

Chapter 3. Design Premises

3.1. Scope of Work

In the SAPROF Study, it is specified that this sub-project consists of the following two (2) work-components.

- 1) Bus Terminal including Mini Bus, Large Bus and Taxi Terminals
- 2) Tourist Deck over the terminal including shops, restaurants, etc.

Based on the scope of this sub-project required in the SAPROF Study, the contents of the above work-components are reviewed and confirmed as follows.

3.1.1. Comparison of the Scope

Based on a series of discussions with the Technical Committee representing Greater Amman Municipality, and MOTA, PMU, and various site investigations, the scope of the Raghadan Bus Terminal sub-project was reviewed and confirmed with the Jordan side.

Table 3.1 shows the confirmed scope of this sub-project in comparison with of the SAPROF Study.

Table 3.1 Comparison of Scope of Work

SAPROF Study	JICA D/D Study
1) Re-pavement	1) Re-pavement and Re-layout of platform
2) Tourist deck construction	2) Tourist deck construction
3) Terminal Building - administration, - shops, etc.	3) Terminal Building - administration, - police station - civil defence station - restaurants - shops - relocation of the existing mosque (work by others)
4) Tourist facilities - ticket centre - transport information - landscaping	4) Tourist facilities - visitor centre with ticket centre, travel guide office - transport information - landscaping
	5) Additional overpass bridges - at the north edge of Raghadan bus terminal across Al Hashimi Street - at the west edge of Raghadan bus terminal connecting Hashimiyah Plaza

Source: JICA Study Team

3.1.2. Major Changes from SAPROF Study

As shown in the above table, the major changes in the scope of the sub-project are as follows:

- (1) Expanding the Parking Area for Large Buses

In order to take clearer land use the large bus terminal should be separate from the mini bus terminal, and therefore the east-end area of approximately 7,000m² (including circulation areas) is to be allocated for the large bus terminal.

- (2) Expansion of the project site

Since it was required that the pedestrian walks surrounding the Terminal should be continued,

the project area for the taxi terminal was expanded to the northern direction in order to secure the space for the pedestrian walk.

It was confirmed to expand the site around 5 meters in the western direction in order to accommodate the required number of lanes of the Taxi Terminal.

(3) Location of Tourist Bus Parking

During development of P/D, the location of the tourist bus parking in relation to the flow and traffic in the parking area was studied. Depending upon the location of the tourist bus parking, flows and traffic in the parking area change due to size of the tourist bus. In order to maintain smooth flow of the traffic in the parking area and surrounding roads, the parking spot for the tourist bus should be placed at the west side of the green belt as originally conceptualised. This location also satisfies convenience and visual impact for the tourists.

(4) Reduction of Tourist Deck Area

Originally, the deck structure was designed as a large deck which covers all the terminal in the JICA Master Plan report, February 1996. However, since lack of bearing capacity of weathered soil in the site was found based on the soil investigation, a large amount of foundation cost was predicted. In order to meet the JBIC budget the deck area was agreed to be reduced by the Technical Committee (T/C), for the following reasons:

- Expensive running and maintenance cost is predicted due to the provision of artificial ventilation and lighting in addition to construction cost.
- The negative urban and spatial effects of a huge deck which could lead to the creation of dead and unsafe areas housing crime and illegal activities.
- Air pollution created by exhaust from vehicles leading to environmental degradation under the Deck.
- Large amount of piling cost is predicted due to lack of bearing capacity of weathered soil in the site (length of pile is estimated to reach at least 15 m).
- Supporting columns will interfere the flow of traffic under the Deck.
- Massive deck structures will dominate and create an obstacle for the residents along Al Mudarag Street on the South in terms of provision of sunlight and blocking the views.

(5) Reduction of floor area and number of stories of the tourist deck

Originally, it was planned as a 4-storey building. However, due to accessibility to the higher levels and predicted expensive construction cost, the number of floors was reduced.

The floor area of the building was slightly reduced. However, this will be modified and further studied in conjunction with the floor area of the existing shops and facilities to be relocated as well as the introduction of new functions.

(6) Introduction of 4 corner towers

At each corner of the rectangular site (except the large bus terminal) a tower type building is constructed for the use of the Police Office, Civil Defence Office, GAM Office and Terminal Management Office. Each corner tower building has its own parking area beside the building.

(7) Overpass Bridge

An overpass bridge across Al Hashimi Street to the Citadel was originally included in the Tourist Trail work-component. However, the nature of the bridge design and construction is

closely related to the deck structure. Therefore, the scope of the bridge was shifted in the work-component of the Raghadan Bus Terminal.

However, it is confirmed that the overpass bridge to the Citadel is to be constructed up to the kerbstone of the northern sidewalk of Al -Hashemi street in the sub-project . After the kerbstone GAM will construct by their own funds.

Another overpass bridge at the connection point with Hashimiyah Plaza is introduced. Originally, the method of the connection was planned as a part of the deck structure in the form of stairs. However, due to the limited availability of land at the Hashimiyah Plaza side and predicted expensive construction cost, the method of the connection is changed into a bridge type from an extensive deck type.

(8) Introduction of Greenbelt

In order to improve the existing terminal in terms of function, environment and tourism attraction, a greenbelt is introduced in the centre of the parking area.

3.2. Design Framework

3.2.1. Number of Buses and Taxis, and Number of Lanes

It is a given condition that the number of buses and taxis to be parked in the parking and platform areas should be kept as they are, although reducing the number of buses and taxis and lanes is suggested in order to apply the international standard for parking area and platform size by the Study Team

However, the Transport Department, GAM has eventually shown the required number of buses, taxis and lanes as shown in Table 3.2. The figures are calculated based on 25% of the total number of each type of vehicles are currently registered for use of the terminal.

Table 3.2 Development Framework for Bus Terminal

Type of Vehicle	(1) Registered Number	(2) Number of taxis and buses to be accommodated (25% of (1))	(3) Required number of Lanes
White Taxi	1,460	365	28
Mini Bus	496	124	27
Large Bus	109	28	12
Tourist Bus	0	8	4

Source: Transport Department, GAM

3.2.2. Number of Visitors and Staff

(1) Visitors

Tourists

According to the tourist statistics in 1998 given by MOTA, the assumption of number of international visitors to the Raghadan Bus Terminal in 2010 is estimated as follows.

