

# **APPENDIX C**

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## COMMUNITY CONSCIOUSNESS SURVEY



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### C.1 Objectives of the Survey

As described in B.1, a CCS (Community Consciousness Survey) has been conducted to obtain the basic data for the formulation of a basic plan. The main objectives of the survey are described as follows ;

- a. Collection of the basic information for the formulation of the SWM basic plan such as population covered by collection service, the public opinion on the present SWM, the public's willingness to pay the collection fee, etc.;
- b. Identification of present discharge and storage system, ratio of waste generation, ratio of waste discharge and self-disposal, amount of recycling at generation sources ; and
- c. Finally, to examine the present waste stream especially from a generation point to a discharge point.

### C.2 Selection of Survey Area

In order to get the representative public opinion and basic data of the Study area, the sample residences and shops were selected according to the following ;

- a. The Study area was divided into the residential area and commercial area called as C zone.
- b. The residential area was divided into the following two zones ;
  - i. A zone is the area where the average monthly income of each household is not less than 55,000 kips in accordance with the Vientiane City Master Plan prepared by UNDP.

- ii. B zone is the area where the average monthly income of each household is less than 55,000 kips in accordance with the Master Plan.
- c. Three homogeneous zones, of which each name was applied in the UNDP M/P, were selected for A and B zones respectively, and a homogeneous zone was selected for C zone.
- d. 20 residences or shops were selected as sampling points from each homogeneous zone. Totally, 120 residences were selected and 60 shops were selected from C zone.

The selection of sampling points was carried out in cooperation with the DCTC. The sample residences and shops are tabulated in Table C.2-1.

### C.3 Survey Period

The survey was conducted according to the following schedule ;

Date	Survey Zone
October 28	Pasak
October 29	Wattay
October 30	Namphou
October 31	Phone Xai, Dong Palane
November 1	Sokpaluang, Hal Mahosot

Table C.2-1 Sampling Points for CCS

Type of Area	Zone	Name of Zone Used in UNDP M/P	Selected Village	No. of Res. (Shop)	
Residential Area	A	Phone Xai	Fai	4	20
			Phone Xai	4	
			Naxay	4	
	Nong Bone Tay		4		
	Phonsa At		4		
	Income: not less than 55,000 kip/month	Sokpaluang	Saphane Thong Neua	5	20
			Thong Saphane Thong	5	
			Phone Papao Thong	5	
	Wat Nak		5		
	B	Hal Mahosot	Phia Wat	4	20
Simuong			4		
Pha Pho			4		
Bung Khangong Tay			4		
Bung Khangong Neua			4		
Income: less than 55,000 kip/month	Wattay	Na Kham	4	20	
		Nong Panay	4		
		Wattay Noy	4		
		Sikhay Tha	4		
		Sikhay Thong	4		
Dong Palane	Pasak	Thon Khan Kham Neua	4	20	
		Sisavath Neua	4		
		Dong Mieng	4		
Thong Sangnang		4			
Khoua Luang Tay		4			
Total				120	
Commercial Area	C	Namphou	Xieng Nhune Thong	13	40
			Xieng Nhune Tha	13	
			Hay Sok	14	
		Wattay	Commercial Area	20	
Total				60	

#### C.4 Method of Survey

Upon consideration of the present conditions of SWM and the Study area, a draft questionnaire written in English was prepared by the Study Team. With the close cooperation of the DCTC, the draft questionnaire was reviewed and modified, then translated into Lao for better understanding.

Before the execution of the survey, the objectives and the contents were carefully explained to the interviewer for several days, and pre-interview survey was also conducted for the reviewal and modification of the contents of the questionnaire.

The CCS was conducted by interviewing each resident and shop owner. The interviewer visited each interviewee and got answers from them at the same time. The answers obtained were entered into the computer and processed. The processed answers are described in the next section.

The questionnaire for consciousness survey is shown as follows;

QUESTIONNAIRE FOR COMMUNITY CONSCIOUSNESS SURVEY

No. \_\_\_\_\_

I Items for Interviewer

1. Date : \_\_\_\_\_

2. Interviewer : \_\_\_\_\_

3. Residential Area or Commercial Area : \_\_\_\_\_

- 1 Residential Area ( Zone A )
- 2 Residential Area ( Zone B )
- 3 Commercial Area ( Zone C )

4. Distance from the house to road (width: more than 5 m) :

\_\_\_\_\_

- 1 In front of the premises
- 2 Less than 10 m
- 3 10 ~ 29 m
- 4 30 ~ 49 m
- 5 50 m or more

5. Distance from the house to communal container or discharge point :

\_\_\_\_\_

- 1 In front of the premises
- 2 Less than 10 m
- 3 10 ~ 29 m
- 4 30 ~ 49 m
- 5 50 m or more
- 6 There is no communal container or Discharge Point in this area.

II General Questions

Answers

6. Type of Interviewee : \_\_\_\_\_
- 1 Housewife
  - 2 The Master
  - 3 Children
  - 4 Other family member
  - 5 Housekeeper (servant)
  - 6 Others
7. Address : \_\_\_\_\_
8. Employment of The Master : \_\_\_\_\_
- 1 Primary Industry (Agriculture & Mining)
  - 2 Secondary Industry (Manufacturing)
  - 3 Tertiary Industry (Service orientated profession)
  - 4 Pensioner (Retired)
  - 5 Unemployed
  - 6 I don't know
9. Number of persons staying in the house : \_\_\_\_\_
10. Number of dwelling years at this place : \_\_\_\_\_
- 1 Less than 5 years
  - 2 5 ~ 9 years
  - 3 10 ~ 19 years
  - 4 20 years or more
  - 5 I don't know
11. Total expenditure of your family per month : \_\_\_\_\_
- 1 Less than 40000 kips/month
  - 2 40000 ~ 55000 kips/month
  - 3 55000 ~ 70000 kips/month
  - 4 70000 ~ 85000 kips/month
  - 5 More than 85000 kips/month
  - 6 I don't know



III Questions on Discharge of Waste from Your House

12. Who discharge waste from your house ? \_\_\_\_\_

- 1 Housewife
- 2 The Master
- 3 Children
- 4 Other family member
- 5 Housekeeper (servant)
- 6 Others
- 7 I don't know

13. Where do you discharge waste from your house ? \_\_\_\_\_

- 1 Into dustbins to be collected by worker
- 2 Around my premises without dustbins
- 3 Communal container
- 4 Discharge Point
- 5 Garbage compartment fixed in the house
- 6 Others (Please specify) :

\_\_\_\_\_

7 I don't know

14. What types of container do you use for carrying waste to discharge point in question No.13 ? \_\_\_\_\_

- 1 Plastic bag
- 2 Plastic bucket
- 3 Metal bucket
- 4 Bamboo basket
- 5 Others (Please specify) :

\_\_\_\_\_

6 I don't know

15. Why do you use it ? \_\_\_\_\_

- 1 It is clean after collection work.
  - 2 It prevents foul odour.
  - 3 It is manageable.
  - 4 Keeps away pest such as flies.
  - 5 Others (Please specify) :
- 

16. How much capacity does such container hold ? 

---

- 1 Less than 10 liters
- 2 10 ~ 19 liters
- 3 20 ~ 29 liters
- 4 30 liters or more
- 5 I don't know

17. Do you discharge waste at a fixed time ? 

---

- 1 YES
- 2 NO
- 3 I don't know

18. If "YES", what time do you usually discharge your waste ? 

---

- 1 6:00 ~ 8:59
  - 2 9:00 ~ 11:59
  - 3 12:00 ~ 14:59
  - 4 15:00 ~ 17:59
  - 5 Others (Please specify) :
- 

- 6 I don't know

19. Do you have ever discharged waste soon after it was collected ? 

---

- 1 YES
- 2 NO
- 3 I don't know

If you have dustbins to be collected by worker (for Question No. 13 answer 1 only).

Please answer the followings (Nos. 20 ~ 26);

20. How many dustbins do you have ? \_\_\_\_\_

- 1 1
- 2 2
- 3 3
- 4 4
- 5 5 or more
- 6 I don't know

21. What type of the dustbins do you use ? \_\_\_\_\_

- 1 Plastic bucket
- 2 Metal bucket
- 3 Bamboo basket
- 4 Drum can
- 5 Others (Please specify) :

\_\_\_\_\_

- 6 I don't know

22. How much capacity does your dustbin hold ? \_\_\_\_\_

- 1 Less than 30 liters
- 2 30 ~ 49 liters
- 3 50 ~ 99 liters
- 4 100 liters or more
- 5 I don't know

23. Where do you put your dustbin to be collected by workers ? \_\_\_\_\_

- 1 In front of my premises
- 2 Behind the premises
- 3 In the house (kitchen)
- 4 In the garden
- 5 Others (Please specify) :

\_\_\_\_\_

- 7 I don't know

24. Is the dustbin with or without lid ? \_\_\_\_\_

- 1 With
- 2 Without
- 3 I don't know

25. Are you able to co-operate to carry your waste to communal containers fixed in your area if you are so requested ?

- 1 YES
  - 2 NO
  - 3 I don't know
- 

26. If "NO", what are the reasons ?

- 1 Present system is better.
  - 2 We have nobody who will carry the waste to communal containers.
  - 3 Communal containers are far.
  - 4 Communal containers are not hygienic.
  - 5 Others (Please specify) :
- 

27. Do you have ever seen human scavengers and animals on your waste ?

- 1 YES
  - 2 NO
  - 3 I don't know
- 

28. How do you discharge garden wastes (fallen leaves and cut trees or grasses) ?

- 1 Discharge to collection point fixed by municipality
  - 2 Discharge in front of the house
  - 3 Open combustion/burning
  - 4 Composting (producing fertilizer from wastes)
  - 5 I don't know
  - 6 Needless to discharge garden wastes
  - 7 Others (Please specify) :
-

If "3", please answer the followings: (No.29)

29. If the waste discharged from your house will be collected, will you discharge the garden wastes (fallen leaves and cut trees or grasses) with other wastes ? \_\_\_\_\_

1. Yes
2. No

30. Does anyone in your family sweep the road shoulder or adjacent public area in front of your houses ? \_\_\_\_\_

- 1 YES, Everyday
- 2 YES, Sometimes
- 3 NO
- 4 I don't know

31. Does anyone in your family clean the drain around your house ? \_\_\_\_\_

- 1 YES, Everyday
- 2 YES, Sometimes
- 3 No
- 4 I don't know

32. How are your bulky waste disposed ? (such as large condemned furniture or electric appliances) \_\_\_\_\_

- 1 Collected by municipal workers
- 2 Sold/collected by special collectors
- 3 Disposed by ourselves
- 4 Sold to Junkyards
- 5 Others (Please specify) :

- \_\_\_\_\_
- 6 I don't know

IV Questions on Services of Waste collection in Your Area.

33. Is there a collection service in your area ?

- 1 YES
- 2 NO
- 3 I don't know

If "YES", please answer the followings;  
(No.34 ~ No.40)  
Otherwise go to No.41

34. Are you satisfied with the collection service ?

- 1 YES
- 2 NO
- 3 I don't know

35. If "No", what are the reasons ?

- 1 Frequency of collection service is low
- 2 Collection time is irregular
- 3 Collection time is very early or late
- 4 Behaviour of workers is bad
- 5 Collection work is crude
- 6 Collection fee is expensive
- 7 Others (Please specify)

36. Do you know how the waste discharged from your house is collected ?

- 1 YES
- 2 NO
- 3 I don't know

37. If "YES", how is the waste collected ?

- 1 Door to door collection system by using collection vehicles.
- 2 Door to door collection system by

collection workers.

- 3 Residents themselves carry waste to a collection point.
  - 4 Collection from dust chute in the building.
  - 5 Others (Please specify)
- 
- 6 I don't know

38. How many times a week is your waste collected ?

- 
- 1 Everyday
  - 2 Six times a week
  - 3 Three times a week (every other day)
  - 4 Twice a week
  - 5 Once a week
  - 6 Others (Please specify)

---

7 I don't know

39. Is collection service done at a fixed time in the day ?

- 
- 1 YES
  - 2 NO
  - 3 I don't know

40. If "YES", what time is your waste normally collected ?

- 
- 1 6:00 ~ 8:59
  - 2 9:00 ~ 11:59
  - 3 12:00 ~ 14:59
  - 4 15:00 ~ 17:59
  - 5 Others (Please specify) :

---

6 I don't know

V Questions on Recycling

41. Do you know that newspaper, bottles etc. are recycled ?

- 1 YES
  - 2 NO
- 

42. Do you know that there are people scavenging resource materials from refuse at the dumping ground ?

- 1 YES
  - 2 NO
- 

43. Do you have someone who comes around to collect or buy your unused or recyclable materials ?

- 1 YES
  - 2 NO
  - 3 I don't know
- 

If "YES", please answer the followings; (No.44 ~ No.47) Otherwise go to No.48.

44. If "YES", how often does the collector comes around your place ?

- 1 Once a week
  - 2 Once a month
  - 3 Once every other week
  - 4 Once every other month
  - 5 Once every 6 months
  - 6 Once a year
  - 7 I don't know
- 

45. What kind of transport vehicles does the collector uses to haul them ?

- 1 Tri-cycle
-



- 2 Bicycle
  - 3 Motorcycle
  - 4 Pick-up Truck
  - 5 Small Lorry
  - 6 Handcart
  - 7 Others (Please specify) :
- 

46. Please state the kind of recyclable materials and their prices.

- |                     |   |       |
|---------------------|---|-------|
| 1 Newspaper         |   | _____ |
|                     |   | _____ |
| 2 Other paper       |   | _____ |
|                     |   | _____ |
| 3 Glass bottles     |   | _____ |
|                     |   | _____ |
| 4 Textile           |   | _____ |
|                     |   | _____ |
| 5 Plastic           |   | _____ |
|                     |   | _____ |
| 6 Ferrous metal     |   | _____ |
|                     |   | _____ |
| 7 Other metal (     | ) | _____ |
|                     |   | _____ |
| 8 Other materials ( | ) | _____ |
|                     |   | _____ |

47. Please state the mount of each item which you sell to him.

- |                     |   |       |
|---------------------|---|-------|
| 1 Newspaper         |   | _____ |
|                     |   | _____ |
| 2 Other paper       |   | _____ |
|                     |   | _____ |
| 3 Glass bottles     |   | _____ |
|                     |   | _____ |
| 4 Textile           |   | _____ |
|                     |   | _____ |
| 5 Plastic           |   | _____ |
|                     |   | _____ |
| 6 Ferrous metal (   | ) | _____ |
|                     |   | _____ |
| 7 Other metal (     | ) | _____ |
|                     |   | _____ |
| 8 Other materials ( | ) | _____ |
|                     |   | _____ |

48. If the resident association or club in your area were to raise some funds (in order to engage beneficial activities for residents), through sale of reusable or recyclable materials, would you be able to contribute or participate ?

---

- 1 YES
- 2 NO
- 3 I don't know

49. Do you use food wastes and garden wastes (fallen leaves and cut trees or grasses) as fertilizer ? \_\_\_\_\_

- 1 YES
- 2 NO

50. Do you like to have guidance on methods of producing fertilizer from food wastes and garden wastes ? \_\_\_\_\_

- 1 YES
- 2 NO
- 3 I don't know

#### VI Others

51. The present cost of waste management (all cleansing services - including collection service, street sweeping, drain cleansing and tree and grass cuttings) is about 18 kips per month per capita. This is about 0.2% of total municipal budget. What do you think of this rate ? \_\_\_\_\_

- 1 High
- 2 Reasonable
- 3 Low
- 4 I don't know

52. The waste management cost is insufficient. If municipality will supply enough cleans-

ing services including garbage collection services and requests extra, how much can you contribute towards management of waste in addition to the present collection fee ?

---

- 1 Less than 100 kips per month per family
- 2 100 ~ 500 kips per month per family
- 3 500 ~ 1000 kips per month per family
- 4 1000 ~ 2000 kips per month per family
- 5 More than 2000 kips per month per family
- 6 I cannot contribute

53. Do you know which authority is responsible for disposal of solid waste discharged by residents ?

---

- 1 State
  - 2 Municipality
  - 3 Yourselves
  - 4 State Sanitation Company
  - 5 Private contractor
  - 6 Others (Please specify) :
- 

7 I don't know

54. Have you ever had any guidance on methods of proper discharge ?

---

- 1 YES
- 2 NO

55. In your area, are there "Clean Day" in which people are requested to participate on the "Public Cleansing" basis ?

---

- 1 YES
- 2 NO
- 3 I don't know

56. If "YES", did you participate in such "Public Cleansing" in your area ?

---

- 1 YES
- 2 NO
- 3 I don't know

57. What kind and how many animals do you breed ?

- 1. Dog \_\_\_\_\_
- 2. Cat \_\_\_\_\_
- 3. Domestic Fowl \_\_\_\_\_
- 4. Domestic Duck \_\_\_\_\_
- 5. Turkey \_\_\_\_\_
- 6. Pig \_\_\_\_\_
- 7. Others (Please specify) \_\_\_\_\_

58. How many liters of food do you give \_\_\_\_\_ 1/day  
your animals per one day ?

If your waste is collected by municipality or private contractor, please answer the followings ( No.59 ~ No.61 )

59. How much do you pay for the collection \_\_\_\_\_ kip/month  
service per a month ?

60. Do you pay the collection fee directly to  
the collection company (municipal) or  
through your community ? \_\_\_\_\_

- 1. Directly ( by myself ) \_\_\_\_\_
- 2. Through the Community \_\_\_\_\_

61. In the case you pay the collection fee through  
community, who collect the fee ? \_\_\_\_\_

- 1. Chief of Ban
- 2. A person who is in charge of sanitation matter in my community
- 3. A representative person selected by the residents
- 4. Others

If a waste discharged from your house is not collected by municipality or private contractor, please answer the followings (No.62~No.63)

62. Do you want to receive a collection service ? \_\_\_\_\_

1. Yes
2. No

63. If you want to receive a collection service, do you like to make a contract of the collection service in direct or through your community ? \_\_\_\_\_

1. Direct
2. Community

64. Does anyone come to collect your food waste ?

1. Yes
2. No

If anyone comes to collect your food waste, please answer the followings ( No.65~n0.67)

65. How many times a week is your food waste collected ? \_\_\_\_\_

1. Once ~ Twice a week
  2. Three times ~ Four times a week
  3. Everyday
  4. Others ( Please specify )
- 

66. How much money do you receive from a collector in exchange for your food waste ? \_\_\_\_\_

1. Never received
2. Less than 500kips/month

3. 500 ~ 1,000kips/month
4. More than 1,000kips/month

67. How many liters of food wastes do you sale  
at one time ? \_\_\_\_\_

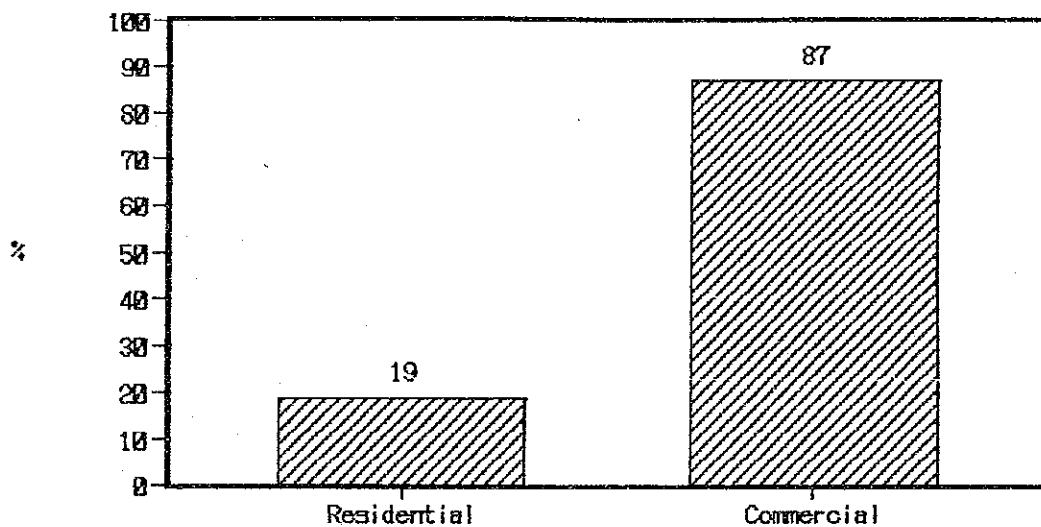
1. Less than 5 liters
  2. 5 ~ 10 liters
  3. 10 ~ 15 liters
  4. 20 liters
  5. Others ( Please specify )
-

### C.5 Result of Survey

The answers processed are described as follows ;

- 1) Percentage of residences and shops with solid waste collection services. (Q33)

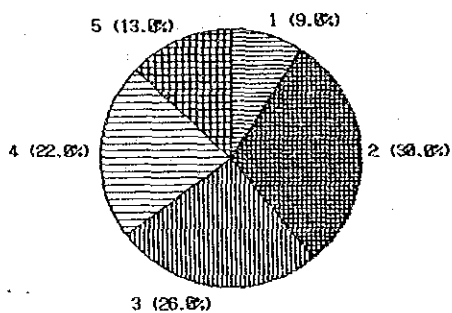
Residential Area ( % )	Commercial Area ( % )
19	87



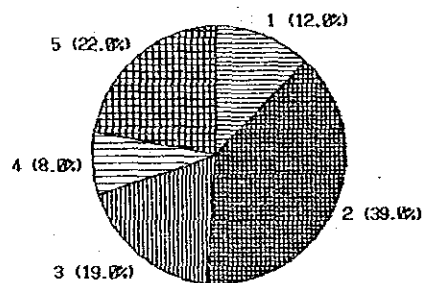
2) Distance from residences and shops to road (width : more than 5 m)(Q4)

	Residential Area (%)		Commercial Area (%)
	Collection	Non-Collection	
1. In front of the premises	9	12	68
2. Less than 10 m	30	39	32
3. 10 ~ 29 m	26	19	0
4. 30 ~ 49 m	22	8	0
5. 50 or more	13	22	0
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>

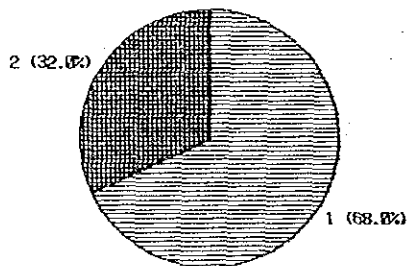
Residential Area  
Collection



Residential Area  
Non-Collection



Commercial Area

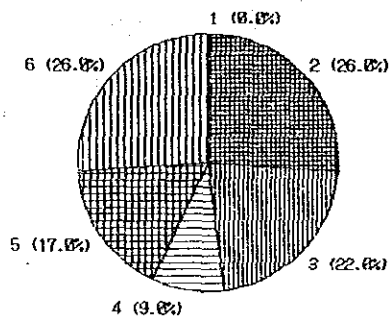




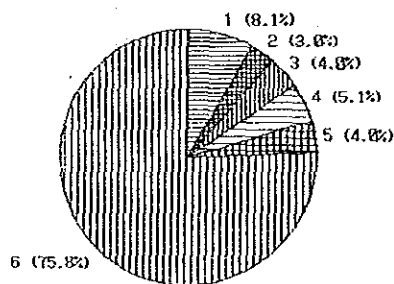
3) Distance from residences and shops to communal container or discharge point. (Q5)

	Residential Area (%)		Commercial
	Collection	Non-Collection	Area (%)
1. In front of the premises	0	8	13
2. Less than 10 m	26	3	3
3. 10 ~ 29 m	22	4	0
4. 30 ~ 49 m	9	5	0
5. 50 or more	17	4	0
6. There is no communal container discharge point in this area	26	75	84
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>

