CHAPTER 14

PROJECT IMPLEMENTATION PROGRAM

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14.1 CONSTRUCTION PLAN

14.1.1 Condition and Requirements of the Project Site

Traffic congestion in the Greater Cairo Region (GCR) continues to deteriorate, from bad to worse, because of the excessive traffic demand, insufficient road capacity, huge traffic volumes and ineffective traffic management.

The high priority urban toll expressway is proposed to improve the present traffic condition and accommodate some of projected traffic demand due to the rapid urban development.

Construction planning for the work will require due consideration of the following:

- ✓ Appropriate and well designed traffic management plan to minimize traffic congestion along the existing roads during construction.
- ✓ Appropriate construction methodology to minimize impacts on traffic, road users, the environment, and public in general.
- ✓ Appropriate construction methodology for the limited working spaces
- ✓ Safety of motorists, pedestrians and other road users, protection of existing adjacent structures, and the operating railway lines.
- ✓ Relocation and protection of the overhead and underground utilities.
- ✓ Least time consuming construction methodology

14.1.2 Construction Method

The most appropriate construction method shall be used to expedite construction with least impact on the public, but without sacrificing quality.

The expressway is comprised of the following structural components:

(a) Cut and Cover Tunnel (E1-2, E3-1 and E3-2)
(b) Underground Road Crossing Box Tunnel (E1-2)
(c) Shield Tunnel (E1-2)
(d) Elevated Structure (E 1-2, E2-2, E3-1, E3-2 and E3-3)
(e) Bridge over the Nile (E3-3)

The outline and conceptual diagrams of each component are discussed hereunder.

(a) Cut and Cover Tunnel (E1-2, E3-1 and E3-2)

Execution usually has huge effect on road traffic because of the area that will have to be occupied during construction. To minimize the traffic interruption the Pre-Stressed Concrete (PSC) Plank Method has been proposed.

After the construction of the bored pile curtain wall or the diaphragm wall, the PSC Plank will be immediately installed, and then the area can be opened to traffic. Therefore, the underground structure can be constructed without traffic interruption.

The conceptual diagram of this method is shown in Figure 14.1-1.

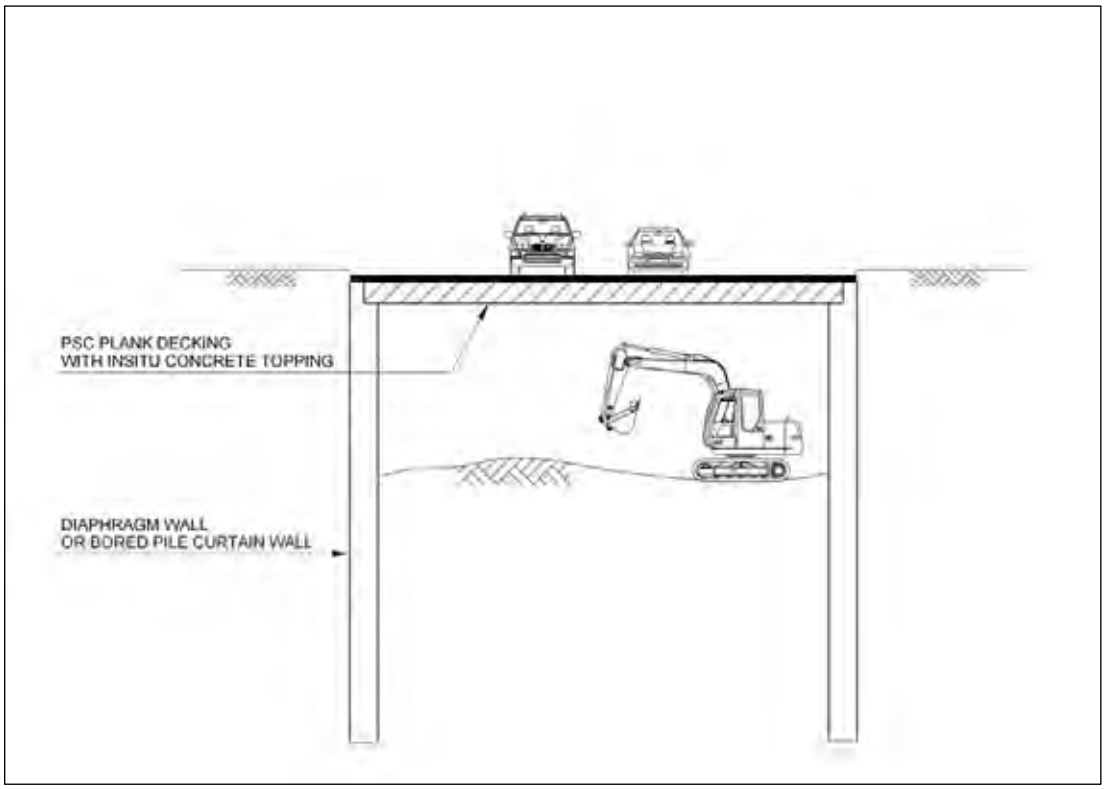


Figure 14.1-1 Cut and Cover Tunnel with PSC Plank

(b) Underground Road Crossing Box Tunnel (E1-2)

There are various advanced technologies applied in the construction of underground road crossing tunnels in Japan. The Endless Self Advancing Box Tunnel Method and URUP Shield Tunnel Method are introduced herein for construction of the underground road crossing tunnel at E1-2 in front of the Agricultural Museum.

(Self Advancing Box Tunnel Method)

The underground tunnel can be constructed using this method without causing traffic interruption except at the vicinity of vertical shafts.

The pre-cast box culvert will be advanced underground by thrust jack like a looper. No special tunnel boring machine is required. Therefore this method is more economical than other shield tunnel methods.

Figure 14.1-2 shows the conceptual diagram of this method.

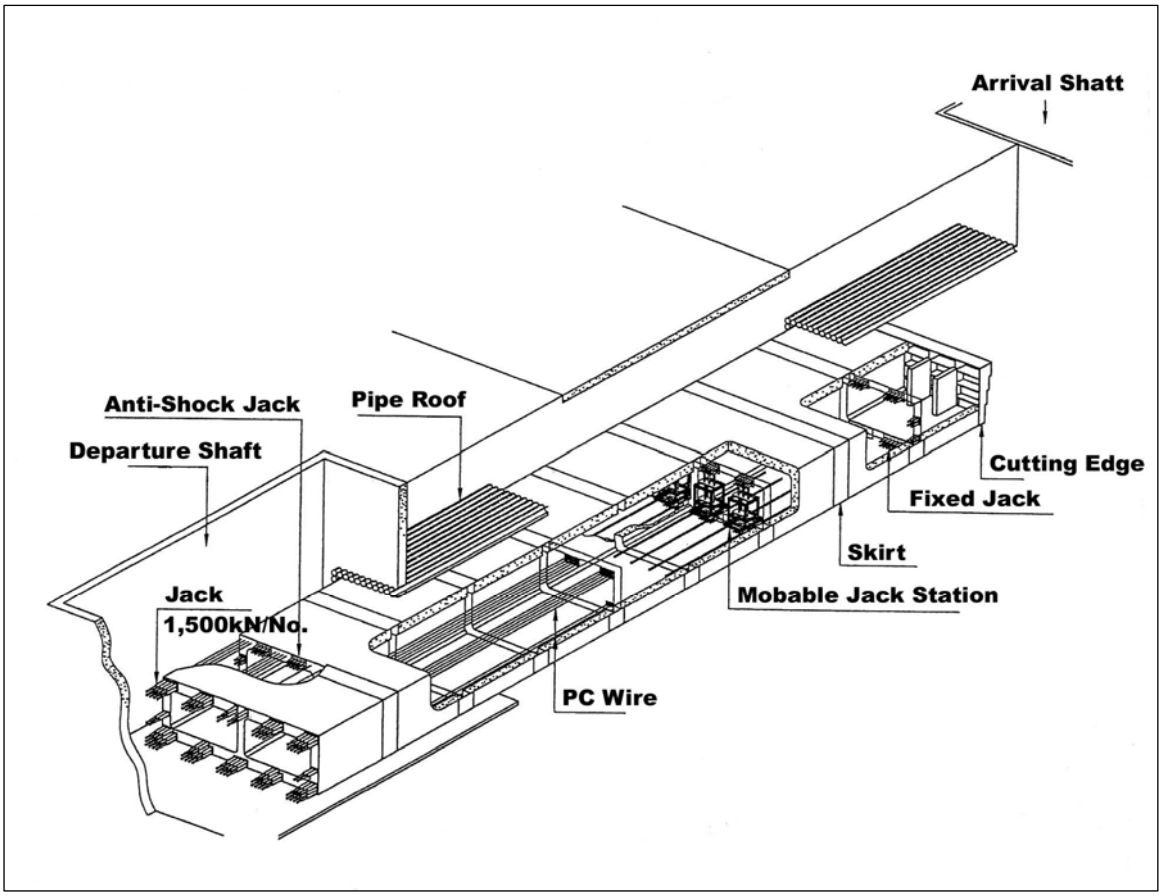


Figure 14.1-2 Endless Self Advancing Box Tunnel Method

(URUP Shield Tunnel Method)

The underground tunnel can also be constructed without traffic interruption using the matrix shield machine. It will not be necessary to construct departure and arrival shafts, however, the shield machine will have to be imported. Hence, this method is not economical for the construction of a single underground road crossing tunnel, but the shield machine can be used for other under ground road crossing tunnel projects if any.

This method may be considered but, considering the depreciation cost of the shield machine, it is recommended that further coordination and a deeper study with the client and relevant authorities should be done during detailed design stage.

The conceptual diagram of this method is shown in Figure 14.1-3.

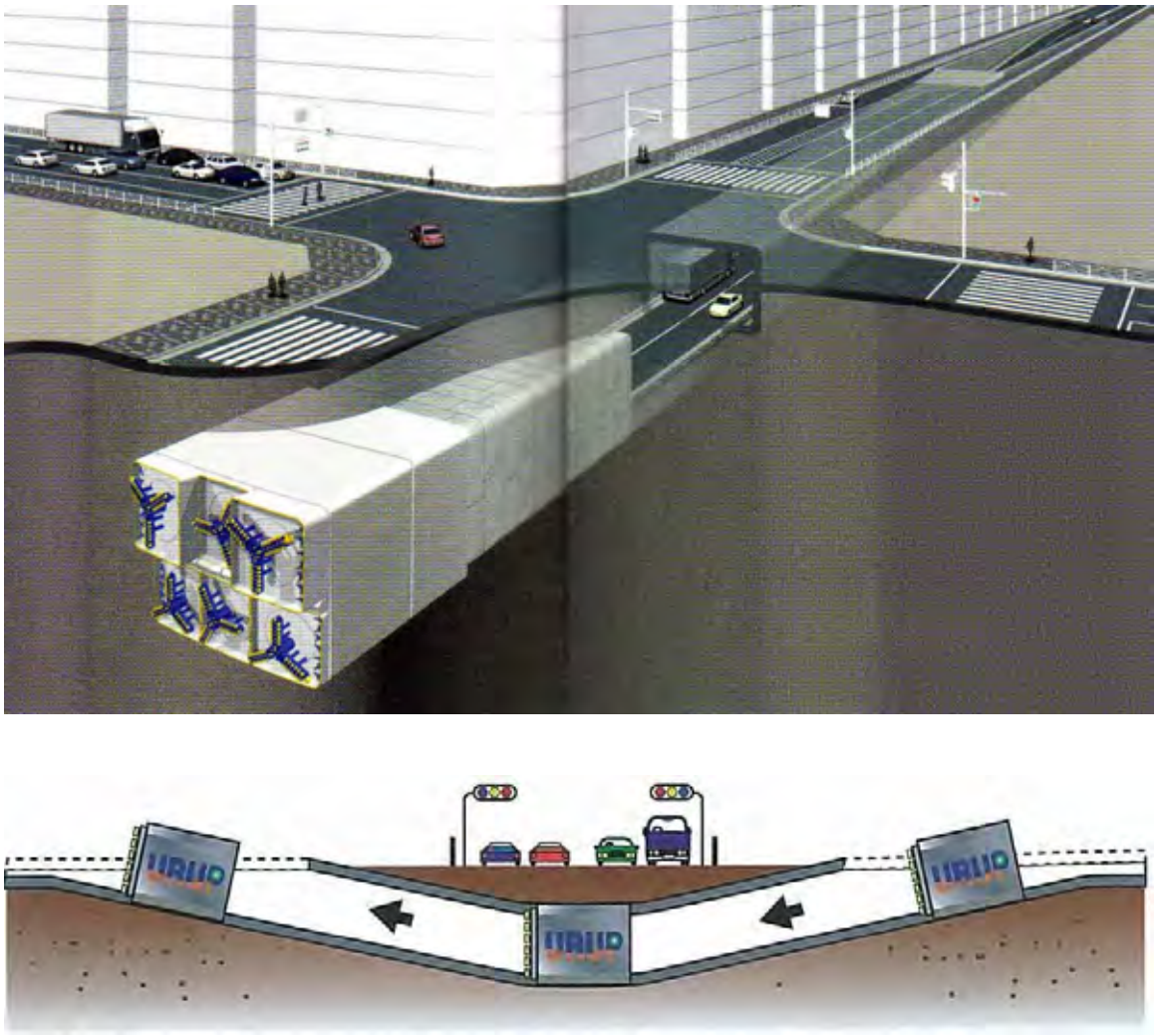


Figure 14.1-3 URAP Shield Tunnel Method

(c) Shield Tunnel (E1-2)

The Shield Tunnel (twin bores) will be adopted along the 2.5 km narrow street and existing railway at E1-2. The influence on existing road traffic is extremely small except at the vicinity of vertical shafts. The impacts of noise and vibration will also be confined within this area.

The classification of the types of shield machine and flow chart of the shield method selection are shown in and Figure 14.1-5. (Reference; Standard Specifications for Tunneling-2006: Shield Tunnels, Japan Society of Civil Engineers)

Selection of the type of shield machine shall be made after consideration of geotechnical condition, environmental conditions and related obstacles. These include the type of soil, stability of cutting face, protection of existing buildings, long distance construction, shape curve construction and track record of tunnels, among others.

It is speculated based on existing soil boring data that the type of soil in E1-2 are silty clay with traces of fine sand and sand with traces of silt.

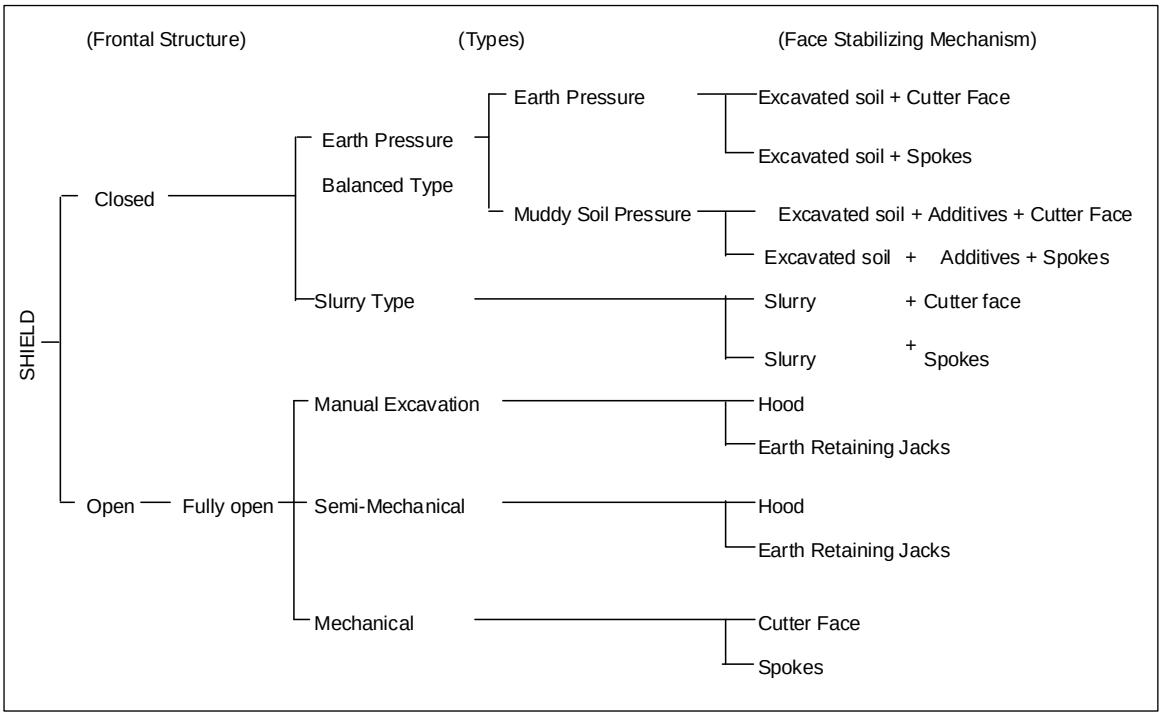


Figure 14.1-4 Classification of the Type of Shield Machine

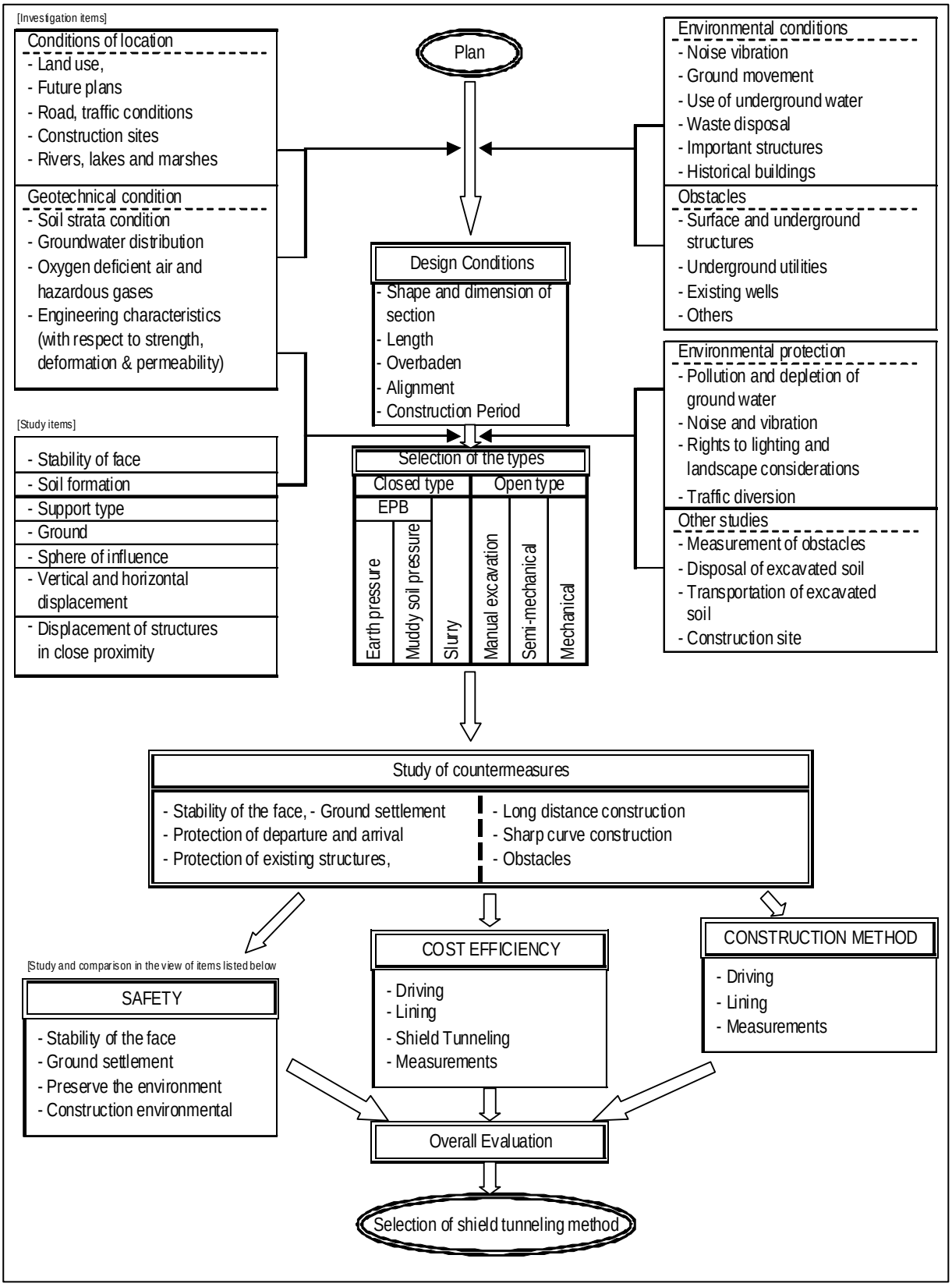


Figure 14.1-5 Flow Chart of Shield Method Selection

Based on the study and record of Al-Azhar Tunnel and Subway Tunnels in Cairo City, the slurry type of shield method is recommended.

Slurry shield machines operate with a slurry pressure that is slightly higher than groundwater pressure to stabilize the cutting face. Slurry is pumped from the ground into the face via feeder and discharge pipes. The face is completely closed, providing a high level of safety and good condition of environmental condition for construction.

The slurry type of shield machines are suitable for various types of soil, including alluvial gravel mixed with sand, sand silt or clay; alternating layers of loosely cemented and soft ground. However, with the slurry shield method, it may be difficult to keep the face stable with high water permeability or large cobbles and boulders. In these cases, the slurry quality and use of auxiliary measures should be considered. Therefore, further soil investigation during the detailed design stage should be carried out.

(d) Elevated Structure (E1-2, E2-2, E3-1, E3-2 and E3-3)

Execution usually has large effect on road traffic because of the area that will have to be occupied during construction. To minimize the traffic interruption the following rapid construction methods are proposed for consideration.

Proposed Rapid Construction Method:

- Fully fabricated steel pier
- Concrete pier with high-early strength concrete
- Precast concrete pier
- Fully fabricated steel girder
- Precast concrete girder
- Precast concrete deck slab

The Swing Pier Construction Method may also be considered to minimize the traffic interruption. The conceptual diagram and photo of this method are shown in Figure 14.1-6.

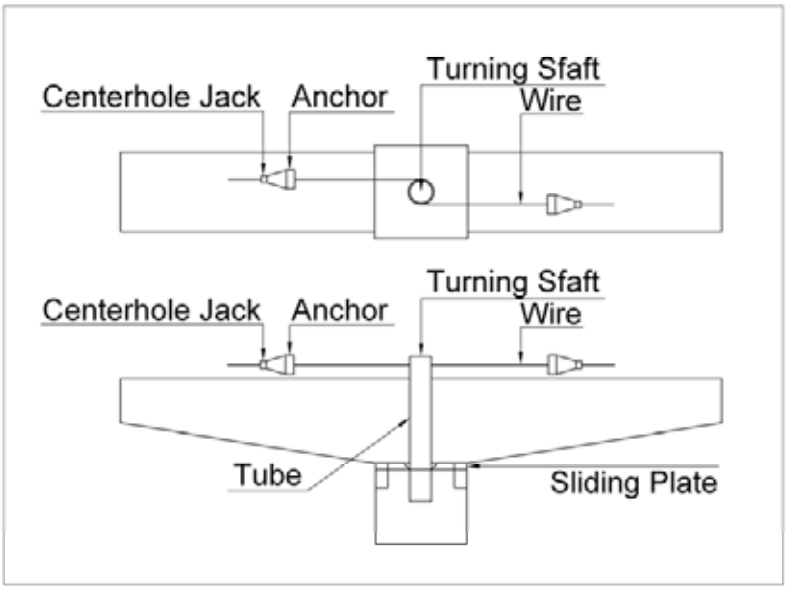


Figure 14.1-6 Swing Pier Construction Method

(e) Bridge over the Nile (E3-3)

For the bridge over the Nile, steel truss bridge, steel arch bridge and cable-stayed bridge were studied and rough cost estimation have been done for each, as shown in Table 14.1-1.

Table 14.1-1 Cost Comparison Of Bridge Over The Nile

(Unit : million LE)

Items	Truss Bridge	Arch Bridge	Cable Stayed Bridge
Foundation & Pilecap	83.6	73.8	76.6
Pier	86.7	86.7	-
Pylon with Stay Cable	-	-	77.8
Double Deck Truss	247.6	208.3	228.7
Total	**417.9**	**368.8**	**383.1**

The bridge over the Nile will be a landmark of Cairo City. Based on the estimates, construction cost of cable-stayed bridge is reasonable compared to the other types of bridges, and hence is recommended under this Study.

The construction flow of a cable-stayed bridge is as follows:

- ➪ ① Construction of pylon tower foundation
- ➪ ② Construction of pylon tower
- ➪ ③ Construction of temporary bridge
- ➪ ④ Diversion of existing traffic from existing road to temporary bridge
- ➪ ⑤ Assembly of double deck truss girder
- ➪ ⑥ Erection of double deck truss girder from the existing El-Giza Bridge
- ➪ ⑦ Pavement work and finishing works
- ➪ ⑧ Diversion of traffic from temporary bridge to the new bridge

The conceptual diagram of the proposed construction method is shown in Figure 14.1-7.