1) International tourists in Amman

Package tour tourist

- Number of tourists per year to Amman area in package tour: 228,306
- Bed-nights of Package tour tourist above: 613,399
- Average length of stay of Package tour tourist: 2.69 days

Non-package tour tourist

- Bed-nights of total tourists including package tour: 1,490,317
- Bed-nights of tourists per year to Amman area without package tour are calculated as: 876,918 (=1,490,317-613,399)
- No. of Non-package tour tourist above: 274,036 (=876,918 bed-nights ÷ 3.2 days: Assumed average length of stay of non-package tour tourist above)

Total number of international tourists in 2010

- Total number of tourist per year to Amman area: 502,342nos. (=228,306+274,036)
- Number of visitors in 2010 with 15% of growth ratio: 2,687,655 (= 502,342 x 1.15/year: - the growth ratio is of from 1997 to 1998)

2) Visitors to Bus Terminal in 2010

Number of visitors per year

- Number of visitors per year to the Bus Terminal: 1,612,593 (=2,687,655 x 60%: the assumed ratio of tourists who will visit the Bus Terminal, taking higher ratio in which some of tourists staying in Amman are included)

Number of visitors in peak hour

- Number of visitors to the Bus Terminal in peak month: 193,511 (=1,612,593 x 12%: share of the peak month (August) against total number of tourists per year)
- Average number of visitors per day: 6,450 (=193,511 ÷ 30 days).
- Number of visitors on peak day: 9,675 (=6,450 x 1.5 times: the assumed peak day ratio to average)
- Average hourly number of visitors: 806 (9,675 ÷ 12 hours: the operation hours of the Complex)
- Number of visitors in peak hour: 1,048 (=806 x 1.3 times: the assumed peak hour ratio to average)

3) Domestic Tourists

Since statistics of domestic tourists are not available, the number of domestic tourists visiting the Raghadan Bus Terminal is assumed as 40% of the international visitors:

- Visitors on peak day: 3,870nos.
- Visitors in peak hour: 420nos.

Number of Passengers of the Raghadan Bus Terminal.

According to the Traffic Survey Data executed on 06 / June 1999, the following assumption for the number of users of the Bus Terminal in 2010 is made:

1) Total number of users of the Bus Terminal

- White Taxi 10,010 x 4 persons = 40,040 nos.
- Mini Bus 3,146 x 26 Persons=81,796 x 0.6 (effective) = 49,077 nos.
- Large Bus 631 x 62 Persons=39,122 x 0.6 (effective) = 23,473 nos.
- Total number of users within twelve (12) hours = 112,590
- Total number of users in 2010 (peak day) = 135,108

(Since the total number of vehicles could not be increased due to the limited area of

the bus terminal, 20% of 112,590 nos. is assumed as the maximum increase and this number of passengers is as of a peak day in the peak month)

2) Visitor to Tourist Deck/shops and restaurants, etc. on peak day

Visitors mean passengers using the terminal who drop-in to the shops, restaurants and kiosks, and it is assumed that 15% of passengers will be visitors.

- Number of visitors to Tourist Decks: 13,510 ($135,108 \times 10\%$)

3) Visitors in peak hour

- Average hourly number of users: 1,126 ($= 13,510 \div 12$ hours: operation hours of the Bus Terminal)
- Number of users in peak hour: 1,464 ($= 1,126 \times 1.3$ times: the assumed peak hour ratio to average)

Local residents in Amman

According to the population statistics in 1997, the following assumption for the number of visitors to the Raghadan Bus Terminal in 2010 is made:

1) Population of Amman and number of visitors

- Total population of Amman in 1997: 1,751,680
- The assumed growth ratio of the population: 3.3% per annum
- Total population in 2010: 2,671,312 ($= 1,751,680 \times 1.525$)
- The number of visitors in 2010: 801,394 ($= 2,671,312 \times 30\%$: assumed that all citizens will visit the Raghadan Bus Terminal once a year)

2) Number of visitors in peak day

- No. of visitors to the Complex in the peak month: 96,167 ($= 801,394 \times 12\%$: share of the peak month (August) against total number of tourists per year)
- Average number of visitors per day: 3,205 ($= 96,167 \div 30$)
- No. of visitors in peak day: 4,807 ($= 3,205 \times 1.5$ times: the assumed peak day ratio to average)

3) Number of visitors in peak hour

- Average hourly number of visitors 400 ($= 4,807 \div 12$ hours: operation hours of the shops and restaurants in the tourist deck)
- Number of visitors in peak hour: 520 ($= 400 \times 1.3$ times: the assumed peak hour ratio to average)

The results of the studies above are summarised in Table 3.3. The total number of visitors to the Bus Terminal in peak hour in peak day is 3,452 including all different segments of the visitors; international and domestic tourists, passengers and residents. However, activity pattern of each segment is different and the peak hour of each is different. For example, for passengers the peak is in the morning and lunch time, for tourists it is in the day time, and for residents it may be in the evening time.

Therefore, 1,726 visitors is set as the development framework, applying a reduction factor of 50% to the total number of visitors calculated.

Table 3.3 Number of Visitors to and Staff of Raghadan Bus Terminal

	International tourists	Domestic tourists	Passengers	Local residents	Total
(1) Total number of visitors in 2010	1,612,593	-	-	801,394	-
(2) Visitors in peak month	193,511	77,404	-	96,167	-
(3) Average daily visitors	6,450	2,580	-	3,205	-
(4) Visitor in peak day in peak month	9,675	3,870	13,520	4,807	-
(5) Average hourly visitors	806	403	1,126	400	-
(6) Visitors in peak hour in peak day	1,048	420	1,464	520	3,452
(7) Adjusting ratio for peak: (6)x50%					1,726

Note: - Number of domestic tourists is assumed as 40% of the international tourists
 - Average daily number of visitors is assumed to be 10% of passengers using this terminal based on survey results made on 6 July 1999

Source: JICA Study Team

(2) Staff

Criteria for determining the number of staff is as follows:

- Shops 1.5 persons/shop
- Restaurants 1.0 person/15seats
- Office 1.0 person/15.0m² gross
- Cleaning 1.0 person/1,000m² of open space and public space

3.2.3. Study on Facility Size

(1) Dimension of Vehicles

The dimensions of each vehicle in the Raghadan Bus Terminal are as shown in Table 3.4.

(2) Size of shops

There are three different areas of shop and kiosk.

- For tourist shops: the design criteria for the size of shops is above 20 m². All shops have an individual rest room.
- For passenger kiosk: the size of shops is about 10 m². This type of kiosk will be located at the ground floor.
- For all visitors: the size of shops is about 20 m². This type of shop will be located outside the terminal building. It will be accessed from outside.

(3) Cafeteria, shops and restaurant

As for the cafeteria, shop and restaurant, in the case of a turn over ratio of 1.0 (assuming that a guest stays an average one hour for taking food and/or drink), 3,452 seats are required in the peak hour in the peak day.

However, most of the users of the Bus Terminal are taking only five(5) minutes for shopping of daily foods or sandwich, and do not stay for a long time. Therefore, the number of seats provided will be 15% of the total number of visitors (3,452 x 15%=) 518 seats.

The design criterion to set the gross area required for a restaurant is 2.1 sq.m per guest. Applying this criterion, the required area for tourists is calculated as 1088 sqm, including kitchen area.

In order to avoid over investment the following are to be taken into consideration:

- There are many over-flow areas with good conditions to take food.
- Most domestic tourists, passengers and local residents except international tourists will eat food outside in the shade.
- The package tour visitors will not stay for a long time in the restaurant and cafeteria, so that they can do other sightseeing.

