

パキスタン回教共和国 コンテナ輸送導入計画 調査報告書 付録

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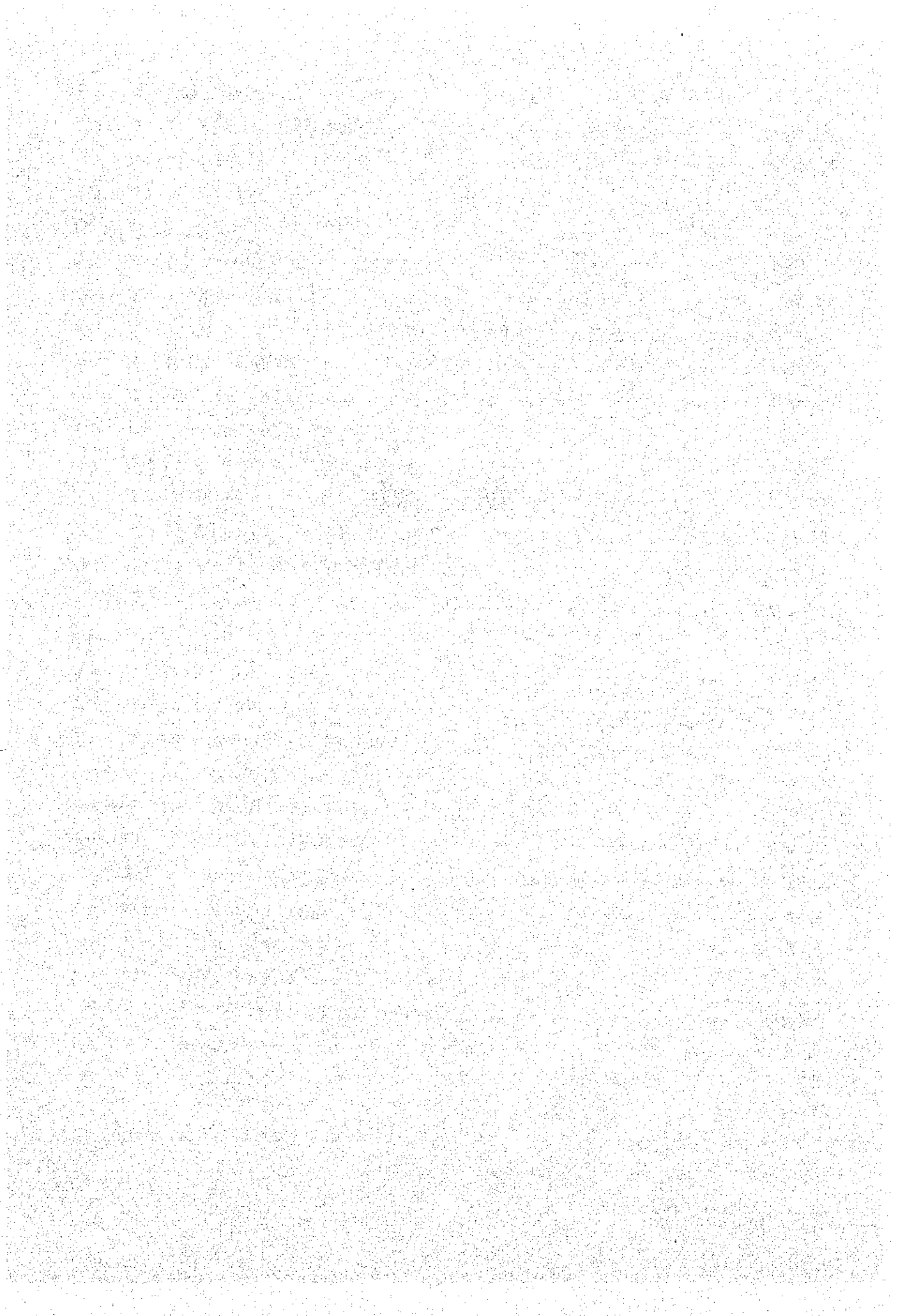
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付 録



付録Ⅱ－Ⅰ システム別平均輸送距離

Multimodel Transport

| | | | | |
|--------------|------------------|----------------------|---------------------|---------------|
| 1. Railway | Karachi ↔ Lahore | 1220 km | | |
| 2. Road | | | | |
| Lahore | | <u>Distance (km)</u> | <u>Cargo Volume</u> | <u>Ton km</u> |
| CFS ↔ Lahore | 20 | 273 | 5,460 | |
| ↔ Faisalabad | 145 | 130 | 18,850 | |
| ↔ Sargoda | 170 | 61 | 10,370 | |
| ↔ Gujranwala | 95 | 143 | 13,585 | |
| ↔ Rawalpindi | 275 | 112 | 30,800 | |
| ↔ Hazara | 390 | 7 | 2,730 | |
| ↔ Malakand | 465 | 5 | 2,325 | |
| ↔ Peshawar | 440 | 79 | 34,760 | |
| ↔ DI Khan | 410 | 8 | 3,280 | |
| | | 818 | 122,160 | |

$$\text{Average Road Distance} = \frac{122,160}{818} = 149. \text{ km}$$

Road Transport

| | | | | |
|------------------|-------|----------------------|---|---------------|
| | | <u>Distance (km)</u> | <u>Cargo Volume</u> <u>1000 tonne)</u> | <u>Ton km</u> |
| Karachi ↔ Lahore | 1,290 | 273 | 352,170 | |
| ↔ Faisalabad | 1,180 | 130 | 153,400 | |
| ↔ Sargoda | 1,225 | 61 | 74,725 | |
| ↔ Gujranwala | 1,320 | 143 | 188,760 | |
| ↔ Rawalpindi | 1,570 | 112 | 175,840 | |
| ↔ Hazara | 1,680 | 7 | 11,760 | |
| ↔ Malakand | 1,755 | 5 | 8,775 | |
| ↔ Peshawar | 1,735 | 79 | 137,065 | |
| ↔ DI Khan | 1,245 | 8 | 9,960 | |
| | | 818 | 1,112,455 | |

$$\text{Average Road Distance} = \frac{1,112,455}{818} = 1,360. \text{ km}$$

付録Ⅱ-2 各輸送システムの費用

Unit: 1000 US\$
Years of Service

Case: Multimodal Transport

| | | | | |
|---|---------------|------------|--------|----|
| 1. Port Terminal | See Next Page | Unit Price | 7,086 | |
| 2. Railway Equipment | | | | |
| Wagon; 72,284 TEU ÷ 300 days x 1.25 ÷ 3 TEU/Wagon x 2 days = 200 Wagons x 57 = 11,400 | | | | 50 |
| Engine; 200 Wagons ÷ 25 Wagons/Train = 8 Engines | | x 1200 = | 9,600 | 20 |
| Shunting Loco; | | x 700 = | 1,400 | 20 |
| 3. Inland CFS | See Next Page | | 12,250 | |
| 4. Road Transport Equipment | | | | |
| 40' trailer; | | x 50 = | 3,650 | 7 |
| 8 ton truck; | | x 12 = | 1,200 | 7 |
| | | Total | 42,464 | |

Case: Road Transport

| | | | | |
|-----------------------------|---------------|--------|--------|---|
| 1. Port Terminal | See Next Page | | 5,164 | |
| 2. Road Transport Equipment | | | | |
| 40' trailer; | | x 50 = | 29,500 | 7 |
| 8 ton truck; | | x 12 = | 7,800 | 7 |

付録Ⅱ-3 コンテナ・ターミナル費用

| Description of Equipment | Years of Service | Unit Price | Port Terminal | | | | Inland CFS | | | |
|--|------------------|------------|---------------|-------|-------|-------|-------------|-------|-------------|-------|
| | | | Multi modal | | Road | | Multi modal | | Multi modal | |
| | | | Q'ty | Cost | Q'ty | Cost | Q'ty | Cost | Q'ty | Cost |
| (Unit train operation) | | | | | | | | | | |
| Rail mounted transfer cranes | 12 | 2,381 | 2 | 4,762 | - | - | 2 | - | 2 | 4,762 |
| Yard tractor | 7 | 37 | 8 | 296 | - | - | 8 | - | 8 | 296 |
| Yard chassis 40' (20' x 2) | 7 | 13 | 8 | 104 | - | - | 8 | - | 8 | 104 |
| Rubber tired transfer crane | 12 | 952 | 2 | 1,904 | - | - | 2 | - | 2 | 1,904 |
| (Container yard operation) | | | | | | | | | | |
| Rubber tired transfer crane | 12 | 952 | - | - | 4 | 3,808 | 4 | 3,808 | 4 | 3,808 |
| (Gate operation) | | | | | | | | | | |
| Weighing scale | 50 | 143 | - | - | 1 | 143 | 1 | 143 | 1 | 143 |
| (Maintenance) | | | | | | | | | | |
| Forklift truck | 7 | 17 | - | - | 1 | 17 | 1 | 17 | 1 | 17 |
| 3.0 tons | 7 | 126 | - | - | 1 | 126 | 1 | 126 | 1 | 126 |
| 15.0 tons with telescopic side spreader | | | | | | | | | | |
| (CFS operation) | | | | | | | | | | |
| Forklift truck | 7 | 17 | - | - | 13 | 221 | 13 | 221 | 13 | 221 |
| 3.0 tons | 7 | 35 | - | - | 2 | 70 | 2 | 70 | 2 | 70 |
| 6.0 tons | 7 | 37 | - | - | 4 | 148 | 4 | 148 | 4 | 148 |
| Yard tractor | 7 | 10 | - | - | 12 | 120 | 12 | 120 | 12 | 120 |
| Yard chassis 20 footer | 7 | 10 | - | - | 6 | 60 | 6 | 60 | 6 | 60 |
| 40 footer | 7 | 10 | - | - | 2,350 | 94 | 2,350 | 94 | 2,350 | 94 |
| Pallet | 3 | 0.04 | - | - | - | - | - | - | - | - |
| (Multipurpose) | | | | | | | | | | |
| Forklift truck | 7 | 17 | - | - | 2 | 34 | 2 | 34 | 2 | 34 |
| 3.0 tons | 7 | 105 | - | - | 1 | 105 | 1 | 105 | 1 | 105 |
| 15.0 tons | | | | | | | | | | |
| Mobile crane for emergency use and CFS operation 30 tons | 7 | 190 | - | - | 1 | 190 | 1 | 190 | 1 | 190 |
| (Communication) | | | | | | | | | | |
| Wireless telephone (VHF) | 10 | 2 | 10 | 20 | 14 | 28 | 14 | 28 | 24 | 48 |
| Total | | | 2,086 | | 5,164 | | Total | | 12,250 | |

付録Ⅱ - 4 内陸輸送の運転経費

Unit: 1000 US\$

Case: Multimodal Transport

| | | |
|---------------------|--------------------------------|---------|
| 1. Port Terminal | | 1,075.8 |
| 2. Railway Expenses | 152,453 x 0.101 x 0.8 ÷ 12,500 | 12,500 |

*Figure is extracted from Table of
Expenditure for Working CNTR Train
in Financial Analysis.

| | | |
|-------------------------|--|---------|
| 3. Inland CFS | | 2,753.1 |
| 4. Truck Operating Cost | | |
| 40' Trailer; | 73 Trailer x 300 Km x 300 days x 3.5 Rs/Km x 0.101 | 2,322 |
| 8 ton truck; | 100 Truck x 300 Km x 300 days x 1.9 Rs/Km x 0.101 | 1,727 |
| | | |
| | Sub Total | 4,049 |

Case: Road Transport

| | | |
|-------------------------|---|---------|
| 1. Port Terminal | | 1,677.3 |
| 2. Truck Operating Cost | | |
| 40' Trailer; | 590 Trailer x 340 Km x 300 days x 3.5 Rs/Km x 0.101 | 21,274 |
| 8 ton Truck; | 650 Truck x 340 Km x 300 days x 1.9 Rs/Km x 0.101 | 12,723 |
| | | |
| | Sub Total | 33,997 |

Multimodal Transport

o Port Terminal

| | | | |
|--------------------|---|---|-------|
| Energy Consumption | | | 76.3 |
| Maintenance | $7,086 \times 0.04$ | = | 283.4 |
| Labour skilled | $23 \times 18,000 \times 0.101 \div 1000$ | = | 42.0 |
| " unskilled | $6 \times 9,000 \times 0.101 \div 1000$ | = | 5.0 |
| | | | 406.7 |

o Inland CFS

| | | | |
|--------------------|--|---|---------|
| Energy Consumption | | | 211.3 |
| Maintenance | $12,250 \times 0.04$ | = | 490.0 |
| Labour skilled | $261 \times 18,000 \times 0.101 \div 1000$ | = | 474.0 |
| " unskilled | $109 \times 9,000 \times 0.101 \div 1000$ | = | 99.0 |
| | | | 1,274.3 |

Road Transport

Port Terminal

| | | | |
|--------------------|--|---|-------|
| Energy Consumption | | | 135.0 |
| Maintenance | $5,164 \times 0.04$ | = | 206.6 |
| Labour skilled | $238 \times 18,000 \times 0.101 \div 1000$ | = | 433.0 |
| " unskilled | $103 \times 9,000 \times 0.101 \div 1000$ | = | 94.0 |
| | | | 868.6 |

付録Ⅱ-6 コンテナ・ターミナルにおけるエネルギー消費コスト

Unit: 000 US\$

| | Energy Consumption Rate | Working Hour/ No. of TEU Per Year | Working Efficiency | Consumption Volume | Unit Price | Consumption Cost/Unit 000 US\$ | Actual Required No. of Equipment | Total Cost |
|--------------------------------------|-------------------------|-----------------------------------|--------------------|--------------------|---------------|--------------------------------|----------------------------------|------------|
| (Unit Train Operation) | | | | | | | | |
| Rail mounted transfer crane | 3.2 Kwh/TEU | 56,472 TEU | - | 180,710 Kwh | 0.05 US\$/Kwh | 9.0 | 1.28 | 11.5 |
| Road tractor (400 ps) | 15.1 Kg/hr | 1,980 hrs | 0.5 | 14.9 Kt | 426.5 US\$/Kt | 6.4 | 8.00 | 51.2 |
| Rubber tired transfer crane(260 ps) | 46.8 Kg/hr | 1,060 hrs | 0.5 | 24.8 Kt | " | 10.6 | 1.28 | 13.6 |
| | | | | | | | Total | (76.3) |
| (Container yard operation) | | | | | | | | |
| Rubber tired transfer crane (260 ps) | 46.8 Kg/hr | 1,980 hrs | 0.5 | 46.3 Kt | " | 19.7 | 0.50 | 9.9 |
| | | | | | | | | |
| (Maintenance) | | | | | | | | |
| Forklift truck 3.0 tons (42 ps) | 8.4 Kg/hr | 660 hrs | 0.5 | 2.8 Kt | " | 1.2 | 1.00 | 1.2 |
| 15.0 tons (110 ps) | 24.2 Kg/hr | 660 hrs | 0.5 | 8.0 Kt | " | 3.4 | 1.00 | 3.4 |
| | | | | | | | | |
| (CFS operation) | | | | | | | | |
| Forklift truck 3.0 tons(42 ps) | 8.4 Kg/hr | 1,980 hrs | 0.5 | 8.3 Kt | " | 3.5 | 9.20 | 32.2 |
| 6.0 tons(85 ps) | 17.9 Kg/hr | 1,980 hrs | 0.5 | 17.7 Kt | " | 7.5 | 1.00 | 7.5 |
| Road tractor (400 ps) | 15.1 Kg/hr | 1,980 hrs | 0.5 | 14.9 Kt | " | 6.4 | 4.00 | 25.6 |
| | | | | | | | | |
| (Multipurpose) | | | | | | | | |
| Forklift truck 3.0 tons(42 ps) | 8.4 Kg/hr | 1,980 hrs | 0.5 | 8.3 Kt | " | 3.5 | 2.00 | 7.0 |
| 15.0 tons(110ps) | 24.2 Kg/hr | 1,980 hrs | 0.5 | 24.0 Kt | " | 10.2 | 1.00 | 10.2 |
| Mobile crane 30.0 tons | 40.0 Kg/hr | 200 hrs | 0.5 | 4.0 Kt | " | 1.7 | 1.00 | 1.7 |
| Toplifter 35.0 tons(212ps) | 39.2 Kg/hr | 1,980 hrs | 0.5 | 38.8 Kt | " | 16.5 | 1.00 | 16.5 |

(232.9 Kt)

(135.0)

G. Total 211.3

付録Ⅱ-7 道路費用

カラチーラホール道路の平均 Structural Number は 1.25 で、再舗装が必要な Structural Number 2.5 よりかなり低い値である。

荷重の大きい海上輸送コンテナを扱うためには、これらの道路は再舗装が必要である。

再舗装費用を控えめに見積るために、再舗装後の S N 値として 2.5 を採用している。

再舗装の設計厚は表層 5 cm、底層 8 cm とする。

「Third IBRD Highway Project」では、各車種別の荷重及び軸重は次のような条件で設定されている。

| | <荷重> | <前輪軸重> | <後輪軸重> |
|----------|------|--------|--------|
| 貨物積載トラック | 14トン | 28% | 72% |
| 無積載トラック | 6トン | 28% | 72% |
| バス | 10トン | 40% | 60% |

上記のプロジェクトに於て、Direction Factor は 0.5、Lane Factor は 0.9 が採用されている。

カラチーラホール間の主要道路における 1987 年の軸重 8 トンの通過頻度は日 3,000 axles と推定される。

1987 年時点で導入される 40' コンテナ・トレーラーの日当り車輛数は 75 台であり、8 トントラックは 80 台である。積載車率が 40' トレーラーで 60%、8 トン・トラックで 85% とすると、軸重 8 トン車の通過頻度は図に示した荷重条件の下では約 600 axles である。

従って、再舗装費用のコンテナ・トレーラーの負担分は 20% である。幅員 7 m 道路の Km 当り再舗装費は 67,000 US\$ とする。この場合、耐用年数を 10 年と考える。

カラチーラホール間の橋梁や他の構造物は IRC 40 トンを使って設計されているので、全般的コンテナ輸送に適しているといえる。

付録Ⅱ－8 鉄道費用

The following railway facilities for railway cost will be required if the multimodal transportation system is adopted:

| | Truck | Unit cost | | |
|---------------|-----------|-----------|---|-------------------|
| Port terminal | 2,000 m x | 143\$ | = | 286,000 |
| Access line | 3,000 m x | 286\$ | = | 858,000 |
| Inland CFS | 2,000 m x | 143\$ | = | 286,000 |
| | | | | <hr/> 1,430,000\$ |

The assumed service life of railway tracks is 20 years.

The per-km maintenance cost of these is 100,000 Rs/year.

I. Equipments for unit Train Operation

$$NE = \frac{NC \times p}{WD \times GH \times w \times AP}$$

where:

NE : Number of equipment at peak hour (units)

NC : Number of CNTR movement per year (units)

WD : Annual working days, 365 - 65 = 300 days

P : Peak day factor

GH : Gross working hours per day

w : Net working ratio

AP : Average productivity per equipment hour.

(A) Rail mount transfer crane for unit train

$$NE = \frac{54,213 \times 1.25}{300 \times 22 \times 0.4 \times 20} = 1.28 = \underline{2 \text{ units}}$$

$$NC = (DS + LS) \times U \times t$$

DS : Number of CNTR discharged from ship per year (TEU)

LS : Number of CNTR loaded to ship per year (TEU)

u : Ratio of transportation by unit train, 42.7%

t : Exchange rate from TEU to units of CNTR, 0.75

$$NC = (84,642 + 84,642) \times 0.427 \times 0.75 = 54,213 \text{ units}$$

(B) Rubber tired transfer crane for unit train

$$NE = \frac{54,213 \times 1.25}{300 \times 22 \times 0.4 \times 20} = 1.28 = \underline{2 \text{ units}}$$

(C) Yard tractor & chassis 40' (20' x 2) for unit train operation

$$4 \text{ sets of tractor \& chassis per crane} \times 2 = \underline{8 \text{ sets}}$$

(D) Wireless telephone (VHF)

- | | |
|---|----------|
| a. Rail mount transfer crane for unit train operation | 2 units |
| b. Yard tractor for unit train operation | 8 units |
| | <hr/> |
| | 10 units |

II. Equipment for CNTR yard Operation

(A) Rubber tired transfer crane

$$1. \text{ LCL by road NE} = \frac{39,656 \times 1.25}{300 \times 22 \times 0.75 \times 20} = 0.50 = \underline{1 \text{ unit}}$$

$$^x\text{NC} = (\text{IF} + \text{EF}) \times \ell \times (1 + e) \times t$$

IF : Number of import CNTR carried from the new port terminal (TEU)

EF : Number of export CNTR carried to the new port terminal (TEU)

ℓ : Percentage of LCL CNTR, 40%

e : Empty CNTR ratio to full CNTR, 1

t : Exchange rate from TEU to units of CNTR, 0.75

$$\text{NC} = (36,142 + 29,952) \times 0.4 \times (1 + 1) \times 0.75 = 39,656 \text{ units}$$

$$2. \text{ FCL by road NE} = \frac{59,485 \times 1.25}{300 \times 8 \times 0.9 \times 15} = 2.3 = \underline{3 \text{ units}}$$

$$^x\text{NC} = (\text{IF} + \text{EF}) \times f \times (1 + e) \times t$$

f : Percentage of FCL CNTR, 60%

$$\text{NC} = (36,142 + 29,952) \times 0.6 \times (1 + 1) \times 0.75 = 59,485 \text{ units}$$

Remark : The miscellaneous operations regarding inspection, repair and adjustment of CNTR are manage at other working hours than the peak ones.

(B) Weighing scale used by export FCL CNTR

$$NS = \frac{13,478 \times 1.25}{300 \times 8 \times 0.9 \times 15} = 0.5 = \underline{1 \text{ unit}}$$

$$*NC = EF \times f \times t$$

NS : Number of weighing scales

EF : Number of export ECL CNTR carried to the new port terminal (TEU)

f : Percentage of FCL CNTR, 60%

t : Exchange rate from TEU to units of CNTR, 0.75

$$NC = 29,952 \times 0.6 \times 0.75 = 13,478 \text{ units}$$

(C) Equipment and pallets for CFS Operation

1. 3 Tons fork lift trucks

$$NE = \frac{NC \times p \times AW}{WD \times GH \times w}$$

where :

NE : Number of equipment at peak hour (units)

NC : Number of LCL CNTR per year (units)

p : Peak day factor

AW : Average working hours per CNTR

Import 20 footer = 1.0 hour

Import 40 footer = 1.5 hours

Export 20 footer = 0.5 hour

Export 40 footer = 0.75 hour

WD : Annual working days, $365 - 65 = 300$ days

GH : Gross working hours per day

w : Net working hour ratio

a. Unstuffing import 20' $NE = \frac{7,228 \times 1.25 \times 1.0}{300 \times 22 \times 0.75} = 1.8 = \underline{2 \text{ units}}$

$$x_{NC} = IF \times \ell \times d$$

IF : Number of import CNTR carried from the new port terminal (TEU)

ℓ : Percentage of LCL CNTR, 40%

d : Exchange rate from TEU to units of 20' or 40' CNTR

$$NC = 36,142 \times 0.4 \times 0.5 = 7,228 \text{ units}$$

b. Unstuffing import 40' $NE = \frac{3,614 \times 1.25 \times 1.5}{300 \times 22 \times 0.75} = 1.4 = \underline{2 \text{ units}}$

$$NC = 36,142 \times 0.4 \times 0.25 = 3,614 \text{ units}$$

c. Stuffing export 20' $NE = \frac{5,990 \times 1.25 \times 0.5}{300 \times 22 \times 0.75} = 0.8 = \underline{1 \text{ unit}}$

$$NC = EF \times \ell \times d$$

EF : Number of export CNTR carried to the new port terminal (TEU)

$$NC = 29,952 \times 0.4 \times 0.5 = 5,990 \text{ units}$$

d. Stuffing export 40' $NE = \frac{2,995 \times 1.25 \times 0.75}{300 \times 22 \times 0.75} = 0.6 = \underline{1 \text{ unit}}$

$$NC = 29,952 \times 0.4 \times 0.25 = 2,995 \text{ units}$$

Total number of fork lift truck for unstuffing & stuffing cargo from/to containers; $NE_t = NE_a + NE_b + NE_c + NE_d = \underline{6 \text{ units}}$

e. The same number of equipment to the above mentioned ones (NE_t) are required to remove/feed cargo between CNTR and stack place, and receive/deliver cargo from/to consignee; $NE_e = NE_t = 6 \text{ units}$

$$\text{Grand total : } NE_t + NE_e = \underline{12 \text{ units}}$$

(D) 6 Tons fork lift truck for handling heavy cargo

One unit every 10 units of 3 tons fork lift truck; NE = 2 units

(E) Yard tractor

4 units per transfer crane for handling LCL CNTR x 1; NE = 4 units

(F) Yard chassis :

NE₂ = 12 units of 20' chassis

NE₄ = 6 units of 40' chassis

NE_t = 18 units

* Number of chassis are required three times as many as container handled at the peak hour.

