16.4 Bus Terminal Improvement Plan

16.4.1 Bus Terminals and Planning Principles

1) Bus Terminals

The country is divided into the four licensed regions in bus operation and each bus company has its own terminals and roadside stopping points along the lines in the region. The terminals are built on the land which is owned by the company in most cases. In large cities there are a few cases where the land is rent by the governorate, but offices and facilities are built by the bus company; an example is Ahmad Helmi Terminal of Cairo.

Since the company is responsible for the management and operation of the bus terminal, the conditions in the terminal are generally maintained better than taxi terminals. But still they need a number of improvements in order to give comfortable atmosphere to passengers, drivers and operation staff. Terminal fee is not levied on departure buses at the terminal. The management cost of the terminal is included in the overhead cost of the company in its annual financial statement.

Existing facility conditions were discussed in Chapter 5. It was identified those realized percentages as well as the actual conditions were not satisfactory levels for users. As a steady increase is expected in users of bus and taxi service, facility conditions and services would be worsen if no improvements are done. Betterment works are necessary.

Terminals surveyed in 1992 are classified into three groups by site condition, and the total 98 terminals are divided into 16 roadsides, 7 open spaces and 75 fenced area terminals, being shown in Table 16-4-1. In order to formulate the master plan of all over the country, terminals in the other zones need be estimated. The estimate is discussed afterward, and the result indicates the total of bus terminals is estimated at 224 in mid-1992.

Table 16-4-1 Bus terminals in the Country

Classification	Surveyed	Others	Total
1. Roadside	16	22	38
2. Open space	7	8	15
3. Fenced	75	96	171
Total	98	126	224

2) Approaches

(1) Terminals are categorized into a group in a good conditions and other groups in inferior conditions. Those in other groups are divided into four groups depending on the existing conditions. The basic planning policy is to improve the other groups of inferior facilities to the level of good conditioned terminals which is named the group A. Net improvement scales are determined by finding shortage of facilities between the group A and the other group. Luxurious and expensive investments are not considered in. Also area expansion of the existing terminals are not considered because of dense land uses of the surrounding area.

(2) There are some which occupy and use the roadways/shoulders in the busy commercial area. The occupied road space should be returned to the road authority so that the road can be utilized for the original purpose of serving traffic flows. This type of terminals should be changed into a simple stopping point in the case of buses.

(3) Terminals using the open space and fenced area should be improved at its site and the scale of improvement are classified into five types, as shown in Table 16-4-2.

(4) Full scale restructurings including relocation of the terminal are absolutely necessary in view of the long range urban planning. This planning should be conducted at each city together with the forecast and planning of land use, population and economic development, apart from this nation-wide master plan study. No individual terminal plan nor relocation study are conducted in this master plan study.

A relation ship between the volume of departure vehicles and the area in m2 of the terminal was studied as in Fig. 16-4-1 where the net terminal area means the space for vehicle passing, parking and maneuvering not including offices and facility spaces. As can be read from the figures, there is little co-relationship between these two factors. This would mean the terminal area can meet different volumes of vehicles and the area size was determined not by expected vehicle trips but by other reasons, in which the availability of space critical would be constraints.

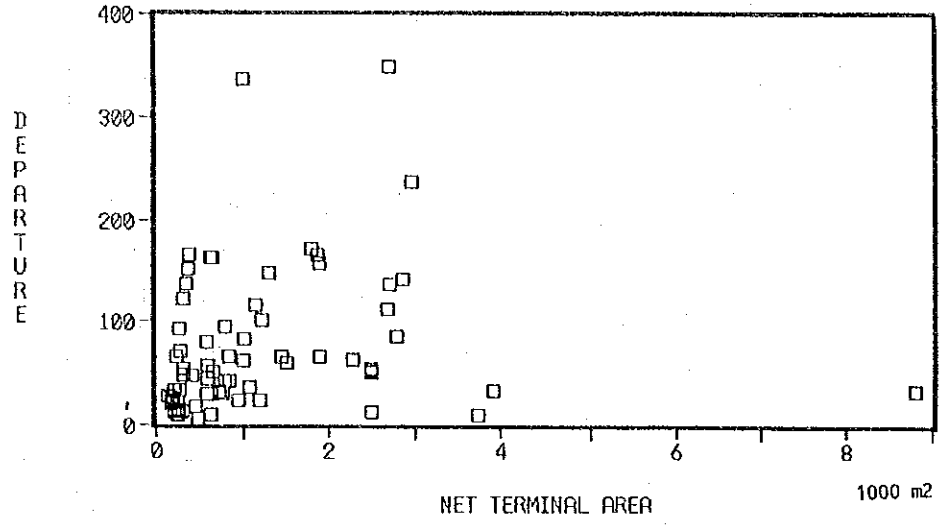


Fig. 16-4-1 Terminal Area and Departure Trips (Buses)

The same tendency in the relationship is confirmed again when terminals are divided into three groups by site condition as shown in Fig. 16-4-2. Particularly the site 3 group of fenced ones, terminals with same size have substantially different trip volumes.

Bus companies have workshops and garages in which they provide spaces for parking, and buses are mobilized from there to the terminal in accordance with the operation schedule. When the departure trips increase as forecasted, the terminals with the existing size can handle the operation, as can be seen in Fig. 16-4-1, with the backup support of workshops and garages. No new development of terminals in other site are supposed and improvements and addition at the existing site are studied.

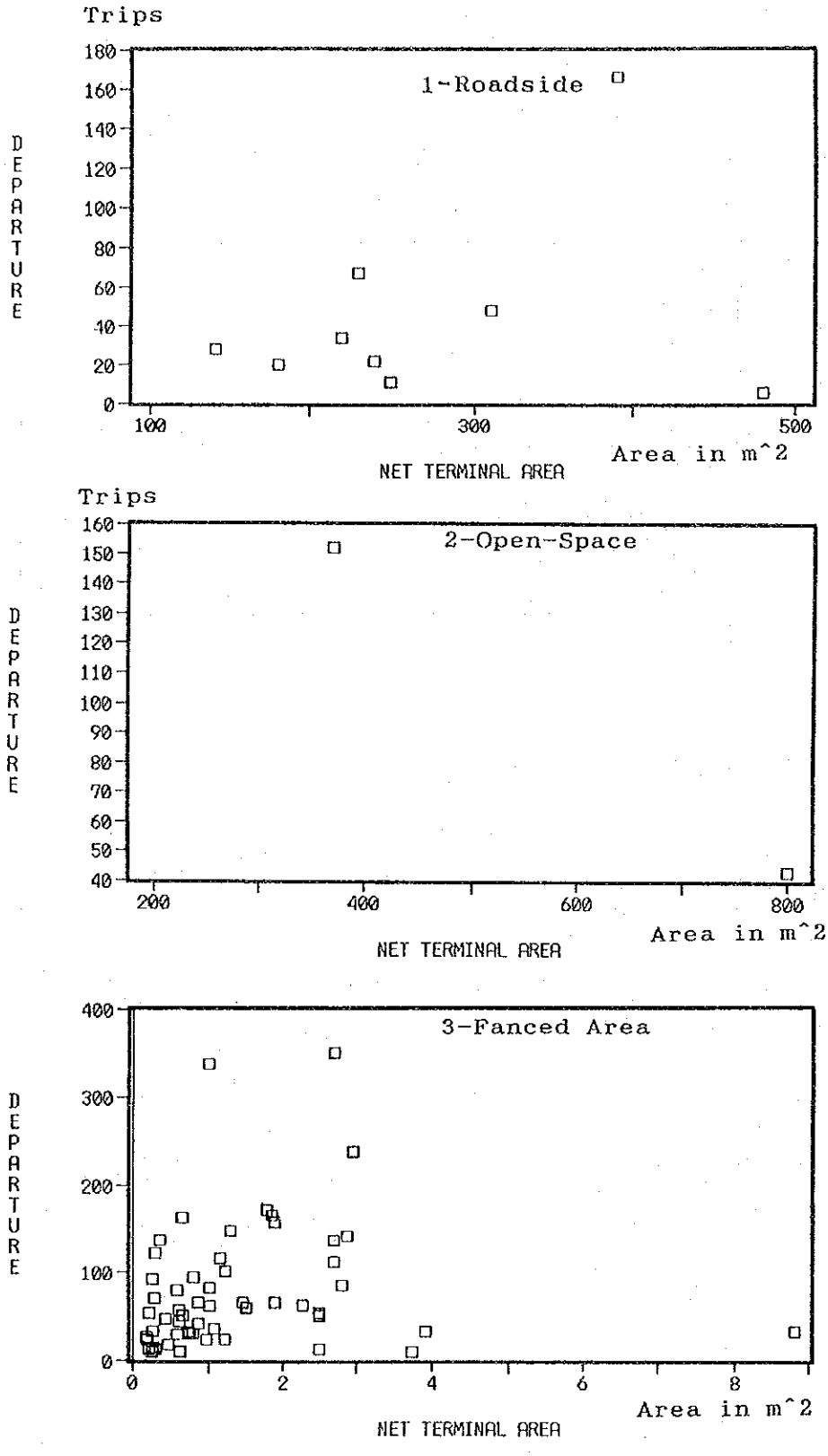


Fig. 16-4-2 Terminal Area and Departure Trips by Terminal Type (Buses)

3) Prototypes of Improvement Plans

Improvements of the existing terminals are divided into the four types, each with a combination of different components. Concepts of these types are sketched in Fig. 16-4-3 and summarized in Table 16-4-2.

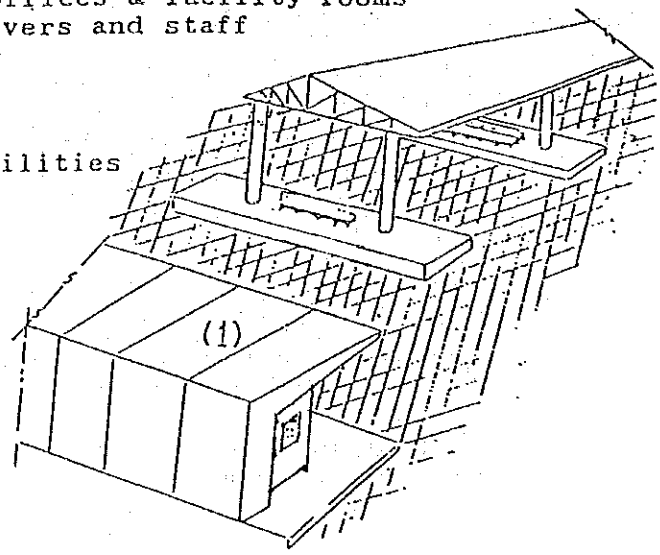
Table 16-4-2 Improvement Plans

Type	Offices & facilities	Ground pavement	Platform sheds & taxi shed
A	--	--	--
B	do	--	--
C	do	--	do
D	do	do	--
E	do	do	do

Notes:
A means the existing conditions are fair/good and no works are necessary
B means offices and facilities should be improved or constructed.
C means platforms and sheds for passengers should be constructed, or taxi sheds should be built in addition to B
D means the ground be paved in addition to B
E means the ground be paved in addition to C
This E is applied for additional terminal constructions in the case for taxis.

The plan B
1-Improve/constuct offices & facility rooms
for passengers,drivers and staff

Existing:
*Some offices and facilities
*Platform with sheds
*Paved Ground



The plan C
1-Improve/constuct offices & facility rooms
2-Platform with sheds

Existing:
*Some offices and facilities
*Paved Ground

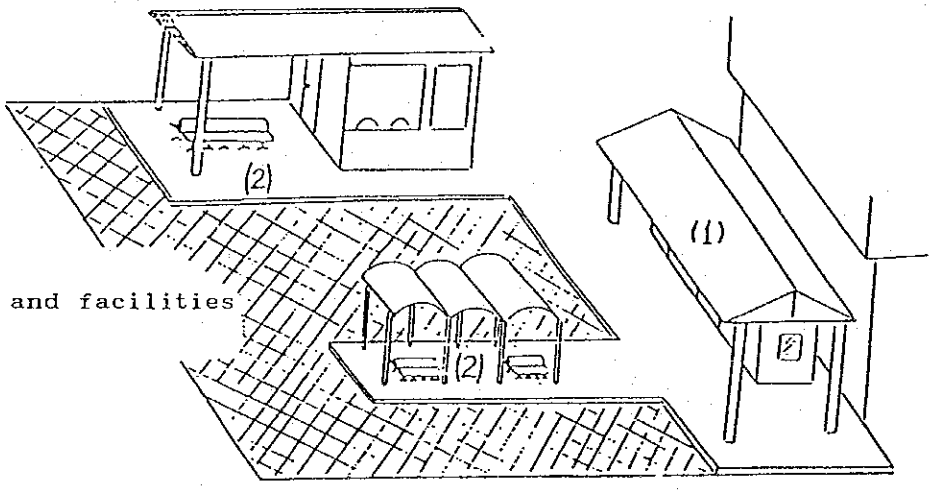
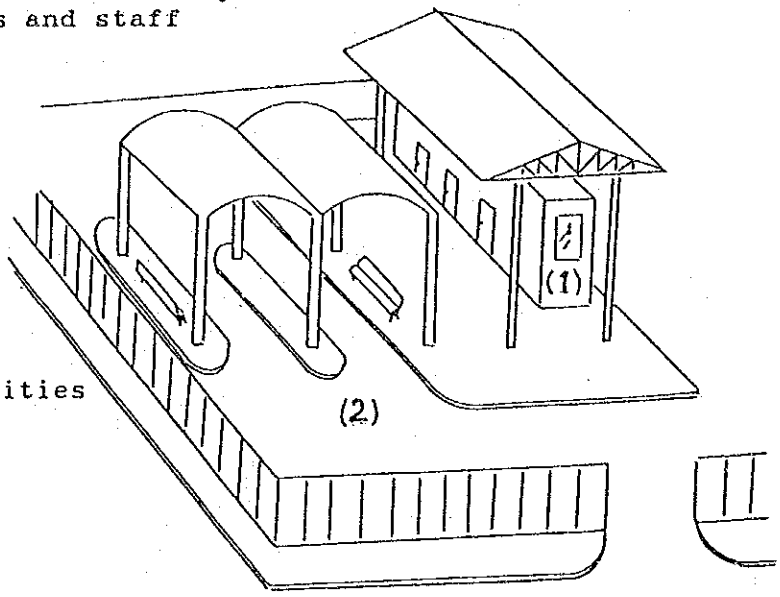


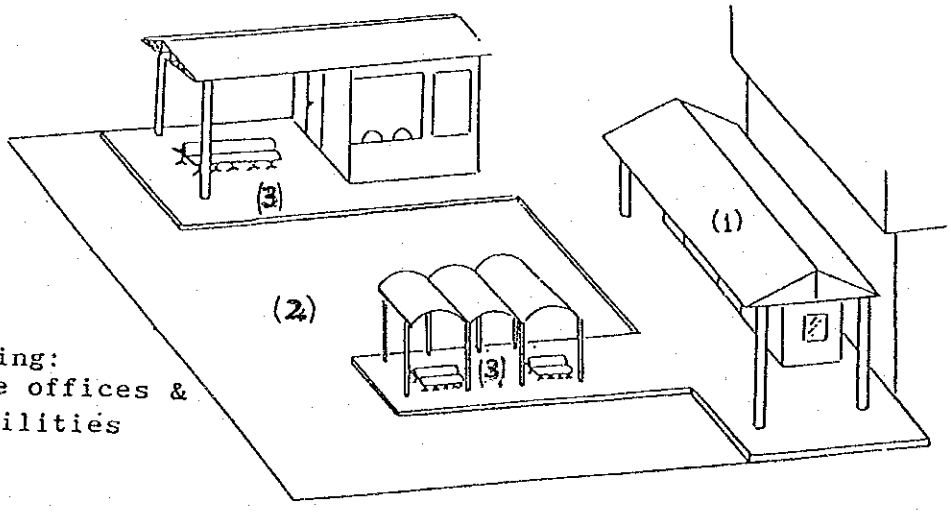
Fig. 16-4-3 Bus Terminal Plans (1/2)

The plan D
1-Improve/constuct offices & facility rooms
for passengers,drivers and staff
2-Paved Ground

Existing:
*Platform with sheds
*Some offices & facilities



The plan E
1-Improve/constuct offices & facilities
2-Paved Ground
3-Platform with sheds



Existing:
*Some offices &
facilities

Fig. 16-4-3 Bus Terminal Plans (2/2)

16.4.2 Improvement Plans and Costs

Improvement plans are developed firstly studying existing conditions of the terminals surveyed in 1992 and the results are adapted to those in other zones through which the overall improvement master plan and its cost are determined. The following are plans and costs for the former group, for the latter group and the total of both groups as well.

1) Terminals surveyed in 1992

(1) Roadside Terminals

Roadside bus terminals are found at 16 locations. As can be seen in Fig. 16-4-2 (1) the departures trips are small mostly less than 80 trips observed. The figure shows those having traffic counted, but others with no traffic count are excluded from the figure. If traffic increases and roads are congested with them, the terminal should be changed to a simple stopping point. This kind of functional change happens at present. An example is found in Shebin el Kom, where a small roadside terminal identified in 1992 is now a stop point in February, 1993. No works are recommended in this category.

(2) Open space Terminals

Terminals using the open space are 7 in total. They are supposed to be able to use the same site in the future and offices and facilities can be constructed over there. Improvement scales are determined in the same way as in the following site 3.

(3) Fenced area

Improvement works on the site are classified into four types as sketched in Fig. 16-4-3. Selection of a type from them to be adapted for each terminal is done by reviewing sketches and data of facilities. As there are some which have fair to good facilities and conditions at present, they are determined not necessary to have additional improvement works and the number of them is 19. An example is the bus terminal in 10th of Ramadan city. The remaining terminals in the site 3 group need improvement works on boarding platform, ground and/or office-facilities as classified into groups A - E. The extent of improvement in these groups is developed by the following methods:

a. The averaged area composition in m2 and percentages are calculated in the group a of good conditions.
b. Each group of B-E is also calculated to have the averaged areas and their percentage share.
c. The balance in percentage of (a)-(b) of the buildings is the net addition to be worked in the improvement. The remaining vehicle space is subject of pavement

work. Platforms with shed are proposed to be installed in two sets.

2) Improvement cost of the surveyed terminals

Improvement plans are grouped into four types as classified B - E. They are the combination of the three components as the following:

a. Buildings

Adding/enlargement of facilities, offices, huts for use of passengers, drivers and terminal staff. They may include ticket windows, information corners, operation offices, drivers rooms, passenger waiting rooms and concourse, toilet, mosque, restaurants, cafeterias shops, etc.

b. Ground pavement

Pave the terminal ground or renewal of the existing poor ground surface of vehicle passages, parking lots, and lanes along the platform.

c. Platforms with shed

Construct the platform with a 30cm up from the paved ground fenced by curb stones. On the platform sheds for passengers for boarding is constructed with concrete poles and corrugated plates.

In order to approximate the cost of the master plan, dimensions of these improvement works are standardized and the averaged area compositions between the group A and the respective other group are compared to find the extent of improvement as discussed in the above subsection. The cost per unit of these works is determined by studying available data from bus companies, taxi terminal managers and other sources. They are in Table 16-4-3.

The estimated cost for the site 3 and 2 groups of the terminals are summarized at 3.23 M.LE in Table 16-4-4.

Table 16-4-3 Unit Cost of Terminal Improvements: Buses and Taxis

Work	Contents and cost
B. Buildings	A flat for offices with RC poles, windows, doors and brick/wood wall panel LE @ 300 / m2
C. Platforms & shed of buses	a. One platform (1 * L15m * W3m) = 15 * 3 @12 = LE 540 b. Shed (Poles & corrugated plates),'L10m*w2 =10*2*100= LE 2000 c. 2 sets per terminal =(540 + 2000) * 2= LE 5000
D. Ground Pave.	Surface 10cm. LE @ 25 / m2
E. Taxi sheds	Covering the parking lots by corrugated plates which are supported by steel poles of 3m height LE @ 100 / m2

Source: In Cairo 1992

Table 16-4-4 Improvement Costs of Bus Terminals (Open space & fenced area)

Improvement plans	Terminal No.	Area (m2)	Unit Cost (LE/m2)	Cost A*UC (LE/T)	Others 1/3 (LE/T)	Cost/ Term. (LE/T)	Total (LE)
2. Open space (site 2)	7						157,567
C. Buildings	6	27	300	8,100	2,700	10,800	64,800
Platforms with shed		2	2,500	5,000	1,667	6,667	40,000
subtotal							104,800
E. Buildings	1	53	300	15,900	5,300	21,200	21,200
Ground pavement		747	25	18,675	6,225	24,900	24,900
Platforms with shed		2	2,500	5,000	1,667	6,667	6,667
subtotal							52,767
3. Fenced area (site 3)	75						3,072,000
A. Good & no Improve.	19						0
B. Buildings	6	53	300	15,900	5,300	21,200	127,200
C. Buildings	14	58	300	17,400	5,800	23,200	324,800
Platforms with shed		2	2,500	5,000	1,667	6,667	93,333
subtotal							418,133
D. Buildings	8	27	300	8,100	2,700	10,800	86,400
Ground pavement		576	25	14,400	4,800	19,200	153,600
subtotal							240,000
E. Buildings	28	97	300	29,100	9,700	38,800	1,086,400
Ground pavement		1086	25	27,150	9,050	36,200	1,013,600
Platforms with shed		2	2,500	5,000	1,667	6,667	186,667
subtotal							2,286,667
Site 2 & 3 Total	82						3,229,567

Notes: Site 1 has no cost of improvement, and needs changes in operation
No. of terminals in Site 1 is 16.

Improvement Plans of each surveyed terminals are given in Table 16-4-5.