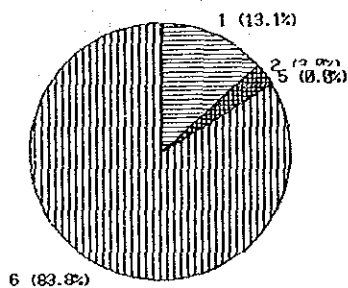
Residential Area  
Collection



Residential Area  
Non-Collection

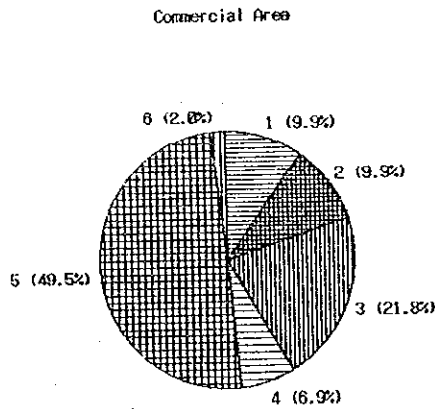
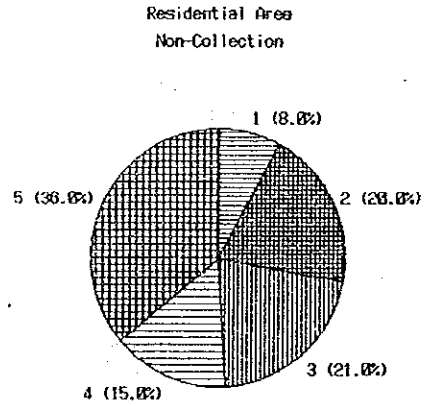
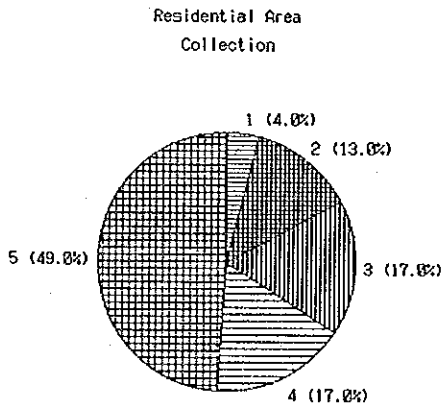


Commercial Area



4) Total expenditure of each family per month. (Q11)

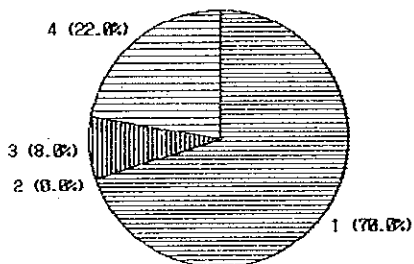
	Residential Area (%)		Commercial Area (%)
	Collection	Non-Collection	
1. Less than 40,000 kips/month	4	8	10
2. 40,000 ~ 55,000 kips/month	13	20	10
3. 55,000 ~ 70,000 kips/month	17	21	22
4. 70,000 ~ 85,000 kips/month	17	15	7
5. More than 85,000 kips/month	49	36	49
6. I don't know	0	0	2
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>



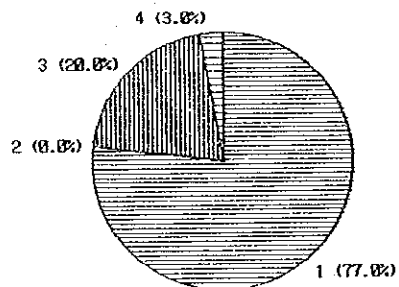
5) Place of discharge. (Q13)

	Residential Area (%)		Commercial Area (%)
	Collection	Non-Collection	
1. Into dustbins to be collected by worker	70	0	87
2. Around premises without dustbins	0	77	13
3. Communal container	8	0	0
4. Discharge point	22	20	0
5. Garbage compartment fixed in the house	0	3	0
6. Others	0	0	0
7. I don't Know	0	0	0
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>

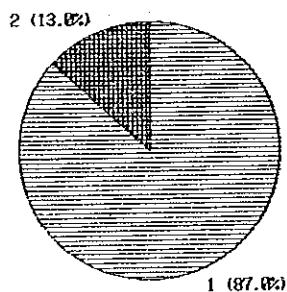
Residential Area  
Collection



Residential Area  
Non-Collection



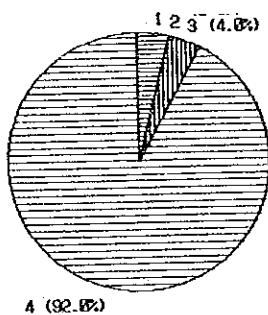
Commercial Area



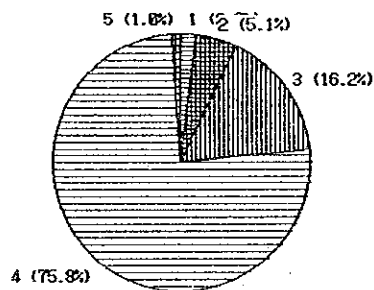
6) Type of containers for carrying waste to discharge point. (Q14)

	Residential Area (%)		Commercial Area (%)
	Collection	Non-Collection	
1. Plastic bag	4	2	3
2. Plastic bucket	0	5	2
3. Metal bucket	4	16	3
4. Bamboo basket	92	75	90
5. Others	0	2	2
6. I don't know	0	0	0
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>

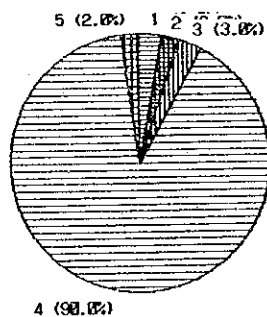
Residential Area  
Collection



Residential Area  
Non-Collection



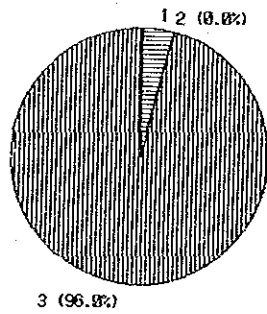
Commercial Area



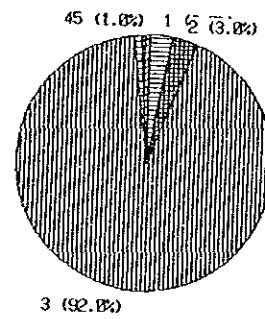
7) Reasons why the container is used. (Q15)

	Residential Area (%)		Commercial
	Collection	Non-collection	Area (5)
1. It is clean after collection work	4	3	7
2. It prevents foul odour	0	3	2
3. It is manageable	96	92	90
4. Keeps away pest such as flies	0	1	0
5. Others	0	1	1
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>

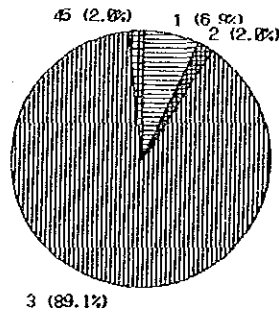
Residential Area  
Collection



Residential Area  
Non-Collection

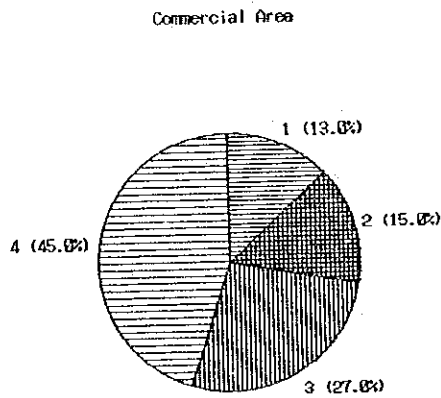
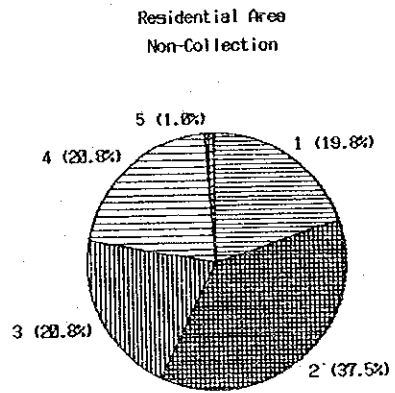
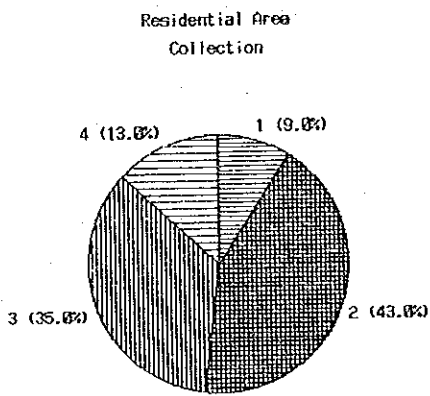


Commercial Area



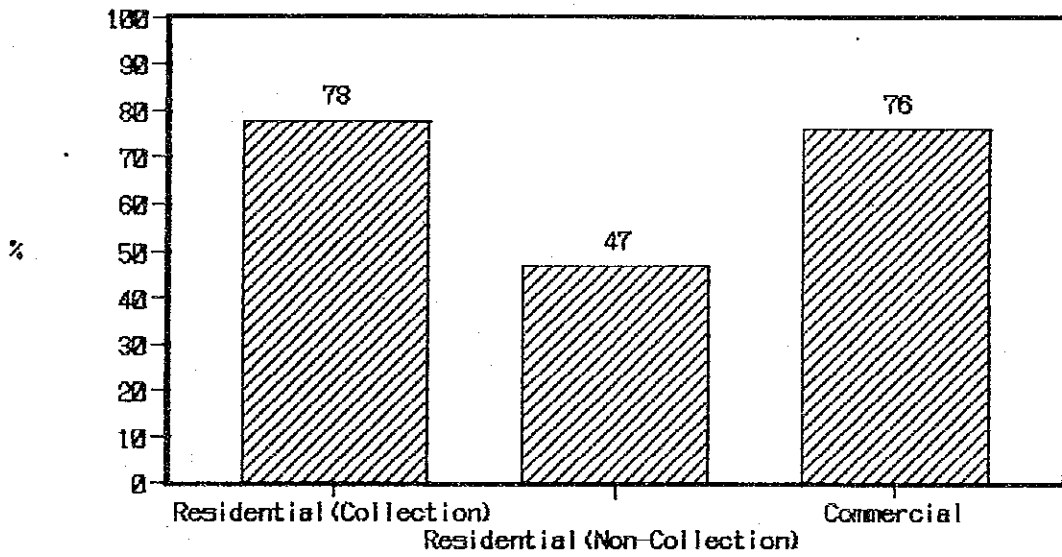
8) Capacity of the container. (Q16)

	Residential Area(%)		Commercial Area (%)
	Collection	Non-Collection	
1. Less than 10 liters	9	20	13
2. 10 ~ 19 liters	43	37	15
3. 20 ~ 29 liters	35	21	27
4. 30 liters or more	13	21	45
5. I don't know	0	1	0
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>



9) Percentage of residents and shop owners who discharge their waste at a fixed time. (Q17)

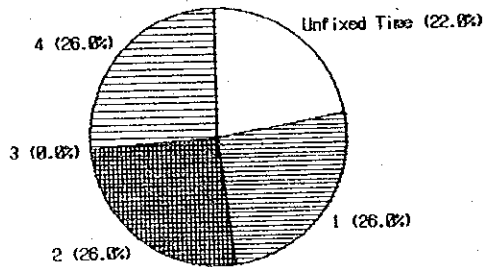
Residential Area (%)		Commercial Area (%)
Collection	Non-Collection	
78	47	76



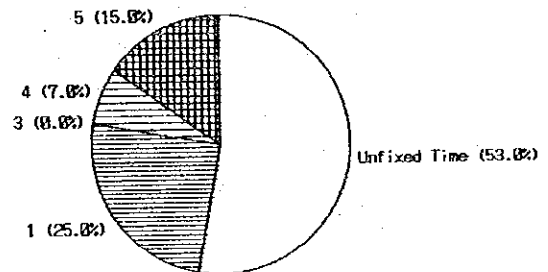
10) Time of discharge of the waste. (Q18)

	<u>Residential Area (%)</u>		<u>Commercial</u>
	<u>Collection</u>	<u>Non-Collection</u>	<u>Area (%)</u>
1. 6:00 ~ 8:59 AM	26	25	27
2. 9:00 ~ 11:59 AM	26	0	12
3. 12:00 ~ 14:59 PM	0	0	15
4. 15:00 ~ 17:59 PM	26	7	5
5. Others	0	15	17
6. I don't know	0	0	0
<b>Total</b>	<b>78</b>	<b>47</b>	<b>76</b>

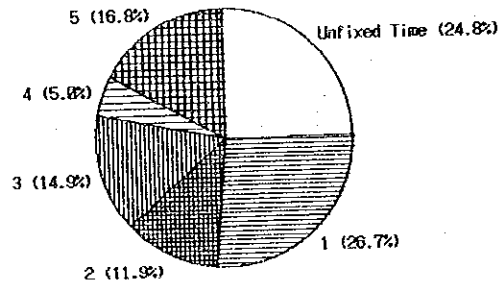
Residential Area  
Collection



Residential Area  
Non-Collection



Commercial

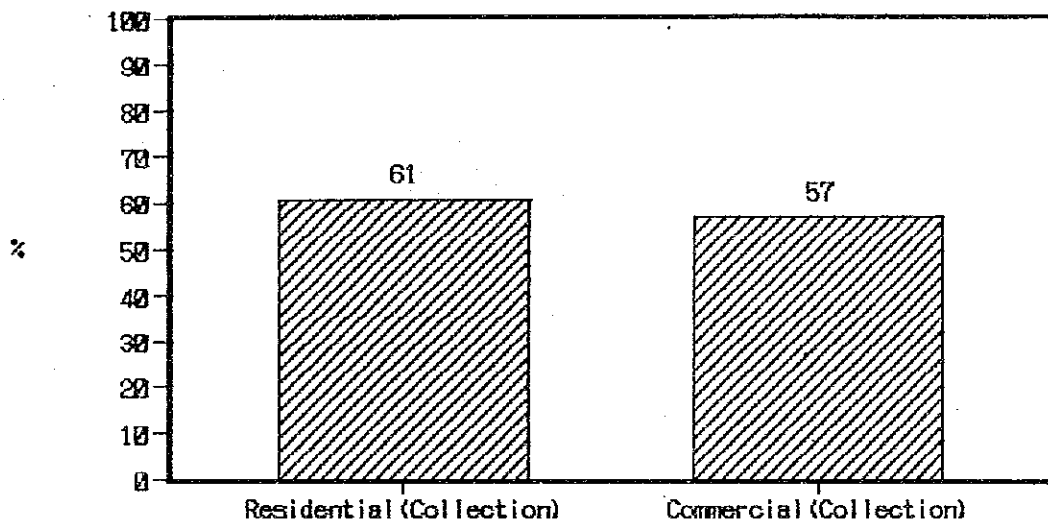




11) Percentage of residents and shop owners who have ever discharged waste soon after it was collected. (Q19)

<u>Residential Area(%)</u>	<u>Commercial Area (%)</u>
<u>{ Collection }</u>	<u>{ Collection }</u>
61	57

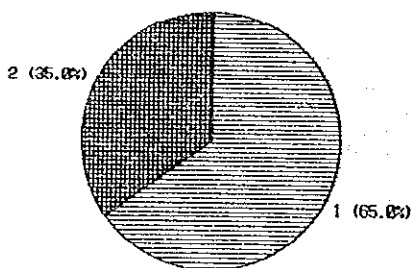
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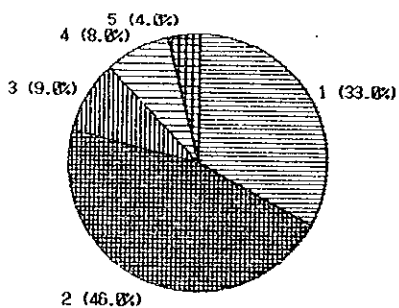
12) Number of dustbins owned by the residents and shops. (Q20)

	<u>Residential Area (%)</u> <u>{ Collection }</u>	<u>Commercial Area (%)</u> <u>{ Collection }</u>
1. 1 dustbin	65	33
2. 2 dustbins	35	46
3. 3 dustbins	0	9
4. 4 dustbins	0	8
5. 5 dustbin or more	0	4
6. I don't know	0	0
<b>Total</b>	<b>100</b>	<b>100</b>

Residential  
Collection



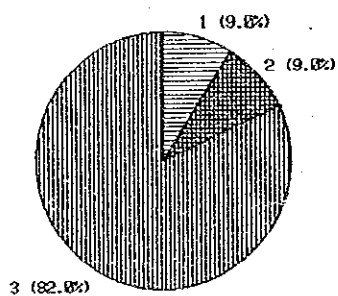
Commercial  
Collection



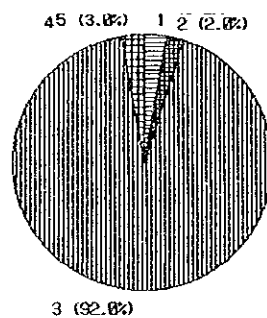
13) Type of dustbins used. (Q21)

	<u>Residential Area(%)</u> <u>{ Collection }</u>	<u>Commercial Area(%)</u> <u>{ Collection }</u>
1. Plastic bucket	9	3
2. Metal bucket	9	2
3. Bamboo basket	82	92
4. Drum can	0	0
5. Others	0	3
6. I don't know	0	0
Total	100	100

Residential  
Collection

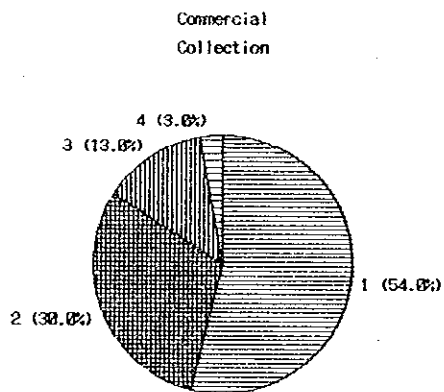
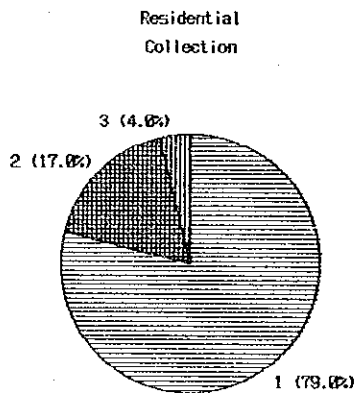


Commercial  
Collection



14) Capacity of dustbin. (Q22)

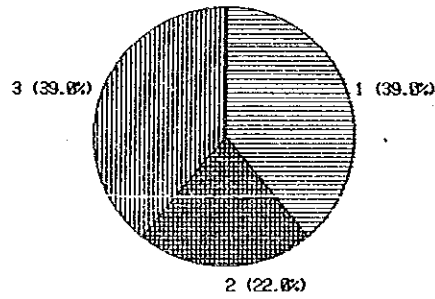
	<u>Residential Area(%)</u> <u>{Collection}</u>	<u>Commercial Area(%)</u> <u>{Collection}</u>
1. Less than 30 liters	79	54
2. 30 ~ 49 liters	17	30
3. 50 ~ 99 liters	4	13
4. 100 liters or more	0	3
5. I don't know	0	0
<b>Total</b>	<b>100</b>	<b>100</b>



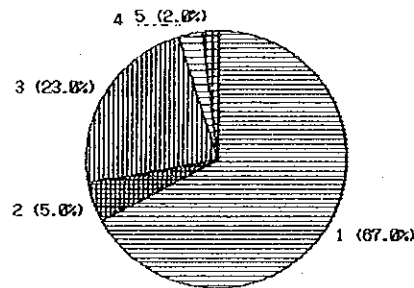
15) Place of the dustbin to be collected. (Q23)

	<u>Residential Area(%)</u>	<u>Commercial Area(%)</u>
	<u>{ Collection }</u>	<u>{ Colection }</u>
1. In front of their premises	39	67
2. Behind the premises	22	5
3. In the house ( kitchen )	39	23
4. In the garden	0	3
5. Others	0	2
6. I don't know	0	0
<b>Total</b>	<b>100</b>	<b>100</b>

Residential  
Collection



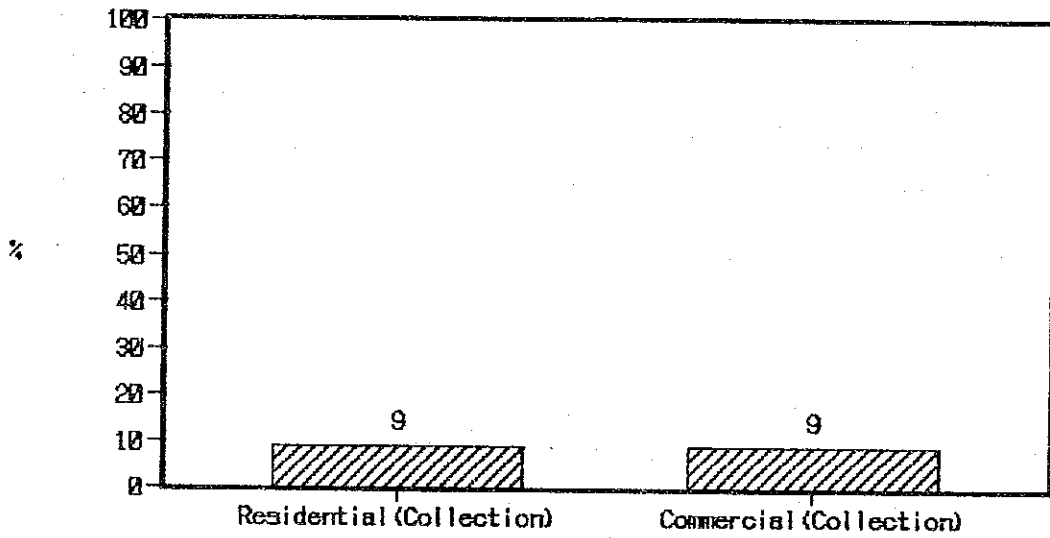
Commercial  
Collection



16) Percentage of dustbins with lids. (Q24)

<u>Residential Area(%)</u>	<u>Commercial Area(%)</u>
<u>{ Collection }</u>	<u>{ Collection }</u>
9	9

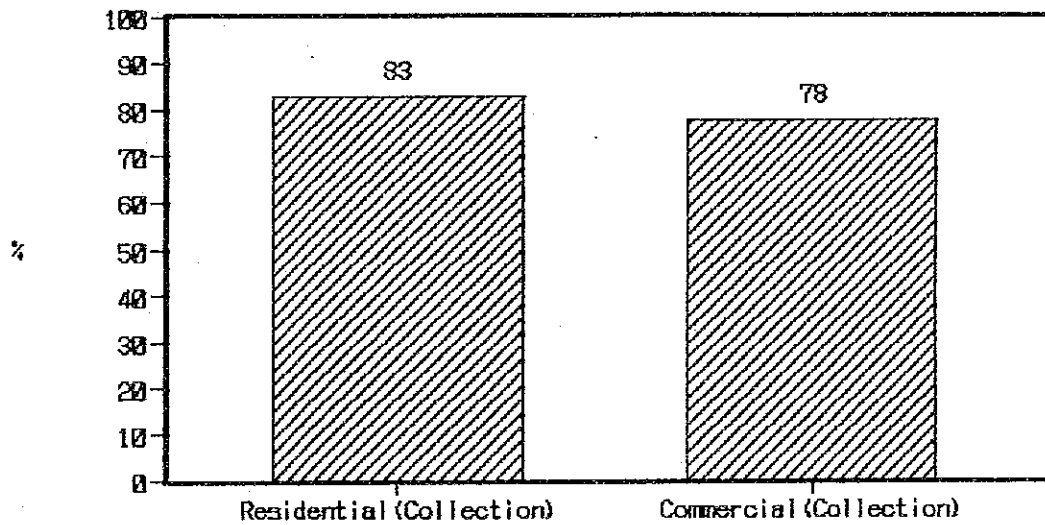
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- 17) Percentage of residents and shop owners who agree to cooperate to carry their waste to communal containers fixed in their areas when requested. (Q25)

