TI$,TYPE,FRONT,REAR,TOTAL,TARE,WEIGHT
2230  B(NU,1)=NO:TI2$(NU)=TI$:B(NU,3)=TYPE:B(NU,4)=FRONT
2240  B(NU,5)=REAR:B(NU,6)=TOTAL:B(NU,7)=TARE:B(NU,8)=WEIGHT
2250 NEXT NU
2260 CLOSE #1
2270 GOSUB 1120
2280 GOTO 240
2290 '
2300 '    Disk I/O
2310 '
2320 INPUT "Make New File --1 , Existing File --2";CH
2330 IF CH=1 THEN GOTO 2780
2340 INPUT "Maintenance Date (Month-Date-Year  ex.07-21-92)";DANAME$
2350 '
2360 '     Disk Read
2370 '
2380 OPEN "a:"+DANAME$ FOR INPUT AS #1
2390 INPUT #1,LAST,TOW
2400 FOR NU=1 TO LAST
2410   INPUT #1,NO,TI$,TYPE,FRONT,REAR,TOTAL,TARE,WEIGHT
2420  B(NU,1)=NO:TI2$(NU)=TI$:B(NU,3)=TYPE:B(NU,4)=FRONT
2430  B(NU,5)=REAR:B(NU,6)=TOTAL:B(NU,7)=TARE:B(NU,8)=WEIGHT
2440 NEXT NU
2450 CLOSE #1
2460 'INPUT "Print Out of Existing Data (y/n)";PR$
2470 'IF PR$="y" THEN gosub 3175 ELSE 30180
2480 '
2490 ' CRT Existing Data
2500 '
2510 'CLS:PRINT "============================== Weighing Data ==================
====="
2520 'pRINT
2530 PA=1:XX=0:XXP=0
```

```
2540 CLS:PRINT "============================== Weighing Data ====================
===":PRINT
2550 PRINT "Date :";DANAME$
2560 PRINT USING "Total Number of Vehciles      ###,### (Nos.)";LAST
2570 PRINT USING "Total Waste Weight        ###,###,### (kg)";TOW
2580 PRINT "No.   Time    Type  Front(kg)   Rear(kg)  Total(kg)  Tare(kg)   Wast
e weight(kg)"
2590 FOR NU=PA TO LAST
2600 PRINT USING "### ";B(NU,1);:PRINT TI2$(NU);:PRINT USING "  ###    ##,###
  ##,###     ##,###     ##,###     ###,###";B(NU,3);B(NU,4);B(NU,5);B(NU,6);B(NU
,7);B(NU,8)
2610 XX=XX+1:XXP=XXP+1
2620 IF XXP=15 THEN GOTO 2690
2630 NEXT NU
2640 INPUT"KONIEC STRONY  POWTORZYC-1  KONIEC-2";PAC
2650 IF PAC=1 THEN GOTO 2510
2660 IF PAC=2 THEN GOTO 2740
2670 IF PAC>3 THEN 2640
2680 GOTO 240
2690 INPUT "NASTEPNA STRONA (n/t)";PA$
2700 '
2710 '
2720 IF PA$="n" THEN 240 ELSE 2730
2730 CLS:PA=XX+1:XXP=0:GOTO 2540
2740 INPUT "Print Out of Existing Data (y/n)";PR$
2750 IF PR$="y" THEN GOSUB 1120 ELSE GOTO 2480
2760 'goto 30180
2770 GOTO 240
2780 '
2790 '  Disk Input
2800 '
2810 CLS
2820 INPUT "Real Time Print Out (y/n)";RTP$
2830 PRINT
2840 INPUT "File Name (Month-Date-Year ex.07-21-92)";DANAME$
2850 '
2860 FOR I=1 TO 500
2870 PRINT:PRINT USING "Data No. #,###";I
2880   A(I,1)=I
2890   INPUT "Time (hh:mm:ss)";TI$
2900   TI$(I)=TI$
2910   INPUT "Type (If you need finish of work input <999>)";A(I,3)
2920   GOSUB 1560
2930 '  IF A(I,3)=999 THEN GOTO 1300:'Make daily data:goto 10000
2940   INPUT "Front(kg)";A(I,4)
2950   INPUT "Rear (kg)";A(I,5)
2960   A(I,6)=A(I,4)+A(I,5)
2970 '          GOTO 10000
2980   A(I,8)=A(I,6)-A(I,7)
2990   INPUT "input miss (y/n)";A$
3000   IF A$="y" THEN GOTO 2890
3010 IF A$="n" AND RTP$="y" THEN GOSUB 1370
3020 NEXT I
3030 GOTO 560
```

C. Forecast Sheet of Waste Amount

Waste amount DF 4(80%)

Waste amount DF 4(80%)

		0.03	0.014																	
GDP 92-1o		0.06	0.027																	
Wa-Ration		0.45																		
Ash Ratio		1																		
Ash		13113.3333																		
			Forecast for Waste Amount																	
590100	Population Year/1992		1.00000000	1.00281478	1.00562955	1.00844433	1.01125911	1.01407389	1.01688866	1.01970344	1.02251822	1.02533299	1.02814777	1.03096255	1.03377733	1.03659210	1.03940688	1.04222166	1.04503643	1.04785121	1.05066598
			0	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	9	10
			1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	GDP		1.00000	1.03000	1.06090	1.09273	1.12551	1.15927	1.19405	1.22987	1.26677	1.34278	1.42334	1.50874	1.59927	1.69522	1.79694	1.90475	2.01904	2.14018	2.26859
	Waste-Ratio		1.00000000	1.01400000	1.02819600	1.04259074	1.05718701	1.07198763	1.08699546	1.10221340	1.11764438	1.14782078	1.17881194	1.21063986	1.24332713	1.27689697	1.31137319	1.34678027	1.38314333	1.42048820	1.45884138
												1.02700000	1.05472900	1.08320668	1.11245326	1.14248950	1.17333672	1.20501681	1.23755226	1.27096617	1.30528226
	1																				
	Waste Generation Ratio (g/unit/day)																				
480	Household (person)		480.0	486.7	493.5	500.4	507.4	514.6	521.8	529.1	536.5	551.0	565.8	581.1	596.8	612.9	629.5	646.5	663.9	681.8	700.2
21.75	Domestic Ash (person)		174.0	152.3	130.6	108.9	87.2	65.5	43.8	22.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	Shops (m2)		24.0	24.3	24.7	25.0	25.4	25.7	26.1	26.5	26.8	27.5	28.3	29.1	29.8	30.6	31.5	32.3	33.2	34.1	35.0
160	Catering (m2)		160.0	162.2	164.5	166.8	169.1	171.5	173.9	176.4	178.8	183.7	188.6	193.7	198.9	204.3	209.8	215.5	221.3	227.3	233.4
3040	Market (Shops)		3,040.0	3,082.6	3,125.7	3,169.5	3,213.8	3,258.8	3,304.5	3,350.7	3,397.6	3,489.4	3,583.6	3,680.3	3,779.7	3,881.8	3,986.6	4,094.2	4,204.8	4,318.3	4,434.9
58	Institutional(employee)		58.0	58.8	59.6	60.5	61.3	62.2	63.0	63.9	64.8	66.6	68.4	70.2	72.1	74.1	76.1	78.1	80.2	82.4	84.6
6.8	Road Sweeping (Person)		6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.8	8.0	8.2	8.5	8.7	8.9	9.2	9.4	9.7	9.9
26.6	Bulky (person)		26.6	27.0	27.4	27.7	28.1	28.5	28.9	29.3	29.7	30.5	31.4	32.2	33.1	34.0	34.9	35.8	36.8	37.8	38.8
139.6	Others (Person)		139.6	141.6	143.5	145.5	147.6	149.6	151.7	153.9	156.0	160.2	164.6	169.0	173.6	178.3	183.1	188.0	193.1	198.3	203.7
	2																				
	Generation Sources																				
1661.495	Household (person)		590,100	591,761	593,422	595,083	596,744	598,405	600,066	601,727	603,388	605,049	606,710	608,371	610,032	611,693	613,354	615,015	616,676	618,337	620,000
	Domestic Ash (person)		590,100	591,761	593,422	595,083	596,744	598,405	600,066	601,727	603,388	605,049	606,710	608,371	610,032	611,693	613,354	615,015	616,676	618,337	620,000
0.34395	Shops (m2)		202,966	203,536	204,107	204,679	205,250	205,821	206,393	206,964	207,535	208,107	208,678	209,249	209,821	210,392	210,963	211,534	212,106	212,677	213,249
0.2927	Catering (m2)		172,725	173,208	173,695	174,181	174,667	175,153	175,639	176,125	176,612	177,098	177,584	178,070	178,556	179,043	179,529	180,015	180,501	180,987	181,474
0.00334	Market (Shops)		1,970	1,976	1,982	1,988	1,993	1,999	2,004	2,010	2,015	2,021	2,026	2,032	2,038	2,043	2,049	2,054	2,060	2,065	2,071
0.27298	Institutional(employee)		161,085	161,539	161,992	162,446	162,899	163,353	163,806	164,259	164,713	165,166	165,620	166,073	166,527	166,980	167,433	167,887	168,340	168,794	169,248
	Road Sweeping (Person)		590,100	591,761	593,422	595,083	596,744	598,405	600,066	601,727	603,388	605,049	606,710	608,371	610,032	611,693	613,354	615,015	616,676	618,337	620,000
	Bulky (person)		590,100	591,761	593,422	595,083	596,744	598,405	600,066	601,727	603,388	605,049	606,710	608,371	610,032	611,693	613,354	615,015	616,676	618,337	620,000
	Others (Person)		590,100	591,761	593,422	595,083	596,744	598,405	600,066	601,727	603,388	605,049	606,710	608,371	610,032	611,693	613,354	615,015	616,676	618,337	620,000
	3																				
	Waste Amount (ton/day 1year=365 days)																				
	Year		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Household (person)		283.2	288.0	292.9	297.8	302.8	307.9	313.1	318.4	323.7	333.4	343.3	353.5	364.1	374.9	386.1	397.6	409.4	421.6	434.1
	Domestic Ash (person)		102.7	90.1	77.5	64.8	52.0	39.2	26.3	13.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Shops		4.9	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.9	6.1	6.3	6.4	6.6	6.8	7.0	7.3	7.5
	Catering		27.6	28.1	28.6	29.1	29.5	30.0	30.5	31.1	31.6	32.5	33.5	34.5	35.5	36.6	37.7	38.8	39.9	41.1	42.4
	Market		6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	7.1	7.3	7.5	7.7	7.9	8.2	8.4	8.7	8.9	9.2
	Institutional		9.3	9.5	9.7	9.8	10.0	10.2	10.3	10.5	10.7	11.0	11.3	11.7	12.0	12.4	12.7	13.1	13.5	13.9	14.3
	Sub-Total(1)(ex ash)		331.0	336.6	342.4	348.1	353.9	359.9	365.9	372.2	378.4	389.7	401.3	413.3	425.6	438.2	451.3	464.7	478.5	492.8	507.5
	Sub-total(2) (inc. ash)		433.7	426.7	419.9	412.9	405.9	399.1	392.2	385.5	378.6	389.7	401.3	413.3	425.6	438.2	451.3	464.7	478.5	492.8	507.5
	Road Sweeping		4.0	4.1	4.2	4.2	4.3	4.4	4.4	4.5	4.6	4.7	4.9	5.0	5.2	5.3	5.5	5.7	5.8	6.0	6.1
	Bulky		15.7	16.0	16.3	16.5	16.8	17.1	17.3	17.6	17.9	18.5	19.1	19.6	20.2	20.8	21.4	22.0	22.7	23.4	24.1
	Sub-total		19.7	20.1	20.5	20.7	21.1	21.5	21.7	22.1	22.5	23.2	24.0	24.6	25.4	26.1	26.9	27.7	28.5	29.4	30.2
	MSW Total		453.4	446.8	440.4	433.6	427.0	420.6	413.9	407.6	401.1	412.9	425.3	437.9	451.0	464.3	478.2	492.4	507.0	522.2	537.7
	Others		82.4	83.8	85.2	86.6	88.1	89.5	91.0	92.6	94.1	96.9	99.9	102.8	105.9	109.1	112.3	115.6	119.1	122.6	126.3
	Sub-total		82.4	83.8	85.2	86.6	88.1	89.5	91	92.6	94.1	96.9	99.9	102.8	105.9	109.1	112.3	115.6	119.1	122.6	126.3
	Total		535.8	530.6	525.6	520.2	515.1	510.1	504.9	500.2	495.2	509.8	525.2	540.7	556.9	573.4	590.5	608	626.1	644.8	664
	4																				
18	Waste Composition (%)																				
0.00555556	Garbage		33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0
0.48333	Paper		19.3	19.8	20.3	20.7	21.2	21.7	22.2	22.7	23.2	23.6	24.1	24.6	25.1	25.6	26.1	26.5	27.0	27.5	28.0
-0.12778	Textile		7.3	7.2	7.0	6.9	6.8	6.7	6.5	6.4	6.3	6.1	6.0	5.9	5.8	5.6	5.5	5.4	5.3	5.1	5.0
0.00556	Plastics		7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
-0.10556	Grass & Wood		5.9	5.8	5.7	5.6	5.5	5.4	5.3	5.2	5.1	4.9	4.8	4.7	4.6	4.5	4.4	4.3	4.2	4.1	4.0
-0.07222	Leather & Rubber		2.3	2.2	2.2	2.1	2.0	1.9	1.9	1.8	1.7	1.7	1.6	1.5	1.4	1.4	1.3	1.2	1.1	1.1	1.0
	Sub-Total		76.6	76.8	77.0	77.2	77.4	77.5	77.7	77.9	78.1	78.3	78.5	78.7	78.9	79.1	79.2	79.4	79.6	79.8	80.0
0.06667	Metal		3.8	3.9	3.9	4.0	4.1	4.1	4.2	4.3	4.3	4.4	4.5	4.5	4.6	4.7	4.7	4.8	4.9	4.9	5.0
-0.28889	Glass		15.2	14.9	14.6	14.3	14.0	13.8	13.5	13.2	12.9	12.6	12.3	12.0	11.7	11.4	11.2	10.9	10.6	10.3	10.0
0.13889	Ceramic & Soil		1.5	1.6	1.8	1.9	2.1	2.2	2.3	2.5	2.6	2.8	2.9	3.0	3.2	3.3	3.4	3.6	3.7	3.9	4.0
-0.10556	Others		2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.0
	Sub-Total		23.4	23.2	23.0	22.8	22.6	22.5	22.3	22.1	21.9	21.7	21.5	21.3	21.1	20.9	20.8	20.6	20.4	20.2	20.0
	Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Waste amount DF 4(80%)

Waste amount DF 4(80%)

5	Waste Amount (ton/day)																		
	MSW(ex Bulky, Road sweeping)																		
	Garbage	112.2	114.1	116.1	118.1	120.1	122.1	124.2	126.3	128.4	130.5	132.7	134.9	137.2	139.5	141.9	144.3	146.8	149.3
	Paper	63.9	66.6	69.4	72.2	75.1	78.2	81.2	84.4	87.7	91.2	94.8	98.5	102.4	106.4	110.6	114.9	119.4	124.1
	Textile	24.2	24.1	24.1	24.1	24.0	24.0	23.9	23.8	23.8	24.0	24.2	24.4	24.5	24.7	24.9	25.0	25.1	25.3
	Plastics	26.1	26.6	27.1	27.6	28.0	28.5	29.0	29.5	30.1	31.0	31.9	32.9	33.9	34.9	36.0	37.1	38.2	39.4
	Grass & Wood	19.5	19.5	19.5	19.4	19.4	19.3	19.3	19.2	19.1	19.3	19.4	19.6	19.7	19.8	20.0	20.1	20.1	20.2
	Leather & Rubber	7.6	7.5	7.4	7.3	7.1	7.0	6.8	6.7	6.5	6.4	6.3	6.2	6.1	6.0	5.8	5.7	5.5	5.3
	Sub-Total	253.5	258.5	263.6	268.6	273.8	279.1	284.4	290.0	295.6	305.1	315.0	325.2	335.7	346.4	357.6	369.1	381.0	393.3
	Metal	12.6	13.0	13.5	13.9	14.4	14.9	15.4	15.9	16.4	17.1	17.9	18.7	19.6	20.4	21.4	22.3	23.3	24.3
	Glass	50.3	50.2	50.1	49.9	49.7	49.5	49.3	49.0	48.8	49.1	49.4	49.7	49.9	50.1	50.3	50.5	50.6	50.7
	Ceramic & Soil	5.0	5.5	6.1	6.7	7.3	7.9	8.5	9.2	9.9	10.7	11.6	12.5	13.5	14.5	15.5	16.7	17.8	19.0
	Others	9.6	9.4	9.2	9.0	8.8	8.5	8.3	8.0	7.8	7.6	7.4	7.2	7.0	6.7	6.4	6.1	5.8	5.4
	Sub-Total	77.5	78.1	78.8	79.5	80.1	80.8	81.5	82.2	82.8	84.6	86.3	88.1	89.9	91.8	93.7	95.6	97.5	99.5