Table 16-4-5 Terminal Facility Improve Plans : Buses (1)

No.	Termi. No.	Zone No.	Terminal Name	Area Tot m2	Facili. m2	Area Net m2	Rdsd1 OpSp2 Fenc3		Site1 No wk
1	5	1	EL CANAL	540	220	320	3	B	
2	3	1	SINBELLAWEN	1080	350	730	3	C	
3	1	1	AHMED HELMI	4200	1500	2700	3	E	
4	4	1	EL MAZALAT	3000	30	2970	3	E	
5	2	1	EL KASENDARA	4500	1630	2870	3	D	
6	6	1	ALMAZA	3600	900	2700	3	A	
7	37	83	EL RAML	360	50	310	1		A
8	38	83	SIDI GABBER	1900	30	1870	3	A	
9	39	83	MIDAN MAHATET MISR	370	0	370	2	C	
10	7	4	EAST DISTRICT	4800	900	3900	3	A	
11	8	4	SUPER JET	4000	270	3730	3	A	
12	76	4	MANAKH DISTRICT	250	30	220	1		A
13	17	44	EL ARBAEEN	2200	300	1900	3	C	
14	16	38	BAB EL HARAS	2750	470	2280	3	A	
15	712	38	PORT SAID	250	0	250	1		A
16	54	30	EL-ESTAD	900	100	800	3	C	
17	55	30	EL BAHR EL SAGHIR	4500	1700	2800	3	B	
18	58	29	SENBELLAWEN	2600	700	1900	3	E	
19	59	32	MANZALA	560	240	320	1		A
20	56	35	BELKAS	480	50	430	3	E	
21	60	36	SHERBIN	420	110	310	3	E	
22	57	27	MIT GHAMR	3350	760	2690	3	E	
23	26	19	ISMAILIA	1650	500	1150	3	A	
24	30	19	ALEXANDRIA	660	70	590	3	A	
25	28	19	BELBES	900	300	600	3	E	
26	31	19	MANSOURA	900	120	780	3	C	
27	29	25	FAQOUS	900	100	800	2	E	
28	100	18	MENYET EL KAMH	900	250	650	3	E	
29	11	14	EL RAYAH(Benha)	4000	1000	3000	3	D	
30	9	12	SHEBEEN EL KANATER	400	10	390	1		A
31	10	10	QALYUB	140	0	140	1		A
32	33	61	CAIRO(KAFR EL SHEIUK)	3000	500	2500	3	A	
33	32	67	DSOUK(DSOUK MARKAZ)	2700	200	2500	3	B	
34	64	55	MAIN COLLECTOR	1500	500	1000	3	A	
35	65	55	ALEXANDRIA	400	100	300	3	A	
36	63	55	AL KOASHIA	300	30	270	3	C	
37	61	598	TALAAT HARB	2000	200	1800	3	A	
38	71	59	EL SHAWAN(MAHALA)	1180	400	780	3	D	
39	62	53	ZEFTA	1080	60	1020	3	E	
40	67	56	KAFR EL ZAIAT	300	50	250	3	E	
41	24	50	TALAAT HARB ST/GO.BUS)	640	10	630	1		A
42	23	50	SHEBEEN EL KOM(TANTA)	1000	150	850	3	A	
43	22	50	SIDNAWI	190	10	180	1		A
44	25	47	MINUF	450	150	650	3	D	
45	12	74	EL GAMHOURIA	270	70	200	3	D	
46	13	78	RASHID	2600	100	2500	3	C	
47	41	42	ISMAILIA	1360	350	1010	3	A	
48	15	1	GIZA SQUARE(KING FAISA	300	10	290	3	B	
49	14	4	EL MONIEB	900	50	850	3	B	
50	40	101	FARGHALI	1900	600	1300	3	A	
51	34	96	MIDAN EL MAHATA	600	10	590	3	E	
52	35	96	EL HAWATEN	9000	200	8800	3	E	
53	18	111	MINYA CITY	700	90	610	3	E	
54	21	112	ABO KERKAS MARKAZ	250	20	230	1		A
55	20	105	MAGHAGHA MARKAZ	500	20	480	1		A
56	19	113	MALLAWI CITY	1120	370	750	3	E	
57	44	130	SOHAG	1300	230	1070	3	E	
58	45	136	BALYANA MARKAZ	330	70	260	3	B	
59	703	135	GERGA	1000	360	640	3	A	
60	47	132	SAKOLTA MARKAZ	210	10	200	3	C	
61	46	127	TAHTA MARKAZ	250	10	240	1		A
62	49	140	WEST QENA	1640	420	1220	3	D	
63	48	143	EL TEGERA(LUXOR CITY)	1000	40	960	3	E	
64	51	139	DESHNA MARKAZ	250	40	210	3	E	
65	50	141	QUES MARKAZ	250	80	170	3	E	
66	52	138	NAG HAMMADY MARKAZ	1550	40	1510	3	E	

Table 16-4-5 Terminal Facility Improve Plans : Buses (2)

No.	Termi. No.	Zone No.	Terminal Name	Area Tot m2	Facili. m2	Area Net m2	Rdsd1 OpSp2 Fenc3		Site1 No wk
67	36	146	ASWAN CITY	1630	430	1200	3	E	
68	42	85	ABDALLAH ABOU SEAF	500	40	460	3	C	
69	43	85	UNION INLAND TRANS.	300	30	270	3	C	
70	75	1	ABDEL MONEM RYAD	1250	480	770	3	C	
71	701	1	EL KOLALI	300	60	240	3	B	
72	74	1	INTERNATIONAL(SINAI)	1320	500	820	3	A	
73	77	39	FARSKOUR	300	10	290	1		A
74	87	28	AGA	400	20	380	3	E	
75	89	31	MAHATTET ELMAHAGER	500	60	440	3	C	
76	53	31	DAMIETTA-MANSOURA	660	160	500	3	E	
77	88	16	10th OF RAMADAN	5000	850	4150	3	A	
78	98	21	DIEARB NEGM	1400	70	1330	3	E	
79	86	67	BALTIM	4400	900	3500	3	E	
80	85	68	MIDANEL EL BOOSTA	900	200	700	3	D	
81	99	55	MIDAN SAMANOUD	400	10	390	1		A
82	82	45	ASHMOUN	3000	0	3000	3	C	
83	81	46	EL BAGOUR	880	30	850	3	C	
84	83	49	TALA	400	50	350	2	C	
85	705	74	SHUBRA	1000	160	840	3	D	
86	80	72	ETAY EL BAROUD	500	60	440	2	C	
87	79	71	KOM HAMADA	300	60	240	2	C	
88	706	73	EL DELENGAT	500	100	400	3	E	
89	84	69	WEST DELTA	3000	470	2530	3	A	
90	707	69	MIDDLE DELTA	5390	1840	3550	3	A	
91	92	102	SUMASTA	250	10	240	1		A
92	93	102	IHNASIA	250	10	240	2	C	
93	90	97	ABSHAWAI	250	10	240	2	C	
94	97	118	MIDAN EL MAHATA	1340	210	1130	3	E	
95	710	123	ABOUTIG	250	10	240	1		A
96	711	116	QOSSIAH	250	40	210	1		A
97	94	115	DAIRUT	470	40	430	3	C	
98	96	117	MANFALOT MARKAZ	400	20	380	3	E	
			Total				98		16

Notes: Site 2 & 3 A means in good conditions and no works are proposed
B-E to be improved as in Table 16-4-2
Site 1 are not the subject of improvement. These roadside terminals are to be changed to a simple stop points. No works are proposed.

3) Terminals in the other zones

(1) Estimates of the number of terminals

The terminal numbers in all the zones were synthesized based on the surveyed terminal numbers to approximate the total cost of the terminals improvement in the country. For this purpose a regression analysis is conducted by using the data of the survey; number of terminals, population, generated and attracted person trips. By selecting the zones having terminals surveyed together with the data, the following model and parameters are calculated.

$$y = 0.91129 - 0.00018*P + 0.000146*Tg \qquad (r2 = 0.8242)$$

where y : terminal number
P : population 1992
Tg: person trips generated in 1992

Using the above model parameters and the data by zone, the

number of terminal in other zones is estimated and summarized by governorate in Table 16-4-6.

Table 16-4-6 Terminals and Vehicles Trips
(Buses and taxis in 1992)

Gov.	No. of Bus Terminals			Trips		
	Surveyed	Estimated	Total	Surveyed	Estimated	Total
CAI	11		11	1088		1088
ALX	3		3	369		369
PTS		2	2		122	122
SUZ	1		1	91		91
DAM	3	2	5	206	117	323
DAK	10	3	13	748	164	912
SHR	8	13	21	522	808	1330
QAL	3	3	6	222	183	405
KAF	4	9	13	215	435	650
GHR	8	3	11	651	158	809
MIF	7	3	10	396	183	579
BEH	8	11	19	407	587	994
ISM	1	3	4	107	130	237
GIZ	4	10	14	137	597	734
BES	4	5	9	225	218	443
FAY	3	3	6	196	135	331
MYA	3	6	9	152	241	393
ASY	5	6	11	226	224	450
SOH	4	7	11	168	252	420
QEN	5	7	12	212	275	487
ASW	1	3	4	36	118	154
RED		5	5		205	205
NEW					40	40
WDS	2	7	9	138	320	458
NSI		6	6		235	235
SSI		9	9		321	321
Total	98	126	224	6515	6066	12581

(2) Cost of improvements of the terminals in other zones

Assuming that the improvement plans for these estimated terminals have the same patterns in scales as discussed in those in the surveyed zones, the distribution of the plans and costs can be estimated. They are in Table 16-4-7 for bus terminals. The total cost is estimated at 4.20 M.LE.

Table 16-4-7 Improvement Plans in the Other Zones

A. Plan Distribution

Site	(a) As it is	(b) Improvement B	C	D	E	(c) New Const	(d)Total (b)+(c)
1- Roadside							
2- Open space			7		1		8
3- Fenced ar		5	19	11	37		72
Total	46	5	26	11	38	0	80

B. Cost Distribution (LE'000 in 1992 prices)

Site	(a) As it is	(b) Improvement B	C	D	E	(c) New Const	(d)Total (b)+(c)
1- Roadside							
2- Open space			122.3		52.8		175.1
3- Fenced area		106.0	567.5	330.0	3021.7		4025.2
Total		106.0	689.8	330.0	3074.5	0.0	4200.3

Notes: Table 16-4-6 of the surveyed 98 terminals is the basic pattern of distribution of plans for 126 terminals in the other zones, which are estimated here.
The unit costs in Table 16-4-3 are used to estimate the overall cost.

Table 16-4-8 summarizes all the bus terminal numbers and estimated improvement cost by improvement type and by governorate. All the improvement works are scheduled in the phase I (1993 - 1997).

Table 16-4-8 Terminal Improvement Plans and Costs by Governorate

Gov.	Improvement plans						Improvement Cost(1,000 LE)					
	A	B	C	D	E	Total	A	B	C	D	E	Total
CAI	3	2	3	1	2	11		42.4	89.6	30.0	163.3	325.3
ALX	2	0	1	0	0	3			29.9			29.9
PTS	1	0	0	0	1	2		2.6	12.2	4.9	48.3	68.0
SUZ	0	0	1	0	0	1			29.9			29.9
DAM	4	0	0	0	1	5		2.6	12.2	4.9	48.3	68.0
DAK	3	0	3	0	7	14		5.2	84.1	9.8	586.7	685.8
SHR	8	1	4	1	8	22		18.2	115.2	34.3	665.0	832.7
QAL	1	0	1	2	2	6		3.9	18.3	67.3	154.2	243.7
KAF	4	1	2	2	3	12		31.6	48.8	49.6	275.0	404.9
GHR	4	0	3	1	3	12		5.2	84.1	39.8	260.0	389.1
MIF	3	1	3	1	2	10		25.1	78.0	37.3	154.2	294.6
BEH	8	1	4	2	4	18		13.0	120.7	54.5	323.3	511.5
ISM	2	0	1	0	1	4		3.9	18.3	7.3	72.5	102.0
GIZ	4	3	3	1	3	13		54.1	84.7	22.0	217.5	378.3
BES	5	0	2	0	1	9		6.5	60.3	12.2	120.8	199.9
FAY	3	0	2	0	1	6		3.9	48.2	7.3	72.5	131.9
MYA	2	0	1	0	5	9		7.8	36.6	14.7	390.0	449.1
ASY	3	0	2	0	5	11		7.8	66.4	14.7	390.0	478.9
SOH	7	0	1	1	2	11		9.1	42.7	17.1	169.2	238.1
QEN	3	0	1	2	6	12		9.1	42.7	47.1	495.8	594.7
ASW	1	0	1	0	2	4		3.9	18.3	7.3	154.2	183.7
RED	2	0	1	0	1	5		6.5	30.5	12.2	120.8	170.0
NEW	0	0	0	0	0	1		1.3	6.1	2.4	24.2	34.0
WDS	3	0	3	1	2	9		9.1	102.4	17.1	169.2	297.8
NSI	2	0	1	0	2	6		7.8	36.6	14.7	145.0	204.1
SSI	3	0	2	1	2	8		10.4	48.8	19.6	193.3	272.1
Total	80	14	46	18	66	224		290.7	1,365.3	548.6	5,413.4	7,618.0

Notes:
A; These are no need to improve, because of good conditions or the terminals the road shoulder be changed to a stopping point.
B; Improve buildings/hut.
C; B plus platforms with sheds
D; B plus ground pavement
E; C plus ground pavement

16.5 Taxi Terminal Improvement Plan

16.5.1 Taxi Terminals and Planning Principles

1) Taxi Terminals

Generally governorates construct the terminals with minimum necessary facilities and ask inter city taxis to use the terminal. Some terminals have vehicle sheds in the waiting corners, ground is paved and with some facilities to passengers and drivers. But in other terminals, conditions of these facilities are not attractive and comfortable for users.

The terminal is managed either by 1) direct management by staff of a department of the governorate, 2) persons commissioned by the governorate or by city council, and 3) representatives persons of the drivers union. In all cases a carta fee is charged to every departure taxi by the terminal staff. The fee depends on the distance and vehicle seats. It is in the range of 5-10% of the total fare receipt of the taxi in every departure. Persons at large terminals said the revenue is used for wages and routine expenditures of the terminal operation, but part of the revenue goes to the governorate or city council as taxes or service charges every year. The remained surplus is used for repair and improvement works or reserved for the next year. A self-financing method is emphasized by them, but there remain necessary improvement works to be done in many terminals.

Existing facility conditions were discussed in Chapter 5. It was identified those realized percentages as well as the actual conditions were not satisfactory levels for users. As a steady increase is expected in users of bus and taxi service, facility conditions and services would be worsen if no improvements are done. Betterment works are necessary.

Terminals surveyed in 1992 are classified as follows in Table 16-5-1 in which the total number was 121. They are classified as 26 roadsides, 21 open spaces, and 74 fenced areas. Terminals in the other zones are estimated as discussed afterward. The total number of inter-city taxi terminals is estimated at 237 in the country in mid-1992.

Table 16-5-1 Taxi Terminals in The Country

	Surveyed	Others	Total
1. Roadside	26	25	51
2. Open space	21	20	41
3. Fenced area	74	71	145
4. Total	121	116	237

2) Approaches

Approach principles applied for bus terminals is also applicable to this taxi terminal study, but with some additions as follows.

a. Taxi terminals on roadside using right of way in city center, classified as site-1, should be relocated to return the road space to its original purpose of serving for traffic movements.

b. Taxi terminals require parking lots within the area because of its different sevice system from buses. Taxis wait for pssengers in queueing order for every destination, but parking lots are not enough and vehicles wait outside on nearby road shoulders causing traffic conflicts. If demand increases steadily as forecast, overflowed parking vehicles would increase and worsen traffic movement on roads much more. It is considered a new terminal should be constructed and some taxi vehicles should be moved over there, when the taxis using a terminal exceed the manageable capacity of the terminal. This addition of terminals is taken into account in site-3 group and is included in the master plan. Site-2 group would not need additonal terminals since they have still available open space beside the designated area.

A relationship between the departure trips and the terminal area size was studied for the all terminals surveyed in 1992 as in Fig. 16-5-1, and terminals grouped by site conditions were in Fig. 16-5-2. These data indicate departure trip volumes and terminal size have no high cor-relation. It means departure trips are related not only to the terminal size but also to the frequency of turning use of the parking lots. It should be noted that the terminal is located in the center of city and difficult to widen the area in response to the increased trips.

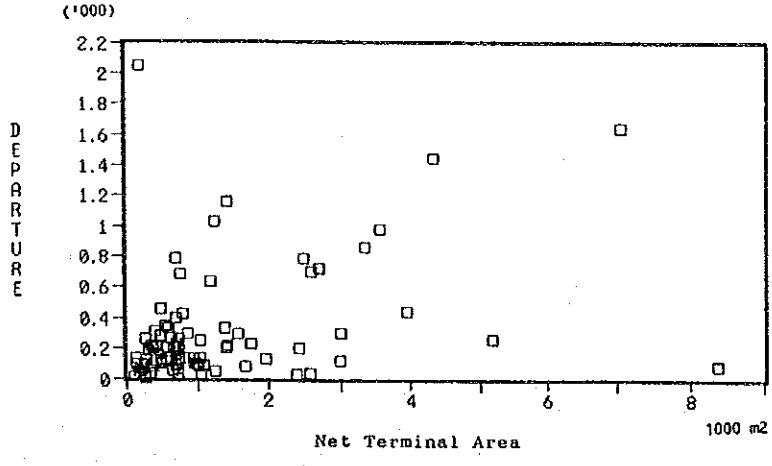


Fig. 16-5-1 Terminal Area and Departure Trips: Taxis

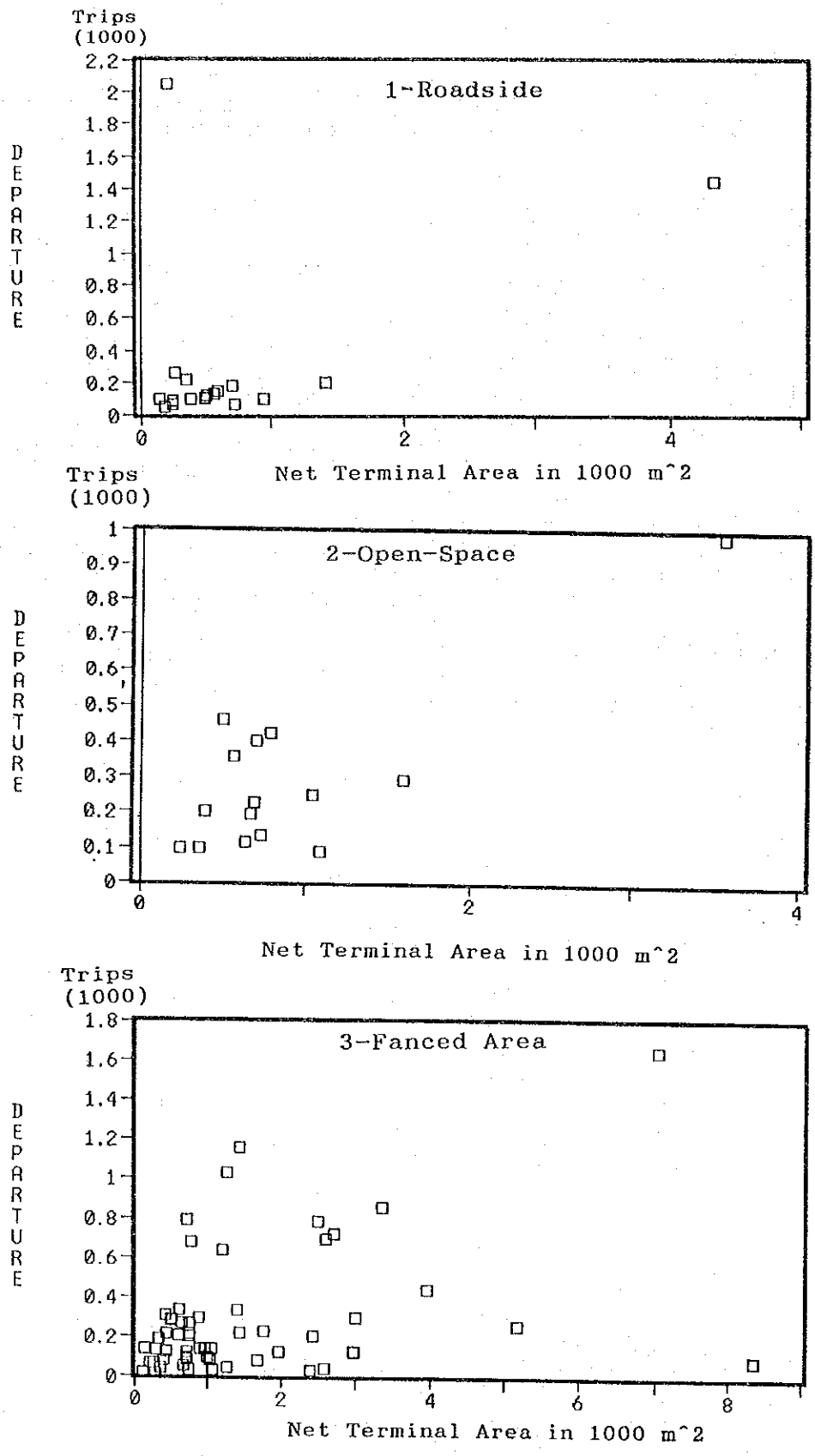


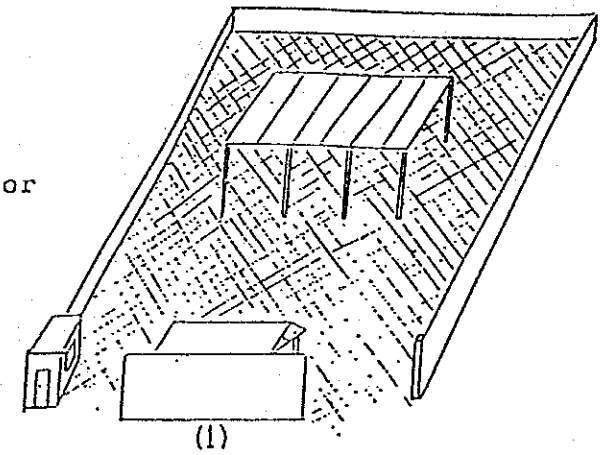
Fig. 16-5-2 Terminal Area and Departure Trips by Terminal Classification

3) Prototypes of Improvement Plans

Improvement of the existing terminals are divided into four types as shown in Fig. 16-5-3 and the previous Table 16-4-2.