<u>Residential Area (%)</u>	<u>Commercial Area(%)</u>
<u>{ Collection }</u>	<u>{ Collection }</u>
83	78

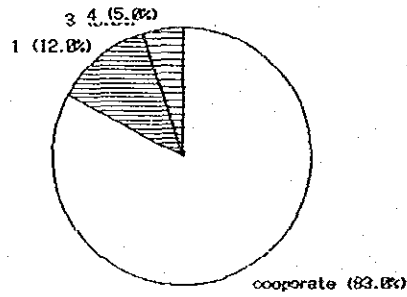
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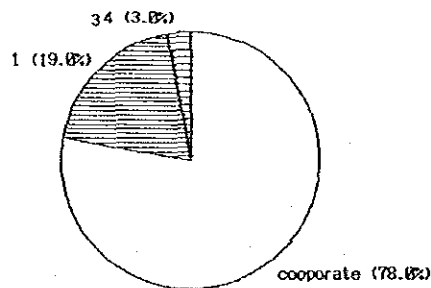
18) Reason why residents and shops can not agree to cooperate. (Q26)

	Residential Area (%) {Collection}	Commercial Area(%) {Collection}
1. Present system is better	12	19
2. They have nobody who will carry	0	0
3. The waste to communal containers	0	0
4. Communal containers are far	5	3
5. Communal containers are not hygienic	0	0
6. Others	0	0
<b>Total</b>	<b>17</b>	<b>22</b>

Residential Area  
Collection



Commercial Area  
Collection

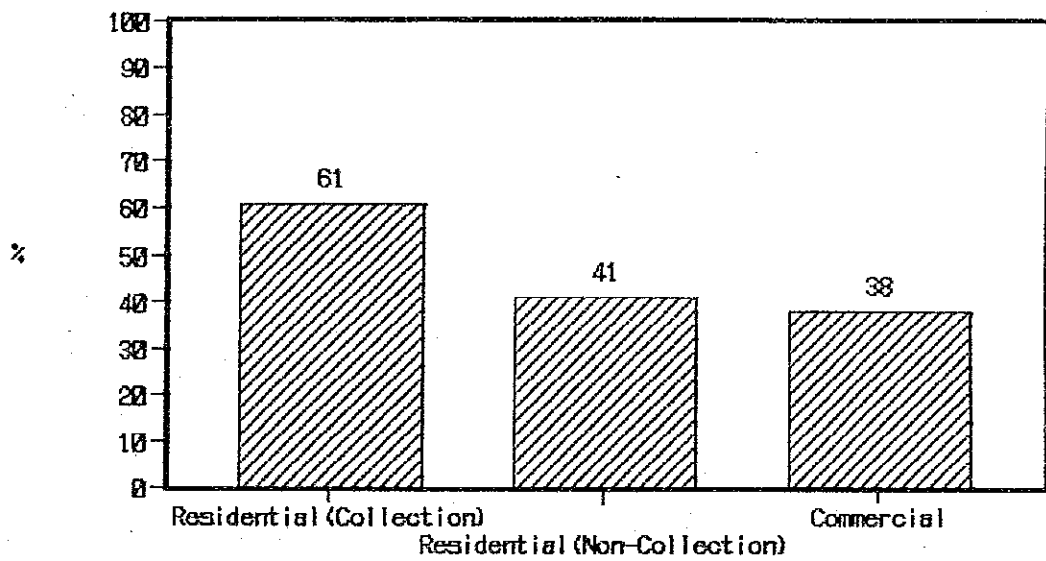




19) Percentage of residents and shop owners who have seen human scavengers and animals on their waste. (Q27)

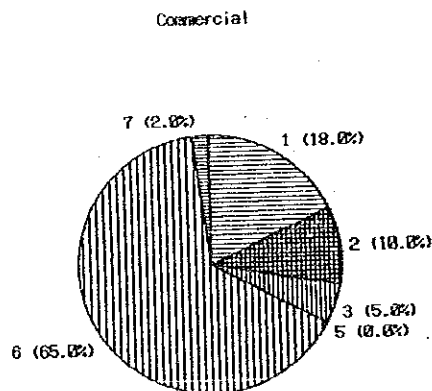
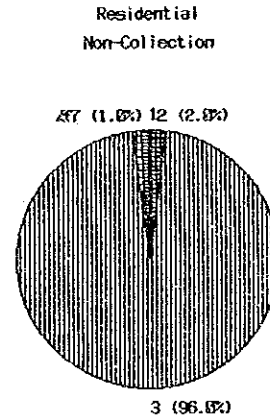
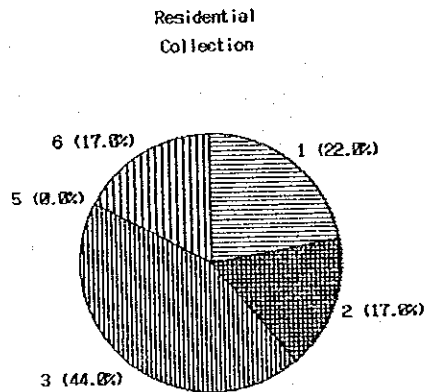
Residential Area(%)		Commercial Area (%)
Collection	Non-Collection	
61	41	38

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20) Discharge method of garden wastes. (Q28)

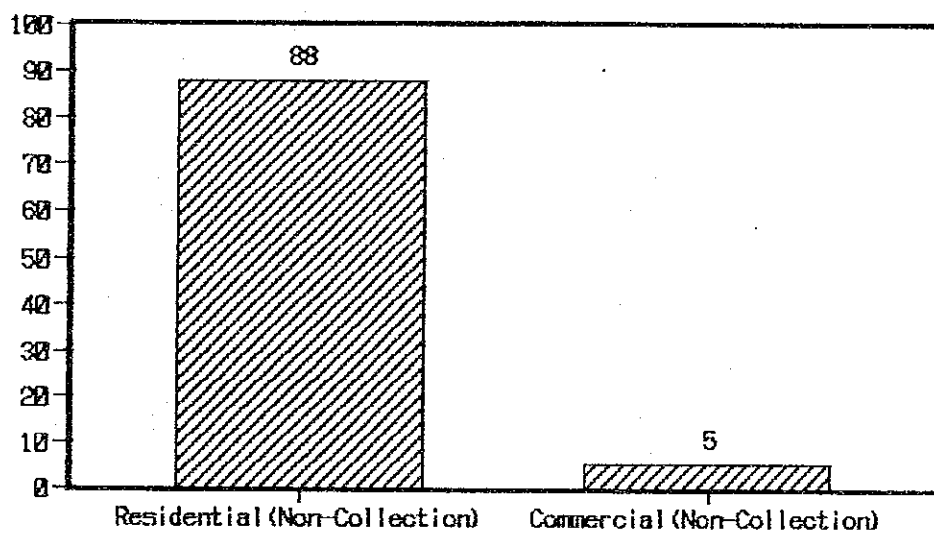
	Residential Area(%)		Commercial
	Collection	Non-Collection	Area
1. Discharge to collection point fixed by municipality	22	0	18
2. Discharge in front of the house	17	2	10
3. Open combustion/burning	44	96	5
4. Composting (producing fertilizer from wastes)	0	0	0
5. I don't know	0	1	0
6. Needless to discharge garden wastes	17	0	65
7. Others	0	1	2
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>



21) Percentage of residents and shop owners who would like to make open combusting or burn the garden wastes regardless of the collection services.  
(Q29)

<u>Residential Area(%)</u>	<u>Commercial Area(%)</u>
<u>{Non-Collection}</u>	<u>{Non-Collection}</u>
88	5

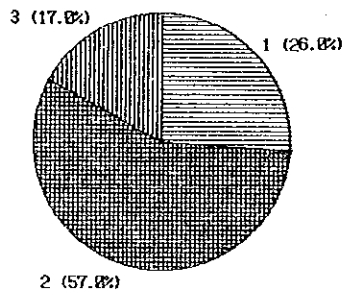
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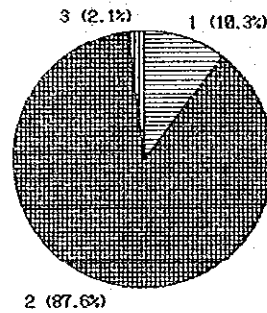
22) Percentage of residents and shop owners who sweep the road shoulder or adjacent public area in front of their houses. (Q30)

	Residential Area (%)		Commercial Area(%)
	Collection	Non-Collection	
1. Everyday	26	10	40
2. Sometimes	57	88	45
3. No	17	2	15
4. I don't know	0	0	0
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>

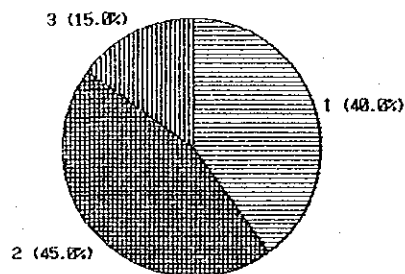
Residential Area  
Collection



Residential Area  
Non-Collection

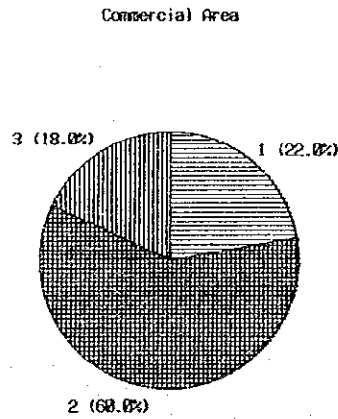
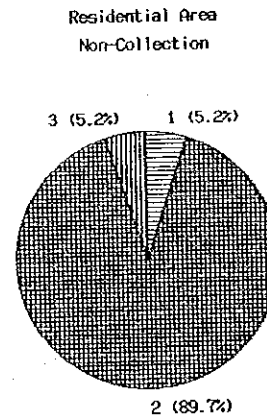
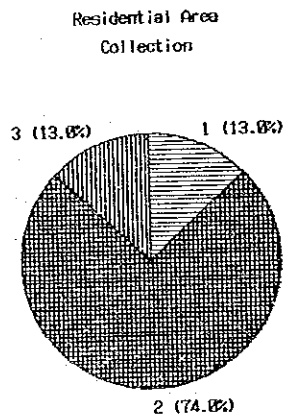


Commercial Area



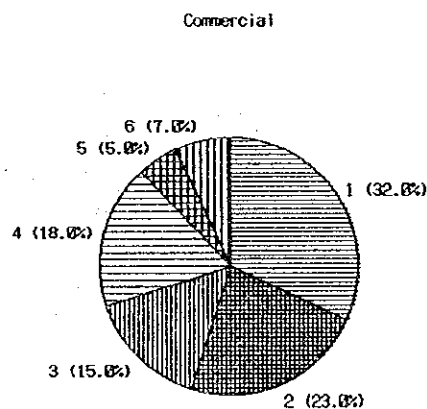
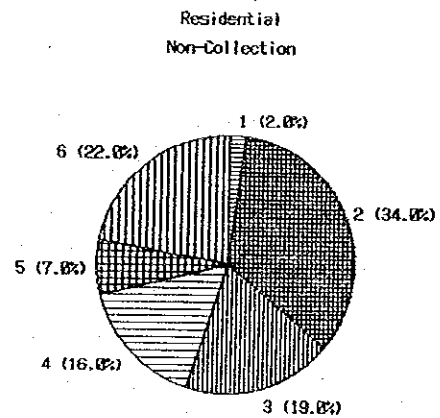
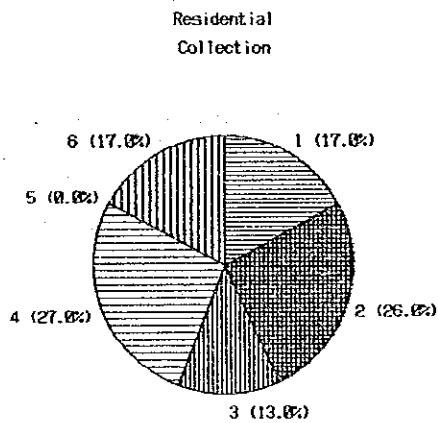
23) Percentage of residents and shop owners who clean the drain around their houses. (Q31)

	<u>Residential Area (%)</u>		<u>Commercial Area (%)</u>
	<u>Collection</u>	<u>Non-Collection</u>	
1. Everyday	13	5	22
2. Sometimes	74	90	60
3. No	13	5	18
4. I don't Know	0	0	0
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>



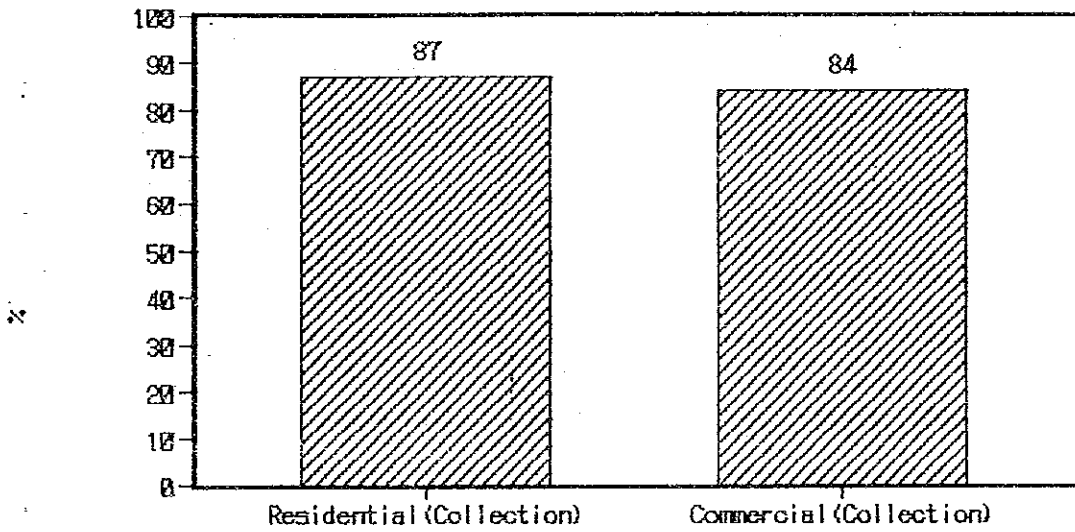
24) Disposal method of the bulky waste. (Q32)

	Residential Area(%)		Commercial Area(%)
	Collection	Non-Collection	
1. Collected by municipal workers	17	2	32
2. Sold/collected by special collectors	26	34	23
3. Disposed by themselves	13	19	15
4. Sold to junkyards	27	16	18
5. Others	0	7	5
6. I don't know	17	22	7
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>



25) Percentage of residents and shop owners who are satisfied with the collection service. (Q34)

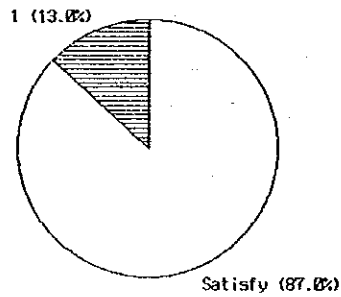
<u>Residential Area (%)</u>	<u>Commercial Area(%)</u>
<u>{Collection}</u>	<u>{Collection}</u>
87	84



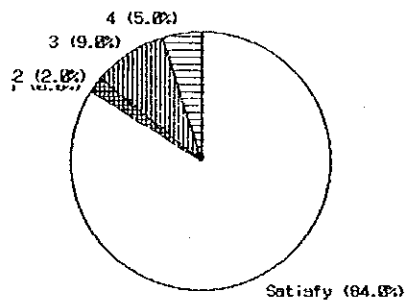
26) Reason why residents and shop owners who are not satisfied with the collection service. (Q35)

	<u>Residential Area</u>	<u>Commercial Area(%)</u>
	<u>{ Collection }</u>	<u>{Collection}</u>
1. Frequency of collection service is low.	13	0
2. Collection time is irregular.	0	2
3. Collection time is very early or late.	0	9
4. Behaviour of workers is bad.	0	5
5. Collection work is crude.	0	0
6. Collection fee is expensive.	0	0
7. Other.	0	0
<b>Total</b>	<b>13</b>	<b>16</b>

Residential  
Collection



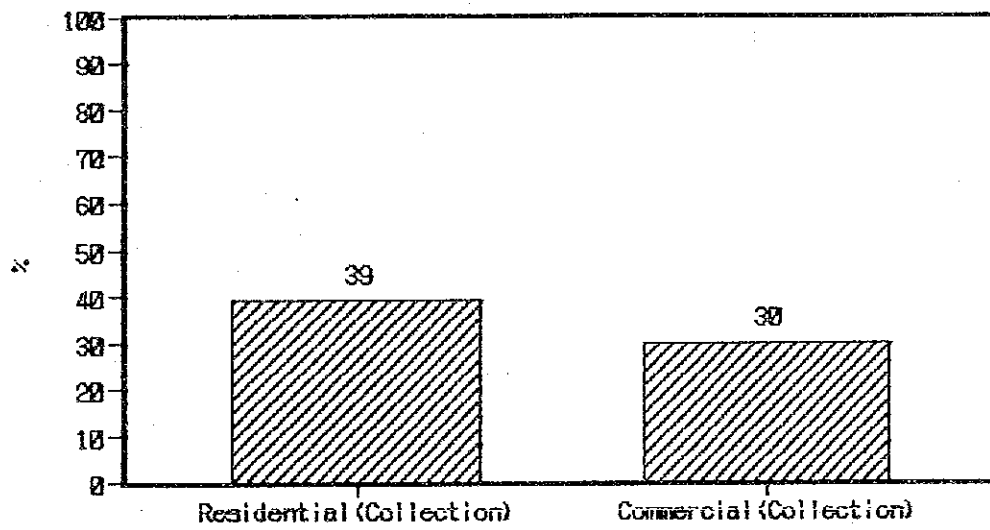
Commercial  
Collection





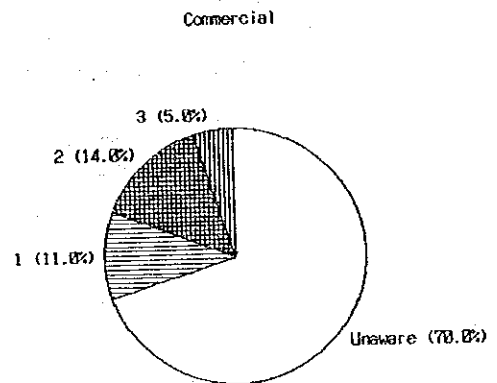
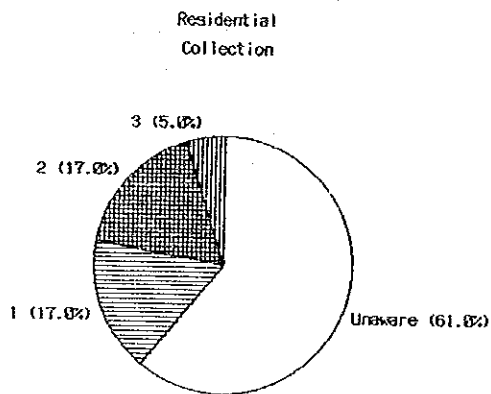
27) Percentage of residents and shop owners who are aware of the collection system in their area. (Q36)

<u>Residential Area(%)</u>	<u>Commercial Area(%)</u>
<u>{Collection}</u>	<u>{Collection}</u>
39	30



28) Collection system. (Q37)

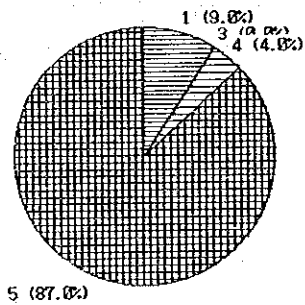
	<u>Residential Area</u>	<u>Commercial Area(%)</u>
	<u>{Collection} (%)</u>	
1. Door to door collection system by using collection vehicles.	17	11
2. Door to door collection system by collection workers.	17	14
3. Residents themselves carry waste to a collection point.	5	5
4. Collection from dust chute in the building.	0	0
5. Others.	0	0
<b>Total</b>	<b>39</b>	<b>30</b>



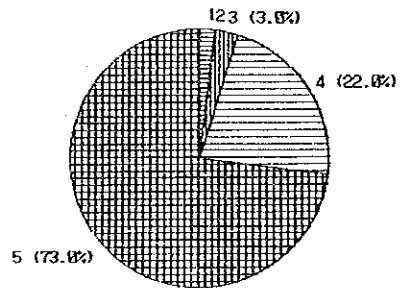
29) Frequency of the collection service. (Q38)

	Residential Area(%) { Collection }	Commercial Area(%) {Collection}
1. Everyday	9	2
2. Six times a week	0	0
3. Three times a week (every otherday)	0	3
4. Twice a week	4	22
5. Once a week	87	73
6. Others	0	0
7. I don't know.	0	0
<b>Total</b>	<b>100</b>	<b>100</b>

Residential Area  
Collection



Commercial Area  
Collection

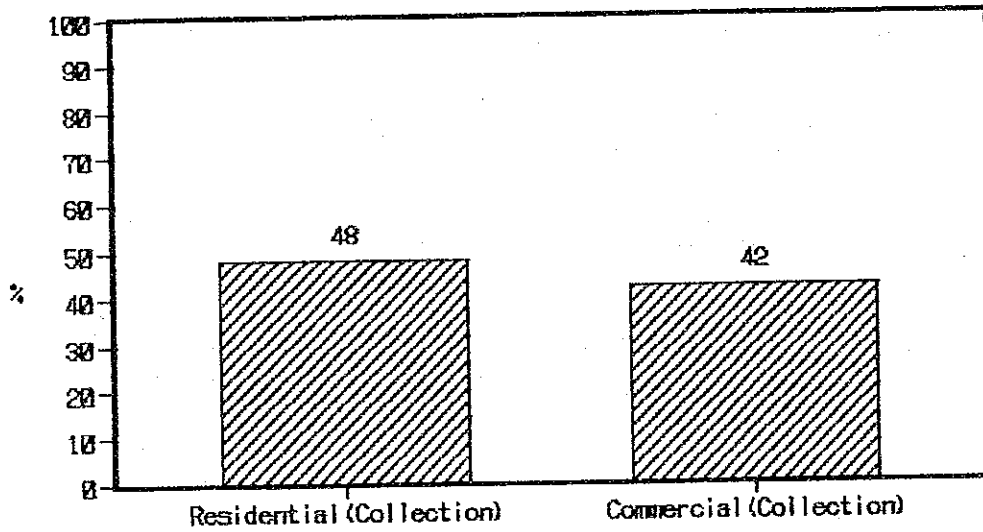


30) Percentage of residents and shop owners who receive the collection service at a fixed time in the day. (Q39)

<u>Residential Area (%)</u>	<u>Commercial Area(%)</u>
<u>{Collection}</u>	<u>{Collection}</u>