Therefore, the restaurant floor area will be 30% to 40% of the required total floor area (1,088 x 30/40% =) 326 / 435sq.m

3.3. Design Standards, Criteria and Conditions

3.3.1. Site Development

(1) Demolition

The site has various existing structures to be removed before construction. The following is a summary of the treatment of the existing structures:

- Trees: to be retained as much as possible; if it is necessary to remove any, GAM to be consulted
- Shade structure over platform: to be dismantled and returned to GAM
- Central building: to be demolished and disposed of by the contractor
- Shops and kiosks: to be demolished and disposed of by the contractor

(2) Provision of Mosque site

A site for a Mosque, as a substitution for the one in the existing central building, which will be demolished for the new terminal construction, should be provided. The construction of the Mosque is to be done by others and not included in this sub-project.

3.3.2. Bus Terminal

(1) Pavement and roads

Design Codes and Standards

All Geometric Design Standards are based on the following:

- AASHTO " A Policy in Geometric Design of Highways and Streets ", 1994 edition,
- Japanese Standards: Ministry of Construction
- Jordanian Codes of Practice (MPWH), and
- Specification for Highway and Bridge Construction (MPWH-1991).

Design Criteria

Geometric design criteria for vehicles, lanes and platforms for the bus terminal are as shown in Table 3.4.

Table 3.4 Geometric Design Criteria

	White Taxi			Mini-bus			Large/tourist		Bus
	W	L	H	W	L	H	W	L	H
Size of Vehicle (max.)	1.8 m	4.9 m	1.6 m	2.2 m	6.9 m	2.5 m	2.50 m	12.0 m	3.2 m
Turning Radius (m)	6.0 m			10.0 m			18.0 m		
Construction Gauge	-	-	+ 0.9 m	-	-	+ 0.9 m	-	-	+ 0.9 m
Width of Lane	2.50 m	-	-	2.73 m	-	-	3.30 m	-	-
Platform	1.20 m 0.80 m	-	10 cm	1.00 m	-	10 cm	1.20 m	-	10 cm

Note: For width of the taxi platform, upper line is for platform with a column and lower is for no column.

Source: JICA Study Team

3.3.3. Building and structure design

(1) Design Codes and Standards

The following Codes of Practice shall be adopted for the design:

- British Standard Code of Practice for the Structural use of Concrete (BS 8110) shall be employed for reinforced concrete structural analysis and design.
- American Concrete Institute Building Code for reinforced concrete, for the structural use of concrete (ACI 318177).
- British Standard Code of Practice for the Structural use of Steelwork in Building (BS 5950) shall be employed for structural steel analysis and design.
- Jordan Code for Loads and Forces shall be employed for the definition of Dead, Live, Wind and Seismic Loading.
- The British Standard Code of Practice for Design of Concrete Structures for Retaining Aqueous Liquids (BS 5337) shall be employed for the design of water – containing structures.
- The British Standard Code of Practice for Foundations (BS 8004) shall be employed for the design of Foundations and Substructures.
- The British Standard Specification for Bending dimensions and scheduling of reinforcement for concrete (BS 4466) shall be employed for reinforcement details.

(2) Materials and Load

Materials

1) Concrete:

The characteristic strength of the concrete employed, as defined by a standard 150mm cube, shall be as follows:

- 20 MPa for plain concrete.
- 30 MPa for reinforced concrete columns.
- 25 MPa for other reinforced concrete members.

2) Reinforcement:

Reinforcing bar shall comply with BS449 , BS4461 or BS4483.

- All reinforcing bars of a diameter larger than 8 millimetres shall be deformed high strength steel bars of Characteristic Strength equal to:

$f_y = 420 \text{ MPa}$.

- Bars of 6 and 8 millimetres diameter shall be mild steel of Characteristic Strength equal to:

$f_y = 280 \text{ MPa}$

3) Structural Steel:

- The structural steel shall be High tensile steel and shall be of yield strength equal to 360 MPa.

4) Aggregates:

- Maximum aggregate size shall be 20mm for all concrete.

5) Concrete Cover:

Clear concrete cover for reinforcement shall be:

- 50mm for concrete surfaces in contact with ground.
- 25mm for interior concrete surfaces above grade.
- 30mm for exposed fair faced concrete surfaces.

Loading

1) Dead Loads:

- | | | |
|---|---|-------------------------|
| - Weight of Reinforced Concrete | = | 24.00 kN/m ³ |
| - Weight of Floor Finishes | = | 1.50 kN/m ² |
| - Weight of Heavy Partitions in Plan | = | 2.00 kN/m ² |
| - Weight of Dry Wall Partitions in Plan | = | 1.00 kN/m ² |

2) Live Loads:

- | | |
|-----------------------|------------------------|
| - Tourist Deck Areas: | 5.00 kN/m ² |
| - Mosque Areas: | 5.00 kN/m ² |
| - Staircases: | 5.00 kN/m ² |
| - Offices: | 3.00 kN/m ² |
| - Overpasses: | 5.00 kN/m ² |

Wind Forces:

- Basic wind speed 35 m/sec.

Earthquake Forces:

Zone B according to the Jordan Loads and Forces Code.

Temperature Effects:

Maximum variation of 21C° will be considered in the design.

3.3.4. Mechanical Design

(1) Design Codes and Standards

The design of the mechanical work shall generally be in accordance with the following standards, codes, and regulations where applicable:

- BSS: British Standards Specifications.
- BSI: British Standards Institute.
- NFPA-90A&B Standards.
- CIBSE: The Chartered Institution of Building Services Engineers-U.K
- General and specific requirements of the local water and drainage authority, local public health officer, and the regulations of the local Civil Defence Department.

(2) Design Criteria and Conditions

Water Supply

The following criteria shall be applied for the study of demand of water supply:

1) Shop and Restaurant

- Restaurant/Shop (café) staff 25 litres
- Restaurant/Shop (café) guest 10 litres
- Shop staff 10 litres

Water supply for each shop and restaurant comes through the water meter room connected to city water's main line to each shop and restaurant.

2) GAM Office, MOTTA Office, Fire Department, Police Station

- Office staff 100 litres

From city water main line, water supply to each office (Tower) is connected with independent supply line and water meter.

Heating and ventilation and air conditioning (HVAC) system

The heating and ventilation and air conditioning (HVAC) systems will be designed in accordance with the following design parameters:

- Location: Amman: Jordan Latitude: 32 N Altitude: 777.0 above sea level
- Average daily temperature range: 14°C
- Outside Design Conditions as shown in Table 3.5.

Table 3.5 Outside Design Temperature

Season	Dry bulb (C)	Relative humidity (%)
Summer	38	30
Winter	0	56

Source: JICA Study Team

- Inside Design Conditions: Inside design temperature in the heating season shall be 20 degrees C

Sewerage

The drainage services shall comprise waste and soil drainage.

1) Demand

The estimated volume of soiled water is calculated using the following criteria, which is 80% of the water supply demand criteria.

- | | |
|------------------------------------|------------------|
| - Office staff | 80 litres/person |
| - Shop staff | 8 litres/person |
| - Restaurant and shop (Café) staff | 20 litres/person |
| - Restaurant shop (Café) guest | 8 litres/person |
- 2) Discharge point
To the city main line running along the road on the north side.
- 3) Sewer pipe
The pipework used for drainage should be UPVC pipes.