The plan B
1-Improve/Construct offices & facility
rooms for passenger,drivers and staff

Existing:
*Carta cabins and/or
some facilities
*Taxi sheds
*Paved Ground



The plan C
1-Construct taxi sheds
2-Improve/Construct offices & facility
rooms for passenger,drivers and staff

Existing:
*Paved Ground
*Carta Cabins and/or
some facilities

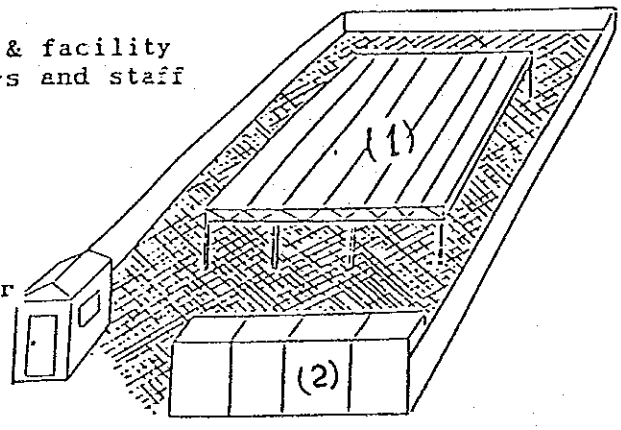
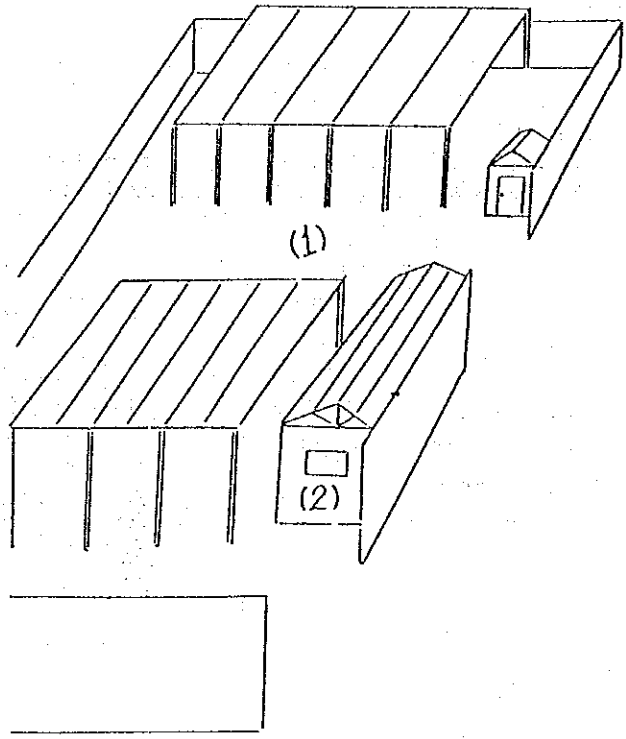


Fig. 16-5-3 Taxi Terminal Plans (1/2)

The plan D
1-Pave... Ground
2-Improve/Construct offices & facility
rooms for passenger,drivers and staff

Existing:
*Carta cabins and/or
some facilities
*Taxi sheds.



The plan E
1- Improve/Construct offices & facility
rooms for passenger,drivers and staff
2- Construct taxi sheds
3 -Pave Ground.

Existing:
*Carta Cabins
and/or some facilities

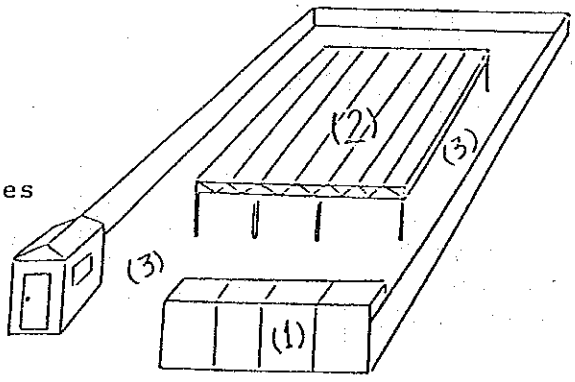
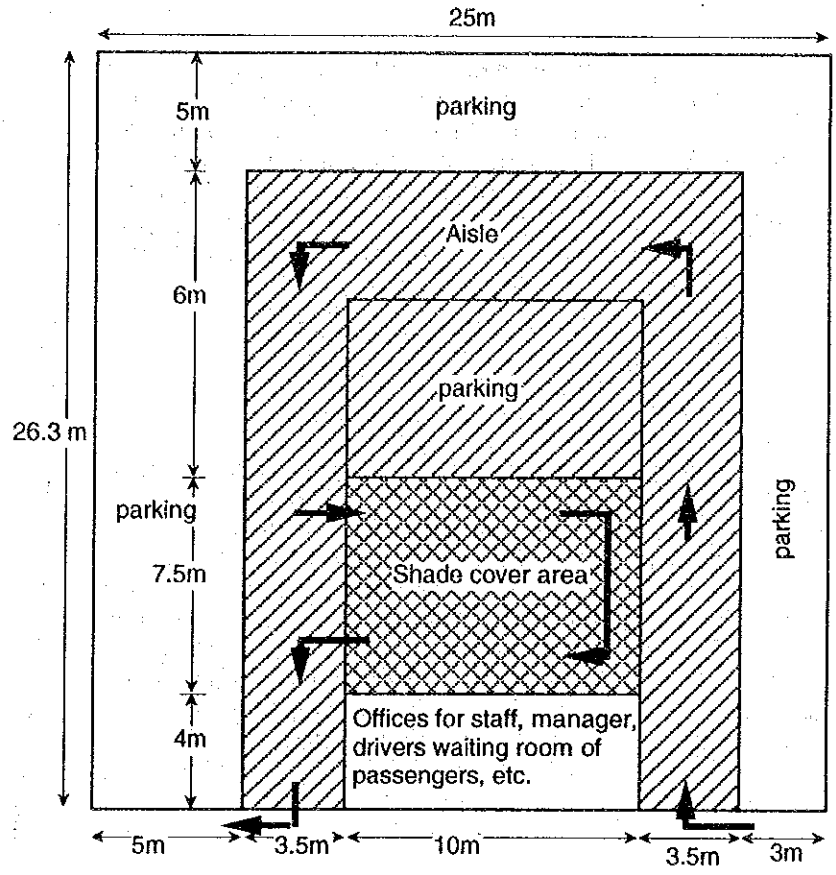


Fig. 16-5-3 Taxi Terminal Plans (2/2)



The area *		658 m^2
Offices		39 m^2
Shade covered area for parking & for pass boarding		75 m^2
paved aisles		264 m^2
parking		65 m^2
unpaved		225 m^2
Total		290 m^2

* The area is the average of 329 m^2 and 987 m^2 as noted in Table16-5-4.

Unit cost

- Office building; a flat — LE300/m^2
  RC concrete, concrete, bricks, glass windows, doors, wood & plywood, corrgate plates for roof, and others
- Shade — LE100/m^2
  corrugate plates supported by steel poles and members at 3m hight
- Pavement — LE 25/m^2
  asphalt concrete for 10cm thick

(prices in 1992)

Cost

1 Office building
39 m^2 x 300 = 11,700

2 Shade / Shelter
75 m^2 x 100 = 7,500

3 pavement
329 x 25 = 8,225

4 Others
Land clearance, fences, utilities, etc.
(1+2+3) x 1/3 = 9,142

5 Total (1+2+3+4) 36,567

6 Land acquisition
36,567 X 1/2 = 18,233

7 G total in LE 54,800

Ref: Table 16-4-3 & Table 16-5-4

Note: If land cost is free by using the government land. This amount can be used for larger area and/or pavement, shading, and others.

Fig. 16-5-4 Schematic Layout of New Taxi Terminal

16.5.2 Improvement Plans and Costs

Taxi terminals have a certain parking space where taxis wait in an order for the departure which depends on the number of passengers. No time table of departure is used. All routes are handled in one terminal if the city is small, but in medium and large cities they have a few terminals each with different routes. Terminals are classified into three types by site. Reviewing the data in each terminal, improvement plan is marked at each terminal.

1) Terminals surveyed in 1992

(1) Roadside Terminals

As can be seen in Fig. 16-5-3 (1) departure trips from those are less than other site types, mostly less than 300 per day, while the area size is virtually variable because they use the road shoulders. The problem is they are located in the central part of the city where persons, carts, and vehicles concentrate in. Urbanization and transport demand will grow in the future and these roadside terminals will be involved in heavier traffic congestion in the city. The site is on the road shoulder and roadway with no boundary marks, where conflicts with others are often seen. Roads should have their original purpose of serving traffic movement and occupied terminal should be moved to a new site.

Governorate or city council managing the roadside terminal should find a new site and construct facilities on it. The number of them are 26 terminals in the survey. This master plan study does not explore the most viable new location and plan of the terminal in each city because the location and plan study require much detailed investigations in land use, road network, population, economic activities at present and future in respective city. The master plan would indicate the necessity to change the site and would approximate the cost of construction in the urban periphery.

(2) Open space Terminals

The open space is owned by city council or governorate with minimum facilities like carta/operation huts on it. It is supposed the site can be used as taxi terminal in the future with adding fences and other facilities. The type of improvement work is determined by reviewing the surveyed data in the same way as the case of bus terminals. The total is 21 terminals .

(3) Fenced area Terminals

Improvement plans are classified in the same way as the case of buses. The number of the site-3 was 74 terminals in the survey. Their divisions into A-E are in Table 16-5-6 afterward.

The terminals need to meet the demand increases. In all over the country the annual average growth will be 4.7% per annum. The growth will cause the taxis to exceed the capability of parking and turning uses, and accelerate traffic congestion on roads in the surrounding areas.

Since the parking lot cannot be expanded at the existing site, the turning use should be increased to meet the demand growth. But, there is a limit in the turning ratio of the parking lot. The terminal managers in large cities say the averaged turns would be 7 or 8 in 12 hours. It can be thought if the ratio of departure trips / parking lots at a terminal exceeds the turn of 9 times, a new taxi terminal should be added. Using this criteria, the site-3 terminals are checked and found the result as in Table 16-5-2.

Table 16-5-2 Terminals required for relocations

site-3 group	number of terminals the turn >9		number of terminals the turn <9		Total
	(1992)	(1997)	(2012)	(2012)	
terminals	22	9	15	28	74

The additional terminals should be constructed at the periphery area of the corresponding city in each phase. The cost per terminal is assumed to be equal to an averaged cost of E category of the improvement plans plus the equal amount for the land acquisition.

2) Improvement cost of the surveyed terminals.

Improvements are classified into four types in the same way as the case of bus terminals. They are composed of combinations of the following contents.

a. Buildings

Scales are less than bus terminals since a standard management facilities are of a carta office and a managers room. Addition will be toilet, passenger waiting room, etc.

b. Ground pavement

Pavement should cover the vehicle passages and lots under sheds.

c. Parking lots with shed

Parking sides are commonly covered by corrugated asbestos plates on concrete/steel poles of 3-4m height. The cover is necessary not only for car parking but drivers

can rest, wash, and inspect machine. Passengers wait in the car under the shed for departure.

Table 16-5-3 in which averaged unit costs for classified works are shown is used for the cost estimate of taxi terminals. Improvement scale is determined by firstly calculating the averaged composition of the areas in the group a of good conditions of the fenced area into the Building area and the vehicle use area. Second the percent shares of these two areas in each other group, B - E are tabulated and thirdly the balance of the building area between the first and the second is calculated as the addition in m2. Since the terminal area is assumed not being able to be enlarged, the pavement area is calculated by deducting the building area in m2 from the total. The shed area is assumed 50% of the vehicle use area. Partial reconstruction, huts relocation, inside innovation are in the item "other cost" in the table which is allocated 1/3 of the calculated cost.

Table 16-5-3 is the improvement plans classified for inter city taxi terminals surveyed in 1992.

Table 16-5-3 Terminal Plans: Taxis

Site Type	(a) As it is	(b) Improvement					(c) New Construction	Total
		B	C	D	E	Total		(b)+(c)
1-Road side						-	26	26
2-Open space	-	6	6		9	21	-	21
3-Fenced Area	14	10	13	30	7	60	-	60
R-New Additions							46	46
Total	14	16	19	30	16	81	72	153

Notes : The site-1 road side terminals are scheduled to be moved to a new location.
(a) If found in good conditions and no works are proposed.
(b)-(c) are plans of improvement.
R:New additions of terminal

2) Improvement Costs of the Surveyed Terminals

The costs of these improvements are summarized in Table 16-5-4.

Table 16-5-4 Improvement Cost of Taxi Terminals

Improvement plans	Terminal NO. 1)	Area m2 1)	unit cost	Cost A*m2	Others 1/3	Total per Term	Total
1. Roadside 1)	26						1,384,500
E. Buildings		39	300	11,700	3,900	15,600	405,600
Ground pavement		297	25	7,425	2,475	9,900	257,400
Taxi sheds		75	100	7,500	2,500	10,000	260,000
Land acquisition							461,500
2. Open space	21						442,200
B. Buildings	6	8	300	2,400	800	3,200	19,200
C. Buildings	6	35	300	10,500	3,500	14,000	84,000
Sheds		75	100	7,500	2,500	10,000	60,000
E. Buildings	9	30	300	9,000	3,000	12,000	108,000
Ground pavement		270	25	6,750	2,250	9,000	81,000
Sheds		75	100	7,500	2,500	10,000	90,000
3. Fenced area	60						1,204,567
B. Buildings	10	8	300	2,400	800	3,200	32,000
C. Buildings	13	8	300	2,400	800	3,200	41,600
Sheds		75	100	7,500	2,500	10,000	130,000
D. Buildings	30	23	300	6,900	2,300	9,200	276,000
Ground pavement		469	25	11,725	3,908	15,633	469,000
E. Buildings	7	39	300	11,700	3,900	15,600	109,200
Ground pavement		329	25	8,225	2,742	10,967	76,767
Sheds		75	100	7,500	2,500	10,000	70,000
R. Addition of terminals							2,523,100
The cost is same as E above						36,567	1,682,067
Land acquisition							841,033
Total							5,554,367

Notes: In the case of new construction, land acquisition cost is included by assuming the the land cost is equal to a half of the construction cost, but if the land is owned by Governorate, the cost can be zero. Shed area is proposed to cover lots for five vehicles Pavement area is for 1/3 of the area.
No. of terminals in a. good condition of Site 3 is 14.

The phasing of the above projects are shown in the Table 16-5-5, where improvements and additions are spread over phases 1 to 3 and are summarized in Table 16-5-6.

Table 16-5-5 Terminal Facility Improvement Plan: TAXIS (1)

No.	Termi. No.	Zone No.	TERMINAL NAME	Area Tot m2	Area m2	Area Net m2	RdsdlPlan Opsp2 Fenc3	Additon terminal for Site-3 Ph 1	Ph2	Ph3	As it is
1	102	1	SABTIA	2560	70	2490	3 C		1		
2	104	1	SINBELLAWEN	750	130	630	3 C	1			
3	101	1	AHMAD HELMI	8640	1600	7040	3 A			1	
4	105	1	EL MAZALAT	702		702	2 E				
5	103	1	EL KHASENDARA	700		700	1 E				
6	149	83	SIDI GABBER	200	20	180	1 E				
7	150	83	MIDAN MAHATET MISR	4640	310	4330	1 E				
8	106	40	MANAKH DISTRICT	550	50	500	2 C				
9	122	44	EL ARBEIEN	1680	170	1200	3 A	1			
10	121	38	TALKHA,GAMASA&SHERBI	1080	30	1050	2 B				
11	120	38	EL MANSORA	350	10	340	3 B				1
12	119	38	PORTSAID	1050	30	1020	3 B				1
13	159	30	EL-ESTAD	1310	60	1250	3 C	1			
14	160	30	EL THALAGA	2650	60	2590	3 B				1
15	163	29	SENBELLAWEN	2500	20	2430	3 B				1
16	164	32	MANZALA	400	10	390	2 E				
17	161	35	BELKAS	750	30	720	1 E				
18	165	36	SHERBIN	800	10	790	2 E				
19	158	34	TALKHA	3625	75	3550	2 E				
20	162	27	MIT GHAMR	2880	280	2600	3 D		1		
21	138	19	ORABI	875	125	740	3 D			1	
22	131	19	ISMAILIA	900	160	740	3 A	1			
23	136	19	ALEX	130	30	100	3 C				1
24	134	19	BELBIS	930	70	860	3 D		1		
25	137	19	MANSOURA	920	30	890	3 A				1
26	133	24	ABU KEBIK	250	60	190	3 D	1			
27	135	25	FAQOUS	1710	30	1680	3 D				1
28	114	18	MENYET EL KAMH	250	10	240	1 E				
29	217	14	EL RAYAH(BENHA)	600	10	590	1 E				
30	109	14	EL RAYAH(CAIRO)	475	75	400	3 C	1			
31	216	14	EL RAYAH(ZAGAZIG)	200		200	1 E				
32	110	14	SIDI AWAD	250	10	240	1 E				
33	107	12	SHEBEEN EL KANATER	350		350	1 E				
34	108	10	QALUB	140		140	1 E				
35	140	61	DSOUK(KAFR EL SHEIKH	9900	1530	8370	3 D				1
36	143	61	CAIRO(KAFR EL SHEIKH	4000	1000	3000	3 A				1
37	139	67	DSOUK(DSOUK MARKAZ)	3500	160	3340	3 E		1		
38	141	66	SIDI SALEM	300	409	260	1 E				
39	142	165	EL RAYAD	750	10	740	2 E				
40	169	55	MAIN COLLECTOR	1600	160	1440	3 B	1			
41	171	55	EL MAHATA	700		700	3 C			1	
42	170	55	ALEX	150	20	130	3 B	1			
43	168	55	AL KORASHIA	350	30	320	3 D	1			
44	166	59	TALAAT HARB	1500	100	1400	3 D			1	
45	167	53	ZEFTA	860	110	750	3 D		1		
46	172	56	KAFR EL ZAIAT	770	10	760	3 B	1			
47	128	50	SH-EL KOM(TANTA)	250	10	240	1 E				
48	129	50	CAIRO & ALEX	750	60	690	3 A				1
49	130	47	MINUF	700	40	660	3 B				1
50	112	74	TAHSIN EL SEHA	1800	100	700	3 C	1			
51	111	74	FALAKAH	2000	30	1970	3 D				1
52	116	78	RASHID	2400	10	2390	3 C				1
53	214	80	EL AWAAID	580	10	570	2 C				
54	213	80	DAMANHOUR	320	50	270	3 A				1
55	115	80	ALEX	700	100	600	3 C	1			
56	155	42	ISMAILIA	3000	290	2710	3 A		1		
57	118	1	GIZA SQUARE	1600	10	1590	2 B				
58	117	4	EL MONIEB	5230	50	5180	3 A				1
59	151	101	FARGHALI	4000	50	3950	3 A				1
60	153	105	EL FASHNEE(MAGHAGHA)	740	10	730	3 D				1
61	152	105	EL FASHNEE(CAIRO)	430	10	420	3 D	1			
62	154	99	EL WASTAA	420	30	390	3 D			1	
63	144	96	MIDAN EL MAHATA	1120	70	1050	3 A				1
64	145	96	EL HAWATEN	260	10	250	3 D		1		
65	123	111	MINYA CITY	500	20	480	3 D	1			

Table 16-5-5 Terminal Facility Improvement PLan: TAXIS (2)

No.	Termi. No.	Zone No.	TERMINAL NAME	Area Tot m2	Area m2	Area Net m2	Rdsd1Plan Opsp2 Fenc3	Additon terminal for Site-3 Ph 1	Ph2	Ph3	As it is
66	127	112	ABO KERKAS MARKAZ	1800	30	1770	3 E			1	
67	124	108	BENI MAZAR MARKAZ	1420		1420	1 E				
68	126	106	MAGHAGHA MARKAZ	530	30	500	1 E				
69	125	113	MALLAWI CITY	700	309	670	2 B				
70	178	130	SOHAG	570	70	500	3 D	1			
71	180	108	BALYANA MARKAZ	450	70	380	1 E				
72	175	128	MARAGHA MARKAZ	600	40	560	1 E				
73	177	134	MENSHEH MARKAZ	300	20	280	3 B	1			
74	179	135	GERGA	800	90	710	3 D			1	
75	176	132	SAKOLTA MARKAZ	650	10	640	2 B				
76	173	128	TEMA MARKAZ	760	60	700	2 E				
77	174	127	TAHTA MARKAZ	1100		1100	2 B				
78	183	140	EL BAHRR EL AHMAR	1400	140	1260	3 D				1
79	186	140	SOHAG,ASYUT	1120	60	1060	3 E				1
80	184	140	WEST QENA	500	10	490	1 E				
81	182	140	EAST QENA	1000	40	960	3 E			1	
82	188	143	EL TEGERA(LUXOR CTIY	600	20	580	3 D	1			
83	181	139	DESHNA MARKAZ	270	30	240	2 E				
84	187	141	QUES MARKAZ	360		360	2 C				
85	185	138	NAG HAMMADI MARKAZ	3000	20	2980	3 D				1
86	146	149	ASWAN CITY	1500	70	1430	3 A			1	
87	148	146	IDFU MARKAZ	1080	90	990	3 D			1	
88	147	147	KOMO OMBO MARKAZ	1040	90	950	1 E				
89	157	85	ABDEL FADEL ABDEL KA	500	80	420	3 B			1	
90	197	1	EL KORBA	100	10	90	1 E				
91	190	1	ABU TABLE	400	10	390	3 E	2			
92	156	4	EL ARAB	5400	420	4980	3 A				2
93	215	38	RAS EL BAR	180	30	150	1 E				
94	189	38	KAF SAAD	870	120	660	3 D		2		
95	191	39	FARASKOUR	600	30	570	1 E				
96	200	28	AGA	100		100	1 E				
97	218	32	MANZALA	870	30	840	3 D			2	
98	202	31	MAHATTET EL MAHAGER	420		420	2 E				
99	201	16	10th of RAMADAN	2380	130	2250	3 E				2
100	219	21	DIEARB NEGM	1740	25	1715	3 D				2
101	199	67	BALTIM	160	20	140	3 D				2
102	198	68	EL GARAYDA	200	20	180	3 D				2
103	221	55	MIDAN SAMANOUD	350		350	1 E				
104	195	45	ASHMOUN	1000	10	990	3 C	2			
105	194	46	EL BAGOUR	1000	40	960	1 E				
106	196	49	TALA	810	60	750	3 C			2	
107	222	74	SHUBRA	1000	90	910	3 E	2			
108	193	72	ETAY EL BAROUD	500	30	470	3 C			2	
109	192	71	KOM HAMADA	600	50	550	3 A	2			
110	223	73	EL DELENGAT	400	60	430	1 E				
111	205	104	SUMUSTA	1000	10	990	3 D				2
112	206	102	EHNASIA	2000	50	1950	2 C				
113	203	97	ABSHAWAI	2500	40	2460	2 E				
114	204	94	TAMAI	300	10	290	2 C				
115	210	118	CAIRO	300		300	2 C				
116	224	118	BAHARI ASSYUT	3200	200	3000	3 D	2			
117	225	118	KEBLI ASSYUT	250	10	240	1 E				
118	211	123	ABOUTIG	285		285	3 C				2
119	208	116	QOSSIAH	140	10	130	2 B				
120	207	115	DAIRUT	870	10	860	3 D		2		
121	209	117	MANFALOT MARKAZ	580	105	455	3 D			2	
							Site-1	26			
							Site-2	21			
							Site-3	74			
							Total	121	22	9	15	28

Notes: In site 3, phases are marked by 1 and 2. "1" is marked by studying traffic data "2" is marked by the scale of popolation of the zone in descending order and and assumed the phasing from 1 to 3.