	Total	331.0	336.6	342.4	348.1	353.9	359.9	365.9	372.2	378.4	389.7	401.3	413.3	425.6	438.2	451.3	464.7	478.5	492.8
	Check	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ash(Household)	102.7	90.1	77.5	64.8	52	39.2	26.3	13.3	0.2	0	0	0	0	0	0	0	0	0
	! Total	433.7	426.7	419.9	412.9	405.9	399.1	392.2	385.5	378.6	389.7	401.3	413.3	425.6	438.2	451.3	464.7	478.5	492.8
	Check	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Road Sweeping	4.0	4.1	4.2	4.2	4.3	4.4	4.4	4.5	4.6	4.7	4.9	5.0	5.2	5.3	5.5	5.7	5.8	6.0
	Bulky Waste																		
0.5	Combustible	7.9	8.0	8.2	8.3	8.4	8.6	8.7	8.8	9.0	9.3	9.6	9.8	10.1	10.4	10.7	11.0	11.4	11.7
0.5	Non-combustible	7.9	8.0	8.2	8.3	8.4	8.6	8.7	8.8	9.0	9.3	9.6	9.8	10.1	10.4	10.7	11.0	11.4	11.7
	! Total	15.8	16.0	16.4	16.6	16.8	17.2	17.4	17.6	18.0	18.6	19.2	19.6	20.2	20.8	21.4	22.0	22.8	23.4
	MSW Total (including Bulky R/S)	453.5	446.8	440.5	433.7	427.0	420.7	414.0	407.6	401.2	413.0	425.4	437.9	451.0	464.3	478.2	492.4	507.1	522.2
	Others Waste																		
0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.18083	Ash (PECK)	14.9	15.2	15.4	15.7	15.9	16.2	16.5	16.7	17.0	17.5	18.1	18.6	19.1	19.7	20.3	20.9	21.5	22.2
0.49635	Sewage Sludge	40.9	41.6	42.3	43.0	43.7	44.4	45.2	46.0	46.7	48.1	49.6	51.0	52.6	54.2	55.7	57.4	59.1	60.9
0.32282	Others	26.6	27.1	27.5	28.0	28.4	28.9	29.4	29.9	30.4	31.3	32.2	33.2	34.2	35.2	36.3	37.3	38.4	39.6
1	! Total	82.4	83.8	85.2	86.6	88.1	89.5	91	92.6	94.1	96.9	99.9	102.8	105.9	109.1	112.3	115.6	119.1	122.6
	Check	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL WASTE (t/d)	535.9	530.6	525.7	520.3	515.1	510.2	505.0	500.2	495.3	509.9	525.3	540.7	556.9	573.4	590.5	608.0	626.2	644.8
	Check	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0
6	Recycling Center Amount																		
	Number of R/C	0	0	0	0	3	6	8	8	8	8	8	8	8	8	8	8	8	8
	R/C Ratio	0.000	0.000	0.000	0.000	0.375	0.750	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Incoming Amount (ton/day)																		
	Household Waste																		
0	Garbage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.17	Paper	0.0	0.0	0.0	0.0	4.8	10.0	13.8	14.4	14.9	15.7	16.5	17.3	18.2	19.1	20.0	21.0	22.0	23.1
0.17	Textile	0.0	0.0	0.0	0.0	1.5	3.1	4.1	4.1	4.0	4.1	4.1	4.1	4.2	4.2	4.2	4.3	4.3	4.3
0.17	Plastics	0.0	0.0	0.0	0.0	1.8	3.6	4.9	5.0	5.1	5.3	5.4	5.6	5.8	5.9	6.1	6.3	6.5	6.7
0.17	Grass & Wood	0.0	0.0	0.0	0.0	1.2	2.5	3.3	3.3	3.3	3.3	3.3	3.3	3.4	3.4	3.4	3.4	3.4	3.5
0.17	Leather & Rubber	0.0	0.0	0.0	0.0	0.5	0.9	1.2	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	0.9	0.9
	Sub-Total	0.0	0.0	0.0	0.0	9.8	20.1	27.3	27.9	28.4	29.5	30.4	31.4	32.6	33.6	34.7	36.0	37.1	38.4
0.18	Metal	0.0	0.0	0.0	0.0	1.0	2.0	2.8	2.9	3.0	3.1	3.2	3.4	3.5	3.7	3.8	4.0	4.2	4.4
0.17	Glass	0.0	0.0	0.0	0.0	3.2	6.3	8.4	8.3	8.3	8.3	8.4	8.4	8.5	8.5	8.6	8.6	8.6	8.6
0.17	Ceramic & Soil	0.0	0.0	0.0	0.0	0.5	1.0	1.5	1.6	1.7	1.8	2.0	2.1	2.3	2.5	2.6	2.8	3.0	3.2
0	Others	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Sub-Total	0.0	0.0	0.0	0.0	4.7	9.3	12.7	12.8	13.0	13.2	13.6	13.9	14.3	14.7	15.0	15.4	15.8	16.2
	Total	0.0	0.0	0.0	0.0	14.5	29.4	40.0	40.7	41.4	42.7	44.0	45.3	46.9	48.3	49.7	51.4	52.9	54.6
0	Ash(Household)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	! Household Total	0.0	0.0	0.0	0.0	14.5	29.4	40.0	40.7	41.4	42.7	44.0	45.3	46.9	48.3	49.7	51.4	52.9	54.6
	Bulky Waste																		
1	Combustible	0.0	0.0	0.0	0.0	3.2	6.5	8.7	8.8	9.0	9.3	9.6	9.8	10.1	10.4	10.7	11.0	11.4	11.7
1	Non-combustible	0.0	0.0	0.0	0.0	3.2	6.5	8.7	8.8	9.0	9.3	9.6	9.8	10.1	10.4	10.7	11.0	11.4	11.7
	! Bulky Total	0.0	0.0	0.0	0.0	6.4	13.0	17.4	17.6	18.0	18.6	19.2	19.6	20.2	20.8	21.4	22.0	22.8	23.4
	Others Waste																		
0	Road Sweeping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0	Ash (PECK)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0	Sewage Sludge	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0	Others	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	! Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	!!! R/C Incoming Total !!!																		
	Combustible	0.0	0.0	0.0	0.0	13.0	26.6	36.0	36.7	37.4	38.8	40.0	41.2	42.7	44.0	45.4	47.0	48.5	50.1
	Non-combustible	0.0	0.0	0.0	0.0	7.9	15.8	21.4	21.6	22.0	22.5	23.2	23.7	24.4	25.1	25.7	26.4	27.2	27.9
	Total	0.0	0.0	0.0	0.0	20.9	42.4	57.4	58.3	59.4	61.3	63.2	64.9	67.1	69.1	71.1	73.4	75.7	78.0
		0	0	0	0	0.056379822	0.112437019	0.149752152	0.149563879	0.149848638	0.150136705	0.150297365	0.14991915	0.150515926	0.150544662	0.150412524	0.150811588	0.151007381	0.151104223

5	Waste Amount (ton/day)																		
	MSW(ex Bulky, Road sweeping)																		
	Garbage	172.6																	
	Paper	142.1																	
	Textile	25.4																	
	Plastics	40.6																	
	Grass & Wood	20.3																	
	Leather & Rubber	5.1																	
	Sub-Total	406.0																	
	Metal	25.4																	
	Glass	50.8																	
	Ceramic & Soil	20.3																	
	Others	5.1																	
	Sub-Total	101.5																	
	Total	507.5																	
	Check	0.0																	
	Ash(Household)	0																	
	! Total	507.5																	
	Check	0.0																	
	Road Sweeping	6.1																	
	Bulky Waste																		
0.5	Combustible	12.1																	
0.5	Non-combustible	12.1																	
	! Total	24.2																	
	MSW Total (including Bulky R/S)	537.8																	
	Others Waste																		
0		0.0																	
0.18083	Ash (PECK)	22.8																	
0.49635	Sewage Sludge	62.7																	
0.32282	Others	40.8																	
1	! Total	126.3																	
	Check	0.0																	
	TOTAL WASTE (t/d)	664.1																	
	Check	0.1																	
6	Recycling Center Amount																		
	Number of R/C	8																	
	R/C Ratio	1.000																	
	Incoming Amount (ton/day)																		
	Household Waste																		
0	Garbage	0.0																	
0.17	Paper	24.2																	
0.17	Textile	4.3																	
0.17	Plastics	6.9																	
0.17	Grass & Wood	3.5																	
0.17	Leather & Rubber	0.9																	
	Sub-Total	39.8																	
0.18	Metal	4.6																	
0.17	Glass	8.6																	
0.17	Ceramic & Soil	3.5																	
0	Others	0.0																	
	Sub-Total	16.7																	
	Total	56.5																	
0	Ash(Household)	0.0																	
	! Household Total	56.5																	
	Bulky Waste																		
1	Combustible	12.1																	
1	Non-combustible	12.1																	
	! Bulky Total	34.2																	
	Others Waste																		
0	Road Sweeping	0.0																	
0	Ash (PECK)	0.0																	
0	Sewage Sludge	0.0																	
0	Others	0.0																	
	! Total	0.0																	
	!!! R/C Incoming Total !!!																		
	Combustible	51.9																	
	Non-combustible	28.8																	
	Total	80.7																	
		0.151777318																	

Waste amount DF 4(80%)

Waste amount DF 4(80%)

Outcome Amount (ton/day)																				
Household Waste																				
0	Garbage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.135	Paper	0.0	0.0	0.0	0.0	0.6	1.4	1.9	1.9	2.0	2.1	2.2	2.3	2.5	2.6	2.7	2.8	3.0	3.1	3.3
0.0938	Textile	0.0	0.0	0.0	0.0	0.1	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
0	Plastics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0	Grass & Wood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0	Leather & Rubber	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Sub-Total	0.0	0.0	0.0	0.0	0.7	1.7	2.3	2.3	2.4	2.5	2.6	2.7	2.9	3.0	3.1	3.2	3.4	3.5	3.7
0.18	Metal	0.0	0.0	0.0	0.0	0.2	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8
0.14	Glass	0.0	0.0	0.0	0.0	0.4	0.9	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
0	Ceramic & Soil	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0	Others	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Sub-Total	0.0	0.0	0.0	0.0	0.6	1.3	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0	2.0	2.0
	Total	0.0	0.0	0.0	0.0	1.3	3.0	4.0	4.0	4.1	4.3	4.4	4.5	4.7	4.9	5.0	5.1	5.4	5.5	5.7
Bulky Waste																				
0	Combustible	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.2	Non-combustible	0.0	0.0	0.0	0.0	0.6	1.3	1.7	1.8	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.3	2.3	2.4
	! Bulky Total	0.0	0.0	0.0	0.0	0.6	1.3	1.7	1.8	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.3	2.3	2.4
!!! R/C Outcome Total !!!																				
Recycling																				
	Combustible	0.0	0.0	0.0	0.0	0.7	1.7	2.3	2.3	2.4	2.5	2.6	2.7	2.9	3.0	3.1	3.2	3.4	3.5	3.7
	Non-combustible	0.0	0.0	0.0	0.0	1.2	2.6	3.4	3.5	3.5	3.7	3.7	3.8	3.8	4.0	4.0	4.1	4.3	4.3	4.4
	Sub - Total	0.0	0.0	0.0	0.0	1.9	4.3	5.7	5.8	5.9	6.2	6.3	6.5	6.7	7.0	7.1	7.3	7.7	7.8	8.1
Disposal																				
	Combustible	0.0	0.0	0.0	0.0	12.3	24.9	33.7	34.4	35.0	36.3	37.4	38.5	39.8	41.0	42.3	43.8	45.1	46.6	48.2
	Non-combustible	0.0	0.0	0.0	0.0	6.7	13.2	18.0	18.1	18.5	18.8	19.5	19.9	20.6	21.1	21.7	22.5	22.9	23.6	24.4
	Sub - Total	0.0	0.0	0.0	0.0	19.0	38.1	51.7	52.5	53.5	55.1	56.9	58.4	60.4	62.1	64.0	66.1	68.0	70.2	72.6
	!!! Total !!!	0.0	0.0	0.0	0.0	20.9	42.4	57.4	58.3	59.4	61.3	63.2	64.9	67.1	69.1	71.1	73.4	75.7	78.0	80.7
	Check	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7. Collection Service (ton/day)																				
Household Waste																				
	Garbage	112.2	114.1	116.1	118.1	120.1	122.1	124.2	126.3	128.4	132.3	136.3	140.4	144.6	148.9	153.3	157.9	162.6	167.5	172.6
	Paper	63.9	66.6	69.4	72.2	70.3	68.2	67.4	70.0	72.8	76.5	80.3	84.4	88.6	93.0	97.6	102.4	107.4	112.5	117.9
	Textile	24.2	24.1	24.1	24.1	22.5	20.9	19.8	19.7	19.8	19.9	20.1	20.3	20.3	20.5	20.7	20.7	20.8	21.0	21.1
	Plastics	26.1	26.6	27.1	27.6	26.2	24.9	24.1	24.5	25.0	25.7	26.5	27.3	28.1	29.0	29.9	29.9	30.8	31.7	32.7
	Grass & Wood	19.5	19.5	19.5	19.4	18.2	16.8	16.0	15.9	15.8	16.0	16.1	16.3	16.3	16.4	16.6	16.7	16.7	16.8	16.8
	Leather & Rubber	7.6	7.5	7.4	7.3	6.6	6.1	5.6	5.6	5.4	5.3	5.2	5.1	5.1	5.0	4.8	4.7	4.6	4.4	4.2
	Sub-Total	253.5	258.5	263.6	268.6	264.0	259.0	257.1	262.1	267.2	275.6	284.6	293.8	303.1	312.8	322.9	333.1	343.9	354.9	366.2
	Metal	12.6	13.0	13.5	13.9	13.4	12.9	12.6	13.0	13.4	14.0	14.7	15.3	16.1	16.7	17.6	18.3	19.1	19.9	20.8
	Glass	50.3	50.2	50.1	49.9	46.5	43.2	40.9	40.7	40.5	40.8	41.0	41.3	41.4	41.6	41.7	41.9	42.0	42.1	42.2
	Ceramic & Soil	5.0	5.5	6.1	6.7	6.8	6.9	7.0	7.6	8.2	8.9	9.6	10.4	11.2	12.0	12.9	13.9	14.8	15.8	16.8
	Others	9.6	9.4	9.2	9.0	8.8	8.5	8.3	8.0	7.8	7.6	7.4	7.2	7.0	6.7	6.4	6.1	5.8	5.4	5.1
	Sub-Total	77.5	78.1	78.8	79.5	75.4	71.5	68.8	69.4	69.8	71.4	72.7	74.2	75.6	77.1	78.7	80.2	81.7	83.3	84.8
	Total	331.0	336.6	342.4	348.1	339.4	330.5	325.9	331.5	337.0	347.0	357.3	368.0	378.7	389.9	401.6	413.3	425.6	438.2	451.0
	Ash(Household)	102.7	90.1	77.5	64.8	52.0	39.2	26.3	13.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	! Household Total	433.7	426.7	419.9	412.9	391.4	369.7	352.2	344.8	337.2	347.0	357.3	368.0	378.7	389.9	401.6	413.3	425.6	438.2	451.0
Bulky Waste																				
	Combustible	7.9	8.0	8.2	8.3	5.2	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Non-combustible	7.9	8.0	8.2	8.3	5.2	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	! Total	15.8	16.0	16.4	16.6	10.4	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
!!! Collection Service Total !!!																				