Solid Waste disposal

Volume of solid waste shall be estimated with the following criteria:

- | | |
|------------------------------|---------------|
| • Office and shop | 0.75kg/person |
| • Visitors | 0.05kg/person |
| • Restaurant and shop (Café) | 0.25kg/person |

3.3.5. Electrical Design

(1) Design Codes and Standards

Design is mainly based on the following standards and shall be carried out accordingly:

- The local Jordanian codes and standards.
- The British standards and code of practices.
- The National Electrical Code (NEC).
- The International Electrical and Electronics Engineers Association regulations -(IEEE).
- The National Fire Protection code (NFPA).
- The local requirements of the Jordan Civil Defence Department.
- The local Jordan telecommunication corporation requirements.
- Any other standards, regulations and/or codes of practice and norms issued by institutes and/or authorities of other countries such as Japan and Europe, provided they are found applicable and acceptable to perform the job.

(2) Design Criteria and Conditions

Power supply

Electrical design is developed under the following conditions.

- High voltage: 11 kV, 3ph., 3 wire, 50 Hz.
- Low voltage: 0.4 kV, 3ph., 4 wire, 50 Hz.
- Symmetrical fault level: 350 MVA, 11 kV

Design illumination level

Table 3.6 shows the design illumination level of the major rooms to be applied to the design.

Table 3.6 Illumination levels for room

Room	Illumination level (Unit: lx)
Shop	NA
Restaurant	NA
Offices	NA
Platform area	30-150
Perimeter pedestrian walk	200
Large bus canopy	200
Central Core Hall	200
Stairs	200
Toilets	200

Source: JICA Study Team

Telecommunications

The following criteria shall be applied for the study of demand of telephone lines

- 1) Shop and Restaurant
 - City office line: 1 line/shop
- 2) GAM Office, MOTA Office, Fire Department, Police Station
 - City office line: 20 lines/building
 - PABX should be employed by each agency according to necessity.

Chapter 4. Detailed Design

4.1. Design Concept

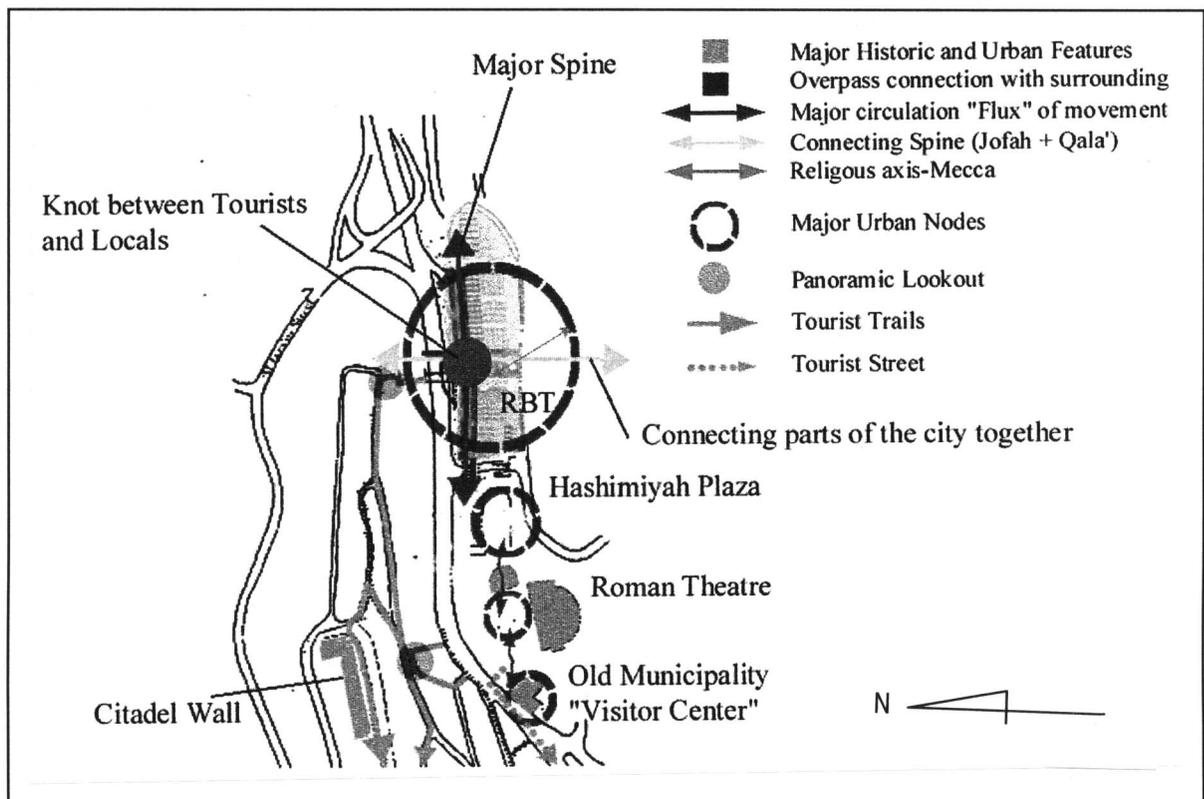
4.1.1. Planning and Design Policy

The Raghadan Bus Terminal sub-project is composed of two major components: 1) improvement of the pavement and functions of terminal, and 2) development of a tourist deck with amenities and necessary facilities servicing drivers, travellers, locals, and tourists. The basic concept for the Terminal project is based on understudying the pedestrian flow and role of open spaces as major urban nodes in the downtown area and complementing/improving on the existing current major urban spaces.

The Terminal is adjacent to the following significant assets:

- Hashimiyah Plaza
- Roman Theatre
- Old Municipality and Visitor Centre
- Citadel Hill

Figure 4.1 Movement Patterns in conjunction with the proposed terminal



Source: JICA Study Team

The plan depends on the continuation of the existing series of movements between major urban assets where the Terminal will be developed into a new nodal point that connects with the Citadel Hill. The tourist trails and the tourist street, which are improved as other sub-projects, raise the status of the Terminal as the nodal point of the pedestrian circulation in the downtown area of Amman.

The following general policy is taken for the planning and design of the Raghadan Bus Terminal:

- To maintain the existing function of the terminal shown below and increase effectiveness and efficiency
 - White taxi terminal
 - Mini bus terminal
 - Large bus terminal
 - Shopping and entertainment
 - Mosque for passengers as well as residents nearby
 - Tourist bus park as additional function
- To take into consideration the most effective land use and better utilisation of the limited land
- To realise more safe, effective and easy traffic flows in and surrounding the terminal for both vehicles and pedestrians such as passengers, worshipers, students, staff of shops and offices, bus and taxi drivers, and passers-by, without interfering with each other
- To introduce measures in planning and design of the terminal in order to make it a new landmark of the downtown area and a new tourism asset as an urban amenity
- To design the terminal building/tourist deck to minimise the construction cost as well as maintenance and operation costs while achieving the improvement of the terminal and facilities
- To respect local customs and practice in the new facilities (e.g. toilets, and praying areas)
- To take into account environmental considerations and safety conditions in the design of facilities and selection of equipment.