Table 16-5-6 Phased Plans of Taxi Terminals

(LE'000 in 1992 prices)

Site	Phases 1	2	3	Total
1- Roadside	1,385			1,385
2- Open space	442			442
3- Fenced area	1,205			1,205
R- New additons	1,207	494	821	2,522
Total	4,239	494	821	5,554

Notes: The site 1 roadside terminals are scheduled to to be moved to a new site.
The site 2 & 3 are improved at the existing site.
R- New additions of terminals

3) Terminals in the Other Zones

(1) Estimates of the number of terminals

The terminal numbers in other zones were synthesized based on the terminal numbers in surveyed zones to approximate the total cost of the terminals improvement in the country. For this purpose a regression analysis is conducted by using the data of the survey; number of terminals, population, generated and attracted person trips. By selecting the zones having terminals surveyed together with the data, the following model and parameters are calculated.

$$y = 1.12973 - 0.00089*P + 0.000231*Tg \qquad (r2 = 0.558)$$

where y : terminal number
p : population 1992
Tg: person trips generated in 1992

Using the above model parameters and the data by zone, the number of terminals in the other zones is estimated and summarized into governorate in Table 16-5-7. The Table shows the inter-city taxi terminals in the whole country.

Table 16-5-7 Terminals and Vehicle Trips (Taxi)

Gov.	Taxi Terminals			Taxi Passenger Trips		
	Surveyed	Estimated	Total	Surveyed	Estimated	Total
CAI	9		9	4041		4041
ALX	2		2	1727		1727
PTS	1		1	780		780
SUZ	1		1	637		637
DAM	6	1	7	1390	256	1646
DAK	12	1	13	3473	1017	4490
SHR	10	11	21	2861	2916	5777
QAL	7	8	15	1659	1970	3629
KAF	6	9	15	1462	2373	3835
GHR	8	8	16	2751	1850	4601
MIF	6	7	13	1861	1918	3779
BEH	9	8	17	2951	1589	4540
ISM	1		1	663	821	1484
GIZ	2	7	9	599	1358	1957
BES	6		6	1175	481	1656
FAY	4		4	797	189	986
MYA	6	7	13	627	777	1404
ASY	7	8	15	1119	1237	2356
SOH	6	9	15	951	1712	2663
QEN	8	8	16	1222	1314	2536
ASW	3	1	4	453	153	606
RED		7	7		1364	1364
NEW		1	1		151	151
WDS	1	4	5	254	762	1016
NSI		6	6		1054	1054
SSI		5	5		936	936
Total	121	116	237	33453	26198	59651

(2) Costs of improvement of terminals in the other zones.

Assuming that improvement plans for terminals estimated in the other zones have the same patterns as those surveyed, the cost can be estimated. Plans and costs of these are summarized in Table 16-5-8 from which the total cost of the plans are quoted as under in prices of 1992.

Table 16-5-8 Improvement Plans in the Other Zones: Inter city Taxi Terminals

A. Plan Distribution

Site	(a) As it is	(b) Improvement B	C	D	E	(c) New Constr	(d)Total (b)+(c)
1- Roadside						25	25
2- Open space		6	6		9		21
3- Fenced ar		9	12	29	6	(44)	56
Total	14	15	18	29	15	25	102
						14+102=	116

(including the additional terminals of 44, G-total is 160)

Table 16-5-8 Improvement Plans in the Other Zones: Inter city Taxi Terminals
B. Cost Distribution
(LE'000 in 1992 prices)

Site	(a) As it is	(b) Improvement B	C	D	E	(c) New Constr	(d)Total (b)+(c)
1- Roadside						1331.3	1331.3
2- Open space		19.2	144.0	0.0	267.1		430.3
3- Fenced area	0.0	28.8	158.4	668.5	199.3	2413.4	3468.4
Total	0.0	48.0	302.4	668.5	466.4	3744.7	5230.0

Notes:
Table 16-5-5 is the basic pattern of distribution of plans for the the surveyed 121 terminals. Terminals in the other zones are 116 of which plans and cost are distributed using the pattern of that table.

4) Overall cost

The summarized improvement costs of the terminals in the whole country in financial terms are estimated as follows and also shown in Table 16-5-9.

Table 16-5-9 Terminal Improvement Plans and Costs (1)

Gov	Site-1	Improvements					Total	Ph1	Ph2	Ph3	Phs
	Relo.	A	B	C	D	E	R..E	Terminal	addition		Total
CAI	2	1	1	2	0	3	9	2	1	1	4
ALX	2	0	0	0	0	0	2	0	0	0	0
PTS	0	0	0	1	0	0	1	0	0	0	0
ISM	0	1	0	0	0	0	1	1	0	0	1
DAM	3	0	3	0	1	0	7	0	1	0	1
DAK	2	0	2	2	3	4	13	2	1	1	4
SHR	3	3	1	4	7	3	21	5	2	2	9
QAL	7	1	1	2	2	2	15	2	0	1	3
KAF	4	2	1	1	5	2	15	1	2	1	4
GHR	3	1	3	2	6	1	16	5	1	3	9
MIF	4	2	2	3	1	1	13	2	0	2	4
BEH	3	3	1	5	3	2	17	5	1	2	8
ISM	0	1	0	0	0	0	1	1	1	0	2
GIZ	1	3	1	1	2	1	9	2	1	1	4
BES	0	1	0	1	4	0	6	2	0	1	3
FAY	0	1	0	1	1	1	4	0	1	0	1
MYA	4	1	2	1	3	2	13	2	0	2	4
ASY	3	1	2	3	5	1	15	2	1	2	5
SOH	3	1	4	1	5	1	15	3	0	2	5
QEN	3	1	1	2	5	4	16	2	1	2	5
ASW	1	1	0	1	1	0	4	0	0	2	2
RED	1	1	1	1	2	1	7	1	0	1	2
NEW	0	0	1	0	0	0	1	0	0	0	0
WDS	0	1	2	1	1	0	5	1	1	2	4
NSI	1	1	0	1	2	1	6	1	0	1	2
SSI	1	0	1	1	1	1	5	2	1	1	4
Total	51	28	30	37	60	31	237	44	16	30	90

Table 16-5-9 Terminal Improvement Plans and Costs (2)

(LE'000 in 1992 prices)

Gov	Site-1 Relo.	Improvement costs B	C	D	E	Total	Ph1 Terminal	Ph2 addition	Ph3	Ph 1-3 Total	G Total
CAI	106.5	3.2	33.4	0.0	89.9	233.0	109.7	54.9	54.9	219.4	452.4
ALX	106.5	0.0	0.0	0.0	0.0	106.5	0.0	0.0	0.0	0.0	106.5
PTS	0.0	0.0	16.7	0.0	0.0	16.7	0.0	0.0	0.0	0.0	16.7
SUZ	0.0	0.0	0.0	0.0	0.0	0.0	54.9	0.0	0.0	54.9	54.9
DAM	159.8	9.6	0.0	24.8	0.0	194.2	0.0	54.9	0.0	54.9	249.0
DAK	106.5	6.4	33.4	74.5	119.8	340.6	109.7	54.9	54.9	219.4	560.0
SHR	159.8	3.2	66.8	173.8	89.9	493.4	274.3	109.7	109.7	493.7	987.1
QAL	372.8	3.2	33.4	49.7	59.9	518.9	109.7	0.0	54.9	164.6	683.5
KAF	213.0	3.2	16.7	124.1	59.9	417.0	54.9	109.7	54.9	219.4	636.4
GHR	159.8	9.6	33.4	149.0	30.0	381.7	274.3	54.9	164.6	493.7	875.3
MIF	213.0	6.4	50.1	24.8	30.0	324.3	109.7	0.0	109.7	219.4	543.7
BEH	159.8	3.2	83.5	74.5	59.9	380.9	274.3	54.9	109.7	438.8	819.7
ISM	0.0	0.0	0.0	0.0	0.0	0.0	54.9	54.9	0.0	109.7	109.7
GIZ	53.3	3.2	16.7	49.7	30.0	152.8	109.7	54.9	54.9	219.4	372.2
BES	0.0	0.0	16.7	99.3	0.0	116.0	109.7	0.0	54.9	164.6	280.6
FAY	0.0	0.0	16.7	24.8	30.0	71.5	0.0	54.9	0.0	54.9	126.3
MYA	213.0	6.4	16.7	74.5	59.9	370.5	109.7	0.0	109.7	219.4	589.9
ASY	159.8	6.4	50.1	124.1	30.0	370.4	109.7	54.9	109.7	274.3	644.6
SOH	159.8	12.8	16.7	124.1	30.0	343.4	164.6	0.0	109.7	274.3	617.6
QEN	159.8	3.2	33.4	124.1	119.8	440.3	109.7	54.9	109.7	274.3	714.6
ASW	53.3	0.0	16.7	24.8	0.0	94.8	0.0	0.0	109.7	109.7	204.5
RED	53.3	3.2	16.7	49.7	30.0	152.8	54.9	0.0	54.9	109.7	262.5
NEW	0.0	3.2	0.0	0.0	0.0	3.2	0.0	0.0	0.0	0.0	3.2
WDS	0.0	6.4	16.7	24.8	0.0	47.9	54.9	54.9	109.7	219.4	267.3
NSI	53.3	0.0	16.7	49.7	30.0	149.6	54.9	0.0	54.9	109.7	259.3
SSI	53.3	3.2	16.7	24.8	30.0	127.9	109.7	54.9	54.9	219.4	347.3
Total	2715.8	96.0	617.9	1489.8	928.8	5848.2	2413.4	877.6	1645.5	4936.5	10784.7

16.6 Financial Capability for Terminal Improvement

When a passenger selects a public transport mode in order to realize the purpose of his trip, he does the selection by comparing the travel time, cost and other service conditions among available transport modes. The terminal improvement will enhance part of the comfort of traveling. At the same time it will give better work situation for drivers and employees at the terminal.

But, quantitative impact of terminal improvements on the passenger modal selection is difficult to quantify because the improvement plans are aimed at enhancing amenity of the existing terminals and can not be measured as the saving in transport cost or time being used commonly in the project evaluation.

In this taxi terminal projects in the master plan, the magnitude of improvement cost is compared with a part of surplus in carta revenue, which may be allocated to recover the project cost, to forecast the years of cost recovery. While in the bus terminals they have no carta revenue and the master plan cost is studied by finding the extent of increases in the total annual current costs.

16.6.1 Bus Terminal Plans

1) Financial Sources

Bus terminals have charged no terminal fee on its departing buses. No revenue exists from the departure trips.

Operation expenditures of terminals are included in the overhead cost in its annual financial report submitted to Inland Transport Holding Company. No separate account for terminal operation is included in it.

2) Influence of plans on the Annual Cost

Using the financial statements of the bus companies in 1991, Table 16-6-1 is prepared to forecast for 1994, which presents the annual current cost plus net depreciation allocation. On this amount, 1/4 of the bus terminal master plan cost is added, where the year 1994 is assumed the first year of phase I works which continue for 4 years. The increase in the annual cost is 0.7% and if depreciation allocation is not included the increase is 0.6% in the total of four bus companies.

The increase of 0.7% is considered modest when compared to the annual cost, and can be manageable by bus companies without deteriorating the financial position of the companies. It is recommended the improvement plans included in the master plan should be implemented in the phase I (1994-97) should be implemented.

Table 16-6-1 Annual Expenses and Master Plan Cost By bus Companies, 1994

(in '000 of 1992 prices)

Description	East Delta	Upper Egypt	Middle Delta	West Delta	Total
1 Wages	31,160	34,229	18,229	11,388	95,006
Materials	26,541	26,122	11,025	7,844	71,532
Services	2,584	2,776	1,258	1,228	7,846
Others	22,474	19,461	9,958	8,683	60,576
Current Cost Total	82,759	82,588	40,470	29,143	234,960
2 Depr.Alloccation	8,967	13,529	6,748	4,413	33,657
3 Total Expenditure	91,726	96,117	47,218	33,556	268,617
4 Master Plan Cost	550	760	310	240	1,860
5 Total 3+4	92,276	96,877	47,528	33,796	270,477
6 4/3 in %	0.60	0.79	0.66	0.72	0.69

Note 1) Financial statements of the four companies in 1991 are reffered and estimated for 1994 by cost increase of 5 % per annum. (prices in 1992 are used)

2) Master plan cost of bus terminals are divided by 4 and added here to represent annual total expenses.

16.6.2 Taxi Terminal Plans

1) Revenue

The revenue in the terminals are through the carta fee received at the terminal gate depending on distance and vehicle types. By paying the fee, the inter-city taxi driver receives " the carta" which he might need to show at traffic check point of the governorate or markaz indicating that he is operating the licensed inter-city route with the payment of carta fee. Traffic surveys at terminals in 1992 are used to estimate trips and revenue, and regression analysis is conducted as follows to determine trips in each zone.

$$TTi = 49.8666 - 0.38123*Pi + 0.09896*TGi + 125.3292*TNi \quad (r2=0.8050)$$

where TTi: taxi departure trips in the zone i, 1992
Pi : population of the zone i, 1992
TGi: person trips generated from the zone i via taxi, 1992
TNi: number of the survey terminals in the zone i, 1992

Using the above model formula, taxi trips in other zones are estimated to have a total of 26,198 trips. While the surveyed data in all showed the average carta fee is LE 0.99 per taxi departure, the revenue per day in the total of the other zones would be 23,419. Table 16-6-2 is the summary of estimates in all zones of the country.

Table 16-6-2 Taxi Terminal Summary
(Terminals, trips, and revenues)

	Surveyed 6-7,'92	Other zones	Total
Terminal	121	116	237
Trips/day	33453	26198	59651
Carta Reve. (L.E)/day	33118	25936	59054

2) Operation Expenditures at Terminals

Operational expenditures of a terminal are divided into (i) wages for the terminal persons, (ii) utility costs for water, lighting, telephone, etc., (iii) maintenance and repair works, and (iv) miscellaneous items. Questions were sent to the terminals divisions of some governorates to get data of revenue and expenditure at the taxi terminals for 1992. Studying available replies, the standard expenditures for different terminal scales are determined as shown in A of Table 16-6-3 in which the annual direct expenditure is estimated to range from 372,400 LE to 32,600 LE.

Table 16-6-3 Terminal Operational Expenditures

Class	Items		LE/yr	Class	Items		LE/yr
A	Wages	120 psn	360000	B	Wages	45 psn	135000
	Utility	L.S.	2400		Utility	L.S.	2400
	Others	L.S.	5000		Others	L.S.	3000
	Maint&Rep.	L.S.	5000		Maint&Rep.	L.S.	4000
	Total		372400		Total		144400
C	Wages	30 psn	90000	D	Wages	18 psn	54000
	Utility	L.S.	1200		Utility	L.S.	1200
	Others	L.S.	2000		Others	L.S.	1000
	Maint&Rep.	L.S.	3000		Maint&Rep.	L.S.	1000
	Total		96200		Total		57200
E	Wages	10 psn	30000				
	Utility	L.S.	600				
	Others	L.S.	1000				
	Maint&Rep.	L.S.	1000				
	Total		32600				

Notes: A-E are the grouping of the terminals by the departure trips surveyed in June-July'1992. Some operate for 24 hours by 3 or 4 shifts, while majority is for 16 hours in 2 or 3 shifts. Here all are assumed to have 3 shifts.
: Persons are the total of all shifts.
: L.S. means lump sum amount.
: A --750 departure trips, B --350, C --200, D --100, E 99--.

The terminals surveyed in 1992 are grouped into the five classes by the volume of departure trips and expenditures are summarized in Table 16-6-4. In the table, the operation expenditures of terminals in the other zones are tabulated and shown also.

Table 16-6-4 Estimated Terminals operation expenditures

Class	Surveyed Terminals		Terminals in Other Zones		Additional Terminals		Total	
	No.	1,000LE	No.	1,000LE	No.	1,000LE	No.	1,000LE
A	8	2979.2	-	-			8	2979.2
B	9	1299.6	1	144.4			10	1444.0
C	24	2308.8	34	3270.8			58	5579.6
D	19	1086.8	51	2917.2	90	5148.0	70	9152.0
E	29	945.4	62	2021.2			91	2966.6
Total	89	8619.8	148	8353.6	90	5148.0	237	22121.4

Notes; see the notes in A above. 22121.4

The governorate receives 15-30% of the gross carta revenue to be used in the governorate expenditures, where the percentage of 25% is applied in this study. In addition a part of the remaining surplus is sent to contributions to local community activities and this study applied 33% for this spending. Accordingly the funds usable for terminal improvements are 67% of the surplus after operation expenditure and governorate charge.

3) Net Balances and Master Plan Cost

The net balance, corresponding to a 67% of the revenue surplus as mentioned above is estimated for 10 years after completion of projects in each phase in order to find how many years are necessary to recover the project costs. All projects in Phase 1 including relocation and additional terminals are assumed to be implemented during 1994-97 at a cost of 7.61 M.LE. It is estimated the cost would be recovered in 6 years after 1998. For costs to be executed in Phase 2 (1998-02) and 3 (2003-07), the recovery may need less period of 4 years and 2 years respectively. They are shown in Table 16-6-5 and the cost revenue streams are in Table 16-6-6.

Table 16-6-5 Period of Cost Recovery by Phase

Phase	Cost LE mill.	Years in which the net surplus 2) of revenue will recover the plan's cost 3)	
1	8.26	6	years (1998-03) 1)
2	0.88	3	years (2003-06)
3	1.65	2	years (2008-09)
1-3	10.79	6	years (1998-03)

Notes: 1) After the completion in each phase
2) Net surplus = carta revenue - Term. Ope. Exp. - Charges by Gov'te and others
3) Interest payment is not included
4) Cost in 1992 prices

Table 16-6-6 Revenue and Cost Stream

	Year	Improve Costs	Growth rate	Usable Revenue Rev-ph1	Rev-ph2	Rev-ph3	Ph1-3	Accum C & rev	
0	1992		1.000						
1	1993		1.047						
2	1994	2065.5	1.096					-2065.5	
3	1995	2065.5	1.148					-4131.0	
4	1996	2065.5	1.202					-6196.5	
5	1997	2065.5	1.258					-8262.0	
6	1998	175.6	1.317	555.3			555.349	-7882.3	
7	1999	175.6	1.379	1142.4			1142.35	-6915.5	
8	2000	175.6	1.444	1348.9			1348.88	-5742.2	
9	2001	175.6	1.512	1985.9			1985.94	-3931.9	
10	2002	175.6	1.583	2232.5			2232.47	-1875.0	
11	2003	329.2	1.657	2923.9	276.0		3199.87	995.7	*
12	2004	329.2	1.735	3214.9	301.1		3516.02	4182.5	
13	2005	329.2	1.817	3965.3	349.6		4314.93	8168.2	
14	2006	329.2	1.902	4304.4	378.5		4682.96	12522.0	
15	2007	329.2	1.992	5118.8	431.8		5550.52	17743.3	
16	2008		2.085		464.9	1099.1	1563.92	19307.3	
17	2009		2.183		523.2	1219.2	1742.39	21049.7	
18	2010		2.286		561.0	1301.2	1862.25	22911.9	
19	2011		2.393		625.0	1432.9	2057.88	24969.8	
20	2012		2.506		668.0	1525.7	2193.70	27163.5	
21	2013		2.623			1670.1	1670.06	28833.6	
22	2014		2.747			1774.8	1774.82	30608.4	
23	2015		2.876			1933.0	1933.04	32541.4	
24	2016		3.011			2051.0	2050.95	34592.4	
25	2017		3.153			2224.4	2224.39	36816.8	
Total		10786		26792.2	4579.12	16231.3	47602.7	275404.	

The same recovery period forecast is conducted on each governorate for phase 1 plans which resulted in the years shown in Table 16-6-7. Some would recover the cost less than 8 years while others may require more than ten years. Those

requiring more than ten years are located in Upper Egypt and Sinai.

Table 16-6-7 Period of Cost Recovery by Governorate

Governorate		Estimated years of cost recovery for Phase 1 plans.
1	Cairo	9
2	Alexandria	1
3	Pt Said	1
4	Suez	5
11	Damietta	2
12	Dakahliya	11
13	Sharkya	3
14	Qalyubiya	4
15	K.el Sheik	7
16	Gharbiya	10
17	Minufia	2
18	Beheira	11
19	Ismailia	1
21	Giza	5
22	Beni Suef	5
23	Fayoum	1
24	Minya	11
25	Asyut	10
26	Sohag	7
27	Quena	8
28	Aswan	10
31	Red Sea	8
32	New Valley	1
33	Matrough	6
34	N. Sinai	5
35	S. Sinai	10
All Plans for Phase		6

Notes1) After the completion in each phase
2) Net surplus = carta revenue - Term. Ope. Exp. - Charges by Gov'te and others
3) Interest payment is not included
4) Cost in 1992 prices
5) Additional terminals in Phase 2 & 3 are calculated to have the recovery in 4 years and 2 years each.