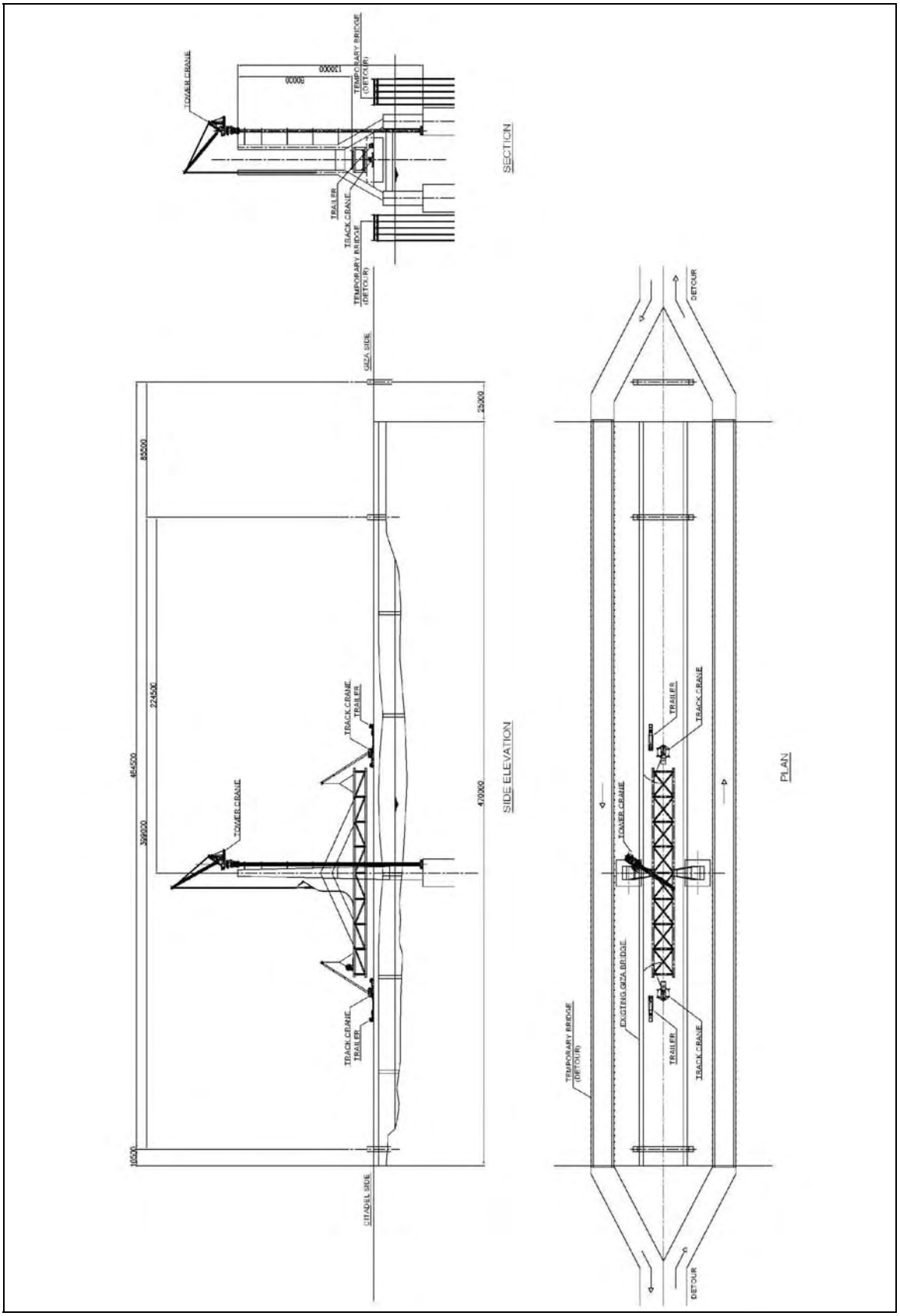


Figure 14.1-7 Cable Stayed Bridge Construction Method

14.1.3 Estimation of Non-Working Day Ratio

An annual rainfall in Cairo is only about 24mm. Hence, rainfall will not be considered in the computation of non-working day ratio. However, a total of five (5) non-working days due to other weather conditions such as sand storm (Hamseen) has been considered.

Therefore, the ratio of non-working days attributable to the weather (5 days) is computed as follows:

$$P1 = 5 \div 365 = 0.014$$

Egypt's national holidays for 2008 are as follows.

(Date)	(Feast)
07 January	Coptic Christians
10 January	Islamic New Year
20 March	Prophet Muhammad's Birthday
25 April	Sinai Liberation Day
27 April	Sham El Nasseem (Spring Festival)
01 May	Labor Day
23 July	Revolution Day
30 September ~ 02 October	Eid El-Fitr
06 October	Armed Forces Day
20~23 December	Eid El-Adha
23 December	Victory Day

Total number of national holidays is 15 days. In addition, further reduction in the number of effective working days due to Ramadan is equivalent to five (5) days (26 days x 20%[1]). Therefore, the ratio of non working days due to national holidays and Ramadan is derived as follows:

$$P2 = (15+5) \div 365 = 0.055$$

Non-working days falling on Friday is equivalent to 52 days. The ration is:

$$P3 = 52 \div 365 = 0.14$$

The total ratio of non-working days is calculated as follows:

[1] Efficiency during Ramadan would be reduced by 20% (i.e. 80% of which of during ordinal season), based on the information obtained from local contractors and GARBLT

$$P = P1 + P2 + P3 - (P1 \times P2 + P1 \times P3 + P2 \times P3) + P1 \times P2 \times P3$$

P1 : Ratio of non-working days due to the weather
P2 : Ratio of non-working days due to national holidays and Ramadan
P3 : Ratio of non-working days falling on Friday

$$P = 0.014 + 0.055 + 0.14 - (0.014 \times 0.055 + 0.014 \times 0.14 + 0.055 \times 0.14) + 0.014 \times 0.055 \times 0.14$$
$$= 0.20$$

14.1.4 Construction Schedule

(1) Production Rate

Diaphragm Wall

The production rate was calculated based on the Construction Cost Estimation Standard Book (Ministry of Land, Infrastructure, and Transportation, Japan). The non-working day's ratio has also been considered in the estimate. Computation is illustrated as follows:

(Foregoing Element[2])

$Td = 0.0269 \times \alpha \times \beta \times D \times H \times T$ (day / element)

(Following Element[3])

$Td = 0.0333 \times \alpha \times \beta \times D \times H \times T$ (day / element)

Where:

Td: Required Time for Construction 1 element of Diaphragm Wall (day)
α: Soil Factor (1.0)
β: Element Thickness Factor (1.0)
D: Length of Element (3.5 m)
H: Depth of Element (16 m)
T: Thickness of Element (0.8 m)

Soil Factor; (α)

Soil Condition	N<50	N>50	Soft Rock, Boulder
α	1.00	1.22	1.96

[2] Foregoing Element is the one inserted in first place, therefore less conflict will be expected, so required time will be less than Following Element (see Construction Cost Estimation Standard Book, MLIT)

[3] Following Element is the one followed by the other elements, therefore more conflict will be expected, so required time will be more than Foregoing Element (see Construction Cost Estimation Standard Book, MLIT)

Element Thickness Factor; (β)

Thickness of Element	T<1.0 m	1.0m < T < 1.5m	1.5 m < T
β	1.0	0.9	0.8

(Foregoing Element)

Td= 0.0269 x 1.0 x 1.0 x 3.5 x 16 x 0.8 = 1.2 days / element

(Following Element)

Td= 0.0333 x 1.0 x 1.0 x 3.5 x 16 x 0.8 = 1.5 days / element

The average time required for construction of the diaphragm wall is 1.35 days per 3.5m element. Thus, production rate of diaphragm wall has been assumed to be 2.6 m per day for one set of machine.

The ratio of non working days (0.2) has also been considered in the construction schedule.

Shield Tunnel

Assumption of the production speed for shield tunnel was based on record of past projects in Europe. The real record of Al-Azhar Road Tunnel in Cairo should not be used as reference because of unexpected problem encountered with the vestige of heritage.

After considering the cross-section and excavation volume of the designed tunnel with outer diameter of 11.4 m, a production rate of 7.4 m per day has been adopted for construction schedule planning.

Three (3) work shifts for 20 working hours per day leaving 4 hours for small-scale maintenance jobs, and the 0.20 ratio of non-working days have been considered in calculating the production rate.

(2) Construction Schedule

The construction schedules for each section are presented in Figure 14.1-8 to .

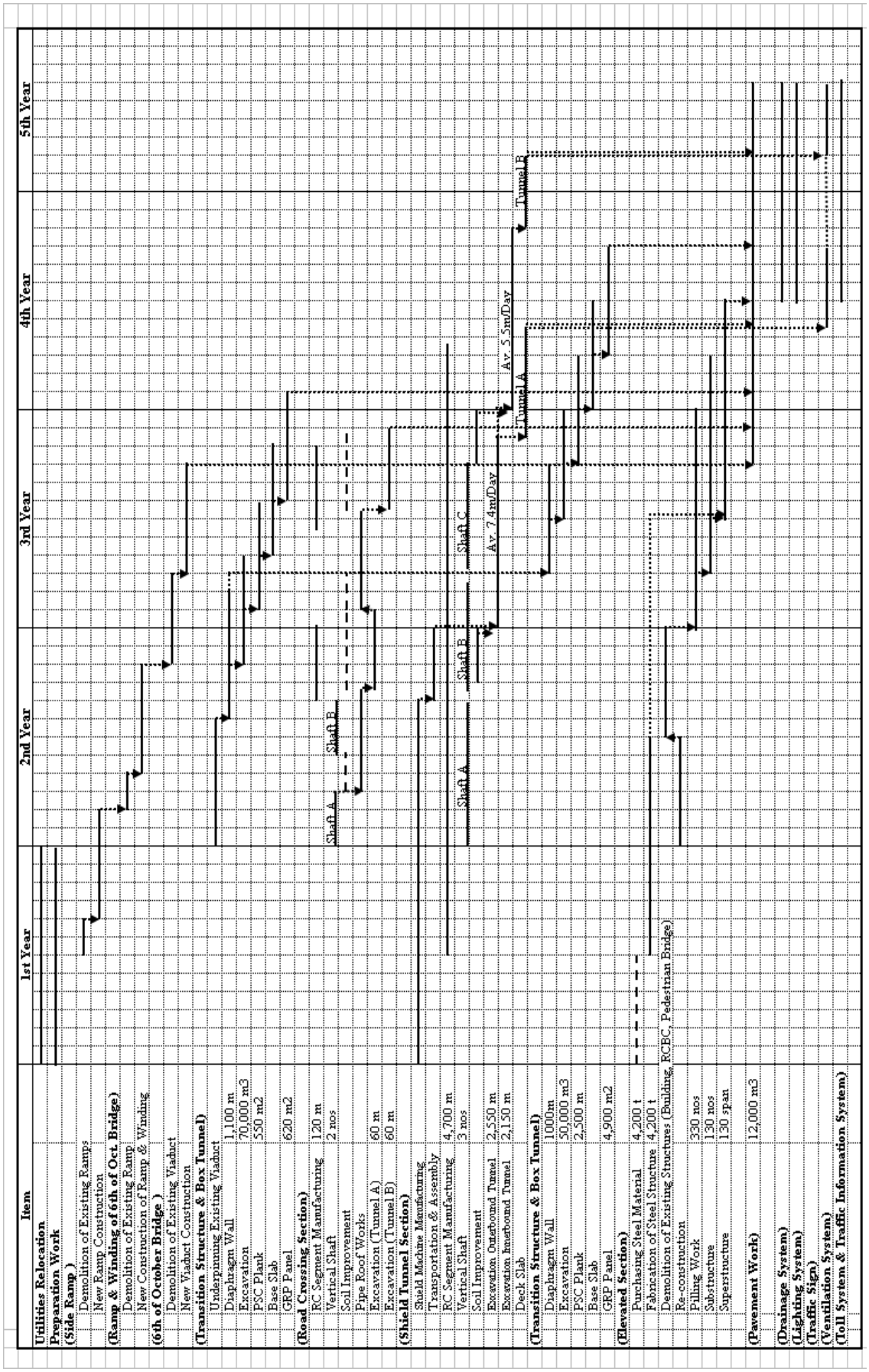


Figure 14.1-8 Construction Schedule (E1-2)

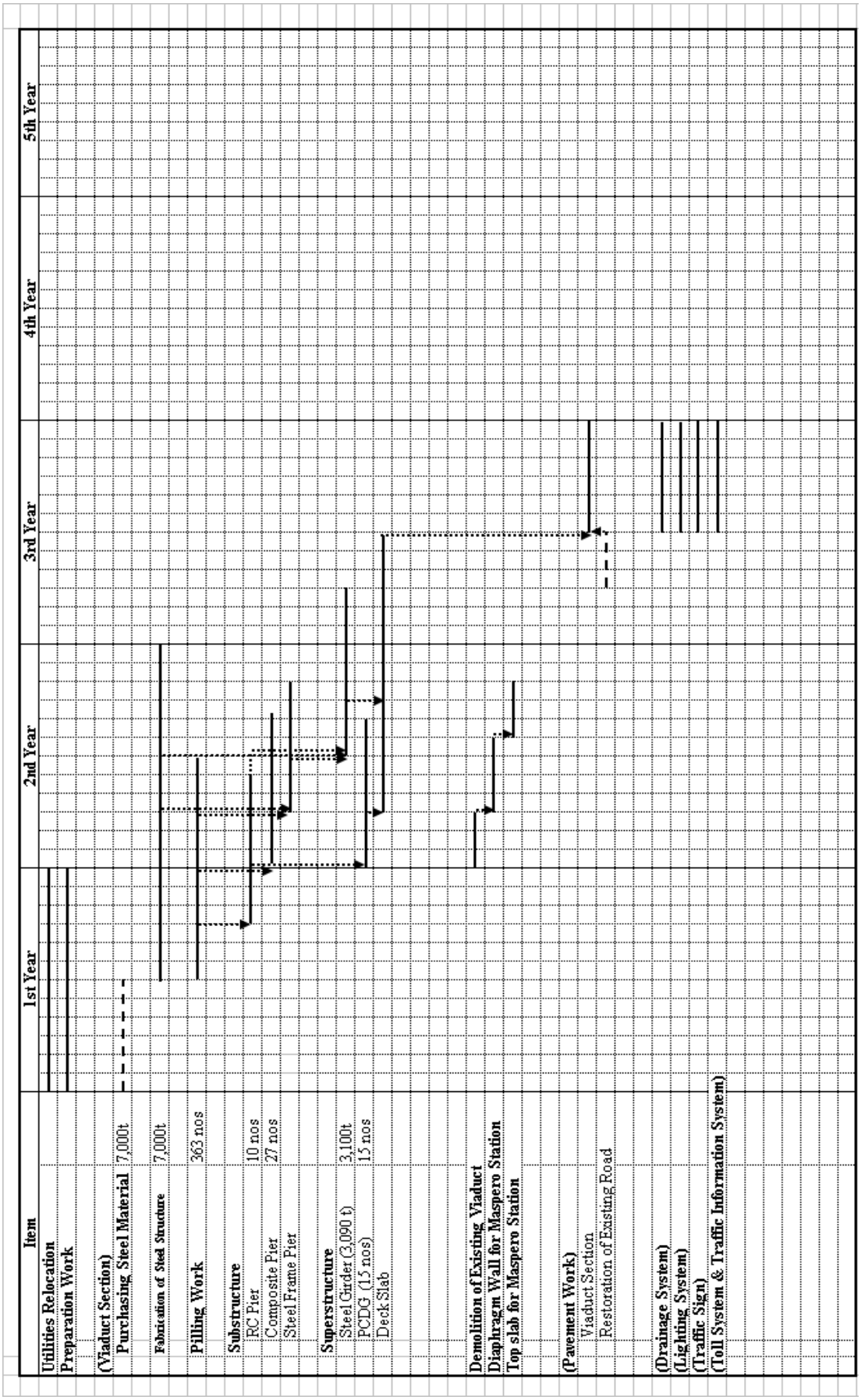


Figure 14.1-9 Construction Schedule (E2-2)

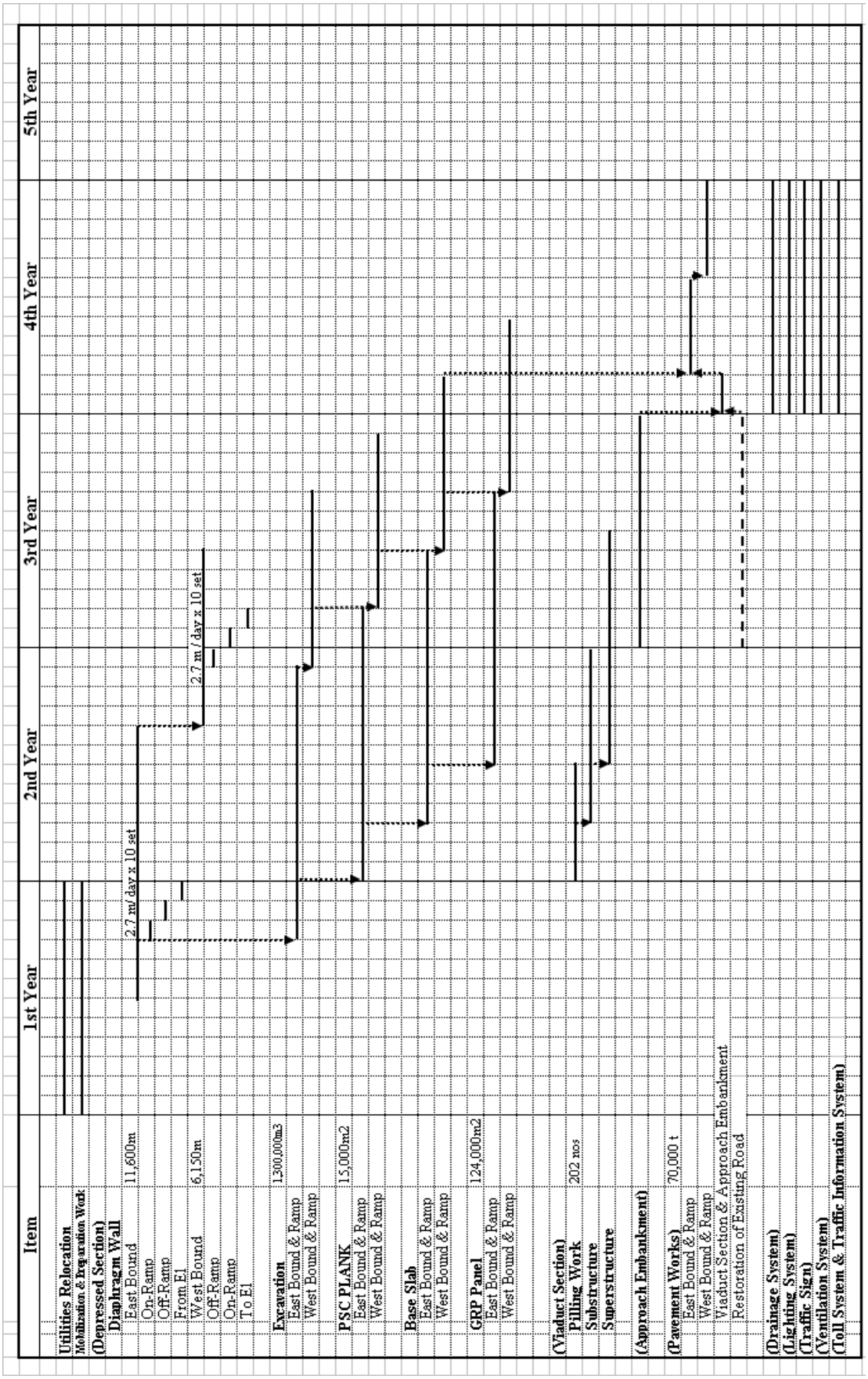


Figure 14.1-10 Construction Schedule (E3-1)

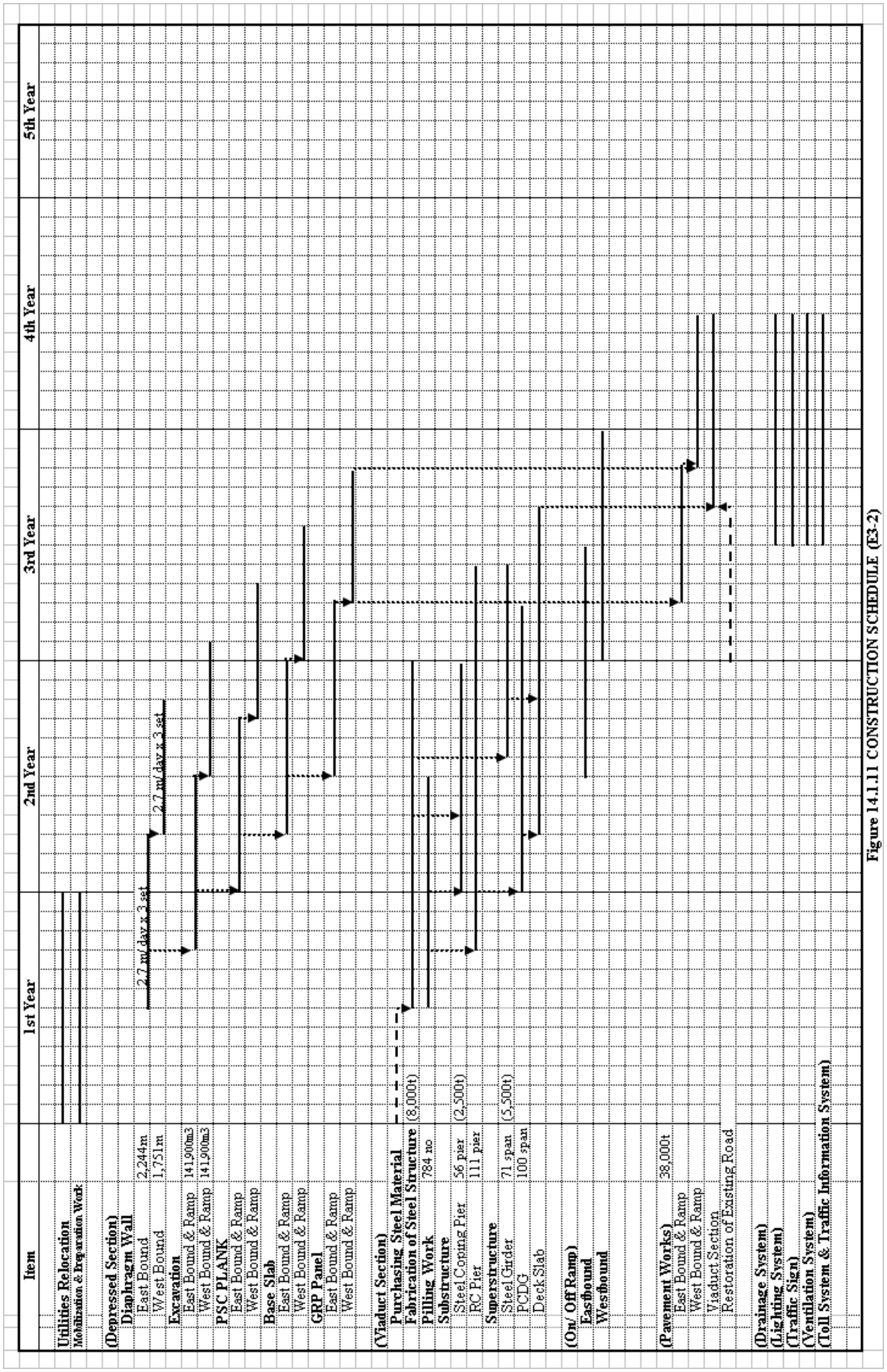


Figure 14.1-11 Construction Schedule (E3-2)

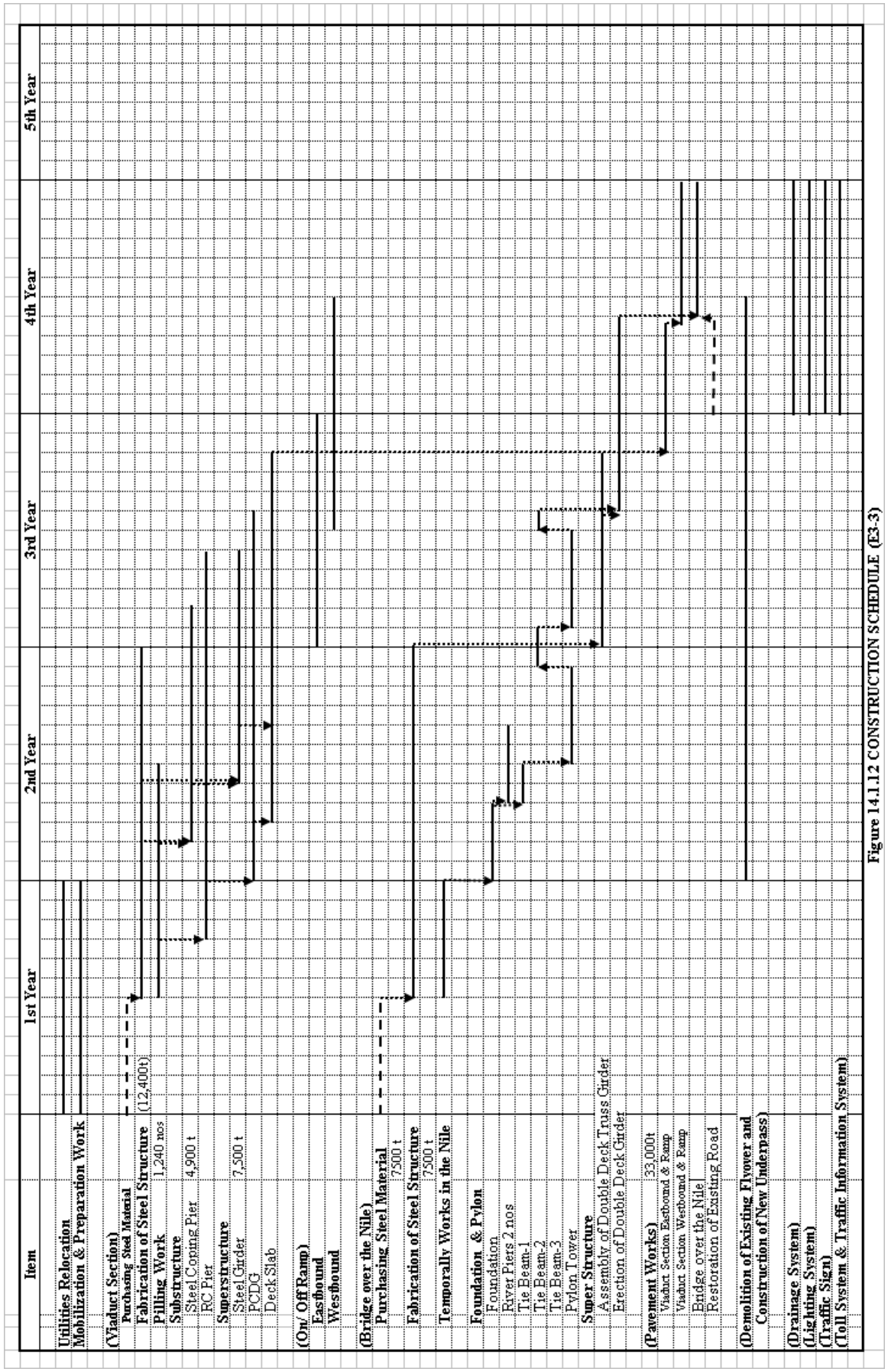


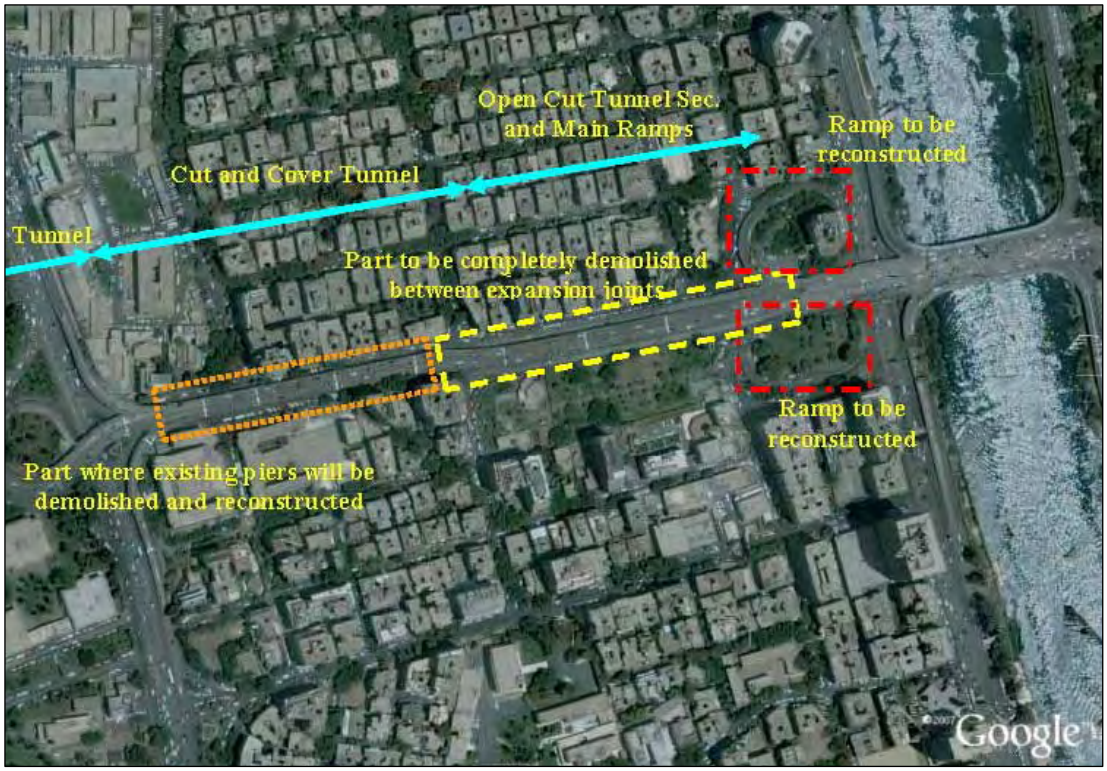
Figure 14.1.12 CONSTRUCTION SCHEDULE (E3-3)

Figure 14.1-12 Construction Schedule (E3-3)

14.2 TRAFFIC MANAGEMENT PLAN

14.2.1 EXPRESSWAY E 1-2

Figure 14.2-1 shows the main features of structural construction plan of E 1-2 based on the review of the structural drawings and Chapter 8.