Pallets with 1.8m x 1.2m two-way reversible winged type

$$NP = \frac{FS \times r \times t}{(WP + W) \times (LP + 1)}$$

where :

NP = Number of pallets (sheets)

FS = Floor space of CFS (m²)

r = Floor utilization ratio of cargo stacking space, 45%

t = Stacking tier, 1

WP = Width of pallet 1.8m

w = Width wise clearance between pallets, 0.2m

LP = Length of pallets, 1.2m

1 = Length wise clearance, 0.1m

$$NP = \frac{13,580 \times 0.45 \times 1}{(1.8 + 0.2) \times (1.2 + 0.1)} = 2,350 \text{ sheets}$$

(G) Equipments for the repair shop

a. 3 Tons fork lift truck for lifting damage CNTR on stands;

NE = 1 unit

b. 15 Tons fork lift truck with telescopic side spreader;

NE = 1 unit

(H) Multipurpose equipment.

- a. Mobile crane with 35 tons capacity for emergency measures at CNTR yard and CFS operation; NE = 1 unit
- b. 3 Tons fork lift truck for carrying cargo gears and others; NE = 2 units
- c. 15 Tons fork lift truck with telescopic side spreader for handling heavy cargo and empty CNTR; NE = 1 unit

(I) Wireless telephone (VHF)

| | |
|--------------------------------|-----------------|
| Rubber tired transfer crane | 6 |
| Yard tractor for CFS operation | 4 |
| Terminal office | 1 |
| Maintenance shop | 1 |
| CFS | 1 |
| Spare | 1 |
| Total | <u>14 units</u> |

付録Ⅱ-10 8トン・トラックの運転経費

Speed : 64 km/hr

(Unit : RS/1000km)

| | Consumption | Economic Cost | Financial Cost |
|------------------------------|--------------------|---------------|----------------|
| Fuel Consumption (lit) | 300.00 | 1,062 | 915 |
| Engine Oil Consumption (lit) | 4.60 | 37 | 46 |
| Tyre wear (Tyre) | 0.07 | 26 | 53 |
| Interest %(veh) | 0.07 | 84 | 140 |
| Maintenance | | | |
| Labour (hrs) | 20.00 | 150 | 150 |
| Parts %(veh) | 0.09 | 108 | 180 |
| Driver (hrs) | 16.00 | 160 | 160 |
| Assistant (hrs) | 16.00 | 96 | 96 |
| Subtotal | | 1,723 | 1,740 |
| Overhead | 10% of above Total | 172 | 174 |
| Total | | 1,895 | 1,914 |

Source : Economic Analysis for Highways

| | Unit Price | (Unit : Rp) |
|----------------|----------------|-----------------|
| | Economic Price | Financial Price |
| Truck | 120,000.00 | 200,000.00 |
| H.S.D. (lit) | 3.54 | 3.05 |
| Oil (lit) | 8.00 | 10.00 |
| Tyre | 375.00 | 750.00 |
| Labour (hr) | 7.50 | 7.50 |
| Driver (hr) | 10.00 | 10.00 |
| Assistant (hr) | 6.00 | 6.00 |

付録Ⅱ－Ⅺ 40'セミトレーラーの運転経費
Speed : 64 km/hr

(Unit : Rs/1000km)

| | Consumption | Economic Cost | Financial Cost |
|------------------------------|--------------------|---------------|----------------|
| Fuel Consumption (lit) | 500.00 | 1,770 | 1,525 |
| Engine Oil Consumption (lit) | 8.00 | 64 | 80 |
| Tyre Wear (Tyre) | 0.14 | 105 | 210 |
| Interest %(veh) | 0.07 | 350 | 490 |
| Maintenance | | | |
| Labour (hrs) | 23.00 | 173 | 173 |
| Parts %(veh) | 0.09 | 450 | 630 |
| Driver (hrs) | 16.00 | 160 | 160 |
| Assistant (hrs) | 16.00 | 96 | 96 |
| Subtotal | | 3,168 | 3,364 |
| Overhead | 10% of above Total | 317 | 336 |
| Total | | 3,485 | 3,700 |

Source : Economic Analysis for Highways

| | Unit Price | (Unit : Rp) |
|----------------|----------------|-----------------|
| | Economic Price | Financial Price |
| Truck | 500,000.00 | 700,000.00 |
| H.S.D. (lit) | 3.54 | 3.05 |
| Oil (lit) | 8.00 | 10.00 |
| Tyre | 750.00 | 1,500.00 |
| Labour (hr) | 7.50 | 7.50 |
| Driver (hr) | 10.00 | 10.00 |
| Assistant (hr) | 6.00 | 6.00 |

付録Ⅱ-12 コンテナ内陸輸送のために必要な輸送機器 1987/88, 1999/2000

Round Trip : 4 days

Distance : 1,220 km

1987/88

Wagons : $CT \div WD \times p \div CC \times RT$

CT : Annual throughput of CNTRS (TEU) transported to
and from new port CNTR terminal by unit train

WD : Annual Working days = 300 days

p : Peak day factor

CC : No. of TEU carried by Wagon = 3 TEU

RT : Round Trip Time = 4 days

$72,284 \div 2 \div 300 \times 1.25 \div 3 \times 4 = 200$ Wagons

Engines : $200 \text{ Wagons} \div 25 \text{ Wagons/unit Train} = 8$ Engines

Shunting Loco : 2 Engines

1999/2000

Wagons : $288,658 \div 2 \div 300 \times 1.25 \div 3 \times 4 = 800$ Wagons

Engine : $800 \text{ Wagons} \div 25 = 32$ Engines

Shunting Loco : 2 Engines

港湾の品目別コンテナ取扱量及びコンテナ当り平均貨物重量予測

1) Rice, Sugar, Cotton, Iron :

- a Total containerized cargo (1988/2000 x Import/Export)
- x b Rice/Sugar/Cotton/Iron (1988/2000 x Import/Export)
- c Total containerizable cargo (1988/2000 x Import/Export)

2) Other dry cargo by commodity:

- a Total containerized cargo (1988/2000 x Import/Export)
- x b Other dry cargo (1988/2000 x Import/Export)
- c Total containerizable cargo (1988/2000 x Import/Export)
- x d Ultimately containerized quantity by commodity (1974 x Import/Export)
- e Total ultimately containerized quantity (1974 x Import/Export)

| Cargo weight (MT) per TEU | | | | | | | | | | (IMPORT 1987 - 1988) | |
|---------------------------|-------------------------------|----------------------------------|---|-------|-------|-------|--------|-------|------------------|----------------------|-----------|
| No. | Commodity | Containerized cargo by commodity | | | | | Total | | | Cargo weight | |
| | | a | x | b | c | x | d | e | (1000MT) per TEU | (MT) per TEU | Total TEU |
| 0 | (FOOD/LIVE ANIMALS) | | | | | | | | | | |
| 01 | MEAT/PREPS | 857 | | 2,820 | 2,820 | 0.04 | 788.30 | 0.04 | 10 | 4.0 | |
| 02 | DAIRY/PRODUCTS/EGGS | | | | | 33.85 | 788.30 | 36.79 | 15 | 2,452.7 | |
| 03 | FISH/PREPS | | | | | 0.47 | 788.30 | 0.51 | 7 | 72.9 | |
| 04 | CEREALS/PREPS | | | | | | | | | | |
| | OTHERS | | | | | 4.14 | 788.30 | 4.50 | 16 | 281.3 | |
| 05 | FRUITS/VEGETABLES | | | | | 71.71 | 788.30 | 77.95 | 8 | 9,743.8 | |
| 06 | SUGAR/PREPS/HONEY | | | | | | | | | | |
| | SUGAR | | | | | 44.10 | 788.30 | 47.94 | 18 | 2,663.3 | |
| | OTHERS | | | | | 0.16 | 788.30 | 0.17 | 17 | 10.0 | |
| 07 | COFFEE/TEA/COCOA/SPICES | | | | | 10.64 | 788.30 | 11.57 | 16 | 723.1 | |
| 08 | ANIMAL FEEDING STUFF | | | | | 0.14 | 788.30 | 0.15 | 5 | 30.0 | |
| 09 | MISC. FOOD PREPS | | | | | 0.66 | 788.30 | 0.72 | 10 | 72.0 | |
| 1 | (BEVERAGES/TOBACO) | | | | | | | | | | |
| 11 | BEVERAGES | | | | | 1.47 | 788.30 | 1.60 | 18 | 88.9 | |
| 12 | TOBACO | | | | | 0.02 | 788.30 | 0.02 | 8 | 2.5 | |
| 2 | (CRUDE MATERIALS EXCL. FUELS) | | | | | | | | | | |
| 21 | HIDES/SKINS/FURS UNDRSSD | | | | | 3.21 | 788.30 | 3.49 | 18 | 193.9 | |

| No. | Commodity | Containerized cargo by commodity | | | | | | Total (1000MT) | Cargo weight (MT) per TEU | Total TEU |
|-----|---------------------------------|----------------------------------|---|-------|-------|-------|--------|-------------------|------------------------------------|--------------|
| | | a | x | b | c | d | e | | | |
| 22 | OIL SEEDS/NUTS/KERNELS | 857 | | 2,820 | 2,820 | 3.61 | 788.30 | 3.92 | 13 | 301.5 |
| 23 | RUBBER CRUDE/SYNTHETIC | | | | | 22.23 | 788.30 | 24.16 | 6 | 4,026.7 |
| 24 | WOOD/LUMBER/CORK | | | | | | | | | |
| | OTHERS | | | | | 10.68 | 788.30 | 11.61 | 13 | 893.1 |
| 25 | PULP/WASTE PAPERS | | | | | 6.87 | 788.30 | 7.47 | 17 | 439.4 |
| 26 | TEXTILE FIBRES | | | | | 91.62 | 788.30 | 99.59 | 10 | 9,959.0 |
| 29 | CRUDE ANIMAL/VEGETABLES, NES | | | | | 8.26 | 788.30 | 8.98 | 10 | 898.0 |
| 5 | (CHEMICALS) | | | | | | | | | |
| 51 | CHEM. ELEMENT COMPOUNDS | | | | | 63.72 | 788.30 | 69.26 | 12 | 5,771.7 |
| 52 | COAL/PETROLEUM, ETC. CHEM. | | | | | 0.22 | 788.30 | 0.24 | 18 | 13.3 |
| 53 | DYES/TANNING/COLOUR PROD. | | | | | 13.12 | 788.30 | 14.26 | 18 | 792.2 |
| 54 | MEDICAL, ETC. PROD. | | | | | 40.58 | 788.30 | 44.11 | 8 | 5,513.8 |
| 55 | PERFUME/CLEANING, ETC. PROD. | | | | | 1.11 | 788.30 | 1.21 | 10 | 121.0 |
| 57 | EXPLOSIVES/PYROTECH.PROD. | | | | | 0.06 | 788.30 | 0.07 | 18 | 3.9 |
| 58 | PLASTIC MATERIALS, ETC. | | | | | 25.30 | 788.30 | 27.50 | 8 | 3,437.5 |
| 59 | CHEMICALS, NES | | | | | 9.89 | 788.30 | 10.75 | 13 | 826.9 |
| 6 | (BASIC MANUFACTURES) | | | | | | | | | |
| 61 | LEATHER DRESSED/FUR, ETC. | | | | | 0.28 | 788.30 | 0.30 | 10 | 30.0 |

| No. | Commodity | Containerized cargo by commodity | | | | | | | | Total (1000MT) | Cargo weight (MT) per TEU | Total TEU | |
|-----|----------------------------------|----------------------------------|---|-------|---|-------|---|--------|---|-------------------|------------------------------------|--------------|----------|
| | | a | x | b | ÷ | c | x | d | ÷ | | | | e |
| 62 | RUBBER MANUFACTRS, NES | 857 | | 2,820 | | 2,820 | | 4.54 | | 788.30 | 4.93 | 10 | 493.0 |
| 63 | WOOD/CORK MANFCTRS, NES | | | | | | | 0.79 | | 788.30 | 0.86 | 7 | 122.9 |
| 64 | PAPER/PAPER BOARD MFRS. | | | | | | | 78.11 | | 788.30 | 84.91 | 12 | 7,075.8 |
| 65 | TEXTILE YARN/FABRIC, ETC. | | | | | | | 26.87 | | 788.30 | 29.21 | 10 | 2,921.0 |
| 66 | NONMETAL MINRL MFRS., NES | | | | | | | 7.65 | | 788.30 | 8.32 | 15 | 554.7 |
| 67 | IRON/STEEL | - | - | - | - | - | - | - | - | - | - | - | - |
| 68 | NON FERROUS METALS | | | | | | | 28.94 | | 788.30 | 31.46 | 15 | 2,097.3 |
| 69 | METAL MFRS, NES | | | | | | | 21.18 | | 788.30 | 23.02 | 17 | 1,354.1 |
| 7 | (MACHINES/TRANSPORT EQUIP.) | | | | | | | | | | | | |
| 71 | MACHINERY NON-ELECTRIC | | | | | | | 38.86 | | 788.30 | 42.24 | 8 | 5,280.0 |
| 72 | ELECTRIC MACHINERY | | | | | | | 32.59 | | 788.30 | 35.43 | 5 | 7,086.0 |
| 73 | TRANSPORT EQUIPMENT | | | | | | | | | | | | |
| | CARS | | | | | | | 41.95 | | 788.30 | 45.60 | 3 | 15,200.0 |
| | PARTS | | | | | | | 23.42 | | 788.30 | 25.46 | 8 | 3,182.5 |
| 8 | (MISC. MANUFACTURED GOODS) | | | | | | | | | | | | |
| 81 | PLUMBING/HEATING/LIGHTING EQUIP. | | | | | | | 0.47 | | 788.30 | 0.51 | 6 | 85.0 |
| 86 | INSTRUMENT/WATCHES/CLOCKS | | | | | | | 4.43 | | 788.30 | 4.82 | 10 | 482.0 |
| 89 | MISC. MANFCTRD GOODS, NES | | | | | | | 10.34 | | 788.30 | 11.24 | 8 | 1,405.0 |
| | GRAND TOTAL | | | | | | | 788.30 | | | 856.89 | 8.9 | 96,705.7 |

Cargo weight (MT) per TEU (EXPORT 1987 - 1988)

Cargo weight (MT) per TEU

| No. | Commodity | Containerized cargo by commodity | | | | | | | Total (1000MT) | Cargo weight (MT) per TEU | Total TEU |
|-----|-------------------------------|----------------------------------|---|-------|-------|---|-------|--------|-------------------|------------------------------------|--------------|
| | | a | x | b | c | x | d | e | | | |
| 0 | (FOOD/LIVE ANIMALS) | | | | | | | | | | |
| 01 | MEAT/PREPS | 890 | | 1,210 | 2,175 | | 0.04 | 696.71 | 0.03 | 10 | 3.0 |
| 03 | FISH/PREPS | 890 | | 1,210 | 2,175 | | 16.97 | 696.71 | 12.07 | 7 | 1,724.3 |
| 04 | CEREALS/PREPS | | | | | | | | | | |
| | RICE | 890 | | 465 | 2,175 | | - | - | 190.28 | 18 | 10,571.1 |
| | OTHERS | 890 | | 1,210 | 2,175 | | 8.89 | 696.71 | 6.32 | 16 | 395.0 |
| 05 | FRUITS/VEGETABLES | 890 | | 1,210 | 2,175 | | 31.62 | 696.71 | 22.48 | 8 | 2,810.0 |
| 06 | SUGAR/PREPS/HONEY | | | | | | | | | | |
| | SUGAR | 890 | | 200 | 2,175 | | - | - | 81.84 | 18 | 4,546.7 |
| | OTHERS | 890 | | 1,210 | 2,175 | | 0.86 | 696.71 | 0.61 | 17 | 35.9 |
| 07 | COFFEE/TEA/COCOA/SPICES | 890 | | 1,210 | 2,175 | | 6.77 | 696.71 | 4.81 | 16 | 300.6 |
| 08 | ANIMAL FEEDING STUFF | 890 | | 1,210 | 2,175 | | 80.28 | 696.71 | 57.08 | 5 | 11,416.0 |
| 09 | MISC. FOOD PREPS | 890 | | 1,210 | 2,175 | | 1.03 | 696.71 | 0.73 | 10 | 73.0 |
| 1 | (BEVERAGES/TOBACO) | | | | | | | | | | |
| 11 | BEVERAGES | 890 | | 1,210 | 2,175 | | 1.44 | 696.71 | 1.02 | 18 | 56.7 |
| 12 | TOBACO | 890 | | 1,210 | 2,175 | | 4.85 | 696.71 | 3.45 | 8 | 431.3 |
| 2 | (CRUDE MATERIALS EXCL. FUELS) | | | | | | | | | | |
| 21 | HIDES/SKINS/FURS UNDRSSD. | 890 | | 1,210 | 2,175 | | 0.14 | 696.71 | 0.10 | 18 | 5.6 |

| No. | Commodity | Containerized cargo by commodity | | | | | | | | Total (1000MT) | Cargo weight (MT) per TEU | Total TEU | |
|-----|-------------------------------------|----------------------------------|---|-------|---|-------|---|--------|---|-------------------|------------------------------------|--------------|----------|
| | | a | x | b | ÷ | c | x | d | ÷ | | | | e |
| 7 | (MACHINES/TRANSPORT EQUIP) | | | | | | | | | | | | |
| 71 | MACHINERY NON ELECTRIC | 890 | | 1,210 | | 2,175 | | 3.50 | | 696.71 | 2.49 | 8 | 311.3 |
| 72 | ELECTRIC MACHINERY | 890 | | 1,210 | | 2,175 | | 1.79 | | 696.71 | 1.27 | 5 | 254.0 |
| 73 | TRANSPORT EQUIPMENT | | | | | | | | | | | | |
| | CARS | 890 | | 1,210 | | 2,175 | | 0.50 | | 696.71 | 0.36 | 3 | 120.0 |
| | PARTS | 890 | | 1,210 | | 2,175 | | 0.37 | | 696.71 | 0.26 | 8 | 32.5 |
| 8 | (MISC. MANUFACTURED GOOD) | | | | | | | | | | | | |
| 81 | PLUMBING/HEATING/LIGHTING EQUIP. | 890 | | 1,210 | | 2,175 | | 1.02 | | 696.71 | 0.73 | 6 | 121.7 |
| 84 | CLOTHING | 890 | | 1,210 | | 2,175 | | 6.88 | | 696.71 | 4.89 | 5 | 978.0 |
| 85 | FOOT WEAR | 890 | | 1,210 | | 2,175 | | 5.26 | | 696.71 | 3.74 | 7 | 534.3 |
| 89 | MISC. MANUFACTURED GOODS, NES | 890 | | 1,210 | | 2,175 | | 21.30 | | 696.71 | 15.14 | 8 | 1,892.5 |
| | GRAND TOTAL | | | | | | | 696.71 | | | 890.22 | 10.8 | 82,292.5 |

| Cargo weight (MT) per TEU | | | | | | | | | | | | | | (IMPORT 1999 - 2000) | |
|---------------------------|-------------------------------|----------------------------------|---|-------|---|-------|---|-------|---|--------|----------------|---------------------------|-----------|----------------------|--|
| No. | Commodity | Containerized cargo by commodity | | | | | | | | | | Total weight (MT) per TEU | Total TEU | | |
| | | a | x | b | ÷ | c | x | d | ÷ | e | Total (1000MT) | | | | |
| 0 | (FOOD/LIVE ANIMALS) | | | | | | | | | | | | | | |
| 01 | MEAT/PREPS | 3,221 | | 4,945 | | 5,495 | | 0.04 | | 788.30 | | 0.15 | 10 | 15.0 | |
| 02 | DAIRY PRODUCTS/EGGS | | | | | | | 33.85 | | 788.30 | | 124.47 | 15 | 8,298.0 | |
| 03 | FISH/PREPS | | | | | | | 0.47 | | 788.30 | | 1.73 | 7 | 247.1 | |
| 04 | CEREALS/PREPS | | | | | | | | | | | | | | |
| | OTHERS | | | | | | | 4.14 | | 788.30 | | 15.22 | 16 | 951.3 | |
| 05 | FRUITS/VEGETABLES | | | | | | | 71.71 | | 788.30 | | 263.68 | 8 | 32,960.0 | |
| 06 | SUGAR/PREPS/HONEY | | | | | | | | | | | | | | |
| | SUGAR | | | | | | | 44.10 | | 788.30 | | 162.16 | 18 | 9,008.9 | |
| | OTHERS | | | | | | | 0.16 | | 788.30 | | 0.59 | 17 | 34.7 | |
| 07 | COFFEE/TEA/COCOA/SPICES | | | | | | | 10.64 | | 788.30 | | 39.12 | 16 | 2,445.0 | |
| 08 | ANIMAL FEEDING STUFF | | | | | | | 0.14 | | 788.30 | | 0.51 | 5 | 102.0 | |
| 09 | MISC. FOOD PREPS | | | | | | | 0.66 | | 788.30 | | 2.43 | 10 | 243.0 | |
| 1 | (BEVERAGES/TOBACO) | | | | | | | | | | | | | | |
| 11 | BEVERAGES | | | | | | | 1.47 | | 788.30 | | 5.41 | 18 | 300.6 | |
| 12 | TOBACO | | | | | | | 0.02 | | 788.30 | | 0.07 | 8 | 8.8 | |
| 2 | (CRUDE MATERIALS EXCL. FUELS) | | | | | | | | | | | | | | |
| 21 | HIDES/SKINS/FURS UNDRSSD | | | | | | | 3.21 | | 788.30 | | 11.80 | 18 | 655.6 | |
| 22 | OIL SEEDS/NUTS/KERNELS | | | | | | | 3.61 | | 788.30 | | 13.27 | 13 | 1,020.8 | |

| No. | Commodity | Containerized cargo by commodity | | | | | | | | Total (1000MT) | Cargo weight (MT) per TEU | Total TEU | |
|-----|---------------------------------|----------------------------------|---|-------|---|-------|---|-------|---|-------------------|------------------------------------|--------------|----------|
| | | a | x | b | ÷ | c | x | d | ÷ | | | | e |
| 23 | RUBBER CRUDE/SYNTHETIC | 3,221 | | 4,945 | | 5,495 | | 22.23 | | 788.30 | 81.74 | 6 | 13,623.3 |
| 24 | WOOD/LUMBER/CORK | | | | | | | | | | | | |
| | OTHERS | | | | | | | 10.68 | | 788.30 | 39.27 | 13 | 3,020.8 |
| 25 | PULP/WASTE PAPERS | | | | | | | 6.87 | | 788.30 | 25.26 | 17 | 1,485.9 |
| 26 | TEXTILE FIBRES | | | | | | | 91.62 | | 788.30 | 336.89 | 10 | 33,689.0 |
| 29 | CRUDE ANIMAL/VEGETABLES, NES | | | | | | | 8.26 | | 788.30 | 30.37 | 10 | 3,037.0 |
| 5 | (CHEMICALS) | | | | | | | | | | | | |
| 51 | CHEM. ELEMENT COMPOUNDS | | | | | | | 63.72 | | 788.30 | 234.30 | 12 | 19,525.0 |
| 52 | COAL/PETROLEUM, ETC.CHEM. | | | | | | | 0.22 | | 788.30 | 0.81 | 18 | 45.0 |
| 53 | DYES/TANNING/COLOUR PROD. | | | | | | | 13.12 | | 788.30 | 48.24 | 18 | 2,680.0 |
| 54 | MEDICAL, ETC. PROD. | | | | | | | 40.58 | | 788.30 | 149.21 | 8 | 18,651.3 |
| 55 | PERFUME/CLEANING, ETC. PROD. | | | | | | | 1.11 | | 788.30 | 4.08 | 10 | 408.0 |
| 57 | EXPLOSIVES/PYROTECH PROD. | | | | | | | 0.06 | | 788.30 | 0.22 | 18 | 12.2 |
| 58 | PLASTIC MATERIALS, ETC. | | | | | | | 25.30 | | 788.30 | 93.03 | 8 | 11,628.8 |
| 59 | CHEMICALS, NES | | | | | | | 9.89 | | 788.30 | 36.37 | 13 | 2,797.7 |
| 6 | (BASIC MANUFACTURES) | | | | | | | | | | | | |
| 61 | LEATHER DRESSED/FUR, ETC. | | | | | | | 0.28 | | 788.30 | 1.03 | 10 | 103.0 |
| 62 | RUBBER MANUFACTURES, NES | | | | | | | 4.54 | | 788.30 | 16.69 | 10 | 1,669.0 |