(4) Recommendations

(a) Ministry of Transport

The ministry should conduct studies of public passenger transport service much extensively and in periodic. They should study trip distribution, carta revenue, terminal expenditure and charges by governorate and others and file these results in the ministry.

Monitoring system on licensed vehicles, routes, fares and services should be developed to cover inter city taxi service. Inter-governorate matters and governorate matters in monitoring should be clarified and the former should be placed in responsibilities of the Ministry.

Research should be done to find the most agreeable way of

charging on inter city taxis beside the current carta system, since the revenue is used by non-taxi sectors in governorate and communities. The conclusion of the research may achieve reduction of passenger fares if those spending in non-taxi sectors are eliminated.

(B) Governorate and taxi terminals

Regulations of informal taxis should be conducted with full cooperation of traffic police, because it is not fair if they run freely while there are taxis within the terminal-carta framework. The regulation would reduce non-carta movements of taxis and increase the carta revenue.

(C) Bus Companies

Currently the bus companies are in the process of privatization under the jurisdiction of Inland Transport Holding Company, and are difficult to get loans from government funding agencies as it had before. It is recommended they should establish new funding sources partly or entirely in private sector at the earliest time. At the same time they should concentrate much efforts to improve their financial positions and raise productivity, through which they can restore balanced age distribution of bus fleet and use funds in other investments to respond changes of demand by public.

CHAPTER 17 FREIGHT ROAD TRANSPORT MASTER PLAN

17.1 Objectives

The freight transport master plan shall be prepared in the context of the overall national road transportation master plan. Therefore the freight master plan shall deal with freight hauled on the road network and the facilities required to upgrade the service. Recommendations and projects required to upgrade the rail and inland waterways freight transport shall not be presented in this plan.

There have been various studies in the past to upgrade or develop various freight transport and handling facilities such as inland container depots, port container terminals, grain silos, etc. However there has not been a comprehensive freight road transport master plan developed so far.

This study has identified the present freight road transport demand and forecast the future demand. The issues facing the industry have also been considered. The plan shall be prepared on the basis of the above and shall have specific objectives as outlined hereafter.

1) Upgrade Transport Service for Future Demand

At present the interzonal freight transported by road accounts for 93% of the total. While this study forecasts the share of road transport to decrease to 76% in the year 2012, the total transported amount in tons shall nevertheless increase by three times, reaching 430 million tons. An efficient and reliable service to deal with the forecast demand is therefore necessary.

2) Decrease Vehicle Congestion on Road Network

The utilization of suitably sized vehicles and efficient loading shall contribute to decreasing the number of vehicles on the road network. An improvement in information flow and freight distribution will diminish percentage of empty-loading trips and improve economical operation of the vehicles.

3) Resolve Current Issues and Problems

There are a number of very significant features concerning physical distribution at present. Lack of intermediate distribution and storage centers used by producers and consumers alike is one feature. A second is the inadequate supervision by the government over the trucking industry.

These problems and issues can be summarized as follows;

(1) Extent of vehicles running empty. In the case of truck-

ing industry operators only 30% of the vehicles covered distance is empty, while in the case of private large truckers and own account fleets it is higher at about 45%-50%.

(2) Waiting time to load or unload. In the case of Ministry of Supply haulage work, vehicles wait at inland silos or ports for 2-3 days in some instances. Vehicles serving factories are often queuing outside plants along the highway. This is in part due to small storage space in plants or the slow loading/unloading. Large vehicles can not operate in some parts of Cairo, Giza, and Alexandria urban areas during daytime, and in cases where loading or unloading locations are located at such places, and vehicles used are semi-trailers or truck-trailers, then an extra full day is sometimes required to begin the return journey.

(3) Small private truckers plying the parcel trade between various cities are well organized in terms of routes and arranging enough work to carry goods on return trips. However distribution points of these small businesses are usually located in commercial urban areas (in the area where Port Said st. intersects with Azhar st. in Cairo, off Attaba). Means of transporting the goods at the trip ends from distribution points to consignee are often left to the consignee or done by primitive means (using manual means) and are inefficient and time consuming. In some cases while it would cost LE 1.0 to transport a parcel from one city to another, it may cost 4-5 times that much to transport that parcel to its final destination within the city.

(4) Lack of strong enforcement and sufficient number of weight stations to ensure freight vehicles comply with maximum loading regulations.

17.2 Structure of the Master Plan

17.2.1 Master Plan Components

To achieve the service levels proposed in the preceding section a number of facilities must be constructed. Distribution centers, or truck terminals (TT), having space for loading-unloading between large and small vehicles, and storage are needed. Container freight stations (CFS) where containers may be stripped, packed or inspected are also required. The facilities shall be discussed hereafter.

1) Truck Terminal to serve Line Haul

(1) Functions of the Truck Terminal

- Shorten travel distance and time of line haul trucks.
- Abolish delays in waiting times at urban areas during restricted hours.
- Mitigate traffic congestion in urban areas.
- Improve environmental conditions of urban areas.
- Improve truck operation efficiency by ensuring a back-haul trip.
- Improve truck loading ratio.
- Assist in receiving and sorting of line haul LTL trucks (goods for more than one consignee) into respective feeder lines.
- Serve as a transshipment point for long distance hauls.
- Serve as an information center.

(2) Planning Target Achieved

- Segregation of line haul and feeder line transport.
- Optimum use of large size vehicles and better loading condition.

(3) Disadvantages

- Increase loading and unloading times
- Large investment costs
- Difficulties until an efficient feeder service is developed

(4) Proposed Truck Terminal Locations

Based on the interzonal freight vehicles demand in 2012 as shall be discussed hereafter, Cairo is the primary candidate for construction of this facility, followed by Alexandria. Truck terminals in Mansoura and Minya will also be considered. Therefore the master plan will evaluate construction of terminals in Cairo and Alexandria during the short term plan, a terminal in Mansoura during the medium term plan, and a facility in Minya for the long term plan.

2) Container Freight Stations

(1) Functions of the Container Freight Stations

- Stripping of LCL containers (containers with loads bound for more than one consignee) into break-bulk cargo for loading onto trucks.
- Temporary storage facility for empty containers and general cargo
- Loading of containers
- Point of receiving or delivering general cargo from or for containers
- Customs inspection for export/import goods shipped in containers

(2) Planning Target Achieved

- Encourage container transport as a more efficient transport means
- Facilitate trucking involvement in container transport
- Reduce trip time by speedier loading/unloading

(3) Disadvantages

- High investment costs for construction and operation
- High costs of container utilization
- Increase in number of loading-unloading times

(4) Proposed Container Freight Stations Locations

At present facilities for container handling are available at the ports of Alexandria, Damyat, Port Said and Suez. These facilities are for containerized import and export goods. The master plan approach shall be the installation of container handling facilities at truck terminals to be proposed under the short term master plan. As the demand increases the construction of an independent CFS in Cairo by the medium term master plan may be warranted.

3) Inland Container Depot (ICD)

(1) Functions

- An inter modal transport point for FCL containers (container load bound for only one consignee) between rail or inland waterways and road transports.
- Storage space for empty containers.
- Distribution center for FCL/LCL containers.
- Customs inspection point.

(2) Planning Target Achieved

- Encouragement of container transport
- Facilitate trucking involvement in containerization
- Encourage inter modal transfer to ensure transport

efficiency

(3) Disadvantages

- High investment costs
- High level of coordination between various transport operators is necessary to set up and operate such a facility

(4) Proposed Inland Container Depot Locations

Studies conducted by ENR call for construction of an ICD facility at Bashtil, in the Greater Cairo region to handle an initial volume of 22,000 TEU/year (in 1990 as proposed in the Study) and reach 74,000 TEU/year by 2000. In discussions with ENR, they explained that most of the necessary rolling stock has been acquired and land is available but there is no budget to develop the facility, and no agreement with customs authorities concerning its operation. However ENR has given this project priority and the master plan will consider that Bashtil ICD will be in operation by the year 2012. The ENR commissioned studies also propose construction of a number of container terminals in Upper Egypt. Of interest to this master plan is that container terminal facility proposed in Minya by the year 2000.

17.2.2 Identification of Priority Locations

1) Freight Vehicle Traffic Demand by Corridor

Based on the truck O-D matrix for the year 2012, truck traffic on major corridors was analyzed as shown in Fig. 17-2-1. Each corridor starts from Cairo, and there are four corridors as further discussed in the following sections.

(1) Cairo-Alexandria Corridor

The freight vehicle traffic generated and attracted by seven transport zones of Cairo, Qaluibiya, Minoufia, Gharbia South, Beheira South, Beheira North and Alexandria run through this corridor. Traffic to and from each zone north of Cairo and most of Upper Egypt, Red Sea and New Valley transport zones also travel along this corridor. Traffic along this corridor is very heavy and the master plan will recommend various facilities to be implemented to accommodate the forecast vehicle flow demand.

The truck average daily traffic along the sections of this corridor are more or less similar, ranging between 22,500 and 26,000 indicating heavy flow between Cairo-Alexandria pair. However the highest figure is that projected between Qaliubia and Minufia of 27,700.

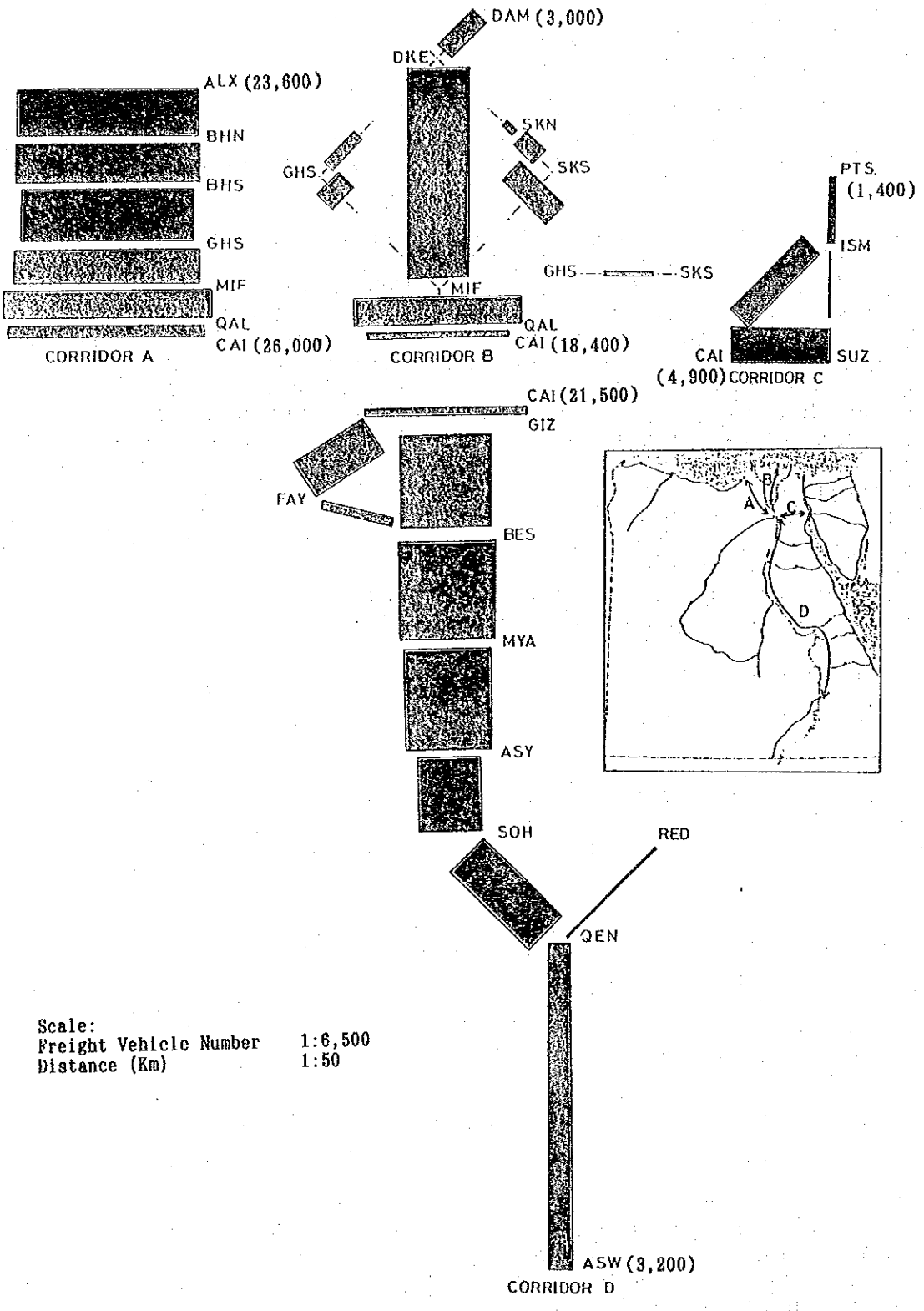


Fig. 17-2-1 Interzonal Freight Vehicles Transport Demand in 2012 (Average Daily Traffic)

(2) Cairo-Damyat Corridor

This corridor extends from Cairo, through the eastern part of the Delta, to the port city of Damyat. As shown in the figure, the corridor connects eight transport zones of Cairo, Qaliubia, Minoufia, Dakahlia East, Sharakia South, Sharkia North, Gharbia South and Damyat. The figure shows the MIF-DKE section of directly connected, however in reality traffic projected along this section may travel directly between the two zones on the Benha-Mit Ghamr-Mansoura link, or through the agricultural road to the west (Benha-Tanta-Talkha link) or the Benha-Zagazig-Mansoura link to the east. The assignment of traffic on the three links is dealt with in the road master plan, and the purpose of the discussion here is to show demand on the corridor as a whole.

Projected daily truck traffic between the Qaliubia and Minoufia section is highest at 22,000. Traffic between Minoufia and Sharkia South is also high at 8,800, followed by that between Minoufia and Dakahlia East (8,200). Traffic attracted to or generated from Damyat and passing through the corridor is comparatively low at 3,000 vehicles (as shown in the Damyat-Dakahlia East section).

This analysis indicates that heavy truck traffic is projected between Cairo and the four zones of Minoufia (Benha), Sharkia South (Zagazig), Dakahlia East (Mansoura), and Gharbia South (Tanta) and the need for some facilities to assist in the smooth vehicular flow in this relatively small area of roughly 4,000 km^2. This area is heavily populated and predominantly agricultural land with many agricultural-based industries. Measures, in relation with the Greater Cairo area shall be considered in the plan.

On the other hand, comparatively low truck traffic demand on Dakahlia East - Damyat section indicates that construction of facilities in Damyat is not an urgent matter to be considered in this master plan.

(3) Cairo-Canal Zone Corridor

This corridor connects the Canal cities of Port Said, Ismailia and Suez with Cairo. Truck traffic between Sinai and Cairo, and traffic between Canal cities and most of Upper Egypt zones also pass through this corridor.

The heaviest truck traffic projected along this corridor is in Cairo-Suez section, at 4,900 vehicles per day. Cairo-Ismailia section is also projected to accommodate a daily truck traffic volume of 3,600. The importance of the Suez Canal zone and anticipated industrial development there, especially along the Suez gulf, coupled with moderately high traffic projections make it necessary to include traffic generated/attracted by traffic zones along this corridor in the estimated traffic demand.

(4) Upper Egypt Corridor

With the exception of Cairo-Giza section of this corridor, projected truck traffic on all major sections is 6,000 to 12,000 vehicles daily.

Three consecutive sections of Giza-Beni Suef, Beni-Suef-Minya, and Minya-Assyout are forecast to have daily truck traffic of 11,000 to 12,000. Going southwards traffic volumes will decrease, with Assyut-Minya section having 8,400, Sohag-Qena section 6,200 and finally Qena-Aswan with 3,200 trucks daily.

High truck traffic volumes projected along this corridor from Cairo to Minya indicate that some measurements may be required along that portion of the corridor which shall be developed in the master plan.

2) Freight Vehicle Traffic Demand by Traffic Zone

In the year 2012, 24% of total freight vehicles traveling between traffic zones will have their destination in Cairo zone, as shown in Table 17-2-1. The respective figure for Alexandria zone shall be 12%, and all other zones shall be 5% or less.

The high concentration of trucks projected in the two heavily-populated urban zones of Cairo and Alexandria warrant their consideration in the master plan.

Table 17-2-1 Truck Destinations in 2012

GOV.	Inbound Truck	Share of Total(%)	GOV.	Inbound Truck	Share of Total(%)
CAI	64860	23.9%	DAM	4968	1.8%
ALX	31741	11.7%	ASY	5487	2.0%
GIZ	14521	5.3%	QEN	4508	1.7%
SKS	13363	4.9%	ISM	4548	1.7%
DKE	13168	4.8%	SKN	4199	1.5%
BHN	12994	4.8%	DKW	3475	1.3%
GHS	11995	4.4%	BES	3492	1.3%
MIF	12067	4.4%	PTS	3518	1.3%
QAL	10175	3.7%	ASW	2756	1.0%
KAF	7545	2.8%	MAT	1689	0.6%
BHS	6737	2.5%	SIN	1527	0.6%
FAY	7094	2.6%	RED	846	0.3%
SUZ	6870	2.5%	NEW	758	0.3%
SOH	6540	2.4%			
GHN	4850	1.8%			
MYA	5299	2.0%	Total	271590	100.0%

Upper Egypt region as a whole accounts for a low 18% of the total truck traffic. The zone with the highest projection is

Fayoum, followed by Sohag, Minya and Assyout. Although demand is presently on the low side yet some facility shall be considered in Minya, as a mid point between Lower Egypt and Cairo and Upper Egypt region in the master plan.

17.2.3 Outline of the Master Plan

The master plan shall introduce the following services into the network, based on the forecast demand;

- Line haul service
- Containerization

The master plan shall address the necessary projects and facilities to realize these services. Locations of these facilities and proposed service levels by routes are shown in Fig. 17-2-2.

1) Line haul service

Corridors designated for this service level are those where forecast freight vehicle demand is very high. On such corridors it is necessary to minimize the number of trucks by ensuring efficient truck loading, decreasing number of trucks traveling empty, and operating suitably sized vehicles.

Distribution centers at outskirts of major production and consumption areas play an important role in realizing efficient freight transport along these corridors and shall be considered in this study.

As indicated in the previous section, Cairo is forecast to have the largest number of trucks entering and leaving the traffic zone, and all the significant O-D pairs have Cairo as one of its two zones. The corridors that shall be designated as line haul corridors under the master plan are;

- Cairo-Alexandria,
- Cairo-Mansoura, and
- Cairo-Minya

2) Containerization

Imported goods packed in containers can be immediately loaded onto trucks or rail way cars and transported to their destination, with no loss in time due to container stripping, unloading and loading of the second transport mode. Containerized goods are also protected from damage and theft.

Export goods bound for foreign markets may also be packed into containers at production points, sealed and then transported to ports where they are immediately hauled onto outgoing ships.

Container sizes are standardized and transfer from one transport mode to another is done at ease and in a speedy manner provided the necessary facilities are available.

The master plan will consider the expansion of container service related to foreign trade, and the introduction of domestic container service.

(1) Foreign Trade-related Container Service

This service entails off-loading containers of import goods from ships at port of arrival, transporting containers inland to consignee and stripping the container at the delivery location. For export bound goods, containers are loaded at consigner's location then transported to port of loading, where they are hauled onto ships. While this service is at present available it is being practiced on a very small scale.

For both containerized imports and exports customs clearance is necessary. In the case of imported goods arriving in containers, inspection of containers at delivery location to the consignee for FCL containers or at a distribution point for LCL containers will improve transport efficiency.

On the other hand customs inspection should be completed at consigner's production location for export goods to be shipped in containers, or a nearby container loading station. Containers are then transported to the port of departure where they are immediately loaded on ships.

This service shall be expanded at ports forecast to have a large role in the country's foreign trade. These ports are Alexandria, Damyat and Suez. The plan shall focus on enforcing the service along routes linking each of these ports to Cairo.

(2) Domestic Container Service

This service will make it possible to provide rapid door-to-door service from the producer to the wholesaler/retailer, in the case of FCL, or door-to-distribution center (and vice-versa) service in the case of LCL.

The master plan will introduce this service along Cairo-Alexandria corridor. Both Cairo and Alexandria are the country's two largest consumption and production centers and truck traffic between them in 2012 is forecast at 23,000 vehicles daily, the largest O-D pair among the 29 traffic zones.