Source: JICA Study Team

Figure 14.2-1 Outline of E1-2 Construction Plan

The expressway comprises the following structural components:

- New ramps from 6th October Bridge to replace the existing straight ramps onto El-Mathaf al Zirai Street – length 112m : Sta. 0+188 to 0+300 and ramps to be demolished and replaced
- Transition Structure (Open Cut) – length 100m : Sta. 0+300 to Sta. 0+400
- Cut and Cover Tunnel – length 300m : Sta. 0+ 400 to 0+700
- ESA Tunnel –length 60m : Sta. 0+700 to 0+760
- Shield Tunnel (Twin Bore)
  - ✧ Left Tunnel (Eastbound) – length 2200m : Sta. 0+760 to Sta. 2+960
  - ✧ Right Tunnel (Westbound) – length 2300m : Sta. 0+760 to Sta. 3+060
- Cut and Cover Tunnel

- ✧ Left Side of ENR Track (Eastbound): length 60m : Sta. 2+ 960 to 3+020
- ✧ Right Side of ENR Track (Westbound) : length 100m : Sta. 3+ 060 to 3+160

- Transition Structure (Open Cut)
  - ✧ Left Side of ENR Track (Eastbound): length 160m : Sta. 3+020 to Sta. 3+180
  - ✧ Right Side of ENR Track (Westbound) : length 140m : Sta. 3+160 to 3+300
- Elevated structures
  - ✧ Left Side of ENR Track (Eastbound): length 1590m : Sta. 3+ 180 to 4+770
  - ✧ Right Side of ENR Track (Westbound) : length 1060m : Sta. 3+300 to 4+360

The existing 6th October Bridge will require widening, demolition and reconstruction works in order to accommodate the new expressway structure.

El-Mathaf al-Zirai Street will require to be closed to vehicular access during construction. Alternative routes for local traffic will therefore have to be ensured and proper attention paid to traffic management during construction.

The following construction steps are envisaged:

1. Close the road to traffic and construct the bored pile curtain walls each side
2. Excavate for the top slab of the cut-and-cover tunnel between the existing bridge foundations
3. Construct the central contiguous bored pile support wall between the existing bridge foundations
4. Construct the top slab of the cut-and-cover tunnel between the existing bridge foundations
5. When the top slab has gained sufficient strength, place temporary column supports on the slabs at locally reinforced points (additional diaphragms constructed and top slab thickened as necessary) and span between these points with temporary steel stringers adjacent and parallel with the existing bridge piers.
6. Jack the existing deck onto bearing points on the stringers. The jacking forces are determined to be equivalent to the pier reactions, thereby effectively unloading the piers. The deck is now temporarily supported from the top slab of the tunnel through the temporary supports.
7. Demolish the existing bridge piers and foundations and excavate for the remaining top slab of the cut-and-cover tunnel.
8. Construct the remaining central bored pile wall and top slab of the cut-and-cover tunnel at the location of the now demolished bridge foundations. The new top slab will be designed to carry all loads from the bridge piers and will have all necessary reinforcement including starter bars for the new bridge piers.
9. Construct the new bridge piers to be monolithic with the new top slab of the tunnel

and cement grout the pier column/deck joints.

10. Release and remove the temporary supports. The deck is now permanently supported on the new bridge piers from the top slab of the tunnel.
11. Fill above the tunnel slab, reinstate the pavement works and reopen the road to traffic.
12. Excavate the main tunnel space and construct the tunnel wall linings and base slabs to complete the cut-and cover tunnel civil works. This can be done at the same time as steps 9, 10 & 11 above.

Figure 14.2-2 shows the major traffic movements that will be affected due to the construction of E1-2 along El-Mathaf al-Zirai Street. As can be recognized, there are six major traffic movements will be affected and need to be considered in the Traffic Management Plan. In traffic study to provide the detour rout of each of these six major traffic movements, the structural construction plan has been considered and the main following can be concluded:

Source: JICA Study Team

Figure 14.2-2 Major Affected Traffic Movements

1. The Ramp from 6 Oct. Br. To El Nile St. should be demolished and reconstructed (2 lanes) before any construction works along El-Mathaf al-Zirai Street start.
2. The Ramp from El Nile St. to 6 Oct. Br. should be demolished and reconstructed (2-Lane) before any construction works along El-Mathaf al-Zirai Street start.

3. After these two new ramps will be constructed, demolish the part of existing 6 Oct. Bridge along El-Mathaf al-Zirai Street at the part of Open Cut Tunnel Section and Main Ramps can be carried out.

Based on these above mentioned practical and applicable constrains the traffic detour schemes for the major six affected traffic movement are presented in Figure 14.2-3 to Figure 14.2-8.

Due to this detour plan, traffic will be shifted to alternative roads. The volume of the traffic that will be shifted was estimated in year 2007 as presented in Table 14.2-1 based on the results of traffic count survey undertaken by this Study. This table shows the results obtained on Sept. 11 and Oct. 29, 2007. The highest volume from the both surveys is considered as the design hour volume.

Table 14.2-1 Surveyed Traffic Volumes of Major Traffic Movements

Move No.	Sept. 11	Oct. 29	Design Hour Volume (Veh/hr)
I	1,372	2,181	2,181
II	2,802	2,695	2,802
III	1,840	8,46	1,840
IV	2,582	2,758	2,758
V	-----	-----	1,373*
VI	-----	-----	1,343*

*: From Ramp Traffic Count Survey on Feb. 2008.
Source: JICA Study Team

Table 14.2-2 presented the surveyed detour roads widths and estimated capacities.

Table 14.2-2 Detour Roads Width, Capacity and Diverted Traffic Volumes (PCU/hr)

Road	Width (m)	Capacity (PCU/hr)	Diverted Traffic Due to Movement 5	Diverted Traffic Due to Movement 6	Diverted Traffic Due to Movements 1,2,3 & 4
El Cornich	28	12,000	0	0	919
El Tahrir	30	12,000	687	671	2,802+2,759= 5,561
Wizart Al Zeraah	33	13,500	687	671	1,839+2,011= 3,850
Al Batal Ahmed Abd Al Aziz	33	13,500	0	336	2,758+3,101= 5,859
Al Said Al Ali	16	6,000	686	0	1,090
XYZ	18	7,500	0	336	460
Al Mathaf Al Zirai, (6 Oct.)	12	4,800	1373	1343	0
El Nile	32	13,500	1373	672	4,983+2,758= 7,741

Source: JICA Study Team

Figure 14.2-3 Detour of Traffic Movement I

Figure 14.2-4 Detour of Traffic Movement II

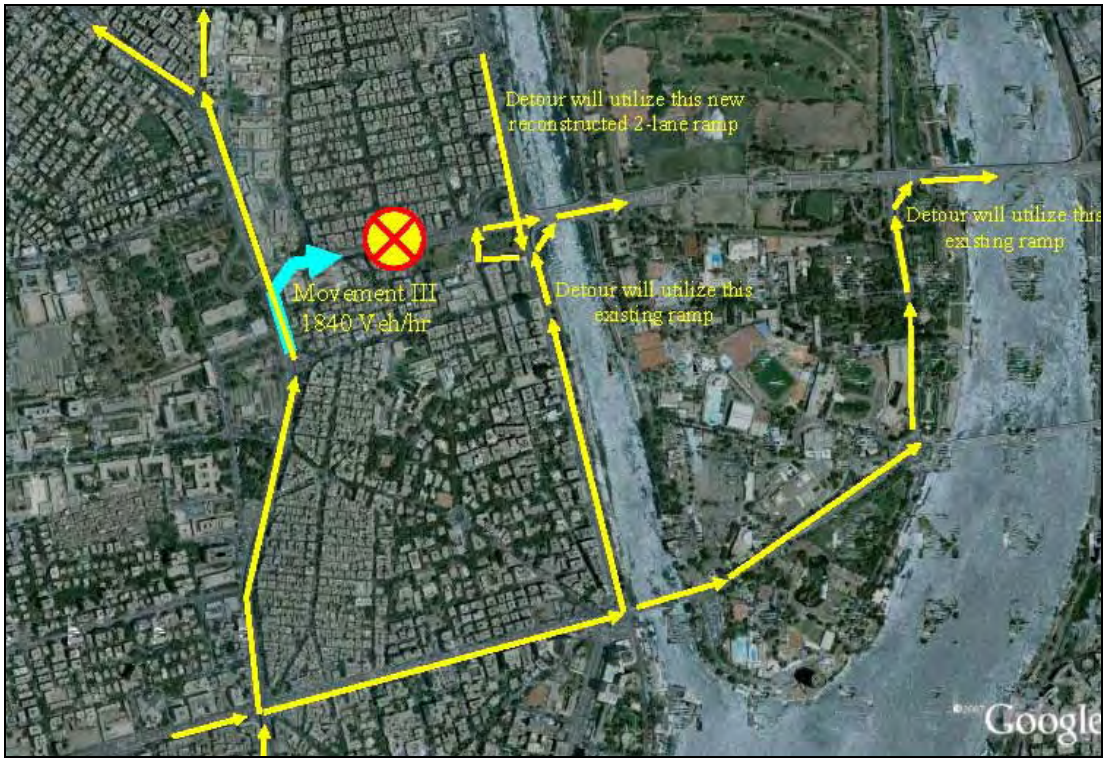


Figure 14.2-5 Detour of Traffic Movement III

Figure 14.2-6 Detour of Traffic Movement IV

Figure 14.2-7 Detour of Traffic Movement V

Figure 14.2-8 Detour of Traffic Movement VI

Figure 14.2-9 shows the result of detoured traffic volumes 1, 2, 3 and 4 after assignment. Figure 14.2-10 shows the result of detoured traffic volume 5 after assignment while Figure 14.2-11 shows the result of detoured traffic volumes 6 after assignment.

Figure 14.2-9 Assigned Detoured Traffic Movements 1, 2, 3 and 4

Figure 14.2-10 Assigned Detoured Traffic Movement 5

Figure 14.2-11 Assigned Detoured Traffic Movement 6

As can be noticed from the tables, detour roads should be fully utilized to accommodate traffic volume that means, along these roads shown in the tables, parking should be completely prohibited and strong enforcement should be adopted during the construction. However, for traffic movements 5 and 6, the traffic can be more easily managed but in case of movements 1, 2, 3 & 4 parking prohibition should be implemented especially these four movements will be stopped at same time.

From the results of traffic count survey at Doqqi Squar undertaken on Nov. 2007, the existing maximum traffic volumes in both directions along Tahrir Street are 5,995 veh/hr. Therefore, during construction stage, the traffic volume along Tahrir Street will be about (5,561 (Detoured Traffic) + 5,995 (Existing Traffic)) 11,556 veh/hr which is less than the estimated road capacity of about 12,000 veh/hr.

However, during the detail design stage, the detour roads should be subjected to traffic count surveys and also the sections to be reconstructed. Based on these traffic volumes the traffic management plan proposed here should be reassessed versus to more accurate capacity estimate of these detour roads. That means the volume over capacity ratio will be estimated where the volume will be the sum of the existing traffic volume plus the diverted traffic volume due to detouring. A set of detour plan drawings should be prepared based on the implemented construction plan.

Figure 14.2-12 shows the results of the ADT assignment on the concerned area under the existing condition versus to under construction condition obtained by JICA-STRADA Program. As can be expected the parallel bridges (15th May and El Tahrir Bridges) will be subjected to additional traffic volumes. As can be noticed from the figure, the ADT increase along 15th of May will be 6,000 veh/day (= 56,000 - 50,000), and El Tahrir Bridge will be 6,000 veh/day (= 91,000 - 85,000). Corresponding to these increases, 6th October Bridge will be subjected to decrease about 12,000 veh/day (= 168,000 - 146,000).

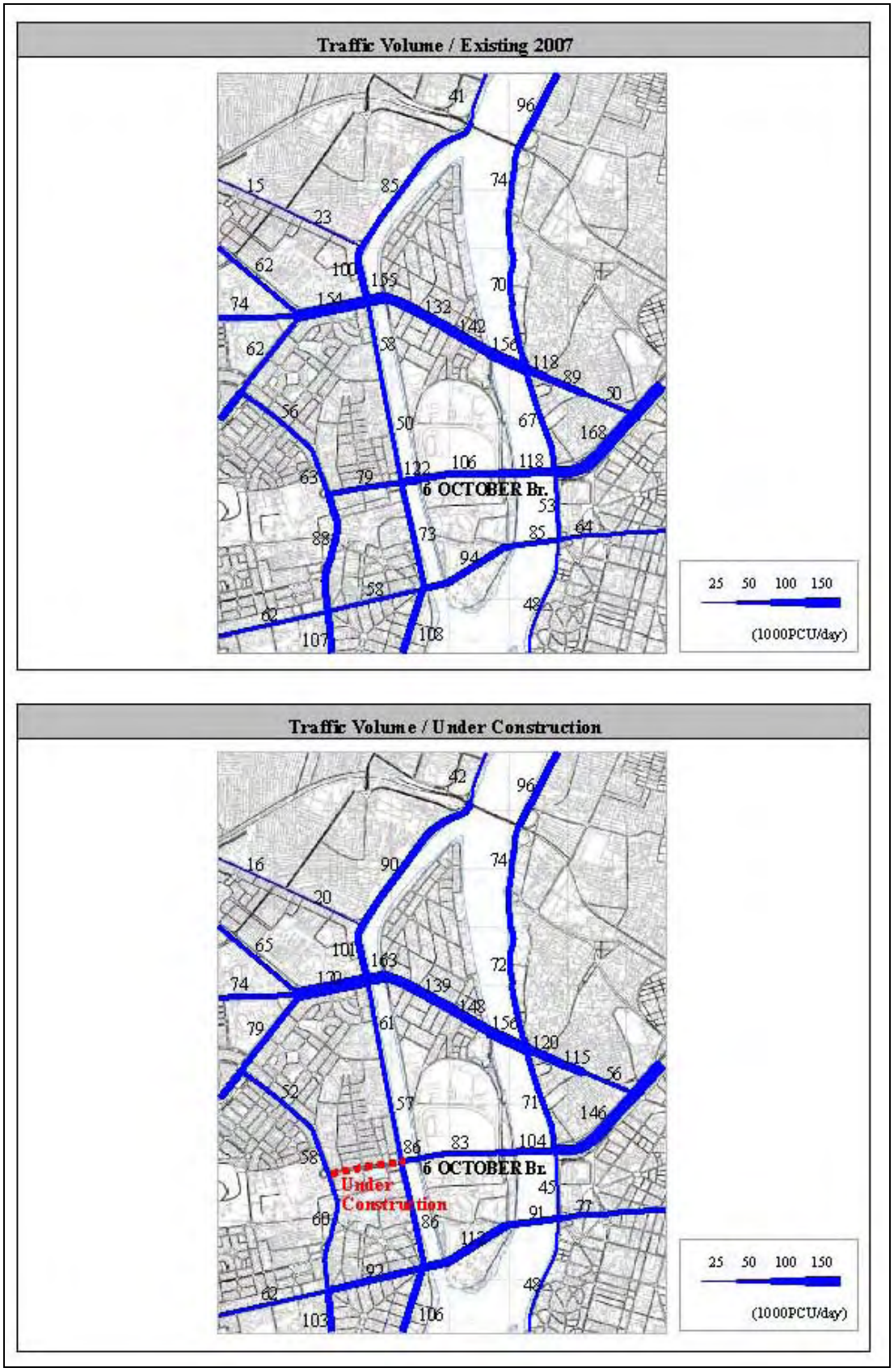


Figure 14.2-12 Existing ADT versus to Under Construction ADT

14.2.2 EXPRESSWAY E 2-2

Expressway section E2-2 will provide the "missing link" for Eastbound traffic in the network, connecting E2 with E1. The expressway section will commence at the existing "jump off" point on the 15th May Bridge (E2-1), at Aboul Ela on 26th July Street. The expressway section will extend to the east along 26th July Street above the existing 15th May Bridge (E2-1), will pass over 6th October Bridge (E1) and then will turn and extend north-east along Ramsis Street before again turning north onto Orabi Street for the connection with E1. The existing 15th May Bridge at this location provides only two lanes for Westbound traffic coming from E1. The proposed missing link will therefore provide two lanes for Eastbound traffic, passing directly above the Westbound traffic along 26TH July Street.

The expressway section will be elevated for a total length of 1.8km; including a 1.0km double deck section along 26th July Street. No on ramp/off ramp facilities are proposed in this relatively short section.

Based on the review of the structural drawings and Chapter 8, there are several alternative strategies for the construction along 26th July Street, including the following one where the third option is selected based on the comparative study.

1. Retain the existing 15th May Bridge and construct a single new deck above it on separate independent foundations.
2. Demolish the existing 15th May Bridge and construct new double-deck structure on new foundations along 26th July Street
3. Partially demolish the existing bridge at the location of the proposed Maspero MRT underground station. Construct new double-deck structure on new foundations, giving an optimum arrangement for integration with the future underground station, along this demolished section. Construct a single new deck, connected with the double deck section, above the remaining existing 15th May Bridge on separate independent foundations.

Figure 14.2-13 shows location of Maspero Station on 26th July Street. From the layout of the station, it is expected that during construction 26th July corridor should be close in face of traffic. If this is the case, construction of E2-2 new section as shown in Figure 14.2-14 can be undertaken at the same time. As it is understoodd from structure construction point of view for the new pier between the existing ones, the limited height between the bottom side of existing bridge deck and at-grad surface level will govern the pile diameter size. Up to maximum 80 cm pile diameter can be used. This small diameter means more piles that needs larger pile cap. To construct it will require close the road in face of traffic.

Figure 14.2-13 Approximate Location of Maspero Station: Metro Line 3 on 26th July Street

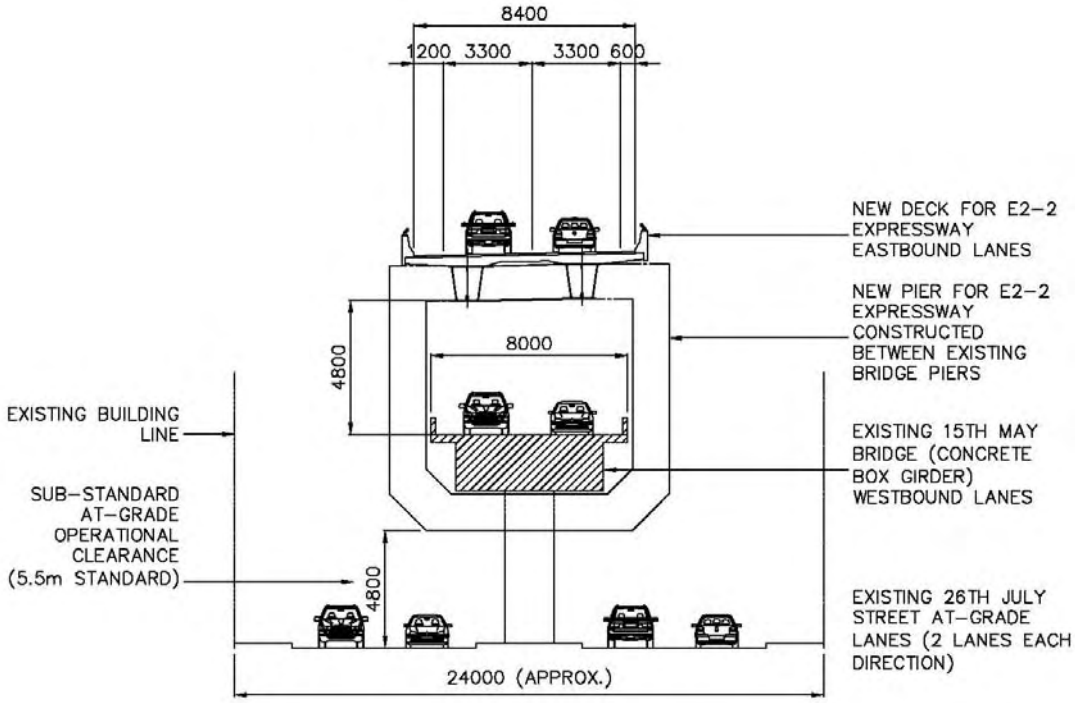


Figure 14.2-14 DRAFT Section at Sta. 0+300: E2-2

The proposed detour plan during the period of closing the road at Maspero Station is presented in Figure 14.2-15. Based on the traffic count survey carried out in Oct. 2007 at 15th of May East and El Kornish, the maximum traffic volumes are 3,060 veh/hr from east to west and 2,564 veh/hr from west to east.

To accommodate the traffic from east to west a construction of temporary flyover may be required.

Figure 14.2-15 Detour Plan during Construction of Maspero Station

Figure 14.2-16 shows the results of the ADT assignment on the concerned area under the existing condition versus to under construction condition obtained by JICA-STRADA Program. As can be expected, the parallel bridges (6th October and El Tahrir Bridges) will be subjected to additional traffic volumes.

However, during the detail design stage, the detour roads should be determined, according to the result of traffic count surveys and the sections to be reconstructed. Based on these traffic volumes, the traffic management plan proposed here should be reassessed and it is necessary to estimate capacity of these detour roads more accurately. That means the volume over capacity ratio will be estimated where the volume will be the sum of the existing traffic volume plus the diverted traffic volume due to detouring. A set of detour plan drawings should be prepared based on the implemented construction plan.