4.1.2. Conceptual Plan

One of the most significant urban and heritage conservation considerations is the respect of pedestrian movement patterns within the downtown area. Therefore, the design is reflected onto a major spine of tourist deck where pedestrian space is caters for both public and tourist use (shops, restaurants, and terraced gardens), which is linked to the following urban nodes:

- Hashimiyah Plaza: through an overpass bridge
- Citadel Hill: through an overpass bridge over Al-Hashemi St.
- The new Mosque Plaza (*Sahn al Masjid*)

The following are the major aspects to be introduced:

(1) Site Plan

- 1) The terminal/parking areas for white taxis, mini buses and large buses as well as the tourist buses should be clearly separated in the site.
- 2) A greenbelt is allocated in the middle of the parking area in order to act as a visual and environmental buffer. The large size of the terminal area is sub-divided into two major terminal zones by the greenbelt.
- 3) Provision of tourist bus lanes at the centre of the Terminal; beside the greenbelt.

(2) Building layout and design

- 1) The architectural design of the Terminal is regulated by the provision of 3 major axes:
 - A major spine connecting the Terminal with the Hashimiya Plaza (most of the pedestrian flux is expected to follow this line).
 - An intersecting spine connecting the opposite hills of Joufeh and Qalaa (Citadel) together. These two axes meet at a significant intersection point representing a knot between tourists and locals.
 - A religious axis directed to Mecca for the mosque.
- 2) The terminal building/tourist deck is to be located at the northern part along Al Hashmi street where no residents are living, in order:
 - to avoid disturbance to the residents by the gathering visitors,
 - to emphasise visual effects and to express stronger expression of the simple building
- 3) It is important to consider scenery and harmonisation with the surrounding buildings. As the building is visible from the roads as well as the north and south slope, the view from those points should be considered in order to improve the city landscape as a whole.
- 4) The new facilities should be designed in consideration of the local weather conditions (rain, sun and wind). Natural ventilation and lighting should be considered in order to minimise running costs of electrical lighting, air-conditioning and mechanical ventilation.

(3) Tourist Deck/Terminal Building

- 1) The tourist deck with its overpass bridge is linking the Terminal to the tourist trails at the lower slopes of the Citadel Hill. The slope creates an open dialogue with the opposite panoramic lookout and tourist trails, hence giving the overall Amman Downtown Tourist Zone Sub-project harmony and unity.
- 2) The tourist deck should create joyful outdoor and indoor spaces, which provide meetings and contact among the visitors to the terminal deck; international and domestic tourists, residents as well as the passengers. The indoor spaces are to be allocated in a cluster system along the pedestrian paths and plazas.
- 3) Outdoor furniture includes seating and canopies for the waiting lines of the buses and taxis. In addition, the upper deck includes outdoor furniture suitable for the outdoor restaurants and coffee shops provided by the project.

(4) Corner Towers

- 1) A tower type building is allocated at each of the 4 corners of the bus/taxi terminal area to reflect remnants of the Citadel in order to emphasise the identity of Downtown Amman as an ancient city and giving expression as a landmark. The buildings accommodate necessary public service functions for the operation and management of the terminal such as police station and fire fighting station.
- 2) For the future expansion of the tourist deck, if required, although the problems of Item (3) 2) above remain, the 2 southern tower type buildings could be utilised for structural anchoring of the expanded deck.

4.2. Detailed Design

4.2.1. Site Plan

(1) Land Use and Site Layout

The Sub-project site is broadly divided into three (3) functional zones from west to east;

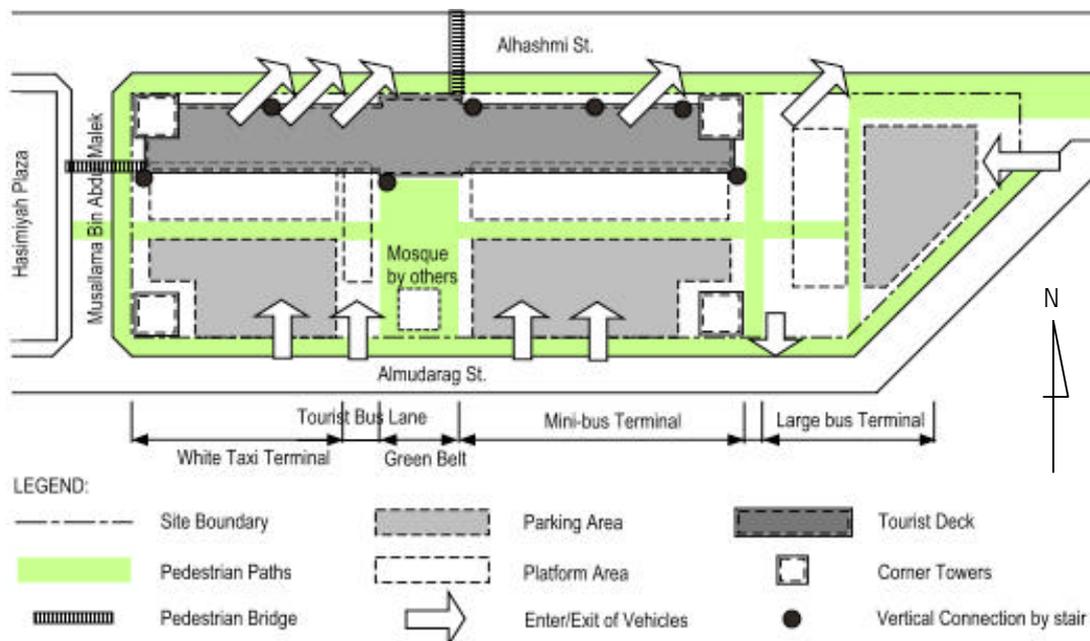
- White-taxi terminal,
- Mini bus terminal, and
- Large bus terminal.

A greenbelt is provided in-between the white-taxi and min-bus terminals. In the white-taxi terminal at the east end along the greenbelt 8 tourist bus parking lots are provided as shown in Figure 4.2.

Each of the terminals are furthermore sub-divided into three (3) areas; 1) Parking area, 2) Platform area and 3) A vehicle circulation space to the exit to Al Hashmi Street. The white taxi and mini bus terminals are divided in the north-south direction; the north is the vehicle circulation area, the intermediate part is platform area and the south is the parking area. The large bus terminal is sub-divided in the west-east direction; the west part is the vehicle circulation area, and the far-east part is the parking area.

In-between parking and platform areas pedestrian paths are allocated. The pedestrian path is identified by marking and safety guides a passenger to any platform he/she wants to go to. The pedestrian path is connected to the perimeter pedestrian walks.

Figure 4.2 Land Use Diagram of the Raghadan Bus Terminal



Source: JICA Study Team

A tourist deck/terminal building is designed over the vehicle circulation areas in the white taxi and mini bus terminals. A small part of the platform areas is also covered by the building. The tourist deck/terminal building is a 2-storey structure in the west half, and a 3-storey structure in the east half, since the site has around 4 m height difference in ground level in the

west/east direction. The deck has a central core, which is located in the greenbelt and where the main vertical connection between the Bus/Taxi Terminal level and the Tourist Deck level is located.