	Combustible	261.4	266.5	271.8	276.9	269.2	261.1	257.1	262.1	267.2	275.6	284.6	293.8	303.1	312.8	322.9	333.1	343.9	354.9	366.2
	Non-combustible	188.1	176.2	164.5	152.6	132.6	112.8	95.1	82.7	70.0	71.4	72.7	74.2	75.6	77.1	78.7	80.2	81.7	83.3	84.8
	Total	449.5	442.7	436.3	429.5	401.8	373.9	352.2	344.8	337.2	347.0	357.3	368.0	378.7	389.9	401.6	413.3	425.6	438.2	451.0
8. Direct Haulage (ton/day)																				
Road Sweeping		4	4.1	4.2	4.2	4.3	4.4	4.4	4.5	4.6	4.7	4.9	5	5.2	5.3	5.5	5.7	5.8	6	6.1
Others Waste																				
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ash (PEC)	14.9	15.2	15.4	15.7	15.9	16.2	16.5	16.7	17.0	17.5	18.1	18.6	19.1	19.7	20.3	20.9	21.5	22.2	22.8
	Sewage Sludge	40.9	41.6	42.3	43.0	43.7	44.4	45.2	46.0	46.7	48.1	49.6	51.0	52.6	54.2	55.7	57.4	59.1	60.9	62.7
	Others	26.6	27.1	27.5	28.0	28.4	28.9	29.4	29.9	30.4	31.3	32.2	33.2	34.2	35.2	36.3	37.3	38.4	39.6	40.8
	!Others Total	82.4	83.8	85.2	86.6	88.1	89.5	91.0	92.6	94.1	96.9	99.9	102.8	105.9	109.1	112.3	115.6	119.1	122.6	126.3
	!Direct Haulage Total	86.4	87.9	89.4	90.8	92.4	93.9	95.4	97.1	98.7	101.6	104.8	107.8	111.1	114.4	117.8	121.3	124.9	128.6	132.4

Waste amount DF 4(80%)

Waste amount DF 4(80%)

9_____

Summary

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Amount (ton/day)	535.9	530.6	525.7	520.3	515.1	510.2	505.0	500.2	495.3	509.9	525.3	540.7	556.9	573.4	590.5	608.0	626.2	644.8	664.1
Annual Amount (ton/year)	195,604	193,669	191,881	189,910	188,012	186,223	184,325	182,573	180,785	186,114	191,735	197,356	203,269	209,291	215,533	221,920	228,563	235,352	242,397
9_(1)_____Recycling center																			
Number of R/C	0	0	0	0	3	6	8	8	8	8	8	8	8	8	8	8	8	8	8
Incoming Amount (ton/day)	0.0	0.0	0.0	0.0	20.9	42.4	57.4	58.3	59.4	61.3	63.2	64.9	67.1	69.1	71.1	73.4	75.7	78.0	80.7
Outcome Amount (ton/day)	0.0	0.0	0.0	0.0	20.9	42.4	57.4	58.3	59.4	61.3	63.2	64.9	67.1	69.1	71.1	73.4	75.7	78.0	80.7
Recycling	0.0	0.0	0.0	0.0	1.9	4.3	5.7	5.8	5.9	6.2	6.3	6.5	6.7	7.0	7.1	7.3	7.7	7.8	8.1
To Incineration or Landfill (Comb.)	0.0	0.0	0.0	0.0	12.3	24.9	33.7	34.4	35.0	36.3	37.4	38.5	39.8	41.0	42.3	43.8	45.1	46.6	48.2
To Landfill (Non-combustible)	0.0	0.0	0.0	0.0	6.7	13.2	18.0	18.1	18.5	18.8	19.5	19.9	20.6	21.1	21.7	22.3	22.9	23.6	24.4
Annual Recycling Amount	0.0	0.0	0.0	0.0	694.0	1,570.0	2,081.0	2,117.0	2,154.0	2,263.0	2,300.0	2,373.0	2,446.0	2,555.0	2,592.0	2,665.0	2,811.0	2,847.0	2,957.0
9_(2)_____Incineration																			
Number of Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0
Incineration Capacity (ton/day)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	159.0	159.0	159.0	159.0	159.0	318.1	318.1	318.1	318.1	477.1
Collection Service (Comb.)	261.4	266.5	271.8	276.9	269.2	261.1	257.1	262.1	267.2	275.6	284.6	293.8	303.1	312.8	322.9	333.1	343.9	354.9	366.2
R/C Residue (Comb.)	0.0	0.0	0.0	0.0	12.3	24.9	33.7	34.4	35.0	36.3	37.4	38.5	39.8	41.0	42.3	43.8	45.1	46.6	48.2
Sewage Sludge	40.9	41.6	42.3	43.0	43.7	44.4	45.2	46.0	46.7	48.1	49.6	51.0	52.6	54.2	55.7	57.4	59.1	60.9	62.7
Total (ton/day)	302.3	308.1	314.1	319.9	325.2	330.4	336.0	342.5	348.9	360.0	371.6	383.3	395.4	408.0	421.0	434.3	448.1	462.4	477.1
Total (ton/year)	110,340	112,444	114,632	116,764	118,694	120,598	122,638	125,008	127,341	131,411	135,620	139,905	144,328	148,918	153,654	158,521	163,559	168,762	174,137
Incoming Amount (ton/day)	302.3	308.1	314.1	319.9	325.2	330.4	336.0	342.5	348.9	360.0	371.6	383.3	395.4	408.0	421.0	434.3	448.1	462.4	477.1
Incineration Amount (ton/day)																			
Collection + R/C Resid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	110.9	109.4	108.0	106.4	104.8	262.4	260.7	259.0	257.2	414.4
Sewage Sludge	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.1	49.6	51.0	52.6	54.2	55.7	57.4	59.1	60.9	62.7
!!!!!! Incineration Total !!!!!!	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	159.0	159.0	159.0	159.0	159.0	318.1	318.1	318.1	318.1	477.1
Annual Incin. Amount(ton/year)	0	0	0	0	0	0	0	0	0	58,035	58,035	58,035	58,035	58,035	116,107	116,107	116,107	116,107	174,142
Outcome																			
Combustible Waste (ton/day)																			
Collection + R/C Residue	261.4	266.5	271.8	276.9	281.5	286.0	290.8	296.5	302.2	201.0	212.6	224.3	236.5	249.0	102.8	116.2	130.0	144.3	0.0
Sewage Sludge	40.9	41.6	42.3	43.0	43.7	44.4	45.2	46.0	46.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.34 Slag and Ash (ton/day)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.1	54.1	54.1	54.1	54.1	108.2	108.2	108.2	108.2	162.2
!!! Outcome Total !!! (ton/day)	302.3	308.1	314.1	319.9	325.2	330.4	336.0	342.5	348.9	255.1	266.7	278.4	290.6	303.1	211.0	224.4	238.2	252.5	162.2
!!! Outcome Total !!! (ton/year)	110,340	112,457	114,647	116,764	118,698	120,596	122,640	125,013	127,349	93,112	97,346	101,616	106,069	110,632	77,015	81,906	86,943	92,163	59,203
0.8 Heat Recovery (Gcal/day)	0	0	0	0	0	0	0	0	0	217	215	214	212	210	503	501	501	499	795
4.1868 Heat Recovery (GJ/day)	0	0	0	0	0	0	0	0	0	909	900	896	888	879	2,106	2,098	2,098	2,089	3,329
Annual Heat Recovery (Gcal/year)	0	0	0	0	0	0	0	0	0	79,205	78,475	78,110	77,380	76,650	183,595	182,865	182,865	182,135	290,175
Annual Heat Recovery (GJ/year)	0	0	0	0	0	0	0	0	0	331,785	328,500	327,040	324,120	320,835	768,690	765,770	765,770	762,485	1,215,085
9_(3)_____Landfill																			
Incoming Amount (ton/day)																			
Combustible(Collection+R/C Re)	261.4	266.5	271.8	276.9	281.5	286.0	290.8	296.5	302.2	201.0	212.6	224.3	236.5	249.0	102.8	116.2	130.0	144.3	0.0
Non-Comb.(Collection Service)	85.4	86.1	87.0	87.8	80.6	73.6	68.8	69.4	69.8	71.4	72.7	74.2	75.6	77.1	78.7	80.5	81.7	83.3	84.8
Non-Comb.(Collection Ash)	102.7	90.1	77.5	64.8	52.0	39.2	26.3	13.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Road Sweeping	4.0	4.1	4.2	4.2	4.3	4.4	4.4	4.5	4.6	4.7	4.9	5.0	5.2	5.3	5.5	5.7	5.8	6.0	6.1
Sewage Sludge (Direct Haulage)	40.9	41.6	42.3	43.0	43.7	44.4	45.2	46.0	46.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Others(Direct Haulage)	41.5	42.2	42.9	43.6	44.4	45.1	45.8	46.6	47.4	48.8	50.3	51.8	53.3	54.9	56.6	58.2	60.0	61.7	63.6
R/C Residues (Non-Combustible)	0.0	0.0	0.0	0.0	6.7	13.2	18.0	18.1	18.5	18.8	19.5	19.9	20.6	21.1	21.7	22.3	22.9	23.6	24.4
Slag and Ash (Incinerator)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.1	54.1	54.1	54.1	54.1	108.2	108.2	108.2	108.2	162.2
!!!!!! Incoming Total !!!!!!	535.9	530.6	525.7	520.3	513.2	505.9	499.3	494.4	489.4	398.8	414.1	429.3	445.3	461.5	373.5	390.8	408.6	427.1	341.1
Annual Incoming Amount(t/y)	195,604	193,669	191,881	189,910	187,318	184,654	182,245	180,456	178,631	145,562	151,147	156,695	162,535	168,448	136,328	142,642	149,139	155,893	124,502
Annual Collection Ash Amount(t/y)	37,486	32,887	28,288	23,652	18,980	14,308	9,600	4,855	73	0	0	0	0	0	0	0	0	0	0
Incoming Amount (cu. m/day)																			
0.8 Combustible(Collection+R/C Re)	326.8	333.1	339.8	346.1	351.9	357.5	363.5	370.6	377.8	251.3	265.8	280.4	295.6	311.3	128.5	145.3	162.5	180.4	0.0
0.8 Non-Comb.(Collection Service)	106.8	107.6	108.8	109.8	100.8	92.0	86.0	86.8	87.3	89.3	90.9	92.8	94.5	96.4	98.4	100.3	102.1	104.1	106.0
1.1 Non-Comb.(Collection Ash)	93.4	81.9	70.5	58.9	47.3	35.6	23.9	12.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.1 Road Sweeping	3.6	3.7	3.8	3.8	3.9	4.0	4.0	4.1	4.2	4.3	4.5	4.5	4.7	4.8	5.0	5.2	5.3	5.5	5.5
0.8 Sewage Sludge (Direct Haulage)	51.1	52.0	52.9	53.8	54.6	55.5	56.5	57.5	58.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.8 Others(Direct Haulage)	51.9	52.8	53.6	54.5	55.5	56.3	57.3	58.3	59.2	61.0	62.9	64.7	66.7	68.7	70.7	72.8	75.0	77.2	79.5
0.8 R/C Residues (Non-Combustible)	0.0	0.0	0.0	0.0	8.4	16.5	22.5	22.6	23.1	23.5	24.4	24.9	25.8	26.4	27.1	27.9	28.6	29.5	30.5
1.1 Slag and Ash (Incinerator)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	49.2	49.2	49.2	49.2	49.2	98.4	98.4	98.4	98.4	147.5
!!!!!! Incoming Total !!!!!!	633.6	631.1	629.4	626.9	622.4	617.4	613.7	612.0	610.2	478.6	497.7	516.5	536.5	556.8	428.1	449.9	471.9	495.1	369.0
Annual Incoming Amount(cu. m/y)	231,264	230,352	229,731	228,819	227,176	225,351	224,001	223,380	222,723	174,689	181,661	188,523	195,823	203,232	156,257	164,214	172,244	180,712	134,685
				228,819	455,995	681,346	905,347	1,128,727	1,351,450	1,526,139	1,707,800	1,896,323	2,092,146	2,295,378	2,451,635	2,615,849	2,788,093	2,968,805	3,103,490

Waste amount DF 4(80%)

Waste amount DF 4(30%)

9_(4)_____Collection																			
0.0111 Collection Ratio(Collection Service)	0.9000	0.9111	0.9222	0.9333	0.9444	0.9555	0.9666	0.9777	0.9888	1	1	1	1	1	1	1	1	1	1
West Discharge (ton/day)	439.5	442.7	436.3	429.5	401.8	373.9	352.2	344.8	337.2	347.0	357.3	368.0	378.7	389.9	401.6	413.3	425.6	438.2	451
disposal or treatment amount	404.6	403.3	402.4	400.9	379.5	357.3	340.4	337.1	333.4	347.0	357.3	368.0	378.7	389.9	401.6	413.3	425.6	438.2	451.0
Check !!!!	-1.6	-1.5	-1.3	-1.1	-0.6	-0.2	0	0	0	0	0	0	-5.68434E-14	0	5.68434E-14	0	5.68434E-14	0	0
Actual Amount (ton/day)																			
Collection Service Total	406.2	404.8	403.7	402	380.1	357.5	340.4	337.1	333.4	347	357.3	368	378.7	389.9	401.6	413.3	425.6	438.2	451
Combustible	228.2	235.5	243.1	250.7	249.3	247.5	248.5	256.3	264.2	275.6	284.6	293.8	303.1	312.8	322.9	333.1	343.9	354.9	366.2
Non-comb.	162.2	153.3	144.2	134.7	120.4	105.8	91.9	80.8	69.2	71.4	72.7	74.2	75.6	77.1	78.7	80.2	81.7	83.3	84.8