| No. | Commodity | Containerized cargo by commodity | | | | | | | | | | Total weight (MT) per TEU | Total TEU | |
|-----|----------------------------------|----------------------------------|---|-------|---|-------|---|--------|---|--------|----------------|---------------------------|-----------|--|
| | | a | x | b | ÷ | c | x | d | ÷ | e | Total (1000MT) | | | |
| 63 | WOOD/CORK MANFCTRS, NES. | 3,221 | | 4,945 | | 5,495 | | 0.79 | | 788.30 | 2.90 | 7 | 414.3 | |
| 64 | PAPER/PAPER BOARD MFRS. | | | | | | | 78.11 | | 788.30 | 287.21 | 12 | 23,934.2 | |
| 65 | TEXTILE YARN/FABRIC, ETC. | | | | | | | 26.87 | | 788.30 | 98.80 | 10 | 9,880.0 | |
| 66 | NONMETAL MINRL MFRS. NES | 3,221 | | 4,945 | | 5,495 | | 7.65 | | 788.30 | 28.13 | 15 | 1,875.3 | |
| 67 | IRON/STEEL | 3,221 | | 550 | | 5,495 | | - | | - | 322.39 | 18 | 17,910.6 | |
| 68 | NONFERROUS METALS | 3,221 | | 4,945 | | 5,495 | | 28.94 | | 788.30 | 106.41 | 15 | 7,094.0 | |
| 69 | METAL MFRS, NES | | | | | | | 21.18 | | 788.30 | 77.88 | 17 | 4,581.2 | |
| 7 | (MACHINES/TRANSPORT EQUIP) | | | | | | | | | | | | | |
| 71 | MACHINERY NON ELECTRIC | | | | | | | 38.86 | | 788.30 | 142.89 | 8 | 17,861.3 | |
| 72 | ELECTRIC MACHINERY | | | | | | | 32.59 | | 788.30 | 119.83 | 5 | 23,966.0 | |
| 73 | TRANSPORT EQUIPMENT | | | | | | | | | | | | | |
| | CARS | | | | | | | 41.95 | | 788.30 | 154.25 | 3 | 51,416.7 | |
| | PARTS | | | | | | | 23.42 | | 788.30 | 86.12 | 8 | 10,765.0 | |
| 8 | (MISC. MANUFACTURED GOODS) | | | | | | | | | | | | | |
| 81 | PLUMBING/HEATING/LIGHTING EQUIP. | | | | | | | 0.47 | | 788.30 | 1.73 | 6 | 288.3 | |
| 86 | INSTRUMENT/WATCHES/CLOCKS | | | | | | | 4.43 | | 788.30 | 16.29 | 10 | 1,629.0 | |
| 89 | MISC. MANFCTRD GOODS, NES | | | | | | | 10.34 | | 788.30 | 38.02 | 8 | 4,752.5 | |
| | GRAND TOTAL | | | | | | | 788.30 | | | 3,220.97 | 9.3 | 345,035.2 | |

| Cargo weight (MT) per TEU | | | | | | | | | | | (EXPORT 1999 ~ 2000) | | | |
|---------------------------|-------------------------------|----------------------------------|---|-------|---|-------|---|-------|--------|------------------------------|------------------------------------|--------------|----------|--|
| No. | Commodity | Containerized cargo by commodity | | | | | | | | Total (1000MT) per TEU | Cargo weight (MT) per TEU | Total TEU | | |
| | | a | x | b | ÷ | c | x | d | ÷ | | | | e | |
| 0 | (FOOD/LIVE ANIMALS) | | | | | | | | | | | | | |
| 01 | MEAT/PREPS | 2,655 | | 2,120 | | 3,270 | | 0.04 | 696.71 | 0.10 | 10 | | 10.0 | |
| 03 | FISH/PREPS | 2,655 | | 2,120 | | 3,270 | | 16.97 | 696.71 | 41.92 | 7 | | 5,988.6 | |
| 04 | CEREALS/PREPS | | | | | | | | | | | | | |
| | RICE | 2,655 | | 650 | | 3,270 | | - | - | 527.75 | 18 | | 29,319.4 | |
| | OTHERS | 2,655 | | 2,120 | | 3,270 | | 8.89 | 696.71 | 21.96 | 16 | | 1,372.5 | |
| 05 | FRUITS/VEGETABLES | 2,655 | | 2,120 | | 3,270 | | 31.62 | 696.71 | 78.10 | 8 | | 9,762.5 | |
| 06 | SUGAR/PREPS/HONEY | | | | | | | | | | | | | |
| | SUGAR | 2,655 | | 200 | | 3,270 | | - | - | 162.39 | 18 | | 9,021.7 | |
| | OTHERS | 2,655 | | 2,120 | | 3,270 | | 0.86 | 696.71 | 2.12 | 17 | | 124.7 | |
| 07 | COFFEE/TEA/COCOA/SPICES | 2,655 | | 2,120 | | 3,270 | | 6.77 | 696.71 | 16.72 | 16 | | 1,045.0 | |
| 08 | ANIMAL FEEDING STUFF | 2,655 | | 2,120 | | 3,270 | | 80.28 | 696.71 | 198.29 | 5 | | 39,658.0 | |
| 09 | MISC. FOOD PREPS | 2,655 | | 2,120 | | 3,270 | | 1.03 | 696.71 | 2.54 | 10 | | 254.0 | |
| 1 | (BEVERAGES/TOBACO) | | | | | | | | | | | | | |
| 11 | BEVERAGES | 2,655 | | 2,120 | | 3,270 | | 1.44 | 696.71 | 3.56 | 18 | | 197.8 | |
| 12 | TOBACO | 2,655 | | 2,120 | | 3,270 | | 4.85 | 696.71 | 11.98 | 8 | | 1,479.5 | |
| 2 | (CRUDE MATERIALS EXCL. FUELS) | | | | | | | | | | | | | |
| 21 | HIDES/SKINS/FURS UNDRSSD | 2,655 | | 2,120 | | 3,270 | | 0.14 | 696.71 | 0.35 | 18 | | 19.4 | |

| No. | Commodity | Containerized cargo by commodity | | | | | | | | | | Cargo weight | |
|-----|------------------------------|----------------------------------|-------|-------|--------|--------|--------|----|----------|---|----------------|--------------|-----------|
| | | a | x | b | ÷ | c | x | d | ÷ | e | Total (1000MT) | per TEU | Total TEU |
| 22 | OIL SEEDS/NUTS/KERNELS | 2,655 | 2,120 | 3,270 | 12.52 | 696.71 | 30.92 | 13 | 2,378.5 | | | | |
| 25 | PULPS/WASTE PAPERS | 2,655 | 2,120 | 3,270 | 0.20 | 696.71 | 0.49 | 17 | 28.8 | | | | |
| 26 | TEXTILE FIBRES | 2,655 | 2,120 | 3,270 | 67.33 | 696.71 | 166.31 | 10 | 16,631.0 | | | | |
| | COTTON | 2,655 | 300 | 3,270 | - | - | 243.58 | 10 | 24,358.0 | | | | |
| 29 | CRUDE ANIMAL/VEGETABLES, NES | 2,655 | 2,120 | 3,270 | 76.15 | 696.71 | 188.09 | 10 | 18,809.0 | | | | |
| 6 | (BASIC MANUFACTURES) | | | | | | | | | | | | |
| 61 | LEATHER DRESSED/FUR, ETC. | 2,655 | 2,120 | 3,270 | 25.50 | 696.71 | 62.99 | 10 | 6,299.0 | | | | |
| 62 | RUBBER MANUFACTURES, NES | 2,655 | 2,120 | 3,270 | 0.83 | 696.71 | 2.05 | 10 | 205.0 | | | | |
| 63 | WOOD/CORK MANUFACTURES, NES | 2,655 | 2,120 | 3,270 | 0.42 | 696.71 | 1.04 | 7 | 148.6 | | | | |
| 64 | PAPER/PAPER BOARD MFRS. | 2,655 | 2,120 | 3,270 | 0.89 | 696.71 | 2.20 | 12 | 183.3 | | | | |
| 65 | TEXTILE YARN/FABRIC, ETC. | 2,655 | 2,120 | 3,270 | 235.59 | 696.71 | 581.91 | 10 | 58,191.0 | | | | |
| 66 | NONMETAL MINERAL MFRS, NES | | | | | | | | | | | | |
| | OTHERS | 2,655 | 2,120 | 3,270 | 53.80 | 696.71 | 132.89 | 15 | 8,859.3 | | | | |
| 67 | IRON/STEEL | 2,655 | 2,120 | 3,270 | 5.50 | 696.71 | 13.59 | 18 | 755.0 | | | | |
| 68 | NON FERROUS METALS | 2,655 | 2,120 | 3,270 | 0.20 | 696.71 | 0.49 | 15 | 32.7 | | | | |
| 69 | METAL MFRS, NES | 2,655 | 2,120 | 3,270 | 24.27 | 696.71 | 59.95 | 17 | 3,526.5 | | | | |
| 7 | (MACHINES/TRANSPORT EQUIP.) | | | | | | | | | | | | |
| 71 | MACHINERY NONELECTRIC | 2,655 | 2,120 | 3,270 | 3.50 | 696.71 | 8.65 | 8 | 1,081.3 | | | | |
| 72 | ELECTRIC MACHINERY | 2,655 | 2,120 | 3,270 | 1.79 | 696.71 | 4.42 | 5 | 884.0 | | | | |

| No. | Commodity | Containerized cargo by commodity | | | | | | | Total (1000MT) | Cargo weight (MT) per TEU | Total TEU | | |
|-----|-----------------------------------|----------------------------------|---|-------|---|-------|---|--------|-------------------|------------------------------------|--------------|------|-----------|
| | | a | x | b | ÷ | c | x | d | | | | ÷ | e |
| 73 | TRANSPORT EQUIPMENT | | | | | | | | | | | | |
| | CARS | 2,655 | | 2,120 | | 3,270 | | 0.50 | | 696.71 | 1.24 | 3 | 413.3 |
| | PARTS | 2,655 | | 2,120 | | 3,270 | | 0.37 | | 696.71 | 0.91 | 8 | 113.8 |
| 8 | (MISC. MANUFACTURED GOOD) | | | | | | | | | | | | |
| 81 | PLUMBG/HEATING/LIGHTING EQUIP. | 2,655 | | 2,120 | | 3,270 | | 1.02 | | 696.71 | 2.52 | 6 | 420.0 |
| 84 | CLOTHING | 2,655 | | 2,120 | | 3,270 | | 6.88 | | 696.71 | 16.99 | 5 | 3,398.0 |
| 85 | FOOT WEAR | 2,655 | | 2,120 | | 3,270 | | 5.26 | | 696.71 | 12.99 | 7 | 1,855.7 |
| 89 | MISC. MANUFACTURED GOODS, NES | 2,655 | | 2,120 | | 3,270 | | 21.30 | | 696.71 | 52.61 | 8 | 6,576.3 |
| | GRAND TOTAL | | | | | | | 696.71 | | 696.71 | 2,654.61 | 10.5 | 253,401.2 |

港湾コンテナターミナルのコンテナ蔵置面積予測

The required ground slots of CNTR can be calculated using the following formula:

$$GS = \frac{NC \times CS}{t \times n \times WD}$$

Where, GS : Number of ground slots of CNTR (TEU)

NC : Number of CNTR handled per year (TEU)

CS : Days of CNTR's stay (dwell time) in terminal

t : Number of stacking tiers of CNTR (stacking height)
for rubber tired transfer crane

n : Net stacking CNTR ratio exclusive of operational
allowance for slot availability due to reservation,
shifting or congestion

WD : Annual working days, 365 - 65 = 300 days.

| | Handling mode of CNTR | CS | t | n |
|---|--|----|---|-----|
| a | Import FCL dry CNTR by rail | 4 | 3 | 0.9 |
| b | Import FCL special CNTR by rail | 4 | 1 | 0.9 |
| c | Import FCL dry CNTR by road | 14 | 2 | 0.7 |
| d | Import FCL special CNTR by road | 14 | 1 | 0.9 |
| e | Import LCL dry CNTR by rail & road | 4 | 3 | 0.9 |
| f | Import LCL special CNTR by rail & road | 4 | 1 | 0.9 |
| g | Export FCL dry CNTR by rail | 7 | 3 | 0.5 |
| h | Export FCL special CNTR by rail | 7 | 1 | 0.9 |
| i | Export FCL dry CNTR by road | 7 | 3 | 0.5 |
| j | Export FCL special CNTR by road | 7 | 1 | 0.9 |
| k | Export LCL dry CNTR by rail & road | 5 | 3 | 0.5 |
| l | Export LCL special CNTR by rail & road | 5 | 1 | 0.9 |
| m | Empty CNTR for stuffing export cargo | 14 | 3 | 0.9 |
| n | Export empty CNTR | 7 | 3 | 0.9 |
| o | Tranship dry & empty CNTR | 14 | 3 | 0.7 |
| p | Tranship special CNTR | 14 | 1 | 0.9 |

1. Master plan (1999–2000)

a. Import FCL dry CNTR by rail; $GSa = \frac{129,896 \times 4}{3 \times 0.9 \times 300} = \underline{642 \text{ TEU}}$

* $NC = IFR \times d$

IFR : Number of import FCL CNTR carried by rail per year (TEU)

d : Dry CNTR ratio of FCL CNTR by rail, 90%

$NC = 144,329 \times 0.9 = 129,896 \text{ TEU}$

b. Import FCL special CNTR by rail; $GSb = \frac{14,433 \times 4}{1 \times 0.9 \times 300} = \underline{214 \text{ TEU}}$

* $NC = IFR \times c$

c : Special CNTR ratio of FCL CNTR by rail, 10%

$NC = 144,329 \times 0.1 = 14,433 \text{ TEU}$

c. Import FCL dry CNTR by road; $GSc = \frac{63,275 \times 14}{2 \times 0.7 \times 300} = \underline{2,110 \text{ TEU}}$

* $NC = IFD \times d$

IFD : Number of import FCL CNTR carried by road per year (TEU)

$NC = 70,305 \times 0.9 = 63,275 \text{ TEU}$

d. Import FCL special CNTR by road; $GSd = \frac{7,031 \times 14}{1 \times 0.9 \times 300} = \underline{365 \text{ TEU}}$

* $NC = IFD \times c$

$NC = 70,305 \times 0.1 = 7,031 \text{ TEU}$

e. Import LCL dry CNTR by rail & road; $GSe = \frac{80,615 \times 4}{3 \times 0.9 \times 300} = \underline{398 \text{ TEU}}$

* $NC = (ILR + ILD) \times d$

ILR : Number of import LCL CNTR carried by rail per year (TEU)

ILD : Number of import LCL CNTR carried by road per year (TEU)

$NC = (18,590 + 70,982) \times 0.9 = 80,615 \text{ TEU}$

f. Import LCL special CNTR by rail & road; $GSf = \frac{8,957 \times 4}{1 \times 0.9 \times 300} = \underline{133 \text{ TEU}}$

* $NC = (ILR + ILD) \times c$

$NC = (18,590 + 70,982) \times 0.1 = 8,957 \text{ TEU}$

g. Export FCL dry CNTR by rail; $GSg = \frac{86,390 \times 7}{3 \times 0.5 \times 300} = \underline{1,344 \text{ TEU}}$

* $NC = EFR \times d$

EFR : Number of export FCL CNTR carried by rail per year (TEU)

$NC = 95,989 \times 0.9 = 86,390 \text{ TEU}$

h. Export FCL special CNTR by rail; $GSh = \frac{9,599 \times 7}{1 \times 0.9 \times 300} = \underline{249 \text{ TEU}}$

* $NC = EFR \times c$

$NC = 95,989 \times 0.1 = 9,599 \text{ TEU}$

i. Export FCL dry CNTR by road; $GSi = \frac{39,848 \times 7}{3 \times 0.5 \times 300} = \underline{620 \text{ TEU}}$

* $NC = EFD \times d$

EFD: Number of export FCL CNTR carried by road per year (TEU)

$NC = 44,276 \times 0.9 = 39,848 \text{ TEU}$

j. Export FCL special CNTR by road; $GSj = \frac{4,428 \times 7}{1 \times 0.9 \times 300} = \underline{115 \text{ TEU}}$

* $NC = EFD \times c$

$NC = 44,276 \times 0.1 = 4,428 \text{ TEU}$

k. Export LCL dry CNTR by rail & road; $GSk = \frac{58,405 \times 5}{3 \times 0.5 \times 300} = \underline{650 \text{ TEU}}$

* $NC = (ELR + ELD) \times d$

ELR : Number of export LCL CNTR carried by rail per year (TEU)

ELD : Number of export LCL CNTR carried by road per year (TEU)

$NC = (9,801 + 55,093) \times 0.9 = 58,405 \text{ TEU}$

l. Export LCL special CNTR by rail & road; $GS_l = \frac{6,489 \times 5}{1 \times 0.9 \times 300} = \underline{121 \text{ TEU}}$

* $NC = (ELR + ELD) \times c$

$NC = (9,801 + 55,093) \times 0.1 = 6,489 \text{ TEU}$

$$m. \text{ Empty CNTR for stuffing export cargo; } GSm = \frac{87,032 \times 14}{3 \times 0.9 \times 300} = \underline{1,505 \text{ TEU}}$$

$$* NC = EFD \times e + (FLR + FLD)$$

e : Percentage of empty CNTR stored at terminal, 50%

$$NC = 44,276 \times 0.5 + 9,801 + 55,093 = 87,032 \text{ TEU}$$

$$n. \text{ Export empty CNTR; } GS_n = \frac{99,047 \times 7}{3 \times 0.9 \times 300} = \underline{856 \text{ TEU}}$$

$$\begin{aligned} * NC &= (IFR + ILR + IFD + ILD) - (EFR + ELR + EFD + ELD) \\ &= (144,329 + 18,590 + 70,305 + 70,982) - (95,989 + 9,801 \\ &\quad + 44,276 + 55,093) = 99,047 \text{ TEU} \end{aligned}$$

$$o. \text{ Tranship dry \& empty CNTR; } GSo = \frac{32,111 \times 14}{3 \times 0.7 \times 300} = \underline{714 \text{ TEU}}$$

$$* NC = IF \left\{ \left(\frac{tf}{100-tf-te} \right) \times d + \left(\frac{te}{100-tf-te} \right) \right\}$$

IF : Number of import full CNTR discharged per year (TEU)

tf : Percentage of tranship full CNTR, 5%

te : Percentage of tranship empty CNTR, 5%

$$NC = 304,206 \left\{ \left(\frac{5}{100-10} \right) \times 0.9 + \left(\frac{5}{100-10} \right) \right\} = 32,111 \text{ TEU}$$

$$p. \text{ Tranship special CNTR; } GSp = \frac{1,690 \times 14}{1 \times 0.9 \times 300} = \underline{88 \text{ TEU}}$$

$$* NC = IF \times \left(\frac{tf}{100-tf-te} \right) \times c$$

$$NC = 304,206 \left(\frac{5}{100-10} \right) \times 0.1 = 1,690 \text{ TEU}$$

$$\text{Total ground slots: } GSt = GSa + \text{---} + GSp = \underline{\underline{10,124 \text{ TEU}}}$$

* Reference No.1: The same number of chassis (TEU) to the total stacking slots, exclusive of operational margin for the rubber-tired transfer crane system, are required for the all chassis system.

| | | |
|-----------------------|-------------------------------|-----|
| Total stacking slots: | 642 (GSa) x 0.9 x 3 = 1,734 | TEU |
| | 214 (GSb) x 0.9 x 1 = 193 | " |
| | 2,110 (GSc) x 0.7 x 2 = 2,954 | " |
| | 365 (GSd) x 0.9 x 1 = 329 | " |
| | 398 (GSe) x 0.9 x 3 = 1,075 | " |
| | 133 (GSf) x 0.9 x 1 = 120 | " |
| | 1,344 (GSg) x 0.5 x 3 = 2,016 | " |
| | 249 (GSh) x 0.9 x 1 = 224 | " |
| | 620 (GSi) x 0.5 x 3 = 930 | " |
| | 115 (GSj) x 0.9 x 1 = 104 | " |
| | 650 (GSk) x 0.5 x 3 = 975 | " |
| | 121 (GS1) x 0.9 x 1 = 109 | " |
| | 1,505 (GSm) x 0.9 x 3 = 4,064 | " |
| | 856 (GSn) x 0.9 x 3 = 2,311 | " |
| | 714 (GSo) x 0.7 x 3 = 1,499 | " |
| | 88 (GSp) x 0.9 x 1 = 79 | TEU |
| | <hr/> | |
| | 18,716 | TEU |
| | <hr/> | |

∴ The necessary number of chassis

$$20 \text{ footer : } 18,716 \times 0.5 = \underline{9,358 \text{ units}}$$

$$40 \text{ footer : } 18,716 \times 0.25 = \underline{4,679 \text{ units}}$$

* Reference No.2: The required ground slots of refrigerated CNTR at CNTR yard are calculated as follows:

$$GSr = (GSb + GSd + GSf + GSh + GSj + GS1 + GSp) \times \gamma + GSq$$

GSr : Ground slots of refrigerated CNTR

γ : Refrigerated CNTR ratio to all special ones, 0.3

GSq : Ground slots of empty refrigerated CNTR for pretrip (cooling)

$$GSq = \frac{2,611 \times 3}{1 \times 0.9 \times 300} = 29 \text{ TEU}$$

CS : Days of CNTR's stay, 3 days

$$NC = EFD \times c \times e \times \gamma + (FLR + FLD) \times c \times \gamma$$

$$= 44,276 \times 0.1 \times 0.5 \times 0.3 + (9,801 + 55,093) \times$$

$$0.1 \times 0.3 = 2,611 \text{ TEU}$$

$$\therefore GSr = (214 + 365 + 133 + 249 + 115 + 121 + 88) \times$$

$$0.3 + 29 = \underline{\underline{415 \text{ TEU}}}$$

2. Urgent plan (1987-1988)

a. Import FCL dry CNTR by rail; $GSa = \frac{32,528 \times 4}{3 \times 0.9 \times 300} = \underline{161 \text{ TEU}}$

* $NC = IFR \times d$

IFR : Number of import FCL CNTR carried by rail per year (TEU)

d : Dry CNTR ratio of FCL CNTR by rail, 90%

$NC = 36,142 \times 0.9 = 32,528 \text{ TEU}$

b. Import FCL special CNTR by rail; $GSb = \frac{3,614 \times 4}{1 \times 0.9 \times 300} = \underline{54 \text{ TEU}}$

* $NC = IFR \times c$

c : Special CNTR ratio of FCL CNTR by rail, 10%

$NC = 36,142 \times 0.1 = 3,614 \text{ TEU}$

c. Import FCL dry CNTR by road; $GSc = \frac{15,845 \times 14}{2 \times 0.7 \times 300} = \underline{529 \text{ TEU}}$

* $NC = IFD \times d$

IFD : Number of import FCL CNTR carried by road per year (TEU)

$NC = 17,606 \times 0.9 = 15,845 \text{ TEU}$

d. Import FCL special CNTR by road; $GSd = \frac{1,761 \times 14}{1 \times 0.9 \times 300} = \underline{92 \text{ TEU}}$

* $NC = IFD \times c$

$NC = 17,606 \times 0.1 = 1,761$

e. Import LCL dry CNTR by rail & road; $GSe = \frac{20,187 \times 4}{3 \times 0.9 \times 300} = \underline{100 \text{ TEU}}$

* $NC = (ILR + ILD) \times d$

ILR : Number of import LCL CNTR carried by rail per year (TEU)

ILD : Number of import LCL CNTR carried by road per year (TEU)

$NC = (4,740 + 17,690) \times 0.9 = 20,187 \text{ TEU}$

f. Import LCL special CNTR by rail & road; $GSf = \frac{2,243 \times 4}{1 \times 0.9 \times 300} = \underline{34 \text{ TEU}}$

* $NC = (ILR + ILD) \times c$

$NC = (4,740 + 17,690) \times 0.1 = 2,243 \text{ TEU}$

- g. Export FCL dry CNTR by rail; $GSg = \frac{26,957 \times 7}{3 \times 0.5 \times 300} = \underline{420 \text{ TEU}}$
 * $NC = EFR \times d$
 EFR : Number of export FCL CNTR carried by rail per year (TEU)
 $NC = 29,952 \times 0.9 = 26,957 \text{ TEU}$
- h. Export FCL special CNTR by rail; $GSh = \frac{2,995 \times 7}{1 \times 0.9 \times 300} = \underline{78 \text{ TEU}}$
 * $NC = EFR \times c$
 $NC = 29,952 \times 0.1 = 2,995 \text{ TEU}$
- i. Export FCL dry CNTR by road; $GSi = \frac{11,804 \times 7}{3 \times 0.5 \times 300} = \underline{184 \text{ TEU}}$
 * $NC = EFD \times d$
 EFD : Number of export FCL CNTR carried by road per year (TEU)
 $NC : 13,115 \times 0.9 = 11,804 \text{ TEU}$
- j. Export FCL special CNTR by road; $GSj = \frac{1,312 \times 7}{1 \times 0.9 \times 300} = \underline{34 \text{ TEU}}$
 * $NC = EFD \times c$
 $NC = 13,115 \times 0.1 = 1,312 \text{ TEU}$
- k. Export LCL dry CNTR by rail & road; $GSk = \frac{19,494 \times 5}{3 \times 0.5 \times 300} = \underline{217 \text{ TEU}}$
 * $NC = (ELR + ELD) \times d$
 ELR : Number of export LCL CNTR carried by rail per year (TEU)
 ELD : Number of export LCL CNTR carried by road per year (TEU)
 $NC = (3,554 + 18,106) \times 0.9 = 19,494 \text{ TEU}$
- l. Export LCL special CNTR by rail & road; $GSe = \frac{2,166 \times 5}{1 \times 0.9 \times 300} = \underline{41 \text{ TEU}}$
 * $NC = (ELR + ELD) \times c$
 $NC = (3,554 + 18,106) \times 0.1 = 2,166 \text{ TEU}$
- m. Empty CNTR for stuffing export cargo; $GSm = \frac{28,218 \times 14}{3 \times 0.9 \times 300} = \underline{488 \text{ TEU}}$
 * $NC = EFD \times e + (FLR + FLD)$
 e : Percentage of empty CNTR stored at terminal, 50%
 $NC = 13,115 \times 0.5 + (3,554 + 18,106) = 28,218 \text{ TEU}$

$$n. \text{ Export empty CNTR; } GSn = \frac{11,451 \times 7}{3 \times 0.9 \times 300} = \underline{99 \text{ TEU}}$$

$$\begin{aligned} * NC &= (IFR + ILR + IFD + ILD) - (EFR + ELR + EFD + ELD) \\ &= (36,142 + 4,740 + 17,606 + 17,690) - (29,952 + 3,554 + \\ &\quad 13,115 + 18,106) = \underline{11,451 \text{ TEU}} \end{aligned}$$

$$o. \text{ Tranship dry \& empty CNTR; } GSo = \frac{8,041 \times 14}{3 \times 0.7 \times 300} = \underline{179 \text{ TEU}}$$

$$* NC = IF \left\{ \left(\frac{tf}{100-tf-te} \right) \times d + \left(\frac{te}{100-tf-te} \right) \right\}$$