Tower type of building is allocated at each corner of the area of the White Taxi and Mini bus Terminal zone to identify the space of the Terminal. The tower buildings are used for to Police Department Office, GAM Office, Civil Defence Office and MOTA Office. Each office has its own parking area.

At the south end of the greenbelt, a mosque site is provided for the relocation of the existing musholla in the existing central building, which should be demolished for the new terminal construction. The mosque will serve for the passengers using the terminal and visitors to the tourist deck as well as the residents living near to the terminal as the existing musholla is functioning. The design and construction of the Mosque are to be by others.

(2) Circulation Plan

Figure 4.2 also shows the circulation system of the terminal for both vehicles and pedestrians.

Vehicle Circulation

The access for all vehicles, the white taxis and buses, to the terminal is basically from Al Mudarag street running along the south side of the terminal. Each of them stays in the parking area before going to the platform area, and enters its own lane designated by destination. In the lane they wait for passengers until full. They then depart to their destination through Al-Hashemi Street running along the north boundary of the site. The taxi and mini bus will move underneath the tourist deck building to the exits to the street. One exit to Al Mudarag Street is provided for the white taxis to some destinations, as this is more convenient.

Pedestrian Circulation

The terminal provides perimeter pedestrian walks surrounding the terminal composed of street sidewalks. The perimeter walk can be an access for pedestrians to the terminal. At the centre of the site a pedestrian walk is provided in the east-west direction as an access to the platforms. Other pedestrian accesses to the terminal are through the tourist deck to which two overpass bridges are connecting from/to the Hashimiyah plaza and Citadel hill. The tourist deck is connected to the level of the taxi and bus terminal with various stairs.

(3) Features of the Space in the Terminal

The features of the space are shown in Figure 4.3, and the features of the buildings are shown below:

Vertical Space Structure

Since the existing site of the terminal has approximately 4.0m difference in ground level in the east-west direction, it is proposed to adjust the height as shown in Figure 4.3.

Zoning of Buildings in the Terminal

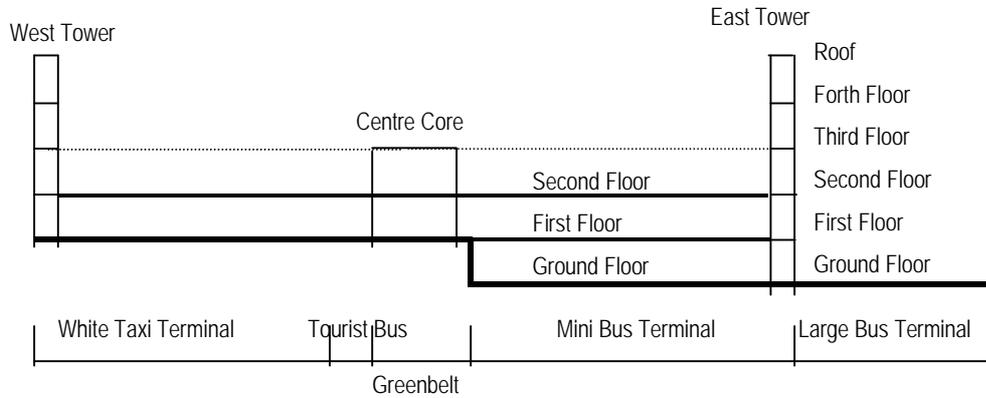
The buildings in the sub-project are divided into 8 building zones according to the separation with expansion joints as shown in Figure 4.4.

Number of storeys by building zone is as follows:

- Zone 1 and 2 : Two storey
- Towers in Zone 1 and 7 : Four storey
- Zone 4 and 5 : Three storey
- Zone 3 : Two storey

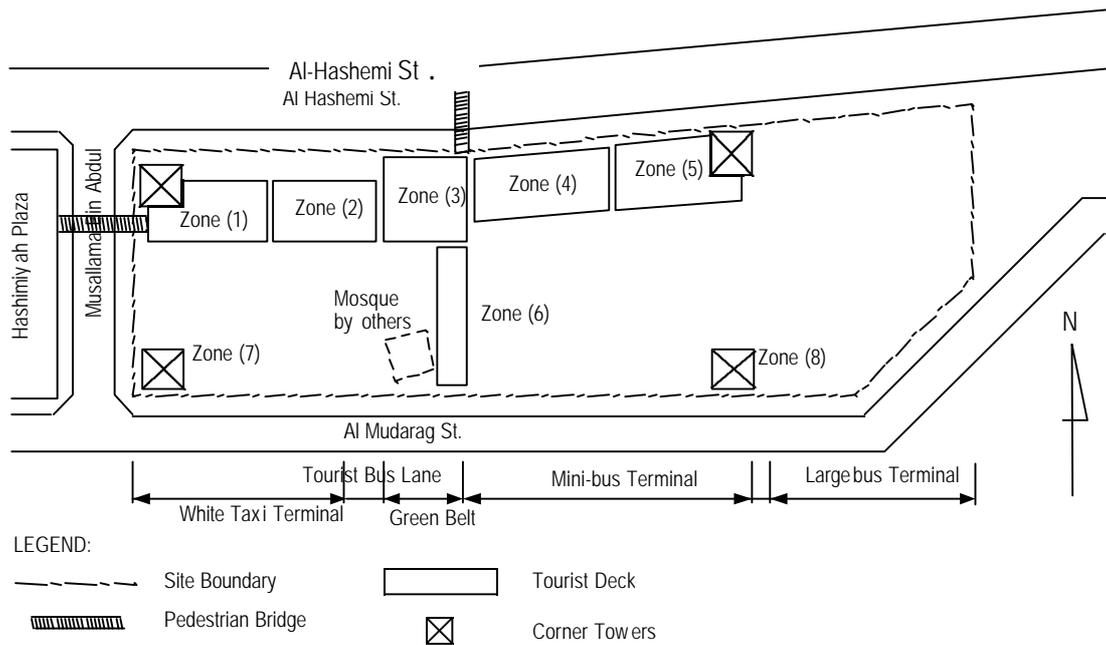
- Zone 6 : One storey
- Zone 5 and 8 : Five storey

Figure 4.3 Vertical Space Structure (Floor level diagram)



Source: JICA Study Team

Figure 4.4 Zoning of the Terminal Buildings



Source: JICA Study Team

4.2.2. Taxi and Bus Terminal

The designed number of vehicles and lanes to be accommodated in the parking area are summarised in Table 4.1.

(1) White Taxi Terminal

The white taxi terminal has 28 lanes (destinations) and accommodates 257 white taxis. In addition to that, 36 taxis and 4 lanes are allocated in the large bus terminal, since the taxi terminal could not accommodate the required number of taxis.

Eventually the terminal can accommodate 293 taxis and 32 lanes (destinations) in total. The total number of taxis which can be parked is 20% of the registered number, while the requirement is 25% (365), however the capacity of taxi parking was accepted by GAM since the number of lanes satisfies the requirement.