48

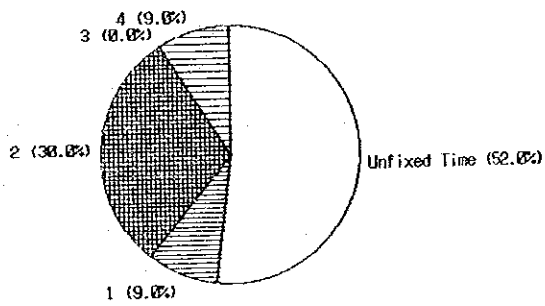
42



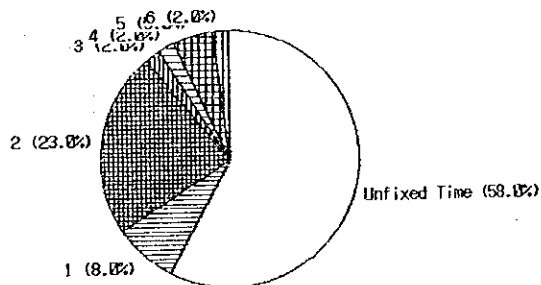
31) Time of the collection service. (Q40)

	Residential Area {Collection}	Commercial Area(%) {Collection}
1. 6:00 ~ 8:59	9	8
2. 9:00 ~ 11:59	30	23
3. 12:00~ 14:59	0	2
4. 15:00~ 17:59	9	2
5. Others	0	5
6. I don't know	0	2
<b>Total</b>	<b>48</b>	<b>42</b>

Residential Area  
Collection



Commercial Area  
Collection

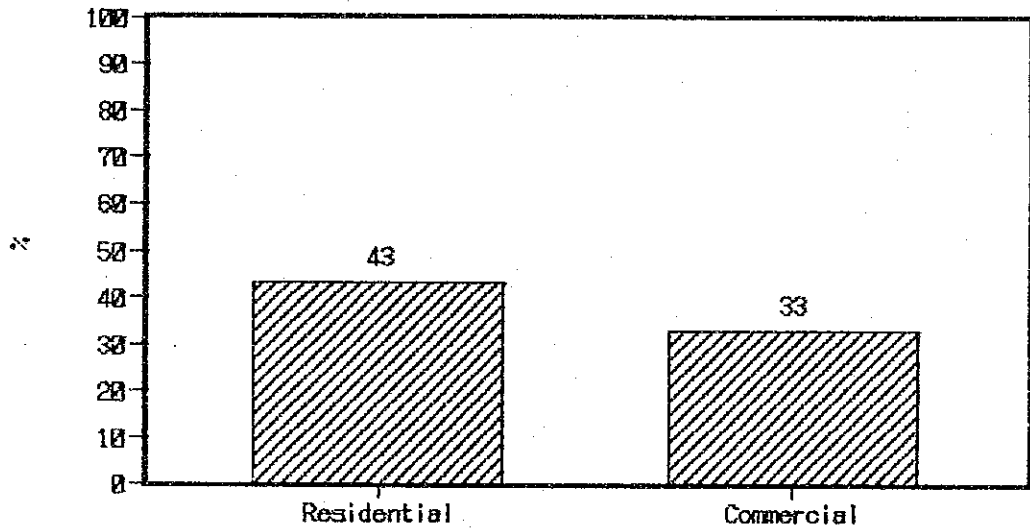


32) Percentage of residents and shop owners who are aware of the recycling system. (Q41)

Residential Area(%)                      Commercial Area(%)

43

33

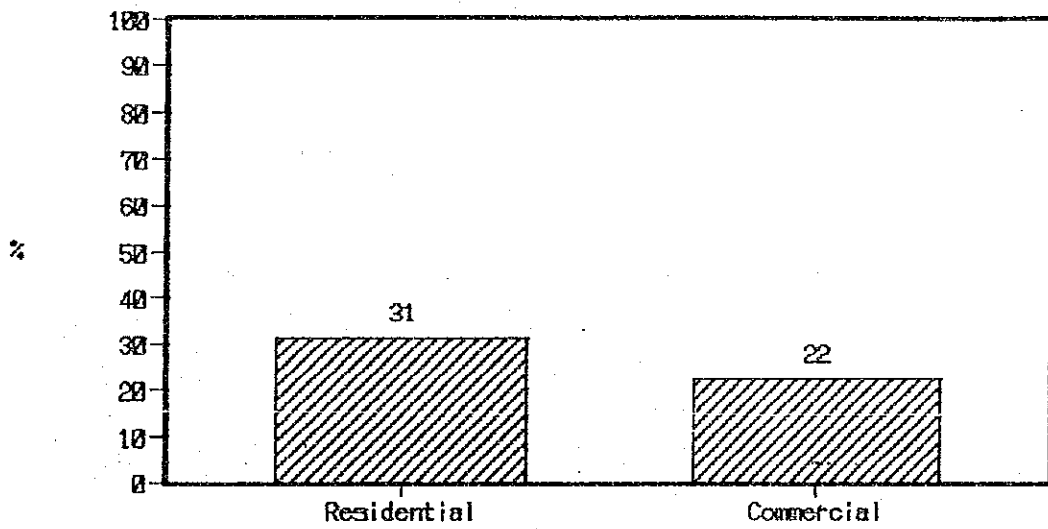


33) Percentage of residents and shop owners who are aware of scavengers at the dumping grounds. (Q42)

Residential Area(%)      Commercial Area(%)

31

22

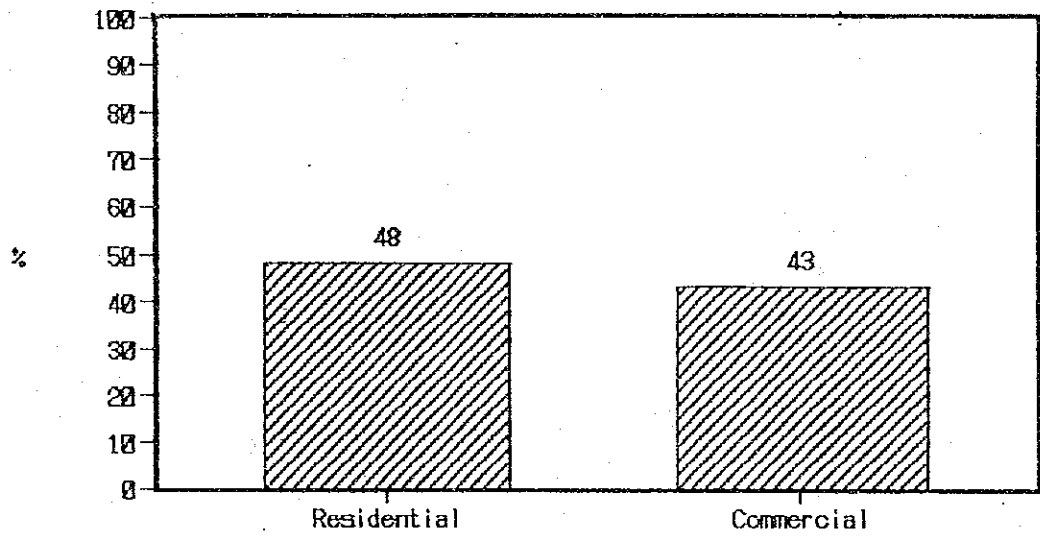


34) Percentage of residents and shop owners who are aware that someone who collects or buys unused or recyclable materials in their area. (Q43)

Residential Area(%)      Commercial Area(%)

48

43

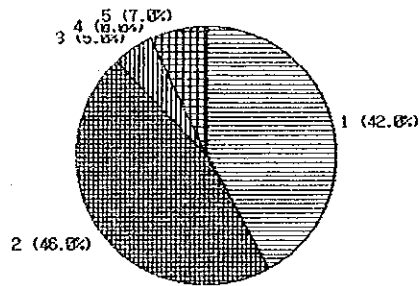




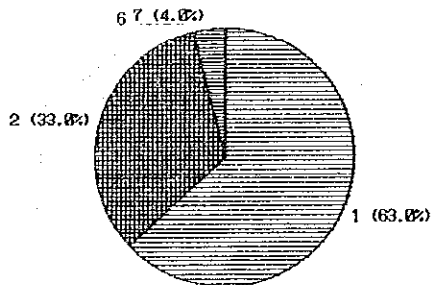
35) Frequency of the visits of the collector. (Q44)

	<u>Residential Area(%)</u> <u>{Collector coming}</u>	<u>Commercial Area(%)</u> <u>{Collector coming}</u>
1. Once a week	42	63
2. Once a month	46	33
3. Once every other week	5	0
4. Once every other month	0	0
5. Once every 6 months	7	0
6. Once a year	0	0
7. I don't know	0	4
<b>Total</b>	<b>100</b>	<b>100</b>

Residential Area



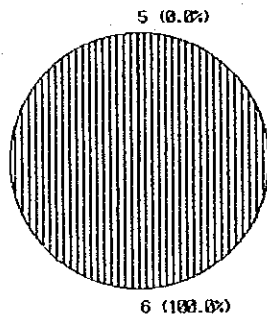
Commercial Area



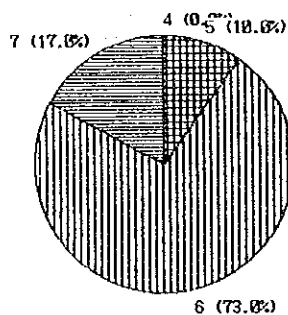
36) Kind of transport vehicles which the collectors use to haul recyclable materials. (Q45)

	<u>Residential Area(%)</u> <u>{Collector coming}</u>	<u>Commercial Area(%)</u> <u>{Collector coming}</u>
1. Tri-cycle	0	0
2. Bicycle	0	0
3. Motorcycle	0	0
4. Pick-up truck	0	0
5. Small lorry	0	10
6. Handcart	100	73
7. Others	0	17
<b>Total</b>	<b>100</b>	<b>100</b>

Residential Area  
Collector Coming



Commercial Area  
Collector Coming



37) Kinds and average prices of recyclable materials. (Q46)

	<u>Residential Area(kips/kg)</u>	<u>Commercial Area(kips/kg)</u>
1. Newspaper	250 (200~300)	275 (250~300)
2. Others paper	-	600
3. Glass bottles	16 ( 10~20 )	12 ( 10~20 )
4. Textile	-	-
5. Plastic	10 ( 2~20 )	-
6. Ferrous metal	29 ( 20~30 )	23 ( 20~30 )
7. Others metal	30	-
8. Others materials	-	-

38) Amount of recyclable materials sold to the collectors. (Q47)

	<u>Residential Area</u> <u>(g/mon./house)</u>	<u>Commercial Area</u> <u>(g/mon./house)</u>
Newspaper	400 (10)	2,000 (67)
Other paper	0 (0)	0 (0)
Glass bottles	5.6 (2.7) bottles	9.5(4 bottles)
Textile	0 (0)	0 (0)
Plastic	0 (0)	0 (0)
Ferrous metal	2,600 (260)	0 (0)
Other metal	0 (0)	0 (0)
Other materials	0 (0)	0 (0)

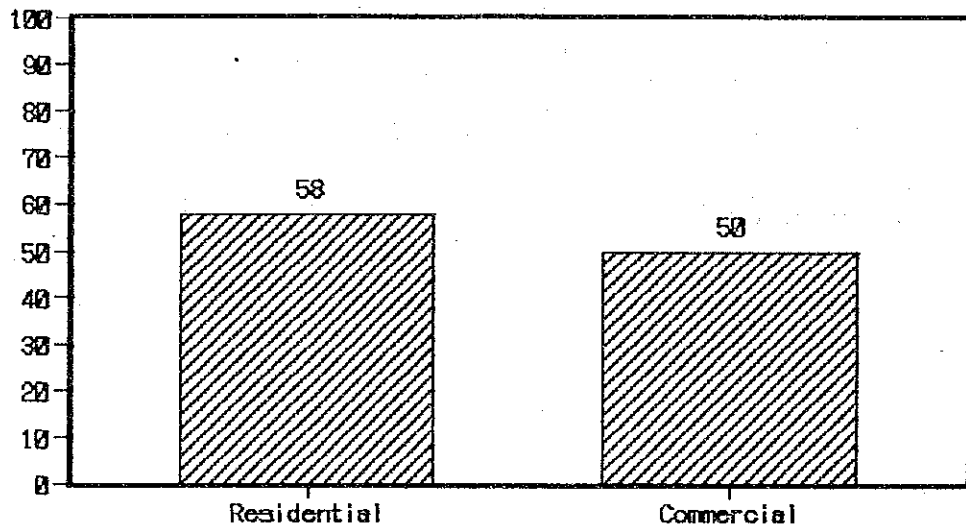
Figures in parentheses indicate the average of total samples

39) Percentage of residents and shop owners who agree to sell of reusable or recyclable materials for beneficial activities in their area.(Q48)

Residential Area(%)    Commercial Area(%)

58

50



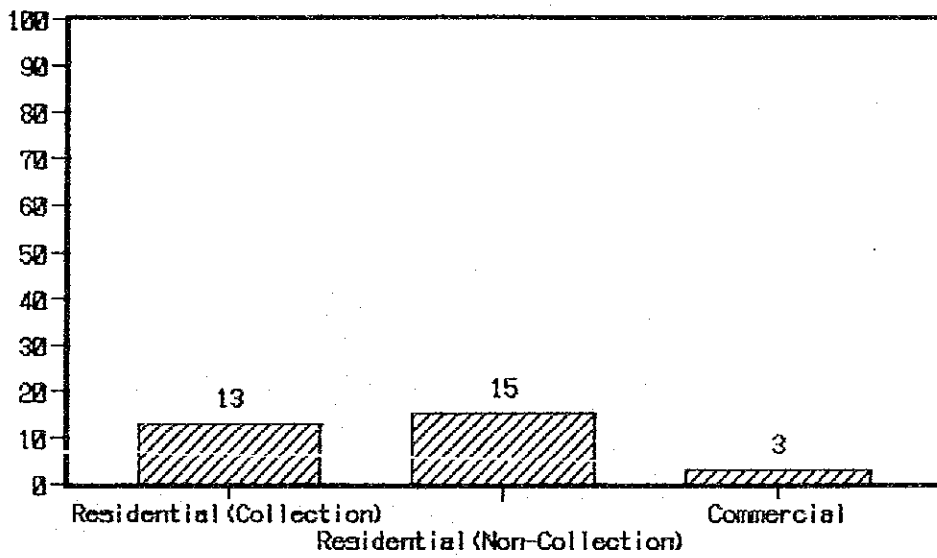
40) Percentage of residents and shop owners who use food wastes and garden wastes as fertilizer. (Q49)

<u>Residential Area(%)</u>	<u>Commercial Area(%)</u>
<u>Collection</u>	<u>Non-Collection</u>

13

15

3



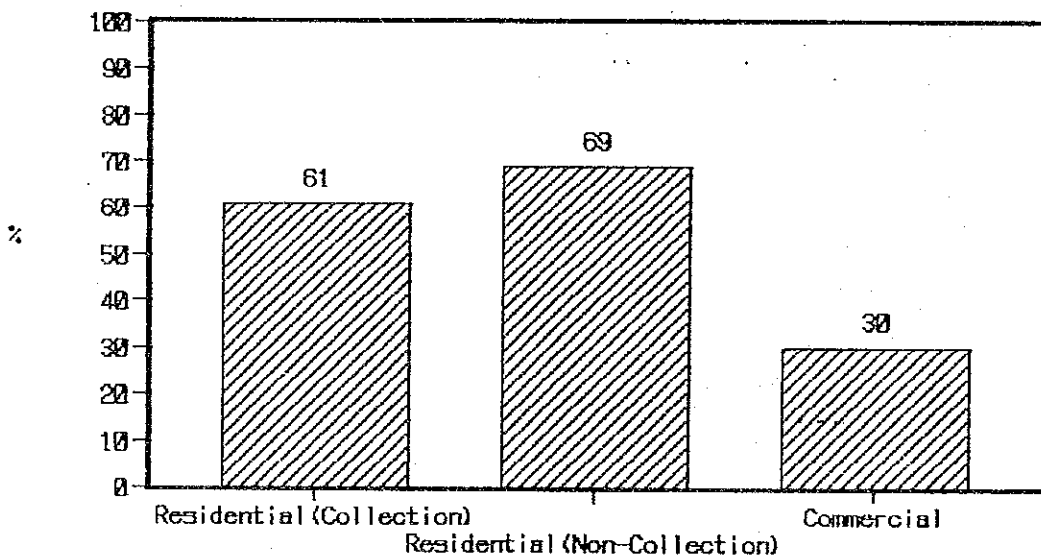
41) Percentage of residents and shop owners who like to have guidance on methods of producing fertilizer from food wastes and garden wastes. (Q50)

<u>Residential Area(%)</u>	<u>Commercial Area(%)</u>
<u>Collection</u>	<u>Non-Collection</u>

61

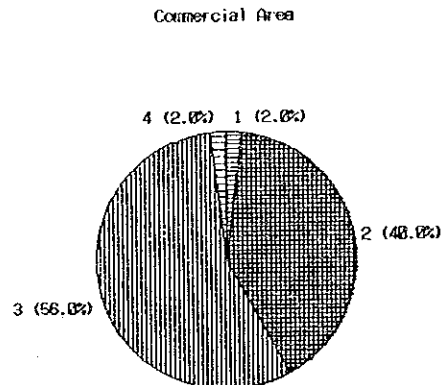
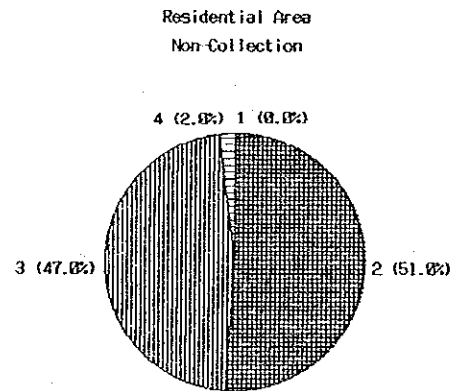
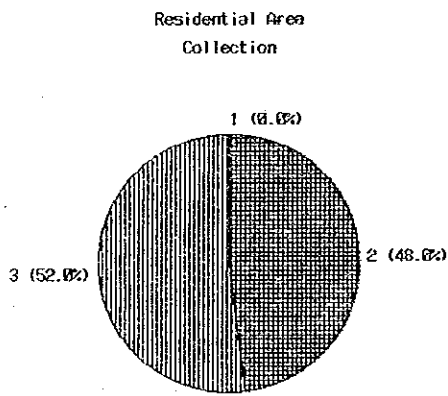
69

30



42) Opinion of residents and shop owners regarding present solid waste management budget in Vientiane Municipality of 18 kips per month per capita. (Q51)

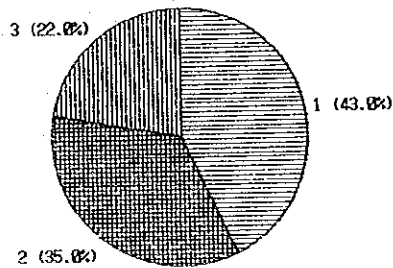
	Residential Area(%)		Commercial Area(%)
	Collection	Non-Collection	
1. High	0	0	2
2. Reasonable	48	51	40
3. Low	52	47	56
4. I don't know	0	2	2
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>



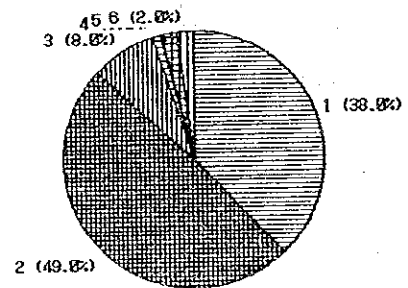
43) Opinion of residents and shop owners regarding the amount of extra money which can be paid by them for solid waste management in addition to the present collection fee. (unit, kips per month per family) (Q52)

	Residential Area(%)		Commercial Area(%)
	Collection	Non-Collection	
1. Less than 100 kips	43	38	18
2. 100 ~ 500 kips	35	49	47
3. 500 ~ 1000 kips	22	8	23
4. 1000 ~ 2000 kips	0	1	10
5. More than 2000 kips	0	2	0
6. I can not contribute	0	2	2
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>

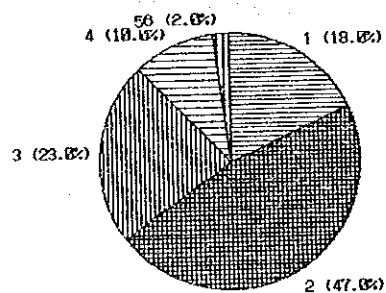
Residential Area  
Collection



Residential Area  
Non-Collection



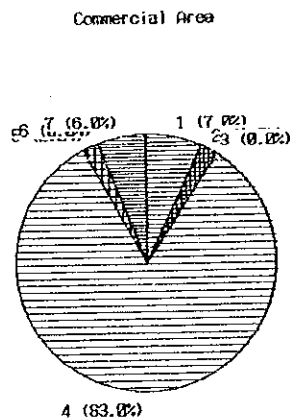
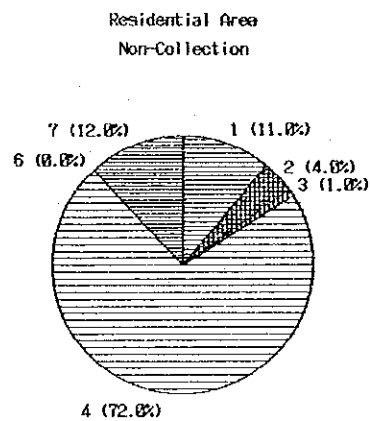
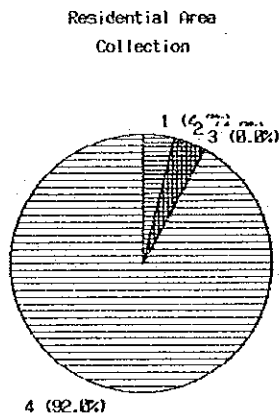
Commercial Area





44) Knowledge of residents and shop owners regarding responsible organizations for disposal of solid waste. (Q53)

	Residential Area(%)		Commercial Area(%)
	Collection	Non-Collection	
1. State	4	11	7
2. Municipality	4	4	2
3. Theirselves	0	1	0
4. State Sanitation Company	92	72	83
5. Private Contractor	0	0	2
6. Others	0	0	0
7. I don't know	0	12	6
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>



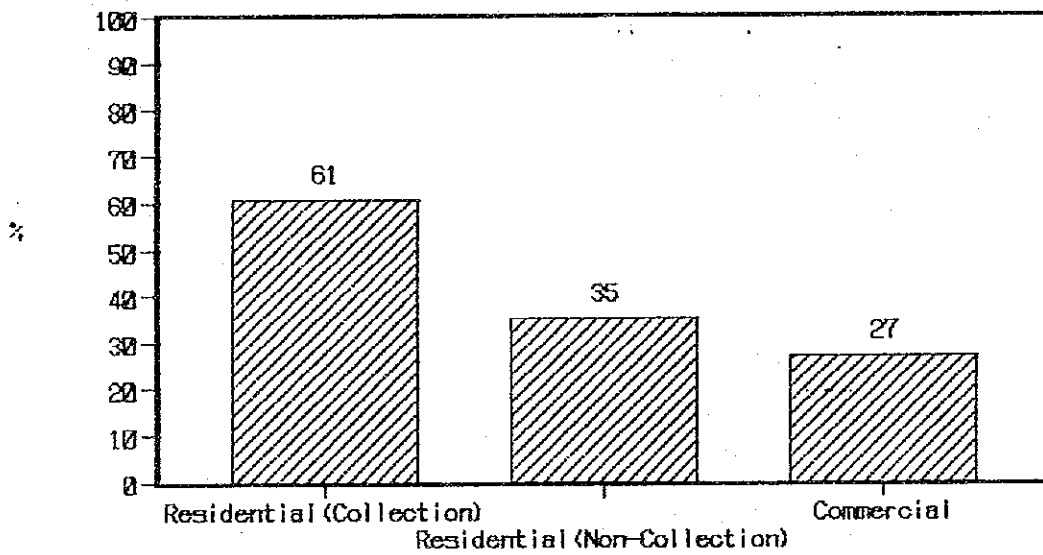
45) Percentage of residents and shop owners who have had guidance on method of proper discharge of wastes. (Q54)  
any guidance on method of paper discharge.