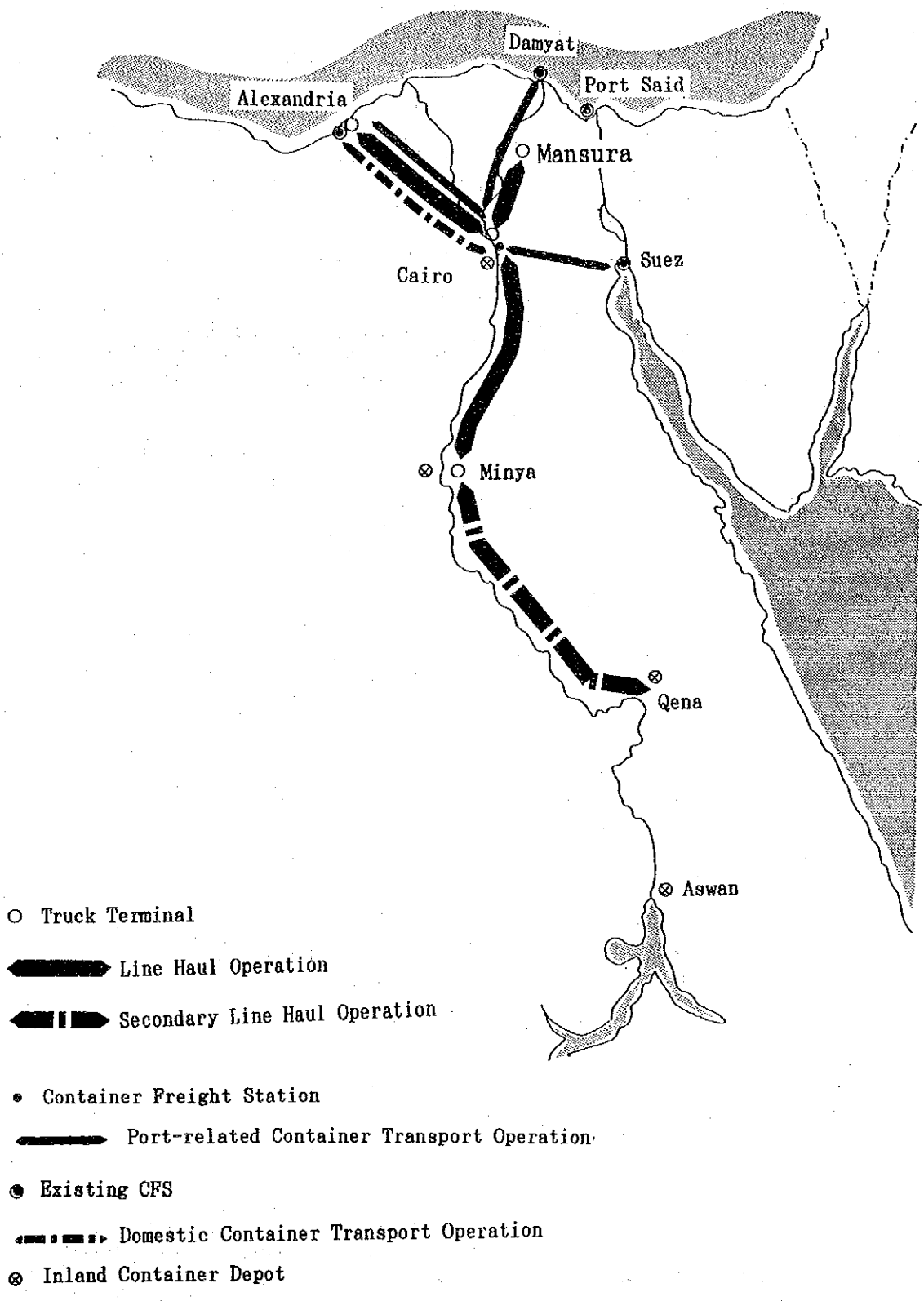


Fig. 17-2-2 Freight Transport Master Plan Outline

17.3 Master Plan Projects

17.3.1 Line Haul Freight Transport Facilities

Construction of truck terminals at outskirts of urban areas to handle loading/unloading of line haul truck-trailer and tractor semi-trailer combinations and smaller feeder line trucks distributing in urban areas shall be the major project under this transport system.

1) Commodity Types Served by Truck Terminal

Commodities under this Study are classified into thirty groups. Not all commodities are suitable to be handled at truck terminal facilities. Commodities selected as potential freight handled at these facilities and considered under this master plan are mainly those which may be described as general cargo.

The large amount of transport demand for construction materials has also made it necessary to consider more efficient transport systems for such commodities. Therefore the two construction related commodities are also included as potential freight.

Table 17-3-1 shows the potential commodities to be served at truck terminal facilities. These commodities account for over 70% of total interzonal freight transport demand forecast for the year 2012.

Table 17-3-1 Potential Commodities processed at TT

Commodity	Potential	Commodity	Potential	Commodity	Potential
1 COIL	--	11 CERE	--	21 BVRG	H
2 PETR	--	12 FRUT	--	22 OFOD	H
3 NGAS	--	13 SCAN	--	23 CHEM	M
4 CEMT	VL	14 FCRP	--	24 MTAL	L
5 CMAT	VL	15 LSTK	--	25 TXTL	H
6 PHOS	--	16 APRD	M	26 FTLZ	L
7 IORE	--	17 AGPR	--	27 PULP	M
8 COAL	--	18 SGAR	H	28 LUMB	--
9 MNRL	--	19 FATS	M	29 MANU	M
10 WHET	--	20 AFED	L	30 MEXC	--

Notes:
H; High potential M ; Medium potential L; Low potential
VL; Very Low potential --; No potential

Based on the practice in Japan and Egypt concerning TL (Truck Load: all truck contents going to one consignee) and LTL (Less-than Truck Load: truck contents to be delivered to more than one place) the plausible utilization degree of the TT by the individual commodities was determined. Four degrees were considered, as follows;

- High (50% of inbound, outbound and through freight will use the facility)
- Medium (30%)
- Low (10%)
- Very Low (1%)

Utilization rate of cement and other construction materials was taken at only 1% in order to eliminate inclusion of such commodities as limestone, sand/gravel/earth, and bricks which are considered unsuitable to be served at truck terminals.

2) Commodity Amounts to be Processed at Truck Terminals

The scale of the terminals shall be determined based on daily amount of commodities that shall enter the terminal and functions of the terminal. The amount is estimated using the utilization rates discussed in the preceding section.

(1) Cairo Truck Terminal

Fig. 17-3-1 shows the total Cairo outbound/inbound and transshipment amount for the above 14 potential commodities (before application of utilization rates) in the year 2012. Freight inbound to Cairo via Cairo-Alexandria corridor is largest at 30 million tons. Amount of freight passing through Cairo, and with both origins and destinations outside it are forecast to be 25 million tons.

Discarding freight transported over an average distance of less than 100 km from Cairo, and applying utilization rates as explained in the previous section the actual amounts estimated to use the truck terminal in the year 2012 are shown in Table 17-3-2.

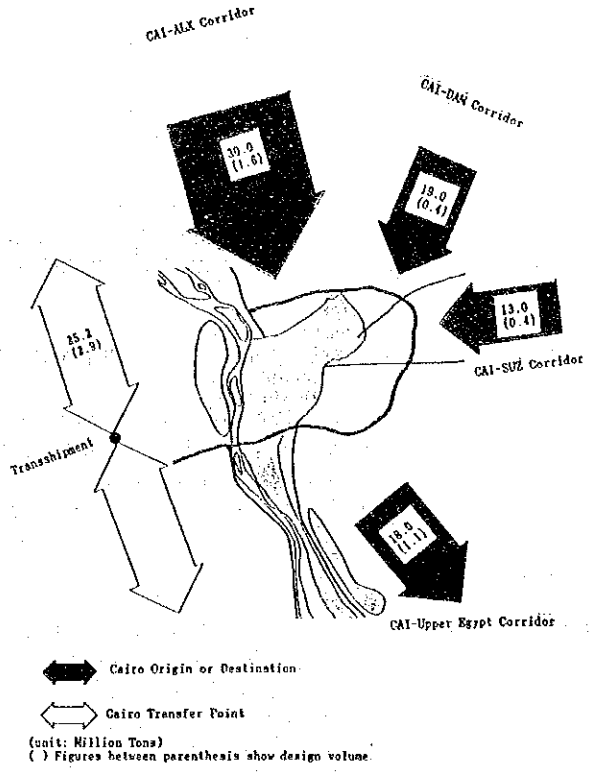


Fig. 17-3-1 Potential Volume of Commodities to be handled at Cairo Truck Terminal

Table 17-3-2 Cairo Truck Terminal Design Capacity

(unit:(1000t)

Corridor:	A.CAI-Alex		B.CAI-Damyat		C.CAI-Suez		D.CAI-UpEgy		E.Transshipment
Comm-odity	Cai O	Cai D	Cai O	Cai D	Cai O	Cai D	Cai O	Cai D	Cai Transit
04.CEMT	--	--	56	--	59	81	13	--	9
05.CMAT	251	239	104	--	59	40	123	143	150
16.APRD	32	120	--	92	10	4	19	15	251
18.SGAR	--	--	--	--	6	30	33	15	18
19.FATS	--	--	--	--	2	25	7	--	74
20.AFED	34	1	37	--	2	--	49	2	444
21.BVRG	33	37	26	--	29	12	94	17	278
22.OFOD	31	54	--	--	3	3	20	1	155
23.CHEM	14	199	--	--	24	10	18	--	241
24.MTAL	45	240	70	--	25	3	75	3	54
25.TXTL	17	49	--	--	4	2	23	--	437
26.FTLZ	--	--	--	--	7	5	17	3	129
27.PULP	121	276	--	--	23	6	59	4	199
29.MANU	347	407	--	287	86	154	592	94	687
Total	924	1623	292	379	339	373	1140	295	2948

Based on the results of that table, Cairo truck terminal facility in 2012 is estimated to handle approximately 6.1% of total Cairo inbound and transshipment potential commodities amount. Total annual amount is estimated at 5.62 million tons annually (Cairo inbound + transshipment), or 19,000 tons daily.

After estimating the freight volume that will be processed at Cairo truck terminal the number of trucks required to haul this amount was determined. The present vehicle loading conditions by commodity and region (Delta and Upper Egypt) were obtained from the transportation surveys conducted under the Study and presented in Table 8-2-2 of the Interim Report. The vehicle loading conditions in Upper Egypt for all commodities were found to be much heavier than those for Lower Egypt.

In determining truck number, it is assumed that in the future there will be more rational vehicle loading due to segregation of line-haul and feeder-line operation than at present. Therefore number of freight vehicles required was in principal calculated by applying present Upper Egypt region loading factors by commodity for both Lower and Upper Egypt regions. Some adjustments in loading condition for certain commodities, such as Other Manufactured Goods from the present 3.74 ton/veh. to 8.0 ton/veh. was also assumed. Under these loading conditions it is estimated that 556 thousand line haul trucks (Cairo inbound plus transshipment) will use the terminal in 2012, i.e. approximately 1850 trucks/day. Table 17-3-3 shows the results of this calculation.

Table 17-3-3 Number of Line Haul Trucks using Cairo TT in 2012

Commodity	Delta Region	Upper Egypt	Transshipment	Commodity	Delta Region	Upper Egypt	Transshipment
	CAI D	CAI D			CAI D	CAI D	
04.CEMT	3557	--	0	23.CHEM	18080	--	20839
05.CMAT	18355	9408	9035	24.MTAL	18437	228	4052
16.APRD	27000	1875	25613	25.TXTL	6375	--	54125
18.SGAR	957	479	511	26.FTLZ	225	135	5207
19.FATS	1594	--	4688	27.PULP	28200	400	19290
20.AFED	72	145	28870	29.MANU	106000	11700	66113
21.BVRG	6125	2125	31313				
22.OFOD	7125	125	18063	Total	242103	26620	287715

(2) Alexandria Truck Terminal

Volume of freight to be processed in Alexandria Truck Terminal in 2012 has been calculated by studying flow of the 14 commodities that may be processed at the terminal along three corridors; Alexandria - Cairo, Alexandria - Upper

Egypt, and Alexandria - Canal cities and Sinai. It is assumed that no transshipment freight will be processed at this terminal.

Of the total 1.75 million tons freight amount calculated, 67% is bound for Cairo. Estimation by commodity and corridor is shown in Table 17-3-4.

Table 17-3-4 Alexandria Truck Terminal Design Capacity

(unit: 1000t)

Commodity	ALX-CAI	ALX-UPE	ALX-CANAL	Commodity	ALX-CAI	ALX-UPE	ALX-CANAL
	Alx O	Alx O	Alx O		Alx O	Alx O	ALX O
04.CEMT	0	0	0	24.MTAL	240	3	2
05.CMAT	156	3	0	25.TXTL	15	74	7
16.APRD	70	20	3	26.FTLZ	0	0	0
18.SGAR	0	0	0	27.PULP	273	163	32
19.FATS	0	0	0	29.MANU	298	33	7
20.AFED	0	19	3				
21.BVRG	31	86	9	Sub-Tot.	1164	479	102
22.OFOD	35	40	3				
23.CHEM	47	39	36	Total Alexandria Outbound:			1746

The number of line haul trucks needed to transport the estimated freight amount has been calculated in the same manner as in the case of Cairo Truck Terminal. Alexandria truck terminal will be designed to handle 178,000 line haul trucks per year, or 590 trucks daily. This figure is about 30% of the respective figure calculated for the Cairo Truck Terminal. The results of this estimation are shown in Table 17-3-5.

Table 17-3-5 Number of Line Haul Trucks using Alexandria TT in 2012

Commodity	Delta	Up.Egy.	Commodity	Delta	Up.Egy.
	Alx O	Alx O		Alx O	Alx O
04.CEMT	0	0	24.MTAL	18376	258
05.CMAT	10288	193	25.TXTL	2333	8222
16.APRD	9075	2550	26.FTLZ	5	0
18.SGAR	0	0	27.PULP	30540	16320
19.FATS	0	0	29.MANU	38063	4125
20.AFED	246	1355			
21.BVRG	5000	10688	Sub-Tot	125792	51996
22.OFOD	4625	4938			
23.CHEM	7240	3348	Tot. Alx Origin		177787

(3) Mansoura Truck Terminal

The truck terminal at Mansoura is proposed to process inbound and outbound freight between Dakahlia East transport zone and each of Cairo, Alexandria and Minya. Damyat related freight to and from Cairo and Minya is also proposed to be transshipped at Mansoura truck terminal. Major freight movement is, not surprisingly, forecast between Cairo and Dakahlia East, at 54% of the total outbound freight of 0.74 million ton in 2012. These figures are shown in Table 17-3-6.

Table 17-3-6 Mansoura Truck Terminal Design Capacity

(Unit: 1000t)

Commodity	DKE-CAI	DKE-ALX	DKE-MYA	Commodity	DKE-CAI	DKE-ALX	DKE-MYA
	Dke O	Dke O	Dke O		Dke O	Dke O	Dke O
04.CEMT	0	0	0	24.MTAL	0	0	0
05.CMAT	47	3	24	25.TXTL	2	7	3
16.APRD	45	38	22	26.FTLZ	1	2	0
18.SGAR	0	0	0	27.PULP	0	0	0
19.FATS	7	2	1	29.MANU	181	7	21
20.AFED	23	64	27				
21.BVRG	53	19	43	Sub-Tot.	402	185	153
22.OFOD	7	23	5				
23.CHEM	37	22	8	Total Mansoura Outbound:			739

Applying the loading factors utilized for Cairo and Alexandria truck terminals estimation, the number of line haul trucks to use Mansoura truck terminal is forecast to be 78,469 in the year 2012 or 262 vehicles daily. Mansoura TT shall be accordingly designed. Table 17-3-7 shows number of line haul trucks by commodity type.

Table 17-3-7 Number of Line Haul Trucks using Mansoura T in 2012

Commodity	Delta	Up.Egy	Commodity	Delta	Up.Egy
	MAN O	MAN O		MAN O	MAN O
04.CEMT	0	0	24.MTAL	8	0
05.CMAT	3231	1567	25.TXTL	889	333
16.APRD	10350	2700	26.FTLZ	126	9
18.SGAR	0	0	27.PULP	30	0
19.FATS	612	57	29.MANU	23438	2625
20.AFED	6297	1246			
21.BVRG	8875	5313	Sub-Tot.	62593	15876
22.OFOD	3625	625			
23.CHEM	5112	727	Total MAN Origin		78469

(4) Minya Truck Terminal

The total outbound and inbound freight associated with the six traffic zones south of Fayoum (Beni Suef, Minya, Asyut, Sohag, and Qena) accounts for only 10% of the total transported interzonal freight in 2012. That, and the satisfactory loading conditions in that region indicate that it may not be necessary to establish a truck terminal in Upper Egypt. However in order to evaluate the need for such a facility, construction of a truck terminal in Minya will be studied here.

Minya has been chosen because its 2012 projected population is the largest of the six traffic zones in Upper Egypt, and its accumulated inbound and outbound freight transport demand for the same year is the second highest of the six. In addition a truck terminal in Minya may serve the ICD facility ENR is planning to construct there.

The design capacity for Minya TT is estimated assuming the terminal will process freight transported between Minya and the traffic zones north of it (with the exception of Beni Suef). The terminal shall be designed to process an estimated 505,000 tons in the year 2012, i.e. 1,680 tons daily. This estimation is shown in Table 17-3-8.

Table 17-3-8 Minya Truck Terminal Design Capacity

(unit: 1000t)

Commodity	MYA-CAI		MYA-ALX		MYA-DELTA		MYA-EAST	
	MYA	D	MYA	D	MYA	D	MYA	D
04.CEMT	0		0		0		0	
05.CMAT	11		0		10		1	
16.APRD	2		4		21		5	
18.SGAR	10		0		6		0	
19.PATS	2		0		4		4	
20.AFED	4		4		44		0	
21.BVRG	13		14		27		3	
22.OFOD	2		4		11		0	
23.CHEM	2		4		10		0	
24.MTAL	15		0		0		0	
25.TXTL	4		12		70		1	
26.FTLZ	1		0		1		3	
27.PULP	12		30		1		1	
29.MANU	116		0		19		2	
Sub-Tot.	192		71		222		20	
Total Minya Inbound:							505	

As the table shows inbound freight amount from Cairo accounts for roughly 40% of the total amount. Number of line haul trucks that will be required to meet that demand, estimated in the same way as that for the other terminals, is 188 trucks daily (Table 17-3-9).

Table 17-3-9 Number of Line Haul Trucks using Minya TT in 2012

Comm-odity	MYA-CAI	MYA-ALX	MYA-DELTA	MYA-EAST	Comm-	MYA-CAI	MYA-ALX	MYA-DELTA	MYA-EAST
	MYA D	MYA D	MYA D	MYA D		MYA D	MYA D	MYA D	MYA D
04.CEMT	0	0	0	0	24.MTAL	1161	0	15	8
05.CMAT	711	32	654	72	25.TXTL	444	1333	7778	111
16.APRD	300	488	2663	600	26.FTLZ	23	0	23	135
18.SGAR	319	0	175	0	27.PULP	1170	2970	60	60
19.FATS	96	0	249	249	29.MANU	14438	0	2400	300
20.AFED	254	290	3159	0					
21.BVRG	1625	1750	3313	313	Sub-Tot.	20945	7638	22719	1873
22.OFOD	250	438	1375	0					
23.CHEM	156	337	856	26	Tot. MYA Destination:				53175

3) Truck Terminal Scale and Cost Estimates

(1) Terminal Facilities

The TT shall have the following facilities;

- Berths; The truck terminal shall have a sufficient number of berths to accommodate line haul trucks and transshipment operations and an equal number of berths to handle feeder trucks on the opposite side of line haul berths. Another set of parallel berths shall be for transshipment freight. Berth dimensions shall be as follows:

  Line Haul Vehicles : 3.5 m x 15 m
  Feeder Line Vehicles: 3.5 m x 10 m

- Platforms; A roofed reinforced concrete platform shall separate both lines of berths for loading/unloading operations. Platforms length will depend upon number of berths along the platform and width will be 20 m.
- Administration and office buildings
- Petrol station, maintenance and car wash area
- Parking area for trunk line trucks ($45m^2$/vehicle) and feeder line trucks ($30m^2$/vehicle)
- Paved road space
- Storage space

(2) Conceptual Layouts and Cost Estimation

a. Berths

The major factor governing the terminal space requirement and layout is the number of berths required. Based on the criteria applied in Japan for design of the terminals and considering the daily demand in tons and number of vehicles per day using the terminal and turnover per berth, the

number of berths for the four truck terminals proposed under this Study are as follows:

- Cairo Truck Terminal : 600 berths
- Alexandria Truck Terminal : 200 berths
- Mansoura Truck Terminal : 90 berths
- Minya Truck Terminal : 70 berths

Opposite these berths an equal number of berths for either feeder line trucks or transshipment trucks is required. Table 17-3-10 compares truck terminal facilities in operation in Japan with those proposed in the master plan. Loading/unloading time for the Egyptian terminals is assumed to be longer (8 hours) than that in Japan and average truck loading are larger than those of Japan.

Table 17-3-10 Comparison of Truck Terminal Facilities in Japan and those proposed in the Master Plan

Country	Terminal	Daily Cap. (ton)	Daily Veh.	Berths Number	Cap/ Veh	Veh/ Berth daily	Loading, Unloading Time (hr)
Japan: (1)	Keihin TT	12000	2155	433	6	5.0	5
	Itabashi TT	7000	1251	320	6	3.9	6
	Kasai TT	11500	1783	460	6	3.9	6
	Adachi TT	7000	1527	340	5	4.5	5
Egypt: (2)	Cairo TT	19000	1840	600	10	3.1	8
	Alexandria TT	5830	590	200	10	3.0	8
	Mansoura TT	2470	260	90	10	2.9	8
	Minya TT	1700	200	70	9	2.9	8

Notes:
(1) Japan TT data source: Japan Motor Terminal Co., Ltd.
(2) JICA Study

b. Parking Area

Parking space for approximately 35% of daily line haul vehicles and 45% of daily feeder line vehicles entering the terminal was provided.

Conceptual layouts have been prepared without taking into consideration specific sites or space constraints. Layouts for each of the four terminals are shown in Figs. 17-3-2 to 17-3-5, and areas of the facilities and construction costs are indicated in Table 17-3-11. For reference, data on the four truck terminals around Tokyo Metropolitan area are included in the Appendix.

Truck terminals are proposed to be constructed in desert areas and therefore unit cost for land acquisition was taken at a low 25 LE/m^2. This unit cost is similar to actual costs incurred in the construction of Obour wholesale market along

Cairo-Ismailia desert road. Construction costs for Cairo and Alexandria truck terminals together are estimated to cost LE 60.1 million.