Bulky Waste	15.8	16.0	16.4	16.6	10.4	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Direct Haulage Total	86.4	87.9	89.4	90.8	92.4	93.9	95.4	97.1	98.7	101.6	104.8	107.8	111.1	114.4	117.8	121.3	124.9	128.6	132.4
Road Sweeping	4.0	4.1	4.2	4.2	4.3	4.4	4.4	4.5	4.6	4.7	4.9	5.0	5.2	5.3	5.5	5.7	5.8	6.0	6.1
Sewage Sludge	40.9	41.6	42.3	43.0	43.7	44.4	45.2	46.0	46.7	48.1	49.6	51.0	52.6	54.2	55.7	57.4	59.1	60.9	62.7
Non-Comb.	41.5	42.2	42.9	43.6	44.4	45.1	45.8	46.6	47.4	48.8	50.3	51.8	53.3	54.9	56.6	58.2	60.0	61.7	63.6
Citizen Transport Total	0.0	0.0	0.0	0.0	20.9	42.4	57.4	58.3	59.4	61.3	63.2	64.9	67.1	69.1	71.1	73.4	75.7	78.0	80.7
Combustible	0.0	0.0	0.0	0.0	13.0	26.6	36.0	36.7	37.4	38.8	40.0	41.2	42.7	44.0	45.4	47.0	48.5	50.1	51.9
Non-comb.	0.0	0.0	0.0	0.0	7.9	15.8	21.4	21.6	22.0	22.5	23.2	23.7	24.4	25.1	25.7	26.4	27.2	27.9	28.8
Total	492.6	492.7	493.1	492.8	493.4	493.8	493.2	492.5	491.5	509.9	525.3	540.7	556.9	573.4	590.5	608.0	626.2	644.8	664.1
Illegal Dumping	43.3	37.9	32.6	27.5	21.7	16.4	11.8	7.7	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Check !!!!!	0	0	0	0	0	0	0	0	0	0	0	0	1.13687E-13	1.13687E-13	0	0	0	0	0
Actual Amount (ton/year)																			
Collection Service Total	148,263	147,753	147,351	146,731	138,737	130,488	124,247	123,042	121,691	126,655	130,415	134,320	138,226	142,314	146,585	150,855	155,345	159,944	164,615
Combustible	83,293	85,958	88,732	91,506	90,995	90,338	90,703	93,550	96,433	100,594	103,879	107,237	110,632	114,172	117,859	121,582	125,524	129,539	133,663
Non-comb.	59,203	55,955	52,633	49,166	43,946	38,617	33,544	29,492	25,258	26,061	26,536	27,083	27,594	28,142	28,726	29,273	29,821	30,405	30,952
Bulky Waste	5,767	5,840	5,986	6,059	3,796	1,533	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct Haulage Total	30,977	30,587	31,099	31,609	32,157	32,668	33,215	33,799	34,347	35,369	36,464	37,522	38,654	39,822	40,990	42,194	43,472	44,750	46,100
Sewage Sludge	14,929	15,184	15,440	15,695	15,951	16,206	16,498	16,790	17,046	17,557	18,104	18,615	19,199	19,783	20,331	20,951	21,572	22,229	22,886
Non-Comb.	15,148	15,403	15,659	15,916	16,206	16,462	16,717	17,009	17,301	17,812	18,360	18,907	19,455	20,039	20,659	21,243	21,900	22,521	23,214
Citizen Transport Total	0	0	0	0	7,629	15,476	20,951	21,280	21,681	22,375	23,058	23,689	24,492	25,222	25,952	26,791	27,631	28,471	29,456
Combustible	0	0	0	0	4,745	9,709	13,140	13,396	13,651	14,162	14,600	15,038	15,586	16,060	16,571	17,155	17,703	18,287	18,944
Non-comb.	0	0	0	0	2,884	5,767	7,811	7,884	8,030	8,213	8,468	8,651	8,906	9,162	9,381	9,636	9,928	10,184	10,512
Total	178,340	178,340	178,450	178,340	178,523	178,632	178,413	178,121	177,719	184,399	189,947	195,531	201,372	207,358	213,527	219,840	226,448	233,165	240,171
Illegal Dumping	15,805	13,834	11,899	10,038	7,921	5,986	4,307	2,810	1,387	0	0	0	0	0	0	0	0	0	0

Waste amount DF 4(80%)

Waste amount DF 4(80%)

10	Heat Value																		
	Household Waste Composition(%)																		
	Garbage	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0
	Paper	19.3	19.8	20.3	20.7	21.2	21.7	22.2	22.7	23.2	23.6	24.1	24.6	25.1	25.6	26.1	26.5	27.0	27.5
	Textile	7.3	7.2	7.0	6.9	6.8	6.7	6.5	6.4	6.3	6.1	6.0	5.9	5.8	5.6	5.5	5.4	5.3	5.1
	Plastics	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
	Grass & Wood	5.9	5.8	5.7	5.6	5.5	5.4	5.3	5.2	5.1	4.9	4.8	4.7	4.6	4.5	4.4	4.3	4.2	4.1
	Leather & Rubber	2.3	2.2	2.2	2.1	2.0	1.9	1.9	1.8	1.7	1.7	1.6	1.5	1.4	1.4	1.3	1.2	1.1	1.1
	Sub-Total	76.6	76.8	77.0	77.2	77.4	77.5	77.7	77.9	78.1	78.3	78.5	78.7	78.9	79.1	79.2	79.4	79.6	79.8
	Calorific Value (charily/chg.)																		
1400	Garbage	475	475	475	475	475	475	475	475	475	475	475	475	476	476	476	476	476	476
2550	Paper	492	504	517	529	541	554	566	578	591	603	615	628	640	652	665	677	689	702
2450	Textile	179	176	173	169	166	163	160	157	154	151	148	144	141	138	135	132	129	126
6900	Plastics	545	545	546	546	547	547	547	548	548	549	549	549	550	550	550	551	551	552
630	Grass & Wood	37	37	36	35	35	34	33	33	32	31	31	30	29	29	28	27	27	26
3400	Leather & Rubber	78	76	73	71	68	66	63	61	59	56	54	51	49	46	44	41	39	36
	All Waste Calorific Value (charily/chg.)	1,806	1,813	1,820	1,825	1,832	1,839	1,844	1,852	1,859	1,865	1,872	1,877	1,885	1,891	1,898	1,904	1,911	1,918
	Combustible Waste Calorific	2,358	2,361	2,364	2,365	2,368	2,372	2,372	2,377	2,380	2,382	2,385	2,386	2,390	2,392	2,395	2,397	2,400	2,403
	Moisture Contents																		
0.5579	Garbage	18.91	18.92	18.92	18.92	18.93	18.93	18.93	18.93	18.94	18.94	18.94	18.95	18.95	18.95	18.96	18.96	18.96	18.97
0.2737	Paper	5.28	5.41	5.55	5.68	5.81	5.94	6.08	6.21	6.34	6.47	6.61	6.74	6.87	7.00	7.13	7.27	7.40	7.53
0.2875	Textile	2.10	2.06	2.03	1.99	1.95	1.92	1.88	1.84	1.80	1.77	1.73	1.69	1.66	1.62	1.58	1.55	1.51	1.47
0.2776	Plastics	2.19	2.19	2.20	2.20	2.20	2.20	2.20	2.20	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.22	2.22	2.22
0.7322	Grass & Wood	4.32	4.24	4.17	4.09	4.01	3.93	3.86	3.78	3.70	3.62	3.55	3.47	3.39	3.32	3.24	3.16	3.08	3.01
0.2788	Leather & Rubber	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.48	0.46	0.44	0.42	0.40	0.38	0.36	0.34	0.32	0.30
	Total	33.44	33.44	33.47	33.46	33.46	33.46	33.47	33.46	33.47	33.47	33.48	33.48	33.48	33.48	33.48	33.50	33.49	33.50
	Combustible Contents																		
	Garbage	14.99	14.99	14.99	15.00	14.99	15.00	15.00	15.01	15.00	15.01	15.02	15.01	15.02	15.02	15.02	15.02	15.03	15.02
	Paper	14.02	14.37	14.72	15.07	15.42	15.78	16.12	16.47	16.83	17.18	17.52	17.88	18.23	18.58	18.94	19.28	19.63	19.99
	Textile	5.20	5.11	5.01	4.93	4.84	4.74	4.65	4.57	4.48	4.38	4.29	4.20	4.11	4.02	3.93	3.83	3.75	3.66
	Plastics	5.71	5.72	5.71	5.72	5.72	5.73	5.73	5.74	5.73	5.74	5.75	5.75	5.76	5.76	5.77	5.76	5.77	5.77
	Grass & Wood	1.58	1.55	1.52	1.49	1.47	1.44	1.41	1.38	1.36	1.33	1.29	1.27	1.24	1.21	1.18	1.16	1.13	1.10
	Leather & Rubber	1.66	1.61	1.56	1.50	1.45	1.40	1.35	1.29	1.24	1.19	1.14	1.09	1.03	0.98	0.93	0.88	0.82	0.77
	Total	43.16	43.35	43.51	43.71	43.90	44.08	44.29	44.46	44.64	44.83	45.01	45.20	45.39	45.58	45.76	45.93	46.13	46.31
35.71	Moisture	35.71	35.71	35.71	35.71	35.71	35.71	35.71	35.71	35.71	35.71	35.71	35.71	35.71	35.71	35.71	35.71	35.71	35.71
	Combustible	38.05	38.14	38.24	38.33	38.43	38.52	38.61	38.71	38.80	38.89	38.99	39.08	39.18	39.27	39.36	39.46	39.55	39.65
	Non-combustible	26.24	26.15	26.05	25.96	25.86	25.77	25.68	25.58	25.49	25.40	25.30	25.21	25.11	25.02	24.93	24.83	24.74	24.64
		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	Dry Comb. Lower Calorific Value	5,309.50	5,315.30	5,319.70	5,320.30	5,324.60	5,330.40	5,330.90	5,337.80	5,343.50	5,346.50	5,350.80	5,351.20	5,358.00	5,361.00	5,366.50	5,368.10	5,373.60	5,377.70
	All Waste Lower Calorific Value	1,806	1,813	1,820	1,825	1,832	1,839	1,844	1,852	1,859	1,865	1,872	1,877	1,885	1,891	1,898	1,904	1,911	1,918
	Check	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Moisture + Comb.	76.60	76.79	76.98	77.17	77.36	77.54	77.73	77.92	78.11	78.30	78.49	78.68	78.87	79.06	79.24	79.43	79.62	79.81
	Moisture	43.66	43.55	43.48	43.36	43.25	43.15	43.06	42.94	42.85	42.75	42.66	42.55	42.45	42.35	42.25	42.17	42.06	41.97
90	Combustible	46.34	46.45	46.52	46.64	46.75	46.85	46.94	47.06	47.15	47.25	47.34	47.45	47.55	47.65	47.75	47.83	47.94	48.03
10	Non-combustible	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Separate Calorific	2198.5	2207.7	2213.8	2221.3	2229.8	2238.4	2244	2254.3	2262.4	2269.7	2277.1	2283.8	2293	2300.4	2309	2314.5	2323.7	2331.1
1	Design Number	2,199	2,208	2,214	2,221	2,230	2,238	2,244	2,254	2,262	2,270	2,277	2,284	2,293	2,300	2,309	2,315	2,324	2,331
400	Sewage Sludge	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Total Calorific (kcal/kg)										1,704	1,691	1,680	1,667	1,652	1,975	1,969	1,967	1,961
		1,956	1,964	1,970	1,976	1,984	1,991	1,996	2,005	2,013	2,020	2,027	2,033	2,041	2,048	2,056	2,062	2,070	2,077

Waste amount DF 4(80%)

Waste amount DF 4(80%)

11._____Figure

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Waste amount (ton/day)	535.8	530.6	525.6	520.2	515.1	510.1	504.9	500.2	495.2	509.8	525.2	540.7	556.9	573.4	590.5	608.0	626.1	644.8	664.0
RC Incoming amount (ton/day)	0.0	0.0	0.0	0.0	20.9	42.4	57.4	58.3	59.4	61.3	63.2	64.9	67.1	69.1	71.1	73.4	75.7	78.0	80.7
Recycling Amount (ton/day)	0.0	0.0	0.0	0.0	1.9	4.3	5.7	5.8	5.9	6.2	6.3	6.5	6.7	7.0	7.1	7.3	7.7	7.8	8.1
Incineration Amount (ton/day)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	159.0	159.0	159.0	159.0	159.0	318.1	318.1	318.1	318.1	477.1
Landfill Amount (ton/day)	535.9	530.6	525.7	520.3	513.2	505.9	499.3	494.4	489.4	398.8	414.1	429.3	445.3	461.5	373.5	390.8	408.6	427.1	341.1

Waste Composition (%)

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Garbage	33.9	33.91	33.91	33.92	33.93	33.93	33.93	33.94	33.94	33.95	33.96	33.96	33.97	33.97	33.98	33.98	33.99	33.99	34.00
Paper	19.3	19.78	20.27	20.75	21.23	21.72	22.20	22.68	23.17	23.65	24.13	24.62	25.10	25.58	26.07	26.55	27.03	27.52	28.00
Textile	7.3	7.17	7.04	6.92	6.79	6.66	6.53	6.41	6.28	6.15	6.02	5.89	5.77	5.64	5.51	5.38	5.26	5.13	5.00
Plastics	7.9	7.91	7.91	7.92	7.92	7.93	7.93	7.94	7.94	7.95	7.96	7.96	7.97	7.97	7.98	7.98	7.99	7.99	8.00
Grass & Wood	5.9	5.79	5.69	5.58	5.48	5.37	5.27	5.16	5.06	4.95	4.84	4.74	4.63	4.53	4.42	4.32	4.21	4.11	4.00
Leather & Rubber	2.3	2.23	2.16	2.08	2.01	1.94	1.87	1.79	1.72	1.65	1.58	1.51	1.43	1.36	1.29	1.22	1.14	1.07	1.00
Metal	3.8	3.87	3.93	4.00	4.07	4.13	4.20	4.27	4.33	4.40	4.47	4.53	4.60	4.67	4.73	4.80	4.87	4.93	5.00
Glass	15.2	14.91	14.62	14.33	14.04	13.76	13.47	13.18	12.89	12.60	12.31	12.02	11.73	11.44	11.16	10.87	10.58	10.29	10.00