<u>Residential Area(%)</u>		<u>Commercial Area(%)</u>
<u>Collection</u>	<u>Non-Collection</u>	

61

35

27



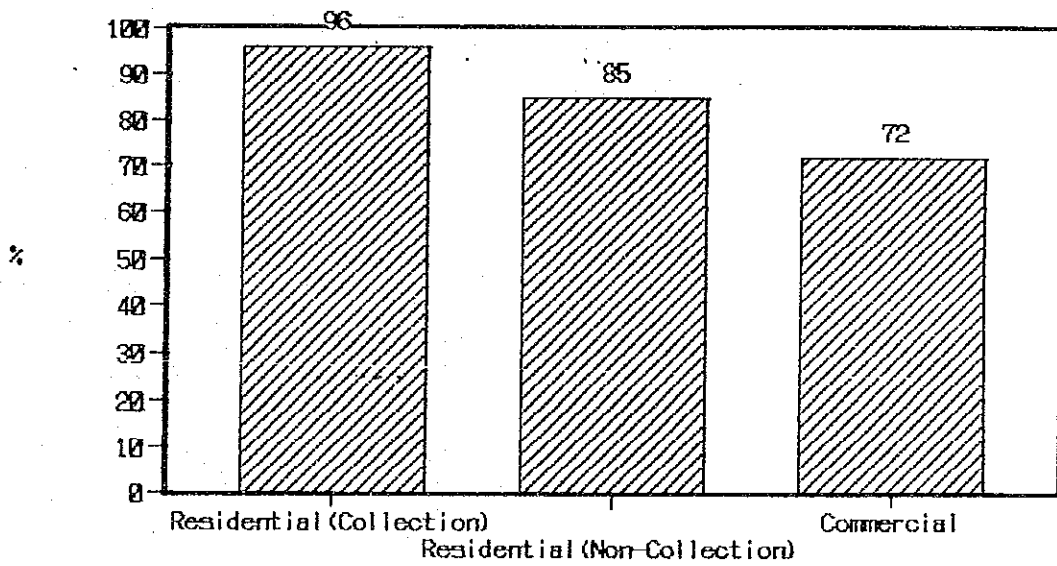
46) Percentage of residents and shop owners who have a "Clean Day" in their area for "Public Cleansing" service by the residents. (Q55)

Residential Area (%)      Commercial Area(%)  
Collection    Non-Collection

96

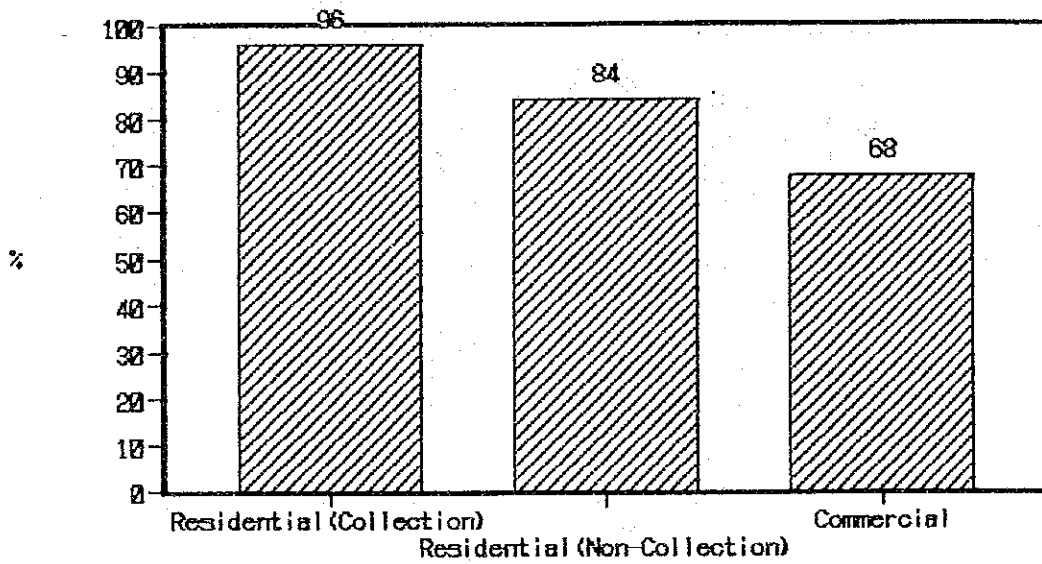
85

72



47) Percentage of residents and shop owners who participate in the "Public Cleansing" in their area. (Q56)

<u>Residential Area (%)</u>	<u>Commercial Area(%)</u>
<u>Collection</u>	<u>Non-Collection</u>
96	84
	68



48) Percentage of residents and shop owners who breed animals.

<u>Residential Area (%)</u>	<u>Commercial Area (%)</u>
<u>Collection</u>	<u>Non-Collection</u>

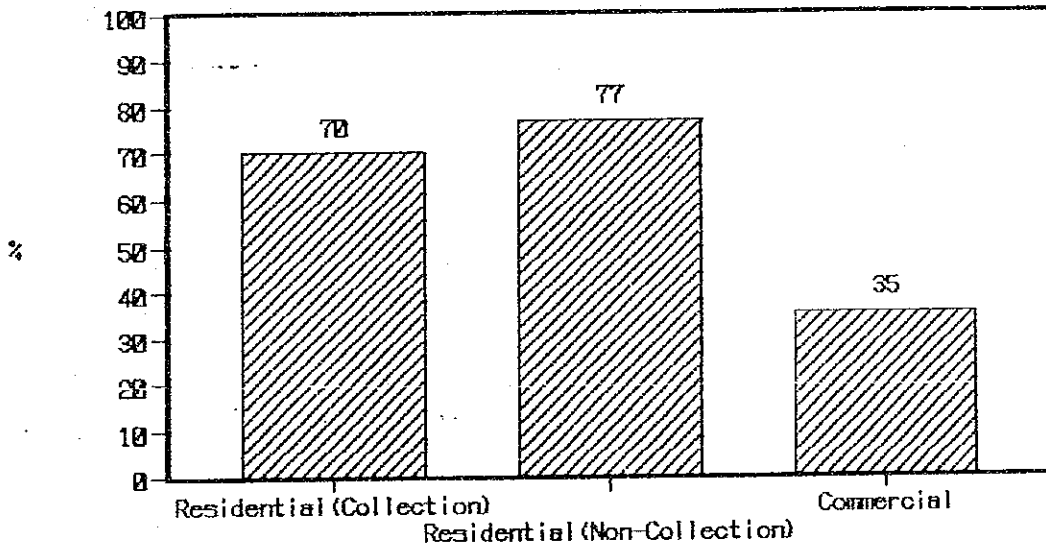
70

77

35

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Commercial Area



49) Kind of animals bred. (Q57)

	<u>Residential Area(%)</u>		<u>Commercial Area(%)</u>
	<u>Collection</u>	<u>Non-Collection</u>	
Dog	17	42	17
Cat	17	24	15
Domestic fowl	43	54	7
Domestic duck	9	37	3
Turkey	0	6	0
Pig	4	10	2
Others	4	5	0

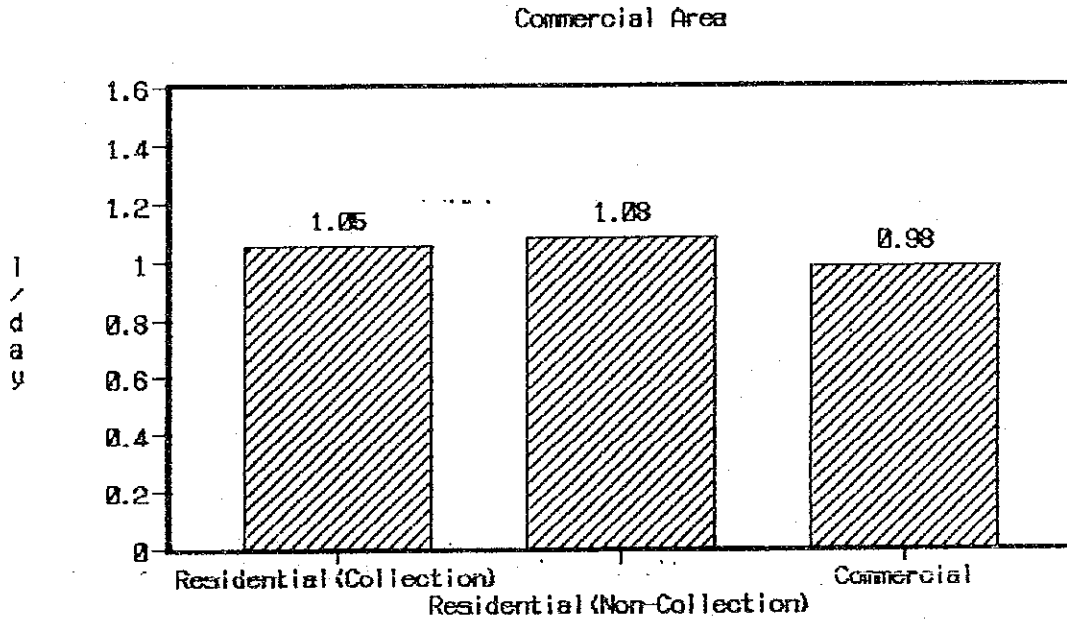
50) Number of animals bred. (Q57)

	<u>Residential Area</u>		<u>Commercial Area</u>
	<u>(No. of animal/house)</u>		<u>( No. of animal/shop)</u>
	<u>Collection</u>	<u>Non-Collection</u>	
Dog	2	2	1
Cat	2	2	3
Domestic fowl	25	15	11
Domestic duck	14	12	12
Turkey	0	6	0
Pig	2	2	7
Others	3	112	0

51) Amount of the food to the animals (livestocks).(unit; l/days)(Q58)

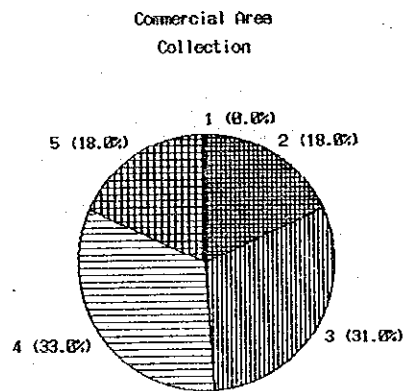
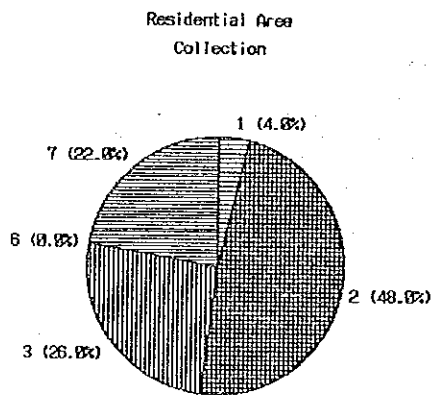
<u>Residential Area(l/day)</u>		<u>Commercial</u>
<u>Collection</u>	<u>Non-Collection</u>	<u>Area (l/day)</u>
1.05	1.08	0.95

---



52) Amount of money paid per month for the collection service. (Q59)

	<u>Residential Area(%)</u> <u>{Collection}</u>	<u>Commercial Area(%)</u> <u>Collection}</u>
1. Less than 100 kips	4	0
2. 100 ~ 499 kips	48	18
3. 500 ~ 999 kips	26	31
4. 1000 ~ 1499 kips	0	33
5. 1500 ~ 1999 kips	0	18
6. More than 2000 kips	0	0
7. Temporarily payment	22	0
Total	100	100

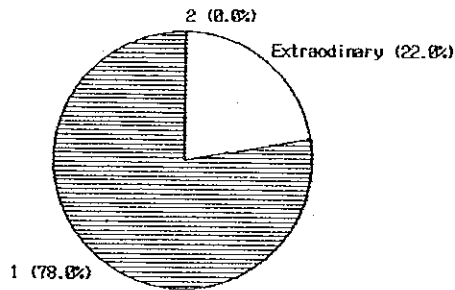




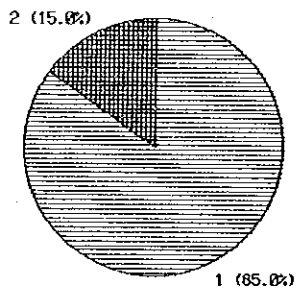
53) Percentage of direct and indirect payment for the collection service. (Q60)

	<u>Residential Area(%)</u> <u>{Collection}</u>	<u>Commercial Area(%)</u> <u>{Collection}</u>
1. Direct payment	78	85
2. Through the community	0	15
<b>Total</b>	<b>78</b>	<b>100</b>

Residential Area  
Collection



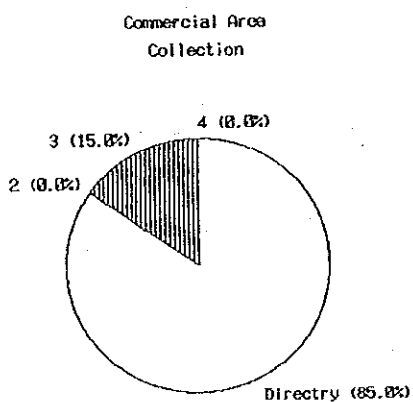
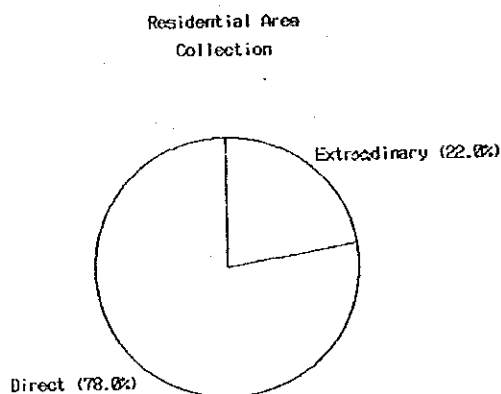
Commercial Area  
Collection



54) Kinds of persons who collect the waste collection fee in the community. (Q61)

	<u>Residential Area(%)</u> <u>{ Collection }</u>	<u>Commercial Area(%)</u> <u>{Collection}</u>
1. Chief of Ban.	0	0
2. A person in charge of sanitation matter in the community.	0	0
3. A representative person selected by ourselves	0	15
4. Others	0	0
<b>Total</b>	<b>0</b>	<b>15</b>

#### Residential Area

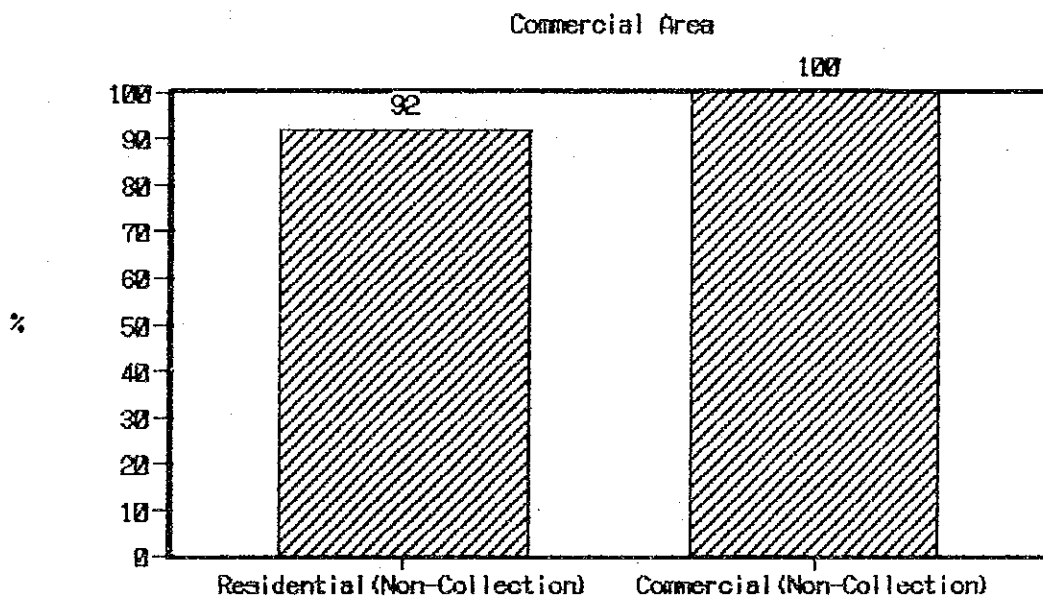


55) Percentage of residents and shop owners who want to get a collection service. (Q62)

<u>Residential Area(%)</u>	<u>Commercial Area(%)</u>
<u>{ Non-Collection }</u>	<u>{ Non-Collection }</u>

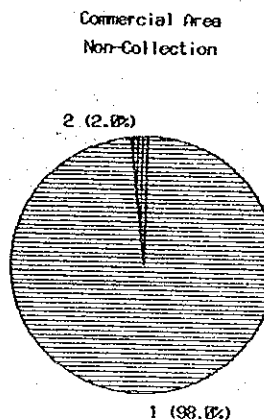
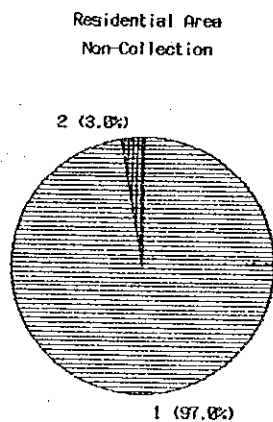
92

100



56) Types of contract for the collection service which the residents without a collection service would like to have. (Q63)

	<u>Residential Area(%)</u> <u>{ Non-Collection}</u>	<u>Commercial Area(%)</u> <u>{Non-Collection}</u>
1. Direct contract	97	98
2. Through the community	3	2
<b>Total</b>	<b>100</b>	<b>100</b>



57) Percentage of residents and shop owners who have someone to collect their food wastes. (Q64)

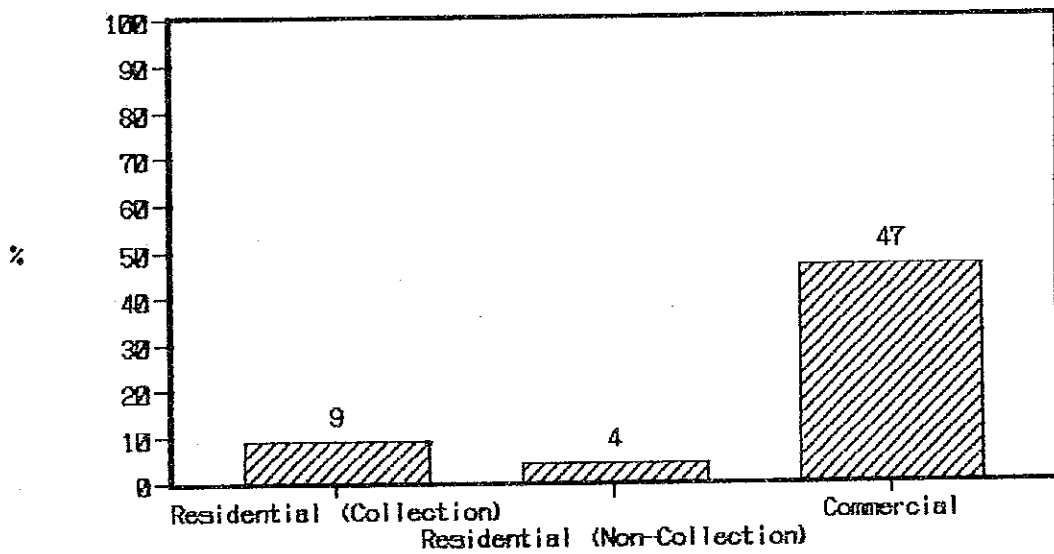
	Residential Area(%)	Commercial Area(%)
Collection	9	47
Non-Collection	4	

9

4

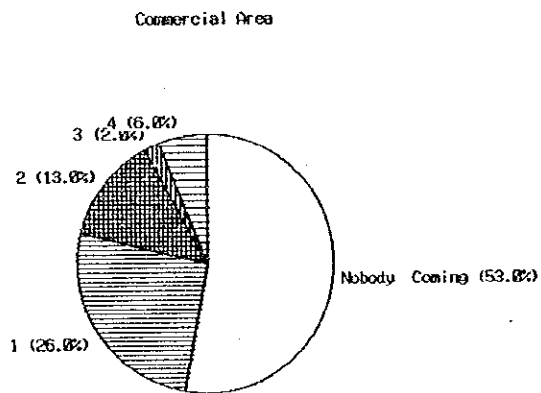
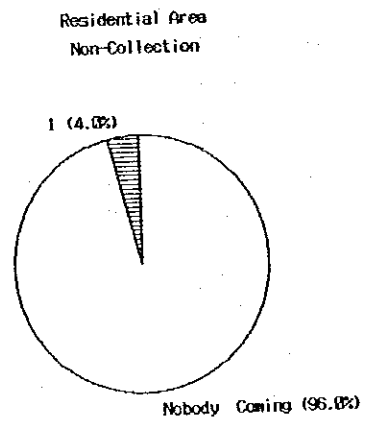
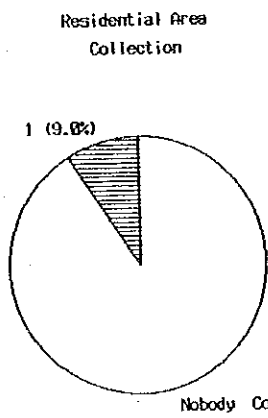
47

Commercial Area



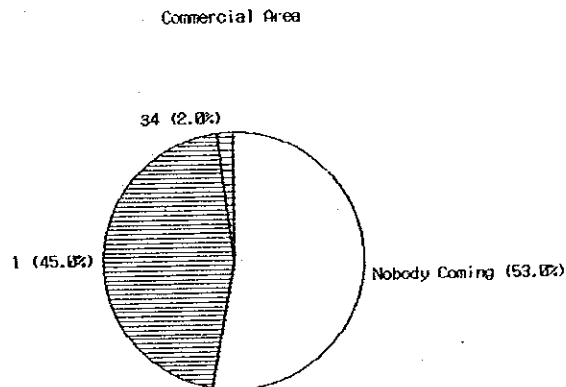
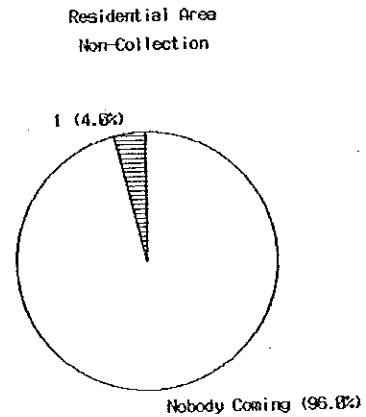
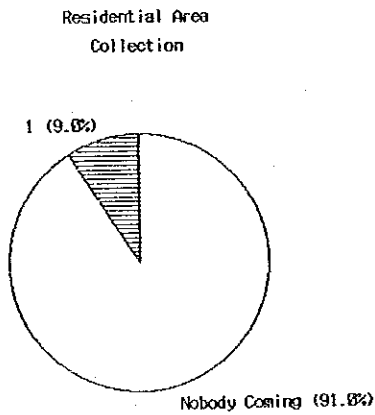
58) Frequency of the food waste collection service. (Q65)

	Residential Area (%)		Commercial
	Collection	Non-Collection	Area
1. Once ~ twice a week	9	4	26
2. Three times~four times a week	0	0	13
3. Everyday	0	0	2
4. Others	0	0	6
<b>Total</b>	<b>9</b>	<b>4</b>	<b>47</b>



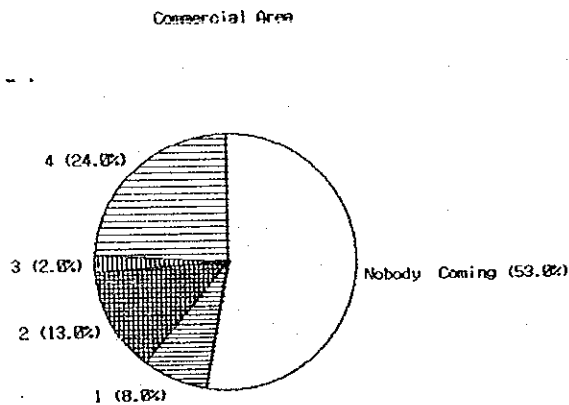
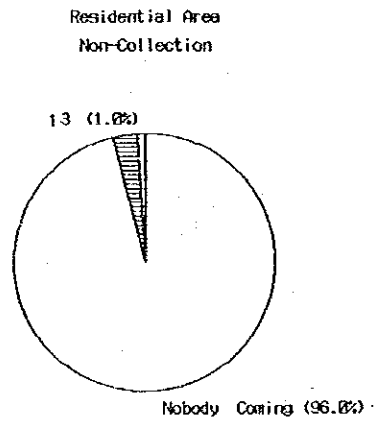
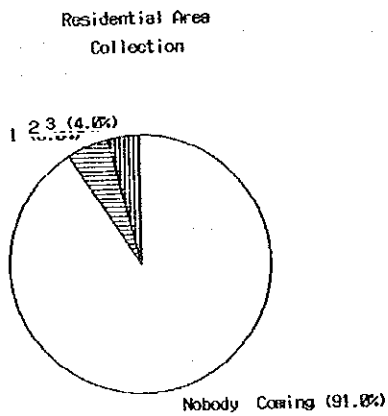
59) Amount of money which the resident receive from the collector in exchange for food waste. (Q66)

	Residential Area(%)		Commercial
	Collection	Non-Collection	Area (%)
1. Never recieved	9	4	45
2. Less than 500kips/month	0	0	0
3. 500 ~ 1000kips/month	0	0	0
4. More than 1000kips/month	0	0	2
<b>Total</b>	<b>9</b>	<b>4</b>	<b>47</b>



60) Amount of the food waste collected at one time. (Q67)

	Residential Area(%)		Commercial
	Collection	Non-Collection	Area (%)
1. Less than 5 liters	5	3	8
2. 5 ~ 10 liters	0	0	13
3. 10 ~ 15 liters	4	0	2
4. 20 liters	0	1	24
5. Others	0	0	0
<b>Total</b>	<b>9</b>	<b>4</b>	<b>47</b>





## C.6 Findings

Major findings by the CCS are summarized as follows ;

### C.6.1 Discharge and Storage

#### 1) Source Separation

##### a. Food waste

The residents who breed domestic animals are equivalent to 70% in the collection area, and 77% in the non-collection area. Most of the food waste generated from the residences is fed to domestic animals.