IF : Number of import full CNTR discharged per year (TEU)

tf : Percentage of tranship full CNTR, 5%

te : Percentage of tranship empty CNTR, 5%

$$NC = 76,178 \left\{ \left(\frac{5}{100-10} \right) \times 0.9 + \left(\frac{5}{100-10} \right) \right\} = 8,041 \text{ TEU}$$

$$p. \text{ Tranship special CNTR; } GSp = \frac{423 \times 14}{1 \times 0.9 \times 300} = \underline{22 \text{ TEU}}$$

$$* NC = IF \times \left(\frac{tf}{100-tf-te} \right) \times c$$

$$NC = 76,178 \times \left(\frac{5}{100-10} \right) \times 0.1 = 423 \text{ TEU}$$

$$\text{Total ground slots: } GSt = GSa + \text{---} + GSp = \underline{\underline{2,732 \text{ TEU}}}$$

* Reference : The required ground slots of refrigerated CNTR at CNTR yard are calculated as follows:

$$GSr = (GSb + GSd + GSf + GSh + GSj + GS1 + GSp) \times \gamma + GSq$$

GSr : Ground slots of refrigerated CNTR

γ : Refrigerated NCTR ratio to all special ones, 0.3

GSq : Ground slots of empty refrigerated CNTR for pretrip (cooling)

$$GSq = \frac{847 \times 3}{1 \times 0.9 \times 300} = \underline{10 \text{ TEU}}$$

CS : Days of CNTR's stay, 3 days

$$\begin{aligned} NC &= EFD \times c \times e \times \gamma + (FLR + FLD) \times c \times \gamma \\ &= 13,115 \times 0.1 \times 0.5 \times 0.3 + (3,554 + 18,106) \times 0.1 \times 0.3 = 847 \text{ TEU} \end{aligned}$$

$$\therefore GSr = (54 + 92 + 34 + 78 + 34 + 41 + 22) \times 0.3 + 10 = \underline{\underline{117 \text{ TEU}}}$$

港湾コンテナターミナルのコンテナプレートステーション上屋面積予測

The floor space of CFS is calculated by the following equation:

$$FS = \frac{(IR + ID + ER + ED) \times DS}{\omega \times \gamma \times WD}$$

Where;

- FS : Floor space of CFS (m²)
- IR : Import LCL cargo volume by rail (MT)
- ID : Import LCL cargo volume by road (MT)
- ER : Export LCL cargo volume by rail (MT)
- ED : Export LCL cargo volume by road (MT)
- DS : Days of cargo stay in CFS, 7 days
- ω : Average weight of cargo stacked in storage space, 1.0 MT/m²
- γ : Coefficient of floor utilization for storing cargo, 0.45
- WD : Annual working days, 365 - 65 = 300 days

a. Urgent plan

$$FS = \frac{(42,507 + 159,745 + 39,160 + 198,648) \times 7}{1 \times 0.45 \times 300} = \underline{\underline{22,818 \text{ m}^2}}$$

$$\text{LCL by rail} = 4,235 \text{ m}^2$$

$$\text{LCL by road} = 18,583 \text{ m}^2$$

b. Master plan

$$FS = \frac{(169,747 + 637,919 + 106,067 + 607,066) \times 7}{1 \times 0.45 \times 300} = \underline{\underline{78,856 \text{ m}^2}}$$

$$\text{LCL by rail} = 14,301 \text{ m}^2$$

$$\text{LCL by road} = 64,555 \text{ m}^2$$

港湾コンテナターミナルの荷役機械数量予測 (基本計画)

The necessary number of equipment is calculated as follows:

- (1) Container cranes: 2 units per berth
(12 units per terminal)

Average productivity per crane hour = 20 movements (units)

Gross working hour per day = 22 hours

Net working hour ratio = 0.75

Ordinary productivity per berth day = $20 \times 22 \times 0.75 \times 2 = 660$ movements

- (2) Equipment for unit train and CNTR yard operation

$$NE = \frac{NC \times P}{WD \times GH \times w \times AP}$$

Where:

NE : Number of equipment at peak hour (units)

NC : Number of CNTR movements per year (units)

WD : Annual working days, $365 - 65 = 300$ days

P : Peak day factor

GH : Gross working hours per day

w : Net working hours ratio

AP : Average productivity per equipment hour

- (A)-1 Rail-mounted transfer cranes for unit train

$$NE = \frac{36,082 \times 1.25}{300 \times 22 \times 0.4 \times 20} = 0.9 = 1 \text{ unit per berth (6 units per terminal)}$$

$$* NC = (DS + LS) \times u \times t \div NB$$

DS : Number of CNTR discharged from ship per year (TEU)

LS : Number of CNTR loaded to ship per year (TEU)

u : Ratio of transportation by unit train, 0.427

t : Exchange rate from TEU to units of CNTR, 0.75

NB : Number of berths, 6

$$NC = (338,007 + 338,007) \times 0.427 \times 0.75 \div 6 = 36,082 \text{ units per berth}$$

(A)-2 Top lifter for unit train

$$NE = \frac{36,082 \times 1.25}{300 \times 22 \times 0.4 \times 14} = 1.2 = 2 \text{ units per berth (12 units per terminal)}$$

(B)-1 Rail-mounted
Rubber-tired) transfer cranes at CNTR yard.

a. Ship's operation : $NE_a = \frac{PB}{GH \times w \times AP}$

PB : Ordinary productivity per berth day (units)

GH : Gross working hours per day

w : Net working hour ratio, 0.75

AP : Average productivity per equipment hour, 20

$$NE_a = \frac{660}{22 \times 0.75 \times 20} = 2 \text{ units}$$

b. Unit train : $NE_b = \frac{36,082 \times 1.25}{300 \times 22 \times 0.4 \times 20} = 0.9 = 1 \text{ unit}$

c. LCL by rail & road: $NE_c = \frac{38,617 \times 2.5}{300 \times 22 \times 0.75 \times 20} = 1 \text{ unit}$

$$* NC = (IL + EL) \times t \div NB \times (1 + e)$$

IL : Number of import LCL CNTR by rail & road (TEU)

EL : Number of export LCL CNTR (TEU)

t : Exchange rate from TEU to units of CNTR, 0.75

NB : Number of berths, 6

e : Percentage of empty CNTR stored at terminal, 100%

$$NC = (89,572 + 64,894) \times 0.75 \div 6 \times (1 + 1) = 38,617 \text{ units}$$

d. FCL by road : $NE_d = \frac{23,111 \times 1.5}{300 \times 8 \times 0.9 \times 12} = 1.3 = 2 \text{ units}$

$$* NC = 2(IF + e \times EF) \times t \div NB$$

IF : Number of import FCL CNTR by road (TEU)

EF : Number of export FCL CNTR (TEU)

e : Percentage of empty CNTR stored at terminal, 50%

$$NC = 2(70,305 + 0.5 \times 44,276) \times 0.75 \div 6 = 23,111 \text{ units}$$

Total number of transfer cranes : $NE_t = NE_a + NE_b + NE_c + NE_d$
 $= 6$ units per berth
(36 units per terminal)

Remark : The miscellaneous operations regarding inspection, repair and adjustment of CNTR are managed at other working hours than the peak ones.

e. Tractors & chassis 40' (20' x 2) for ship's operation

4 sets of tractors & chassis per crane x 2 = 8 sets per berth
(48 sets per terminal)

f. Tractors & chassis 40' (20' x 2) for unit train operation

4 sets of tractors & chassis per crane x 1 = 4 sets per berth
(24 sets per terminal)

(B)-2 All straddle carrier

a. Ship's operation : $NE_a = \frac{660}{22 \times 0.75 \times 12} = 3.3 = 4$ units

b. Unit train : $NE_b = \frac{36,082 \times 1.25}{300 \times 22 \times 0.4 \times 12} = 14 = 2$ units

c. LCL by rail & road: $NE_c = \frac{38,617 \times 2.5}{300 \times 22 \times 0.75 \times 12} = 1.6 = 2$ units

d. FCL by road : $NE_d = \frac{23,111 \times 1.5}{300 \times 8 \times 0.9 \times 12} = 1.3 = 2$ units

e. Spare : $NE_e = 1$ unit

Total number of straddle carriers: $NE_t = NE_a + NE_b + NE_c + NE_d + NE_e$
 $= 11$ units per berth
(66 units per terminal)

f. Tractors & chassis 40' (20' x 2) for unit train operation

4 sets per crane x 1 = 4 sets per berth
(24 sets per terminal)

(B)-3 Combined system of rubber tired transfer cranes and straddle carriers

| | Transfer cranes | Straddle carriers |
|---------------------------|--------------------------------------|-------------------|
| a. Ship's operation | 2 units | 2 units |
| b. Unit train | 1 | 1 |
| c. Delivery of import FCL | 1 | 1 |
| d. Spare | 0 | 1 |
| Total | 4 units | 5 units per berth |
| | (24 units and 30 units per terminal) | |

The above number of equipment are required at least when most operations are concentrated in a service area of the transfer crane or the straddle carrier.

e. Tractors & chassis 40' (20' x 2) for ship's operation

4 sets per crane x 2 = 8 sets per berth
(48 sets per terminal)

f. Tractors & chassis 40' (20' x 2) for unit train operation

4 sets per crane x 1 = 4 sets per berth
(24 sets per terminal)

(B)-4 All chassis and shifters

- a. Chassis : 592 units of 20 footer and 296 units of 40 footer chassis per berth.
3,552 units of 20 footer and 1,776 units of 40 footer chassis per terminal.

b. Tractors

Ship's operation : 4 units per CNTR crane x 2 = 8 units

Unit train " : 4 units per crane x 1 = 4 units

Gate operation : 4 units per shifter x 2 = 8 units

Total : 20 units
(120 units per terminal)

c. Shifters:
$$NE_c = \frac{23,111 \times 1.5}{300 \times 8 \times 0.9 \times 15} = 1.1 = 2 \text{ units per berth}$$

(12 units per terminal)

(B)-5 Top lifters and chassis feed

a. Ship's operation :
$$NE_a = \frac{660}{22 \times 0.75 \times 14} = 2.9 = 3 \text{ units}$$

b. Unit train :
$$NE_b = \frac{36,082 \times 1.25}{300 \times 22 \times 0.4 \times 14} = 1.2 = 2 \text{ units}$$

c. LCL by rail & road:
$$NE_c = \frac{38,617 \times 2.5}{300 \times 22 \times 0.75 \times 14} = 1.4 = 2 \text{ units}$$

d. FCL by road :
$$NE_d = \frac{23,111 \times 1.5}{300 \times 8 \times 0.9 \times 7} = 2.3 = 3 \text{ units}$$

e. Spare :
$$NE_e = 1 \text{ unit}$$

Total number of top lifters = $NE_a + NE_b + NE_c + NE_d + NE_e$
= 11 units per berth
(66 units per terminal)

f. Tractors & chassis 40' (20' x 2) for ship's operation

4 sets per crane x 2 = 8 sets per berth
(48 sets per terminal)

g. Tractors & chassis 40' (20' x 2) for unit train operation

4 sets per crane x 1 = 4 sets per berth
(24 sets per terminal)

(3) Gate operation

(A) Lanes (NL : Number of lanes)

a. Unit train :
$$NL_a = \frac{36,082 \times 1.25}{300 \times 22 \times 0.4 \times 20} = 0.9 = 1 \text{ lane}$$

b. LCL by rail & road :
$$NL_b = \frac{38,617 \times 2.5}{300 \times 22 \times 0.75 \times 20} = 1 \text{ lane}$$

c. FCL by road :
$$NL_c = \frac{23,111 \times 1.5}{300 \times 8 \times 0.9 \times 15} = 1.1 = 2 \text{ lanes}$$

Total number of lanes : $NL_t = NL_a + NL_b + NL_c = 4$ lanes per berth
(24 lanes per terminal)

(B) Booths

One booth between two lanes ----- 2 booths per berth
(12 booths per terminal)

(C) Weighing scales used by export FCL CNTR

$$NS = \frac{5,535 \times 3.0}{300 \times 8 \times 0.9 \times 15} = 0.5 = 1 \text{ unit per berth}$$

(6 units per terminal)

$$* NC = EF \times t \div NB$$

NS : Number of weighing scales

EF : Number of export FCL CNTR by road (TEU)

t : Exchange rate from TEU to units of CNTR, 0.75

NB : Number of berths, 6

$$NC = 44,276 \times 0.75 \div 6 = 5,535 \text{ units}$$

(4) Equipments and pallets for CFS operation

(A) 3 Ton fork lift trucks

$$NE = \frac{NC \times p \times AW}{WD \times GH \times w}$$

Where :

NE : Number of equipment at peak hour (units)

NC : Number of LCL CNTR per year (units)

p : Peak day factor

AW : Average working hours per CNTR

Import 20 footer = 1.0 hour

Import 40 footer = 1.5 hours

Export 20 footer = 0.5 hour

Export 40 footer = 0.75 hour

WD : Annual working days, $365 - 65 = 300$ days

GH : Gross working hours per day

w : Net working hour ratio

$$a. \text{ Unstuffing import 20' : } NE_a = \frac{7,464 \times 1.5 \times 1.0}{300 \times 22 \times 0.75} = 2.3 = 3 \text{ units}$$

$$* NC = IL \times d \div NB$$

IL : Number of import LCL by rail and road (TEU)

d : Exchange rate from TEU to units of 20' or 40' CNTR

NB : Number of berths, 6

$$NC = 89,572 \times 0.5 \div 6 = 7,464 \text{ units}$$

$$b. \text{ Unstuffing import 40' : } NE_b = \frac{3,732 \times 1.5 \times 1.5}{300 \times 22 \times 0.75} = 1.7 = 2 \text{ units}$$

$$* NC = 89,572 \times 0.25 \div 6 = 3,732 \text{ units}$$

$$c. \text{ Stuffing export 20' : } NE_c = \frac{5,408 \times 4.0 \times 0.5}{300 \times 22 \times 0.75} = 2.2 = 3 \text{ units}$$

$$* NC = 64,894 \times 0.5 \div 6 = 5,408 \text{ units}$$

$$d. \text{ Stuffing export 40' : } NE_d = \frac{2,704 \times 4.0 \times 0.75}{300 \times 22 \times 0.75} = 1.6 = 2 \text{ units}$$

$$* NC = 64,894 \times 0.25 \div 6 = 2,704 \text{ units}$$

Total number of fork lift trucks for unstuffing and stuffing LCL cargo from/to containers; $NE_t = NE_a + NE_b + NE_c + NE_d = 10$ units per berth.

e. The same number of equipment for the above mentioned ones (NE_t) are required to remove/feed cargo between CNTR and stack place, and receive/deliver cargo from/to consignor; $NE_e = NE_t = 10$ units per berth.

Grand total; $NE_t + NE_e = 20$ units per berth

(120 units per terminal)

(B) Fork lift trucks with 6 ton capacity for handling heavy cargo;

$NE = 2$ units per berth

(12 units per terminal)

(C) Tractors

4 units per transfer crane $\times 1 = 4$ units per berth

(24 units per terminal)

(D) Chassis

NE₂ = 20 units of 20' chassis

NE₄ = 10 units of 40' chassis

NE_t = 30 units per berth

(180 units per terminal)

* Required number of chassis are three times as many as number of containers stuffed and unstuffed at the peak hour.

(E) Pallets with 1.8 m x 1.2 m two-way reversible winged type

$$NP = \frac{FS \times \gamma \times t}{(WP + w) \times (LP + l)}$$

Where :

NP : Number of pallets (sheets)

FS : Floor space of CFS (m²)

γ : Floor utilization ratio of cargo stacking space, 45%

t : Number of stacking tires of pallet, 1

WP : Width of pallet, 1.8 m

w : Widthwise clearance between pallets, 0.2 m

LP : Length of pallet, 1.2 m

l : Lengthwise clearance, 0.1 m

$$NP = \frac{13,143 \times 0.45 \times 1}{(1.8 + 0.2) \times (1.2 + 0.1)} = 2,275 \text{ sheets per berth}$$

(13,650 sheets per terminal)

$$* FS = 78,856 \div 6 = 13,143 \text{ m}^2 \text{ per berth}$$

(5) Equipment for the repair shop

(A) 3 ton fork lift truck for lifting CNTR on the repair stand

One unit per berth

(6 units per terminal)

(B) 15 ton fork lift truck with telescopic side spreader

One unit per berth

(6 units per terminal)

(6) Multipurpose equipment

(A) Mobile crane with 35 ton capacity for emergency

Measures at CNTR yard and CFS operation : One unit every 2 berth
(3 units per terminal)

(B) 3 ton fork lift trucks for carrying cargo gears and others

3 units every 2 berths
(9 units per terminal)

(C) 15 ton fork lift trucks with telescopic side spreader for handling heavy cargo and empty CNTR

One unit every two berths
(3 units per terminal)

(D) 35 ton top lifters with telescopic spreader for transferring full CNTR at CFS and CNTR yard

One unit every two berths
(3 units per terminal)

(7) Terminal office

(A) Computer for inventory control of CNTR in terminal

One set every two berths
(3 units per terminal)

(B) Wireless telephone (VHF)

| | Main equipment | Office, CFS & maintenance | Total per terminal |
|---------------------|----------------|------------------------------|--------------------|
| a. Transfer crane | 153 | 12 | 165 |
| b. Straddle carrier | 135 | 12 | 147 |
| c. Combined system | 171 | 12 | 183 |
| d. All chassis | 177 | 12 | 189 |
| e. Top lifter | 183 units | 12 units | 195 units |

港湾コンテナターミナルの荷役機械数量予測 (緊急計画)

The necessary number of equipment is calculated as follows:

- (1) Container cranes: 2 units per berth
(4 units per terminal)

Average productivity per crane hour = 20 movements (units)

Gross working hour per day = 22 hours

Net working hour ratio = 0.75

Ordinary productivity per berth day = $20 \times 22 \times 0.75 \times 2 = 660$ movements

- (2) Equipments for unit train and CNTR yard operation

$$NE = \frac{NC \times p}{WD \times GH \times w \times AP}$$

Where :

NE : Number of equipment at peak hour (units)

NC : Number of CNTR movements per year (units)

WD : Annual working days, $365 - 65 = 300$ days

p : Peak day factor

GH : Gross working hours per day

w : Net working hour ratio

AP : Average productivity per equipment hour

- (A) Rail mount transfer cranes for unit train

$$NE = \frac{27,107 \times 1.25}{300 \times 22 \times 0.4 \times 20} = 0.6 = 1 \text{ unit per berth}$$

(2 units per terminal)

$$* NC = (DS + LS) \times u \times t \div NB$$

DS : Number of CNTR discharged from ship per year (TEU)

LS : Number of CNTR loaded to ship per year (TEU)

u : Ratio of transportation by unit train, 0.427

t : Exchange rate from TEU to units of CNTR, 0.75

NB : Number of berths, 2

$$NC = (84,642 + 84,642) \times 0.427 \times 0.75 \div 2 = 27,107 \text{ units}$$

(B) Rubber tired transfer cranes for CNTR yard operation

a. Ship's operation : $NE_a = \frac{PB}{GH \times w \times AP}$

PB : Ordinary productivity per berth day (units) :

GH : Gross working hours per day

w : Net working hours ratio, 0.75

AP : Average productivity per equipment hour, 20

$$NE_a = \frac{660}{22 \times 0.75 \times 20} = 2 \text{ units}$$

b. Unit train : $NE_b = \frac{27,107 \times 1.25}{300 \times 22 \times 0.4 \times 20} = 0.6 = 1 \text{ unit}$

c. LCL by rail & road : $NE_c = \frac{33,068 \times 2.5}{300 \times 22 \times 0.75 \times 20} = 0.8 = 1 \text{ unit}$

$$* NC = (IL + EL) \times t \div NB \times (1 + e)$$

IL : Number of import LCL CNTR by rail & road (TEU)

EL : Number of export LCL CNTR (TEU)

t : Exchange rate from TEU to units of CNTR, 0.75

NB : Number of berths, 2

e : Percentage of empty CNTR stored at terminal, 100%

$$NC = (22,430 + 21,660) \times 0.75 \div 2 \times 2 = 33,068 \text{ units}$$

d. FCL by road : $NE_d = \frac{18,123 \times 1.5}{300 \times 8 \times 0.9 \times 12} = 1 \text{ unit}$

$$* NC = 2 (IF + e \times EF) \times t \div NB$$

IF : Number of import FCL CNTR by road (TEU)

EF : Number of export FCL CNTR by road (TEU)

e : Percentage of empty CNTR stored at terminal, 50%

$$NC = 2 (17,606 + 0.5 \times 13,115) \times 0.75 \div 2 = 18,123 \text{ units}$$

Total number of transfer cranes : $NE_t = NE_a + NE_b + NE_c + NE_d$
= 5 units per berth
(10 units per terminal)

Remark : The miscellaneous operations regarding inspection, repair and adjustment of CNTR are managed at other working hours than the peak ones.

(C) Tractors and chassis 40' (20' x 2) for ship's operation

4 sets of tractor & chassis per crane x 2 = 8 sets per berth
(16 sets per terminal)

(D) Tractors and chassis 40' (20' x 2) for unit train operation

4 sets of tractors & chassis per crane x 1 = 4 sets per berth
(8 sets per terminal)

(3) Gate operation

(A) Lanes (NL : Number of lanes)

a. Unit train : $NL_a = \frac{27,107 \times 1.25}{300 \times 22 \times 0.4 \times 20} = 0.6 = 1 \text{ lane}$

b. LCL by rail & road : $NL_b = \frac{33,068 \times 2.5}{300 \times 22 \times 0.75 \times 20} = 0.8 = 1 \text{ lane}$

c. FCL by road : $NL_c = \frac{18,123 \times 1.5}{300 \times 8 \times 0.9 \times 15} = 0.8 = 1 \text{ lane}$

Total number of lanes: $NL_t = NL_a + NL_b + NL_c = 3 \text{ lanes per berth}$
(6 lanes per terminal)

(B) Booths

One booth between two lanes ----- 2 booths per berth
(3 booths per terminal)

(C) Weighing scale used by export FCL CNTR

$NS = \frac{4,918 \times 3.0}{300 \times 8 \times 0.9 \times 15} = 0.5 = 1 \text{ unit per berth}$
(2 units per terminal)

$$* NC = EF \times t \div NB$$

NS : Number of weighing scales

EF : Number of export FCL CNTR by road (TEU)

t : Exchange rate from TEU to units of CNTR, 0.75

NB : Number of berths, 2

$$NC = 13,115 \times 0.75 \div 2 = 4,918$$

(4) Equipment and pallets for CFS operation

(A) 3 ton fork lift trucks

$$NE = \frac{NC \times p \times AW}{WD \times GH \times w}$$

Where :

NE : Number of equipment at peak hour (units)

NC : Number of LCL CNTR per year (units)

p : Peak day factor

AW : Average working hours per CNTR

Import 20 footer = 1.0 hour

Import 40 footer = 1.5 hours

Export 20 footer = 0.5 hour

Export 40 footer = 0.75 hour

WD : Annual working days, 365 - 65 = 300 days

GH : Gross working hours per day

w : Net working hour ratio

$$a. \text{ Unstuffing import 20' ; } NE_a = \frac{5,608 \times 1.5 \times 1.0}{300 \times 22 \times 0.75} = 1.7 = 2 \text{ units}$$

$$* NC = IL \times d \div NB$$

IL : Number of import LCL by rail and road (TEU)

d : Exchange rate from TEU to units of 20' or 40'

NB : Number of berths, 2

$$NC = 22,430 \times 0.5 \div 2 = 5,608$$

b. Unstuffing import 40'; $NE_b = \frac{2,804 \times 1.5 \times 1.5}{300 \times 22 \times 0.75} = 1.3 = 2 \text{ units}$

* $NC = 22,430 \times 0.25 \div 2 = 2,804 \text{ units}$

c. Stuffing export 20'; $NE_c = \frac{5,415 \times 4.0 \times 0.5}{300 \times 22 \times 0.75} = 2.2 = 3 \text{ units}$

* $NC = 21,660 \times 0.5 \div 2 = 5,415 \text{ units}$

d. Stuffing export 40'; $NE_d = \frac{2,708 \times 4.0 \times 0.75}{300 \times 22 \times 0.75} = 1.6 = 2 \text{ units}$

* $NC = 21,660 \times 0.25 \div 2 = 2,708 \text{ units}$

Total number of fork lift trucks for unstuffing and stuffing LCL cargo from/to CNTR; $NE_t = NE_a + NE_b + NE_c + NE_d = 9 \text{ units.}$

e. The same number of equipment for the above mentioned ones (NE_t) are required to remove/feed cargo between CNTR and stack place, and receive/deliver cargo from/to consignor; $NE_e = NE_t = 9 \text{ units.}$

Grand total : $NE_t + NE_e = 18 \text{ units per berth}$
(36 units per terminal)

(B) 6 ton fork lift trucks for handling heavy cargo : $NE = 2 \text{ units per berth}$
(4 units per terminal)

(C) Road tractor

4 units per transfer crane for CFS operation $\times 1 = 4 \text{ units per berth}$
(8 units per terminal)

(D) Chassis

$NE_2 = 18 \text{ units of } 20' \text{ chassis}$

$NE_4 = 9 \text{ units of } 40' \text{ chassis}$

$NE_t = 27 \text{ units per berth}$

(54 units per terminal)

* Required number of chassis are three times as many as number of containers stuffed and unstuffed at the peak hour.