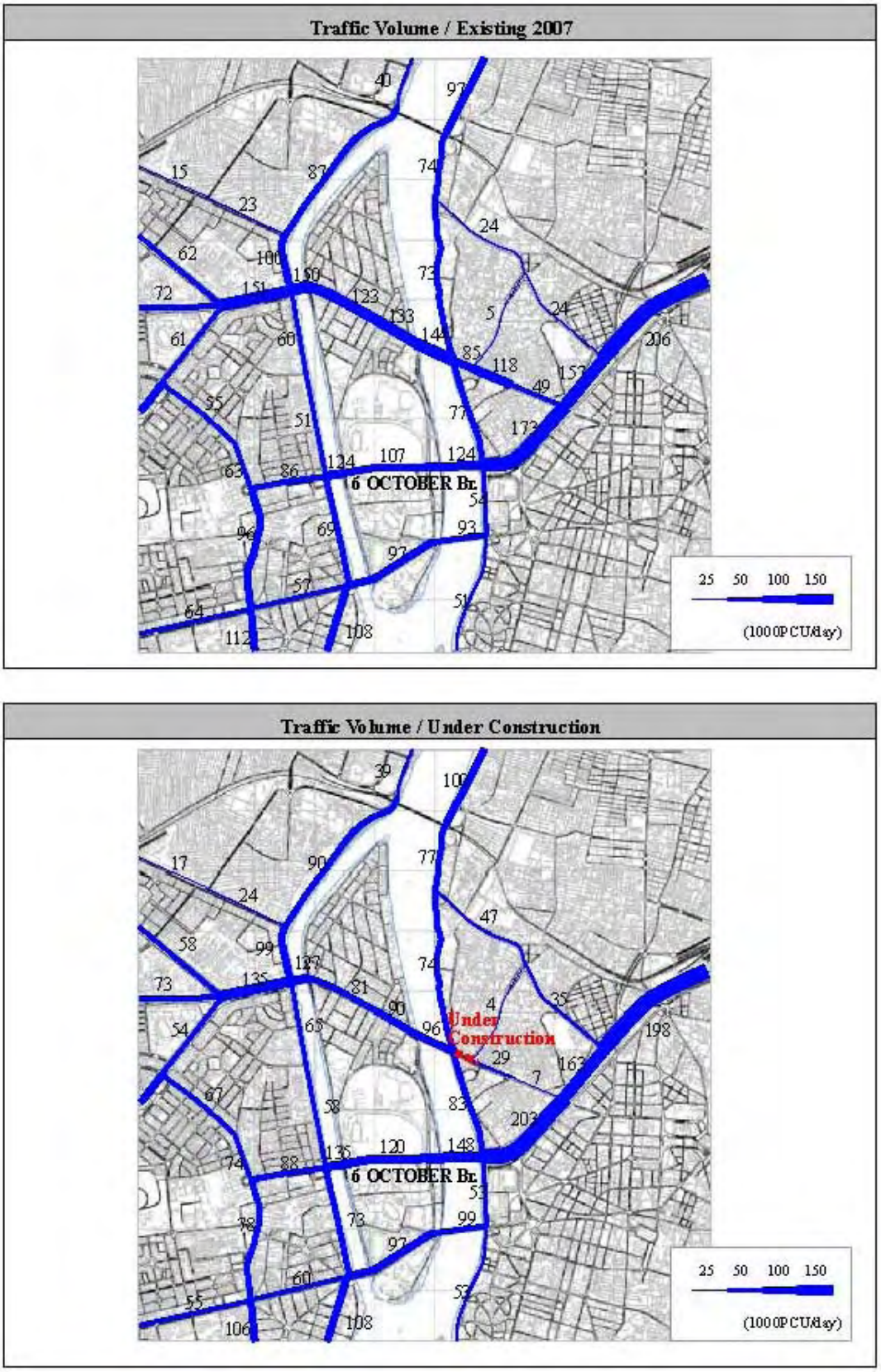


Figure 14.2-16 Existing ADT versus to Under Construction ADT

14.2.3 EXPRESSWAY E 3-1

Expressway section E3-1 on El-Nasr Road will be constructed in two stages in order to connect with the proposed E4/E6 components of the expressway system on the Suez Desert Road. The initial stage will commence on El-Nasr Road 700m from the intersection of E3-1 (El-Nasr Road) with E4/E6. The ultimate stage will complete the connection once the E4 /E6 sections of the expressway are constructed. Figure 14.2-17 shows the schematic plan of Expressway E 3-1.

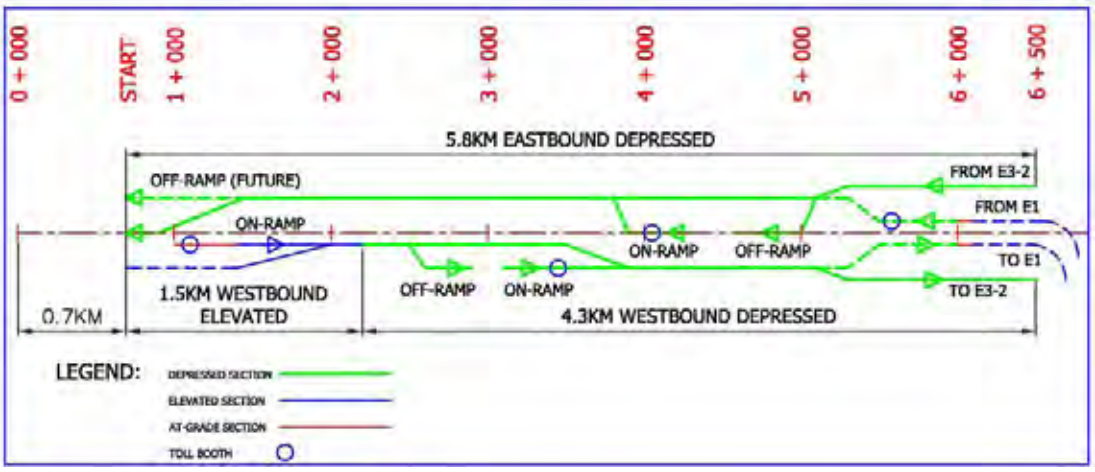


Figure 14.2-17 Schematic Plan of E3-1

The initial stage of the expressway comprises the following structural components:

- Eastbound Depressed Structure (Cut & Cover Tunnel) – length 5.8km : Sta. 0+700 to 6+500
- Westbound Depressed Structure (Cut & Cover Tunnel) – length 4.3km : Sta. 2+200 to Sta. 6+500
- Westbound Elevated Structure (Viaduct) – total length 1.5km (including 80m of approach embankment) : Sta. 0+ 700 to 2+200
- Westbound Elevated On-Ramp (Ramp 1) – length 310m (including 135m of approach embankment) : Sta. 1+210 to 1+520

The Westbound depressed structure features single on and off ramps located at the right (north) side of El-Nasr Road (Ramp 2).

The Eastbound depressed structure features single on and off ramps located at the median of El-Nasr Road (Ramp 3), requiring separation of the Eastbound and Westbound depressed structures at Station 3+530 (3.53km from junction of El-Nasr Raod with Suez Desert Road).

The Eastbound and Westbound depressed structures remain separated in order to pass each side of the existing centrally located ramps of the 6th October bridge at the junction of El-Nasr Road with Ramsis Extension. At this location a connection is provided between E3-1 and 6th October Bridge (E1) in the form of a 4-lane centrally located ramp to the depressed expressway.

The main expressway structures carry 3-lanes in each direction. The on and off ramps provide single lane access/egress.

In order for the initial stage of the expressway to be made operational, the Westbound elevated structure need only be constructed from the nosing point with the Westbound Elevated On-Ramp (Ramp 1) at Sta. 1+520. The elevated westbound section from the start of the initial stage at Sta. 0+700, to the nosing at Sta. 1+520, need not be fully constructed at the initial stage. Only the foundations that are integral with the depressed structure require to be constructed in the initial stage.

The proposed Westbound elevated structure constructed in the initial stage, including the on-ramp, will be located either (i) above the existing wide median on El-Nasr Road, (ii) in the proposed future median or (iii) above existing central lanes reserved for U-turn traffic movements.

In order to maintain traffic along El-Nasr Road “top down” cut-and-cover construction will be required for the depressed structure. In this form of construction, the necessary support for the excavation is put in place first, either as temporally works or as part of the permanent works, working in stages with minimum number of traffic lanes closed or traffic diverted onto temporary lanes occupying the road median.

The top slab of the tunnel section can then be constructed in stages, with sufficient traffic lanes maintained in operation and maximum use made of night-time possession of road space. Once the top slab is in place, traffic can be diverted as necessary to use the at-grade lanes above the tunnel works; the main excavation works can then proceed from below and the remaining structural works completed from inside the excavated space.

The top slab for the depressed structure will be constructed prior to the main tunnel excavation, thereby avoiding the use of shoring works and minimizing impact on at-grade traffic lanes during construction. There are several methods of construction that can be used for the top slab.

Based on the above mentioned explanation of construction techniques, it can be concluded that traffic flow can be maintain along E3-1 corridors along the whole period of the

construction and only readjustment of accessible traffic lanes based on the progress of construction will be required.

During the detail design stage, set of drawings showing the accessible traffic lanes should be prepared, based on the implemented construction plan.

CHAPTER 15

ECONOMIC AND FINANCIAL ANALYSIS

CHAPTER 15

ECONOMIC AND FINANCIAL ANALYSIS

15.1 FRAMEWORK FOR ECONOMIC AND FINANCIAL ANALYSIS

15.1.1 Assumptions

The following assumptions are used for economic and financial analysis:

- Project life: 30 years (plus 4-year construction period)
  - A project life is 30 years after the opening of the expressways to the public in 2013 up to 2042 plus 4-year construction period between 2008 and 2012.
  - Residual value of the expressway roads is counted in the last year of the project period in 2042, assuming that an economic life of the expressway roads is 40 years.
- Demand: Based on the demand forecast described in Chapter 3
  - Demand forecast between 2008 and 2027 is based on the social and economic framework described in the "The Strategic Urban Development Master Plan Study for Sustainable Development of the Greater Cairo Region in the Arab Republic of Egypt".
  - Demand after 2027 is estimated by increasing demand until the capacity/vehicle ratio at expressway reaches to 1.5 times in 2042[1].
- Coverage of the analysis: Greater Cairo Region
  - Analysis covers the impacts of the project in the Greater Cairo Region.
- Implementation Schedule:
  - Table 15.1-1 is the summary of the implementation schedule.

[1] Volume/capacity ratio of All Toll Scenario in 2027 is 0.98.

Table 15.1-1 Implementation Schedule

Section	Detail Design	Construction	Year of Operation Start
F/S Routes			
E1-2	2009	2010-2014	2014 (middle of year)
E2-2	2009	2010-2012	2013
E3-1	2009	2010-2013	2014
F/S + Pre-F/S Routes			
E3-2	2010	2011-2014	2014 (middle of year)
E3-3	2010	2011-2015	2015

- Currency: Egyptian Pounds (LE)

  - The foreign component of the capital costs were estimated and imputed in Egyptian Pounds equivalent at the current exchange rate.

- Price Escalation Rates: Based on IMF's forecast on inflation

  - The Table 15.1-2 shows the rate of price contingency.

Table 15.1-2 Inflation Rate (Unit: %)

	2007	2008	2009	2010	2011	2012	2013	2014-42
International Inflation	2.2	2.6	2	2.1	2.1	2.1	2.1	2
Local Inflation	11	8.8	8.8	7.8	7.2	6.7	6.7	5

Source: IMF (1998-2013), 2014-2042 by JICA study team

- Toll Setting:

The toll will be charged on the basis of 2 vehicle sizes (light vehicle and heavy vehicle) at the fixed rate per one-time usage regardless of the distance traveled. The toll on heavy vehicle[2] will be charged double. It is assumed that tolls will increase gradually, by about 1.5 LE every five years, which mostly coincide with increases by inflation. As the economy grows, the toll is assumed to be fixed after 2027. The standard toll rate on expressways and Ring Road is summarized in the Table 15.1-3.

[2] The ratios of heavy vehicles (standard bus and heavy truck) on expressways and the Ring Road are 0.76% and 23%, respectively.

Table 15.1-3 Toll Setting (Unit: LE)

Section	Light/ Heavy	2012	2017	2022	2027	2028-42
New Expressway (E1-2, E2-2, E3-1, E3-2, E3-3)	L	4	5	6.5	8	8
	H	8	10	13	16	16
Existing Expressway (E1-1, E2-1, E11-1)	L	2	2.5	3.25	4	4
	H	4	5	6.5	8	8
Ring Road	L	2	2.5	3.25	4	4
	H	4	5	6.5	8	8

L: Light Vehicle, H: Heavy Vehicle

15.1.2 Project Costs

Project costs described in Chapter 13 are used as base costs for the economic and financial analyses, and some adjustments for economic and financial costs are calculated as below:

Economic costs = Base Costs + Physical Contingency – Transfer Items (Tax and Import Duties)
Financial costs = Base Costs + Physical Contingency + Price Contingency + Tax

Construction Costs

Construction Costs estimated at Chapter 13 are applied as Base Costs. Estimated costs in Chapter 13 include Engineering Costs of 5% of base Construction Costs and Physical Contingency of 5% of Total Construction Costs. A Detail Design Costs, which are another 3% of base construction costs, is added as costs born before the construction of each route.

Traffic Information System and Toll Collection Costs

Base costs of Traffic Information System and Toll Collection Costs are estimated at Chapter 13 and 5%of physical contingency is added to the base costs. Economic life of the system is assumed as 15-20 years, and the reinvestment of the half of the initial capital costs is assumed after 15 years of its operation.

Land Acquisition and Resettlement

Base costs estimated at Chapter 13 are applied for the analyses. As described in Chapter 13, required costs for land acquisition and resettlement is relatively low as most of the acquired land for the project is government's land which does not require compensation. Compensation for land acquisition and resettlement is not subject to tax.

Operating & Maintenance (O&M) Expenditures

O&M expenditures consist of maintenance costs, operation costs for traffic management, a toll collection and management office, and toll collectors. Annual O&M expenditure for the whole network (from E1 to E13) is summarized in Table 13-5-1 in Chapter 13. Total economic and financial O&M costs for each route during the project period are estimated based on the share of the length of each route to the whole network.

15.1.3 Scenarios for Analysis

Economic and financial analyses are conducted for the following 2 scenarios:

Scenario 1: All Toll Case (A toll is charged on all expressways and Ring Road.)
Scenario 2: Existing Free Case (A toll is charged only on newly constructed expressways, but existing expressways and Ring Road remains free.)

(1) Scenario 1: All Toll Case (A toll is charged on all expressways and Ring Road).

The Base Case sets a standard toll rate which is explained in Chapter 3 and Table 15.1.1. The toll on existing expressways and Ring Road is set at half of those for new expressways. The toll level for light vehicle used for the analysis is shown in the Table 15.1-4.

Table 15.1-4 Toll Rate Applied for Scenario 1

	2012	2017	2022	2027	2028-42
New Expressway (E1-2, E2-2, E3-1, E3-2, E3-3)	4.00	5.00	6.50	8.00	8.00
Existing Expressway (E1-1, E2-1, E11-1 (under construction))	2.00	2.50	3.25	4.00	4.00
Ring Road	2.00	2.50	3.25	4.00	4.00

(2) Scenario 2: Existing Free Case (A toll is charged only on newly constructed expressways, but existing expressways and Ring Road remains free).

The second scenario, existing free case, assumes that a standard toll rate is applied only for newly constructed expressways, which are E1-2, E2-2, E3-1, E3-2 and E3-3, leaving the existing expressways and Ring Road as free. The toll level for a light vehicle used for the analysis is shown in the Table 15.1-5.

Table 15.1-5 Toll Rate Applied for Scenario 2

	2012	2017	2022	2027	2028-42
New Expressway (E1-2, E2-2, E3-1, E3-2, E3-3)	4.0	5.0	6.5	8.0	8.0
Existing Expressway (E1-1, E2-1, E11-1 (under construction))	0	0	0	0	0
Ring Road	0	0	0	0	0

15.2 ECONOMIC ANALYSIS

For assessing economic viability, the analysis uses the following measures:

(i) Economic Internal Rate of Return (EIRR);
(ii) Benefit Cost (B/C) Ratio; and
(iii) Net Present Value (NPV).

The economic analysis of the project was carried out within the framework of a cost-benefit analysis under "with" and "without" project situations for a 30-year project period. The cost-benefit analysis compared the direct benefits accrued by the economy through: a) reduction in Vehicle Operating Costs (VOC); and b) savings in Travel Time Costs (TTC) to the current traffic and the economic cost of the project. Although it is not included in the analysis due to the unavailability of appropriate data in the project area, benefits from accident reduction is also promising. Besides the quantifiable benefits from the project, benefits from environment improvement are also discussed.

For Scenario 1 described in 15.1.2, the Study Team tested cases by route:

1) F/S Routes;
2) F/S and Pre-F/S Routes;
3) Each of F/S Routes;
   3) -1 E1-2;
   3) -2 E2-2;
   3) -3 E3-1;
   3) -4 E3-2; and
   3) -5 E3-3.

With regard to the Scenario 2, economic analysis was conducted for 1)F/S Routes and 2) F/S and Pre-F/S Routes.

15.2.1 Economic Costs

Project costs consist of a) construction costs, b) costs for the traffic information system and toll collection system, c) land acquisition and resettlement costs, and d) annual costs of operation and maintenance. Costs were converted to economic costs by eliminating price contingency, taxes, and custom duties on imported materials, if necessary. The overall economic costs are about 71% and 73% of the financial costs in F/S Routes and F/S + Pre-F/S Routes, respectively. A summary of the project economic costs is shown in the Table 15.2-1.

Table 15.2-1 Summary of Project Economic Costs (LE Million)

	F/S Routes	F/S and Pre- F/S Routes
Construction	5,184	8,398
Land Acquisition and Resettlement	9	46
Traffic Information System and Toll Collection	286	559
O&M Cost for 30 years	110	213
Total Economic Cost	5,590	9,215

15.2.2 Economic Benefits

The direct economic benefits are evaluated by the reduction in cost of road users benefited from the construction of the new expressways, primarily derived from: (1) reduction in VOC and (2) reduction in TTC.

(1) VOC savings

VOC comprised of time related VOC and distance related VOC is estimated for each vehicle type. VOC is evaluated in the economic price for this analysis, and calculated for each vehicle types[3] as summarized in Table 15.2-2.

Table 15.2-2 VOC/1,000 km at Speed of 50 kph by Vehicle Type (Economic Prices)

Type of Vehicle	Passenger Car	Shared Taxi	Minibus	Bus	Light Truck	Heavy Truck	Motor-cycle
VOC (LE/(pcu-km))	454	860	1,276	2,223	2,284	2,457	136
%	68%	12%	8%	3%	5%	4%	0.5%

Source: JICA study team

The difference in VOC by speed[4] is also considered. VOC savings are estimated by calculating the differences in total VOC with and without project. The VOC saving is estimated as follows:

$$\text{VOC savings} = VOC_{wo} - VOC_{w}$$

Where;

$$VOC_{wo} = VOC_{wov} \times \text{PCU-km}_{wo}$$

[3] Average of vehicle share in expressways and Ring Road.

[4] VOC by speed range is estimated by updating the information in 2001 by CREATS. The updated VOC for passenger cars by speed range in 2008 is shown in the table below. It is assumed that the change in VOC by speed for the other vehicle types is similar to those for passenger cars.

(LE/km)

Speed	S<5	5<S<10	10<S<15	15<S<20	20<S<25	25<S<30	30<S<35	35<S<40	40<S<45	45<S<50	50<S
VOC	0.77	0.69	0.67	0.61	0.56	0.52	0.49	0.47	0.45	0.45	0.45

Source: Updated by JICA study team based on CREATS

$VOC_w = VOC_{wv'} \times PCU\text{-}km_w$

VOC_{wov}- VOC at a speed of v when project is not implemented

$VOC_{wv'}$ - VOC at a speed of v' when project is implemented

$PCU\text{-}km_{wo}$ – PCU multiplied by length traveled (km) without project

$PCU\text{-}km_w$ – PCU multiplied by length traveled (km) with project

v - velocity without project

v' – velocity with project

(2) TTC savings

Benefits from TTC savings are value of reduced travel time costs after the project. The value of passenger time was computed based on the income level of vehicle users at the project areas collected from traffic surveys by the Study Team. The time value in future until 2027 is estimated based on the projected GRDP (Gross Regional Domestic Product) per capita growth in the Greater Cairo Region[5]. GRDP per capita is estimated to increase by about 4.9% per annum during 2012-17 and about 4.4% per annum during 2018-2027. The time value after 2027, of which no information on economic growth forecast is available, it is assumed that the time value will increase 3% annually until 2042.

The average value of passenger time was estimated depending on the purpose of trips obtained from the traffic survey conducted during the study (see Table 15.2-3 for the summary of trip purpose). The value of passengers who ride vehicles for business purposes (9.9%) is highly valued whereas the time value of passengers travelling for other purposes including studying, shopping, commuting, recreation, and so on are valued at half of that for business purposes. In addition, car occupancy by vehicle type and trip purpose is also considered. Estimated financial hourly time value is LE 8.0/(pcu-km) (2007). The financial value is converted to economic value by eliminating tax, resulting in economic value of LE 6.4 /(pcu-km) (2007).

Table 15.2-3 Result of the Traffic Survey on Trip Purpose

Trip Purpose	Share
Home	11.6%
Job	60.5%
Study	3.2%
Business	9.9%
Shopping	2.7%
Freight Delivery	0.8%
Social	3.6%
Medical	0.6%
Recreational	0.6%
Others	6.7%
Total	100.0%

Source: Survey by JICA study team

[5]Based on the economic growth projected in "The Strategic Urban Development Master Plan Study for Sustainable Development of the Greater Cairo Region in the Arab Republic of Egypt", 2008

TTC savings are estimated by calculating the differences in total reduction in travel time when the project is implemented and not implemented. The TTC savings are estimated as follows:

$$\text{TTC savings} = TTC_{wo} - TTC_{w}$$

Where;

TTC_{wo}: $H_{wo} \times$ PCU*-hrs_{wo}

TTC_{w} : $H_{w} \times$ PCU-hrs_{w}

H_{wo}: hourly time value when project is not implemented

H_{w}: hourly time value when project is implemented

PCU-hrs_{wo}: PCU multiplied by time traveled (hours) without project

PCU-hrs_{w}: PCU multiplied by time traveled (hours) with project

(3) Summary of Benefits

As can be seen in the Figure 15.2-1, time saving value contributes to 70 % of project's benefits. This high contribution from time savings is similar for all the cases in the 2 Scenarios.

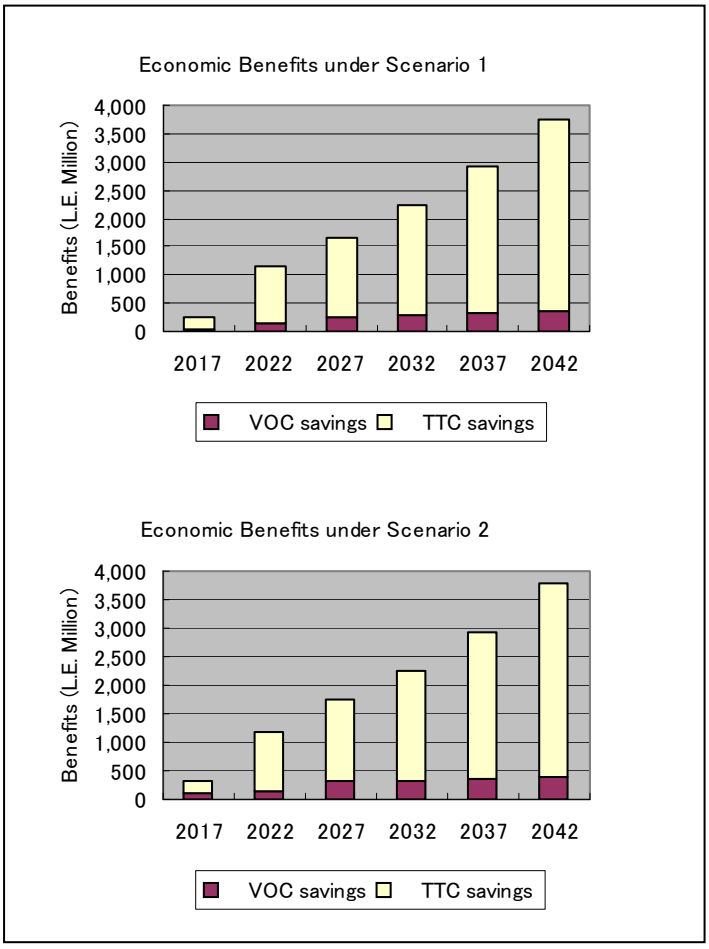


Figure 15.2-1 Economic Benefits from 2017 to 2042
(Scenario 1 and 2, F/S Routes)

Figure 15.2-2 shows the stream of net economic benefits from 2009 to 2042. As it can be seen, the net benefit has negative value until 2014, when construction completes, and after that, it turns to show positive value. The big jump in the net value in 2042, the last year, is due to the addition of residual value of roads.

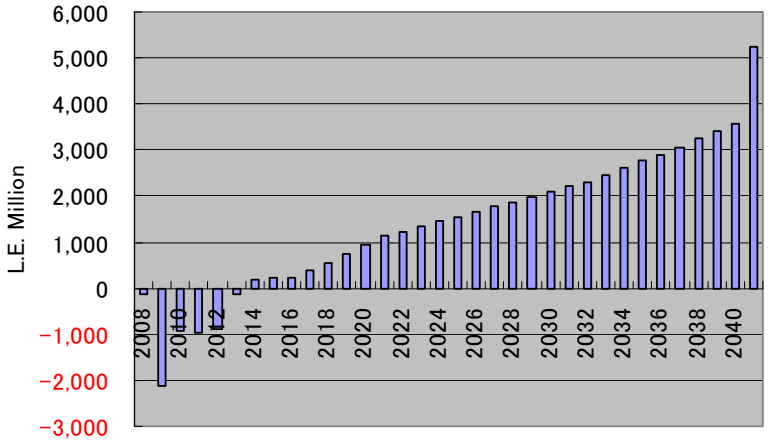


Figure 15.2-2 Net Economic Benefits from 2009 to 2042
(Scenario 1, F/S Routes)

15.2.3 Economic Evaluation

(1) Results of Economic Analysis under Scenario 1

Table of economic benefit and cost streams of Scenario 1 is attached in the Attachment 15-1. Summary of Economic Evaluation of Scenario 1 is in Table 15.2-4.

Table 15.2-4 Summary of Economic Evaluation (Scenario 1)

	F/S Routes	F/S + Pre-F/S Routes
EIRR (%)	12.8%	14.0%
B/C (times)	1.1	1.3
NPV at discount rate of 12% (LE Million)	424	1,619

As the table illustrates, all the results show that the project is economically viable in the both cases. As can be seen, Case 2) F/S and Pre-F/S Routes show better results. This result indicates that because of the network-impacts, especially the connection of routes from E3-1 to E3-3 which run through Cairo from east to west, more benefits can be expected compared to the additional investment costs required for the expansion of networks.

When constant time value after 2027 is assumed instead of increase in time value by 3% per annum, the EIRR and NPV for F/S Routes slightly decrease to 12.4%, LE 154.4 million

respectively, but the project is still feasible.

The EIRR and NPV of each route are summarized in the Table 15.2-5. The EIRR of 3)-1 E1-2 is significantly lower than the other routes, and NPV shows negative figure due to high investment costs for a shield tunnel.