The average amount of the food waste is about 1 liter a day per family.

The food waste generated from the commercial area is collected by collectors and/or farmers free of charge. 47% of the shops receive food waste collection service. The shops receive the service at least once a week, though the frequency is subject to the requirement of each shop. 50% of the shops discharge more than 20 liters for one time.

##### b. Waste for self-disposal

As for the treatment of garden waste, 96% of the residents in the non-collection area carry out open burning at the premises and/or road-side, only while 44% in the collection area do the same thing.

88% of the residents in the non-collection area answered that they would burn garden waste even if collection service would be provided in the future.

The residents who utilize their food waste and garden waste as a

fertilizer account for 13% in the collection service area, 15% in the non-collection service area and 3% in the shops. The residents who want to have a guidance on methods of producing fertilizer from food waste and garden waste share of 61, 69 and 30% respectively.

c. Reusable materials for recycling

The residents and the shops where unused or recyclable materials are collected by the collectors equivalent to 48% and 43%, respectively.

Most of residents and shops who receive the collection services answered that a collector came around their places once a week or once a month mainly by using handcart.

Major recyclable materials are bottles and ferrous metal. The exchange prices are as follows.

- newspaper                      about 250 kips/kg
- bottle                            about 10 to 20 kips/bottle
- ferrous metal                  20 to 30 kips/kg

The average quantity of recyclable materials discharged from a residence is as follows.

- newspaper                      10 g/month
- bottle                            2.7 bottles/month
- ferrous metal                  260 g/month

On the other hand, the average quantity of recyclable materials discharged from a shop is as follows.

- newspaper                      67 g/month
- bottle                            4 bottles/month

## 2) Type of Refuse Bins

Bamboo baskets are commonly used as dustbins. Each residence has one or two baskets and the capacity of a basket is 30 ~ 50 liters. Most of the baskets have no lids. The baskets are usually placed in front of the houses or at the backyard for collection.

Most of the shops use bamboo baskets for dustbins. Each shop usually owns one or two baskets. The capacity of the basket is more than 50 liters and the basket has no lid. The baskets are placed in front of the shops for collection.

## 3) Storage and Discharge Points

In the non-collection area, residents who discharge waste around their premises without dustbins are equivalent to 77% in the non-collection area. On the other hand, 70% of residents of the collection area discharge waste into dustbins to be collected by the collection workers.

However, more than 20% of the residences both in the collection and non-collection are discharge their waste at open spaces where spontaneously become clandestine disposal sites in the area.

The waste discharged around the premises is self-disposed mainly by means of open burning and partly by landfilling.

In the case of self-disposal, however, the method is considered to be insufficient. There are many waste scattered on the road around premises.

## C.6.2 Collection Service

### 1) Collection Area

The residents who receive collection service are shared 19% in the residential area. 20% among the 19% which is equivalent to 4% of all seems to receive the service at temporary.

In commercial area the shops which receive a collection services are share 87%.

More than 90% of the residences and shops not receiving collection services wish for services.

### 2) Collection System

39% of the residents are aware of the collection system. About half of the residents who are aware of the collection system replied that waste had been collected under curb collection system along the roads. Another half of the residents said that waste had been collected under the door to door collection system by collection workers. About 5% of the residents receive bell collection system.

30% of the shops are aware of the collection system. About half of the shops which know the collection system said that waste has been collected under curb collection system along the roads. Another half of the shops replied that waste had been collected under the door to door collection system by collection workers. About 5% of the shops receive bell collection system.

### 3) Collection Time

78% of the residents who receive collection service make it a rule to discharge their waste at the fixed time.

On the other hand, they are not satisfied with the collection time because of its irregularity. Only 48% of the residents replied that they received the collection services at a fixed time. Moreover, 61% of the residents have experienced discharging waste after collection vehicle's left.

76% of the shops who receive collection service discharge their waste at the fixed time. The time for discharge is not characteristic but the period of 6:00 to 8:59 in the morning is considered as majority of the discharge time.

On the contrary, with regard to receiving time, only 42% of the shops reported that they received service at the fixed time. Judging from this, the shops as well as the residents receive the collection service at uncertain time. This uncertainty is proven by the fact that 57% of the shops have experienced discharging their waste after collection vehicle's left.

#### 4) Collection Fee

48% of the residents who receive collection services pay 100 to 499 kips/month and 26% of the residents pay 500 to 999 kips/month for the collection fee. 22% of the residents temporarily pay about 200 kips per bamboo basket.

33% of the shops receiving collection services pay 1,000 to 1,499 kips/month and 31% of the shops pay 500 to 999 kips/month for the collection fee.

Both of 78% of the residents and 85% of the shops who receive a regular collection service directly pay collection fees to contractors.

Assuming that the collection service is conducted, most of the residents and the shops reported that they would pay the collection fee directly to contractors.

50% of the residents and the shops said that the current budget in Vientiane Municipality of waste management (18 kips/month/capita) was reasonable while another 50% said that it was too little.

With respect to the extra fee for cleansing services, 35% of the residents in the collection area reported that they were able to afford to pay 100 kips to 500 kips/month, and 43% replied that they were able to pay if it was less than 100 kips/month.

On the other hand, 50% of the residents and the shops in the non-collection area, would pay 100 to 500 kips/month, while 40% would pay less than 100 kips/month.

#### 5) Others

More than 80% of the residences and shops are satisfied with the collection service. However, there are some residences and shops who are unsatisfied with the service due to the low frequency of collection service and the uncertainty of the collection time.

Total expenditure per month per family of about half of the residences and shops is more than 85,000 kips per month. About 80% of the households and shops exceed 55,000 kips/month/family.

# **APPENDIX D**

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INVESTIGATION OF KM 18-DS,  
DCDS AND NCDS





## APPENDIX D INVESTIGATION OF PRESENT AND CANDIDATE DISPOSAL SITES

### D.1 Proposed Sites

As stated in the S/W and M/M agreed between Vientiane Municipality and the Preliminary Survey Team, the final disposal plan to be studied shall be limited to the following scenarios :

- a. Continued use and improvement of the existing site (KM 18-DS) ;  
and
- b. Opening of a new sanitary landfill site according to the proposal made by the UNDP Report on Disposal of Solid Waste in Urban Vientiane. When the life of the proposed site is over, an alternative site will be opened based on the recommendations of the said report.

However, it was identified that two proposed disposal sites (Site A is located at Ban Khamsawat and Site B is at Ban Nongvang.) were already occupied by some residents. Then, the Vientiane Municipality requested that instead of the two candidate disposal sites proposed by UNDP, the following two candidate sites shown in Fig. D.1-1 should be studied in the Study. The request was accepted by the Study Team.

- a. DCDS (Dongphosi Candidate Disposal Site)
- b. NCDS (Noensaard Candidate Disposal Site)

Consequently, in accordance with the IC/R (Inception Report), a topographic, geological, water quality and landuse survey has been carried out for the present disposal site(KM 18-DS) and two candidate sites (DCDS and NCDS).

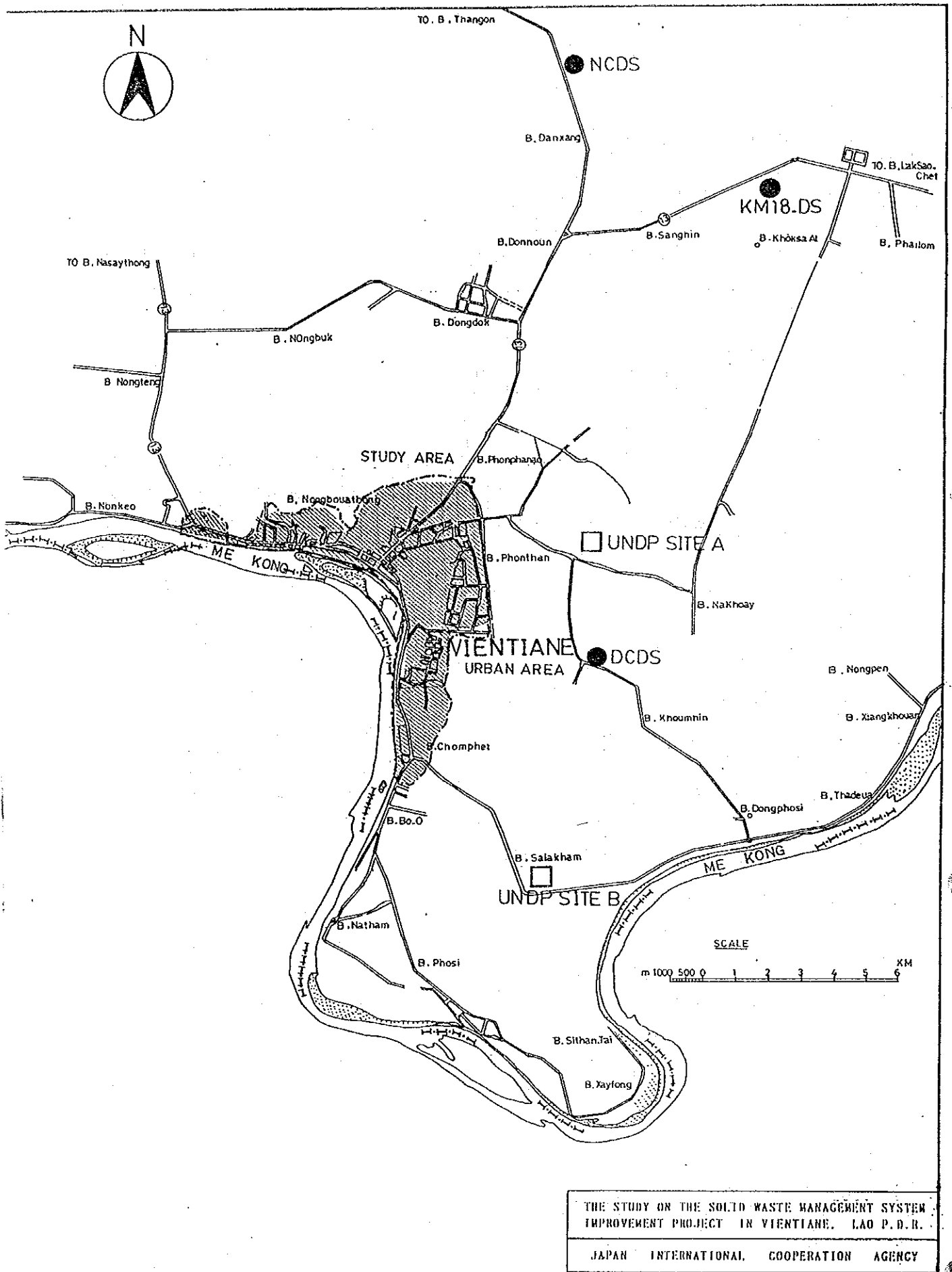


Fig. D.1-1 Location of Present and Candidate Disposal Sites

## D.2. Contents of the Investigation

### 1) Topographic Survey

The topographic survey was carried out in the following manner ;

#### a. KM 18-DS (existing disposal site at KM 18 of Route 13)

Area : 70 ha (including the surroundings)  
Scale : 1/1000  
Contour Interval : 0.5 m

#### b. NCDS (candidate disposal site at Ban Noensaard)

Area : 40 ha (including the surroundings)  
Scale : 1/1000  
Contour Interval : 0.5 m

#### c. DCDS (candidate disposal site at Ban Dongphosi)

Area : 40 ha (including the surroundings)  
Scale : 1/1000  
Contour Interval : 0.5 m

One Temporary Bench Mark (T.B.M.) was set up at each site and the T.B.M. was tied to the existing bench mark which was established by the government authority in order to prepare the implementation of the project.

### 2) Soil Investigation

The contents of the soil investigation work were as follows ;

#### a. Boring in soil

- i. number of boreholes : 2 boreholes at each site; a total of 6 boreholes.

ii. depths of boreholes : As a rule, 10 meters for each borehole.

b. Sampling and insitu test

i. samples : 3 samples from each borehole; a total of 18 samples.

ii. standard penetration test : 1.0 meter intervals; a total of 60 numbers.

iii. water sampling : a water sample from each borehole; a total of 6 samples.

c. Laboratory tests

i. physical property tests

- moisture contents	: 18 Nos.
- liquid limit	: 18 Nos.
- plastic limit	: 18 Nos.
- specific gravity	: 18 Nos.
- mechanical analysis	: 18 Nos.

ii. permeability test : 18 Nos.

3) Water Quality Analysis

The contents of the water quality analysis were as follows ;

a. Sampling

Water sampling was conducted at the following sites; i.e. the four(4) samples from the four(4) boring holes for soil investigation, one(1) sample from leachate of the present KM 18 disposal site, three(3) samples from the existing wells near boring holes and one(1) sample from surface water.

i. KM 18-DS

- K1 from the boring hole ;
- K2 from the boring hole ; and
- K3 from leachate in the site.

ii. DCDS

- D1 from the existing well ;
- D2 from the existing well near the boring hole ; and
- D3 from the existing well near the boring hole.

iii. NCDS

- N1 from the boring hole ;
- N2 from the stream in the site ; and
- N3 from the existing well.

b. Test items

Seven(7) items listed below were tested at the laboratory ;

- i. P H ;
- ii. C O D ;
- iii. B O D ;
- iv. Total Nitrogen (T-N) ;
- v. Lead (Pb) ;
- vi. Mercury (Hg) ; and
- vii. Chlorine Ion (Cl<sup>-</sup>)

In addition to the above-items, the following items were measured at the time of sampling by the Study Team member and the laboratory ;

- P H ;
- Temperature ;
- Water temperature ;
- D O ;
- Conductivity ;

- Turbidity ;
- Chlorine Ion ( $\text{Cl}^-$ ) ; and
- C O D.

### D.3 Result of the Investigation

#### 1) Topographic Survey

The topographic survey was conducted by the NGD (National Geographic Department), Office of Cabinet Council. The NGD prepared and submitted three copies of the report to the Study Team and the report includes the following ;

##### a. Location map

- indicating the areas surveyed on the existing topographic map scale of 1/100,000.

##### b. Topographic map

- drawing of the topography with 0.5 meter contour interval at a scale of 1/1,000 ;
- indicating the locations of Temporary Bench Marks ;
- indicating the existing houses, roads and others, if any; and
- indicating the water level of shore line if any.

##### c. Others

- network of the control point survey ;
- coordinates and elevations (top of piles and ground level) of Temporary Bench Marks ;
- description of Temporary Bench Marks ; and
- photographs for field works including Temporary Bench Marks.

## 2) Soil Investigation

The soil investigation was carried out by the CDRI (Communication Design and Research Institute), MCTPC (Ministry of Communication, Transport, Post and Construction). The CDRI has prepared and submitted three copies of the report to the Study Team. The report includes the following ;

### a. Location map

### b. Work method

- boring
- sampling
- insitu test
- laboratory tests

### c. Work result

- borehole log
- summary of work
- results of laboratory tests
- summary of laboratory tests

### d. Photographs

- field works
- split soil sample
- laboratory tests

## 3) Water Quality Analysis

The water quality analysis was conducted by the LWQA (Laboratory of Water Quality Analysis), Department of Irrigation, Ministry of Agriculture and Forestry. The LWQA prepared and submitted a report which included the followings to the Study Team ;

a. Location map

b. Work method

- sampling
- on-site measurement
- water analysis

c. Results of water analysis

- list of water quality
- list of on-site measurement

Data of the on-site water quality analysis concluded by both the Study Team and the LWQA is tabulated in Table D.3-1.



Table D. 3-1 Data of On-site Water Quality Analysis

Sampling Place & No.	pH	Tem. (°C)	W.Tem. (°C)	DO (ppm)	Conduct. (ms/cm)	Turb. (ppm)	Cl <sup>-</sup> (ppm)	COD (ppm)
D 1	5.1	29.6	27.9	4.3	0.8	22	3	5
D 2	6.4	28.8	27.4	6.5	0.6	9	8	11
D 3	5.4	28.8	30.1	3	0.7	6	6	5
K 1	7.7	28.8	27.7	5.5	0.7	41	4	2
K 2	8.2	26.0	26.8	4.2	0.4	11	7	7
K 3	8.2	26.2	26.1	5	2.1	46	856	200
N 1	7.8	25.5	26.9	4	1	6	3	4
N 2	7.5	25.3	24.1	3	0.8	8	2	7
N 3	7.5	24.4	24.8	4.9	0.9	4	14	6

Note: Tem. ; Temperature  
W. Tem. ; Water Temperature  
Conduct.; Conductivity  
Turb. ; Turbidity

#### D.4 Surrounding Environment

In order to study the surrounding environment, the latest aerial photographs of the three candidate sites were obtained. Using the aerial photos, several field reconnaissances have been done. The results of the field reconnaissances are tabulated in Tables D.4-1, D.4-2, and D.4-3.