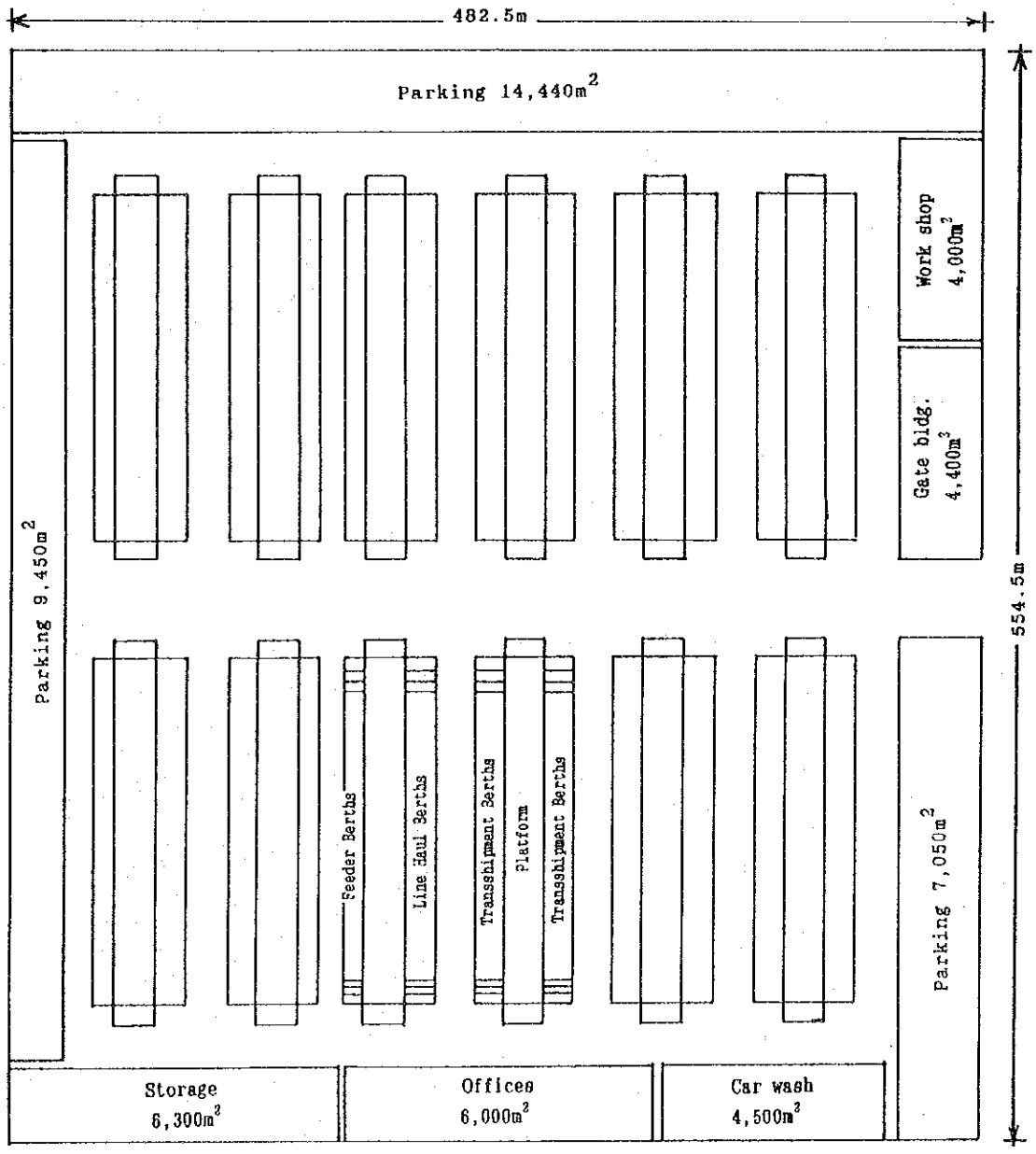


Fig. 17-3-2 Cairo Truck Terminal Schematic Layout

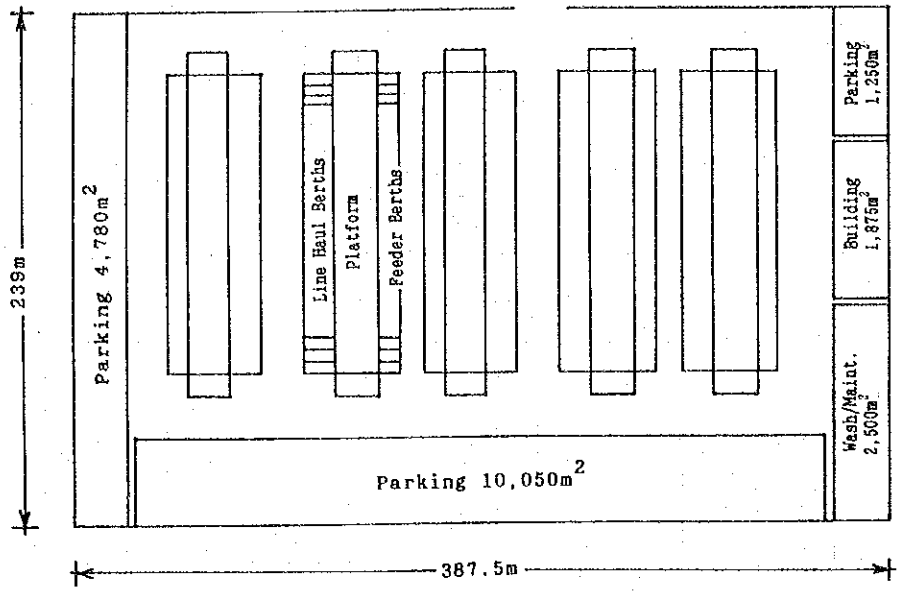


Fig. 17-3-3 Alexandria Truck Terminal Schematic Layout

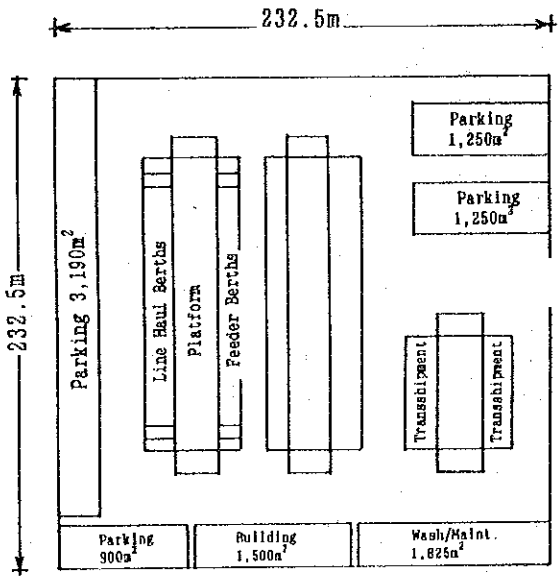


Fig. 17-3-4 Mansoura Truck Terminal Schematic Layout

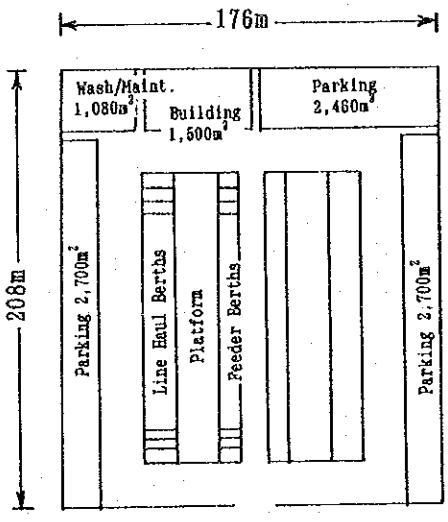


Fig. 17-3-5 Minya Truck Terminal Schematic Layout

Table 17-3-11 Truck Terminals Construction Cost

ITEM	Unit	CAI TT	ALX TT	Man TT	MYA TT
(A) TRUCK TERMINAL CAPACITY					
1. Daily capacity	Ton	19000	5830	2470	1700
2. Trunk Line Veh/day	No.	1853	590	260	200
3. Number of Berths	No.	600	200	90	70
(B) TERMINAL SCALE					
1. Total Area	m^2	267546	92613	54056	36608
2. Platform area	m^2	42000	14000	6650	5600
3. Berths Area	m^2	57750	17500	8575	7000
4. Parking	m^2	30938	16075	6588	7860
5. Administrative Bldgs					
- Built-up area	m^2	10400	1875	1500	1500
- Floor Area	m^2	12480	4320	2700	1800
6. Repair/Gasoline Stand					
- Built-up area	m^2	8500	2500	1825	1080
- Floor Area	m^2	8500	2500	1825	1080
7. Road, storage, etc	m^2	117958	40663	28918	13568
8. Fence	m	2074	1253	930	768
(C) CONSTRUCTION COSTS (M.LE)					
1. Buildings, platforms 300	LE/m^2	31.49	10.45	5.35	4.22
2. Asphalt pavement 25	LE/m^2	5.38	1.92	1.15	0.74
3. Fencing 5	LE/m	0.01	0.01	0.00	0.00
4. Site Preparation 5	LE/m^2	1.34	0.46	0.27	0.18
5. Land Acquisition 25	LE/m^2	6.69	2.32	1.35	0.92
TOTAL	M.LE	44.91	15.15	8.12	6.06

4) Proposed Truck Terminal Locations

Truck terminals should be located in close proximity to production centers but at a distance from inhabited areas. The terminal location should be served by a major artery and entrance/exit gates should be positioned on an access road off that artery to avoid creating traffic congestions.

A suitable location for Cairo TT would be along Cairo Ring Road. The settlements being constructed along the road, particularly in the sector between Suez Road and Qatamia Road can house such a facility. According to the Ministry of Development and New Communities, industrial development in that area is strongly encouraged and such a facility would be welcome there. The relatively large demand for Cairo TT makes it plausible to consider construction of two terminals at different locations. A second terminal may be located along the Cairo ring road western arc in Giza.

A suitable location for Alexandria TT is near Cairo-Alexandria desert road on desert land. Likewise it is possible to locate Minya TT west of the Nile River on the new Upper

Egypt western highway. However in the case of Mansoura TT, Mansoura city is surrounded by agricultural land and land acquisition may be difficult and costly.

5) Line Haul Operation Benefit

(1) Rationalization of Loading Conditions

Construction of truck terminal facilities at Cairo and Alexandria and segregation of line haul and feeder line freight transport for a number of commodities that may be processed at the terminals will reduce the number of trucks on the national highway network. This will be achieved through better loading conditions that will result from the truck terminals function as a point where a large number of small shipments are consolidated into small numbers of large shipments.

The number of freight vehicles that shall be required to satisfy transport demand generated by the 14 commodities to be processed at the truck terminals has been calculated as shown in Table 17-3-3 where the number of trunk line vehicles to use Cairo TT was estimated. The number of trucks needed to haul the same transport demand without line haul operation conditions, i.e. assuming that there will be no improvement in present loading conditions has also been calculated. The estimated reduction in vehicles may be achieved without the construction of truck terminals at Mansoura and Minya however terminals in these two locations will contribute to improving traffic conditions within these two urban centers and provide a distribution/consolidation point for inbound/outbound freight.

Under trunk line operation Cairo inbound trucks can be reduced by about 55%. The results of this comparison are shown in Table 17-3-12.

Table 17-3-12 Trunk Line Operation Effect on Vehicle Number

	Freight Transport Demand (ton/day)	Number of Vehicles (veh/day)	Ave. Loading per Vehicle (ton/veh)
CASE A: CONVENTIONAL LOADING			
Cairo Inbound	9000	1975	4.8
Transshipment	9830	2230	4.4
CASE B: TRUNK LINE OPERATION			
Cairo Inbound	9000	896	10.0
Transshipment	9830	960	10.2

It can be argued that the improved operation of freight vehicles without the need for construction of truck terminals in Cairo and Alexandria may bring about the same re-

sults. However truck terminals play an important role in securing cargo at one location to optimize vehicle loading. At present, with the exception of parcel trade which accounts for roughly 5-10% of interzonal transport demand, most of freight is transported as FTL. Under such a condition it is difficult to secure a complete truck load, and loss resulting in inefficient utilization of vehicle capacity is absorbed by the consigner or truck operator. The Truck Terminal facility may also increase the share of LTL freight transport.

Another function of the truck terminal would be to distribute Cairo inbound freight to the feeder service and thus provide an efficient distribution service to LTL freight trucks.

(2) Reduction in Trip Time

According to 1990/1991 financial reports of the five public freight transport companies a truck vehicle can complete a 460 km round trip (Cairo-Alexandria) in an average 2 days (average annual running distance per vehicle was 74,000 km). The actual time covered for this trip at present is shown in Fig. 17-3-6 for truck-trailer and tractor-semi-trailer combinations. During the 48 hour period, the actual running time is 10 hours, while the loading/unloading time is about 20 hours and idle time; 18 hours. In most parts of Cairo such trucks are not allowed to operate during day time and so must arrive in Cairo or depart from it between 11 PM and 6 AM. This explains the long idle time. Operation time which may be roughly calculated as ratio of actual operating time (30 hours) divided by average time required of two days (48 hours), is 63%. Idle time is therefore estimated at 37%.

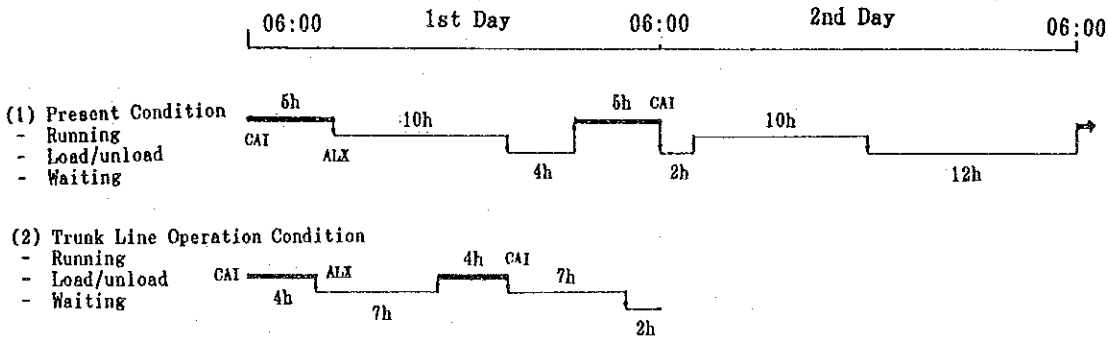


Fig. 17-3-6 Round Trip Time Reduction due to Trunk Line Operation System

Theoretically the vehicle utilization rate can be improved to about 118,000 km per year by eliminating all idle time. However this is unrealistic.

Operation of a line haul system with truck terminal facilities would make it possible to eliminate waiting time, prior to loading and unloading and decrease amount of time required to obtain orders. Assuming the same distance as covered above, Fig. 17-3-6 shows that under line haul operation the round trip can be covered in one day. The actual operating time share would improve to 90% and vehicle utilization per annum can be improved to 106,000 km.

It is necessary however to note that while reduced time shall contribute to improving efficiency of vehicle operation, the time required by the feeder transport service from and to the terminal must be considered to judge the benefit to the consigner or consignee.

6) Truck Terminal Facility Investment and Operating Agency

Various investment schemes and the setting up of an operating agency should be considered. The investment schemes and operating plans may cover the following ideas;

- Public sector investment
  The government will initiate the construction of such a facility and shoulder all or part of construction costs. The government effort will be spearheaded by the Ministry of Transport and the Ministry of Development, with possible involvement of the related governorate authority. The governmental body will operate the facility after its construction renting berth space to various trucking companies. Under this scheme the private sector may also be invited to shoulder some of the initial investment costs.

- Private sector investment
  The private sector will invest in construction and utilization of this facility. Private sector production companies will organize the effort and berths will be rented to various trucking agencies and companies. Storage facilities will be constructed and utilized by producing companies. A private organization will be responsible for managing the facility.

17.3.2 Container Freight Station for Container Transport

1) Commodities suitable for Container Transport

The master plan shall promote increased utilization of containers in road transport of both foreign trade-related commodities and domestic transportation.

Of the thirty transport commodities studied under this master plan the following general cargo shall be considered for container transport, as shown in Table 17-3-13.

Table 17-3-13 Commodities Potential as Container Freight

Commodity	Potential	Commodity	Potential	Commodity	Potential
1 COIL	--	11 CERE	--	21 BVRG	M
2 PETR	--	12 FRUT	H	22 OFOD	M
3 NGAS	--	13 SCAN	--	23 CHEM	M
4 CEMT	--	14 FCRP	L	24 MTAL	L
5 CMAT	--	15 LSTK	--	25 TXTL	H
6 PHOS	--	16 APRD	H	26 FTLZ	L
7 IORE	--	17 AGPR	H	27 PULP	L
8 COAL	--	18 SGAR	M	28 LUMB	--
9 MNRL	--	19 FATS	M	29 MANU	M
10 WHET	--	20 AFED	--	30 MEXC	--

Notes:
H; High potential, M; Medium potential, L; Low potential, --; None

2) Container Transport Demand Projections

Potential container transport demand in the year 2012 originating or terminating in Cairo shall take into consideration foreign trade-related commodities as well as commodities transported between Cairo and Alexandria for domestic consumption. Each shall be treated separately hereafter.

(1) Foreign Trade-related Containerizable Commodities

At present ports of Alexandria, Dikheila, Port Said and Damyat are equipped with container loading/unloading facilities to handle imports and exports packed in containers. The Third 5-Year Plan sets the following targets for container handling capacity by port in the year 2000 as follows;

Port	TEU Cap./year
Alexandria	110,000
Dikheila	105,000
Port Said	178,000
Damyat	168,000
Total	561,000

The master plan will not address container facilities at ports and will consider their capacities as those planned for in the Third 5-Year Plan.

The master plan shall encourage the transport of containers between the ports and Cairo. A container freight station (CFS) on the outskirts of Cairo is expected to serve as a loading/unloading point for containers. The CFS shall have a sufficient capacity so as to handle the forecast foreign trade in the year 2012 projected to pass through the CFS.

The total foreign trade in 2012 is forecast to be 58.2 million tons, and that of the above defined commodities is 9.9 million tons, i.e. about 20% of the total. In terms of TEU (twenty foot container equivalent) total amount of containerizable commodities is about 700,000 TEU. Table 17-3-14 shows import and export projections in 2012 for the above stated commodities by port.

Table 17-3-14 Containerizable Foreign Trade Commodities in 2012

(year 2012) (unit: 1000t)

COMM	Alexandria		Suez		Port Said		Damyat		Red Sea	
	Imp	Exp	Imp	Exp	Imp	Exp	Imp	Exp	Imp	Exp
(12)FRUT	29	143	6	163	2	200	0	51	0	0
(14)FCRP	110	0	83	0	0	0	81	0	0	0
(16)APRD	300	1	5	4	96	9	50	0	0	0
(17)AGPD	586	0	550	5	150	13	300	2	0	0
(18)SGAR	300	87	14	0	84	1	81	0	0	0
(19)FATS	500	0	116	11	0	8	100	0	0	0
(21)BVRG	0	4	0	0	0	60	0	49	0	0
(22)OFOD	19	50	4	50	2	10	0	46	0	0
(23)CHEM	17	275	1	324	1	0	0	0	0	0
(24)MTAL	895	287	94	11	72	0	54	0	6	1
(25)TXTL	50	500	10	150	6	100	10	200	3	10
(26)FTLZ	245	717	0	70	0	0	100	0	0	0
(27)PULP	1005	8	20	19	30	0	16	0	0	0
(29)MANU	35	5	1	2	15	1	0	0	1	0
Sub-Tot.	4091	2077	904	809	458	402	792	348	10	11

Total Import: 6255 Export: 3647 Total Import+Export: 9902

To meet this projected demand it is necessary to increase handling capacity of ports from 560,000 TEU (target figure for 2000) by 1.2 times to 700,000 TEU by the year 2012.

The master plan shall concentrate on development of containerization facilities for Cairo inbound and outbound freight. An amount of 2.35 million tons of cotainerizable imports is forecast to enter Cairo traffic zone, and exports from Cairo are expected to be 0.36 million tons in 2012, about 30% of total containerizable commodities. Cairo inbound imports and outbound exports have been estimated by considering amount of road transport for each of the containeriazable commodities from port of entry/exit to/from Cairo forecast in the year 2012. For example, although an amount of 300,000 tons of (18) Sugar Products Commodity is projected to be imported via Alexandria, there is no road transport demand for that commodity from Alexandria to Cairo, and therefore this commodity has not been included in the container transport

demand.

Conversion into TEU, the total containerizable imports amount inbound to Cairo will be approximately 168,000 TEU. The master plan shall assume that by the year 2012, all these commodities shall be transported by containers and the CFS shall be designed to accommodate that volume. The results of this estimation are shown in Table 17-3-15.

Table 17-3-15 Foreign Trade Freight Container Amount served by Cairo CFS

(year 2012) (unit: 1000 t)

COMM	Alexandria		Suez		Port Said		Damyat		Red Sea	
	Imp	Exp	Imp	Exp	Imp	Exp	Imp	Exp	Imp	Exp
(12)FRUT	29	15	1	1	0	1	0	4	0	0
(14)FCRP	3	0	6	0	0	0	1	0	0	0
(16)APRD	232	1	1	4	2	4	50	2	0	0
(17)AGPD	586	0	175	0	0	0	63	0	0	0
(18)SGAR	0	0	0	0	60	1	0	0	0	0
(19)FATS	0	0	83	6	0	1	0	0	0	0
(21)BVRG	0	4	0	0	0	35	0	20	0	0
(22)OFOD	19	48	1	1	2	2	0	0	0	0
(23)CHEM	17	22	0	69	0	0	0	0	0	0
(24)MTAL	0	0	0	0	0	0	0	0	0	0
(25)TXTL	29	25	4	6	0	1	1	0	0	0
(26)FTLZ	0	0	0	53	0	0	0	0	0	0
(27)PULP	910	8	10	19	10	0	0	0	0	0
(29)MANU	35	5	0	2	15	0	0	0	0	0
Sub-Total	1860	128	281	161	89	45	115	26	0	0
Total Import:	2345	Export:	360	Total Import+Export	2705					

(2) Cairo-Alexandria Containerizable Commodity Flow

At present there is no domestic container service. The master plan shall introduce such a service on the heaviest O-D zone pair, i.e. between Cairo and Alexandria. Based on previous studies in Egypt and discussions with the counterpart team containerizable commodities have been classified into three categories, of high (utilization degree is 50%), medium (30%) and low (10%). Applying these utilization rates, demand is estimated at 54,000 TEU containers.