(2) Mini bus Terminal

The mini bus terminal has 27 lanes (destinations) in total and accommodates 177 mini buses. All the mini buses enter the terminal from Almudarag Street and exit to Al Hashmi Street. This number of mini buses satisfies the required number.

(3) Large Bus Terminal

The large bus terminal has 12 lanes (destinations) in total and accommodates 31 large buses. All of them enter the terminal from Almudarag Street and exit to Al Hashmi Street. The number of large buses is 28% of the registered number, while the required number is 28 buses (25%). The number of lanes satisfies the requirement.

Table 4.1 Number of Taxis and Buses, and Lanes

Type of vehicle	No. of vehicles parked		Number of lanes		Remarks
	Required	Designed	Required	Designed	
White Taxi	365 (25)	293 (20)	28	32	36 out of 293 are located in Large bus terminal
Mini Bus	124 (25)	177 (35)	27	27	
Large Bus	28 (25)	31 (28)	12	12	
Tourist Bus	8	8	4	4	2 buses for each lane

Note: Figure in () shows percentage of registered vehicles

Source: JICA Study Team

(4) Tourist Bus Parking Lots

For convenience of the tourists coming by bus to the tourist deck, parking lots for 8 tourist buses are allocated adjacent to the west edge of the greenbelt, which is directly connected to the deck building. There is a visitor centre managed by MOTA located on the 2nd floor. The tourist bus will take tourists to some destinations and after dropping them off the bus can wait in the parking lot in the terminal until they return, before leaving for the next destination.

4.2.3. Greenbelt

The greenbelt is at the same level as the white taxi terminal at the western side, while having a 4.0m height difference with the mini bus terminal at the eastern side. A public toilet and an electrical transformer room are located at the lower level (mini bus terminal level) and the roof level of the toilet is the greenbelt level. This greenbelt is provided for the safe access for tourists to the tourist bus parking lots and connected to the central core of the tourist deck building at the north. At the south end of the greenbelt construction of a mosque is planned as a replacement of the existing musholla which will be demolished. Only the site preparation and soil improvement for the foundations are included in the scope of the contractor of the terminal construction.

4.2.4. Tourist Deck

As shown in Figure 4.3, the tourist deck is composed of 2 storey and 3 storey buildings in the west and east respectively, and additionally at the centre a central core a 3 storey building is planned.

(1) Floor use

The strategies of the floor use by each section of the tourist deck building, especially for the major market strategies coordinated with and agreed by GAM and MOTA, are applied as shown in Table 4.2.

Table 4.2 Strategy of Floor Use of Tourist Deck

	Western deck	Central core	Eastern deck
2 nd floor	<u>international and local visitors</u> - shops, restaurants - plazas, walk ways - visitor centre	<u>international and local visitors</u> - shops (restaurants) - central plaza	<u>local and international visitors</u> - shops (restaurants) - plazas, walk ways
1 st floor	<u>all use for white taxi terminal</u>	<u>international and local visitors</u> - shops (restaurants) - central plaza	<u>local visitors</u> - shops (restaurants) - walk ways
Ground floor	<u>no floor to use</u>	<u>local visitors</u> (mainly passengers, drivers) - plaza and shops	<u>local visitors</u> (mainly drivers, passengers) - except small numbers of shops, all use for min-bus terminal

Note: Underlined is showing the basic market strategy of each section

Source: JICA Study Team

The tourist deck provides plazas (open spaces) and walkways, which are well designed with pavement and outdoor furniture as well as green plants, and where the shops and restaurants are facing to. In the plazas and walkways visitors can stroll and do window-shopping, chat, eat and drink. They also provide opportunities for international and domestic tourists, as well as residents, to meet.

According to Table 4.3 showing the number of shops and restaurants, the deck has 110 shops, and 3 restaurants with 90 seats in total. Some shops will be used as restaurants or café terraces according to the existing uses of the shops as shown in Section 2.2.3 of Chapter 2. Floor size of each shop is basically 6.5~20.7m² and every shop has an individual toilet, which is standard practice in Jordan.

They are scheduled to be rented or sold to tenants, then the internal finish is as follows:

- Floor: Terrazzo tile
- Wall: Plaster with paint
- Ceiling: Paint on concrete
- Utilities: Plug end
- Opening: Provision of steel shutter

The tenant can complete the interior as well as exterior design of the shops or restaurants according to his own preference and sales strategies.

The floor height of the tourist deck is as follows:

- Eastern part: 390 cm for ground floor and 310 cm for 1st Floor
- Central core: 360 cm for ground floor and 445 cm for 1st Floor
- Western part: 450 cm for 1st Floor

Table 4.3 Number of Shops and Restaurants

Location	Western deck	Central core	Eastern deck	Total
Shops				
Ground Fl.	-	24	6	30
1st Fl.	-	4	30	34
2nd Fl.	11	6	29	46
Total	11	34	65	110
Restaurants				
Ground Fl.	-	-	-	-
1st Fl.	-	-	-	-
2nd Fl.	3 (90)	-	-	3 (90)
Total	3 (90)	-	-	3 (90)

Note: Figure in () shows the proposed number of seats.

Source: JICA Study Team

4.2.5. Corner Towers

The corner towers, provided according to the various policies, concepts and strategies as shown before, are designed to function as described below:

(1) North-west Tower

This tower is planned to be the office of MOTA and GAM with 522 m² in total in 4 floors. The 1st floor will be used as MOTA's new visitor centre. A parking area for 5 cars is provided for this building and it will be used for the delivery of commodities to the tourist deck floors in the early morning.

(2) North-east Tower

The Traffic Department of GAM is planned to occupy this building, of which floor area is 643m² in 5 storeys. They are managing the Raghadan Bus Terminal as a whole for the terminal and the tourist deck. A parking area for 5 cars for office use and 2 cars for the delivery of commodities to the tourist decks is provided.

(3) South-west Tower

This tower has 4 floors with 658m² in total floor area. All floors of this tower are used for the office of the Police Department. A parking area, which can accommodate 7 cars, is provided for this office.

(4) South-east Tower

This tower's floors are for the Civil Defence office. This building has 5 floors with 643 m² in total. A parking area accommodating 8 cars and 2 cars for emergency is provided for this office.

Internal finish for the corner tower and floor height

The internal finish of the offices above is to be as follows and the final finish should be made by each agency:

- Floor: Terrazzo tile
- Wall: Plaster with paint
- Ceiling: Paint on concrete
- Floor height 481.5cm for the ground floor and 390cm for other floors

4.2.6. Development Area of Raghadan Bus Terminal

The floor area for each category of the tourist deck/terminal building and the corner towers is shown in Table 4.4 and 4.5 respectively, while Table 4.6 shows the area by site sub-division item.