Ceramic & Soil	1.5	1.64	1.78	1.92	2.06	2.19	2.33	2.47	2.61	2.75	2.89	3.03	3.17	3.31	3.44	3.58	3.72	3.86	4.00
Others	2.9	2.79	2.69	2.58	2.48	2.37	2.27	2.16	2.06	1.95	1.84	1.74	1.63	1.53	1.42	1.32	1.21	1.11	1.00
	100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Waste amount (ton/day)	535.8	530.6	525.6	520.2	515.1	510.1	504.9	500.2	495.2	509.8	525.2	540.7	556.9	573.4	590.5	608.0	626.1	644.8	664.0
MSW Total Amount (ton/day)	453.4	446.8	440.4	433.6	427.0	420.6	413.9	407.6	401.1	412.9	425.3	437.9	451.0	464.3	478.2	492.4	507.0	522.2	537.7
? ????? Amount (ton/day)	43.3	37.9	32.6	27.5	21.7	16.4	11.8	7.7	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MSW (ex RS& Bulky)	433.7	426.7	419.9	412.9	405.9	399.1	392.2	385.5	378.6	389.7	401.3	413.3	425.6	438.2	451.3	464.7	478.5	492.8	507.5
Road Sweeping	4.0	4.1	4.2	4.2	4.3	4.4	4.4	4.5	4.6	4.7	4.9	5.0	5.2	5.3	5.5	5.7	5.8	6.0	6.1
Bulky	15.7	16.0	16.3	16.5	16.8	17.1	17.3	17.6	17.9	18.5	19.1	19.6	20.2	20.8	21.4	22.0	22.7	23.4	24.1
Other Waste	82.4	83.8	85.2	86.6	88.1	89.5	91.0	92.6	94.1	96.9	99.9	102.8	105.9	109.1	112.3	115.6	119.1	122.6	126.3
Sewage Sludge	40.9	41.6	42.3	43.0	43.7	44.4	45.2	46.0	46.7	48.1	49.6	51.0	52.6	54.2	55.7	57.4	59.1	60.9	62.7
PEC Ash	14.9	15.2	15.4	15.7	15.9	16.2	16.5	16.7	17.0	17.5	18.1	18.6	19.1	19.7	20.3	20.9	21.5	22.2	22.8
Other	26.6	27.1	27.5	28.0	28.4	28.9	29.4	29.9	30.4	31.3	32.2	33.2	34.2	35.2	36.3	37.3	38.4	39.6	40.8
Collection Service Amount (ton/day)																			
Collection Ratio (%)	90.00	91.11	92.22	93.33	94.44	95.55	96.66	97.77	98.88	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100 % Collection Amount	449.5	442.7	436.3	429.5	401.8	373.9	352.2	344.8	337.2	347.0	357.3	368.0	378.7	389.9	401.6	413.3	425.6	438.2	451.0
Collection Amount	404.2	404.8	403.7	402.0	380.1	357.5	340.4	337.1	333.4	347.0	357.3	368.0	378.7	389.9	401.6	413.3	425.6	438.2	451.0
Combustible Waste	228.2	235.5	243.1	250.7	249.3	247.5	248.5	256.3	264.2	275.6	284.6	293.8	303.1	312.8	322.9	333.1	343.9	354.9	366.2
Non-combustible Waste	162.2	153.3	144.2	134.7	120.4	105.8	91.9	80.8	69.2	71.4	72.7	74.2	75.6	77.1	78.7	80.2	81.7	83.3	84.8
Bulky	15.8	16.0	16.4	16.6	10.4	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
? ????? Amount (ton/day)	43.3	37.9	32.6	27.5	21.7	16.4	11.8	7.7	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Check	5.68434E-14	5.68434E-14	-1.13687E-13	0	0	5.68434E-14	0	0	1.13687E-13	-5.68434E-14	-1.13687E-13	0	0	0	5.68434E-14	-1.13687E-13	-5.68434E-14	-1.13687E-13	0
Road Sweeping Amount (ton/day)	4.0	4.1	4.2	4.2	4.3	4.4	4.4	4.5	4.6	4.7	4.9	5.0	5.2	5.3	5.5	5.7	5.8	6.0	6.1
Combustible Waste	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-combustible Waste	4.0	4.1	4.2	4.2	4.3	4.4	4.4	4.5	4.6	4.7	4.9	5.0	5.2	5.3	5.5	5.7	5.8	6.0	6.1
Citizen Transport (ton/day)	0.0	0.0	0.0	0.0	20.9	42.4	57.4	58.3	59.4	61.3	63.2	64.9	67.1	69.1	71.1	73.4	75.7	78.0	80.7
Combustible Waste	0.0	0.0	0.0	0.0	13.0	26.6	36.0	36.7	37.4	38.8	40.0	41.2	42.7	44.0	45.4	47.0	48.5	50.1	51.9
Non-combustible Waste	0.0	0.0	0.0	0.0	7.9	15.8	21.4	21.6	22.0	22.5	23.2	23.7	24.4	25.1	25.7	26.4	27.2	27.9	28.8
Recycling Center(ton/day)																			
Incoming	0.0	0.0	0.0	0.0	20.9	42.4	57.4	58.3	59.4	61.3	63.2	64.9	67.1	69.1	71.1	73.4	75.7	78.0	80.7
Combustible Waste	0.0	0.0	0.0	0.0	13.0	26.6	36.0	36.7	37.4	38.8	40.0	41.2	42.7	44.0	45.4	47.0	48.5	50.1	51.9
Non-combustible Waste	0.0	0.0	0.0	0.0	7.9	15.8	21.4	21.6	22.0	22.5	23.2	23.7	24.4	25.1	25.7	26.4	27.2	27.9	28.8
Outcome	0.0	0.0	0.0	0.0	20.9	42.4	57.4	58.3	59.4	61.3	63.2	64.9	67.1	69.1	71.1	73.4	75.7	78.0	80.7
Recycling	0.0	0.0	0.0	0.0	1.9	4.3	5.7	5.8	5.9	6.2	6.3	6.5	6.7	7.0	7.1	7.3	7.7	7.8	8.1
Combustible Waste	0.0	0.0	0.0	0.0	0.7	1.7	2.3	2.3	2.4	2.5	2.6	2.7	2.9	3.0	3.1	3.2	3.4	3.5	3.7
Non-combustible Waste	0.0	0.0	0.0	0.0	1.2	2.6	3.4	3.5	3.5	3.7	3.7	3.8	3.8	4.0	4.0	4.1	4.3	4.3	4.4
To Landfill (Non-comb.)	0.0	0.0	0.0	0.0	6.7	13.2	18.0	18.1	18.5	18.8	19.5	19.9	20.6	21.1	21.7	22.3	22.9	23.6	24.4
To Incinerator or Landfill (Comb.)	0.0	0.0	0.0	0.0	12.3	24.9	33.7	34.4	35.0	36.3	37.4	38.5	39.8	41.0	42.3	43.8	45.1	46.6	48.2
Incineration Plant (ton/day)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	159.0	159.0	159.0	159.0	159.0	318.1	318.1	318.1	318.1	477.1
Incoming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	159.0	159.0	159.0	159.0	159.0	318.1	318.1	318.1	318.1	477.1
From Collection Service	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	74.6	72.0	69.5	66.6	63.8	220.1	216.9	213.9	210.6	366.2
From Recycling Center	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.3	37.4	38.5	39.8	41.0	42.3	43.8	45.1	46.6	48.2
Sewage Sludge	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.1	49.6	51.0	52.6	54.2	55.7	57.4	59.1	60.9	62.7
Outcome																			
To Landfill (slag & ash)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.1	54.1	54.1	54.1	54.1	108.2	108.2	108.2	108.2	162.2

Waste amount DF 4(80%)

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Landfill Amount (ton/day)																			
Total Amount	535.9	530.6	525.7	520.3	513.2	505.9	499.3	494.4	489.4	398.8	414.1	429.3	445.3	461.5	373.5	390.8	408.6	427.1	341.1
Slag & Ash (from Incinerator)	0	0	0	0	0	0	0	0	0	54.1	54.1	54.1	54.1	54.1	108.2	108.2	108.2	108.2	162.2
Total -(slag & Ash)	535.9	530.6	525.7	520.3	513.2	505.9	499.3	494.4	489.4	344.7	360	375.2	391.2	407.4	265.3	282.6	300.4	318.9	178.9
Annual Amount (ton/year)	195,604	193,669	191,881	189,910	187,318	184,654	182,245	180,456	178,631	145,562	151,147	156,695	162,535	168,448	136,328	142,642	149,139	155,892	124,502
Slag & Ash (from Incinerator)	0	0	0	0	0	0	0	0	0	19,747	19,747	19,747	19747	19,747	39,493	39,493	39,493	39,493	59,203
Total -(slag & Ash)	195,604	193,669	191,881	189,910	187,318	184,654	182,245	180,456	178,631	125,816	131,400	136,948	142,788	148,701	96,835	103,149	109,646	116,399	65,299
Landfill Amount (cu.m/day)																			
Total Amount	632.6	631.1	629.4	626.9	622.4	617.4	613.7	612	610.2	478.6	497.7	516.5	536.5	556.8	428.1	449.9	471.9	495.1	369
Slag & Ash (from Incinerator)	0	0	0	0	0	0	0	0	0	49.2	49.2	49.2	49.2	49.2	98.4	98.4	98.4	98.4	147.5
Total -(slag & Ash)	633.6	631.1	629.4	626.9	622.4	617.4	613.7	612	610.2	429.4	448.5	467.3	487.3	507.6	329.7	351.5	373.5	396.7	221.5
Annual Amount (cu.m/year)	231,264	230,352	229,731	228,819	227,176	225,351	224,001	223,380	222,723	174,689	181,661	188,523	195,823	203,232	156,257	164,314	172,244	180,712	134,665
Slag & Ash (from Incinerator)	0	0	0	0	0	0	0	0	0	17,958	17,958	17,958	17,958	17,958	35,916	35,916	35,916	35,916	53,838
Total -(slag & Ash)	231,264	230,352	229,731	228,819	227,176	225,351	224,001	223,380	222,723	156,731	163,703	170,565	177,865	185,274	120,341	128,398	136,328	144,796	80,848
Accumulated Amount (cu.m)				228,819	455,995	681,346	905,347	1,128,727	1,351,450	1,526,139	1,707,800	1,896,323	2,092,146	2,295,378	2,451,635	2,615,949	2,788,093	2,968,805	3,103,490
Slag & Ash (from Incinerator)				0	0	0	0	0	0	17,958	35,916	53,874	71,832	89,790	125,706	161,622	197,538	233,454	287,292
Total -(slag & Ash)				228,819	455,995	681,346	905,347	1,128,727	1,351,450	1,508,181	1,671,884	1,842,449	2,020,314	2,205,588	2,325,929	2,454,327	2,590,555	2,735,351	2,816,199
Heat Recovery (Gcal/day)	0	0	0	0	0	0	0	0	0	217	215	214	212	210	503	501	501	499	795
Heat Recovery (GJ/day)	0	0	0	0	0	0	0	0	0	909	900	896	889	879	2,106	2,098	2,098	2,089	3,329
Annual Heat Recovery (Gcal/year)	0	0	0	0	0	0	0	0	0	79,205	78,475	78,110	77,380	76,650	183,595	182,865	182,865	182,135	290,175
Annual Heat Recovery (GJ/year)	0	0	0	0	0	0	0	0	0	331,785	328,500	327,040	324,120	320,835	768,690	765,770	765,770	762,485	1,215,085
Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Combustible Amount(ton/year)	110,340	112,444	114,632	116,764	118,694	120,598	122,638	125,008	127,341	131,411	135,620	139,905	144,328	148,910	153,654	158,521	163,559	168,762	174,137
MSW	95,412	97,262	99,197	101,075	102,733	104,383	106,152	108,232	110,293	113,856	117,521	121,281	125,142	129,145	133,309	137,578	141,982	146,551	151,256
Sewage Sludge	14,928	15,182	15,435	15,689	15,961	16,215	16,486	16,776	17,048	17,555	18,099	18,624	19,186	19,765	20,345	20,943	21,577	22,211	22,881
Incineration Amount (ton/year)	0	0	0	0	0	0	0	0	0	58,035	58,035	58,035	58,035	58,035	116,107	116,107	116,107	116,107	174,142
MSW	0	0	0	0	0	0	0	0	0	40,480	39,936	39,411	38,849	38,270	95,762	95,164	94,530	93,896	151,261
Sewage Sludge	0	0	0	0	0	0	0	0	0	17,555	18,099	18,624	19,186	19,765	20,345	20,943	21,577	22,211	22,881
Calorific Value for Incineration	0	0	0	0	0	0	0	0	0	1,704	1,692	1,679	1,667	1,653	1,974	1,970	1,966	1,962	2,083
MSW	2,199	2,208	2,214	2,221	2,230	2,238	2,244	2,254	2,262	2,270	2,277	2,284	2,293	2,300	2,309	2,315	2,324	2,331	2,338
Sewage Sludge	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
Annual Heat Recovery (GJ/year)	0	0	0	0	0	0	0	0	0	331,785	328,500	327,040	324,120	320,835	768,690	765,770	765,770	762,485	1,215,085
All mix Cal	1,956	1,964	1,970	1,976	1,984	1,991	1,996	2,005	2,013	2,020	2,027	2,033	2,041	2,048	2,056	2,062	2,070	2,077	2,083

Waste amount DF 4(80%)

D. Geological Survey Data

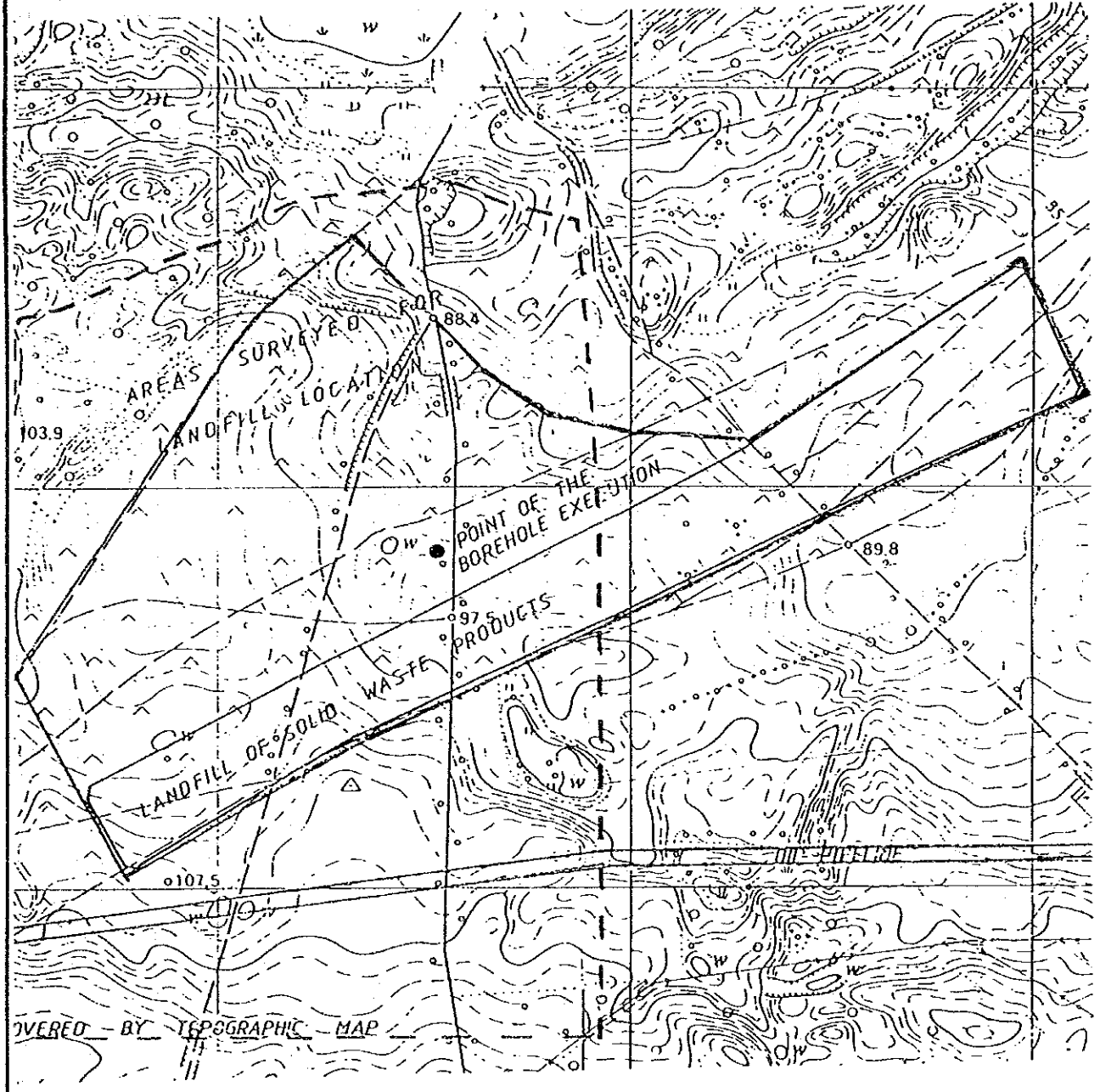


Fig. 6.1-1 Point of the Boring Work

THE STUDY ON THE SOLID WASTE MANAGEMENT FOR POZNAN CITY IN THE REPUBLIC OF POLAND

JAPAN INTERNATIONAL COOPERATION AGENCY

BOREHOLE LOG INCLUDING LABORATORY TESTS RESULTS

"Przedsiębiorstwo „Bud-Eko" ...