Table D.4-1 Results of Field Reconnaissances of KM 18-DS

- 1

Items	Description
1) Possibility of Land Acquisition	
a. Land use restrictions	Nil
b. Land ownership	Vientiane Municipality
c. Necessity of compensation	Nil
d. Other considerations	Existing disposal site
2) Possibility of Acquiring Neighbor- food Consensus	
a. Necessity of neighboring consensus	A little
b. Necessity of "out of sight" measures	Necessary
c. Necessity of isolation from noise, dust and odor measures	Necessary
d. Other considerations	Existing disposal site
3) Compatibility with Regional Development Plans	
a. Competitive development plan	Nil
b. Conformity with the Master Plan and land use plan	Good
c. Direction of urbanization towards sites	Within year 2,000, direction of urbanization towards the site is less probability

- 2

Items	Description
d. Other considerations	There is a new airport constuc- tion plan within 4 to 6 km from the site.
4) Economic Feasibility	
a. Location of site (distance from main waste generation area)(km)	18 km
b. Area of site (ha)	More than 60 ha
c. Life expectancy (years)	More than 30 years
d. Availability of cover soil	Available
e. Accessibility of public services	Very good
f. Estimated cost of compensation	Nil
g. Availability of public services	Electricity
h. Present conditions of site (Land use, type of surface soil, depth of ground water)	Disposal site but partly is forest and rice field,
i. Technical considerations	Construction of surrounding bund
j. Benefits of site upon completion	Nil
5) Environmental Acceptability	
a. Possibility of drinking water pollution	Possible
b. Impact by surface water pollution	Possible
c. Impact of flooding	Nil
d. Impact by groundwater pollution	Possible
e. Distance from airport and other public facilities	A primary school is located within 800m. Plan to construct a new airport in adjacent area

Items	Description
f. Distance from densely populated area	12 km
g. Dust, noise and odor hazards	Possible
h. Land use of adjacent areas	Rice field and residential area
i. Slope stability	Flat
j. Inshore or river fishery	Nil
k. Terrestrial vegetation and wildlife	Nil
l. Aquatic / Marine flora and fauna	Nil
m. Impact on Natural landscape	Nil
n. Historic places or structures	Nil
o. Religious places or structures	Nil

Table D.4-2 Results of Field Reconnaissances of NCDS

- 1

Items	Description
1) Possibility of Land Acquisition	
a. Land use restrictions	National Reserved Forestt
b. Land ownership	Ministry of Agriculture & Forestry
c. Necessity of compensation	Nil
d. Other considerations	Nil
2) Possibility of Acquiring Neighboring Consensus	
a. Necessity of neighboring consensus	A little
b. Necessity of "out of sight" measures	Necessary
c. Necessity of isolation from noise, dust and odor measures	Necessary
d. Other considerations	At present, it is a national reserved forest.
3) Compatibility with Regional Development Plans	
a. Competitive development plan	Nil
b. Conformity with the Master Plan and land use plan	Fair
c. Direction of urbanization towards sites	Within year 2,000, direction of urbanization towards the site is less probility.
d. Other considerations	There is a new airport construction plan within 4 to 6 km from the site

- 2

Items	Description
4) Economic Feasibility	
a. Location of site (distance from main waste generation area)(km)	18 km
b. Area of site (ha)	More than 30 ha
c. Life expectancy (years)	More than 15 years
d. Availability of cover soil	Available
e. Accessibility of public services	Very good
f. Estimated cost of compensation	Nil
g. Availability of public services	Electricity
h. Present conditions of site (Land use, type of surface soil, depth of ground water)	Reserved forest but partly cultivated
i. Technical considerations	Construction of surrounding bund
j. Benefits of site upon completion	Nil
5) Environmental Acceptability	
a. Possibility of drinking water pollution	Possible
b. Impact by surface water pollution	Possible
c. Impact of flooding	Nil
d. Impact by groundwater pollution	Possible
e. Distance from airport and other public facilities	A primary school is located within 800m. Plan to construct a new airport in near area
f. Distance from densely populated area	12 km
g. Dust, noise and odor hazards	Possible

Items	Description
h. Land use of adjacent areas	Mainly reserved forest, partly rice field
i. Slope stability	Flat
j. Inshore or river fishery	Nil
k. Terrestrial vegetation and wildlife	Nil
l. Aquatic / Marine flora and fauna	Nil
m. Impact on Natural landscape	Fair
n. Historic places or structures	Nil
o. Religious places or structures	Nil



Table D.4-3 Results of Field Reconnaissances of DCDS

- 1

Items	Description
1) Possibility of Land Acquisition	
a. Land use restrictions	National Reserved Forest
b. Land ownership	Office of Cabinet Council
c. Necessity of compensation	Necessary
d. Other considerations	Nil
2) Possibility of Acquiring Neighboring Consensus	
a. Necessity of neighboring consensus	A little
b. Necessity of "out of sight" measures	Necessary
c. Necessity of isolation from noise, dust and odor measures	Necessary
d. Other considerations	Road pavement is necessary for about 7 km
3) Compatibility with Regional Development Plans	
a. Competitive development plan	Green Peace Lanxang Plan
b. Conformity with the Master Plan and land use plan	Poor
c. Direction of urbanization towards sites	Within year 2000, direction of urbanization towards the site is probable.
d. Other considerations	Nil

Items	Description
4) Economic Feasibility	
a. Location of site (distance from main waste generation area)(km)	11 km (7.0 km is unpaved)
b. Area of site (ha)	30 ha
c. Life expectancy (years)	More than 15 years
d. Availability of cover soil	Available
e. Accessibility of public services	Fair
f. Estimated cost of compensation	18 million US \$
g. Availability of public services	Nil
h. Present conditions of site (Land use, type of surface soil, depth of ground water)	Reserved forest but partly cultivated.
i. Technical considerations	Construction of surrounding bund
j. Benefits of site upon completion	Nil
5) Environmental Acceptability	
a. Possibility of drinking water pollution	Possible
b. Impact by surface water pollution	Possible
c. Impact of flooding	Nil
d. Impact by groundwater pollution	Possible
e. Distance from airport and other public facilities	Primary school is located within 100 meters.
f. Distance from densely populated area	4.2 km
g. Dust, noise and odor hazards	Possible

Items	Description
h. Land use of adjacent areas	Rice field and residential area
i. Slope stability	Flat
j. Inshore or river fishery	Nil
k. Terrestrial vegetation and wildlife	Nil
l. Aquatic / Marine flora and fauna	Nil
m. Impact on Natural landscape	Fair
n. Historic places or structures	Nil
o. Religious places or structures	Nil

# ***APPENDIX E***

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## *OTHER FIELD SURVEYS*

## APPENDIX E OTHER FIELD SURVEYS

### E.1 Survey of Private Contractors

#### E.1.1 Private Contractors

The Present collection service in the study area is carried out by the DCTC and private contractors. The location of their offices are shown in Fig. E.1-1. There are three private companies who are engaged in the collection, haulage and disposal of the solid waste in the Study area. These companies are newly established under the government policy, the New Economic Mechanism as described in Appendix A Profile of the Study Area, A.5 Economic Conditions, A.5.1 National Economy, which promotes privatization. For instance, before October 1989 the CRC (Construction and Renovation Company No.1) was under the Chanthabouly district administrative committee. In October 1989, it became an independent private company by the procurement of the vehicles and equipment from the district. Therefore, these companies are usually called after the names of the district they belonged to instead of the names of the company. The three private contractors are as follows;

- Construction and Renovation Company No.1 in Chanthabouly District;
- Inter-Construction and Sanitation Company in Sisattanak District; and
- Solid Waste Management Company in Saisettha District.

#### E.1.2 Status of Private Contractors

An interview survey was conducted by the Study Team in October 1991 in order to know the status of the three private companies, such as their activities, financial situation, number of collection vehicles, etc.. The results of the interview survey are tabulated in

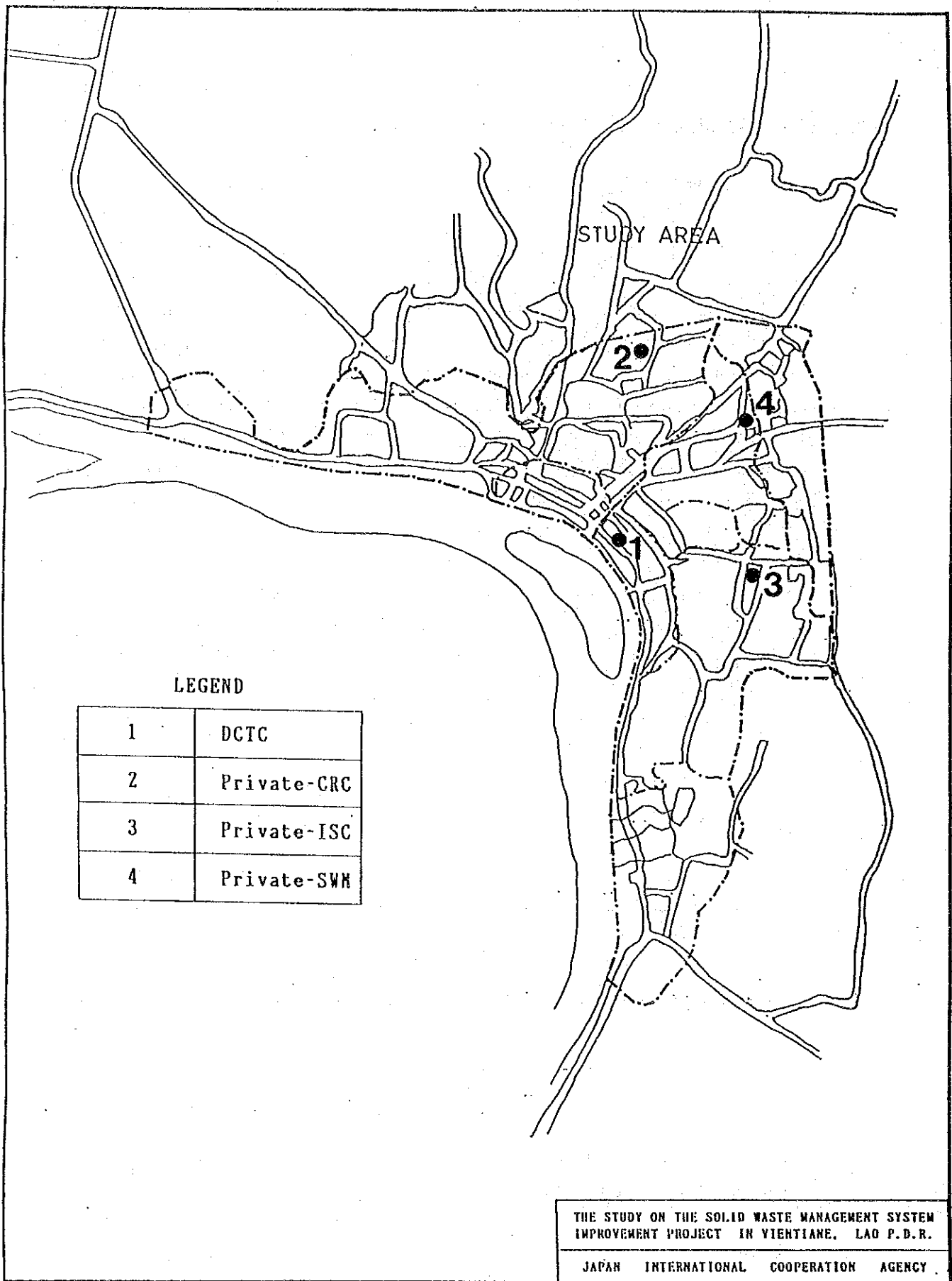


Fig. E.1-1 Location of DCTC and Private Contractor

Table E.1-1. In addition to the survey, a survey which traced their collection vehicles was carried out by the Study Team in order to know their collection service areas. The result of the survey is illustrated in Fig. F.2-2, Collection Routes of DCTC and Private Contractors.

Table E.1-1 Status of Private Contractors

October, 1991

Name of Company	Construction and Renovation Co. Co.	Inter- Construction and Sanitation Co.	Solid Waste Management Co.
Located District	Chanthabouly District	Sisattanak District	Saisettha District
Adress	Ban Dongpalab, Tel.5245	Ban Sinouane, Dongpalane	Ban Nongbone, Nongbone road
Year of Establish- ment	10/1989	1989	1/1991
Capital	22 millions kips	8 millions kips	N.A.
Interviewee .name .position	Mr.Sisoumang Manager	Mr.Thongkone Manager	Mr.Bounhieng Manager
Number of Employees	25 persons	11 persons	4 persons
.manager	1 person	1 person	1 person
.vice-manager	2 persons	-	-
.clerk	5 persons	2 persons	1 person
.driver	3 persons	2 persons	1 person
.collector	7 persons	6 persons	1 person
.others	7 persons	-	-



Nos. of Vehicle	3 vehicles	2 vehicles	1 vehicle
.brand	Isuzu IFA Fuso	Ford Tata	Hino
.plate No.	0508 3913 0328	0554 1208	0312
.full or part	Full Time	Full Time	Part Time
.loading capacity	5 ton/each	5 ton/each	6 ton
.type	2 dumps 1 truck without dump	2 dumps	1 dump
.first service year	1970 1980 1982	1983 1982	1980
.materials & tools	- 2 bamboo basket /vehicle - 2 rakes each - 2 shovels each	same as the left Same as the left	
Refuse Collection System			
.working system	-The collectors started to collect waste at the time of the arrival of the vehicle.		
.team	-One truck is composed of a driver and three collectors		
.frequency	-Twice a week per family	the same as the left	- Once a week per family
Working Hours, Trips and Fuel			
.working hours	8 AM to 6 PM	7 AM to 5 PM	8 AM to 6 PM
.lunch break	2 hours	2 hours	
.trips	2 to 3 trips per day	1 up to 2 trips per day	
.fuel (diesel)	1 kilolitre/	400 litre/	
.price of diesel per liter	223 kip/litre		

Maintenance System of Vehicle			
.small maintenance	by driver	by driver	
.heavy maintenance	private workshop	private workshop	
Collection Area			
.Nos. of family	1,084 families	56 families	239 families
.Nos. of offices and markets	37 offices 1 market	10 offices 5 markets	2 markets
Income, Expenditure and Balance (kip/month)	987,260 854,518 132,742	1,360,000 528,000 832,000	250,000 247,000 3,000
Salary of Employee			
.manager	30,000	-	20,000k
.1st vice manager	28,000k	-	-
.2nd vice manager	25,000k	-	-
.clerk	18,000k	25,000k	13,000k
.driver	40,000k	43,800k	13,000k
.collector	26,000k	22,000k	13,000k
.others	lunch	lunch	-
Working Time of Employee	6-7 hours/day	5-6 hours/day	2 days/week
.week day	7 AM to 6 PM	6 AM to 5 PM	7 AM to 6 PM
.holiday and sunday	double paid	double paid	-

Collection Fee/month			
- For Residences			
. maximum	1,000k/family	5,000k/family	2,000k/family
. minimum	200k/family	2,000k/family	600k/family
- For Offices			
. maximum	5,000k/month	35,000k/month	
. minimum		5,000k/month	
. foreign residents	5,000k/month	11,200k/month	
- For Markets			
. maximum	300,000k/month	300,000k/month	12,000k/month
. minimum		150,000k/month	7,000k/month
- Basis of	1/ Quantity of		
Collection Fee	waste		
Decision	2/ Nos. of people		
	3/ Location		
	4/ Profession		

## E.2 Survey of Scavengers

### 1) Time and Method of the Survey

The survey of scavengers has been done by the Study Team in 2 periods during the Study. The first survey was conducted for a week in the middle of October 1991. At that time the scavengers were free from rice field work which was another main source of their income. The survey was carried out again for a week in the middle of November 1991, during rice harvesting time when almost all of scavengers were engaged in the harvesting work.

In terms of the method of the survey, the Study Team members mainly conducted interviews with the scavengers and observed their daily work at the present KM 18 disposal site. Total number of scavengers interviewed were about 20 including full time and part time scavengers.

### 2) Result of the Survey

#### a. Residence of scavengers

Scavengers in the municipal disposal site at KM 18 are one of the recycler groups in Vientiane Municipality. Almost all of them come from Phokham village which is located only 300 m from the disposal site. This fact describes that the scavengers of KM 18-DS are the residents of the vicinity of the site.

#### b. Number of scavengers

Based on the answers of the scavengers and the two results of weeks observation, it is estimated that the average number of scavengers per day is 30 and the maximum is around 70. The scavengers range from children to elderly persons and their presence at the site fluctuates seasonally.

During rice cultivating and harvesting seasons which is about 3 months per year, the number of full time scavengers is reduced because of their engagement in rice field works. On the other hand, their numbers increase after this season. Meanwhile, the number of part-time children scavengers highly depends on educational season. This part time workers (children) normally share about 30% of the total number of scavengers. However, the number of children scavengers increases three times more than this figure during school holidays. The observation carried out in October and November 1991 indicates that the categories for scavenging vary by individuals. Below is the summary of the categories.

Categories of Scavengers	* Average Daily	
	Children	Adult
Almost full time work as in major source of income	0%	43.4%
Part time work as in supplementary source of income	33.3%	23.3%

\* Percentage fluctuates seasonally.

It is worthy to be noted that number of scavengers during recent years has nearly stabilized. There seems to be little relationship between the number of scavengers and economic situation.

c. Mode of operation and activities of scavengers

The activities of the scavengers at the dumpsite are basically confined to two types of works ; i.e.

- i. collection of recyclable materials from salvageable waste;

and

ii. Manual sorting of goods to sell.

An interesting feature is that more than 60% of the scavengers use certain types of tools such as harrows and wide-mouthed baskets. It also should be noted that these scavengers have their own means of transportation for transporting goods, especially metal and rubber shoe, to local dealers in town who offer better prices than those at the disposal site.

The results of the survey identified the following modes of vehicles as owned by the scavengers.

Type of Vehicles	% of Scavengers
Bicycle	90%
Motorcycle	10%
Total	100%

The types of goods normally collected and sold by the scavengers are as shown in Table E.2-1.

However, plastic bags and animal bones were only salvaged when the order was made by four primary dealers who visited the KM 18-DS (3 Vietnamese and one Laotian). Without the order, the scavengers did not salvage these items.

The scavengers work between 3 to 8 hours daily at the disposal site. The average is 5.8 hours per day. Accordingly, the average total number of hours each scavenger spends on the disposal site per year is ;

30 day-month x 5.8 hr.-day x 9 months= 1,566 hr./yr.

Table E. 2-1 Types and Prices of Reusable Materials Recovered

Items	Selling Price of Scavenger	From Primary Dealers		From Final Dealers		Buying Price of End Users	Place of Recycling
		Buy	Sell	Buy	Sell		
Metals	- Iron	20- 30 kip/kg	28- 40 kip/kg	28-42 kip/kg	60 kip/kg	60 kip/kg	Thailand
	- Aluminum	150- 300 kip/kg	170- 475 kip/kg	450- 600 kip/kg	450- 600 kip/kg	450- 600 kip/kg	
	- Copper	700-1000 kip/kg	840-1100 kip/kg	980-1120 kip/kg	980-1120 kip/kg	980-1120 kip/kg	
	- Brass	500- 700 kip/kg	560- 950 kip/kg	1090-1120 kip/kg	1090-1120 kip/kg	1090-1120 kip/kg	
Paper	- Newspaper	15 kip/kg	25 kip/kg		35-75 kip/kg	35-75 kip/kg	Lao P. D. R. Vietnam Thailand
	- Cardboard	10 kip/kg	20 kip/kg		88 kip/kg	88 kip/kg	
Rubber Shoe	150 kip/kg	140-200 kip/kg	160-210 kip/kg			252 kip/kg	Thailand
Glass	- Bottle	10-20 kip/bottle	10-20 kip/bottle	15-30 kip/bottle		20-30 kip/kg	Lao P. D. R.
	- Plastic bin	30-40 kip/kg	not available	not available		not available	Vietnam
- Plastic bag	20 kip/kg	not available	not available	140 kip/kg		not available	
Animal's bone	20 kip/kg					47-117 kip/kg	Thailand

Based on the survey, the amount of recyclable waste collected and recovered by the scavengers at the dumpsite per month is estimated to be 9 tons per month from the following calculation;

Average 30 Scavengers per day x 30 days/month x 10 kg of  
recyclable waste/day/scavenger = 9 tons

The scavenged goods are mainly sold to foreign countries (Thailand and Vietnam). Almost all of the scavenged goods are exported to Thailand. The distribution channel of reusable materials is shown in Fig. E.2-1.

d. Remuneration of scavengers

The average income of the scavengers varies and depends largely on the types of goods they salvage for sale. Goods derived from scrap metal fetch good prices. However, it is often difficult to obtain valuable metals such as copper, brass at the disposal site. Aluminum, plastic and bottle are more commonly sold because they are plentiful and easy to find.

Another important factor which affects the remuneration of scavengers is sex. Actually, male scavengers benefit higher than female scavengers because the former have access to new garbage on arriving collection vehicle before they are dumped in the disposal site whereas the latter has to spend time for house work.

Most of the scavengers interviewed told that they scavenged because they had no other better jobs and that the income from the disposal site was good and enabled to sustain their livelihood. The average income of each scavenger is estimated at 20,000 kips (28 US\$) per month. Although it is less than the manual worker's pay, almost all scavengers are satisfied with their income and they do not intend to resort to another job for their major sources of income. The survey has clearly supported the fact by showing that nearly 20 scavengers have been



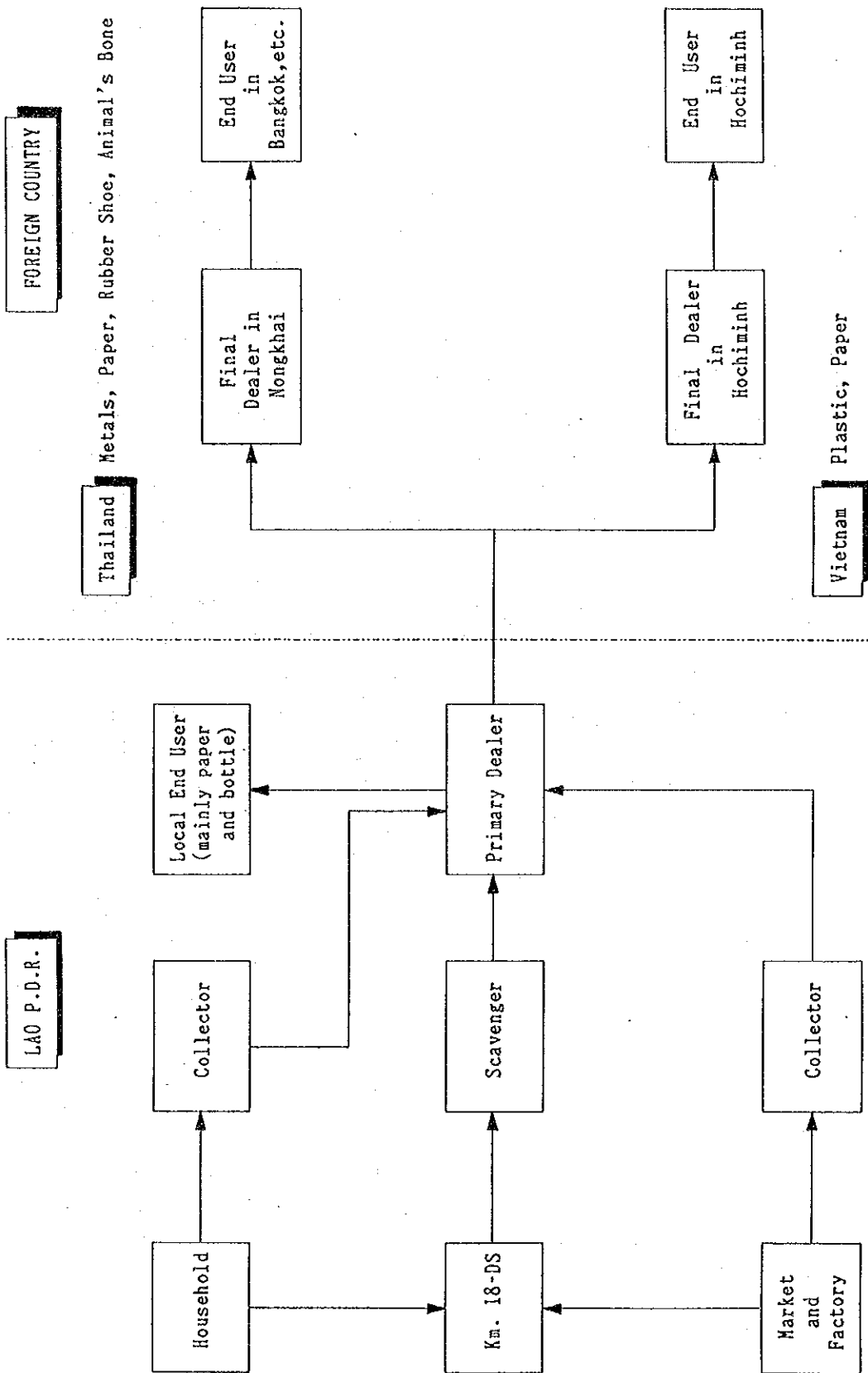


Fig. E. 2-1 Distribution Channel of Reusable Materials in the Study Area

scavenging for more than 20 years.

e. Social and health aspects of scavengers

The work environment and occupational hazards of the scavengers are clearly seen at the disposal site. Firstly, the work environment, i.e. the condition of the KM 18-DS where crude dumping is practiced, may pose many occupational hazards, such as high possibilities of infections, diseases and accidents. Undefined movements of the scavengers and vehicles on the site may subject scavengers to possible accidents. The lack of inspection of incoming waste disposed at the site by private collectors may result to the inclusion of prohibited or dangerous waste, which could endanger the scavengers.

However, it is surprising to know that despite the unfavorable condition of the dump site, all of the scavengers working at the dump site are in good health. There are also no reports stating that scavengers are infected with communicable diseases, including minor diseases and bodily pains. There seems to be no relationship, therefore, between the health of the scavengers and the condition of the dump site.

### E.3 Survey on Private Recyclers

#### 1) Time and Method of the Survey

Scavenging and recycling activities of private recyclers are closely related to each other. The survey on the private recyclers was conducted a week after the survey on scavengers was done by the Study Team. The private recyclers consists of individual collectors, primary and secondary dealers both in Lao P.D.R. and other foreign countries, and end users.

The survey on private recyclers for reusable materials has been carried out not only in Lao P.D.R. but also in Thailand, which is the biggest market for reusable materials from Vientiane. Persons concerned were interviewed and data were collected from all related government and private agencies. All recycling dealers in Vientiane, including a recycling factory and some recycling dealers in Nongkhai and Khonkaen provinces, Thailand, were visited by the Study Team during the 3 week survey, from the end of October to the middle of November. The location of the dealers, scavenger's village and end users of the reusable materials is illustrated in Fig. E.3-1.