Table 15.2-5 EIRR and NPV of each Route (Scenario 1)

	EIRR	NPV at discount rate of 12%, (LE million)
1) F/S Routes	12.8%	424
2) F/S and Pre-F/S Routes	14.0%	1,619
3)-1 E1-2	8.5%	-700
3)-2 E2-2	19.5%	316
3)-3 E3-1	15.1%	807
3)-4 E3-2	15.1%	540
3)-5 E3-3	15.9%	835

(2) Results of Economic Analysis under Scenario 2

Summary of Cost-Benefit Analysis of Scenario 2 is shown in Table 15.2-6. Overall, the results show higher economic viability compared to the scenario when all routes are implemented as toll expressways. It is mainly because free expressways will attract more demand than toll expressways and less people will divert to at grade road. However, it will adversely affect financial results, since higher demand will not generate additional revenues.

Table 15.2-6 Summary of Economic Evaluation (Scenario 2)

	F/S Routes	F/S + Pre-F/S Routes
EIRR (%)	14.1 %	15.7 %
B/C (times)	1.3	1.6
NPV at discount rate of 12% (LE in million)	1,020	3,110

As similar to the finding from Scenario 1, better results can be found for Case 2) F/S and Pre-F/S Routes than Case 1) F/S Routes, implying a synergy effect from expansion of expressway networks.

(3) Summary of Scenario 1 and Scenario 2

The obtained EIRR of Scenario 1 and Scenario 2 are summarized in Table 15.2-7. The result shows higher economic value when toll is not applied for existing routes. This result is caused by higher demand when toll is not applied to existing routes.

Table 15.2-7 Summary of EIRR (Scenario1, 2)

Scenario		(1) All Toll	(2)Existing Free
Toll	New Expressway	●	●
	Existing Expressway	●	
	Ring Road	●	
F/S Routes		12.8%	14.1%
F/S+ Pre-F/S Routes		14.0%	15.7%

(4) Environmental Benefits

Regional health benefits such as reduction in costs including medical treatments can be expected through the reduced illness caused by polluted air, though it is difficult to measure it. In addition, as discussed in Chapter 3, in 2017, it is estimated that 66,000 tons of CO_2 will be reduced with the project because of the improvement in air quality. If we assume that such CO_2 reduction is traded as a CO_2 emission credit, it has a value of € 1.5 million assuming the price of CO_2 credit is € 20.8/ton[6].

15.2.4 Sensitivity Analysis

Major risks that may affect the results of economic analysis are: Cost Overruns and Lower Traffic Demand reducing the benefits from travel cost reduction. The following 6 patterns of sensitivity analysis were conducted including both Downside and Upside Cases. Summary of the sensitivity analysis is shown in the Table 15.2-8.

Downside Cases:

(1) Cost Overruns (Overall Cost increases by 20%)

(2) Lower Traffic Demand (Economic Benefits decrease by 20%)

(3) Combination (1) + (2)

Upside Cases:

(4) Cost Decrease (Overall Cost decreases by 20%)

(5)More Traffic Demand (Economic Benefits increase by 20%)

vi) Combination (5) + (6)

[6] There are several types of CO_2 emission credit, and EU Allowance (EUA) credit's traded volume is the biggest. As of August 11, 2008, the price of EUA is € 22.80/ton.
http://www.pointcarbon.com/productsandservices/carbon/
Japan Bank for International Cooperation (JBIC) and Nikkei Digital Media Inc. is announcing the price of carbon credit, the Carbon Quotation Index, and the price as of August 11, 2008 is 3,300.6 yen/ton.
http://www.joi.or.jp/carbon/h_index.html

Table 15.2-8 Summary of Sensitivity Analysis (Scenario1)

	F/S Routes		F/S and Pre-F/S Routes	
	EIRR	NPV (LE million)	EIRR	NPV (LE:million)
Base Case	12.8%	424	14.0%	1,619
(1) Costs + 20%	11.6%	-249	12.7%	701
(2) Benefits - 20%	11.3%	-334	12.4%	340
(1) + (2)	10.1%	-1,007	11.2%	-765
(3) Costs -20%	14.5%	1,069	15.9%	1,855
(4) Benefits + 20%	14.2%	1,187	15.4%	3,273
(3) + (4)	15.7%	2,911	17.2%	4,378

Note: NPV is estimated at a discount rate of 12%.

15.2.5 Whole Network Scenario

In addition to the 2 scenarios discussed above, economic analysis of "whole network case" is analyzed to show a broader picture of the economic impacts assuming all networks are constructed and connected in the future.

In this scenario, it is assumed that the entire proposed networks (from E 1 to E 13, total length of about 83.3km) will be gradually constructed by year 2027. All expressways, E1 to E13 and Ring Road, are assumed to be tolled. The project life is assumed for 40 years from the first route, E 2-2, starts operation until year 2052, and other assumptions are the same as the other 2 scenarios. As the detail information on the technical design of each route other than F/S and Pre-F/S Routes is not available, costs are estimated based on the unit costs used for the cost estimation of F/S and Pre-F/S section as well as number of interchanges, and number of toll booth according to the possible structure and length of roads.

Total economic costs are estimated at LE 30,499 million, which is about 3.3 times of the cost of F/S + Pre-F/S Routes. The overall EIRR is about 18.3%, higher than the Scenarios 1 and 2 indicating the larger network impacts to entire Cairo, when a whole network is constructed.

15.3 FINANCIAL ANALYSIS

15.3.1 Financial Evaluation

The Study Team conducted the financial evaluation of the project: including F/S Routes only and F/S and Pre-F/S Routes. Also, financial evaluation of each route, i.e. E1-2, E2-2, E3-1, 3-2, and 3-3, was conducted. In addition to assumptions explained at 15.1.1, other major assumptions for a financial analysis on an implementing agency, toll revenues from other networks, a toll level, and financing costs are described below.

Implementing agency:

As of August 2008, it is not determined whether the project is implemented by a governmental organization, such as MEA, or GARBLT under Ministry of Transport. In this section, it is assumed that GARBLT will implement the project and the project FIRR is calculated.

Treatment of revenues from other networks:

The proposed project, F/S Routes and Pre-F/S Routes, is the first step of the networks and it is only amounts to 25 km in the length which consist of about 30% of the all networks proposed at the PPP study. It will be legitimate to assess the proposed project assuming connection to exiting networks and a further network and will be developed in due course. Therefore, the financial profitability of the project is assessed with three revenue streams of project toll revenues: revenues from (i) F/S Routes and/or Pre-F/S Routes of the New Expressway; (ii) existing expressway; and (iii) Ring Road. Capital costs for upgrading existing expressways and Ring Road are included in the analysis, since the traffic information and toll collection system will be required for toll collection.

Toll Level Setting:

The proposed toll level described above as an assumption at 15.1.1 is not set out at the level either maximizing the financial returns of the project or enabling cost recovery of the project. In order to identify the maximum toll revenue available for the project, the Study Team analyzed the toll level maximizing toll revenue. However, it is discussed that the revenue maximizing toll setting will not be suitable at this stage, considering the willingness to pay and affordability analyses, (see Chapter 3).

As a result, project financial return will not realize enough profit to cover capital and operating costs. However, since the project section is an integral part of the Cairo Urban Toll Expressway Networks, the Financial Rate of Return of the project has to be evaluated in the wider context of the networks based on the future development plan. The analyses were conducted both for the project itself and the wider networks.

Financing Costs:

Financing costs are omitted from economic and financial analysis to assess the quality of the project independently of its financing mode. However, the financial cash flow including debt services were considered at the section on a financing plan.

Project Financial Internal Rate of Return:

A financial analysis of the project was undertaken by valuing incremental revenues and costs at the proposed tolls for new expressway and existing networks.

Scenarios:

The demand Scenario 1 for all toll case described at 15.1.3 was applied for the analysis. Since the toll revenue is the main source of financial benefits, Scenario 2 for existing free case is not reviewed.

Project Revenue:

(1) Toll Revenue

Toll revenue collected from user is a major component of project revenue. Toll exempted vehicles (military, police, fire brigades, ambulance) are expected to account for one percent of a traffic volume. It is assumed the traffic volume will halve on Fridays and national holidays (about 64 days in a year).

(2) Advertisement Revenue

According to GARBLT, current advertisement revenue is about LE 2,500 per one square meter per year. An average billboard size is about 24 square meters and the average distance between advertisings is about 250m. Advertisement revenue is assumed to account for a marginal share, about a few percent for total revenue.

Project Cost:

Summary of the initial project financial costs is shown at Table 15.3-1. Upgrading costs for existing expressways and Ring Road are excluded. Total costs for F/S Route and F/S plus Pre-F/S Routes amount to about LE 7.5 billion and LE 12.6 billion, respectively. Foreign portion will account for about 35% of the total costs.

Table 15.3-1 Summary of Project Financial Costs

(Unit: LE million)

		Length (km)	Total Cost	Foreign	Local	Foreign	Local
Capital Expenditure Total	E1-2	5.4	3,755	1,323	1,891	35%	50%
	E2-2	1.9	468	154	250	33%	53%
	E3-1	5.7	3,276	1,066	1,753	33%	54%
	F/S	**13.0**	**7,499**	**2,543**	**3,893**	**34%**	**52%**
	E3-2	6.9	2,332	761	1,244	33%	53%
	E3-3	5.5	2,773	1,051	1,315	38%	47%
	Pre	**12.4**	**5,104**	**1,812**	**2,560**	**35%**	**50%**
	F/S+Pre	**25.4**	**12,603**	**4,354**	**6,453**	**35%**	**51%**
Construction	E1-2		3,332	1,030	1,802	31%	54%
	E2-2		391	103	232	26%	59%
	E3-1		2,896	797	1,679	28%	58%
	F/S		**6,619**	**1,930**	**3,712**	**29%**	**56%**
	E3-2		2,001	535	1,172	27%	59%
	E3-3		2,397	818	1,205	34%	50%
	Pre		**4,398**	**1,353**	**2,376**	**31%**	**54%**
	F/S+Pre		**11,017**	**3,282**	**6,089**	**30%**	**55%**
Design and Engineering	E1-2		313	219	63	70%	20%
	E2-2		37	26	7	70%	20%
	E3-1		272	190	54	70%	20%
	F/S		**621**	**435**	**124**	**70%**	**20%**
	E3-2		188	131	38	70%	20%
	E3-3		225	157	45	70%	20%
	Pre		**413**	**289**	**83**	**70%**	**20%**
	F/S+Pre		**1,034**	**724**	**207**	**70%**	**20%**
Land Acquisition & Resettlement	E1-2		8	0	8	0%	100%
	E2-2		4	0	4	0%	100%
	E3-1		0	0	0	0%	100%
	F/S		**12**	**0**	**12**	**0%**	**100%**
	E3-2		11	0	11	0%	100%
	E3-3		47	0	47	0%	100%
	Pre		**58**	**0**	**58**	**0%**	**100%**
	F/S+Pre		**70**	**0**	**70**	**0%**	**100%**
Traffic Information System	E1-2		103	74	19	75%	15%
	E2-2		36	26	6	75%	15%
	E3-1		108	78	20	75%	15%
	F/S		**247**	**178**	**45**	**75%**	**15%**
	E3-2		131	95	24	75%	15%
	E3-3		104	75	19	75%	15%
	Pre		**235**	**170**	**43**	**75%**	**15%**
	F/S+Pre		**482**	**348**	**88**	**75%**	**15%**

Note 1: The difference between the total cost and the sum of foreign and local portion. Is tax
2: Inflation and physical contingency of 5% are included.
3: Rehabilitation cost is excluded.

FIRR:

FIRR for the overall project is estimated at about 4.0% for F/S Routes and 3.1% for F/S and Pre-F/S Routes under Scenario 1, all toll case. The detailed results by section are presented in the Table 15.3-2 below and ranged from 1.0% to 8.7%. The value of net financial benefits is significantly less than that of economic benefits because of a gradual increase in toll rates

despite high initial capital costs. Since the project is the first such kind of urban toll expressway projects, installing toll rates to obtain FIRR as high as economic benefits is considered not socially acceptable at the initial stage. Raising toll rates higher than those of a socially acceptable level will increase a diversion rate of road users from the expressways to at grade roads and result in lower economic benefits. GARBLT assumes to increase the toll rates gradually during the project period.

The lowest FIRR is estimated at the section E1-2, due to the high construction cost of the planned shield tunnel.

Table 15.3-2 Results of FIRR by Section under All Toll Case

Section	FIRR	NPV (in LE million)
F/S Routes	4.0%	-3,346
F/S and Pre-F/S Routes	3.1%	-5,738
E1-2	1.0%	-1,976
E2-2	8.7%	-105
E3-1	5.7%	-1,265
E3-2	5.6%	-812
E3-3	6.2%	-885

If the network development is evaluated in the wider context, there might be an option to start collecting tolls from the existing expressways and Ring Road, which will enables MOT/GARBLT to cross-subsidize the newly constructed expressways.

The Study Team discussed with GARBLT the possible toll rates for the existing and the Ring Road and proposed to charge a half of the toll rates of new expressways, i.e. LE 2 for a light vehicle and LE 4 for a heavy vehicle.

The result shows that financial viability of F/S Routes and Pre-F/S Routes will increase if those are considered as a network with upgraded existing expressway and Ring Road. For the analyses, upgrading costs for toll collection system and traffic information system of existing expressways and Ring Road of LE 389.2 million and LE 1,605 million, respectively, are included as well as additional operating and maintenance costs. Toll revenues from existing expressway and Ring Road are calculated for the analysis. The demand analysis shows that most of the existing expressway users drive though existing expressway and new expressways at the same tirp. Therefore, an incremental increase in toll revenues resulted from collecting tolls from the existing expressways is not significant. However, an incremental increase in toll revenues from Ring Road will improve the financial rate of return, significantly (see Table 15.3-3).

It is noted that collecting different tolls from exiting expressway, the ring road, and the new expressways, which are all connected in the network, will require some technical measures in order to identify whether each vehicle drives through several sections in one trip. The measures may include a ramp tolling system.

Table 15.3-3 Results of FIRR as a Network

Section	Base Case Scenario 1	Including Existing Expressway	Including the Ring Road
F/S Routes	4.0%	4.4%	11.6%
F/S and Pre-F/S Routes	3.1%	3.4%	9.1%

If a nominal toll rate is increased by estimated inflation after 2027, the results will be improved by 1.1 - 1.3 %.

Sensitivity Analysis:

The sensitivity of FIRR to 2 variables, was examined: increase and decrease in costs and demand; and a combination of those. The results of the analyses are given in Table 15.3-4.

Table 15.3-4 Results of Sensitivity Analyses of FIRR (Unit: LE Billion)

	F/S Routes		F/S and Pre-F/S Routes	
	FIRR	NPV	FIRR	NPV
Base Case	4.0%	-3.3	3.1%	-5.7
(1) Cost increase by 20%	3.1%	-4.3	2.2%	-7.3
(2) Demand decrease by 20%	2.9%	-3.6	2.0%	-6.1
(1) + (2)	2.0%	-4.6	1.2%	-7.6
(3) Cost decrease by 20%	5.2%	-2.4	4.2%	-4.2
(4) Demand increase by 20%	5.0%	-3.0	4.0%	-5.4
(3) +(4)	6.2%	-2.1	5.3%	-3.8

15.3.2 Financing Plan

Under PPP Study, it is recommended to mobilize government budget and/or concessional finances for the proposed project in the first phase of the whole network development. It is proposed that the government will build and strengthen its foundation for future network development and operation. The Study Team accepts this view and proposes to utilize government budgets and/or concessional finances in the first phase in order to introduce a toll system and establish a system which enable cross subsidy in the wider context of the networks.

Fiscal Impact:

Financing the project by the government budget will have a considerable fiscal impact for the Government of Egypt. Despite many of favorable macroeconomic developments in the Egyptian economy, the Government faces the challenge of managing a large fiscal deficit and a sizeable public debt stock. It is noted that the Ministry of Finance announced a plan to cut the budget deficit by one percent of GDP per annum which will help restrain inflation.

In this context, financing the project with the general account budget is a challenge. Based on the current estimates, the project cost amounts to about LE 12.6 billion (about 2% of GDP, US$ 107.5 Billion in 2006). However, based on the financial analyses above, it is noted that the project will have marginal profitability and be required to be funded by the government budget to some extent. The government budget will mitigate tight project cash flow to cover its capital and operating costs. At the same time, managing fiscal deficits is an important matter for the government and an implementing agency/ministry must develop a disciplinary system on utilizing budgets and/or borrowing loans as a budget entity, and retain a solid financial base for project implementation.

Road Revenues:

Based on the increasing demand on road and other transport infrastructure in the country as well as above mentioned budgetary constraints, it is clear that the general account budget of the Government will not be sufficient to meet the needs. Developing other sources of road financing, such as user fees, domestic borrowing and private financing will be necessary. The beneficiary-pay principle was recommended at the PPP study as a basic concept. Those who get benefits by using a particular road should pay for the costs for construction and/or maintenance of the said road. Otherwise, the general account budget, i.e. taxpayers' money, has to be utilized for the construction, operation, and maintenance of roads. Following the phased approach recommended at the PPP study, the Study Team emphasized that introducing a toll system for an urban expressway network will be the first important step for the beneficiary-pay principle. Since it would be difficult to implement a toll system without developing new expressways and/or upgrading existing expressways, toll revenues are not assumed to fund initial capital expenditure but assumed to recover its costs in the long run under this analysis.

Financing Gap:

Financing plan is required to be set out assuring financial sustainability of a project. If a road project is profitable and/or self sustainable by acquiring enough toll revenue, private financing could be an option and funds will be repaid by future toll revenue. However, if a project with socially acceptable toll is not able to generate enough cash flow to cover its capital and

operating costs, funding gap must be covered by other sources as shown in Figure 15.3-1.

Cross subsidy from other profitable routes and subsidy from the budget will be plausible and necessary as alternatives. It is noted that the Government needs to assure the system enabling cross subsidy for the construction and operation of new expressways. At the same time, assessing economic and financial appraisal of each network and sustainability of a whole network is inevitable in order to establish discipline of new investment.

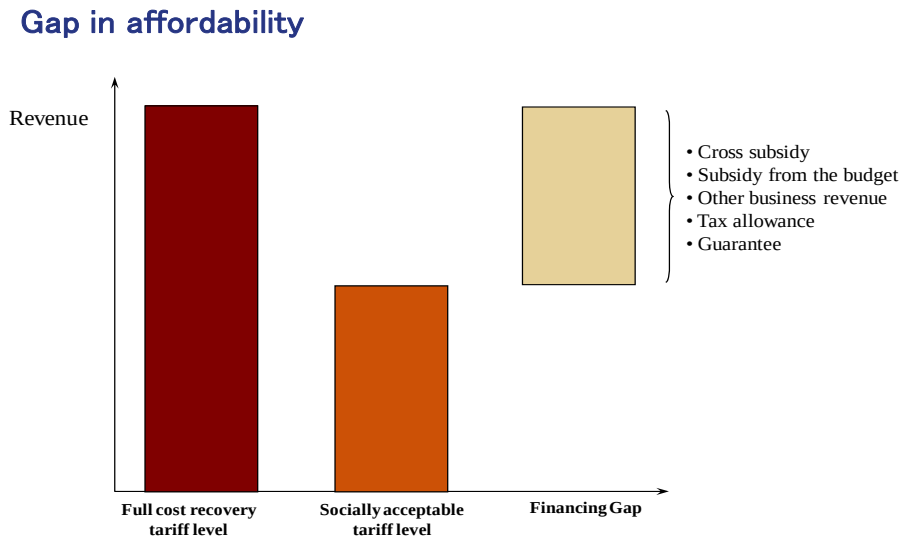


Figure 15.3-1 Financing Gap

Funding Source:

The Study Team discussed with GARBLT the possible source of funding for the initial large capital investment. It is pointed out that related ministries, such as MOF, MOT, MOIC, and GARBLT, will develop a funding plan only after the Prime Minister's decision to press forward with the project. Although, the Study Team proposes a funding plan in this section, the further review and discussion among the Government is essential.

There is an uncertainty in institutional framework as well. Since the implementing agency could be GARBLT and will not be an independent entity despite of the proposal under the PPP study, direct borrowing from national and/or commercial banks would not be an option. However, the Study Team assessed the robustness of the funding plan by assuming repayment and interest payments which will cover a certain cost of capital by the budget authority. It is assumed that capital costs will be funded by sources backed with: (i) General Account Budget; (ii) Concessional Loans; and (iii) Domestic Loans.

General Account Budget:

GARBLT's Budget for 2007-2012 capital projects is limited and will be about LE 10 Billion

(or about LE 2 Billion per year at an average)[7]. Nevertheless, the budget allocation could be sometimes determined based on the priority of the project and the government will. For example, the Government allocated GARBLT a considerable amount of national budget, about LE 3 Billion, for Regional Ring Road Project.

Concessional Loan:

An annual ceiling of soft loans for the country is considered to be US$ 1.2 - 1.5 Billion (or about LE 6.4 - 8.0 Billion) in total. Loan terms from major international financial institutions are in the Table 15.3-5. Repayment schedule of Yen loan is the most concessional term. However, according to JBIC, the largest Yen loan amount in Egypt for one project from JBIC was about JPY 35.8 Billion (or about LE 1.8 Billion) for Museum Project and JPY 30 - 40 billion (or about LE 1.5 - 2.0 Billion) would be a reasonable size of Yen Loan as a single project. Yen Loan will not finance tax and land acquisition costs(see Table 15.3-6).

At the same time, the government will be obliged to limit an amount of concessional loans for the project. From the government point of view, it will be justifiable to borrow foreign debt for a foreign portion of the project costs, which amount to about 35% of the project cost.

Table 15.3-5 Loan Terms from Selected International Financial Institutions:

	Currency	Interest Rate (%)	Duration (year)	Grace Period (year)
JBIC	Yen	1.4	30	10
AfDB	US$	3.52 (LIBOR* + 40b.p)	20	5
World Bank	US$	3.17 (LIBOR* + 5b.p.)**	20	8

* LIBOR is 3.12% as of August 1, 2008
**Conditions for Fixed Spread Loan

Table 15.3-6 Loan Lending Amount by Selected International Financial Institutions

(Unit: US$ Million)

Lending Agency	FY 2005	FY 2006	FY 2007	FY 2008
JBIC*	152.3	371.5	-	-
AfDB**	460.8	645.9	513.3	-
World Bank	140.0	779.6	182.1	884.8

* Exchange rate 1 US$ = JPY 107.66 (August 1, 2008)
**Exchange rate 1 US$= 0.617 UA (August 1, 2008)

7 Source: GARBLT presentation at the World Bank seminar

Domestic Loan:

Availability and conditions of loans from public and private domestic banks will be determined by a profitability of a financed project, credit situation of a borrower, and sustainability of a project structure. Since the project implementation entity has not yet been determined, loan term from National Investment Bank (10 years, 11%: [to be confirmed]) will be assumed as a standard terms and conditions in the analysis.

Development of expressways requires a long term debt due to its large initial investment and a long economic life, although a generally available loan term in Egypt is less than five years. 2 state owned banks, National Investment Bank and MISR Bank, provide loans whose repayment periods are about 20-25 years with interest rate of from 10.5 to 13%. However, the maximum available amount for one project will be relatively small and less than L.E.100 million. Some exceptional cases were observed with government guarantee.[8]

Financing Plan:

Based on the fiscal constraints described above, it is assumed that concessional loans from international financial institutions will be limited to finance a foreign portion of the project. The government will provide an implementing agency with budgets as grants and/or sub-loans to cover the capital investments for the networks. Preliminary financing flow is shown at Figure 15.3-2. The government will arrange sub-loans to be provided at domestic reference rates (estimated at about 11%) for 10-year terms but without any grace period. The ratio of sub-loans and capital grants for the implementing agency shall be such that the notional interest rate over the total amount of loan and grant is no less than estimated cost of capital of the government. Several scenarios are developed to see the impact of the structure of funding sources to the financing cost of the project.

[8] There is possibility that public banks provide with policy lending with longer maturity than commercial basis. For example, National Bank of Egypt and Bank Misr co-financed Cairo metro line III project at special terms and conditions (total cost: 6 billions LE, Government equity: L.E. 3.6 billion, debt: L.E. 2.6 billion, loan period: 20 years, grace period: 4 years, interest rate: 11%, the number of tranches: 4, borrower: National Authority for Tunnels) because of government guarantee, which is regarded as public debt and listed on every year budget.

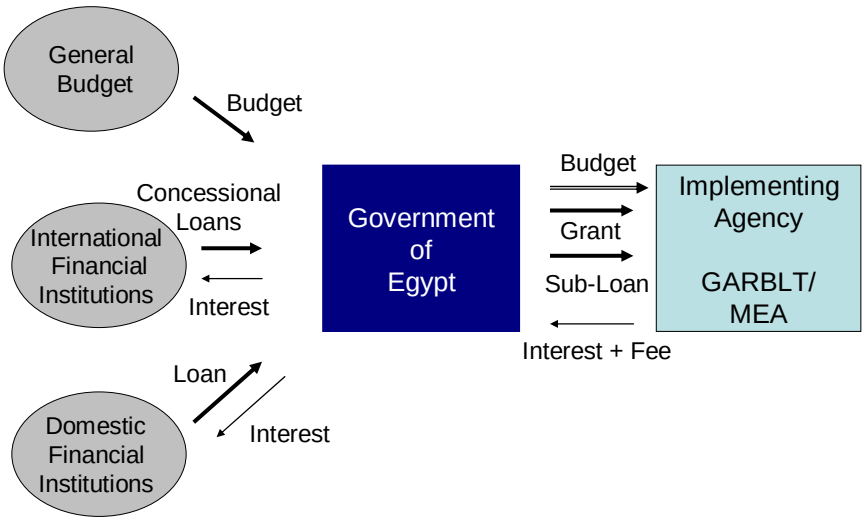


Figure 15.3-2 Preliminary Financing Flow

At the same time, the project shall be reasonably profitable to cover the interest rate in order to assure sustainable financial conditions of an implementing agency. Concessional international loans and Ring Road revenues will be major factors to improve project finances. Without concessional international loans and Ring Road revenues, the debt services continue to increase during the project period, although 50% of capital expenditure is funded by the national budget (see Figure15.3-3.).