(E) Pallets with 1.8 m x 1.2 m two-way reversible winged type

$$NP = \frac{FS \times \gamma \times t}{(WP + w) \times (LP + l)}$$

Where :

NP : Number of pallets (sheets)

FS : Floor space of CFS (m²)

γ : Floor utilization ratio of cargo stacking space, 45%

t : Number of stacking tires of pallet, 1

WP : Width of pallet, 1.8 m

w : Widthwise clearance between pallets, 0.2 m

LP : Length of pallets, 1.2 m

l : Lengthwise clearance, 0.1 m

$$NP = \frac{11,409 \times 0.45 \times 1}{(1.8 + 0.2) \times (1.2 + 0.1)} = 1,975 \text{ sheets per berth}$$

(3,950 sheets per terminal)

$$* FS = 22,818 \div 2 = 11,409 \text{ m}^2 \text{ per berth}$$

(5) Equipment for the repair shop

(A) 3 ton fork lift truck for lifting CNTR on the repair stands

One unit per berth

(2 units per terminal)

(B) 15 ton fork lift truck with telescopic side spreader

One unit per berth

(2 units per terminal)

(6) Multipurpose equipment

(A) Mobile crane with 35 ton capacity for emergency

measures at CNTR yard and CFS operation : One unit every 2 berths
(1 unit per terminal)

(B) 3 ton fork lift truck for carrying cargo gears and others

3 units every 2 berths

(3 units per terminal)

(C) 15 ton fork lift truck with telescopic side spreader for handling heavy cargo and empty CNTR : One unit every 2 berths

(One unit per terminal)

(D) 35 ton top lifter with telescopic spreader for transferring full CNTR at CFS and CNTR yard : One unit every 2 berths

(One unit per terminal)

(7) Terminal office

(A) Computer for inventory control of CNTR in terminal

One set every two berths

(One set per terminal)

(B) Wireless telephone (VHF)

| | |
|--|---------|
| Container crane | 4 units |
| Yard tractor for ship's operation | 16 " |
| Rail-mounted transfer crane for unit train operation | 2 " |
| Tractor for unit train operation | 8 " |
| Rubber tired-transfer crane | 10 " |
| Tractor for CFS operation | 8 units |
| Top lifter | 1 unit |
| Terminal office | 1 " |
| Maintenance shop | 1 " |
| CFS | 1 " |
| Spare | 1 unit |

(53 units per terminal)

付表 A-IV-1(a) Cargo Volume for Karachi Port ("Without" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G. CARGO | P. I. / COKE | TOTAL | Z |
|---------|-------|--------|-----------|--------|----------|--------------|--------|------|
| 1979.80 | 672.1 | 1,106 | 1,426. | 6 | 3,494. | | 7,308. | 100. |
| 1980.81 | 308. | 1,257. | 1,530. | 444. | 3,650. | | 7,189. | 98. |
| 1981.82 | 280. | 1,399. | 1,490. | 300. | 3,520. | | 6,990. | 96. |
| 1982.83 | 250. | 1,500. | 1,499. | 150. | 3,189. | | 6,538. | 89. |
| 1983.84 | 180. | 1,575. | 2,078. | 150. | 3,339. | | 7,322. | 100. |
| 1984.85 | 0. | 150. | 570. | 150. | 3,499. | | 4,369. | 60. |
| 1985.86 | 0. | 150. | 570. | 0. | 3,537. | | 4,257. | 58. |
| 1986.87 | 0. | 150. | 570. | 0. | 3,751. | | 4,471. | 61. |
| 1987.88 | 0. | 150. | 570. | 0. | 3,964. | | 4,684. | 64. |
| 1988.89 | 0. | 150. | 570. | 0. | 4,217. | | 4,937. | 68. |
| 1989.90 | 0. | 150. | 570. | 0. | 4,557. | | 5,277. | 72. |
| 1990.91 | 0. | 160. | 570. | 0. | 4,860. | | 5,590. | 76. |
| 1991.92 | 0. | 178. | 570. | 0. | 5,075. | | 5,815. | 80. |
| 1992.93 | 0. | 180. | 570. | 0. | 5,290. | | 6,040. | 83. |
| 1993.94 | 0. | 190. | 570. | 0. | 5,505. | | 6,265. | 86. |
| 1994.95 | 0. | 200. | 570. | 0. | 5,720. | | 6,490. | 89. |
| 1995.96 | 0. | 210. | 570. | 0. | 6,039. | | 6,819. | 93. |
| 1996.97 | 0. | 220. | 570. | 0. | 6,358. | | 7,148. | 98. |
| 1997.98 | 0. | 230. | 570. | 0. | 6,677. | | 7,477. | 102. |
| 1998.99 | 0. | 240. | 570. | 0. | 6,996. | | 7,806. | 107. |
| 1999.00 | 0. | 250. | 570. | 0. | 7,315. | | 8,135. | 111. |

(Cargo allocation proposed by SWANCO)

付表 A-IV-1(b) No. of ship call for Karachi Port ("Without" case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G. CARGO | P. I. / COKE | TOTAL | Ship/day |
|---------|-------|------|-----------|--------|----------|--------------|--------|----------|
| 1979.80 | 45. | 178. | 110. | 51. | 998. | | 1,374. | 4.04. |
| 1980.81 | 21. | 193. | 118. | 37. | 1,043. | | 1,411. | 4.15. |
| 1981.82 | 19. | 215. | 115. | 25. | 1,006. | | 1,279. | 4.06. |
| 1982.83 | 17. | 231. | 111. | 13. | 911. | | 1,283. | 3.77. |
| 1983.84 | 12. | 242. | 160. | 13. | 954. | | 1,381. | 4.06. |
| 1984.85 | 0. | 23. | 44. | 13. | 1,000. | | 1,079. | 3.17. |
| 1985.86 | 0. | 23. | 44. | 0. | 1,011. | | 1,077. | 3.17. |
| 1986.87 | 0. | 23. | 44. | 0. | 1,072. | | 1,139. | 3.35. |
| 1987.88 | 0. | 23. | 44. | 0. | 1,133. | | 1,199. | 3.53. |
| 1988.89 | 0. | 23. | 44. | 0. | 1,205. | | 1,272. | 3.74. |
| 1989.90 | 0. | 23. | 44. | 0. | 1,302. | | 1,369. | 4.03. |
| 1990.91 | 0. | 25. | 44. | 0. | 1,389. | | 1,457. | 4.29. |
| 1991.92 | 0. | 26. | 44. | 0. | 1,450. | | 1,520. | 4.47. |
| 1992.93 | 0. | 28. | 44. | 0. | 1,511. | | 1,583. | 4.66. |
| 1993.94 | 0. | 29. | 44. | 0. | 1,573. | | 1,646. | 4.84. |
| 1994.95 | 0. | 31. | 44. | 0. | 1,634. | | 1,709. | 5.03. |
| 1995.96 | 0. | 32. | 44. | 0. | 1,725. | | 1,802. | 5.30. |
| 1996.97 | 0. | 34. | 44. | 0. | 1,817. | | 1,894. | 5.57. |
| 1997.98 | 0. | 35. | 44. | 0. | 1,908. | | 1,987. | 5.84. |
| 1998.99 | 0. | 37. | 44. | 0. | 1,999. | | 2,080. | 6.12. |
| 1999.00 | 0. | 38. | 44. | 0. | 2,090. | | 2,172. | 6.39. |

付表 A-IV-1(c) Ship Day & Waiting Time for Karachi Port ("Without" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G. CARGO | P. I. / COKE | TOTAL | Berth No. | B. NO | W. TIME | W. TIME(%) |
|---------|-------|------|-----------|--------|----------|--------------|---------|-----------|-------|---------|------------|
| 1979.88 | 192. | 691. | 891. | 382. | 6,353. | | 8,509. | 189. | 23. | | |
| 1980.81 | 88. | 786. | 956. | 278. | 6,636. | | 8,744. | 112. | 23. | | |
| 1981.82 | 80. | 875. | 931. | 188. | 6,400. | | 8,474. | 200. | 25. | 1.24. | 4.26 |
| 1982.83 | 71. | 938. | 906. | 94. | 5,798. | | 7,806. | 85. | 27. | 0.15 | 0.33 |
| 1983.84 | 51. | 984. | 1,299. | 94. | 6,071. | | 8,499. | 93. | 27. | 0.69 | 1.87 |
| 1984.85 | 0. | 94. | 356. | 94. | 6,362. | | 6,906. | 75. | 27. | 0.07 | 0.15 |
| 1985.86 | 0. | 94. | 356. | 0. | 6,431. | | 6,881. | 75. | 27. | 0.08 | 0.16 |
| 1986.87 | 0. | 94. | 356. | 0. | 6,820. | | 7,270. | 79. | 27. | 0.16 | 0.36 |
| 1987.88 | 0. | 94. | 356. | 0. | 7,207. | | 7,657. | 83. | 27. | 0.33 | 0.76 |
| 1988.89 | 0. | 94. | 356. | 0. | 7,667. | | 8,117. | 88. | 27. | 0.74 | 2.05 |
| 1989.90 | 0. | 94. | 356. | 0. | 8,285. | | 8,735. | 95. | 27. | 2.70 | |
| 1990.91 | 0. | 100. | 356. | 0. | 8,836. | | 9,293. | 101. | 27. | | |
| 1991.92 | 0. | 106. | 356. | 0. | 9,227. | | 9,690. | 106. | 27. | | |
| 1992.93 | 0. | 113. | 356. | 0. | 9,618. | | 10,087. | 110. | 27. | | |
| 1993.94 | 0. | 119. | 356. | 0. | 10,009. | | 10,484. | 113. | 27. | | |
| 1994.95 | 0. | 125. | 356. | 0. | 10,400. | | 10,881. | 119. | 27. | | |
| 1995.96 | 0. | 131. | 356. | 0. | 10,980. | | 11,468. | 125. | 27. | | |
| 1996.97 | 0. | 138. | 356. | 0. | 11,560. | | 12,054. | 131. | 27. | | |
| 1997.98 | 0. | 146. | 356. | 0. | 12,148. | | 12,648. | 138. | 27. | | |
| 1998.99 | 0. | 150. | 356. | 0. | 12,720. | | 13,226. | 144. | 27. | | |
| 1999.00 | 0. | 156. | 356. | 0. | 13,300. | | 13,813. | 150. | 27. | | |

付表 A-IV-2(a) Cargo Volume for Karachi Port ("With" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G. CARGO | P. I. / COKE | TOTAL | % |
|---------|-------|--------|-----------|--------|----------|--------------|--------|------|
| 1979.80 | 671. | 1,106. | 1,426. | 611. | 3,494. | | 7,308. | 100. |
| 1980.81 | 308. | 1,257. | 1,530. | 444. | 3,650. | | 7,189. | 98. |
| 1981.82 | 280. | 1,400. | 1,490. | 300. | 3,520. | | 6,990. | 96. |
| 1982.83 | 250. | 1,500. | 1,449. | 150. | 3,189. | | 6,538. | 89. |
| 1983.84 | 180. | 1,575. | 2,078. | 150. | 3,339. | | 7,322. | 100. |
| 1984.85 | 0. | 1,650. | 570. | 150. | 3,499. | | 5,869. | 80. |
| 1985.86 | 0. | 1,720. | 570. | 0. | 3,537. | | 5,827. | 80. |
| 1986.87 | 0. | 1,790. | 570. | 0. | 3,751. | | 6,111. | 84. |
| 1987.88 | 0. | 1,799. | 570. | 0. | 3,466. | | 5,835. | 80. |
| 1988.89 | 0. | 1,824. | 570. | 0. | 3,351. | | 5,745. | 79. |
| 1989.90 | 0. | 1,839. | 570. | 0. | 3,197. | | 5,606. | 77. |
| 1990.91 | 0. | 1,860. | 570. | 0. | 3,060. | | 5,490. | 75. |
| 1991.92 | 0. | 1,920. | 570. | 0. | 3,275. | | 5,765. | 79. |
| 1992.93 | 0. | 1,980. | 570. | 0. | 3,490. | | 6,040. | 83. |
| 1993.94 | 0. | 2,040. | 570. | 0. | 3,705. | | 6,315. | 86. |
| 1994.95 | 0. | 2,100. | 570. | 0. | 3,920. | | 6,590. | 90. |
| 1995.96 | 0. | 2,158. | 570. | 0. | 4,239. | | 6,967. | 95. |
| 1996.97 | 0. | 2,216. | 570. | 0. | 4,558. | | 7,344. | 100. |
| 1997.98 | 0. | 2,274. | 570. | 0. | 4,877. | | 7,721. | 106. |
| 1998.99 | 0. | 2,332. | 570. | 0. | 5,196. | | 8,098. | 111. |
| 1999.00 | 0. | 2,390. | 570. | 0. | 5,515. | | 8,475. | 116. |

(rice is handled in Karachi Port)

付表 A-IV-2(b) No. of Ship Call for Karachi Port ("With" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G. CARGO | P. I. / COKE | TOTAL | Ship/day |
|---------|-------|------|-----------|--------|----------|--------------|--------|----------|
| 1979.80 | 45. | 170. | 110. | 51. | 998. | | 1,374. | 4.04 |
| 1980.81 | 21. | 193. | 118. | 37. | 1,043. | | 1,411. | 4.15 |
| 1981.82 | 19. | 215. | 115. | 25. | 1,006. | | 1,379. | 4.06 |
| 1982.83 | 17. | 231. | 111. | 13. | 911. | | 1,283. | 3.77 |
| 1983.84 | 12. | 242. | 160. | 13. | 954. | | 1,381. | 4.06 |
| 1984.85 | | 254. | 44. | 13. | 1,000. | | 1,310. | 3.85 |
| 1985.86 | 0. | 265. | 44. | 0. | 1,011. | | 1,319. | 3.88 |
| 1986.87 | 0. | 275. | 44. | 0. | 1,072. | | 1,391. | 4.09 |
| 1987.88 | 0. | 277. | 44. | 0. | 990. | | 1,311. | 3.86 |
| 1988.89 | 0. | 281. | 44. | 0. | 957. | | 1,282. | 3.77 |
| 1989.90 | 0. | 283. | 44. | 0. | 913. | | 1,240. | 3.65 |
| 1990.91 | 0. | 286. | 44. | 0. | 874. | | 1,204. | 3.54 |
| 1991.92 | 0. | 295. | 44. | 0. | 936. | | 1,275. | 3.75 |
| 1992.93 | 0. | 305. | 44. | 0. | 997. | | 1,346. | 3.96 |
| 1993.94 | 0. | 314. | 44. | 0. | 1,059. | | 1,416. | 4.17 |
| 1994.95 | 0. | 323. | 44. | 0. | 1,120. | | 1,487. | 4.37 |
| 1995.96 | 0. | 332. | 44. | 0. | 1,211. | | 1,587. | 4.67 |
| 1996.97 | 0. | 341. | 44. | 0. | 1,302. | | 1,687. | 4.96 |
| 1997.98 | 0. | 350. | 44. | 0. | 1,393. | | 1,787. | 5.26 |
| 1998.99 | 0. | 359. | 44. | 0. | 1,485. | | 1,887. | 5.55 |
| 1999.00 | 0. | 368. | 44. | 0. | 1,576. | | 1,987. | 5.84 |

付表 A-IV-2(c) Ship Day & Waiting Time for Karachi Port ("With" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G. CARGO | P. I. / COKE | TOTAL | Berth No. | W. TIME | W. TIME(%) |
|---------|-------|--------|-----------|--------|----------|--------------|---------|-----------|---------|------------|
| 1979.80 | 192. | 691. | 891. | 382. | 6,353. | | 8,509. | 23. | | |
| 1980.81 | 88. | 786. | 956. | 278. | 6,675. | | 8,744. | 23. | | |
| 1981.82 | 88. | 875. | 931. | 188. | 6,400. | | 8,474. | 25. | 1.24 | 4.26 |
| 1982.83 | 71. | 938. | 906. | 94. | 5,798. | | 7,806. | 27. | 0.15 | 0.33 |
| 1983.84 | 51. | 984. | 1,299. | 94. | 6,071. | | 8,499. | 27. | 0.69 | 1.87 |
| 1984.85 | 0. | 1,031. | 356. | 94. | 6,362. | | 7,843. | 27. | 0.31 | 0.72 |
| 1985.86 | 0. | 1,075. | 356. | 0. | 6,431. | | 7,862. | 27. | 0.39. | 0.91 |
| 1986.87 | 0. | 1,119. | 356. | 0. | 6,820. | | 8,295. | 27. | 0.90 | 2.79 |
| 1987.88 | 0. | 1,124. | 356. | 0. | 6,302. | | 7,782. | 27. | 0.38 | 0.90 |
| 1988.89 | 0. | 1,140. | 356. | 0. | 6,093. | | 7,589. | 27. | 0.28 | 0.63 |
| 1989.90 | 0. | 1,149. | 356. | 0. | 5,813. | | 7,318. | 27. | 0.18 | 0.38 |
| 1990.91 | 0. | 1,163. | 356. | 0. | 5,564. | | 7,082. | 27. | 0.12 | 0.25 |
| 1991.92 | 0. | 1,200. | 356. | 0. | 5,955. | | 7,511. | 27. | 0.25 | 0.55 |
| 1992.93 | 0. | 1,238. | 356. | 0. | 6,345. | | 7,939. | 27. | 0.51 | 1.29 |
| 1993.94 | 0. | 1,275. | 356. | 0. | 6,736. | | 8,368. | 27. | 1.12 | 4.09 |
| 1994.95 | 0. | 1,313. | 356. | 0. | 7,127. | | 8,796. | 27. | 3.02 | |
| 1995.96 | 0. | 1,349. | 356. | 0. | 7,707. | | 9,412. | 27. | | |
| 1996.97 | 0. | 1,385. | 356. | 0. | 8,287. | | 10,029. | 27. | | |
| 1997.98 | 0. | 1,421. | 356. | 0. | 8,867. | | 10,645. | 27. | | |
| 1998.99 | 0. | 1,458. | 356. | 0. | 9,447. | | 11,261. | 27. | | |
| 1999.00 | 0. | 1,494. | 356. | 0. | 10,027. | | 11,877. | 27. | | |

附表 A-IV-3(a) Cargo Volume for Karachi Port ("With" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G.CARGO | P.I./COKE | TOTAL | % |
|---------|--------|--------|-----------|--------|---------|-----------|---------|------|
| 1979.80 | 671. | 1,106. | 1,426. | 611. | 3,494. | | 7,308. | 100. |
| 1980.81 | 308. | 1,257. | 1,530. | 444. | 3,650. | | 7,189. | 98. |
| 1981.82 | 280. | 1,400. | 1,490. | 300. | 3,520. | | 6,990. | 96. |
| 1982.83 | 250. | 1,500. | 1,449. | 150. | 3,289. | | 6,638. | 91. |
| 1983.84 | 180. | 1,575. | 2,078. | 150. | 3,439. | | 7,422. | 102. |
| 1984.85 | 200. | 1,650. | 2,180. | 150. | 3,599. | | 7,779. | 106. |
| 1985.86 | 256. | 1,698. | 2,158. | 0. | 3,469. | | 7,581. | 104. |
| 1986.87 | 312. | 1,738. | 2,136. | 0. | 3,441. | | 7,627. | 104. |
| 1987.88 | 368. | 1,769. | 2,120. | 0. | 3,316. | | 7,573. | 104. |
| 1988.89 | 424. | 1,790. | 2,102. | 0. | 3,162. | | 7,478. | 102. |
| 1989.90 | 480. | 1,800. | 2,070. | 0. | 2,957. | | 7,307. | 100. |
| 1990.91 | 546. | 1,860. | 1,924. | 0. | 3,160. | | 7,490. | 102. |
| 1991.92 | 612. | 1,920. | 2,018. | 0. | 3,375. | | 7,925. | 108. |
| 1992.93 | 678. | 1,980. | 2,112. | 0. | 3,590. | | 8,360. | 114. |
| 1993.94 | 744. | 2,040. | 2,206. | 0. | 3,805. | | 8,795. | 120. |
| 1994.95 | 810. | 2,100. | 2,300. | 0. | 4,020. | | 9,230. | 126. |
| 1995.96 | 872. | 2,158. | 2,382. | 0. | 4,339. | | 9,751. | 133. |
| 1996.97 | 934. | 2,216. | 2,464. | 0. | 4,658. | | 10,272. | 141. |
| 1997.98 | 996. | 2,274. | 2,546. | 0. | 4,977. | | 10,793. | 148. |
| 1998.99 | 1,058. | 2,332. | 2,628. | 0. | 5,296. | | 11,314. | 155. |
| 1999.00 | 1,120. | 2,390. | 2,710. | 0. | 5,615. | | 11,835. | 162. |

(Marginal Wharf berth No. 5-7 converted to container berths)

附表 A-IV-3(b) No. of Ship Call for Karachi Port ("With" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G.CARGO | P.I./COKE | TOTAL | Ship/day |
|---------|-------|------|-----------|--------|---------|-----------|--------|----------|
| 1979.80 | 45. | 170. | 118. | 51. | 998. | | 1,374. | 4.04 |
| 1980.81 | 21. | 193. | 118. | 37. | 1,043. | | 1,411. | 4.15 |
| 1981.82 | 19. | 215. | 115. | 25. | 1,006. | | 1,379. | 4.06 |
| 1982.83 | 17. | 231. | 111. | 13. | 940. | | 1,311. | 3.86 |
| 1983.84 | 12. | 242. | 160. | 13. | 983. | | 1,409. | 4.14 |
| 1984.85 | 13. | 254. | 168. | 13. | 1,028. | | 1,476. | 4.34 |
| 1985.86 | 17. | 261. | 166. | 0. | 991. | | 1,435. | 4.22 |
| 1986.87 | 21. | 267. | 164. | 0. | 983. | | 1,436. | 4.22 |
| 1987.88 | 25. | 272. | 163. | 0. | 947. | | 1,407. | 4.14 |
| 1988.89 | 28. | 275. | 162. | 0. | 903. | | 1,369. | 4.03 |
| 1989.90 | 32. | 277. | 159. | 0. | 845. | | 1,313. | 3.86 |
| 1990.91 | 36. | 286. | 148. | 0. | 903. | | 1,373. | 4.04 |
| 1991.92 | 41. | 295. | 155. | 0. | 964. | | 1,456. | 4.28 |
| 1992.93 | 45. | 305. | 162. | 0. | 1,026. | | 1,538. | 4.52 |
| 1993.94 | 50. | 314. | 170. | 0. | 1,087. | | 1,620. | 4.77 |
| 1994.95 | 54. | 323. | 177. | 0. | 1,149. | | 1,703. | 5.01 |
| 1995.96 | 58. | 332. | 183. | 0. | 1,240. | | 1,813. | 5.33 |
| 1996.97 | 62. | 341. | 190. | 0. | 1,331. | | 1,924. | 5.66 |
| 1997.98 | 66. | 350. | 196. | 0. | 1,422. | | 2,034. | 5.98 |
| 1998.99 | 71. | 359. | 202. | 0. | 1,513. | | 2,145. | 6.31 |
| 1999.00 | 75. | 368. | 208. | 0. | 1,604. | | 2,255. | 6.63 |