...
86-4... Żnińskie
ul. 600-lecia 10, tel. centr. 95 lub 215
„GEOKOM" Spółka z o. o.
60-651 POZNAŃ, ul. Słowiańska 26/1
tel. 22-00-95

1. Location : BIEDRUSKO (64 meters from landfill and 15 meters from road)
2. Elevation: of borehole ground surface: 96,90 meters above sea level
3. Final depth : 20,0 meters below ground surface 4. Date of drilling : 11th June 1992
5. Drilling rig : H3-05H; mechanical-rotary and percussion method

Geological and ground water profile

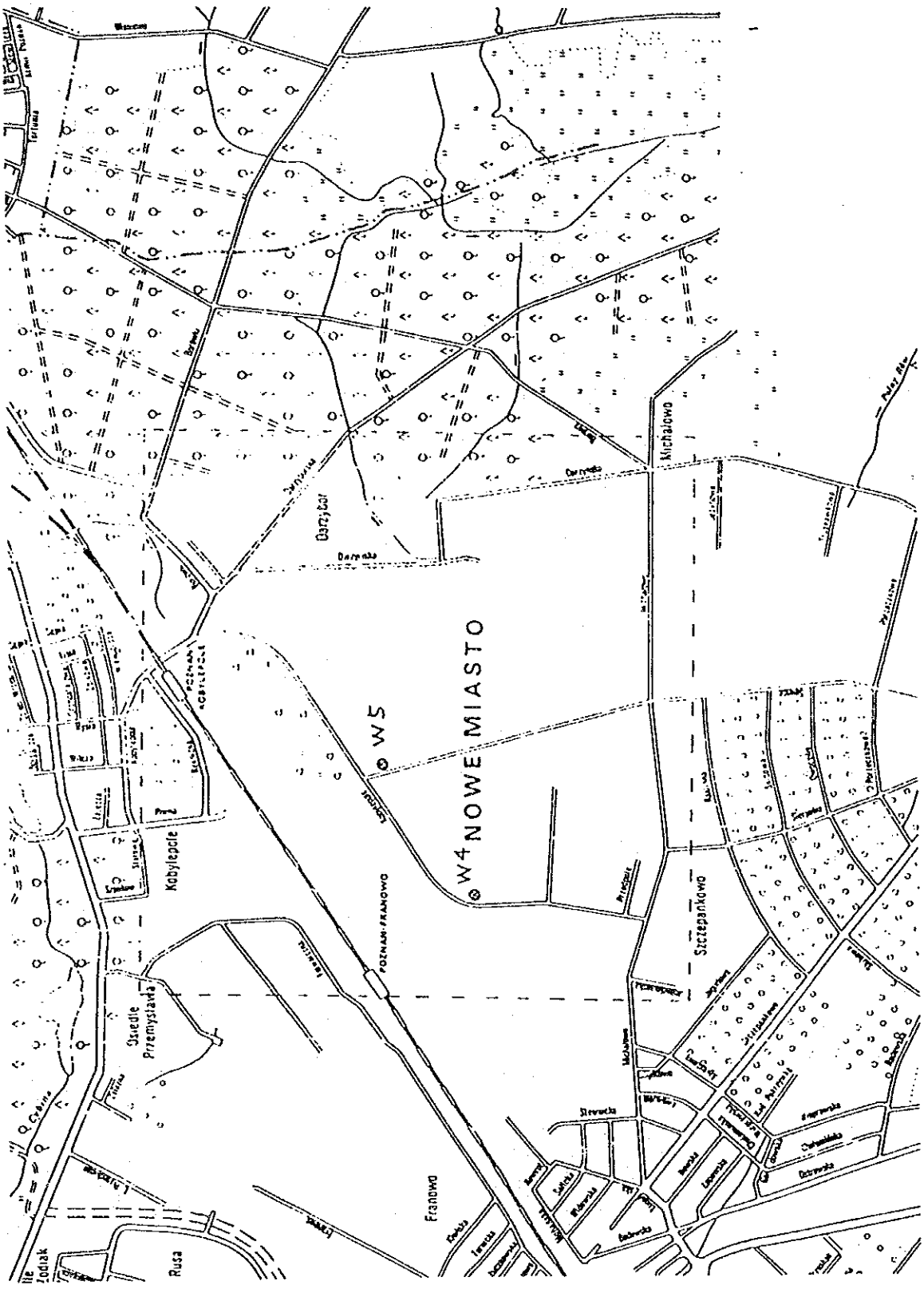
Age of format.	Depth of layer (m b.g.s) from	to	Thickness of layer m	GEOLOGICAL DESCRIPTION
QUATERNARY	0,0	0,2	0,2	loamy top soil „ dark grey
	0,2	0,6	0,4	silty loam, some cobbles, dark grey
	0,6	1,5	0,9	silty loam, yellow
	1,5	2,5	1,0	sandy loam with admixture of gravel, greyish yellow
	2,5	16,9	14,4	sandy loam, dark grey
TERTIARY	16,9	18,0	1,1	silty loam, greyish blue
	18,0	18,8	0,8	peat, thin strata of silt, grey
	18,8	20,0	1,2	fine sand, grey

Ground water (m b.g.s):
- slightly outflow from 2,6 (94,3) m a.s.l. to 6,5 (91,4) m a.s.l.
- 13,25 (83 65) — ground water: stabilized
- 18,8 (78 10) — drilled

Laboratory tests results

Depth of sampling	Permeability m / 24 hours	Unconfined compression test kPa	Triaxial shear test: Angle of friction °	Triaxial shear test: Cohesion kPa	Modulus of compressibility: Primary MPa	Modulus of compressibility: Secondary MPa
6,0	$8,6 \cdot 10^{-4}$	33,5	14,5	35,3	14,4	36,5
12,0	$12,0 \cdot 10^{-5}$	34,8	15,5	37,3	13,5	31,0
17,5	$7,0 \cdot 10^{-3}$	36,4	9,5	42,2	10,6	24,5
18,5			5,5	7,8		

Fig.2.2.2-1 Location of Boring



W 4 BOREHOLE LOG INCLUDING LABORATORY TESTS RESULTS

1. Location : POZNAŃ - FRANOWO
2. Elevation: of borehole ground surface: 86,56 meters above sea level
3. Final depth : 15,0 meters below ground surface
4. Date of drilling: 10 - 11 th December 1992
5. Drilling rig : H3-05H, mechanical - rotary method

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60-967 Poznań
ul. Piekary 14/15
tel. 53 25 81 w. 329

Geological and ground water profile

Age of format.	Depth of layer (m b.g.s.) from	to	Thickn. of layer m	GEOLOGICAL DESCRIPTION	Ground water (m b.g.s.)
QUATERNARY	0.0	0.6	0,6	top sail , dark brown	slightly out flow from
	0,6.	2.0	1,4	fine sand, light brown	
	2,0	3.6	1,6	sandy boulder clay, greyish-brown, medium plasticity	m a.s.l
	3,6		4,4	boulder clay, light brown low plasticity	4,06 (8,49)
		8.0		boulder clay with thin layers of sand, light brown, medium plasticity	
	8.0	8,2	0,2		
	8,2		6,8	boulder clay, dark grey, low plasticity	
		15,0			