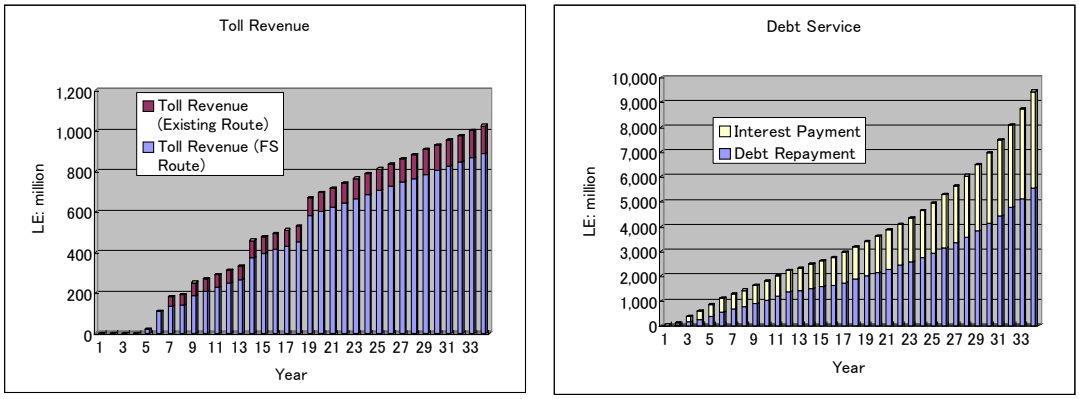


Figure 15.3-3 Toll Revenue and Debt Service (no Ring Road revenues and concessional loans)

If 70% of toll revenue from Ring Road is used to repay debt service for the project section, the debt will be paid by 2032. However, the debt service burden during the initial stage of the project is significant amounting to L.E. 1.2 billion per year (see Figure15.3-4.).

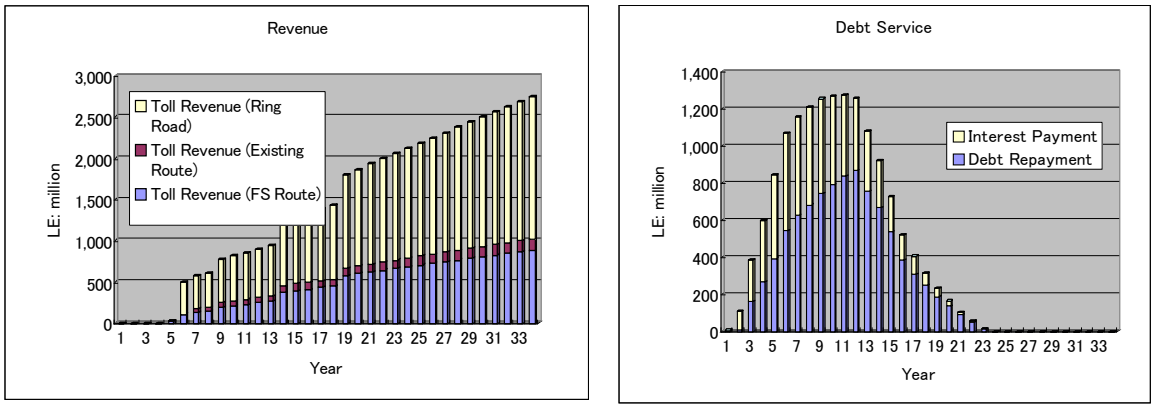


Figure 15.3-4 Toll Revenue and Debt Service (with Ring Road revenues)

If concessional loans are utilized in addition to the Ring Road revenues, the debt service will be leveled during the longer period to some extent, and debt service burden at the initial stage of the project will be mitigated. The project team recommended the leveled payment utilizing concessional loans and the use of Ring Road revenues as the project section is considered to be a part of the networks (see Figure15.3-5.).

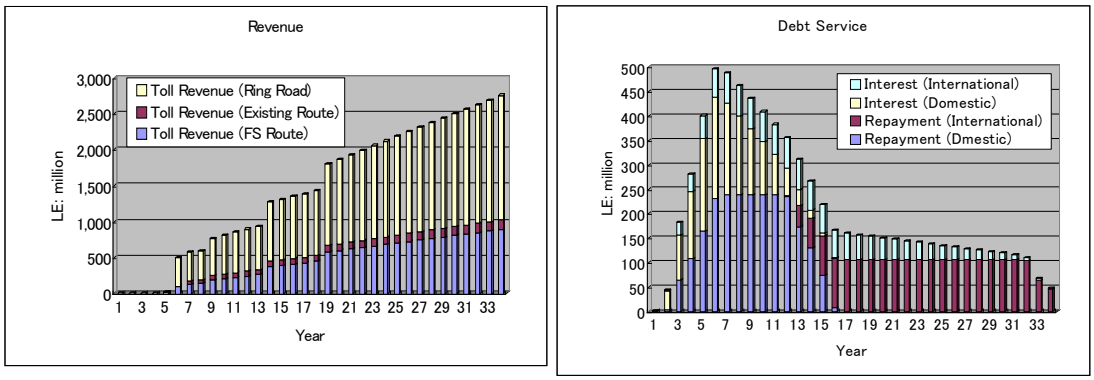


Figure 15.3-5 Toll Revenue and Debt Service (with Ring Road revenues and concessional loans)

Table 15.3-7 and Table 15.3-8 show the summary of the results of combination of funds. It shows that the government commitment is inevitable and additional borrowing for sub-loan repayment and interest payment will be required. An amount of additional borrowing will be determined based on an amount of possible budget support as a grant.

Table 15.3-7 shows a financing plan for F/S Routes only. Foreign loans are assumed to finance a foreign portion of the project cost under Case 1 with the general account budget of 50% of the project costs, domestic loans will finance the rest of the project costs. Additional loans will be required only during the initial stage. If an amount of a foreign loan is limited to reasonable amount for one financial institutions (Case 2), and/or the general account budget allowance is

limited to LE 3 billion (Case 3), amount and years of required additional borrowing will be increased accordingly.

Table 15.3-7 Summary of financing Plan for F/S Routes only

(Unit: LE billion)

	Case 1		Case 2		Case 3	
Initial Capital cost	7.5	100%	7.5	100%	7.5	100%
General Account Budget	3.7	50%	3.7	50%	3.0	40%
Foreign Loans (ex. JBIC)	2.3	30%	1.9	25%	1.9	25%
Domestic Loans	1.5	20%	1.9	25%	2.6	35%
Additional Domestic Loans during Operation	0.9	Up to 2014	1.3	Up to 2015	2.6	Up to 2018

Table 15.3-8 Summary of Financing Plan for F/S and Pre-F/S Routes

(Unit: LE billion)

	Case 1		Case 2		Case 3	
Initial capital cost	12.6	100%	12.6	100%	12.6	100%
General account budget	5.7	45%	5.0	40%	4.4	35%
Foreign loans (ex. JBIC)	1.9	15%	1.9	15%	1.9	15%
Foreign loans (ex. AfDB)	1.9	15%	1.9	15%	1.9	15%
Domestic loans	3.2	25%	3.9	30%	4.4	35%
Additional domestic loans during operation	5.4	Up to 2021	8.5	Up to 2023	12.9	Up to 2025

Attachment15- 1 Economic Cost and Benefit Stream of F/S Routes (Scenario 1)

	Economic Cost					Economic Benefit			
Fiscal Year	Construction	Land Acquisition and Resettlement	Traffic Information System and Toll Collection	O&M	Total Cost	Reduction in VOC	Reduction in TTC	Total Benefit	Net Benefit
2009	151	0	0	0	151	0	0	0	-151
2010	2,135	5	0	0	2,140	0	0	0	-2,140
2011	924	5	0	0	929	0	0	0	-929
2012	924	0	38	0	962	0	0	0	-962
2013	848	0	76	1	925	7	23	30	-895
2014	202	0	76	3	281	38	123	162	-119
2015	0	0	0	4	4	47	157	204	200
2016	0	0	0	4	4	49	173	222	218
2017	0	0	0	4	4	52	189	241	237
2018	0	0	0	4	4	68	327	395	392
2019	0	0	0	4	4	85	478	563	559
2020	0	0	0	4	4	101	642	744	740
2021	0	0	0	4	4	118	820	937	934
2022	0	0	0	4	4	134	1,010	1,144	1,141
2023	0	0	0	4	4	156	1,087	1,243	1,239
2024	0	0	0	4	4	177	1,166	1,344	1,340
2025	0	0	0	4	4	199	1,248	1,447	1,444
2026	0	0	0	4	4	220	1,333	1,554	1,550
2027	0	0	0	4	4	242	1,421	1,663	1,659
2028	0	0	0	4	4	251	1,518	1,769	1,765
2029	0	0	0	4	4	259	1,618	1,878	1,874
2030	0	0	0	4	4	268	1,722	1,990	1,986
2031	0	0	0	4	4	276	1,829	2,105	2,101
2032	0	0	19	4	23	285	1,939	2,224	2,201
2033	0	0	38	4	42	293	2,061	2,354	2,312
2034	0	0	38	4	42	302	2,186	2,488	2,446
2035	0	0	0	4	4	311	2,316	2,626	2,622
2036	0	0	0	4	4	319	2,449	2,768	2,764
2037	0	0	0	4	4	328	2,585	2,913	2,909
2038	0	0	0	4	4	336	2,737	3,074	3,070
2039	0	0	0	4	4	345	2,894	3,238	3,235
2040	0	0	0	4	4	353	3,054	3,408	3,404
2041	0	0	0	4	4	362	3,219	3,581	3,577
2042	-1,502	0	0	4	-1,499	370	3,389	3,759	5,258
Total	3,682	9	286	110	4,087	6,353	45,714	52,067	47,980
NPV at Discount Rate of 12% / year					3,366			3,790	424
								EIRR	12.8%

Attachment 15- 2 Financial Analysis of F/S Routes

(Unit: L.E. million)

	Financial Cost							Financial Benefit			
Fiscal Year	Construction	Design and Engineering	Land Acquisition and Resettlement	Traffic Information System & Toll Collection	O&M Cost	Physical Contingrency	Total Cost	Toll Revenue from New Expressway	Ad	Total Revenue	Net Benefit
2008	0	0	0	0	0	0	0	0	0	0	0
2009	0	222	0	0	0	11	233	0	0	0	-233
2010	2,509	147	5	0	0	133	2,795	0	0	0	-2,795
2011	1,145	67	6	0	0	61	1,279	0	0	0	-1,279
2012	1,203	71	0	45	0	66	1,385	0	0	0	-1,385
2013	1,161	68	0	94	1	66	1,389	21	0	21	-1,369
2014	286	17	0	96	5	20	424	109	0	109	-315
2015	0	0	0	0	6	0	6	134	5	139	133
2016	0	0	0	0	6	0	7	143	5	148	141
2017	0	0	0	0	7	0	7	189	5	194	187
2018	0	0	0	0	7	0	7	209	6	214	207
2019	0	0	0	0	7	0	7	228	6	234	227
2020	0	0	0	0	7	0	8	248	6	254	247
2021	0	0	0	0	8	0	8	268	7	274	266
2022	0	0	0	0	8	0	8	374	7	381	372
2023	0	0	0	0	8	0	9	394	7	401	392
2024	0	0	0	0	9	0	9	414	8	421	412
2025	0	0	0	0	9	0	10	433	8	441	432
2026	0	0	0	0	9	0	10	453	8	462	452
2027	0	0	0	34	10	2	46	582	9	591	545
2028	0	0	0	70	10	4	84	603	9	612	528
2029	0	0	0	72	11	4	87	623	10	633	546
2030	0	0	0	0	11	1	12	644	10	654	642
2031	0	0	0	0	12	1	12	664	11	675	662
2032	0	0	0	0	12	1	13	684	11	696	683
2033	0	0	0	0	13	1	13	705	12	717	703
2034	0	0	0	0	13	1	14	725	12	738	724
2035	0	0	0	0	14	1	15	746	13	759	744
2036	0	0	0	0	15	1	15	766	14	780	765
2037	0	0	0	0	15	1	16	787	14	801	785
2038	0	0	0	0	16	1	17	807	15	822	806
2039	0	0	0	0	17	1	17	828	16	843	826
2040	0	0	0	0	17	1	18	848	17	865	847
2041	0	0	0	0	18	1	19	868	18	886	867
2042	-1,576	0	0	0	19	1	-1,556	889	18	907	2,463
Total	**4,728**	**592**	**11**	**411**	**319**	**382**	**6,443**	**15,384**	**287**	**15,671**	**9,228**
										FIRR	4.0%

CHAPTER 16

PPP IMPLEMENTATION

CHAPTER 16

PPP IMPLEMENTATION

16.1 REVIEW OF PPP ENVIRONMENT

The Study Team collected information on Egypt's PPP projects to identify current issues relating to implementation of PPP. Although it is expected that the urban toll expressways project provides economic and social benefits, it would not be easy to have the private sector actively participate in the project due to a large scale of initial capital investments, a long period to recover investment costs, uncertainty in future traffic demand. In addition, toll expressway is a relatively new concept in the country. In this section, major projects with private participation from the past to the future in Egypt are reviewed. In addition, the status of PPP initiatives in Egypt in terms of legislative and institutional aspects is described, followed by the issues concerning the establishment of MEA that is expected to be a core institution to implement urban toll expressways in Cairo. Further, issues on implementation of PPP are summarized.

16.1.1 PPP Project in Egypt

(1) Projects with Private Participation

Egyptian government implemented 21 projects with the private sector participation according to the Private Participation in Infrastructure (PPI) database[1]. A summary of PPI projects in the database is in the Annex 1. The trend of PPI is analyzed by the following categories: project status, sector, type of PPI, investment commitments, and contract period.

Project Status

Most of the projects are at operational stage as shown in Figure 16.1-1, except two, 'Five Regional Egyptian Airports at 'Sharm El Sheikh, Hurghada, Luxor, Aswan and Abu Simbel' and 'Sidi Krir Power Station', that are under construction. 'Greater Cairo Wastewater Project' with management contract of four years has been already completed.

[1] http://ppi.worldbank.org/

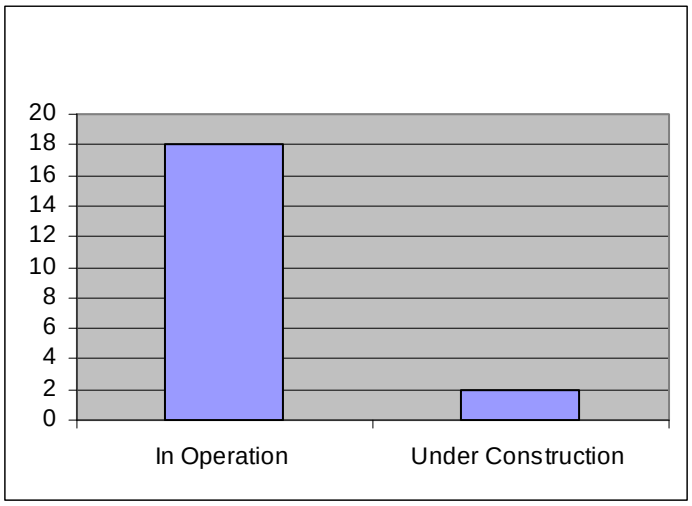


Figure 16.1-1 Number of Project by Project Status

Sector

Almost half of the projects, 10 as shown in Figure 16.1-2, are in the transport sector, followed by six projects and four projects in the telecom and energy sector, respectively. Among 10 transport projects, seven projects are for airports, two projects are for seaports, and one is railway project. One wastewater project is implemented in the Greater Cairo.

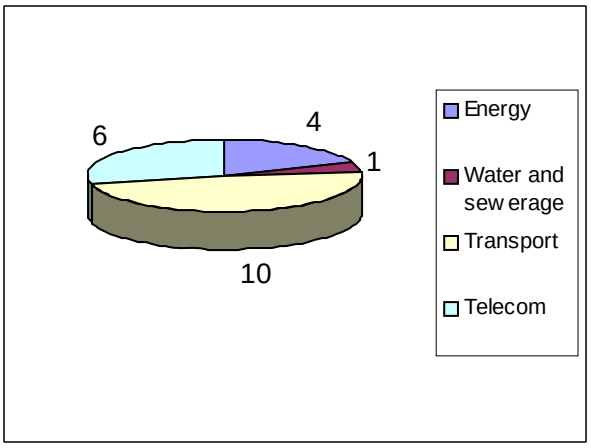


Figure 16.1-2 Number of PPI Projects by Sector

Type of PPI

Among 21 projects, more than half, 14 projects were Greenfield. Out of the 14 Greenfield-Type Projects, 10 projects are implemented under Build Own Transfer (BOT), the other two are under Build Own Operate (BOO), and the other two are in merchant. Two concession projects of airport and seaport are under Build Rehabilitate Operate, and Transfer (BROT) scheme. Two divestiture projects are in the telecom sector; in one project, the government transfers 100 percent of the equity of the state-owned company to private entities as shown in Figure 16.1-3.

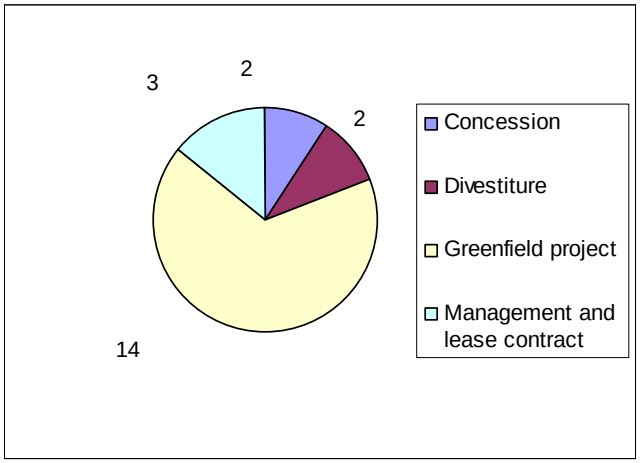


Figure 16.1-3 Type of Private Participation

Table 16.1-1 shows the subtype of the PPI projects by sector. As it shows, all the projects in the energy sector are implemented under BOT scheme, whereas a subtype of the PPI projects varies in the telecom and transport sector.

Table 16.1-1 Matrix of projects by sector and subtype of PPI

	Management & lease contract	BROT (Concession)	BOO (Greenfield)	BOT (Greenfield)	Merchant (Greenfield)	Divestiture	Total
Telecom	-	-	2	-	2	2	6
Energy	-	-	-	4	-	-	4
Transport	2	2	-	6	-	-	10
Water and sewerage	1	-	-	-	-	-	1
Total	3	2	2	10	2	2	21

Investment commitments

An investment commitment amount for the projects ranges from Etisalat Misr Project of LE 3,075 million, which includes improvement of mobile access and long distance call, to Hurghada Airport Passenger Terminal Project of LE 4.4 million. Top three projects are all in the telecom sector in the form of merchant and full divestiture. Three out of four projects in the telecom sector include a large amount of payments to be made before the private sector's investments in the government assets (see Figure 16.1-4).

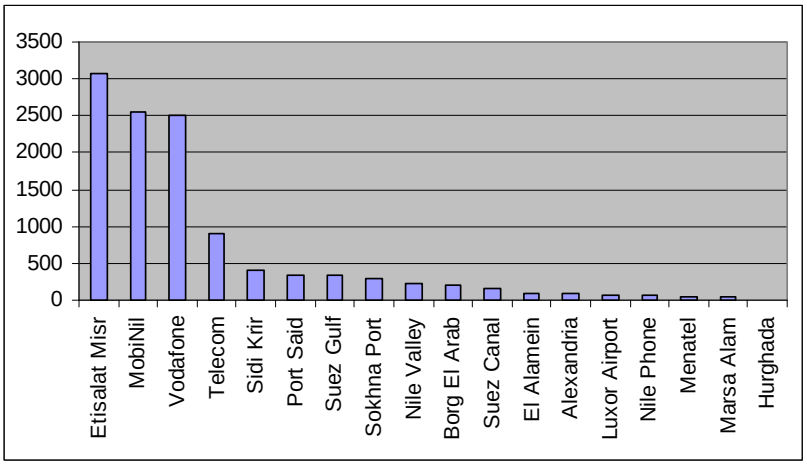


Figure 16.1-4 Total Investment Commitments by Project

Contract period

Contract period of most of projects falls in the range between 11 and 20 years, while three BOT projects in the energy sector last 20 years. Relatively long contracts, more than 20 years, are in the energy and transport sector. More than half of the projects are shorter than 20 years, and this may be due to financial constraints; e.g. the maximum lending term from commercial banks with government's share of 100% is about 20 years. The longest contract period is 50 years in two airport projects. Although the BOT law allows maximum 99-year concession period, there is no project longer than 50 years, assumedly due to the risk associated with projects (see Figure 16.1-5).

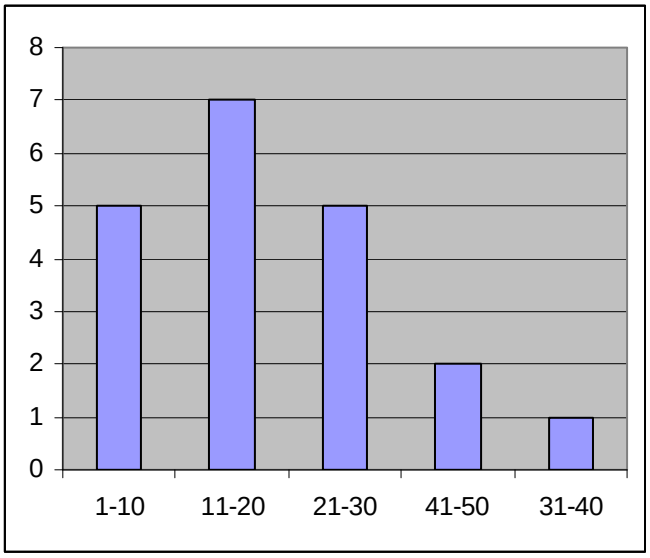


Figure 16.1-5 Number of Projects by Contract Period

(2) PPP Pilot Projects Promoted by MOF

PPP central unit under the Ministry of Finance is implementing PPP pilot projects and the status of the projects is summarized in the Table 16.1-2.

Table 16.1-2 List of the PPP pilot project

Project	Sector	Description	Status of the project
Potable Water Treatment Plant	Water and sewerage	Water Treatment Plant in new Cairo 500,000m3/day: expected by PPP (concession for 20 years)	Technical DD underway Call for PQ - end 2007 Bid awarding - end 2008
Ministry of Health and Population Hospitals Project	Health	Rebuild and renew of two hospitals in Cairo	Reviewing the project.
Ministry of Higher Education/ Mowassat Hospital	Education	Renovation and rehabilitation of Mowassat hospitals in Alexandria	Reviewing the project.
New Cairo Wastewater Treatment Plant	Water and sewerage	Waste Water Treatment Plant in new Cairo Total capacity - 1,250,000m3/day	EOI from 39 players, and 6 were qualified PQ documents deadline - February, 2008
Cairo / Alexandria free road	Road	Cairo-Alexandria road, 231km	Technical and Legal DD - finalized by May 2008 EOI and investment sounding - progressing
New Public Schools Project	Education	Construction of new 345 public schools in 7 batches in 5 years	PQ - finished, 5 investors were qualified Issuance of bidding documents and invitation for bids - completed
Port Said / Matrouh free road	Road	Mort Said- Matrough road, 530km	
Ministry of Higher Education/ new Gynecology/Obsterics University Hospital	Health	Construction of hospital	Reviewing the project
Ain Shams –10th of Ramadan City railway	Railway	Upgrading of the existing line, construction of a second line, and double track line Rehabilitation and construction of stations	DD underway RFP - summer /autumn 2008 Bid awarding - October 2009

Source: MOF PPP central unit's website[2],
"National Program for Public Private Partnership 2nd edition", September 2007

IFC's Support for the Implementation of the PPP Projects

IFC, one of the leading supporters of PPP implementation, and Ministry of Finance of Egypt signed a Memorandum of Understanding (MOU) in October 2006 for future cooperation in the promotion of the PPP projects. Under the agreement, it is stated that IFC would provide

[2] http://pppcentralunit.mof.gov.eg/AllProjects.aspx

advisory assistance[3] for five pilot PPP transactions intended to develop Egypt's infrastructure. The pilot projects are in hospitals, water, wastewater, and road sector. IFC's support includes:

- Providing small training program to government officials as agreed in the MOU
- Transferring techniques through day-to-day joint preparation work
- Conducting Due Diligence (DD) in technical, social, environmental, financial, and the rest aspects (e.g. support in the legal DD includes verification of the appropriateness of relevant sector laws).

Among the projects with IFC's assistance, the wastewater project is currently at the initial stage of the procurement (prequalification), and several procurement related documents are available. Detail information of the project is shown in Annex 2 as an example of IFC's support.

(3) PPP Projects in the Road Sector

Road projects amounting to L.E. 7 billion are planned as shown in the project list of the National Five-Year Plan for 2007-2012. With these projects, it is expected that roads of 4,138 km, which is 20% of the existing network, will be added to the current network. Considering a huge budget required for such investments, several projects are planned to be implemented with private sector participation. List of the projects with private players is shown in the Table 16.1-3.

[3] MOT considers the advisor's role as follows:
Lead/financial advisor prepares a Strategy Report that will simply state their final recommendations with respect to the commercial viability of the project and the best way to tender it as a PPP concession
Technical Advisors prepares: Traffic Forecast Report, Technical Report, Commercial Report (revenue potential) and Financial Report (i.e. the Financial Model which shows the forecasted Revenues and Operations Cost as well as a Sensitivity Analysis to establish the viability of the project from an investment viewpoint).