附表 A-IV-3(c) Ship Day & Waiting Time for Karachi Port ("With" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G.CARGO | P.I./COKE | TOTAL | Berth No. | W.TIME | W. TIME(52) |
|---------|-------|--------|-----------|--------|---------|-----------|---------|-----------|--------|-------------|
| 1979.80 | 192. | 691. | 891. | 382. | 6,353. | | 8,509. | 23. | | |
| 1980.81 | 88. | 786. | 956. | 278. | 6,675. | | 8,744. | 23. | | |
| 1981.82 | 80. | 875. | 931. | 188. | 6,400. | | 8,474. | 25. | 1.24 | 4.26 |
| 1982.83 | 71. | 938. | 906. | 94. | 5,980. | | 7,988. | 27. | 0.21 | 0.65 |
| 1983.84 | 51. | 984. | 1,299. | 94. | 6,253. | | 8,681. | 27. | 0.94 | 2.96 |
| 1984.85 | 57. | 1,031. | 1,363. | 94. | 6,544. | | 9,088. | 27. | 3.79 | -16.32 |
| 1985.86 | 73. | 1,061. | 1,349. | 0. | 6,307. | | 8,790. | 27. | 2.32 | 47.17 |
| 1986.87 | 89. | 1,086. | 1,335. | 0. | 6,256. | | 8,767. | 27. | 2.50 | 193.14 |
| 1987.88 | 105. | 1,106. | 1,325. | 0. | 6,029. | | 8,565. | 27. | 1.65 | 9.22 |
| 1988.89 | 121. | 1,119. | 1,314. | 0. | 5,749. | | 8,303. | 27. | 0.99 | 3.23 |
| 1989.90 | 137. | 1,125. | 1,294. | 0. | 5,376. | | 7,932. | 27. | 0.51 | 1.29 |
| 1990.91 | 156. | 1,163. | 1,203. | 0. | 5,745. | | 8,266. | 27. | 0.93 | 2.96 |
| 1991.92 | 175. | 1,200. | 1,261. | 0. | 6,136. | | 8,772. | 27. | 2.86 | |
| 1992.93 | 194. | 1,238. | 1,328. | 0. | 6,527. | | 9,278. | 27. | | |
| 1993.94 | 213. | 1,275. | 1,379. | 0. | 6,918. | | 9,785. | 27. | | |
| 1994.95 | 231. | 1,313. | 1,438. | 0. | 7,309. | | 10,291. | 27. | | |
| 1995.96 | 249. | 1,349. | 1,489. | 0. | 7,889. | | 10,976. | 27. | | |
| 1996.97 | 267. | 1,385. | 1,540. | 0. | 8,469. | | 11,661. | 27. | | |
| 1997.98 | 285. | 1,421. | 1,591. | 0. | 9,049. | | 12,346. | 27. | | |
| 1998.99 | 302. | 1,458. | 1,643. | 0. | 9,629. | | 13,031. | 27. | | |
| 1999.00 | 320. | 1,494. | 1,694. | 0. | 10,209. | | 13,717. | 27. | | |

附表 A-IV-4(a) Cargo Volume for Karachi Port ("Without" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G.CARGO | P.I./COKE | TOTAL | Z |
|---------|-------|--------|-----------|--------|---------|-----------|---------|------|
| 1979.80 | 671. | 1,106. | 1,426. | 611. | 3,494. | | 7,308. | 100. |
| 1980.81 | 308. | 1,257. | 1,530. | 444. | 3,650. | | 7,189. | 98. |
| 1981.82 | 280. | 1,400. | 1,490. | 300. | 3,520. | | 6,990. | 96. |
| 1982.83 | 250. | 1,500. | 1,449. | 150. | 3,189. | | 6,538. | 89. |
| 1983.84 | 180. | 1,575. | 2,078. | 150. | 3,339. | | 7,322. | 100. |
| 1984.85 | 0. | 1,650. | 570. | 150. | 3,499. | | 5,869. | 80. |
| 1985.86 | 0. | 1,720. | 570. | 0. | 3,537. | | 5,827. | 80. |
| 1986.87 | 0. | 1,790. | 570. | 0. | 3,751. | | 6,111. | 84. |
| 1987.88 | 0. | 1,860. | 570. | 0. | 3,964. | | 6,394. | 87. |
| 1988.89 | 0. | 1,930. | 570. | 0. | 4,217. | | 6,717. | 92. |
| 1989.90 | 0. | 2,000. | 570. | 0. | 4,557. | | 7,127. | 98. |
| 1990.91 | 0. | 2,060. | 570. | 0. | 4,860. | | 7,490. | 102. |
| 1991.92 | 0. | 2,120. | 570. | 0. | 5,075. | | 7,765. | 106. |
| 1992.93 | 0. | 2,180. | 570. | 0. | 5,290. | | 8,040. | 110. |
| 1993.94 | 0. | 2,240. | 570. | 0. | 5,505. | | 8,315. | 114. |
| 1994.95 | 0. | 2,300. | 570. | 0. | 5,720. | | 8,590. | 118. |
| 1995.96 | 0. | 2,358. | 570. | 0. | 6,039. | | 8,967. | 123. |
| 1996.97 | 0. | 2,416. | 570. | 0. | 6,358. | | 9,344. | 128. |
| 1997.98 | 0. | 2,474. | 570. | 0. | 6,677. | | 9,721. | 133. |
| 1998.99 | 0. | 2,532. | 570. | 0. | 6,996. | | 10,098. | 138. |
| 1999.00 | 0. | 2,590. | 570. | 0. | 7,315. | | 10,475. | 143. |

(rice is handled in Karachi Port)

附表 A-IV-4(b) No. of Ship Call for Karachi Port ("Without" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G.CARGO | P.I./COKE | TOTAL | Ship/day |
|---------|-------|------|-----------|--------|---------|-----------|--------|----------|
| 1979.80 | 45. | 170. | 110. | 51. | 998. | | 1,374. | 4.04 |
| 1980.81 | 21. | 193. | 118. | 37. | 1,043. | | 1,411. | 4.15 |
| 1981.82 | 19. | 215. | 115. | 25. | 1,006. | | 1,379. | 4.06 |
| 1982.83 | 17. | 231. | 111. | 13. | 911. | | 1,283. | 3.77 |
| 1983.84 | 12. | 242. | 160. | 13. | 954. | | 1,381. | 4.06 |
| 1984.85 | 0. | 254. | 44. | 13. | 1,000. | | 1,310. | 3.85 |
| 1985.86 | 0. | 265. | 44. | 0. | 1,011. | | 1,319. | 3.88 |
| 1986.87 | 0. | 275. | 44. | 0. | 1,072. | | 1,391. | 4.09 |
| 1987.88 | 0. | 286. | 44. | 0. | 1,133. | | 1,463. | 4.30 |
| 1988.89 | 0. | 297. | 44. | 0. | 1,205. | | 1,546. | 4.55 |
| 1989.90 | 0. | 308. | 44. | 0. | 1,302. | | 1,654. | 4.86 |
| 1990.91 | 0. | 317. | 44. | 0. | 1,389. | | 1,749. | 5.15 |
| 1991.92 | 0. | 326. | 44. | 0. | 1,450. | | 1,820. | 5.35 |
| 1992.93 | 0. | 335. | 44. | 0. | 1,511. | | 1,891. | 5.56 |
| 1993.94 | 0. | 345. | 44. | 0. | 1,573. | | 1,961. | 5.77 |
| 1994.95 | 0. | 354. | 44. | 0. | 1,634. | | 2,032. | 5.98 |
| 1995.96 | 0. | 363. | 44. | 0. | 1,725. | | 2,132. | 6.27 |
| 1996.97 | 0. | 372. | 44. | 0. | 1,817. | | 2,232. | 6.57 |
| 1997.98 | 0. | 381. | 44. | 0. | 1,908. | | 2,332. | 6.86 |
| 1998.99 | 0. | 390. | 44. | 0. | 1,999. | | 2,432. | 7.15 |
| 1999.00 | 0. | 398. | 44. | 0. | 2,090. | | 2,532. | 7.45 |

附表 A-IV-4(c) Ship Day & Waiting Time for Karachi Port ("without" Case) ("Without" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G.CARGO | P.I./COKE | TOTAL | Berth No. | W.TIME | W.TIME 5% |
|---------|-------|--------|-----------|--------|---------|-----------|---------|-----------|--------|-----------|
| 1979.80 | 192. | 691. | 891. | 382. | 6,353. | | 8,509. | 23. | | |
| 1980.81 | 88. | 786. | 956. | 278. | 6,675. | | 8,744. | 23. | | |
| 1981.82 | 80. | 875. | 931. | 188. | 6,400. | | 8,474. | 25. | 1.24 | 4.26 |
| 1982.83 | 71. | 938. | 906. | 94. | 5,798. | | 7,806. | 27. | 0.15 | 0.33 |
| 1983.84 | 51. | 984. | 1,299. | 94. | 6,071. | | 8,499. | 27. | 0.69 | 1.87 |
| 1984.85 | 0. | 1,031. | 356. | 94. | 6,362. | | 7,843. | 27. | 0.31 | 0.72 |
| 1985.86 | 0. | 1,075. | 356. | 0. | 6,431. | | 7,862. | 27. | 0.39 | 0.91 |
| 1986.87 | 0. | 1,119. | 356. | 0. | 6,820. | | 8,295. | 27. | 0.90 | 2.79 |
| 1987.88 | 0. | 1,163. | 356. | 0. | 7,207. | | 8,726. | 27. | 2.35 | 74.21 |
| 1988.89 | 0. | 1,206. | 356. | 0. | 7,667. | | 9,238. | 27. | 32.90 | |
| 1989.90 | 0. | 1,250. | 356. | 0. | 8,285. | | 9,892. | 27. | | |
| 1990.91 | 0. | 1,288. | 356. | 0. | 8,836. | | 10,480. | 27. | | |
| 1991.92 | 0. | 1,325. | 356. | 0. | 9,227. | | 10,909. | 27. | | |
| 1992.93 | 0. | 1,363. | 356. | 0. | 9,618. | | 11,337. | 27. | | |
| 1993.94 | 0. | 1,400. | 356. | 0. | 10,009. | | 11,765. | 27. | | |
| 1994.95 | 0. | 1,438. | 356. | 0. | 10,400. | | 12,194. | 27. | | |
| 1995.96 | 0. | 1,474. | 356. | 0. | 10,980. | | 12,810. | 27. | | |
| 1996.97 | 0. | 1,510. | 356. | 0. | 11,560. | | 13,426. | 27. | | |
| 1997.98 | 0. | 1,546. | 356. | 0. | 12,140. | | 14,043. | 27. | | |
| 1998.99 | 0. | 1,583. | 356. | 0. | 12,720. | | 14,659. | 27. | | |
| 1999.00 | 0. | 1,619. | 356. | 0. | 13,300. | | 15,275. | 27. | | |

附表 A-IV-5(a) Cargo Volume for Karachi Port ("Without" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G.CARGO | P.I./COKE | TOTAL | Z |
|---------|--------|--------|-----------|--------|---------|-----------|---------|------|
| 1979.80 | 671. | 1,106. | 1,426. | 611. | 3,494. | | 7,308. | 100. |
| 1980.81 | 308. | 1,257. | 1,530. | 444. | 3,650. | | 7,189. | 98. |
| 1981.82 | 280. | 1,400. | 1,490. | 300. | 3,520. | | 6,990. | 96. |
| 1982.83 | 250. | 1,500. | 1,449. | 150. | 3,289. | | 6,638. | 91. |
| 1983.84 | 180. | 1,575. | 2,078. | 150. | 3,439. | | 7,422. | 102. |
| 1984.85 | 200. | 1,650. | 2,180. | 150. | 3,599. | | 7,779. | 106. |
| 1985.86 | 256. | 1,698. | 2,158. | 0. | 3,637. | | 7,749. | 106. |
| 1986.87 | 312. | 1,738. | 2,136. | 0. | 3,851. | | 8,037. | 110. |
| 1987.88 | 368. | 1,769. | 2,120. | 0. | 4,064. | | 8,321. | 114. |
| 1988.89 | 424. | 1,790. | 2,102. | 0. | 4,317. | | 8,633. | 118. |
| 1989.90 | 480. | 1,800. | 2,070. | 0. | 4,657. | | 9,007. | 123. |
| 1990.91 | 546. | 1,860. | 1,924. | 0. | 4,960. | | 9,290. | 127. |
| 1991.92 | 612. | 1,920. | 2,018. | 0. | 5,175. | | 9,725. | 133. |
| 1992.93 | 678. | 1,980. | 2,112. | 0. | 5,390. | | 10,160. | 139. |
| 1993.94 | 744. | 2,040. | 2,206. | 0. | 5,605. | | 10,595. | 145. |
| 1994.95 | 810. | 2,100. | 2,300. | 0. | 5,820. | | 11,030. | 151. |
| 1995.96 | 872. | 2,158. | 2,382. | 0. | 6,139. | | 11,551. | 158. |
| 1996.97 | 934. | 2,216. | 2,464. | 0. | 6,458. | | 12,072. | 165. |
| 1997.98 | 996. | 2,274. | 2,546. | 0. | 6,777. | | 12,593. | 172. |
| 1998.99 | 1,058. | 2,332. | 2,628. | 0. | 7,096. | | 13,114. | 179. |
| 1999.00 | 1,120. | 2,390. | 2,710. | 0. | 7,415. | | 13,635. | 187. |

(Marginal Wharf Berth No.5-7 converted to container berths)

附表 A-IV-5(b) No. of Ship Call for Karachi Port ("Without" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G.CARGO | P.I./COKE | TOTAL | Ship/day |
|---------|-------|------|-----------|--------|---------|-----------|--------|----------|
| 1979.80 | 45. | 170. | 110. | 51. | 998. | | 1,374. | 4.04 |
| 1980.81 | 21. | 193. | 118. | 37. | 1,043. | | 1,411. | 4.15 |
| 1981.82 | 19. | 215. | 115. | 25. | 1,006. | | 1,379. | 4.06 |
| 1982.83 | 17. | 231. | 111. | 13. | 940. | | 1,311. | 3.86 |
| 1983.84 | 12. | 242. | 160. | 13. | 983. | | 1,409. | 4.14 |
| 1984.85 | 13. | 254. | 168. | 13. | 1,028. | | 1,476. | 4.34 |
| 1985.86 | 17. | 261. | 166. | 0. | 1,039. | | 1,483. | 4.36 |
| 1986.87 | 21. | 267. | 164. | 0. | 1,100. | | 1,553. | 4.57 |
| 1987.88 | 25. | 272. | 163. | 0. | 1,161. | | 1,621. | 4.77 |
| 1988.89 | 28. | 275. | 162. | 0. | 1,233. | | 1,699. | 5.00 |
| 1989.90 | 32. | 277. | 159. | 0. | 1,331. | | 1,799. | 5.29 |
| 1990.91 | 36. | 286. | 148. | 0. | 1,417. | | 1,888. | 5.55 |
| 1991.92 | 41. | 195. | 155. | 0. | 1,479. | | 1,970. | 5.79 |
| 1992.93 | 45. | 305. | 162. | 0. | 1,540. | | 2,052. | 6.04 |
| 1993.94 | 50. | 314. | 170. | 0. | 1,601. | | 2,135. | 6.28 |
| 1994.95 | 54. | 323. | 177. | 0. | 1,663. | | 2,217. | 6.52 |
| 1995.96 | 58. | 332. | 182. | 0. | 1,754. | | 2,327. | 6.85 |
| 1996.97 | 62. | 341. | 190. | 0. | 1,845. | | 2,438. | 7.17 |
| 1997.98 | 66. | 350. | 196. | 0. | 1,936. | | 2,548. | 7.50 |
| 1998.99 | 71. | 359. | 202. | 0. | 2,027. | | 2,659. | 7.82 |
| 1999.00 | 75. | 368. | 208. | 0. | 2,119. | | 2,769. | 8.15 |

附表 A-IV-5(c) Ship Day & Waiting Time for Karachi Port ("Without" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G.CARGO | P.I./COKE | TOTAL | Berth No. | W.TIME |
|---------|-------|--------|-----------|--------|---------|-----------|---------|-----------|--------|
| 1979.80 | 192. | 691. | 891. | 382. | 6,353. | | 8,509. | 23. | |
| 1980.81 | 88. | 786. | 956. | 278. | 6,636. | | 8,744. | 23. | |
| 1981.82 | 88. | 875. | 931. | 188. | 6,400. | | 8,474. | 25. | 1.24 |
| 1982.83 | 71. | 938. | 906. | 94. | 5,980. | | 7,988. | 27. | 0.21 |
| 1983.84 | 51. | 984. | 1,299. | 94. | 6,253. | | 8,681. | 27. | 0.94 |
| 1984.85 | 57. | 1,031. | 1,363. | 94. | 6,544. | | 9,088. | 27. | 3.79 |
| 1985.86 | 73. | 1,061. | 1,349. | 0. | 6,613. | | 9,096. | 27. | |
| 1986.87 | 89. | 1,086. | 1,335. | 0. | 7,002. | | 9,512. | 27. | 5.97 |
| 1987.88 | 105. | 1,106. | 1,325. | 0. | 7,389. | | 9,925. | 27. | |
| 1988.89 | 121. | 1,119. | 1,314. | 0. | 7,849. | | 10,403. | 27. | |
| 1989.90 | 137. | 1,125. | 1,294. | 0. | 8,467. | | 11,023. | 27. | |
| 1990.91 | 156. | 1,163. | 1,203. | 0. | 9,018. | | 11,539. | 27. | |
| 1991.92 | 175. | 1,200. | 1,261. | 0. | 9,409. | | 12,045. | 27. | |
| 1992.93 | 194. | 1,238. | 1,320. | 0. | 9,800. | | 12,551. | 27. | |
| 1993.94 | 213. | 1,275. | 1,379. | 0. | 10,191. | | 13,057. | 27. | |
| 1994.95 | 231. | 1,313. | 1,438. | 0. | 10,582. | | 13,563. | 27. | |
| 1995.96 | 249. | 1,349. | 1,489. | 0. | 11,162. | | 14,248. | 27. | |
| 1996.97 | 267. | 1,385. | 1,540. | 0. | 11,742. | | 14,934. | 27. | |
| 1997.98 | 285. | 1,421. | 1,591. | 0. | 12,322. | | 15,619. | 27. | |
| 1998.99 | 302. | 1,458. | 1,643. | 0. | 12,902. | | 16,304. | 27. | |
| 1999.00 | 320. | 1,494. | 1,694. | 0. | 13,482. | | 16,989. | 27. | |

付表 A-IV-6(a) Cargo Volume for Qasim Port ("Without" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G. CARGO | P. I. / COKE | TOTAL | Z |
|---------|--------|--------|-----------|--------|----------|--------------|--------|--------|
| 1979.80 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1980.81 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1981.82 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1982.83 | 0. | 0. | 0. | 150. | 300. | 176. | 626. | 100. |
| 1983.84 | 0. | 0. | 0. | 150. | 300. | 176. | 626. | 100. |
| 1984.85 | 200. | 1,500. | 1,610. | 150. | 300. | 176. | 3,936. | 629. |
| 1985.86 | 256. | 1,570. | 1,588. | 0. | 330. | 176. | 3,920. | 626. |
| 1986.87 | 312. | 1,640. | 1,566. | 0. | 360. | 176. | 4,054. | 648. |
| 1987.88 | 368. | 1,710. | 1,550. | 0. | 390. | 176. | 4,194. | 670. |
| 1988.89 | 424. | 1,780. | 1,522. | 0. | 420. | 176. | 4,322. | 690. |
| 1989.90 | 480. | 1,850. | 1,500. | 0. | 450. | 88. | 4,368. | 698. |
| 1990.91 | 546. | 1,900. | 1,354. | 0. | 480. | 0. | 4,280. | 684. |
| 1991.92 | 612. | 1,950. | 1,448. | 0. | 510. | 0. | 4,520. | 722. |
| 1992.93 | 678. | 2,000. | 1,240. | 0. | 540. | 0. | 4,760. | 760. |
| 1993.94 | 744. | 2,050. | 1,636. | 0. | 570. | 0. | 5,000. | 799. |
| 1994.95 | 810. | 2,100. | 1,730. | 0. | 600. | 0. | 5,240. | 837. |
| 1995.96 | 872. | 2,148. | 1,812. | 0. | 640. | 0. | 5,472. | 874. |
| 1996.97 | 934. | 2,196. | 1,894. | 0. | 680. | 0. | 5,704. | 911. |
| 1997.98 | 996. | 2,244. | 1,976. | 0. | 720. | 0. | 5,936. | 948. |
| 1998.99 | 1,058. | 2,292. | 2,058. | 0. | 760. | 0. | 6,168. | 985. |
| 1999.00 | 1,128. | 2,340. | 2,140. | 0. | 800. | 0. | 6,400. | 1,022. |

(cargo allocation proposed by SWANCO)

付表 A-IV-6(b) No. of Ship Call for Qasim Port ("Without" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G. CARGO | P. I. / COKE | TOTAL | Ship/day |
|---------|-------|------|-----------|--------|----------|--------------|-------|----------|
| 1979.80 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0.00 |
| 1980.81 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0.00 |
| 1981.82 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0.00 |
| 1982.83 | 0. | 0. | 0. | 13. | 53. | 20. | 86. | 0.25 |
| 1983.84 | 0. | 0. | 0. | 13. | 53. | 20. | 86. | 0.25 |
| 1984.85 | 8. | 179. | 124. | 13. | 53. | 20. | 397. | 1.17 |
| 1985.86 | 11. | 188. | 122. | 0. | 58. | 20. | 399. | 1.17 |
| 1986.87 | 13. | 196. | 120. | 0. | 64. | 20. | 413. | 1.22 |
| 1987.88 | 15. | 204. | 119. | 0. | 69. | 20. | 428. | 1.26 |
| 1988.89 | 18. | 213. | 117. | 0. | 74. | 20. | 442. | 1.30 |
| 1989.90 | 20. | 221. | 115. | 0. | 80. | 10. | 446. | 1.31 |
| 1990.91 | 23. | 227. | 104. | 0. | 85. | 0. | 439. | 1.29 |
| 1991.92 | 26. | 233. | 111. | 0. | 90. | 0. | 460. | 1.35 |
| 1992.93 | 28. | 239. | 119. | 0. | 96. | 0. | 481. | 1.42 |
| 1993.94 | 31. | 245. | 126. | 0. | 101. | 0. | 503. | 1.48 |
| 1994.95 | 34. | 251. | 133. | 0. | 106. | 0. | 524. | 1.54 |
| 1995.96 | 36. | 257. | 139. | 0. | 113. | 0. | 546. | 1.60 |
| 1996.97 | 39. | 262. | 146. | 0. | 120. | 0. | 567. | 1.67 |
| 1997.98 | 42. | 268. | 152. | 0. | 127. | 0. | 589. | 1.73 |
| 1998.99 | 44. | 274. | 158. | 0. | 135. | 0. | 611. | 1.80 |
| 1999.00 | 47. | 280. | 165. | 0. | 142. | 0. | 632. | 1.86 |

付表 A-IV-6(c) Ship Day & Waiting Time for Qasim Port ("Without" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G. CARGO | P. I. / COKE | TOTAL | Berth No. | W. TIME |
|---------|-------|--------|-----------|--------|----------|--------------|--------|-----------|---------|
| 1979.80 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | |
| 1980.81 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | |
| 1981.82 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0.00 |
| 1982.83 | 0. | 0. | 0. | 86. | 500. | 207. | 793. | 4. | 1.47 |
| 1983.84 | 0. | 0. | 0. | 86. | 500. | 207. | 793. | 4. | 1.47 |
| 1984.85 | 57. | 857. | 920. | 86. | 500. | 207. | 2,627. | 8. | 21.59 |
| 1985.86 | 73. | 897. | 907. | 0. | 550. | 207. | 2,635. | 8. | 23.74 |
| 1986.87 | 89. | 937. | 895. | 0. | 600. | 207. | 2,728. | 8. | |
| 1987.88 | 105. | 977. | 886. | 0. | 650. | 207. | 2,825. | 8. | |
| 1988.89 | 121. | 1,017. | 870. | 0. | 700. | 207. | 2,915. | 8. | |
| 1989.90 | 137. | 1,057. | 857. | 0. | 750. | 104. | 2,905. | 8. | |
| 1990.91 | 156. | 1,086. | 774. | 0. | 800. | 0. | 2,815. | 8. | |
| 1991.92 | 175. | 1,114. | 827. | 0. | 850. | 0. | 2,967. | 8. | |
| 1992.93 | 194. | 1,143. | 881. | 0. | 900. | 0. | 3,118. | 8. | |
| 1993.94 | 213. | 1,171. | 935. | 0. | 950. | 0. | 3,269. | 8. | |
| 1994.95 | 231. | 1,200. | 989. | 0. | 1,000. | 0. | 3,420. | 8. | |
| 1995.96 | 249. | 1,227. | 1,035. | 0. | 1,067. | 0. | 3,579. | 8. | |
| 1996.97 | 267. | 1,255. | 1,082. | 0. | 1,133. | 0. | 3,737. | 8. | |
| 1997.98 | 285. | 1,282. | 1,129. | 0. | 1,200. | 0. | 3,896. | 8. | |
| 1998.99 | 302. | 1,310. | 1,176. | 0. | 1,267. | 0. | 4,055. | 8. | |
| 1999.00 | 320. | 1,337. | 1,223. | 0. | 1,333. | 0. | 4,213. | 8. | |