Laboratory tests results

Depth of sampling	Mechanical / Hydrometer analyses GRAVEL %	SAND %	SILT %	CLAY %	Permeability m/24h	Unconfined compr. test kPa	Triaxial test Angle of friction °	Triaxial test Cohesion kPa	Density Liquidity Index	$CaCO_3$ Contents %	Bulk density t·m⁻³	Natural moisture %
3,0	1,6	66.4	24,0	8,0	$11 \cdot 10^{-3}$	16	10,5	19,6	I_l=0,45	5,0	2,12	14,5
7,0	2,0	66,5	21,5	10,0	$85 \cdot 10^{-4}$	33	14,5	36,3	I_l=0,16	8,0	2,18	12,6
11,0	2,0	55,0	30,0	13,0	$60 \cdot 10^{-4}$	28	14,5	31,4	I_l=0,22	10,8	2,14	13,3

W 5 BOREHOLE LOG INCLUDING LABORATORY TESTS RESULTS

1. Location : POZNAŃ - FRANOWO
2. Elevation: of borehole ground surface: 83,82 meters above sea level
3. Final depth : 15,0 meters below ground surface
4. Date of drilling: 14 th December 1992
5. Drilling rig: H3-05H; mechanical-rotary and percussion method

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Geological and ground water profile							Laboratory tests results													
Age of formation	Depth of layer (m b.g.s) from	to	Thickness of layer m	GEOLOGICAL DESCRIPTION	Ground water (m b.g.s)		Depth of sampling	Mechanical / Hydrometer analyses GRAVEL %	SAND %	SILT %	CLAY %	Permeability	Unconfined compress test	Triaxial shear test Angle of frict.	Cohesion	Density Liquidity Index	$CaCO_3$ Contents	Bulk density	Natural moisture
												m/24h	kPa	°	kPa		%	t·m⁻³	%
QUATERNARY	0,0	0,7	0,7	top sail, dark brown															
	0,7	1,2	0,5	fine sand with thin layers (0,5 cm) of boulder clay, light brown															
	1,2	4,5	3,3	sandy boulder clay, light brown, medium plasticity	4,43 (79,39)	stabilized	3,7	4,0	64,0	24,0	8,0	$74 \cdot 10^{-4}$	31	17,0	34,3	I_L=0,13	8,0	2,16	10,6
	4,5	7,4	2,9	sandy boulder clay, light brown, medium plasticity			5,5	3,0	68,0	23,0	6,0		12	14,5	14,7	I_L=0,45	11,2	2,10	14,0
	7,4	10,5	3,1	fine sand, light grey, medium dense / dense	7,4 (76,40)	drilled	8,0	0,1	96,9	3,0	–		–	–	–	I_D=0,65	–	–	–
	10,5	12,5	2,0	fine gravel, light grey dense			11,5	13,8	84,4	1,8	–					I_D=0,70			
	12,5	15,0	2,5	boulder clay, dark grey, low plasticity			13,5	2,0	55,5	30,0	12,5	$72 \cdot 10^{-4}$	27	14,0	29,4	I_L=0,24	13,6	2,12	13,9

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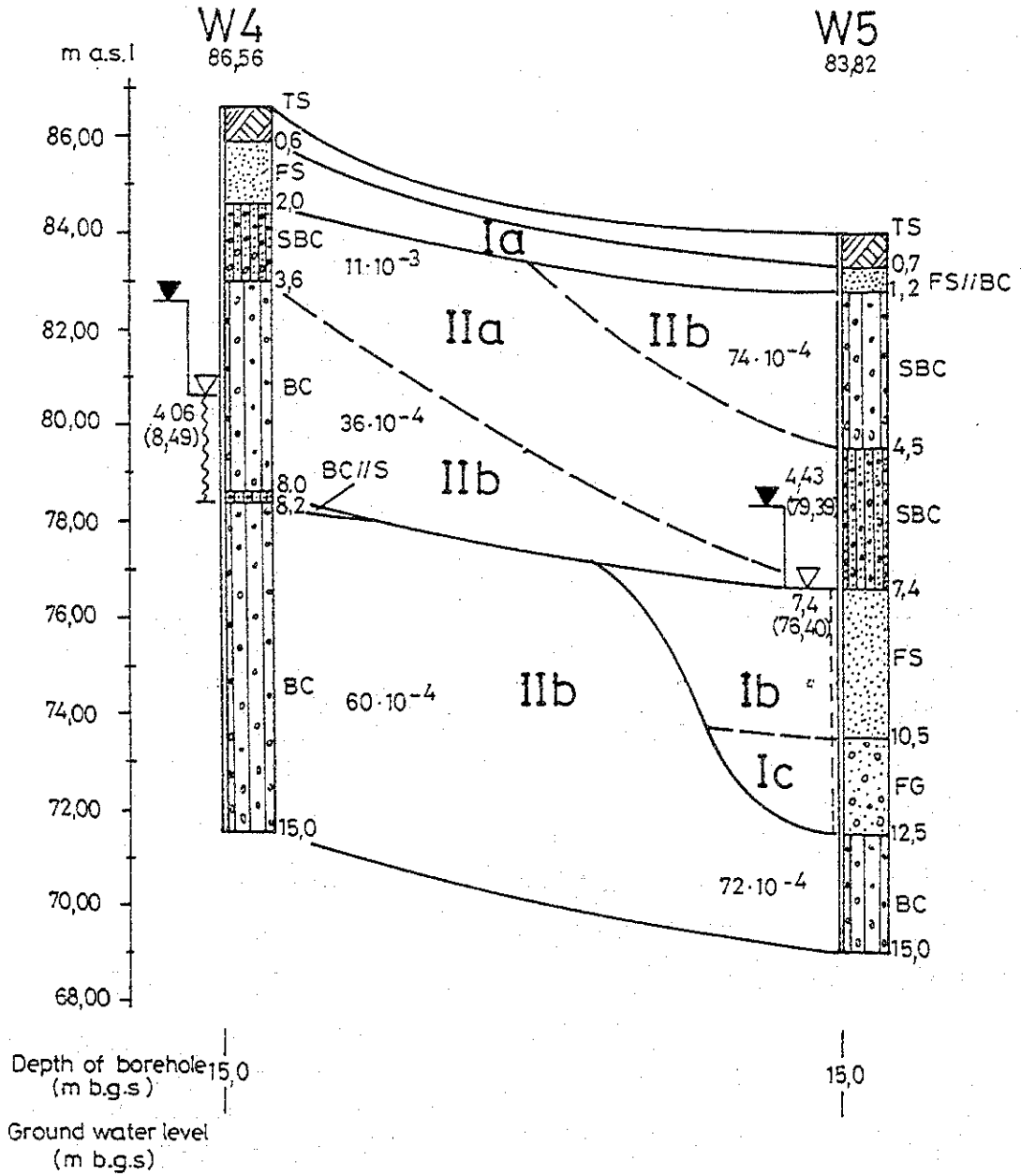
GEOTECHNICAL CROSS-SECTION

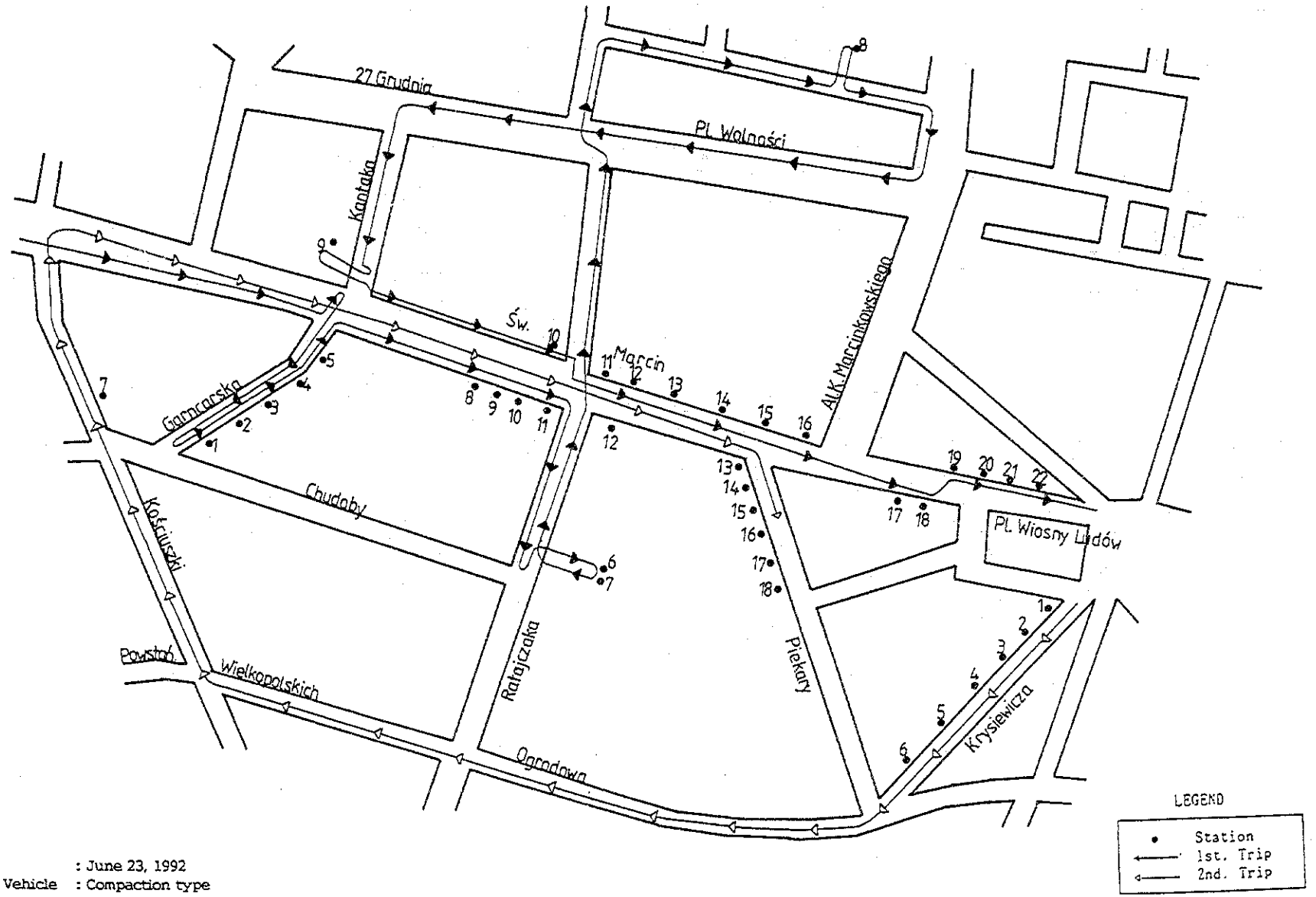


D-6

EXPLANATIONS

- FS — FINE SAND
- FG — FINE GRAVEL
- BC — BOULDER CLAY
- SBC — SANDY BOULDER CLAY
- //S, //BC — THIN LAYERS (ca 0,5 cm) OF SAND / BOULDER CLAY
- Ia — FINE SAND, MEDIUM DENSE
- Ib — FINE SAND, MEDIUM DENSE / DENSE