Table 16.1-3 List of the Road Projects with Potential for PPP

No	Project Description	Length (km)	Approx. Cost (mil. L.E.)	Notes
Current Concession Agreements				
1	Cairo – Sokhna	3423	350	Opened in September 2004. Operated and maintained through a concession agreement with the Armed Forces' National Service Bureau".
2	Helwan – Al Korimat	85	300	Opened in May 2007. Operated and maintained through a concession agreement with the Armed Forces "National Service Bureau".
Ongoing Projects				
1	Cairo – Alexandria - Matrouh Roadway	467 (total)	1700	Technical, traffic, social, and environmental due diligence studies are underway with a support of IFC. Technical and legal DD to be finished in March 2008. EOI and investment sounding are underway.
2	Upgrade of Port Said – Alexandria Northern Coastal Road	285	1600	Social, and environmental due diligence studies are underway with a support of IFC.
3	Cairo Urban Toll Expressway Network	100	11,745 Primary cost only	FS for the first three expressways is undergoing and to be finished in Aug. 2008 with a support of JICA.
Planned Projects				
1	Shobra - Banha	45	710	FS by local consultant is completed, and looking for opportunities for further study.
2	Toukh - Zaghazeig	45	750	
3	Khafr Zayat – Hosh Eisa – Alexandria	110	750	
4	Al Bagour - Defra	40	550	
5	Cairo Ring Road	106	1500	

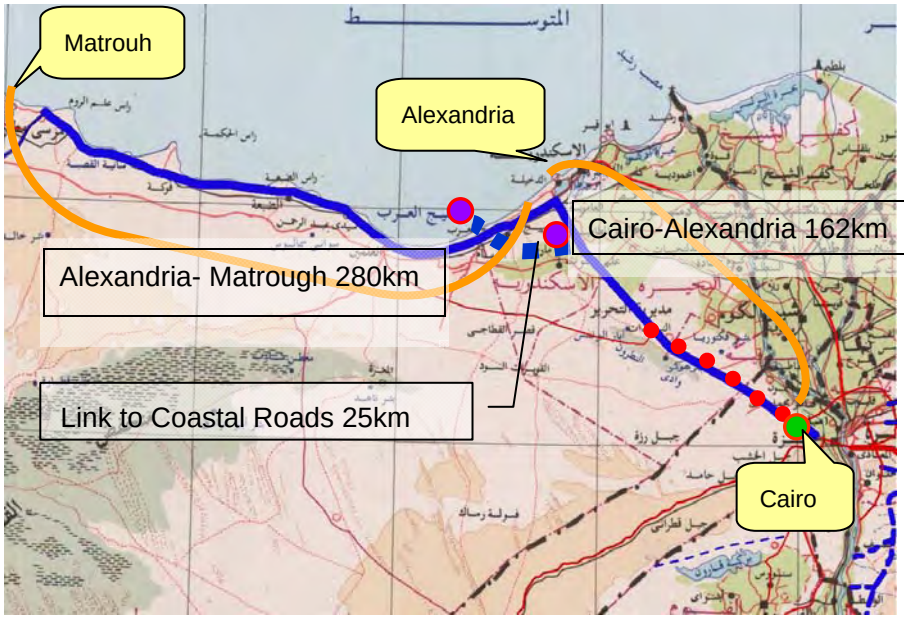
Source:GARBLT's General Development Strategy for the Roadway Network in Egypt", presentation material by Hisham Fouad, for the World Bank's seminar

Among the PPP candidate projects, Cairo –Alexandria – Matrough Roadway Project is considered as one of the most promising projects and its preparation is underway with a support of IFC. The detail of the project is described in the Box 16-1.

Box 16-1. Cairo-Alexandria-Matrouh Road Project

Egyptian government prepared the FS of the all sections with local consultants. This project was planned to be implemented in three phases by government fund, and the awarding of the phase one already completed. However, as preparation proceeded, it found that the potential of the project would be high and there would be a possibility that private sector engages in implementation of this project. IFC started to support this project as a lead financial advisor.

The map of this project is as below.



Planned three phases are:
Phase I: From 26 km sign (Cairo toll gates) to Wadi Al - Natroun (126 km sign).
Phase II: Wadi Al - Natroun to 162 km sign (Alex. toll gates).
Phase III: Connection between Alexandria.toll gates and Alexandria - Matrouh Roadway.

Although the project is considered as a good candidate, it is likely that capital cost is high. There is a possibility that only O&M will be implemented by the private sector.

16.1.2 Review of PPP Situation

(1) Legislative Aspect

There is a law on BOT[4], but no PPP Law exists in Egypt. Recognizing a necessary legislative framework on PPP (see Box 16-2 below regarding PPP central unit of MOF's vision on PPP law[5]), the GOE is currently preparing PPP Law. The draft PPP law was prepared (draft is attached in the Annex 3) and reviewed in the PPP Study. As of February 2008, there has been no major change/progress although it is told that it is ready for the submission, according to government official's view.

[4] "B.O.T. Regulations", June 2007, The Middle East Library For Economic Services
[5] http://pppcentralunit.mof.gov.eg/legal.aspx?id=Legisation&pgnum=3

Box 16-2 Legislations on PPP

Following the evolution of PPP in the UK and other European countries, the Egyptian Government expects to benefit from private sector's know how, experience and resources to facilitate the timely and cost effective procurement of works and services. Further, the Government seeks to ensure better contract management through the fair incentivization of the developers; avoid short term significant capital expenditure and therefore procure a larger number of projects, limit the Government's debt; and pass a substantial part of project risk to the private sector. Its main objectives are to create a market-friendly regulatory environment, establish the administrative basis necessary to coordinate this development and clarify the procurement process for PPP's.

The new PPP law (under preparation) will avoid the necessity for Parliamentary ratification for individual projects within its ambit; creates a specialized Central Unit within the Ministry of Finance, modeled on the UK's and other countries' PPP taskforces; addresses a number of risk allocation issues previously difficult to handle in common asset and services public procurement practice.

In summary, the law attempts to regulate the majority of private financing in Egypt, while also enforcing institutional framework reforms in the same direction. It also sets down a number of elements in respect to risk allocation, which had previously discouraged investment proposals. It aims for eventual standardization of all related processes combined with public administration responsiveness and effectiveness.

Source: MOF PPP central unit's website
http://pppcentralunit.mof.gov.eg/legal.aspx?id=Legisation&pgnum=3

Once the law is approved, it is expected that it will be a basis for implementation of the PPP projects. Even after the approval of the law, when it comes to enforcement of the law, a lot of difficulties/issues are anticipated. Legislative support on the operation of the law will be helpful for smooth implementation of PPP projects.

(2) Institutional Aspect

The importance of the institutional issue, especially the role of the government unit on PPP in facilitating and managing infrastructure investments, has been addressed[6]. There are two key organizations that are involved in the implementation of PPP projects in the road sector: PPP central unit of MOF and PPP unit of MOT.

[6]"GRID Lines Note No. 27", Public-Private Infrastructure Advisory Facility (PPIAF), September 2007 http://www.ppiaf.org/Gridlines/27PPP.pdf

1) MOF PPP central unit

In line with the Government's strategy to promote and increase the private sector involvement in the country's economic and social development plan - particularly in the area of public utility services- the Government has taken the initiative to introduce the PPP program. Affirming the government's seriousness to activate the PPP initiative, a PPP Central Unit was established within the MOF and reporting directly to the Minister. The MOF PPP unit is in charge of co-coordinating the PPP national program across ministries and public bodies. It is considered that PPPs are the key to the Government's economic reform agenda and strategy to increase private sector involvement in public services through leveraging private spending against public spending.

Specific objectives:

- Provide a new source of investment capital for required infrastructure projects,
- Reduce Government sovereign borrowings and associated risks,
- Drive the creation of local long term funding market,
- Utilize efficiencies of private sector in running public services,
- Expand economy and stimulate job creation , and
- Increase quality of public services to the Egyptian citizen.

Implementation strategy:

- Adoption and localization of international successful PPP models (UK)
- Provision of supportive legislative environment in
  - New legal framework for PPP Projects
  - Standard contract implementation
  - Standardization of procurement documentation and procedures
- Creation of regulatory bodies for post contract implementation
- Placing clearly PPP initiative within the reform agenda
- Establishing a PPP Central Unit at the Ministry of Finance as well as satellite units in line ministries
- Identifying PPP able projects as part of line ministries' 5 years strategic plan
- Providing a legislative framework – PPP Law
- Developing a tool kit for implementation of projects

Role of PPP unit

- Act as a public face of PPP initiative in Egypt since June 2006
- Establish a national PPP policy framework for implementation
- Set PPP guidelines and methodologies appropriate to Egypt
- Draft and issue standard project documents, contracts and PPP laws
- Coordinate the PPP program and process across Line Ministries, private sector and

funding market

- Report to Ministerial Committee for projects approval and recognize issues that may impede the PPP program
- Identify PPP able projects as part of line ministries' 5 years strategic plan
- Manage PPP transactions and provide technical and advisory support as well as ensure compliance with legislative framework
- Supervise tendering and performance monitoring committees
- Act as:
    - Center of PPP expertise, support and intelligence gatherer
    - Center for capacity building
    - Central complaints resolution office for PPP investors

2) PPP unit at MOT

Public Private Partnership (PPP) Unit at the Ministry of Transport was established in order to identify and implement infrastructure projects within the Ministry's various sectors in partnership with private sector investors.

Specific objectives:

- Improving the levels of service rendered to the public,
- Attracting specialized private sector know how and innovation,
- Sharing the various risks with the private sector investors,
- Decreasing (or eliminating) the government's financial burdens for capital expenditures and operating costs,
- Ensuring long term maintenance and development of the relevant infrastructure works according to international standards throughout the concession period, and
- Improve the performance of public sector staff through interaction with private sector, and ensure continuous transfer of knowledge to government employees.

3) Procurement process

Screening of PPP candidate projects in the approval process is illustrated in the Figure 16.1-6.

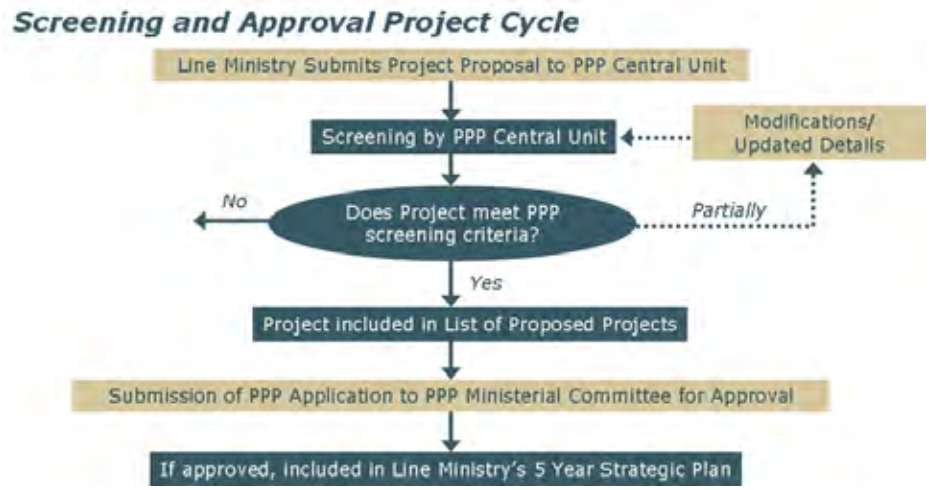


Figure 16.1-6 Screening and Approval Project Cycle

Source: "PPP Policy Framework in Egypt", presentation material by Atter Hannoura, MOF for the World Bank's seminar[7].

Tendering and project monitoring cycle after the project approval is shown in the Figure 16.1-7. The screening criteria indicated in the process needs further study.

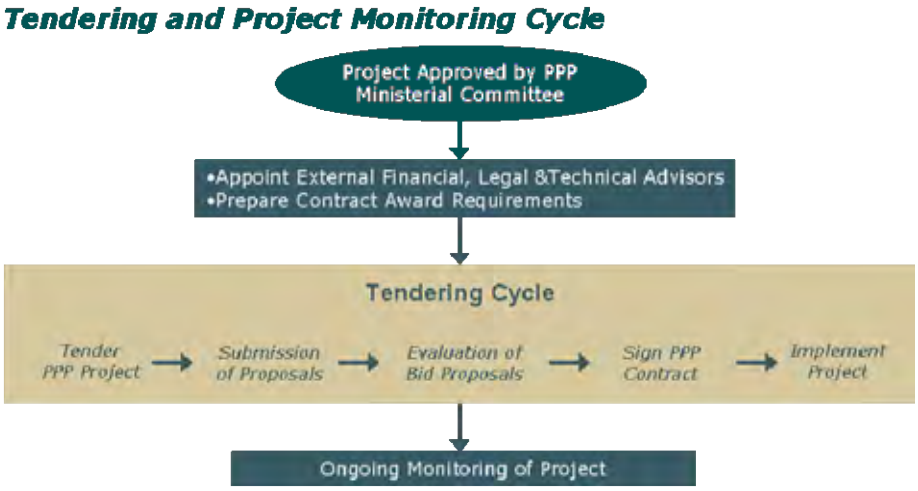


Figure 16.1-7 Tendering Cycle after the Approval

Source: "PPP Policy Framework in Egypt", presentation material by Atter Hannoura, MOF for the World Bank's seminar

As one of the attempts to promote private sector involvement, Egyptian government is piloting performance-based contract, with a support of the WB. The detail of this pilot is in the Box 16-3.

[7] 'Institutional Issues in The Highway Sector in Egypt ', Policy Seminar held on January 29, 2008.

Box 16-3 Pilot Project of Performance-Based Contract

Under the performance-based contract the Private Sector supplies public services over time and is paid by the Public Sector, end user or a hybrid of both. Output is specified by Line Ministries while input is the responsibility of the private sector

Under the PPP contract:

The Government retains total strategic control on the service

The Government secures new infrastructure which becomes Government assets at the end of contract life

Project and performance risks are allocated to the party best able to manage or mitigate

One pilot project is being prepared to be started in March 2008. One candidate project in the road sector is selected.

PPP unit of the MOT summarizes the PPP transaction process in the following three stages, and the detail of the action in each process is in the Box 16-4.

Box 16-4 PPP Transaction Process Described by MOT

1. Due Diligence phase

Identify Physical Scope of Project:

- Engage Lead Advisors who will issue a Request For Proposal
- Select Technical and Legal Advisors
- Prepare the "Legal" Due Diligence Report and the Legal Options Report
- Identify and propose the best scenario to involve the private sector
- Develop the Term Sheet and the Draft Concession Agreement

The Technical Advisors will prepare:

1. The Traffic Forecast Report
2. The Technical Report (including the Minimum Technical Requirements.. MTRs)
3. The Commercial Report (the study of the revenue potential).
4. The Financial Report (i.e. the Financial Model which shows the forecasted Revenues and Operations Cost as well as a Sensitivity Analysis to establish the viability of the project from an investment viewpoint).

On the basis of the findings of the Advisors' reports, the Lead Advisor will prepare a Strategy Report that will simply state their final recommendations with respect to the commercial viability of the project and the best way to tender it as a PPP concession.

2. Implementation phase

- The Grantor/MOT approves the Lead Advisor's Strategy Report & its recommendations
- A pre-Road show would be conducted after identifying a selected list of potential investors
- Newspapers advertisements will be published to invite interested parties to express their interest in the project
- The Information Memorandum will then be issued through the website after another advert in the newspapers for prequalification
- A Second Road Show will take place after the investors have read the Info Memo
- An Invitation for Prequalification is then issued and the submitted prequalification documents are evaluated according to the pre-set prequalification criteria
- The Results of the prequalification are officially announced and published on the website
- The Data Room is then opened and the Draft RFP issued to include the Bidding Documents as follows:
  - The Consultants' Reports as indicated above in Due Diligence Phase
  - Information Memorandum and Cover Letter signed by the Minister
  - Invitation for Prequalification
  - The Bidding Documents:

(The Bidding Requirements will be in a draft form. Pre-qualified bidders will be invited to review the documents and submit their written observations to MOT prior to the launch of the final Request for Proposals - RFP)

- Grantor and Advisors will hold at least two pre-bid meeting to share and discuss with the bidders their concerns and comments. All comments and queries should be addressed to all bidders in writing. A set date will be established after which no additional comments will be entertained by the Grantor
- The Final RFP document will be issued (i.e. the Bidding Documents including the Final Concession Agreement)
- The Bids will be submitted and evaluated according to the pre-selected evaluation team, normally a combination of specialist fro the Grantor and the Advisors (Lead Advisors and Tech & Legal Advisors)
- The Technical Evaluation will be announced and officially sent to each bidder, followed by a public opening of the financial bid
- The Award of the contract will follow immediately after the announcement of the financial bid

3. Contract signing and closing

- Normally a contract-signing ceremony is arranged by the Grantor
- The Grantor and the Investor will then work together to satisfy all Conditions Precedent before a pre-set deadline, after which the contract will be binding for both parties
- Conditions Precedent normally includes putting in place the Financing Structure for the project, together with approvals from financial institutions to finance the majority of the project scope. Also, proof of investor's equity available for the project will be required by the Grantor before Closing

Source: "GARBLT/World Bank Road Workshop", presentation material for the World Bank's seminar and the note named "PPP Transaction Process" by Mohamad Nada, MOT .

As discussed in the PPIAF's note[8], 'But if a specialized organization is to be created to address the government failures, it must be able to perform these functions effectively. That means it needs to be given the necessary executive authority rather than simply act as an advisory body', it is recommended that their executive authority needs to be clarified, and sufficient authority needs to be granted.

16.1.3 Review of status of MEA establishment

(1) Status of MEA Establishment

The Study Team obtained the following information regarding MEA establishment:

- On April 19, 2007, Presidential Decree on "The decision of the President of the Arab Republic of Egypt of issuing a law for Organizing Granting the Concession of Exploitation of Public Utilities" was issued. With this decree, GARBLT is allowed to establish joint ventures independent or with other partners after approval of the Cabinet to build, operate, use and maintain fee roads, highways, and main roads and carry out any work that is under the scope of their purposes.
- The draft Presidential Decree titled, "A Draft the Decree by the President of the Arab Republic of Egypt for the Establishment of Metropolitan Expressway Authority for Greater Cairo" was prepared (see Annex 4 for the draft).

(2) Issues of the Establishment of MEA

The main issue in establishing MEA is that the management responsibility of the road network is fragmented among several Ministries in Egypt.

In this regard WB mentioned in the report "Enhancing the Performance of the Road Sector" as follows:

Road planning, construction, maintenance and funding are handled by different agencies, depending on the road category. The Ministry of Transport is in charge of national (arterial or primary) road network through GARBLT. About 38,000 kms of secondary or regional roads are managed by Directorates for Roads and Transport (DRT) in the Governorates that report to the Ministry of Local Development (MOLD). The Ministry of Housing, Utilities and Urban Communities (MOH) finances arterial and secondary roads for the development of new communities, the Governorates or GARBLT respectively for management, including maintenance. The Ministry of Defense (MOD) is also involved in large highway projects of strategic importance and some toll road concessions are implemented with MOD as a sponsor.

[8] "GRID Lines Note No. 27", Public-Private Infrastructure Advisory Facility (PPIAF),September 2007 http://www.ppiaf.org/Gridlines/27PPP.pdf

The current policy of having one entity responsible for construction, while another agency is responsible for subsequent maintenance management and a third ministry responsible for budgeting has also the potential of inefficient allocation of resources between construction and maintenance besides not promoting good ownership. A considerable institutional review and restructuring seems to be a critical need to consolidate responsibilities for transport under one ministry.

Under this condition, the legislation for the implementation of expressways by GARBLT/MOT is not easy to proceed, although the aforementioned Presidential Decree was issued in April 2007. Before the establishment of MEA, it is necessary to resolve the situation involving different agencies. For this purpose, MOT plans to request the Prime Minister to include the management responsibility of urban network under MOT.

The Study Team will continue to support the establishment of MEA thorough advising on the establishment of rules and regulations as well as institutional structure.

16.1.4 Issues for PPP Project Implementation

In implementing PPP projects, several issues have been identified, and such issues and the key for successful implementation are described below.

Competitive selection of private investor:
In the past, many projects with private sector involvement were implemented through direct negotiation with specific private entities. It is found that direct negotiation is sometimes inefficient, and it is realized that international competitive bidding is more efficient and effective. <IFC>

Proper disclosure of the relevant information:
Information needs to be shared to the public in order to reduce the risk arising from asymmetric information between the Public Sector and the Private Sector. <WB>

Establishment of a regulatory entity:
It is necessary to oversee the contractual agreements over the concession life. <WB>

Public sector dominant:
The road construction and maintenance industry is dominated by Public Sector Corporations. Most of larger road works (Regional as well as National Roads) are undertaken by Public Road Contracting (PRC) enterprises, including the General Nile Company (GNC) for roads and Bridges, the GNC for Desert Roads, the GNC for Road Construction and the GNC for Paving and Construction (which are controlled by a holding company affiliated to MOT). The

largest contracting company in the country is the Arab Contractors. It runs under quasi-private sector management but also has majority government ownership. The MOH also has four large public road construction enterprises under its jurisdictions, besides the National Service Company under the armed forces, and a public road paving unit in each Governorates. It is unclear what degree of financial and managerial autonomy the corporations have vis-à-vis their parent ministries as they do tender for works and operate on commercial principles, but receive ad-hoc grants from the Government and fuel for construction on credit. There are few private road contractors, but almost all of them are small and financially unable to undertake large contracts. Questions about the financial autonomy of the PRCs and fair competition with the Private Sector arise when the Public Sector is subsidized vis-à-vis the Private Companies. The management of the PRCs is totally dependent on the Government budget as the Nile companies claim to execute 90 percent of all road works through contracts with GARBLT. <WB>

Limited competition and low quality of works:

The domination of state owned road construction enterprises in road works limits competition and reduces the quality of works. Projects are tendered or negotiated directly by GARBLT with PRCs under a bidding process that aims at introducing competition in the allocation of works but this system is apparently not working. The direct negotiation method is neither transparent nor efficient in most cases. The PRCs employ smaller private contractors as sub-contractors. As a result, no large private road constructing firms can be developed in Egypt and be able to provide good quality road. The main reason to rely on public corporations may be the high perceived costs of construction works carried out by private sector enterprises. However, the costs of the PRCs' operations are probably distorted by a number of factors, which favors the Publicly-Owned Corporations, despite their inefficiencies and quality problems. When these are taken into account, it appears that construction and maintenance costs by PRCs are actually higher than if works were executed by Private Contractors contracted on a strict competitive basis. <WB>

MOF considers the following points as critical requirements for successful PPPs in Egypt.

1. Strong National Political Backing
2. Rigorous Pre-Procurement Analysis of Project Feasibility: a good business case (based upon clear outputs) and a public sector comparator or benchmark exercise to ensure the Government can afford the required PPP unitary payments
3. Detailed Risk Identification and Analysis of the Project for both Technical and Commercial Risks as well as Political Risks
4. A Well-Structured, Transparent, and Competitive Procurement Process
5. Willingness of the Public Client to Accept Innovative Solutions from Competing Private Bidders

6. A Detailed Contract which can also Accommodate Certain Changes in the Requirements of a Project Over Time
7. Professional and Effective Monitoring of the Private Contractor by the Public Client of the Entire Operational Phase of the Contract with the Spirit of Making the Overall Partnership Work
8. Selection of Appropriate Project Candidates: not too Small, should be Replicable, with Clear Private Sector Interest
9. Good, Detailed Preparation: Clear Business Cases Established (Feasibility Analyses), Clear Output Specifications, and a Committed, Well-Resourced, and Experienced PPP Project Procurement Team
10. Proper Advisory Support: Experienced PPP Legal, Technical and Financial Specialists
11. A Well Structured, Transparent, Competitive PPP Procurement Process
12. A Clear and Consistent Methodology for Evaluating Value for Money: based upon clear models, templates, and Standard Operating Procedures (SOPs)
13. Proper Monitoring of the Entire (15 - 20 + years) Operational Phase
14. A Determination by all Parties and Stakeholders to Make the PPP Work for all the Stakeholders (Government, Private Investors, Private Lenders, and Public Users and Consumers)

16.2 TECHNICAL SUPPORT FOR THE IMPLEMENTATION OF PPP

16.2.1 Overview of Technical Support under the Study

Two-day seminar titled ‘Lecture on PPP for GARBLT’ under JICA ‘Feasibility Study on High Priority Urban Toll Expressways in Cairo’ was held on February 6 and 7, 2008 in Cairo. It was attended by 8 government officials from various departments in GARBLT such as engineers in road investments, roads, bridges, as well as accountant. The Seminar consists of four Modules, and two Sessions on each day.

(1) Agenda of the Seminar

Agenda of the Seminar is shown hereafter:

Day 1- February 6, 2008	Day 2 – February 7, 2008
Module 1: Introduction (9:00-11:30) 1. Overview of PPP 1-1. What are PPPs? 1-2. Comparison between Conventional and PPP 1-3. Historical Perspective 1-4. From wider context 2. Value for Money (VFM) 2-1. What is VFM 2-2. Mechanism of VFM 2-3. Output Based Contracting 2-4. Risk Transfer 2-5. Payment Mechanism 2-6. Competitive Bidding 2-7. Again, what is VFM 3. Q&A Session Break (11:30-12:00) Module 2: Understanding Private Players (12:00-14:30) 1. PPP projects from a private players 2. Structure of PPP project 3. Cash flow analysis 4. Understand the interest of private players 4-1.Developer 4-2.Lender 4-3.Debt vs. Equity	Module 2: Understanding Private Players (carried over from 6th's session: 9:00-) 5. Risk Control Module 3: Risk control for transport specific topics (10:30-11:30) 1. Toll road sector profile 2. Traffic Risk 3. Traffic Risk Mitigation 4. Cost recovery vs. Affordability 5. Example of Toll road project Break (11:30-12:00) Module 4: Design procurement process and bid documents (12:00-14:30) 1. Egyptian PPP Tendering Process 2. Japanese Tendering Procedure 3. Topics on procurement process from UK Experience 4. Transition to PPP world (moving from Module 1) 5. Q&A Session

16.2.2 Summary of PPP Training Course

Day 1

Module 1: Introduction

First half of this module was the overview of PPP. The basic concept and the history of the PPP were explained in comparison with conventional public procurement. Percipients were keen to know 'Why/When they should choose PPP?' The latter half of the module was the introduction of Value for Money (VFM). After the description of basic concept of VFM, an output based contract and a performance monitoring mechanism were discussed. In the next session, it was illustrated how risks are quantified, shared, and transferred between the public and private sectors. In the explanation of a payment mechanism, the lecturer emphasized that introducing an incentive mechanism, not punishment, is especially effective. Lastly, it was discussed how PPP generates innovation thorough its competition process.

Module 2: Understanding Private Players

The private players' key consideration was explained by referring several points discussed in the IFC's presentation at World Bank's seminar on January 28, 2008[9]. A typical PPP structure indicating relevant players was illustrated. In the next session, cash flow analysis was lectured using the sample exercise of cash flow analysis of a simple toll road project. World Bank's 'Toolkit for PPP in Highways' is introduced to the participants. As a last session, interests of private players such as developers and lenders were explained.