#### 2) Result of the Survey

##### a. Amount of recycled materials

For the time being, there are no reliable and comprehensive study or report on recycling system and market for reusable materials in Lao P.D.R. However, it is known that recycling is active at the disposal site of KM 18 by means of scavenging and there are primary dealers who collect them from the generation source or from the scavengers. The type of recovered materials range from scrap metals, papers, rubber shoes, bottles, plastic, and animal bones, as shown in Table E.2-1.

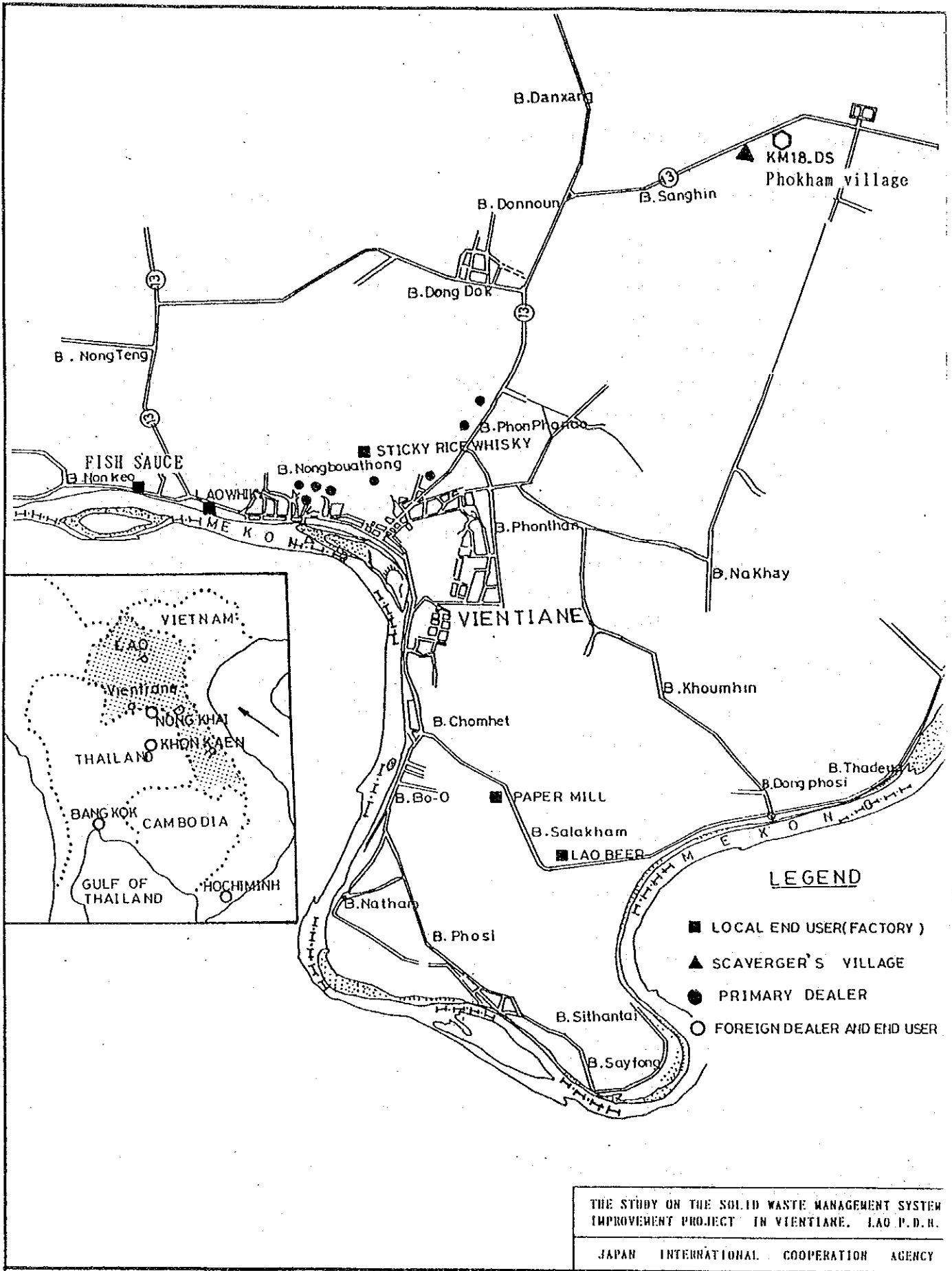


Fig. E.3-1 Location Map of Dealers and End User of the Reusable Materials

The Study Team carried out the recycling system survey by interviewing all of the 8 recycling dealers in Vientiane which collected their goods from scavengers and door-to-door recyclers including those from residences and factories. The survey also included some important factories which are related to the recycling activities. From the results of the above survey, it is estimated that the total amount of recycled materials in Vientiane is 60 tons/month based on the following information obtained by the interview survey. The amount of recycled materials per recycler is shown in Table E.3-2.

This figure (60 tons/month) is also confirmed by the result of the interview with a Thai dealer living in Nongkhai who is the only Thai dealer of recycled materials from Lao P.D.R. According to him, he has bought 100 tons/month of recycled materials from Lao P.D.R. during the past five months, and had bought 300 to 400 tons/month early in 1991. This figure includes all the amount of recycled materials imported to Thailand except for the illegal ones. Therefore, the recycled amount of materials in the Study area is estimated at more than 60 tons/month.

Table E.3-2 Amount of Recycled Materials by Each Recycler

Name of Recycler			Quantity (ton/month)
Phone Panao	Recycling Shop	KM 4	6
Phone Panao	"	" KM 5	12
Phone Kheng	"	"	6
Thong Khan Kham	"	"	1
Nong Duang	"	" No.1	12
Nong Duang	"	" No.2	5
Nong Duang	"	" No.3	6
Nong Duang	"	" No.4	5
Paper Mill (Thadeua KM.10)			2
Santiphap Printing Shop			5
Total			60

b. Recycling system and market for reusable materials

The present situation of the recycling system and market for reusable materials is described as below according to the recycled materials. The distribution channel of reusable materials is illustrated and shown in Fig. E.2-1.

i. metals

The recovered scrap metals, are normally sold to the primary dealers stationed in the city by the scavengers, residents and shops that produce recyclable waste. From the observation survey done by the Study Team, there are totally 8 primary dealers in Vientiane Municipality, and most of them are located in the 2 main areas ; namely Nong Duang market (evening market) and Ban Phone Panao.

All of the dealers collect their goods and normally store large quantities to sell for a period of 2-3 months. When getting enough quantity, they would sell their merchandise to other Thai dealer from Nongkhai province. After a price has been agreed, the Thai dealer arranges vehicles to transport these goods from the primary dealer in Vientiane to Thanaleng port for customs clearance. Afterward, the goods are sent to his shop in Nongkhai. From the shop in Nongkhai, the recycled materials are sold mostly to the end users in Bangkok.

All the transportation expenses from Vientiane to Nongkhai (transportation charge, export tax in Lao P.D.R. and import tax in Thailand) are shouldered by the Thai dealer. Tax rate is shown in Table E.3-3.

Table E.3-3 Tax Rate of Lao P.D.R. and Thailand on Recycling Materials

Items	Tax Rate	
	Export Tax Lao P.D.R.	Import Tax Thailand
Paper	3%	
Rubber Shoe	3%	
Plastic	3%	160%
Animal's Bone	5%	
Metals		
- Iron	10%	0%
- Aluminium	30%	6%
- Copper	40%	6%
- Brass	40%	6%

From the results of the survey conducted by the Study Team on

the biggest recycling dealer in Nongkhai, it is known the price of all scrap metals is determined by the end users in Bangkok based on the market situation. The transportation problem is the only difficulty for the Thai dealer to carry out the business in Vientiane. Number of the vehicles to transport the materials from the Vientiane to Nongkhai is insufficient and almost all of the trucks are more interested in the transport the lumber which normally gives better remuneration than the transportation of recycling materials.

One more recovered material related to scrap metals is the damaged battery. It is sold to the people of Lao who want to use the tin inside the battery for making some parts of the fishing net or air gun bullet.

ii. paper

Papers that are normally recycled are newspapers, books, cardboards and high quality papers. The price of waste paper highly depends on their grade. The paper recycling Work in Vientiane has been established by a paper mill in Lao P.D.R. at KM 10 Thadeua Road. The paper mill has 49 staffs, buys all types of waste paper mainly from printing shops producing a lot of waste paper, and uses these as the raw materials together with new pulps from Khonkaen in Thailand for manufacture of tissue-paper.

At present, the amount of waste paper required for the production is about 2 tons/month. However, the paper mill is now installing new equipment to extend production capacity. After the completion of the equipment installation by the end of this year or early next year, an increase in the amount of waste paper recycled in the paper mill is expected.



Another channel involved in recycled paper is a printing shop in Vientiane. This shop sends its waste paper and paper collected from other sources for recycling to Vietnam by its own truck. About 5 tons/month of waste paper is transported to Hochiminh city which is more than 1,200 km away from Vientiane for recycling. After the paper is recycled, it is returned to the printing shop for further use.

The main reason why the printing shop pays much effort in sending waste paper for recycling to Vietnam instead of Thailand is due to cheaper recycling charges than Thailand even including round-trip transportation cost of about 2,500 km.

Another channel involved in recycling paper is a paper dealer in Vientiane who deals with the Thai dealer in Nongkhai who sells the papers to the paper mill in Bangkok or the surrounding provinces. The average amount of paper is only about 1 ton/month.

### iii. bottle

Bottles are important recovered materials which are recycled only in Lao P.D.R.. Bottles are recovered according to type and size through factories in Vientiane, such as Lao Beer Company, local whisky factories, fish sauce factories, including many small factories and businesses which need bottles to contain their goods.

### iv. plastic and rubber shoe

Plastic is a recycled material which is recovered only through scavenging activities. After buying them from the scavengers, Vietnamese primary dealers convey the waste plastic (bin, bag) to Vietnam for recycling. The main reason why plastic waste is not sent to Thailand is the high tariff imposed on plastic by Thailand. The import tax rate on

plastic waste in Thailand is as high as 160% or about 8 baht/kg, whereas, the buying price of plastic by dealers in Nongkhai is only 5 baht/kg. Due to the high tariff, all primary dealers in Vientiane lose interest in buying plastic wastes because of the difficulty in selling them in their main market in Thailand.

Therefore, the recycling channel for plastic in Vientiane is only through Vietnamese dealers. The Vietnamese dealers transport goods from Vietnam to sell them in Vientiane and then buy plastic wastes from scavengers at the KM 18-DS for recycling in Vietnam.

As for rubber shoes, it is known that all rubber shoes from Vientiane are sent to Thailand through the primary dealers in Vientiane for recycling.

v. animal bone

Animal bone is another interesting recovered material in the Study. It is known that the most important animals in an agricultural country such as Lao P.D.R. are the buffaloes and cows. The bones of buffaloes and cows are bought from scavengers by a Laotian primary dealer who transports them to Phonphisai District, Nongkhai Province, Thailand. The channel for sending animal bones from the KM 18-DS to Thailand is through 2 illegal ports in Bolikhamsai Province. Both of the ports are located 70 and 52 km from Vientiane and the disposal site, respectively.

Animal bones from the disposal site are passed through this way to Phonphisai District and finally sold to 2 animal bone factories in Khonkaen Province in Thailand. By visiting an animal bone factory in Khonkaen (Tha Pra Industry), the Study Team found that animal's feed and fertilizer were produced from the bones. Nearly all products

are sent to the factory's head office in Samut Sakorn Province, 60 km to the east from Bangkok, and then delivered to the Bangkok port to be exported mainly to Japan.

The factory buys animal bones from all the north-eastern parts of Thailand, and also from Vientiane when the supply from the former becomes insufficient. The factory requires about 1,000 tons/month at present. However, the factory complains about the quality of the animal bones from Vientiane. Most of the bones were not suitable for production due to inferior quality caused by long transportation hours. In addition, the price of the bone fluctuates from 1.7 Baht/kg in the dry season to 4.2 Baht/kg in the rainy season, and also by the demand from Japan. This may be the reason why the scavengers at the KM 18-DS only salvage animal bones when order comes. The order comes when both the price and demand of the bone increases in Khonkaen.

E.4 Construction of an Inspection Building and Installation of a Weighbridge

The construction of an inspection building and installation of a weighbridge at the present KM 18 disposal site was carried out according to the following work assignments ;

Work assignments

survey .....	JICA Study Team
design .....	JICA Study Team
procurement of materials	
and employment of labors .....	JICA Study Team
supervision.....	DCTC and JICA Study Team

The building and foundation of the weighbridge were completed by the middle of November 1991. Then, a weighbridge was installed in order to collect the data of the actual disposal amount at the KM 18-DS. The plans and design of the building and foundation are shown in Fig. E.4-1, E.4-2, E.4-3 and E.4-4.

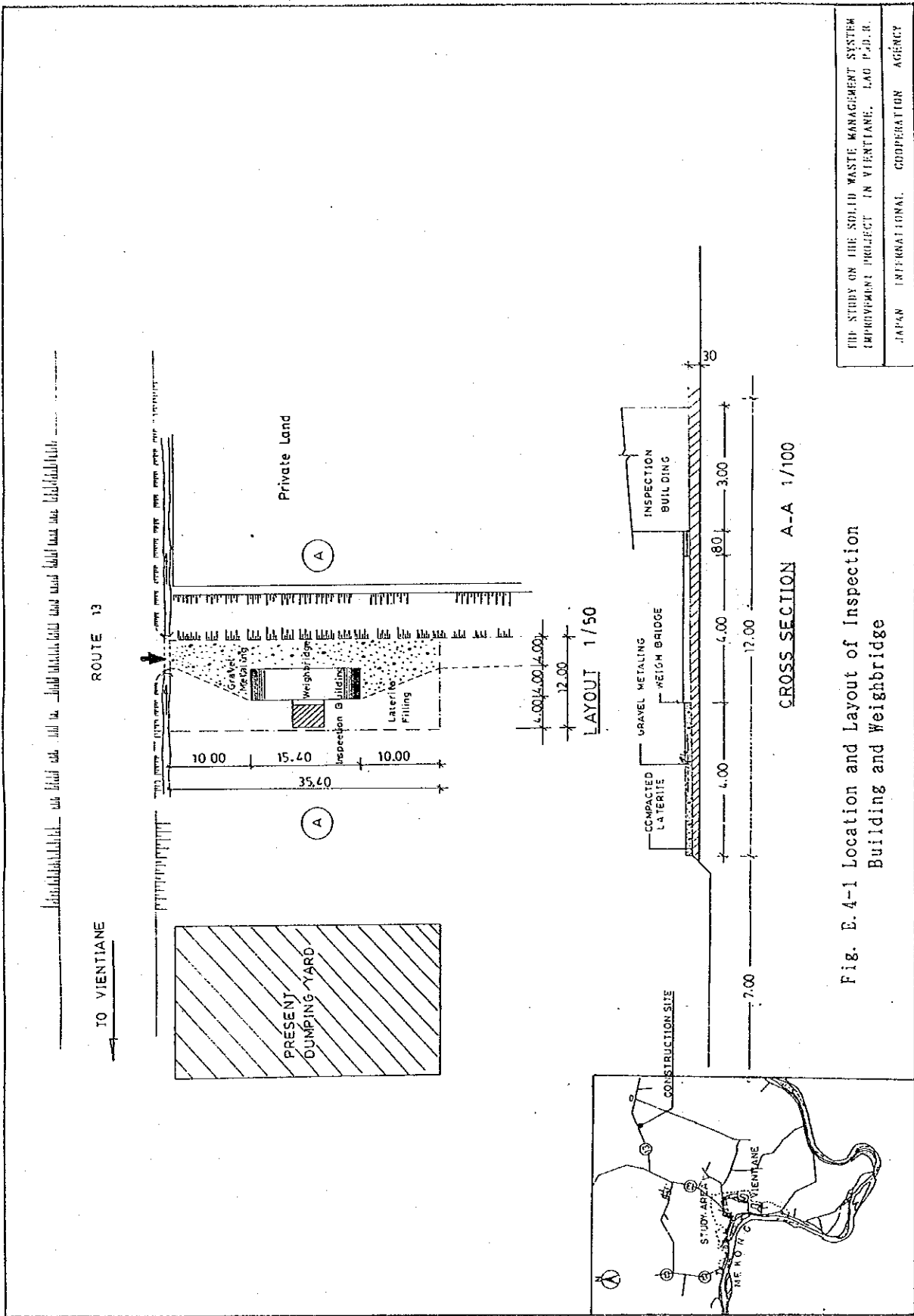
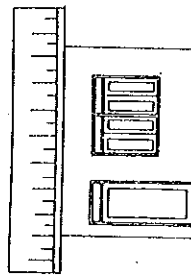
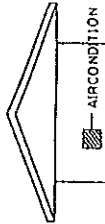


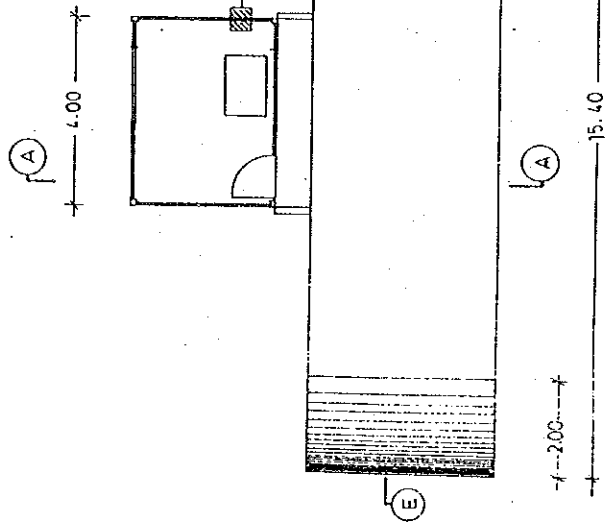
Fig. E.4-1 Location and Layout of Inspection Building and Weighbridge



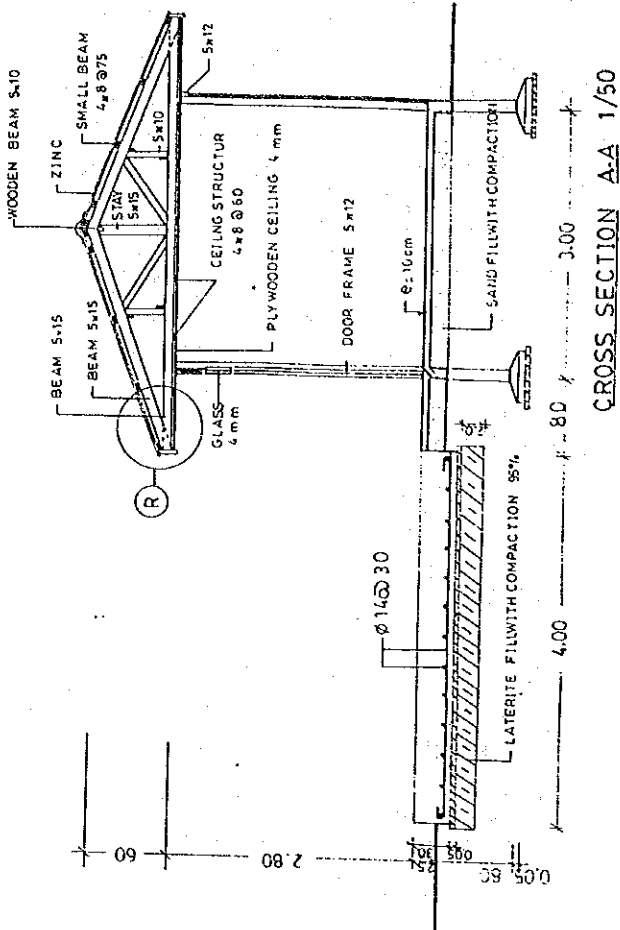
FRONT ELEVATION 1/100



SIDE ELEVATION 1/100



LAYOUT 1/100



CROSS SECTION A-A 1/50

Fig. E.4-2 Layout and Elevations of Inspection Building

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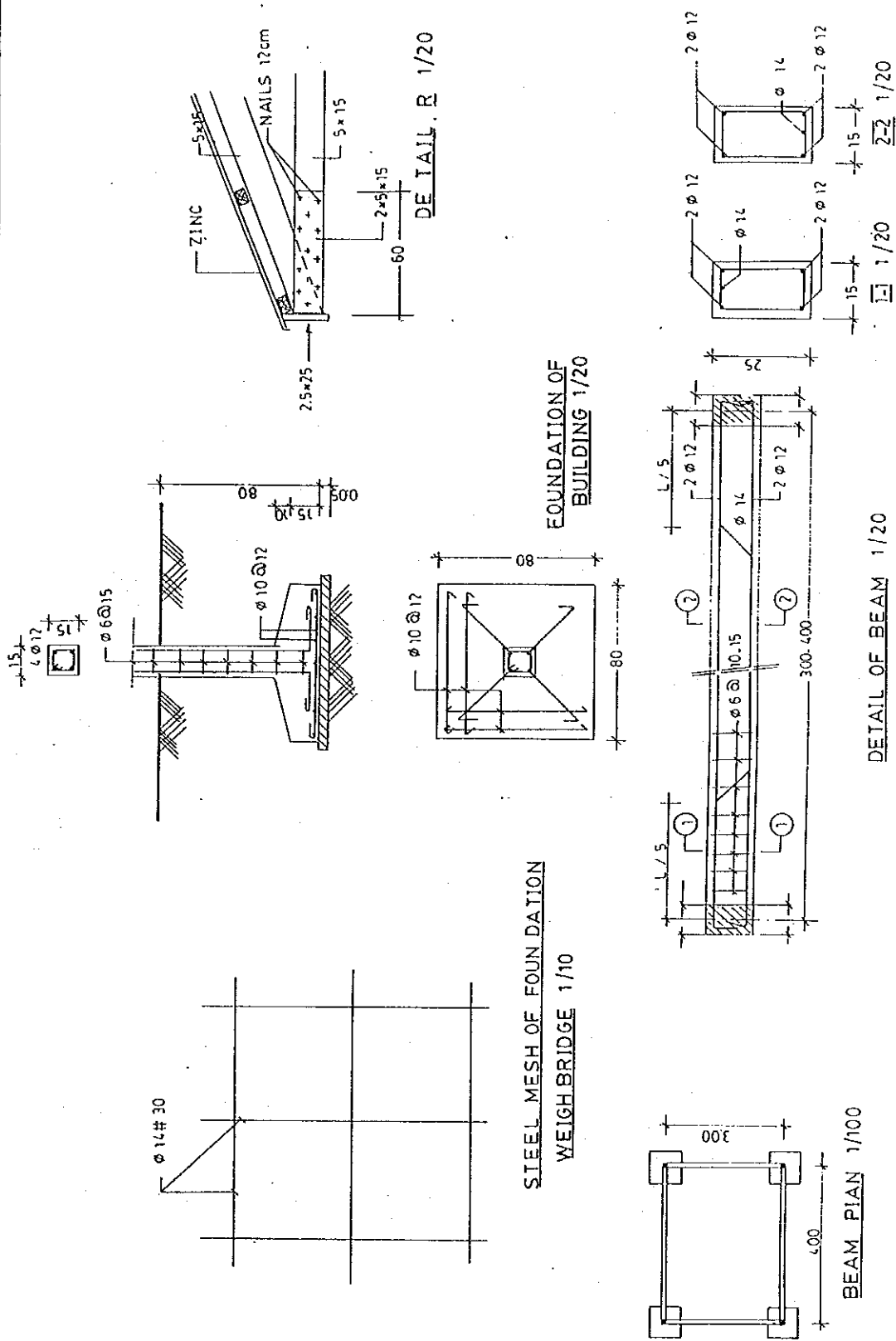


Fig. E.4-3 Details of Inspection Building

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