附表 A-IV-7(a) Cargo Volume for Qasim Port ("With" Case)

| YEAR | WHEAT | RICE | FERT. P/S | CEMENT | G.CARGO | P.I./COKE | TOTAL | Σ |
|---------|--------|------|-----------|--------|---------|-----------|--------|------|
| 1979.80 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1980.81 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1981.82 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1982.83 | 0. | 0. | 0. | 150. | 300. | 176. | 626. | 100. |
| 1983.84 | 0. | 0. | 0. | 150. | 300. | 176. | 626. | 100. |
| 1984.85 | 200. | 0. | 1,610. | 150. | 300. | 176. | 2,436. | 389. |
| 1985.86 | 256. | 0. | 1,588. | 0. | 330. | 176. | 2,350. | 375. |
| 1986.87 | 312. | 0. | 1,566. | 0. | 360. | 176. | 2,414. | 386. |
| 1987.88 | 368. | 0. | 1,550. | 0. | 390. | 176. | 2,484. | 397. |
| 1988.89 | 424. | 0. | 1,522. | 0. | 420. | 176. | 2,542. | 406. |
| 1989.90 | 480. | 0. | 1,500. | 0. | 450. | 88. | 2,518. | 402. |
| 1990.91 | 546. | 0. | 1,354. | 0. | 480. | 0. | 2,380. | 380. |
| 1991.92 | 612. | 0. | 1,448. | 0. | 510. | 0. | 2,570. | 411. |
| 1992.93 | 678. | 0. | 1,240. | 0. | 540. | 0. | 2,760. | 441. |
| 1993.94 | 744. | 0. | 1,636. | 0. | 570. | 0. | 2,950. | 471. |
| 1994.95 | 810. | 0. | 1,730. | 0. | 600. | 0. | 3,140. | 502. |
| 1995.96 | 872. | 0. | 1,812. | 0. | 640. | 0. | 3,324. | 531. |
| 1996.97 | 934. | 0. | 1,894. | 0. | 680. | 0. | 3,508. | 560. |
| 1997.98 | 996. | 0. | 1,976. | 0. | 720. | 0. | 3,692. | 590. |
| 1998.99 | 1,058. | 0. | 2,058. | 0. | 760. | 0. | 3,876. | 619. |
| 1999.00 | 1,120. | 0. | 2,140. | 0. | 800. | 0. | 4,060. | 649. |

(rice is handled in Karachi Port)

附表 A-IV-7(b) No. of Ship Call for Qasim Port ("With" Case)

| YEAR | WHEAT | RICE | FERT.P/S | CEMENT | G.CARGO | P.I./COKE | TOTAL | Ship/day |
|---------|-------|------|----------|--------|---------|-----------|-------|----------|
| 1979.80 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0.00 |
| 1980.81 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0.00 |
| 1981.82 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0.00 |
| 1982.83 | 0. | 0. | 0. | 13. | 53. | 20. | 86. | 0.25 |
| 1983.84 | 0. | 0. | 0. | 13. | 53. | 20. | 86. | 0.25 |
| 1984.85 | 0. | 0. | 124. | 13. | 53. | 20. | 218. | 0.64 |
| 1985.86 | 11. | 0. | 122. | 0. | 58. | 20. | 211. | 0.62 |
| 1986.87 | 13. | 0. | 120. | 0. | 64. | 20. | 217. | 0.64 |
| 1987.88 | 15. | 0. | 119. | 0. | 69. | 20. | 224. | 0.66 |
| 1988.89 | 18. | 0. | 117. | 0. | 74. | 20. | 229. | 0.67 |
| 1989.90 | 20. | 0. | 115. | 0. | 80. | 10. | 225. | 0.66 |
| 1990.91 | 23. | 0. | 104. | 0. | 85. | 0. | 212. | 0.62 |
| 1991.92 | 26. | 0. | 111. | 0. | 90. | 0. | 227. | 0.67 |
| 1992.93 | 28. | 0. | 119. | 0. | 96. | 0. | 242. | 0.71 |
| 1993.94 | 31. | 0. | 126. | 0. | 101. | 0. | 258. | 0.76 |
| 1994.95 | 34. | 0. | 133. | 0. | 106. | 0. | 273. | 0.80 |
| 1995.96 | 36. | 0. | 139. | 0. | 113. | 0. | 289. | 0.85 |
| 1996.97 | 39. | 0. | 146. | 0. | 120. | 0. | 305. | 0.90 |
| 1997.98 | 42. | 0. | 152. | 0. | 127. | 0. | 321. | 0.94 |
| 1998.99 | 44. | 0. | 158. | 0. | 135. | 0. | 337. | 0.99 |
| 1999.00 | 47. | 0. | 165. | 0. | 142. | 0. | 353. | 1.04 |

附表 A-IV-7(c) Ship Day & Waiting Time for Qasim Port ("With" Case)

| YEAR | WHEAT | RICE | FERT.P/S | CEMENT | G.CARGO | P.I./COKE | TOTAL | Berth No. | W.TIME |
|---------|-------|------|----------|--------|---------|-----------|--------|-----------|--------|
| 1979.80 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | |
| 1980.81 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | |
| 1981.82 | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0.00 |
| 1982.83 | 0. | 0. | 0. | 86. | 500. | 207. | 793. | 4. | 1.47 |
| 1983.84 | 0. | 0. | 0. | 86. | 500. | 207. | 793. | 4. | 1.47 |
| 1984.85 | 57. | 0. | 920. | 86. | 500. | 207. | 1,770. | 8. | 0.58 |
| 1985.86 | 73. | 0. | 907. | 0. | 550. | 207. | 1,738. | 8. | 0.52 |
| 1986.87 | 89. | 0. | 895. | 0. | 600. | 207. | 1,791. | 8. | 0.63 |
| 1987.88 | 105. | 0. | 886. | 0. | 650. | 207. | 1,848. | 8. | 0.77 |
| 1988.89 | 121. | 0. | 870. | 0. | 700. | 207. | 1,898. | 8. | 0.91 |
| 1989.90 | 137. | 0. | 857. | 0. | 750. | 104. | 1,848. | 8. | 0.76 |
| 1990.91 | 156. | 0. | 774. | 0. | 800. | 0. | 1,730. | 8. | 0.51 |
| 1991.92 | 175. | 0. | 827. | 0. | 850. | 0. | 1,852. | 8. | 0.77 |
| 1992.93 | 194. | 0. | 881. | 0. | 900. | 0. | 1,975. | 8. | 1.17 |
| 1992.94 | 213. | 0. | 935. | 0. | 950. | 0. | 2,097. | 8. | 1.77 |
| 1994.95 | 231. | 0. | 989. | 0. | 1,000. | 0. | 2,220. | 8. | 2.73 |
| 1995.96 | 249. | 0. | 1,035. | 0. | 1,067. | 0. | 2,351. | 8. | 4.56 |
| 1996.97 | 267. | 0. | 1,082. | 0. | 1,133. | 0. | 2,482. | 8. | 8.58 |
| 1997.98 | 285. | 0. | 1,129. | 0. | 1,200. | 0. | 2,614. | 8. | 22.85 |
| 1998.99 | 302. | 0. | 1,176. | 0. | 1,267. | 0. | 2,745. | 8. | |
| 1999.00 | 320. | 0. | 1,223. | 0. | 1,333. | 0. | 2,876. | 8. | |

附表 A-IV-8(a) Cargo Volume for Qasim Port ("With" Case)

| YEAR | WHEAT | RICE | FERT.P/S | CEMENT | G.CARGO | P.I./COKE | TOTAL | Z |
|---------|-------|------|----------|--------|---------|-----------|-------|------|
| 1979.80 | | | | 0. | 0. | 0. | 0. | 0.00 |
| 1980.81 | | | | 0. | 0. | 0. | 0. | 0.00 |
| 1981.82 | | | | 0. | 0. | 0. | 0. | 0.00 |
| 1982.83 | | | | 13. | 35. | 20. | 68. | 0.20 |
| 1983.84 | | | | 13. | 35. | 20. | 68. | 0.20 |
| 1984.85 | | | | 13. | 35. | 20. | 68. | 0.20 |
| 1985.86 | | | | 0. | 41. | 20. | 61. | 0.18 |
| 1986.87 | | | | 0. | 46. | 20. | 66. | 0.19 |
| 1987.88 | | | | 0. | 51. | 20. | 71. | 0.21 |
| 1988.89 | | | | 0. | 57. | 20. | 77. | 0.23 |
| 1989.90 | | | | 0. | 62. | 10. | 72. | 0.21 |
| 1990.91 | | | | 0. | 67. | 0. | 67. | 0.20 |
| 1991.92 | | | | 0. | 73. | 0. | 73. | 0.21 |
| 1992.93 | | | | 0. | 78. | 0. | 78. | 0.23 |
| 1993.94 | | | | 0. | 83. | 0. | 83. | 0.24 |
| 1994.95 | | | | 0. | 88. | 0. | 88. | 0.26 |
| 1995.96 | | | | 0. | 96. | 0. | 96. | 0.28 |
| 1996.97 | | | | 0. | 103. | 0. | 103. | 0.30 |
| 1997.98 | | | | 0. | 110. | 0. | 110. | 0.32 |
| 1998.99 | | | | 0. | 117. | 0. | 117. | 0.34 |
| 1999.00 | | | | 0. | 124. | 0. | 124. | 0.36 |

(Marginal Wharf Berth No.5-7 converted to container berths)

附表 A-IV-8(b) No. of Ship Call for Qasim Port ("With" Case)

| YEAR | WHEAT | RICE | FERT.P/S | CEMENT | G.CARGO | P.I./COKE | TOTAL | Ship/day |
|---------|-------|------|----------|--------|---------|-----------|-------|----------|
| 1979.80 | | | | 0. | 0. | 0. | 0. | 0. |
| 1980.81 | | | | 0. | 0. | 0. | 0. | 0. |
| 1981.82 | | | | 0. | 0. | 0. | 0. | 0. |
| 1982.83 | | | | 150. | 200. | 176. | 526. | 100. |
| 1983.84 | | | | 150. | 200. | 176. | 526. | 100. |
| 1984.85 | | | | 150. | 200. | 176. | 526. | 100. |
| 1985.86 | | | | 0. | 230. | 176. | 406. | 77. |
| 1986.87 | | | | 0. | 260. | 176. | 436. | 83. |
| 1987.88 | | | | 0. | 290. | 176. | 466. | 89. |
| 1988.89 | | | | 0. | 320. | 176. | 496. | 94. |
| 1989.90 | | | | 0. | 350. | 88. | 438. | 83. |
| 1990.91 | | | | 0. | 380. | 0. | 380. | 72. |
| 1991.92 | | | | 0. | 410. | 0. | 410. | 78. |
| 1992.93 | | | | 0. | 440. | 0. | 440. | 84. |
| 1993.94 | | | | 0. | 470. | 0. | 470. | 89. |
| 1994.95 | | | | 0. | 500. | 0. | 500. | 95. |
| 1995.96 | | | | 0. | 540. | 0. | 540. | 103. |
| 1996.97 | | | | 0. | 580. | 0. | 580. | 110. |
| 1997.98 | | | | 0. | 620. | 0. | 620. | 118. |
| 1998.99 | | | | 0. | 660. | 0. | 660. | 125. |
| 1999.00 | | | | 0. | 700. | 0. | 700. | 133. |

附表 A-IV-8(c) Ship Day & Waiting Time for Qasim Port ("With" Case)

| YEAR | WHEAT | RICE | FERT.P/S | CEMENT | G.CARGO | P.I./COKE | TOTAL | Berth No. | W.TIME |
|---------|-------|------|----------|--------|---------|-----------|--------|-----------|--------|
| 1979.80 | | | | 0. | 0. | 0. | 0. | 0. | |
| 1980.81 | | | | 0. | 0. | 0. | 0. | 0. | |
| 1981.82 | | | | 0. | 0. | 0. | 0. | 0. | |
| 1982.83 | | | | 86. | 333. | 207. | 626. | 4. | 0.00 |
| 1983.84 | | | | 86. | 333. | 207. | 626. | 4. | 0.59 |
| 1984.85 | | | | 86. | 333. | 207. | 626. | 4. | 0.59 |
| 1985.86 | | | | 0. | 383. | 207. | 590. | 4. | 0.50 |
| 1986.87 | | | | 0. | 433. | 207. | 640. | 4. | 0.67 |
| 1987.88 | | | | 0. | 483. | 207. | 690. | 4. | 0.89 |
| 1988.89 | | | | 0. | 533. | 207. | 740. | 4. | 1.17 |
| 1989.90 | | | | 0. | 583. | 104. | 687. | 4. | 0.86 |
| 1990.91 | | | | 0. | 633. | 0. | 633. | 4. | 0.63 |
| 1991.92 | | | | 0. | 683. | 0. | 683. | 4. | 0.83 |
| 1992.93 | | | | 0. | 733. | 0. | 733. | 4. | 1.10 |
| 1993.94 | | | | 0. | 783. | 0. | 783. | 4. | 1.43 |
| 1994.95 | | | | 0. | 833. | 0. | 833. | 4. | 1.85 |
| 1995.96 | | | | 0. | 900. | 0. | 900. | 4. | 2.58 |
| 1996.97 | | | | 0. | 967. | 0. | 967. | 4. | 3.63 |
| 1997.98 | | | | 0. | 1,033. | 0. | 1,033. | 4. | 5.16 |
| 1998.99 | | | | 0. | 1,100. | 0. | 1,100. | 4. | 7.54 |
| 1999.00 | | | | 0. | 1,167. | 0. | 1,167. | 4. | 11.67 |

インランドコンテナフレートステーションのコンテナ蔵置面積予測

The required ground slots of CNTR can be calculated using the following formula;

$$GS = \frac{NC \times CS}{t \times n \times WD}$$

Where: GS : Number of ground slots of CNTR (TEU)
 NC : Number of CNTR handled per year (TEU)
 CS : Days of CNTR's stay (dwell time) in terminal
 t : Number of stacking tiers of CNTR (stacking height)
 for rubber tired transfer crane
 n : Net stacking CNTR ratio exclusive of operational
 allowance for slot availability due to reservation,
 shifting or congestion.
 WD : Annual working days, 365 - 65 = 300 days

| | Handling mode of CNTR | CS | | t | n |
|---|--------------------------------------|------|------|---|-----|
| | | 2000 | 1988 | | |
| a | Import FCL dry CNTR | 8 | 10 | 2 | 0.7 |
| b | Import FCL special CNTR | 7 | 9 | 1 | 0.9 |
| c | Import LCL dry CNTR | 3 | 3 | 3 | 0.9 |
| d | Import LCL special CNTR | 3 | 3 | 1 | 0.9 |
| e | Export FCL dry CNTR | 6 | 8 | 3 | 0.9 |
| f | Export FCL special CNTR | 5 | 7 | 1 | 0.9 |
| g | Export LCL dry CNTR | 3 | 3 | 3 | 0.9 |
| h | Export LCL special CNTR | 3 | 3 | 1 | 0.9 |
| i | Empty CNTR for stuffing export cargo | 12 | 14 | 3 | 0.9 |
| j | Export empty CNTR | 5 | 5 | 3 | 0.9 |

1. Master plan (1999-2000)

a. Import FCL dry CNTR; G_{Sa} = $\frac{91,691 \times 8}{2 \times 0.7 \times 300} = \underline{1,747 \text{ TEU}}$

* NC = IF x $(1 + \frac{s}{100-s})$ x f x d

IF: Number of import CNTR carried from the new port terminal to the inland container freight station per year (TEU)

s : Percentage of CNTR discharged and loaded by the semi and RORO CNTR ship at the present Karachi port, 15%

f : Percentage of FCL CNTR at inland terminal, 60%

d : Dry CNTR ratio of import full CNTR, 90%

NC = 144,329 x $(1 + \frac{15}{85})$ x 0.6 x 0.9 = 91,691 TEU

b. Import FCL special CNTR: G_{Sb} = $\frac{10,188 \times 7}{1 \times 0.9 \times 300} = \underline{265 \text{ TEU}}$

* NC = IF x $(1 + \frac{s}{100-s})$ x f x c

c : Special CNTR ratio of import full CNTR, 10%

NC = 144,329 x $(1 + \frac{15}{85})$ x 0.6 x 0.1 = 10,188 TEU

c. Import LCL dry CNTR; G_{Sc} = $\frac{61,128 \times 3}{3 \times 0.9 \times 300} = \underline{227 \text{ TEU}}$

* NC = IF x $(1 + \frac{s}{100-s})$ x l x d

l : Percentage of LCL CNTR at inland CFS, 40%

NC = 144,329 x $(1 + \frac{15}{85})$ x 0.4 x 0.9 = 61,128 TEU

d. Import LCL special CNTR; G_{Sd} = $\frac{6,792 \times 3}{1 \times 0.9 \times 300} = \underline{76 \text{ TEU}}$

* NC = IF x $(1 + \frac{s}{100-s})$ x l x c

NC = 144,329 x $(1 + \frac{15}{85})$ x 0.4 x 0.1 = 6,792 TEU

$$e. \text{ Export FCL dry CNTR; } GSe = \frac{60,981 \times 6}{3 \times 0.9 \times 300} = \underline{452 \text{ TEU}}$$

$$* NC = EF \times (1 + \frac{s}{100-s}) \times f \times d$$

EF: Number of export CNTR carried from the inland container freight station to the new port terminal per year (TEU)

$$NC = 95,989 (1 + \frac{15}{85}) \times 0.6 \times 0.9 = 60,981 \text{ TEU}$$

$$f. \text{ Export FCL special CNTR; } GSf = \frac{6,776 \times 5}{1 \times 0.9 \times 300} = \underline{126 \text{ TEU}}$$

$$* NC = 95,989 (1 + \frac{15}{85}) \times 0.6 \times 0.1 = 6,776 \text{ TEU}$$

$$g. \text{ Export LCL dry CNTR; } GSg = \frac{40,654 \times 3}{3 \times 0.9 \times 300} = \underline{151 \text{ TEU}}$$

$$* NC = 95,989 (1 + \frac{15}{85}) \times 0.4 \times 0.9 = 40,654 \text{ TEU}$$

$$h. \text{ Export LCL special CNTR; } GSh = \frac{4,517 \times 3}{1 \times 0.9 \times 300} = \underline{51 \text{ TEU}}$$

$$* NC = 95,989 (1 + \frac{15}{85}) \times 0.4 \times 0.1 = 4,517 \text{ TEU}$$

$$i. \text{ Empty CNTR for stuffing export LCL cargo; } GSi = \frac{79,050 \times 12}{3 \times 0.9 \times 300} = \underline{1,172 \text{ TEU}}$$

$$* NC = EF (1 + \frac{s}{100-s}) \times (f \times e + l)$$

e : Percentage of empty CNTR stored at terminal, 50%

$$NC = 95,989 (1 + \frac{15}{85}) \times (0.6 \times 0.5 + 0.4) = 79,050 \text{ TEU}$$

$$j. \text{ Export empty CNTR; } GSj = \frac{56,871 \times 5}{3 \times 0.9 \times 300} = \underline{351 \text{ TEU}}$$

$$* NC = (IF - EF) \times (1 + \frac{s}{100-s})$$

$$= (144,329 - 95,989) \times (1 + \frac{15}{85}) = 56,871 \text{ TEU}$$

Total ground slots: $GSt = GSa + \text{---} + GSj = \underline{4,618 \text{ TEU}}$

* Reference No. 1: The same number of chassis (TEU) to the total stacking slots, exclusive of operational margin for the rubber tired transfer crane system, are required for the all chassis system.

Total stacking slots:

| | |
|-------------------------|-----------|
| 1,747 (GSa) x 0.7 x 2 = | 2,446 TEU |
| 265 (GSb) x 0.9 x 1 = | 239 " |
| 227 (GSc) x 0.9 x 3 = | 613 " |
| 76 (GSd) x 0.9 x 1 = | 69 " |
| 452 (GSe) x 0.9 x 3 = | 1,221 " |
| 126 (GSf) x 0.9 x 1 = | 114 " |
| 151 (GSg) x 0.9 x 3 = | 408 " |
| 51 (GSh) x 0.9 x 1 = | 46 " |
| 1,172 (GSi) x 0.9 x 3 = | 3,165 " |
| 351 (GSj) x 0.9 x 3 = | 948 TEU |

9,269 TEU

The necessary number of chassis

20 footer : $9,269 \times 0.5 = 4,634.5 = \underline{4,635 \text{ units}}$

40 footer : $9,269 \times 0.25 = 2,317.3 = \underline{2,318 \text{ units}}$

* Reference No. 2: The required ground slots of refrigerated CNTR at CNTR yard are calculated as follows;

$$GSr = (GSe + GSd + GSf + GSh) \times \gamma + GSk$$

GSr : Ground slots of refrigerated CNTR

γ : Refrigerated CNTR ratio to all special ones, 0.3

GSq : Ground slots of empty refrigerated CNTR for pretrep (cooling)

$$GSq = \frac{2,372 \times 3}{1 \times 0.9 \times 300} = \underline{27 \text{ TEU}}$$

CS : Days of CNTRs stay, 3 days

$$NC = EFS \times e \times \gamma + ELS \times \gamma = 6,776 \times 0.5 \times 0.3 + 4,517 \times 0.3 = 2,372 \text{ TEU}$$

EFS: Number of export FCL special CNTR handled per year

ELS: Number of export LCL special CNTR handled per year

$$GSr = (265 + 76 + 126 + 51) \times 0.3 + 27 = \underline{\underline{183 \text{ TEU}}}$$

2. Urgent plan (1987-1988)

a. Import FCL dry CNTR; $GSa = \frac{24,396 \times 10}{2 \times 0.7 \times 300} = \underline{581 \text{ TEU}}$

* $NC = IF \times (1 + \frac{s}{100-s}) \times f \times d$

IF: Number of import CNTR carried from the new port terminal to the inland container freight station per year (TEU)

s : Percentage of CNTR discharged and loaded by the semi and RORO CNTR ship at the present Karachi port, 20%

f : Percentage of FCL CNTR at inland terminal, 60%

d : Dry CNTR ratio of import full CNTR, 90%

$NC = 36,142 \times (1 + \frac{20}{80}) \times 0.6 \times 0.9 = 24,396 \text{ TEU}$

b. Import FCL special CNTR; $GSb = \frac{2,711 \times 9}{1 \times 0.9 \times 300} = \underline{91 \text{ TEU}}$

* $NC = IF \times (1 + \frac{s}{100-s}) \times f \times c$

c : Special CNTR ratio of import full CNTR, 10%

$NC = 36,142 \times (1 + \frac{20}{80}) \times 0.6 \times 0.1 = 2,711 \text{ TEU}$

c. Import LCL dry CNTR; $GS_c = \frac{16,264 \times 3}{3 \times 0.9 \times 300} = \underline{61 \text{ TEU}}$

* $NC = IF \times (1 + \frac{s}{100-s}) \times \ell \times d$

ℓ : Percentage of LCL CNTR at inland CFS, 40%

$NC = 36,142 (1 + \frac{20}{80}) \times 0.4 \times 0.9 = 16,264 \text{ TEU}$

d. Import LCL special CNTR; $GS_d = \frac{1,807 \times 3}{1 \times 0.9 \times 300} = \underline{20 \text{ TEU}}$

* $NC = IF \times (1 + \frac{s}{100-s}) \times \ell \times c$

$NC = 36,142 (1 + \frac{20}{80}) \times 0.4 \times 0.1 = 1,807 \text{ TEU}$

$$e. \text{ Export FCL dry CNTR; } GSe = \frac{20,218 \times 8}{3 \times 0.9 \times 300} = \underline{200 \text{ TEU}}$$

$$* NC = EF \times (1 + \frac{s}{100-s}) \times f \times d$$

EF: Number of export CNTR carried from the inland container freight station to the new port terminal per year (TEU)

$$NC = 29,952 (1 + \frac{20}{80}) \times 0.6 \times 0.9 = 20,218 \text{ TEU}$$

$$f. \text{ Export FCL special CNTR; } GSf = \frac{2,246 \times 7}{1 \times 0.9 \times 300} = \underline{59 \text{ TEU}}$$

$$* NC = 29,952 (1 + \frac{20}{80}) \times 0.6 \times 0.1 = 2,246 \text{ TEU}$$

$$g. \text{ Export LCL dry CNTR; } GSg = \frac{13,478 \times 3}{3 \times 0.9 \times 300} = \underline{50 \text{ TEU}}$$

$$* NC = 29,952 (1 + \frac{20}{80}) \times 0.4 \times 0.9 = 13,478 \text{ TEU}$$

$$h. \text{ Export LCL special CNTR; } GSh = \frac{1,498 \times 3}{1 \times 0.9 \times 300} = \underline{17 \text{ TEU}}$$

$$* NC = 29,952 (1 + \frac{20}{80}) \times 0.4 \times 0.1 = 1,498$$

$$i. \text{ Empty CNTR for stuffing export cargo; } GSi = \frac{31,824 \times 14}{3 \times 0.9 \times 300} = \underline{550 \text{ TEU}}$$

$$* NC = EF (1 + \frac{s}{100-s}) (f \times e + l)$$

e : Percentage of empty CNTR stored at terminal, 75%

$$NC = 29,952 (1 + \frac{20}{80}) \times (0.6 \times 0.75 + 0.4) = 31,824 \text{ TEU}$$

$$j. \text{ Export empty CNTR; } GSj = \frac{7,738 \times 5}{3 \times 0.9 \times 300} = \underline{48 \text{ TEU}}$$

$$* NC = (IF - EF) \times (1 + \frac{s}{100-s})$$

$$= (36,142 - 29,952) \times (1 + \frac{20}{80}) = 7,738 \text{ TEU}$$

$$\text{Total ground slots: } GSt = GSa + \text{---} + GSj = \underline{1,677 \text{ TEU}}$$

* Reference: The required ground slots of refrigerated CNTR at CNTR yard are calculated as follows:

$$GSr = (GSb + GSd + GSf + GSh) \times \gamma + GSk$$

GSr : Ground slots of refrigerated CNTR

γ : Refrigerated CNTR ratio to all special ones, 0.3

GSq : Ground slots of empty refrigerated CNTR for pretrip (cooling)

$$GSq = \frac{955 \times 3}{1 \times 0.9 \times 300} = \underline{11 \text{ TEU}}$$

CS : Days of CNTRs stay, 3 days

$$NC = EFS \times e \times \gamma + ELS \times \gamma = 2,246 \times 0.75 \times 0.3 + 1,498 \times 0.3 = 955 \text{ TEU}$$

EFS: Number of export FCL special CNTR handled per year

ELS: Number of export LCL special CNTR handled per year

$$\therefore GSr = (91 + 20 + 59 + 17) \times 0.3 + 11 = \underline{\underline{68 \text{ TEU}}}$$

インランドコンテナフレートステーションのコンテナフレートステーション上屋面積予測

a. Urgent plan

1. Full CNTR (TEU) handled at the inland container freight station

| | | |
|--------|------------------------|------------|
| Import | 36,142 x (1 + 20/80) = | 45,178 TEU |
| Export | 29,952 x (1 + 20/80) = | 37,440 TEU |
| Total | 66,094 (1 + 20/80) = | 82,618 TEU |

80% of total cargo is transported from the new CNTR terminal and 20% of them from the present port.