Day 2

Module 2: Section 5

As a carry over from the previous session, the importance of considering risks and its classification were described, and how risk can be managed was explained.

Module 3: Risk Control for Transport Specific Topics

In the first session, after explaining the basics of traffic risks, risk mitigation measures such as a minimum income guarantee, a contract with flexible duration, and a revenue distribution mechanism were discussed with many graphical illustrations. Participants showed high interest in the methodology of mitigating traffic risk, and many questions were raised on risk mitigation measures. Issues regarding a cost recovery and a willingness to pay were reviewed by referring to examples in the railway project in London and the road project in Manila.

Module 4: Design procurement process and bid documents

The topic of the last module was "Design procurement process and bid documents". In the first session, Egyptian and Japanese PPP tendering process were illustrated. In the next session, several key topics on PPP procurement in UK including pre-qualification, competitive dialogue, and contract management were introduced.

(1) Voices from the Participants

The questionnaire (see Annex 5) was circulated to the participants at the end of the seminar to assess their understanding and requests for future support. According to the self assessment of the participants, most of them answered that they mostly understood the contents for most of the topics though participants' basic knowledge varies depending on their background. Some attendees rated relatively lower rate for their understanding on VFM and private players.

[9] 'Institutional Issues in The Highway Sector in Egypt ', Policy Seminar held on January 29, 2008.

16.2.3 Measures to Promote Private Sector Participation and Future Support under the Project

In order to promote Private Sector participation, the study team started to discuss with the counterpart on the treatment of the revenue side of the project. In this regards, the assumption of the discussion are as follows:

- Investment cost will become **extremely higher** than the estimates in the previous study.→ Tariff factor of the revenue
- Traffic forecasting in this study based on the demographic forecasting of Greater Cairo Urban Development Study will be **highly optimistic**.→ Traffic volume factor of the revenue

From the understanding the situation mentioned above, discussion point are as follows:

- As for a tariff level, affordability of general public can not cover the cost recovery tariff of the project. Therefore, this service delivery gap should be covered by some government assistance with justification. The Study Team suggests that public assistance is not merely a subsidy but also an output based aid or gap funding support (refer to the Figure 16.2-1and Figure 16.2-2).

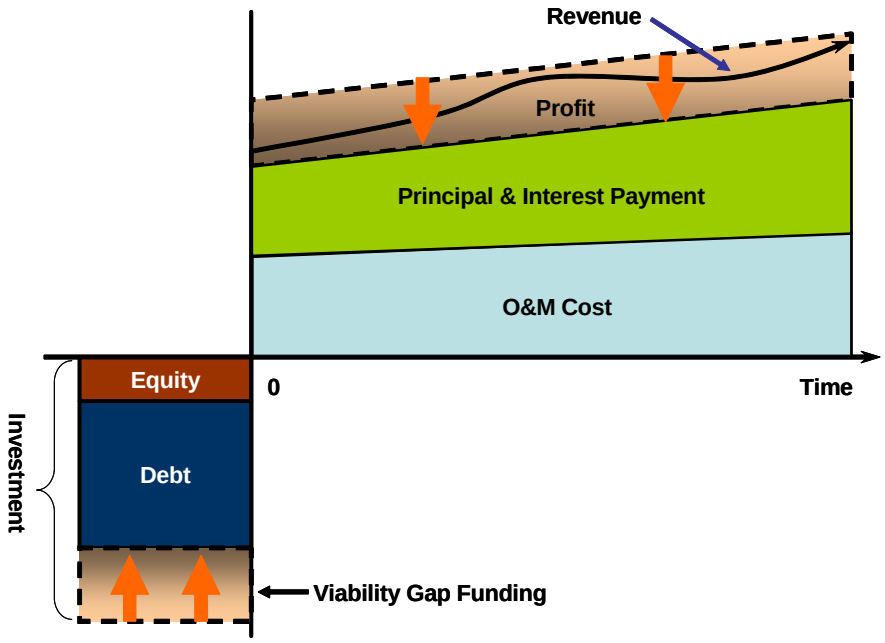


Figure 16.2-1 Viability Gap Funding

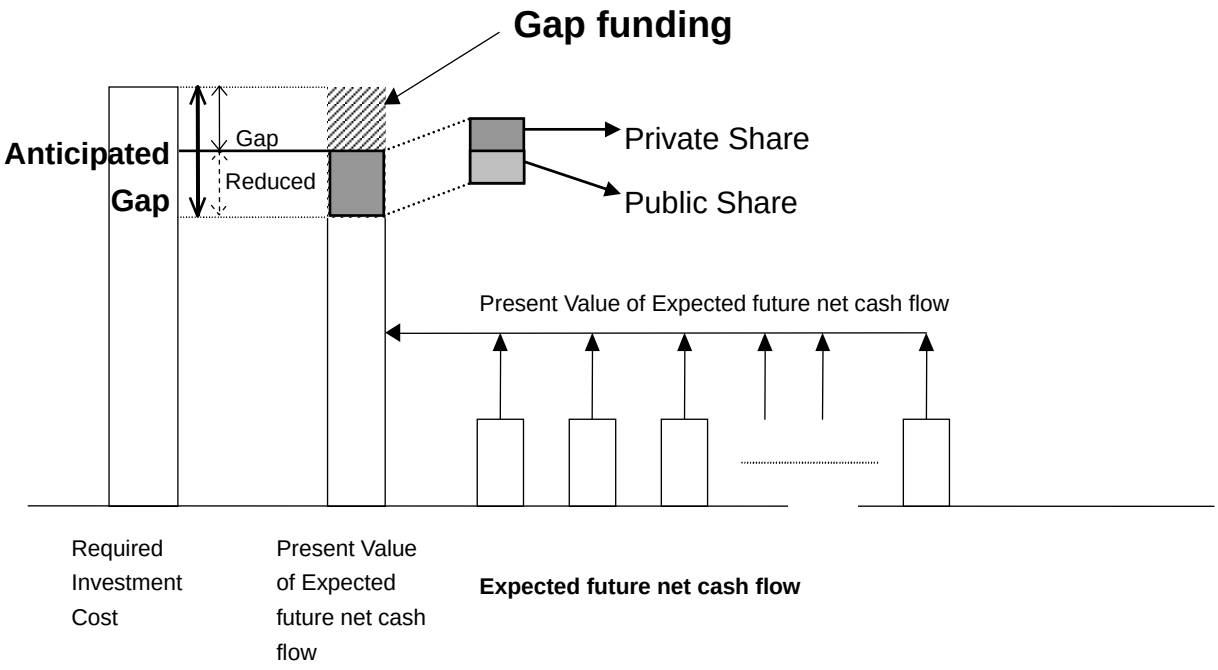


Figure 16.2-2 Gap Funding

- As for a traffic volume, some traffic risk mitigation arrangement for the Private Sector will be necessary. Based on the government's optimistic estimates the private players will submit a proposal based on an inflated forecasting and attempt to renegotiate after they will be selected as a winning bidder. Since the renegotiation process does not tend to be efficient and transparent, it is recommended that a bidding agency structure risk mitigation measures for traffic demand in advance. The Study Team discussed with GARBLT possible traffic risk mitigation arrangements for the Private Sector, such as the Least Present Value of the Revenues (LPVR) arrangement (refer to Figure 16.2-3).

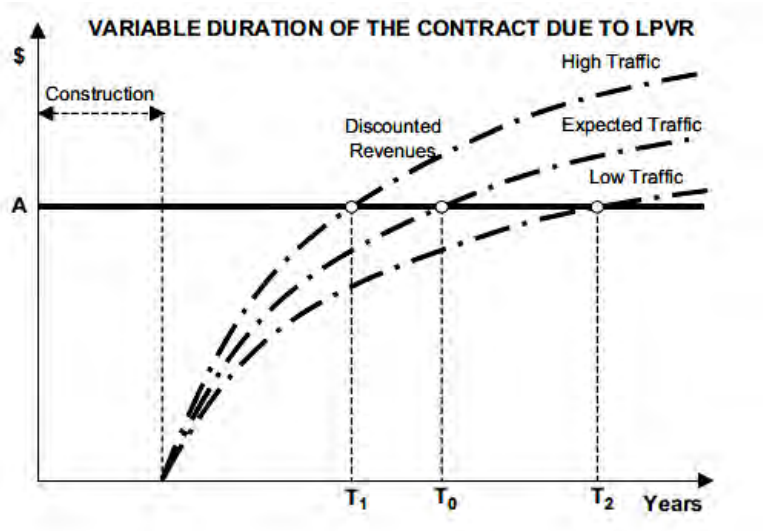


Figure 16.2-3 **L**east Present Value of the Revenues (LPVR)

16.3 POSSIBLE OPTIONS OF TOLL ROAD PPP

16.3.1 Options of Project Scheme

Following the PPP study, phased approach is recommended to implement PPPs. Possible scenario is described in Figure 16.3-1.

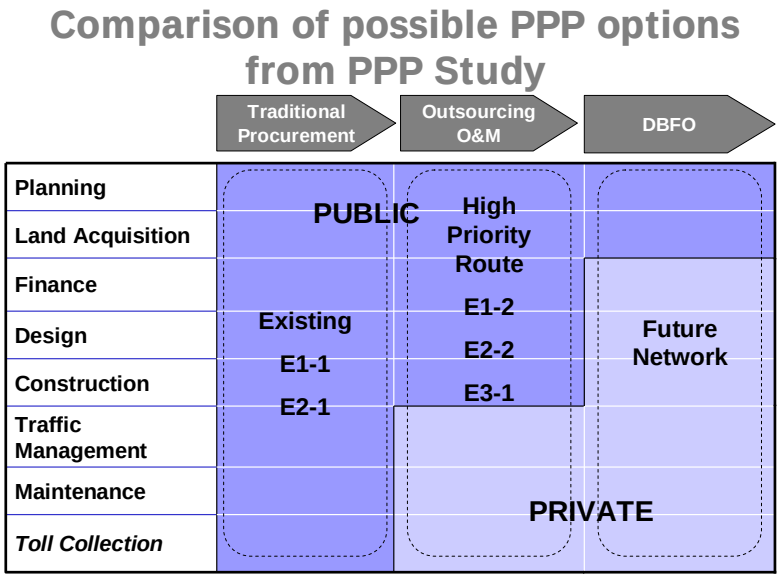


Figure 16.3-1 Possible PPP Options

Scheme of network development will be transformed from the Public Sector/MEA's implementation in the early stage to MEA - private partnership implementation stage.

In the early stage, while GARBLT/MEA will strengthen operational capacity and organization by operating existing E1-1, E2-1 and Ring Road, GARBLT/MEA will implement priority routes such as E1-2, E2-2 and E3-1 by itself.

There would be capable private road operators in Egypt and some extent of operational works on the F/S and Pre-F/S routes could be delegated to the private sector. However, at the initial stage, it is recommended that GARBLT/MEA will be engaged in toll road operation and maintenance by their own capacity and acquire the capacity to monitor the performance of the private sector.

In later stage, MEA would attract private sector to finance, construct and operate remaining routes (from E4 to E13). Possible three schemes (BOT, DBO and DBFO) will be chosen by GARBLT/MEA based on project economics of planned routes, how much competition would occur, toll system, required level of engineering and so on.

CHAPTER 17

CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 17

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17.1 CONCLUSIONS

Expressway Project Justification:

- Cairo urgently needs an increase in its road network to accommodate the sharp increase in traffic demand and to alleviate the severe traffic congestions that residents suffer every day. An urban toll expressway with high capacity/lane compared with ordinary roads is the solution that was concluded long time ago with the formulation of CREATS urban transport plan in 2002.
- The realization of Cairo urban toll expressway network has several objectives, including:
  - To provide a high level-of-service alternative to other roads
  - To reduce traffic congestion in Cairo
  - To contribute to the provision of preferable social and urban environment
  - To contribute to the national, regional and urban socioeconomic development
  - To promote planned urban development and new communities
- The early implementation of high priority sections under this feasibility Study is expected to stimulate project benefits. Even with sharp increase in the unit cost of construction materials, the project shows high values of economic parameters, even for the less-demand all-toll case, as follows:

	EIRR	NPV (LE million)
F/S Routes:	14.2%	1,072
F/S + Pre-F/S Routes	15.8%	3,199
Whole Network	18.1%	12,283

Urban Toll Expressway Network Development:

- This Study is a feasibility study on high priority sections; however, with the final target is developing the whole network, prioritization was revised and some modifications were applied based on the ongoing related large-scale projects. E8 has high priority now since it will increase the efficiency of the network, and a connection (E13) between E3-2 with Al-Azhar Tunnel will provide better accessibility to downtown.
- A Feasibility Study on E8 and E13, together with the pre-F/S sections of E3-2 and E3-3 is the highly recommended next step toward optimizing the use of the urban toll network. To keep the project moving with its high momentum and to optimize its benefits this F/S should start as early as possible.

Structural Design Policy:

- Selection of Structure Types to Minimize Construction Period with Rapid Bridge Construction Techniques and Reduce Impact on Traffic During Construction
- Cost Competitive Construction
- Focus on Structure Types that will result in Minimal Maintenance Obligations in the Future
- Pre-cast or prefabricated construction over railway lines
- Foundation Types selected to Minimize Disruption During Construction
- No Detrimental Effect on Existing Structures
- Minimize Expansion Joint and Bridge Bearing Locations
- Clean Structure Lines where possible to Enhance Visual Impact
- The preliminary design is undertaken based on Egyptian standards, supplemented where necessary by AASHTO and Japan Road Association (JRA) standards.

Alignment and Structural Description:

E1-2: This section, with a length of 5.56km, is basically to connect the existing 6th of October elevated road with E11 (Saft El Laban) being constructed by MoH. Five alternatives were investigated based on the geometrical possibilities along this corridor. Based on the comparative analysis and discussions with SC members, a 2 Lane +2 Lane shield tunnel option was selected. It has several advantages such as less utility relocation, minimum land acquisition, less social and environmental impacts and less landscape disturbance. On the other hand, the construction cost of a shield tunnel is much higher than other elevated options.

E2-2: This section of 1.88km is to provide a facility for the opposite direction (West to East) of traffic in a one-way section between 6th of October and Zamalek Island. This section is basically designed as a double-deck due to the limited width of the at-grade street beneath the existing viaduct. However, another case of a single deck is also included, to be used in case that the government can solve any land acquisition and resettlement issues.

E3-1: This section is located in the most congested areas of Nasr City. It is the long awaited project by residents of Nasr City and new urban communities East of Cairo. It was agreed upon to cancel the viaduct option and go into a cut-and-cover tunnel. The tunnel is accommodating 6 lanes for the two directions, while the at-grade level will keep the present 8 lanes in total. The existing ramps of 6th of October will be extended down to join the tunnel body so the expressway accessibility to the city center will be assured.

E3-2: Under this section of the expressway, the 6 lanes tunnel of E3-1 will be up as a 6-Lane viaduct along the Autostrade. Alignment of this section will pass over the existing railway for which coordination with ENR and MoD is done. Another critical issue is the landscape in front of the Citadel. In this regard, requirement by MoC is justified by maintain the highest level of the expressway lower than the level of Salah Salem road.

E3-3: This section continues from the Citadel Area along Salah Salem, and then it goes over the newly MoH implemented shifted Salah Salem into the cemetery area south of Al Sayeda- Aishaa Over-pass. The 6-Lane single-deck viaduct will be transferred to double deck structure that can pass through the limited width of El Rawdah Street at El-Manyal. It will continue as a double deck structure, and then a double-deck cable-stayed Bridge over the River Nile and Giza square.

Full EIA:

- A full EIA was granted by JICA not only for the F/S sections but for the pre-F/S sections as well. Under the Environmental Impact Assessment (EIA), comprehensive measurements on physical environment and social interview surveys were done in areas with possible negative impact by the Project. Next, data were analyzed and prediction techniques were applied on the 2 cases of “With Project” and “Without Project”. The EIA covers the environmental aspects of:
  - Air pollution
  - Noise and vibration
  - Water contamination
  - Waste
  - Landscape
  - Safety and health risk
  - Cultural assets
  - Distribution of sensitive facilities
  - Global warming

Physical Environment:

- Improvement in the physical environment of Cairo as a whole is expected. Air Pollution survey results and future predicted results are all within the environmental standard. “With Project” case may give some higher values at particular locations near the expressway.
- Cairo is a noisy city, either with expressway project or without project, noise measurements and prediction values are all higher than standards. Slight improvements

are noticed in "With Project" case at higher floor level to be less than 70 dB(A), while at at-grade level in residential areas, it is reduced to less than 60 dB(A).

- Vibration caused during construction can be minimized by selecting proper construction equipments and methods. Vibration caused during operation stage is basically due to the use of improper expansion joints.
- Possibilities of water contamination are only during construction stage, as there will be no water to be contaminated after construction.
- Waste management procedures will be applied during construction for solid and liquid generated waste.
- Traffic detour schemes show no serious impact during construction, when applying rapid construction methods and night-construction techniques. The most critical location comes when extending 6th of October to the tunnel section as several ramps will be out of use.

Social Environment:

- The basic concept in alignment selection is to minimize any negative social impact. regarding land acquisition or resettlement
- With 3 Stakeholders meetings, 2,000 interviews, 50 Group Discussions, 5 Open Houses installations and website, the project is well disseminated and informed to all involved groups
- Out of the total length of the high priority sections under the Study, about 200m for each of the 3 F/S sections are subject to land acquisition. With a total length of 26.340km for the whole study routes, Land acquisition will be required for only 2.3% of the total length.
- In the EIA, however, another 500m on E2-2 are covered for the case of a single viaduct instead of double-deck. In addition, the EIA covers also the cemetery land that will be used by the Ministry of Housing to shift Salah Salem Street far from the black-spot and heavily populated area of Sayeda Aishaa at E3-2 and E3-3. Adding this area to the EIA is supporting to MoH and can facilitate their plan to shift Salah Salem by the time of constructing the expressway.
- The perception of people to the project is in favor side, except people who may be subject to future allocation (about 100 households' informal dwellers in ENR/NAT land) are the only group opposing the project.
- Cultural heritages will not be touched or affected, and their landscape will not be seriously affected as well.

Project Cost

- Compared with the cost estimated during the previous PPP Study, the new cost estimation is much higher; partially due to sudden increase in the prices of construction materials; and partially due to changes in the number of lane and design.
- E1-2: was supposed to be 4-L viaduct, but it was changed to a shield tunnel 2L+2L. In addition, the total length increased due to the location and design of E11 (Saft El Laban) as the super-elevation provided for E11 ramps doesn't allow safe connection without extending E1-2 to a section without super-elevation. In future, if this problem can be solved, a shorter E1-2 can be provided.
- E2-2: requires steel sections for a double-deck structure. If the at-grade street can be widened, the construction cost for a single deck structure will be lower; however, the cost of land acquisition and resettlement will be high.
- E3-1: was supposed to be 4-L viaduct, but this option was excluded based on instructions from MoD. A cut-and-cover tunnel (3-L+3-L) becomes standard carriageway width for E3-2 and E3-3 as well. E3-2 will be shifted from Sayeda Aishaa area south to the cemetery where the Ministry of Housing has a plan to shift the alignment of Salah Salem.
- The total cost, which is about LE12 billion is summarized in the next Table for F/S sections and Pre-F/S sections separately.

	Length (km)	Total Cost (LE '000)	Foreign	Local	Foreign %	Local %
E1-2	5.4	3,755	1,323	1,891	35%	50%
E2-2	1.9	468	154	250	33%	53%
E3-1	5.7	3,276	1,066	1,753	33%	54%
F/S	**13.0**	**7,499**	**2,543**	**3,893**	**34%**	**52%**
E3-2	6.9	2,332	761	1,244	33%	53%
E3-3	5.5	2,773	1,051	1,315	38%	47%
Pre-F/S	**12.4**	**5,104**	**1,812**	**2,560**	**35%**	**50%**
F/S + Pre-F/S	**25.4**	**12,603**	**4,354**	**6,453**	**35%**	**51%**

Toll Rate Setting:

- Basically, this Study follows the previous PPP Study that recommended applying toll on all sections of the expressway network including existing elevated roads and the Ring Road.
- A toll adjustment mechanism that considers inflation rates, foreign exchange rates and the transport costs of other modes was established. In addition, the total length of sections under the network was considered in this mechanism.
- In the financial analysis, applied toll values are based on the Willingness-to-Pay survey,

as presented in the table below:

Section	Light/ Heavy	2012	2017	2022	2027	2028-42
New Expressways (E1-2, E2-2, E3-1, E3-2, E3-3)	L	4	5	6.5	8	8
	H	8	10	13	16	16
Existing Expressway (E1-1, E2-1, E11)	L	2	2.5	3.25	4	4
	H	4	5	6.5	8	8
Ring Road	L	2	2.5	3.25	4	4
	H	4	5	6.5	8	8

Financial Evaluation:

- Values of FIRR are far low, as shown below in the case of applying toll on the new sections only. With low toll levels, the revenue is also expected to be low. When adding the high cost required, FIRR is low with negative NPV.

Section	FIRR	NPV (LE million)
F/S Routes	4.0%	-3,346
F/S and Pre-F/S Routes	3.1%	-5,738

- Applying toll on other existing elevated roads (6th of October and 15th of May) improve the performance of FIRR to some extent. When applying toll on the Ring Road as well, higher values of FIRR are determined.

Section	Including Existing Expressways	Including Cairo Ring Road
F/S Routes	4.4%	11.6%
F/S and Pre F/S Routes	3.4%	9.1%

- To increase FIRR to a viable level, that means an increase in the revenue based on a higher toll levels.
- Governmental subsidy in early stages of expressway construction is required in order to keep the toll level affordable. In later stages, the collected revenue can be used in developing the network together with private sector investments.

17.2 RECOMMENDATIONS

Political Commitment:

- The authorization of Cairo Urban Toll Expressway Network by the Cabinet is a vital systematic implementation process of the planned expressways as scheduled so that all efforts can be integrated toward the same targets at the optimum timing.
- The Institutional set-up toward the establishment of MEA is a very important issue because building the institutional framework obviously needs huge coordination, negotiation, consultation and documentation with timely decision making. The MEA secretariat should be led by a high ranking official who has sufficient power delegated from the Minister of Transport with experts of different related fields on full-time basis as a core for future MEA. This Secretariat should be provided with appropriate initial budget that allow it to efficiently handle all the required activities, and to join all future Studies.
- Projects of the Expressway Network should be included in the 5-Year Development Plan to secure required funds and to assure the sustainable development of the network based on the established schedule for the smooth implementation and maximum efficiency.
- Capacity development of MEA is required during different implementation and operation stages on the network. Training of MEA staff on urban expressway issues should be provided on regular basis in such fields of assets management, design management, maintenance management, traffic management and information, toll setting and toll collection systems, PPP structuring schemes, PPP negotiation and contracting, transport economy, financing and accounting.

Early Implementation of High Priority Expressways:

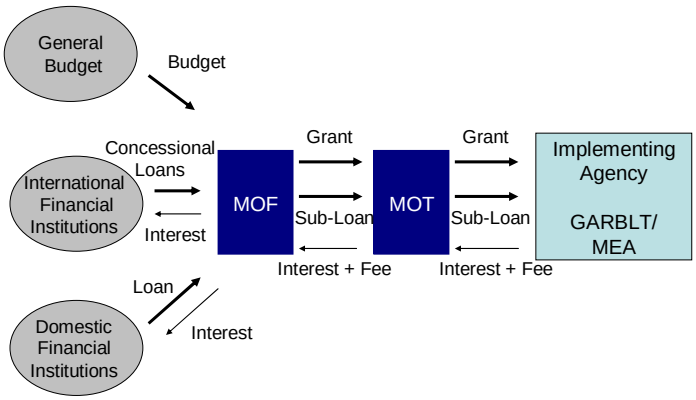
- For the sustainable development of the expressway network, it is important to maintain the momentum of this Study and continue in required steps and studies toward the implementation of high priority expressways as scheduled.
- To implement projects as scheduled, feasibility studies and other social and environmental studies should be conducted few years before the project schedule in order to secure required financial resources and to avoid delay.

Implementation Schedule

Section	Detail Design	Construction	Year of Operation Start
F/S routes			
E1-2	2009	2010-2014	2014 (middle of year)
E2-2	2009	2010-2012	2013
E3-1	2009	2010-2013	2014
F/S + Pre F/S routes			
E3-2	2010	2011-2014	2014 (middle of year)
E3-3	2010	2011-2015	2015

Financing Plan:

- The government commitment is inevitable and additional borrowing for sub-loan repayment and interest payment will be required. An amount of additional borrowing will be determined based on an amount of possible budget support as a grant.



Summary of financing plan for F/S route only (Unit: LE billion)

	Case 1		Case 2		Case 3	
Initial capital cost	7.5	100%	7.5	100%	7.5	100%
General budget	3.7	50%	3.7	50%	3.0	40%
Foreign loans (ex. JBIC)	2.3	30%	1.9	25%	1.9	25%
Domestic loans	1.5	20%	1.9	25%	2.6	35%
Additional domestic loans during operation	0.9	Up to 2014	1.3	Up to 2015	2.6	Up to 2018

Summary of financing plan for F/S and Pre F/S route (Unit: LE billion)

	Case 1		Case 2		Case 3	
Initial capital cost	12.6	100%	12.6	100%	12.6	100%
General budget	5.7	45%	5.0	40%	4.4	35%
Foreign loans (ex. JBIC)	1.9	15%	1.9	15%	1.9	15%
Foreign loans (ex. AfDB)	1.9	15%	1.9	15%	1.9	15%
Domestic loans	3.2	25%	3.9	30%	4.4	35%
Additional domestic loans during operation	5.4	Up to 2021	8.5	Up to 2023	12.9	Up to 2025

Establishment of MEA and Privatization:

- Under current condition, the implementation of expressways by GARBLT/MOT is not easy to proceed, although the aforementioned Presidential Decree was issued in April 2007. Before the establishment of MEA, it is necessary to resolve the situation involving different agencies. For this purpose, MOT plans to request the Prime Minister to include the management responsibility of urban express network under MOT. Traffic Management can be outsourced for the network considered. However, central function should be remained in MEA, so that uniformity of traffic control can be maintained, minimizing confusion of expressway users.
- Development approach through privatization is recommended to implement PPPs. Possible scenario is described in the following Figure.