Table 17-3-16 Cairo-Alexandria Containerizable Commodities Flow in 2012

(unit: 1000t)

COMM	CAI Inbound	Degree of Utilization			COMM	CAI Inbound	Degree of Utilization		
		High (50%)	Med (30%)	Low (10%)			High (50%)	Med (30%)	Low (10%)
(12)FRUT	69	35	--	--	(24)MTAL	2401	--	--	240
(14)FCRP	0	--	--	--	(25)TXTL	0	--	--	--
(16)APRD	0	--	--	--	(26)FTLZ	0	--	--	--
(17)AGPD	248	124	--	--	(27)PULP	0	--	--	--
(08)SGAR	0	--	--	--	(29)MANU	958	--	287	--
(19)FATS	0	--	--	--					
(21)BVRG	62	--	19	--	Sub-Total	3929			762
(22)OFOD	50	--	15	--					
(23)CHEM	141	--	42	--	TEU Tot.(1000)	281			54

Notes:
1) Utilization rates based on previous studies prepared by TPA, ENR and discussions with Counterpart Team.
2) Import/export amounts included in Table 17-3-8 are excluded.

3) Container Freight Stations Scale and Cost Estimates

(1) CFS Facilities

The two container freight stations proposed under this master plan shall have the same facilities, with slight differences concerning design criteria. The station shall provide a venue where Cairo inbound loaded containers are received, stripped, contents cleared by customs (in case of imports), contents loaded onto feeder trucks, and empty containers stored until pick up.

The station shall encourage containerized transport of LCL containers, and at the same time provide a terminal facility for shifting FCL freight transported by line haul trucks and unloaded from containers onto feeder trucks (i.e.. a truck terminal function). Therefore both LCL and FCL containers are considered to be processed at the station. A schematic layout of the CFS is shown in Figure 17-3-7 and components and design criteria are explained hereafter.

a. Loaded Container Storage Yard
Loaded container shall be stored and stripped in this yard. Containers bearing imports shall be custom inspected. The yard shall be designed to accommodate containers arriving in the station daily multiplied by expected average dwell time and a peak factor. For domestic containers, average dwell time shall be 7 days, and 8 days for containers loaded with imports. Container dimensions shall conform to the standard 6.1x2.4x2.4m for TEU, and 12.2x2.4x2.4m for FEU.

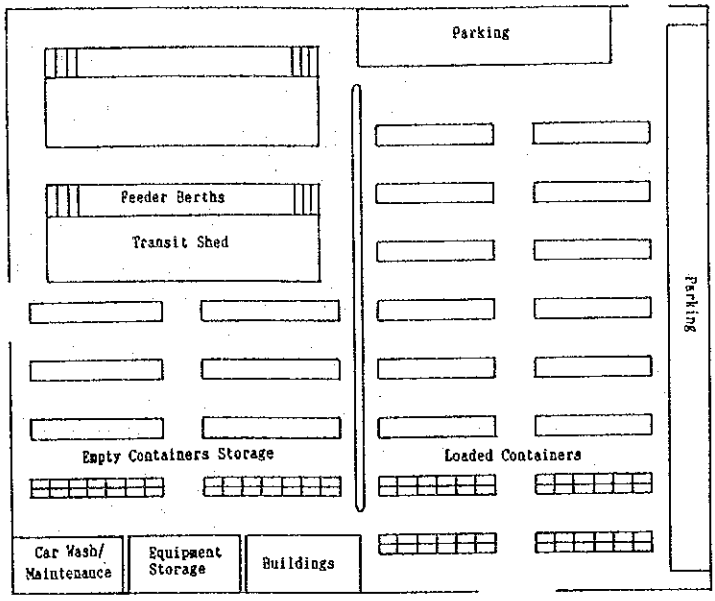


Fig. 17-3-7 Schematic Layout of Container Freight Station

One container shall be stacked over another (maximum two containers) and containers shall be stored in rows of twos. Clearance spaces of about 1.2 m and 0.5 m shall be maintained between backs and sides of the containers in the one row. A 20 m road width shall be provided between the rows.

b. Transit Shed and Feeder Berths
After stripping and custom clearance (for imports) freight shall be moved to the transit shed to await loading onto feeder trucks for transport into Cairo. Number of berths shall be estimated based on number of daily trucks required to transport the freight. Berth turnover rate shall be 4 vehicles per day and a peak factor of 1.5 shall be adopted. Berth area shall be 3.5x10 m.

A concrete platform of 35 m width shall be provided in front of the berths. The platform shall be partially roofed to serve as a transit shed. Sufficient road area shall be provided within the transit shed and feeder berths area.

c. Empty Containers Storage Yard
A space shall be provided for storing empty containers until they leave the station. Containers shall be

stacked in threes and arranged in rows, with each row having two containers. The same clearance spaces between adjacent containers in the rows described for the loaded contained storage yard shall be adopted here. Average dwell time shall be 7 days.

d. Parking Space
Parking space shall be provided for both line haul trucks and feeder trucks. Parking space for about 40% of daily feeder trucks and 35% of line haul trucks shall be considered. Parking slots for line haul trucks shall be 45 m^2 and 30 m^2 for feeder trucks.

e. Buildings
Administration and office buildings shall be provided for station management, customs offices and shipping agents.

f. Vehicle Maintenance, Wash and Gasoline Stand
An area to accommodate about 50 trucks shall be provided for vehicle servicing. A similar area for the storage of equipment used in the station shall be considered.

(2) Cost Estimation

Based on design standards outlined in the preceding section the areas of components for each of the two stations proposed under the Study were estimated and costed as shown in Table 17-3-17. Cost estimation does not include the cost of equipment and engineering design.

Table 17-3-17 Container Freight Stations Cost Estimation

ITEM	Unit	Cairo Inbound Imports (CFS)	CAI-ALX Cairo Inbound (CFS)
(A) CFS CAPACITY			
1. Daily Capacity	TEU	560	200
2. Feeder Line Vehicles	Veh/day	1310	470
3. Feeder Line berths	No.	500	200
(B) CFS SCALE			
1. Total Area	m^2	476662	158670
2. Area of groundslots	m^2	49200	16104
3. Feeder Line berth area	m^2	17500	7000
4. Transit shed	m^2	61250	24500
5. Line Haul parking area	m^2	8800	3200
6. Feeder parking area	m^2	15000	6000
7. Administrative Buildings			
- Built-up area	m^2	1600	900
- Floor area	m^2	3840	2160
8. Repair/gasoline stand	m^2	2500	900
9. Equipment/storage space	m^2	2500	900
10. Road/maneuvering space	m^2	195412	56526
11. Empty container storage	m^2	122900	42640
12. Fencing	m	1882	1446
(C) CONSTRUCTION COSTS (M.LE)			
1. Bldg., Roofed Platform	300 LE/m^2	28.71	11.67
2. Asphalt pavement	25 LE/m^2	10.36	3.34
3. Fencing	5 LE/m	0.01	0.01
4. Site Preparation	5 LE/m	2.38	0.79
5. Land Acquisition	25 LE/m^2	11.92	3.97
TOTAL	M.LE	53.38	19.78

4) Locations of Stations

It is recommended to construct the Cairo CFS as an independent facility at a site along the Cairo Ring Road northern arc. However in the case of the domestic CFS, it is proposed to construct the facility adjacent to the Cairo-Alexandria desert road, on a desert location.

5) Benefit of Containerized Transport

(1) Rationalization of Loading Conditions

Assuming that one tractor-semi trailer combination will transport one TEU container, and that a loaded container will contain on average 12 tons, numbers of vehicles required both in containerized transport case and ordinary transport for the containeriazable commodities transport

demand have been calculated.

Truck number transporting Cairo inbound imports is likely to be reduced by about 70%, while in the case of domestic containerized transport projected reduction is about 73%. The results of this estimation are shown in Tables 17-3-18 and 17-3-19.

Table 17-3-18 Vehicle Reduction effected by Containerized Transport of Cairo Inbound Imports

(unit: Annual Vehicle number)

COMM	Vehicle Number		Percent Reduction (%)	COMM	Vehicle Number		Percent Reduction (%)
	Existing Condition	Container Transport			Existing Condition	Container Transport	
(12)FRUT	13393	2500	81.3	(23)CHEM	3353	1417	57.8
(14)FCRP	3333	833	75.0	(24)MTAL	0	0	NA
(16)APRD	118257	23750	79.9	(25)TXTL	12186	2833	76.8
(17)AGPD	204467	68667	66.4	(26)FTLZ	0	0	NA
(18)SGAR	5008	5000	0.2	(27)PULP	248663	77500	68.8
(19)FATS	10012	6917	30.9	(29)MANU	20833	4167	80.0
(21)BVRG	0	0	NA				
(22)OFOD	5729	1833	68.0	TOTAL	645235	195416	69.7

Note:
Present loading observed in Delta region by commodity applied as Existing Condition

(2) Reduction in Trip Time

Fig. 17-3-6 showed the present trip time for a Cairo-Alexandria round trip, and that expected under trunk line operation condition. Freight container transport for the same trip is expected to reduce loading/unloading time to 6 hours for a round trip, from the present required 20 hours. Under this condition and with the elimination of idle time waiting to enter the urban area during permissible hours, it is expected that three round trips can be accomplished in a two-day duration.

Table 17-3-19 Vehicle Reduction Effected by Containerized Transport of Cairo Inbound Freight from Alexandria

(unit: Annual Vehicle number)

COMM	Vehicle Number		Percent Reduction (%)	COMM	Vehicle Number		Percent Reduction (%)
	Existing Condition	Container Transport			Existing Condition	Container Transport	
(12)FRUT	15402	2875	81.3	(23)CHEM	8343	3525	57.8
(14)FCRP	0	0	NA	(24)MTAL	50547	20008	60.4
(16)APRD	0	0	NA	(25)TXTL	0	0	NA
(17)AGPD	30769	10333	66.4	(26)FTLZ	0	0	NA
(18)SGAR	0	0	NA	(27)PULP	0	0	NA
(19)FATS	0	0	NA	(29)MANU	119750	23950	80.0
(21)BVRG	5027	1550	69.2				
(22)OFOD	3906	1250	68.0	TOTAL	233745	63492	72.8

17.4 Economic and Financial Assessment of Truck Terminal

17.4.1 Objective Terminals

There are four truck terminals suggested to construct in this master plan study. Of which, a large terminal i.e. Cairo truck terminal is selected for the subject of assessment.

Selection of terminals is attributable to the fact that Cairo attracts respectively 24% of all national freight movement in terms of truck number and occupies far larger portions than all others since a second large terminal of Alexandria handles 12% of all. Another reason is that the establishment of other three small truck terminals in Alexandria, Mansoura and Minya do not have any significant impact on the efficient improvement of freights movement at Cairo truck terminal.

17.4.2 Classification of Economic Benefit

Truck terminal are expected to generate four kinds of economic benefits as shown below:

1) Saving in VOC of Line Haul Trucks

Rationalization of loading conditions decreases number of necessary line haul trucks and results in reduction of vehicle operation cost.

Present average loading of 4.8 ton/vehicle for Cairo inbound freight is expected to increase up to 10.0 ton/vehicle, being as much as 2.1 times. Huge volume of urban freight gathered and stored at the truck terminal makes it possible to guarantee the full loading of truck. Introduction of pallet and carton box for packaging can also contribute to an improvement of average loading weight.

Reduction of truck fleet results in decrease in total vehicle hours of line haul truck. This is also apparent other aspect of benefits.

2) Saving in VOC of Collection/Distribution Trucks

Collection and distribution activities by line haul trucks in the urban area are completely replaced by smaller trucks (2 tons) of the consigner or consignee. Extension of collection/distribution activities by smaller trucks increase their distance-related cost, while that of line haul truck turns to be zero.

It is assumed in this analysis that line haul truck conducts collection/distribution activities at 4 points in the Cairo metropolitan area and it makes a trip of 10 km in total. This one long trip will be replaced by 5 trips of individual

consigners or consignees which use 2 ton smaller trucks (pick-up).

3) Saving in Trip Time of Distribution/Collection Trucks

Necessary vehicle-time for distribution/collection by smaller trucks will be compared with that by the large line haul trucks.

One trip of the line haul truck will be replaced by 5 trips of smaller trucks, and thus the total trip time of distribution/collection activities can be longer than that of line haul truck. In addition, trucks are apt to conduct durable trips from adjacent origins to the truck terminal.

These negative effects can be eliminated by introducing a distribution/collection service of smaller trucks by the truck terminal company or licensed truck companies. If one truck is given a specified service area for distribution/collection, all those negative effects can be mitigated. This system can be proposed in more detail study for a system operation of truck terminal.

17.4.3 Estimation of Economic Benefit

It is intended that economic benefits would be quantified under "with" and "without" truck terminal project. Because of the lack of data and information, a simplification was made using some assumptions. This study reckons all the economic benefits at the year 2012 i.e. the last target year of this master plan. This is because traffic forecast suggests the truck terminal be in need at around the year 2012, and never before that year.

It is set that the representative truck for line haul truck is 8 tons before the opening of the truck terminal and 15 tons after that. This is because the former carries 4.9 ton of freight cargo and the latter 10.0 tons. Actual reckoning procedure of each benefit item is shown below:

1) Saving in VOC of Line Haul Trucks

Improvement in actual loading volume of freight vehicle can result in numerical reduction of operational freight vehicles. Traffic forecast reckons that, with Cairo truck terminal, the number of Cairo inbound trucks would decline from 1,975 vehicles per day to 896 at the year 2012. Reduction rates are 65%, which generates the saving in distance-related cost of line haul trucks.

Total vehicle-hour is also affected by this reduction of freight vehicles. This benefit is estimated by the following two functions.

$$VOCrc = Qwo \times D \times Rwo - Qw \times D \times Rw, \text{ and}$$

VOCfc = Qwo x (D/S) x Fwo - Qw x (D/S) x Fw
where, VOCrc; saving in distance-related cost (running cost) of line haul trucks
VOCfc; saving in time-related cost (fixed cost) of line haul trucks
Qwo; necessary number of trucks in case of "without truck terminal"
Qw ; necessary number of trucks in case of "with truck terminal"
D ; average travel distance of truck which carry the freight suitable for handling at truck terminal
Rwo;distance-related cost (running cost) of 8 ton truck
Rw ; time-related cost (running cost) of 15 ton truck
S ; average running speed
Fwo; time-related cost (fixed cost) of 8 ton truck
Fw ; time-related cost (fixed cost) of 15 ton truck

Average travel distance of the truck is set 273.94km in total according to the traffic OD Table. And average travel speed is set 50 km/hour. This benefit reaches 32.57 M.LE at the year 2012.

2) Saving in VOC of Distribution/Collection Trucks

It is assumed that one line haul truck has 4 destinations in Cairo metropolitan area and make 10 km trip of distribution/ collection of cargoes. This trip is replaced by 5 individual trips of 2 ton trucks by consigners or consignees. Average distance of this individual trip is assumed 10.0 km for one round trip, while one trip is empty loaded. This benefit item can be reckoned by the following function;

VOCdc = Q1h x D1h x VOC1h - Qs x Ds x VOCs
where Q ; number of trucks which conduct distribution and collection of cargo
D ; average trip distance of truck for distribu tion and collection
VOC ; distance-related cost of vehicle during distribution and collection
1h ; line haul truck
s ; smaller truck

This benefit shows negative contribution of -0.91 M.LE at the year 2012.

3) Saving in Trip Time of Distribution/Collection Trucks

In reckoning this benefit, same assumptions are set as in previous section. One additional is average running speed, which is set at 25km in Cairo. The following function is adopted to reckon this item of benefit;

$$TV = Q1h \times D1h/Sp \times TV1h - Qs \times Ds/Sp \times TVs$$

where Q ; number of trucks which conduct distribution and collection of cargo
D ; average trip distance of truck for distribution and collection
Sp; running speed in urban area
TV; time-related cost of vehicle during distribution and collection
lh; line haul truck
s ; smaller truck

This effect also shows negative figure of -1.8 M.LE.

All the economic benefits are summarized Table 17-4-1. Largest benefit is attributable to the of VOC (time-related) of line haul trucks accounting for 82% of the total, followed by the VOC (distance-related) of line haul truck with 7.96 M.LE or 27%. Negative contribution are generated by the distribution/collection trucks, -9% of the total benefit.

Table 17-4-1 Annual Benefit of Truck Terminal

Description	Annual Benefit
Line haul truck;	
VOC (distance-related)	7.96 million LE (27%)
VOC (time-related)	24.61 million LE (82%)
Distribution/collection truck	
VOC (distance-related)	-0.91 million LE (-3%)
VOC (time-related)	-1.80 million LE (-6%)
Total	29.86 million LE

17.4.4 Estimation of Economic Cost

Table 17-4-2 Economic and Financial Costs of Truck Terminals

Work Items	Conversion Factor	Cairo T.T.		Alexandria T.T		Mansoura T.T.		Minya T.T.	
		Fin.	Eco.	Fin.	Eco.	Fin.	Eco.	Fin.	Eco.
1. Building, etc.	1.03	31.49	32.43	10.45	10.76	5.35	5.51	4.22	4.35
2. Asphalt Pavement	1.51	5.38	8.12	1.92	2.90	1.15	1.74	0.74	1.12
3. Fencing	0.96	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
4. Site Preparation	2.27	1.34	3.04	0.46	1.04	0.27	0.61	0.18	0.41
5. Land Acquisition	1.00	6.69	6.69	2.32	2.32	1.35	1.35	0.92	0.92
Total		44.91	50.30	15.16	17.04	8.12	9.21	6.06	6.79

Economic cost is obtained by multiplying conversion factors with the cost of each item at 1992 market price. The conversion factors are set based on the cost data of actual

civil works in Egypt. Conversion factors and economic cost of Cairo truck terminal are shown in Table 17-4-2. Economic costs is expanded into 120% of the nominal cost at market in total.

17.4.5 Economic Analysis

Economic benefit and cost are used to calculate financial rate of return (FIRR), net present value (NPV), and benefit cost ratio (B/C). There are some assumptions set for the analysis.

Project life	;	20 years after completion of the terminal
Cost Expenditure	;	All the cost is expensed in one year (2011).
Benefit	;	Economic benefit generates at the first year (2012) of the operation and is kept constant during the project life.
Discount rate	;	12%

Results are as follows;

EIRR	;	51.3 %
NPV	;	53.2 million LE
B/C	;	4.9

All the evaluation indicators prove the validity of the Cairo truck terminal project, and suggest the implementation of the project.

17.4.6 Setting of Charge for Financial Assessment

It is set that all the line haul trucks will be charged on each arrival. This system is more preferable than a berth rental charge system because majority of the line haul truck companies are small companies processing one or two trucks and cannot afford paying whole the berth rental fee. It is also easy to collect the charge without failure.

Charge level is set between theoretical maximum level and minimum level; the former is determined by the economic benefit which the line haul trucks can receive, and the latter is set at the level enough to cover the total maintenance cost of the terminal.

Total sum of economic benefit is reckoned 29.86 M.LE, while 896 trucks per day use Cairo truck terminal. Actual working days is set 320 days per year. The maintenance cost of Cairo truck terminal is set at 4.02 M.LE per year, equivalent to 8% of the construction cost. Thus the range of possible charge level are calculated as follows;

CHmax = Eb / Tw = 104 LE/truck
CHmin = Cm / Tw = 12.53 LE/truck
where,CHmax; maximum level of charge (LE/truck)

CHmin; minimum level of charge (LE/truck)
Eb ; total amount of economic benefit (M.LE/year)
Tw ; number of trucks which use Cairo truck terminal
Cm ; cost of maintenance of Cairo truck terminal

CHmax is 104 LE per truck and CHmin is 12.53 LE. This is almost 7.2 times as high as taxi carta of 1.71 LE per taxi for 80 Km trip (=average trip distance).

17.4.7 Financial Cost

This is estimated in previous section. Its total amount reaches 44.91 M.LE in 1992 price. This estimation excludes the cost of equipment depreciation which is usually included in the cost estimation. This treatment reflects the Egyptian customs and is approved as a formal treatment for the government project.

17.4.8 Financial Analysis

This analysis aims at highlighting the relationship between charge level and investment return, and estimating an appropriate level of charge. This ideal level of charge is evaluated by charge affordability of the truck company and the acceptability is determined.

Table 17-4-3 Relationship of Government Support, Charge evel and Financial Investment Return

(%)

	Private	Government's Support on;				
		Land	+ Land up to 25% Prepa.	+ up to 50% of Build. Pavement	+ up to 75% of Build. Pavement	+ &
(million	44.91	38.22	34.88	27.66	18.44	9.22
Charge (LE/veh)						
12.53	-	-	-	-	-	-
20	-	1.12	2.05	4.60	9.85	22.88
40	16.75	20.08	22.18	28.29	42.69	85.45
60	30.16	35.54	38.97	49.20	73.82	147.85
80	43.05	50.61	55.46	69.95	104.92	209.84
104	58.40	68.62	75.20	94.83	142.24	284.48

This also aims at estimating an appropriate level of government financial support. This is also a major determinant of investment return. Since the maximum level of charge cannot be sufficient to assure the sufficient investment return, device to release the financial burden of management entity are examined, which is the government support at the con-

struction stage. Relationship of charge, government support and financial investment return are tabulated in Table 17-4-3.

17.4.9 Conclusions for Truck Terminal Projects

1) Economic analysis suggests that the project guarantee high rate of investment return and Cairo truck terminal project is feasible.

2) Financial analysis suggests that the feasibility of the project be dependent of financial support extended by the government. Results show sharp contrast in cases of "with the Government support" and "without the Government support."

   (1) without government's support; This case is not feasible in any form.

   (2) with government; In this case, with a charge level of 15.69 LE/truck, the government have to finance 79% of the total construction cost to guarantee a minimum level of investment return (=20%).

3) It is concluded that the project is very promising project as the government project at the year 2012, but not suitable for the private sector if this is executed by the private sector alone.

4) In line with the privatization in the road freight trasnport industries, the medium - small truckers will face to more severe competition with large scale trucking companies, therefore they shall be reorganized to secure the transport efficiency and to ensure the profitability, by introducing the line haul and feeder transport system. The truck terminals will provide one of the opportunities to join to the system for the medium - small scale truckers, who can not prepare the transfer stations or the system itself individually. When traffic condition in urban area will reach to the condition that cargo handling on streets will not be allowed with or without enforcement in near future, the small - medium truckers will have to prepare loading spaces by themselves. Truck terminals will also provide the opportunity to accelerate these movements. The truck terminal project is recommended from all these indirect effects as well.