2. Import cargo unstuffed & export cargo stuffed at the inland container freight station

| | | |
|--------|---------------------|--------------|
| Import | 45,178 x 9 x 0.4 = | 162,641 MT |
| Export | 37,440 x 11 x 0.4 = | 164,736 MT |
| Total | 82,618 | = 327,377 MT |

3. The necessary floor space of CFS

$$\frac{(162,641 + 164,736) \times 7}{1 \times 0.45 \times 300} = 16,975 \text{ m}^2$$

b. Master plan

1. Full CNTR (TEU) handled at the inland container freight station

| | | |
|--------|------------------|-------------|
| Import | 144,329 ÷ 0.85 = | 169,799 TEU |
| Export | 95,989 ÷ 0.85 = | 112,928 TEU |
| Total | 240,318 ÷ 0.85 = | 282,727 TEU |

2. Import cargo unstuffed & export cargo stuffed at the inland container freight station

| | | |
|--------|----------------------|----------------|
| Import | 169,799 x 9 x 0.4 = | 611,276 MT |
| Export | 112,928 x 11 x 0.4 = | 496,883 MT |
| Total | 282,727 | = 1,108,159 MT |

3. The necessary floor space of CFS

$$\frac{(611,276 + 496,883) \times 7}{1 \times 0.45 \times 300} = 57,460 \text{ m}^2$$

インランドコンテナプレートステーションの荷役機械数量予測 (基本計画)

The necessary number of equipment is calculated as follows:

(1) Equipment for unit train and CNTR yard operation

$$NE = \frac{NC \times p}{WD \times GH \times w \times AP}$$

Where :

NE : Number of equipment at peak hour (units)

NC : Number of CNTR movements per year (units)

WD : Annual working days, 365 - 65 = 300 days

p : Peak day factor, 1.25

GH : Gross working hours per day

w : Net working hour ratio

AP : Average productivity per equipment hour

(A)-1 Rail-mounted transfer cranes for unit train

$$NE = \frac{254,698 \times 1.25}{300 \times 22 \times 0.4 \times 20} = \underline{6 \text{ units}}$$

$$* NC = (DS + LS) \times \left(1 + \frac{s}{100-s}\right) \times u \times t$$

DS : Number of CNTR discharged from full CNTR ship per year (TEU)

LS : Number of CNTR loaded to full CNTR ship per year (TEU)

s : Percentage of CNTR discharged and loaded by semi-and RORO CNTR ship at the present Karachi port, 15%

u : Ratio of transportation by unit train, 42.7%

t : Exchange rate from TEU to units of CNTR, 0.75

$$NC = (338,007 + 338,007) \times \left(1 + \frac{15}{85}\right) \times 0.427 \times 0.75 = 254,698 \text{ units}$$

(A)-2 Top lifters for unit train

$$NE = \frac{254,698 \times 1.25}{300 \times 22 \times 0.4 \times 14} = 8.6 = \underline{9 \text{ units}}$$

(B)-1 Rail-mounted
Rubber-tired) transfer cranes at CNTR yard

a. Unit train : $NE_a = \frac{254,698 \times 1.25}{300 \times 22 \times 0.4 \times 20} = 6 \text{ units}$

b. LCL by road : $NE_b = \frac{169,636 \times 1.25}{300 \times 22 \times 0.75 \times 20} = 2.1 = 3 \text{ units}$

* $NC = (IF + EF) \times (1 + \frac{s}{100-s}) \times l \times (1 + e) \times t$

IF : Number of import CNTR carried from the new port CNTR terminal (TEU)

EF : Number of export CNTR carried to the new port CNTR terminal (TEU)

s : Percentage of CNTR discharged and loaded by semi and RORO CNTR ship at the present Karachi port, 15%

l : Percentage of LCL CNTR, 40%

e : Percentage of empty CNTR stored at terminal, 100%

t : Exchange rate from TEU to units of CNTR, 0.75

$NC = (144,329 + 95,989) \times (1 + \frac{15}{85}) \times 0.4 \times (1 + 1) \times 0.75$
 $= 169,636 \text{ units}$

c. FCL by road : $NE_c = \frac{229,046 \times 1.25}{300 \times 8 \times 0.9 \times 15} = 8.8 = 9 \text{ units}$

* $NC = 2(IF + e \times EF) \times (1 + \frac{s}{100-s}) \times f \times t$

e : Percentage of empty CNTR stored at terminal, 50%

f : Percentage of FCL CNTR, 60%

$NC = 2(144,329 + 0.75 \times 95,989) \times (1 + \frac{15}{85}) \times 0.6 \times 0.75$
 $= 229,046 \text{ units}$

Total number of transfer cranes : $NE_t = NE_a + NE_b + NE_c = 18 \text{ units}$

Remark : The miscellaneous operations regarding inspection, repair and adjustment of CNTR are managed at other working hours than the peak ones.

d. Tractors & chassis 40' (20' x 2) for unit train operation

4 sets of tractors & chassis per crane x 6 = 24 sets

(B)-2 Straddle carriers

a. Unit train : $NE_a = \frac{254,698 \times 1.25}{300 \times 22 \times 0.4 \times 16} = 7.5 = 8 \text{ units}$

b. LCL by road : $NE_b = \frac{169,636 \times 1.25}{300 \times 22 \times 0.75 \times 12} = 3.6 = 4 \text{ units}$

c. FCL by road : $NE_c = \frac{229,046 \times 1.25}{300 \times 8 \times 0.9 \times 12} = 11.0 = 11 \text{ units}$

d. Spare : $NE_d = 2 \text{ units}$

Total number of straddle carriers: $NE_t = NE_a + NE_b + NE_c + NE_d = 25 \text{ units}$

e. Tractors & chassis 40' (20' x 2) for unit train operation

4 sets of tractors & chassis per crane x 6 = 24 sets

(B)-3 Combined system of rubber-tired transfer cranes and straddle carriers

a. Transfer cranes: $NE_a = 18 \div 2 = 9 \text{ units}$

b. Straddle carriers: $NE_b = 25 \div 2 = 12.5 = 13 \text{ units}$

Total : 9 units of transfer cranes & 13 units of straddle carriers

c. Tractors & chassis 40' (20' x 2) for unit train operation

4 sets of tractor & chassis per crane x 6 = 24 sets

(B)-4 All chassis and shifters

a. Chassis : 4,635 units of 20 footer and 2,318 units of 40 footer chassis

b. Tractors

Unit train operation : 4 units per crane x 6 = 24 units

Gate operation : 4 units per shifter x 9 = 36 units

Total : 60 units

c. Shifters: $NE_c = \frac{229,046 \times 1.25}{300 \times 8 \times 0.9 \times 15} = 8.8 = 9 \text{ units}$

* NC = Number of FCL CNTR movements per year (units)

(B)-5 Top lifters and chassis feed

a. Unit train : $NE_a = \frac{254,698 \times 1.25}{300 \times 22 \times 0.4 \times 14} = 8.6 = 9 \text{ units}$

b. LCL by rail : $NE_b = \frac{169,636 \times 1.25}{300 \times 22 \times 0.75 \times 14} = 3.0 = 3 \text{ units}$

c. FCL by road : $NE_c = \frac{229,046 \times 1.25}{300 \times 8 \times 0.9 \times 10} = 13.3 = 14 \text{ units}$

d. Spare : $NE_d = 3 \text{ units}$

Total number of top lifters: $NE_t = NE_a + NE_b + NE_c + NE_d = \underline{29 \text{ units}}$

e. Tractors & chassis 40' (20' x 2) for unit train operation

4 sets of tractors and chassis x 6 = 24 sets

(2) Gate operation

(A) Lane (NL : Number of lane)

$$NL = \frac{229,046 \times 1.25}{300 \times 8 \times 0.9 \times 15} = 8.8 = \underline{9 \text{ lanes}}$$

(B) Booths

One booth between two lanes ----- 5 booths

(C) Weighing scales (NS: Number of weighing scales)

Export FCL only : $NS = \frac{50,818 \times 1.25}{300 \times 8 \times 0.9 \times 15} = \underline{2 \text{ units}}$

$$* NC = 95,989 \times \left(1 + \frac{15}{85}\right) \times 0.6 \times 0.75 = 50,818 \text{ units}$$

(3) Equipment and pallets for CFS operation

(A) 3 ton fork lift trucks

$$NE = \frac{NC \times p \times AW}{WD \times GH \times w}$$

Where :

NE : Number of equipment at peak hour (units)

NC : Number of LCL CNTR per year (units)

P : Peak day factor

AW : Average working hours per CNTR

Import 20 footer = 1.0 hour

Import 40 footer = 1.5 hours

Export 20 footer = 0.5 hour

Export 40 footer = 0.75 hour

WD : Annual working days, $365 - 65 = 300$ days

GH : Gross working hours per day

w : Net working hours ratio

$$a. \text{ Unstuffing import 20'; } NE_a = \frac{33,960 \times 1.25 \times 1.0}{300 \times 22 \times 0.75} = 8.6 = 9 \text{ units}$$

$$* NC = IF \times \left(1 + \frac{s}{100-s}\right) \times l \times d$$

IF : Number of import CNTR carried from the new port terminal (TEU)

s : Percentage of CNTR discharged and loaded by semi-and RORO CNTR ship at the present Karachi port, 15%

l : Percentage of LCL CNTR, 40%

d : Exchange rate from TEU to units of 20' or 40'

$$NC = 144,329 \left(1 + \frac{15}{85}\right) \times 0.4 \times 0.5 = 33,960 \text{ units}$$

$$b. \text{ Unstuffing import 40'; } NE_b = \frac{16,980 \times 1.25 \times 1.5}{300 \times 22 \times 0.75} = 6.4 = 7 \text{ units}$$

$$* NC = 144,329 \left(1 + \frac{15}{85}\right) \times 0.4 \times 0.25 = 16,980 \text{ units}$$

$$c. \text{ Stuffing export 20'; } NE_c = \frac{22,586 \times 1.25 \times 0.5}{300 \times 22 \times 0.75} = 2.9 = 3 \text{ units}$$

$$* NC = EF \times \left(1 + \frac{s}{100-s}\right) \times l \times d$$

EF : Number of export CNTR carried to the new port terminal (TEU)

$$NC = 95,989 \left(1 + \frac{15}{85}\right) \times 0.4 \times 0.5 = 22,586 \text{ units}$$

$$d. \text{ Stuffing export 40'; } NE_d = \frac{11,293 \times 1.25 \times 0.75}{300 \times 22 \times 0.75} = 2.1 = 3 \text{ units}$$

$$* NC = 95,989 \left(1 + \frac{15}{85}\right) \times 0.4 \times 0.25 = 11,293 \text{ units}$$

Total number of forklifts for unstuffing & stuffing LCL cargo from/to containers; $NE_t = NE_a + NE_b + NE_c + NE_d = 22$ units.

- e. The same number of equipment for the above mentioned ones (NE_t) are required to remove/feed cargo between CNTR and stack place, and receive/deliver cargo from/to consignor; $NE_e = NE_t = 22$ units.

Grand total : $NE_t + NE_e = \underline{44}$ units

- (B) 6 ton fork lift trucks for handling heavy cargo

One unit every 10 units of 3 ton fork lift trucks : $NE = \underline{5}$ units

- (C) Tractors

4 units per transfer crane for handling LCL CNTR x 3 : $NE = \underline{12}$ units

- (D) Chassis

$NE_2 = 44$ units of 20' chassis

$NE_4 = 22$ units of 40' chassis

$NE_t = \underline{66}$ units

* Required number of chassis are three times as many as number of containers stuffed and unstuffed at the peak hour.

- (E) Pallets with 1.8 m x 1.2 m two-way reversible winged type

$$NP = \frac{FS \times \gamma \times t}{(WP + w) \times (LP + l)}$$

Where :

NP : Number of pallets (sheets)

FS : Floor space of CFS (m^2)

γ : Floor utilization ratio of cargo stacking space, 45%

t : Number of stacking tiers of pallet, 1

WP : Width of pallet, 1.8 m

w : Widthwise clearance between pallets, 0.2 m

LP : Length of pallets, 1.2 m

l : Lengthwise clearance, 0.1 m

$$NP = \frac{57,460 \times 0.45 \times 1}{(1.8 + 0.2) \times (1.2 + 0.1)} = \underline{9,945 \text{ sheets}}$$

(5) Equipment for the repair shop

(A) 3 ton fork lift trucks for lifting damage CNTR on the repair stands: NE = 2 units

(B) 15 ton fork lift trucks with telescopic side spreader : NE = 2 units

(6) Multipurpose equipment

(A) Mobile cranes with 35 ton capacity for emergency

measures at CNTR yard and CFS operation : NE = 2 units

(B) 3 ton fork lift trucks for carrying cargo gears and others : NE = 4 units

(C) 15 ton fork lift trucks with telescopic side spreader for handling heavy cargo and empty CNTR : NE = 2 units

(7) Terminal office

(A) Computer for inventory control of CNTR in terminal : NE = One set

(B) Wireless telephones(VHF)

| | Main equipments | Office, CFS & maintenance | Total |
|---------------------|-----------------|------------------------------|----------|
| a. Transfer crane | 60 | 4 | 64 |
| b. Straddle carrier | 67 | 4 | 71 |
| c. Combined system | 64 | 4 | 68 |
| d. All chassis | 87 | 4 | 91 |
| e. Top lifter | 71 units | 4 units | 75 units |

インランドコンテナフレートステーションの荷役機械数量予測 (緊急計画)

The necessary number of equipment is calculated as follows:

(1) Equipment for unit train and CNTR yard operation

$$NE = \frac{NC \times P}{WD \times GH \times w \times AP}$$

where:

NE : Number of equipment at peak hour (units)

NC : Number of CNTR movements per year (units)

WD : Annual working days, $365 - 65 = 300$ days

P : Peak day factor, 1.25

GH : Gross working hours per day

w : Net working hours ratio

AP : Average productivity per equipment hour.

(A) Rail-mounted transfer cranes for unit train

$$NE = \frac{67,767 \times 1.25}{300 \times 22 \times 0.4 \times 20} = 1.6 = \underline{2 \text{ units}}$$

$$* NC = (DS + LS) \times \left(1 + \frac{s}{100-s}\right) \times u \times t$$

DS : Number of CNTR discharged from ship per year (TEU)

LS : Number of CNTR loaded to ship per year (TEU)

s : Percentage of CNTR discharged and loaded by semi-and RORO CNTR ships at the present Karachi port, 20%

u : Ratio of transportation by unit train, 42.7%

t : Exchange rate from TEU to units of CNTR, 0.75

$$NC = (84,642 + 84,642) \times \left(1 + \frac{20}{80}\right) \times 0.427 \times 0.75 = 67,767 \text{ units}$$

(B) Rubber-tired transfer cranes for CNTR yard operation

a. Unit train : $NE_a = \frac{67,767 \times 1.25}{300 \times 22 \times 0.4 \times 20} = 1.6 = 2 \text{ units}$

b. LCL by road : $NE_b = \frac{49,571 \times 1.25}{300 \times 22 \times 0.75 \times 20} = 0.6 = 1 \text{ unit}$

$$* NC = (IF + EF) \times \left(1 + \frac{s}{100-s}\right) \times l \times (1 + e) \times t$$

IF : Number of import CNTR carried from the new port terminal (TEU)

EF : Number of export CNTR carried to the new port terminal (TEU)

s : Percentage of CNTR discharged and loaded by semi-and RORO CNTR ships at the present Karachi port, 20%

l : Percentage of LCL CNTR, 40%

e : Percentage of empty CNTR stored at terminal, 100%

t : Exchange rate from TEU to units of CNTR, 0.75

$$NC = (36,142 + 29,952) \times \left(1 + \frac{20}{80}\right) \times 0.4 \times (1 + 1) \times 0.75 = 49,571 \text{ units}$$

c. FCL by road : $NE_c = \frac{65,932 \times 1.25}{300 \times 8 \times 0.9 \times 15} = 2.5 = 3 \text{ units}$

$$* NC = 2(IF + e \times EF) \times \left(1 + \frac{s}{100-s}\right) \times f \times t$$

e : Percentage of empty CNTR stored at terminal, 75%

f : Percentage of FCL CNTR, 60%

$$NC = 2(36,142 + 0.75 \times 29,952) \times \left(1 + \frac{20}{80}\right) \times 0.6 \times 0.75 = 65,932 \text{ units}$$

$$\text{Total number of transfer cranes: } NE_t = NE_a + NE_b + NE_c = 6 \text{ units}$$

Remark : The miscellaneous operations regarding inspection, repair and adjustment of CNTR are managed at other working hours than the peak ones.

d. Tractors & chassis 40' (20' x 2) for unit train operation

$$4 \text{ sets of tractor \& chassis per crane} \times 2 = \underline{8 \text{ sets}}$$

(2) Gate operation

(A) Lanes: (NL: Number of lanes)

$$NL = \frac{65,932 \times 1.25}{300 \times 8 \times 0.9 \times 15} = 2.6 = 3 \text{ lanes}$$

(B) Booth

One booth between two lanes ----- 2 booths

(C) Weighing scales used by export FCL CNTR only

$$NS = \frac{16,848 \times 1.25}{300 \times 8 \times 0.9 \times 15} = 0.7 = \underline{1 \text{ unit}}$$

$$* NC = EF \left(1 + \frac{s}{100-s}\right) \times f \times t$$

NS : Number of weighing scales

EF : Number of export FCL CNTR carried to the new port terminal (TEU)

s : Percentage of CNTR discharged and loaded by semi-and RORO CNTR ships at the present Karachi port, 20%

f : Percentage of FCL CNTR, 60%

t : Exchange rate from TEU to units of CNTR, 0.75

$$NC = 29,952 \times \left(1 + \frac{20}{80}\right) \times 0.6 \times 0.75 = 16,848 \text{ units}$$

(3) Equipment and pallets for CFS operation

(A) 3 ton fork lift trucks

$$NE = \frac{NC \times p \times AW}{WD \times GH \times w}$$

where :

NE : Number of equipment at peak hour (units)

NC : Number of LCL CNTR per year (units)

p : Peak day factor

AW : Average working hours per CNTR

Import 20 footer = 1.0 hour

Import 40 footer = 1.5 hours

Export 20 footer = 0.5 hour

Export 40 footer = 0.75 hour

WD : Annual working days, 365 - 65 = 300 days

GH : Gross working hours per day

w : Net working hours ratio

a. Unstuffing import 20' : $NE_a = \frac{9,036 \times 1.25 \times 1.0}{300 \times 22 \times 0.75} = 2.3 = 3 \text{ units}$

* $NC = IF \times (1 + \frac{s}{100-s}) \times \ell \times d$

IF : Number of import CNTR carried from the new port terminal (TEU)

s : Percentage of CNTR discharged and loaded by semi-and RORO CNTR ships at the present Karachi port, 20%

ℓ : Percentage of LCL CNTR, 40%

d : Exchange rate from TEU to units of 20' or 40' CNTR

$NC = 36,142 \times (1 + \frac{20}{80}) \times 0.4 \times 0.5 = 9,036 \text{ units}$

b. Unstuffing import 40' : $NE_b = \frac{4,518 \times 1.25 \times 1.5}{300 \times 22 \times 0.75} = 1.7 = 2 \text{ units}$

* $NC = 36,142 \times (1 + \frac{20}{80}) \times 0.4 \times 0.25 = 4,518 \text{ units}$

c. Stuffing export 20' : $NE_c = \frac{7,488 \times 1.25 \times 0.5}{300 \times 22 \times 0.75} = 0.9 = 1 \text{ unit}$

* $NC = EF \times (1 + \frac{s}{100-s}) \times \ell \times d$

EF : Number of export CNTR carried to the new port terminal (TEU)

$NC = 29,952 \times (1 + \frac{20}{80}) \times 0.4 \times 0.5 = 7,488 \text{ units}$

d. Stuffing export 40' : $NE_d = \frac{3,744 \times 1.25 \times 0.75}{300 \times 22 \times 0.75} = 0.7 = 1 \text{ unit}$

$NC = 29,952 \times (1 + \frac{20}{80}) \times 0.4 \times 0.25 = 3,744 \text{ units}$

Total number of fork lift trucks for unstuffing & stuffing cargo from/to containers; $NE_t = NE_a + NE_b + NE_c + NE_d = 7 \text{ units}$

e. The same number of equipment for the above mentioned ones (NE_t) are required to remove/feed cargo between CNTR and stack place, and receive/deliver cargo from/to consignor; $NE_e = NE_t = 7 \text{ units}$

Grand total : $NE_t + NE_e = 14 \text{ units}$

(B) 6 ton fork lift trucks for handling heavy cargo

One unit every 10 units of 3 ton fork lift trucks; NE = 2 units

(C) Tractors

4 units per transfer crane for handling LCL CNTR x 1; NE = 4 units

(D) Chassis:

$NE_2 = 14$ units of 20' chassis

$NE_4 = 7$ units of 40' chassis

$NE_t = 21$ units

* Required number of chassis are three times as many as number of containers stuffed and unstuffed at the peak hour.

(E) Pallets with 1.8 m x 1.2 m two-way reversible winged type

$$NP = \frac{FS \times r \times t}{(WP + w) \times (LP + 1)}$$

Where : NP = Number of pallets (sheets)

FS = Floor space of CFS (m^2)

r = Floor utilization ratio of cargo stacking space, 45%

t = Number of stacking tiers of pallets, 1

WP = Width of pallet 1.8 m.

w = Width wise clearance between pallets, 0.2 m.

LP = Length of pallets, 1.2 m.

1 = Length wise clearance, 0.1 m.

$$NP = \frac{16,975 \times 0.45 \times 1}{(1.8+0.2) \times (1.2+0.1)} = \underline{2,938 \text{ sheets}}$$

(4) Equipment for the repair shop

(A) 3 ton fork lift truck for lifting damage CNTR on the repair stands:

NE = 1 unit

(B) 15 ton fork lift truck with telescopic side spreader: NE = 1 unit

(5) Multipurpose equipment

(A) Mobile crane with 35 ton capacity for emergency measures at CNTR
yard and CFS operation: NE = 1 unit

(B) 3 ton fork lift trucks for carrying cargo gears and others:

NE = 2 units

(C) 15 ton fork lift truck with telescopic side spreader for handling
heavy cargo and empty CNTR: NE = 1 unit

(6) Terminal office

Wireless telephone (VHF)

| | |
|--|---------|
| a. Rail-mounted transfer cranes for unit train operation | 2 units |
| b. Yard tractors for unit train operation | 8 |
| c. Rubber-tired transfer cranes | 6 |
| d. Yard tractors for CFS operation | 4 |
| e. Terminal office | 1 |
| f. Maintenance shop | 1 |
| g. CFS | 1 |
| h. Spare | 1 |

Total 24 units