- Ic — FINE GRAVEL, DENSE
- IIa — SANDY BOULDER CLAY, MEDIUM PLASTICITY
- IIb — BOULDER CLAY AND SANDY BOULDER CLAY, LOW PLASTICITY
- W4 — no of borehole, elevation of ground surface (m a.s.l)
- boundaries of geotechnical layers
- water level — stabilized / drilled
- slightly out flow within clayey layer
- layer saturated with water

E. Route Maps of Collection Trucks traced by Time and Motion Survey

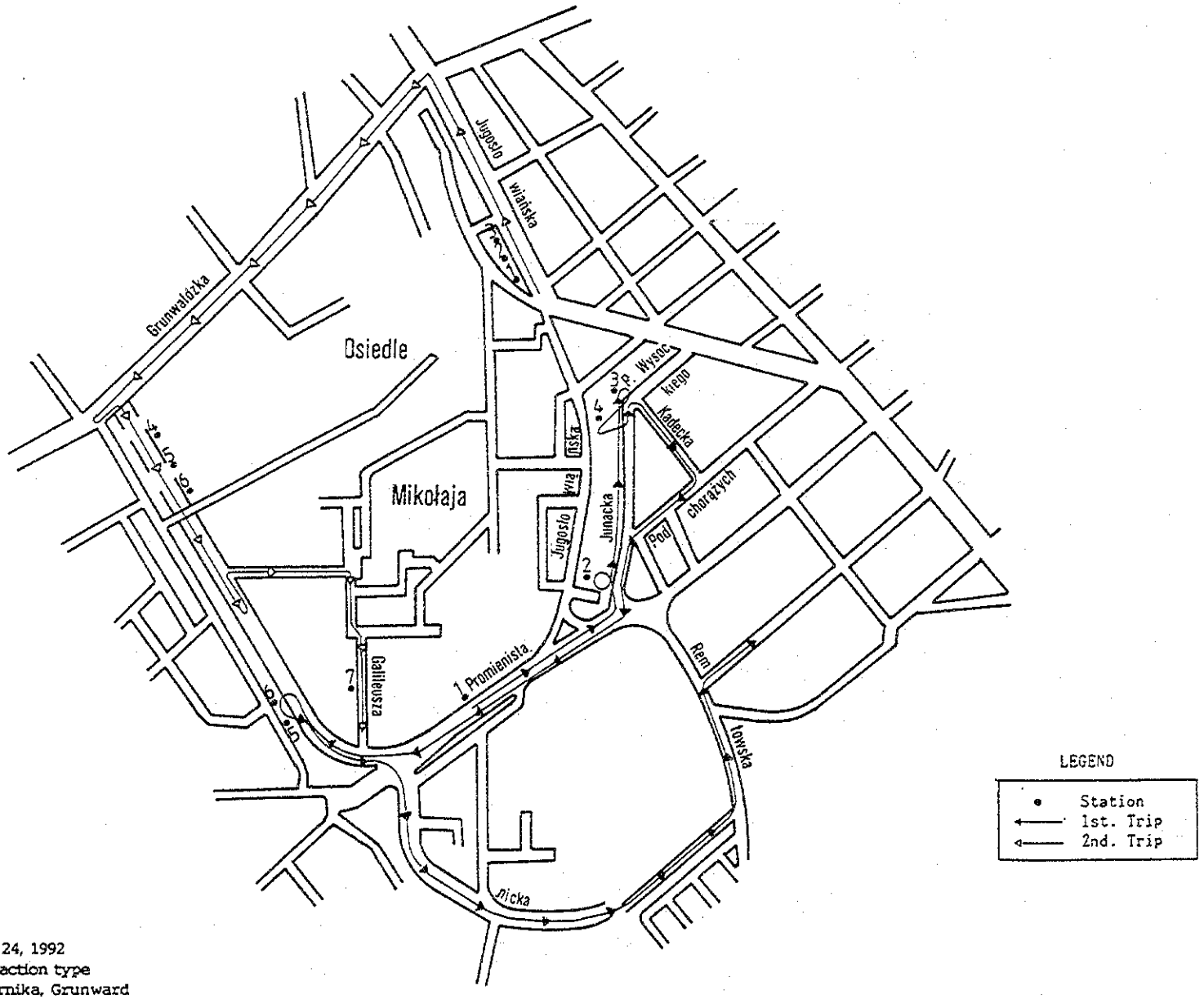


Date : June 23, 1992
Type of Vehicle : Compaction type
Collection Area : Centrum

Fig.6.6-1 Route Map of Collection Vehicle by Time and Motion Survey

THE STUDY ON THE SOLID WASTE MANAGEMENT FOR POZNAN CITY IN THE REPUBLIC OF POLAND

JAPAN INTERNATIONAL COOPERATION AGENCY



Date : June 24, 1992
Type of Vehicle : Compaction type
Collection Area : Kopernika, Grunward

Fig.6.6-2 Route Map of Collection Vehicle by Time and Motion Survey

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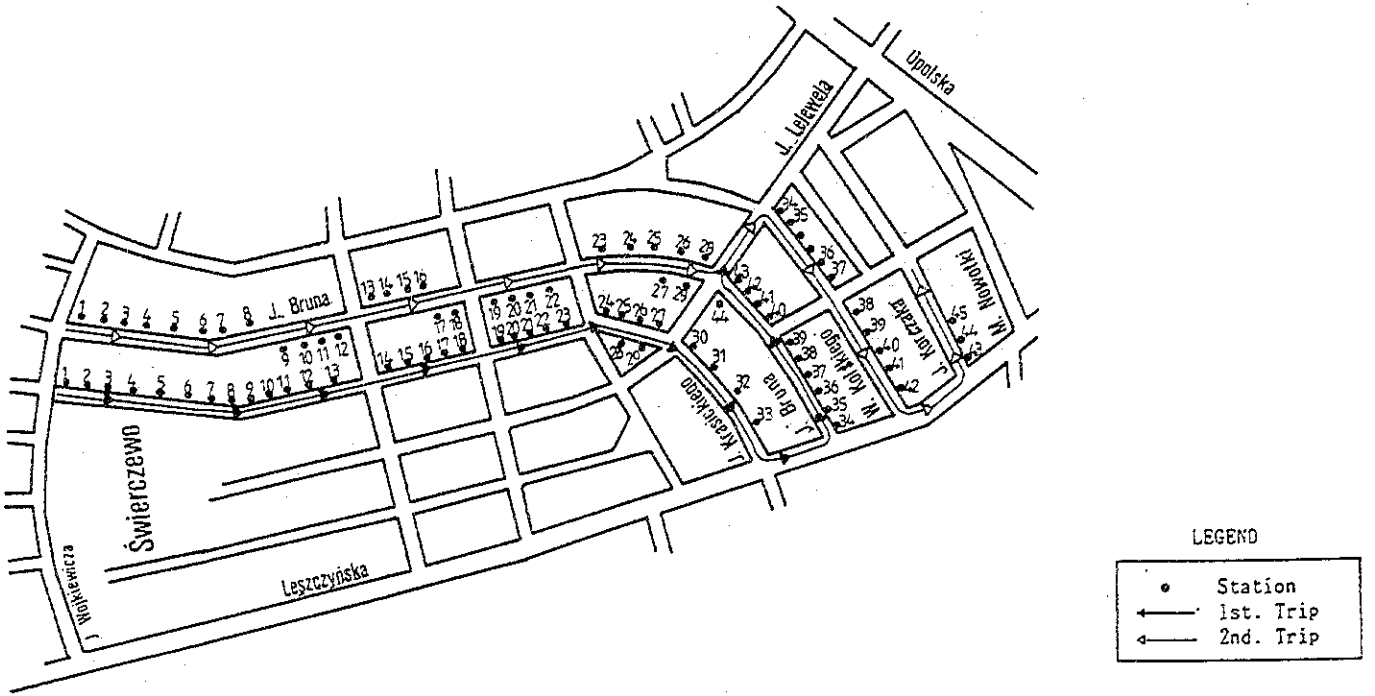
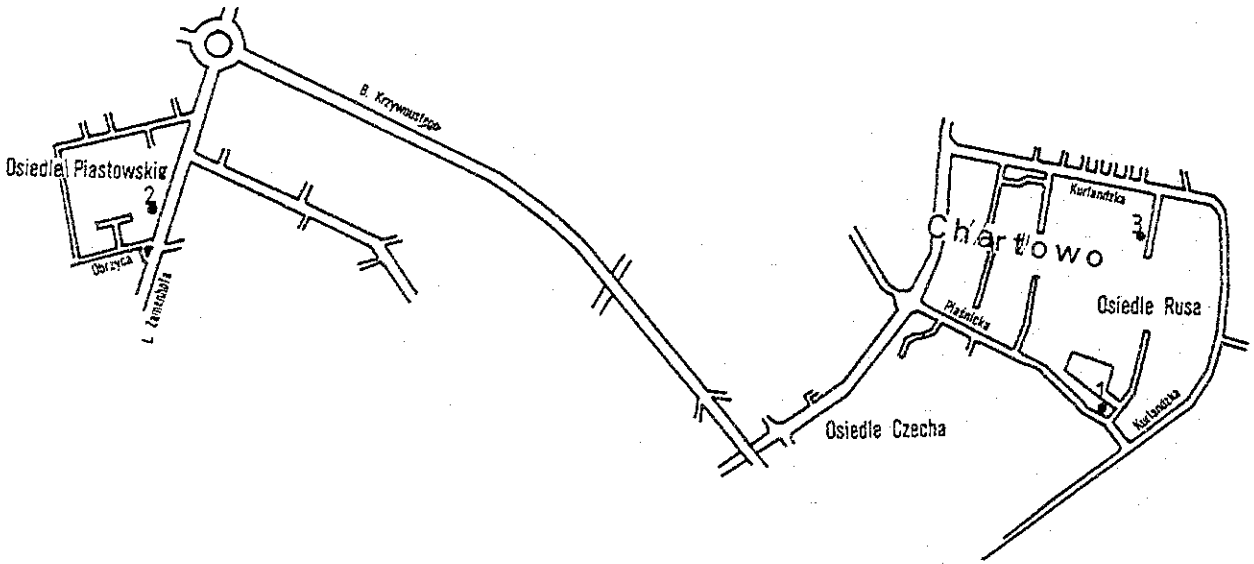


Date : June 25, 1992
Type of Vehicle : Compaction type
Collection Area : Swierczewo

Fig.6.6-3 Route Map of Collection Vehicle by Time and Motion Survey

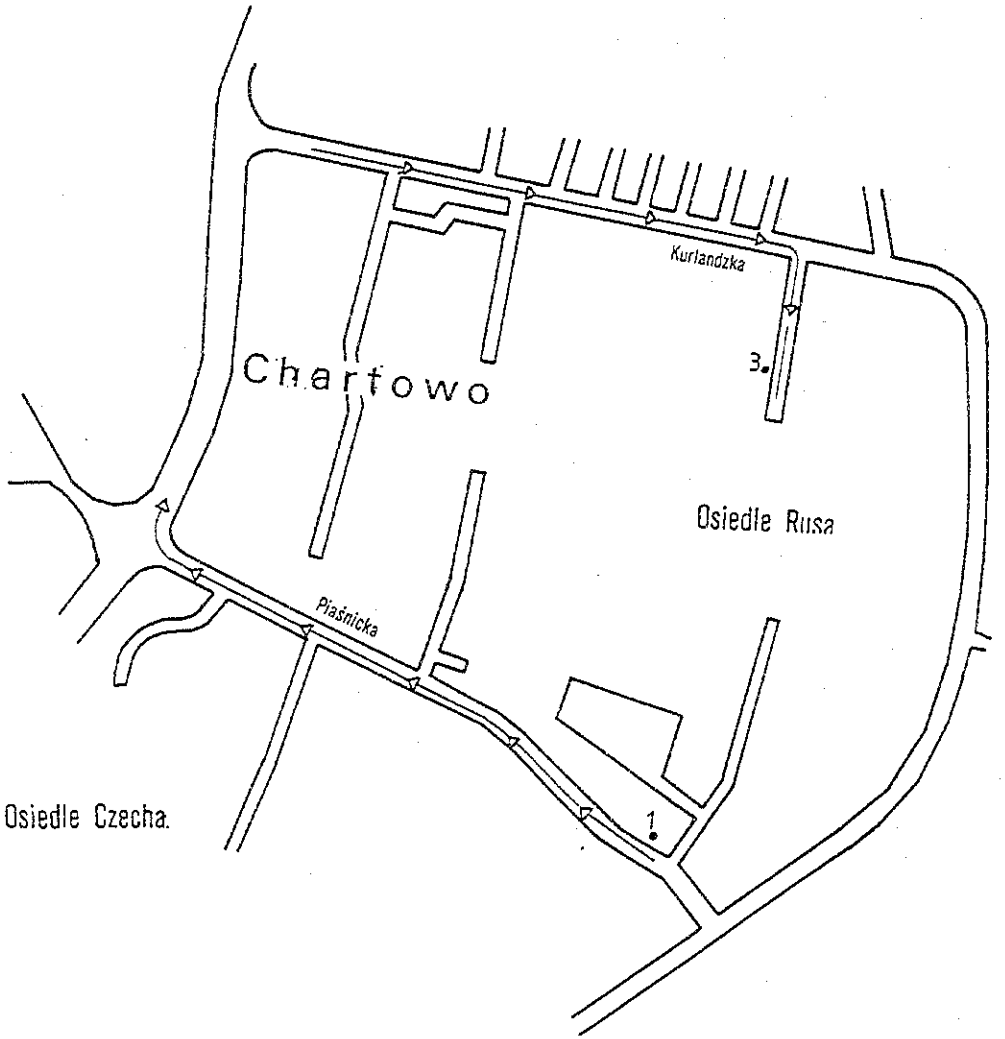


Date : June 25, 1992
Type of Vehicle : Armroll truck
Collection Area : Rusa, Piastowski

Fig.6.6-4 Route Map of Collection Vehicle by Time and Motion Survey

THE STUDY ON THE SOLID WASTE MANAGEMENT FOR POZNAN CITY IN THE REPUBLIC OF POLAND

JAPAN INTERNATIONAL COOPERATION AGENCY

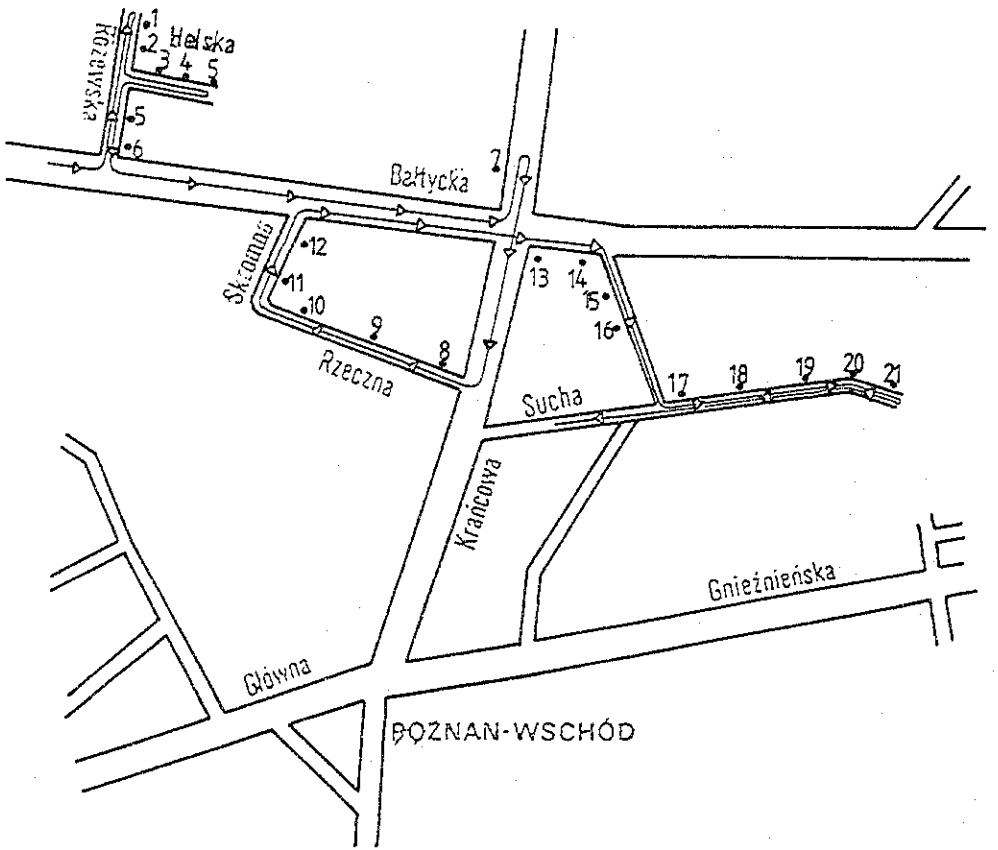


LEGEND

- Station
- 1st. Trip
- 2nd. Trip

Date : June 25, 1992
Type of Vehicle : Armroll truck
Collection Area : Rusa, Piastowski

Fig.6.6-4 Route Map of Collection Vehicle by Time and Motion Survey

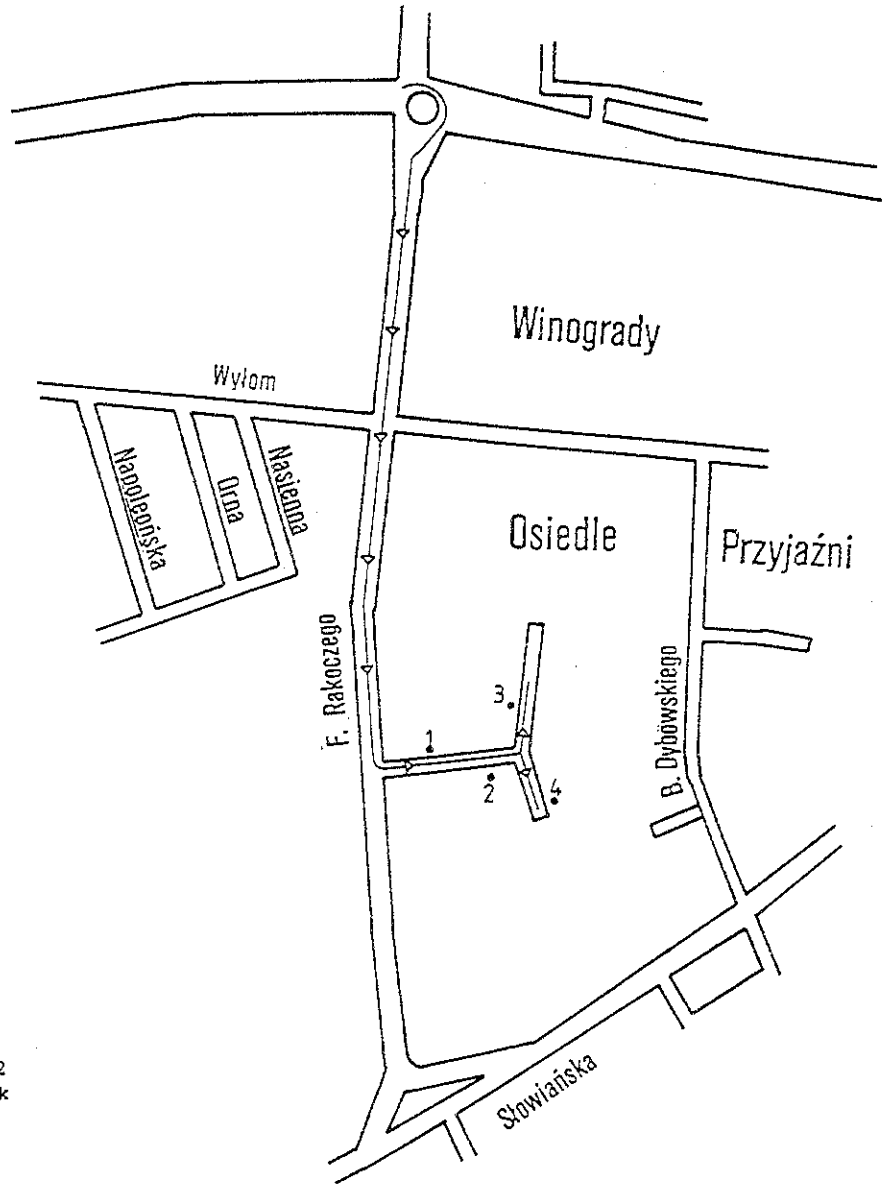


LEGEND

- Station
- 1st. Trip
- 2nd. Trip

Date : June 29, 1992
Type of Vehicle : Compaction type
Collection Area : Chwalszewo, Srodka, Zawady

Fig.6.6-5 Route Map of Collection Vehicle by Time and Motion Survey



LEGEND

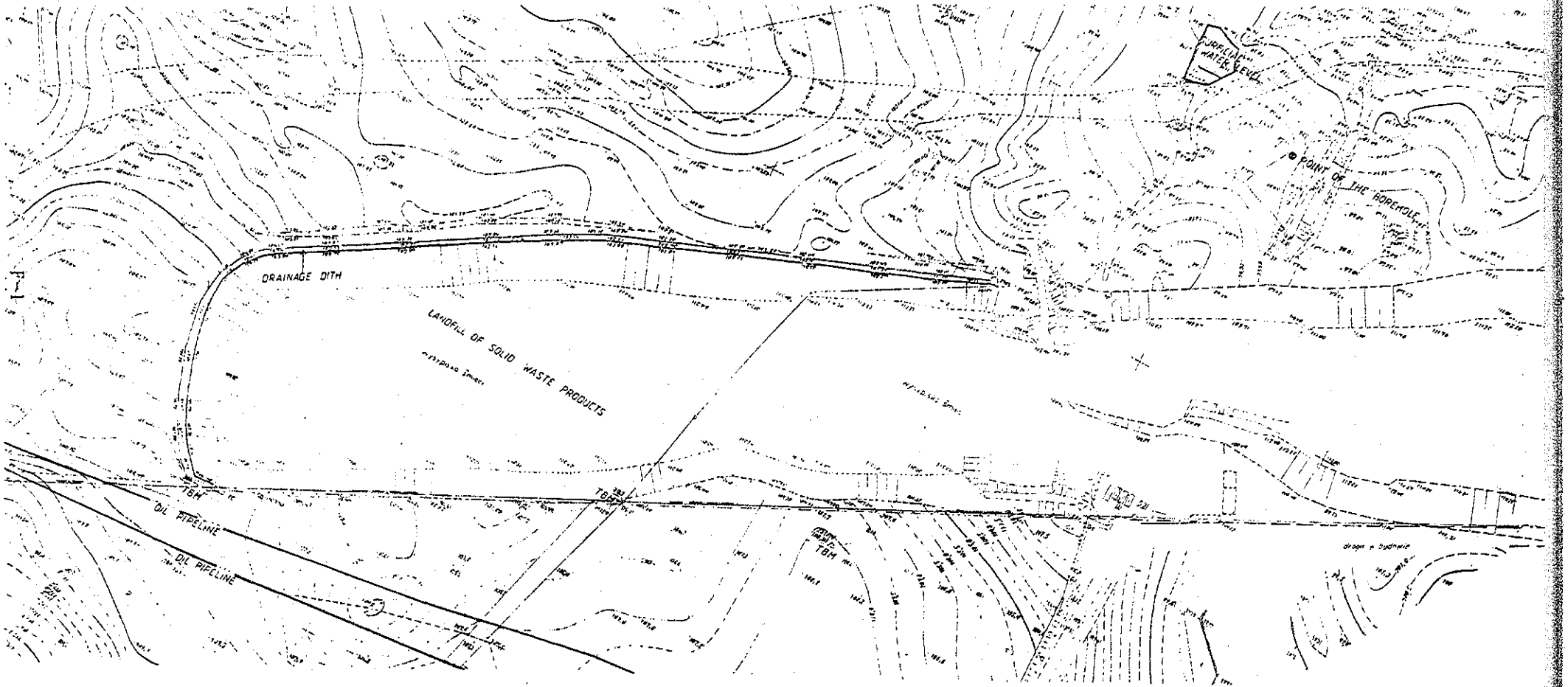
- Station
- 1st. Trip
- 2nd. Trip

Date : June 30, 1992
Type of Vehicle : Armroll truck
Collection Area : Przyjazni

Fig.6.6-6 Route Map of Collection Vehicle by Time and Motion Survey

F. Topographical Survey Maps


POINT OF THE BOREHOLE
WATER LEVEL
LANDFILL OF SOLID WASTE PRODUCTS
DRAINAGE DITH
OIL PIPELINE
OIL PIPELINE


ORIGINAL WATER LEVEL
POINT OF THE BOREHOLE
DRAINAGE DITH
LANDFILL OF SOLID WASTE PRODUCTS
TBM
TBM
TBM
OIL PIPELINE
OIL PIPELINE


LANDFILL OF SOLID
WASTE PRODUCTS