Table 4.4 Floor Area of Terminal Building

Section Floor Use	West terminal building (m2)				Central core Building (m2)				East terminal building (m2)				Total (m2)			
	GFL	1st	2nd	Total	GFL	1st	2nd	Total	GFL	1st	2nd	Total	GFL	1st	2nd	Total
Public open space																
Deck area (Walkway)			1,281	1,281						856	877	1,733		856	2,158	3,014
Deck area (Plaza)					481	796	606	1,883					481	796	606	1,883
Sub-total			1,281	1,281	481	796	606	1,883		856	877	1,733	481	1,652	2,764	4,897
Commercial space																
Shop			209	209	411	39	84	534	52	672	672	1,396	463	711	965	2,139
Restaurant			355	355											355	355
Visitor centre			113	113											113	113
Sub-total			677	677	411	39	84	534	52	672	672	1,396	463	711	1,433	2,607
Other service spaces																
Staircase			26	26						79	116	195		79	142	221
Toilet area			68	68	140			140		71	71	142	140	71	139	350
M & E room			23	23	102			102	13	3		16	115	3	23	141
Back yard							14	14							14	14
Sub-total			117	117	242		14	256	13	153	187	353	255	153	318	726
Total			2,075	2,075	1,134	835	704	2,673	65	1,681	1,736	3,482	1,199	2,516	4,515	8,230

Source: JICA Study Team

Table 4.5 Floor Area of Corner Towers

Room	Floor	Management Tower (North-West)	GAM Tower (North-East)	Police Tower (South-West)	Civil Defence Tower (South-East)	Total
Office space	GFL		60.35		59.97	120.32
	1st	60.35	71.45	84.93	70.94	287.67
	2nd	71.45	71.45	103.67	70.94	317.51
	3rd	71.45	71.45	103.67	70.94	317.51
	4th	71.45	71.45	103.67	70.94	317.51
	Total		274.7	346.15	395.94	343.73
Toilet & Kitchenette	GFL					
	1st		8.16		8.03	16.19
	2nd	8.16	8.16	8.16	8.03	32.51
	3rd	8.16	8.16	8.16	8.03	32.51
	4th	8.16	8.16	8.16	8.03	32.51
	Total		24.48	32.64	24.48	32.12
Circulation	GFL		53.07		52.39	105.46
	1st	53.07	33.81	60.29	33.39	180.56
	2nd	33.81	33.81	33.39	33.39	134.4
	3rd	33.81	33.81	33.39	33.39	134.4
	4th	33.81	33.81	33.39	33.39	134.4
	5th	33.81	33.81	33.39	33.39	134.4
	Total		188.31	222.12	193.85	219.34
Total	GFL		113.42		112.36	225.78
	1st	113.42	113.42	145.22	112.36	484.42
	2nd	113.42	113.42	145.22	112.36	484.42
	3rd	113.42	113.42	145.22	112.36	484.42
	4th	113.42	113.42	145.22	112.36	484.42
	5th	33.81	33.81	33.39	33.39	134.4
Grand Total		487.49	600.91	614.27	595.19	2297.86

Source: JICA Study Team

Table 4.6 Area List of Bus Terminal Site

	Parking area	Platform area	Vehicle Circulation	Building Area	Green Area	Total	Remarks
White Taxi Terminal	4,742	2,108	264			7,114	
Mini bus Terminal	6,499	3,124	1,249	83		10,955	
Large Bus Terminal	4,112	1,638	1,060	169	903	7,882	
Tourist Bus Terminal	952	262	235			1,449	
Total of Terminals	16,305	7,132	2,808	252	903	27,400	
Corner Tower N-W		515		128		643	
Corner Tower N-E	154	869	54	125		1,202	
Corner Tower S-W	183	743	24	162		1,112	5 passenger cars
Corner Tower S-E	249	288	68	128		733	
Total of Towers	586	2,415	146	543		3,690	
Others		920		2,438		3,358	
Grand Total	16,891	10,467	2,954	3,233	903	34,448	

Source: JICA Study Team

4.3. Engineering

The following points are to be taken into account in the detailed design of Raghadan Bus Terminal.

4.3.1. Site Development and Drainage

(1) Demolition

The site has various existing structures to be removed before construction. The following is a summary of the treatment of the existing structures:

- Trees: trees to be retained as much as possible; if it is necessary to remove any, GAM to be consulted.
- Shade structure over platform: to be dismantled and returned to GAM.
- Central building: to be demolished and disposed of by the contractor.
- Shops and kiosks: to be demolished and disposed of by the contractor.

(2) Grading and drainage

The grading level at each land use area is similar to the existing grade level in principle. Rainwater drainage is basically by the gravity system.

The rainwater flow is basically planned from the west (highest point) to the east (lowest point) in each of the terminals according to the existing topography of the site. The slope of the grade from west to east is basically 0.5%. However, slopes of approximately 2.0% in both north and south directions are separated at the pedestrian walk (Zebra) running in the east-west direction in each of the white taxi and mini bus terminals. Therefore, the centre parts of the terminals are required to be filled to raise the grades.

For the northern half, an open ditch with grating cover is provided, at the northern edge of the vehicle roads after the platform, to receive the rainwater and to discharge to the existing manholes on Al Hashmi street. For the rainwater of the southern half, the water is planned to flow out directly to the existing manholes on Al Mudarag street through the openings in the side walk.

For the drainage of the large bus terminal, the rainwater is to discharge to the existing manholes. In order to maintain the proper slope for the water flow to the manhole, the area at the southern part of the large bus terminal is filled to raise the grade a maximum of 1.0m.

The drainage on the greenbelt is to flow out to the western side of the white taxi terminal and out to Al Mudarag street.

4.3.2. Building and Structural Design

(1) Structural design policy

Objective

The objective of the structural design shall be to achieve the required safety at the maximum practicable economy.

Safety

Safety shall be defined according to the requirements of the National Building Codes of Jordan and British Codes of Practice.

Economy

Economy shall be achieved through the use of the most practicable structural system permitted by the architectural design, which yields the simplest form and the minimum dead loads.

(2) Features of the Building

The building is a tourist deck with commercial complex with pedestrian deck and plazas over the mini bus and white taxi terminal. The building consists of one or two storey deck with two over bridges linking the building to the surrounding streets and plazas. There are four towers, two of them belong to the deck (zone 1 and zone 5) and the other two towers are independent. For the features of the building, refer to Figure 4.3 and 4.4.

- Storey by Zone

The buildings in the sub-project are divided into 8 zones according to the separation with expansion joints. The number of storeys by zone is as shown below:

- Zone 1 and 2 : Two storeys
- Towers in Zone 1 and 7 : Four storeys
- Zone 4 and 5 : Three storeys
- Zone 3 : Two storeys
- Zone 6 : One storeys
- Zone 5 and 8 : Five storeys

- Dimension of the tourist deck: width approx. 19.7 m, length approx. 245m
- Basic Span: varies from 7.0 m /11.4 m, 7.0m/8.3m, 7.5 m /13.7m, 7.5 m /5.95m
- Position of column supporting the tourist deck is not to disturb the traffic of buses and taxis.
- Expansion joints: Five expansion joints are located on the pedestrian deck.
- Ground floor level: Ground floor level of the western site is about 4 m higher than the eastern site.

(3) Frame System

1) General:

Cast-in-situ reinforced concrete is employed for the main framing of the building. Structural steel is used for two over bridges.

2) Floor Slab Framing Systems:

The framing plan of the building is to consist of joist ribs in the long direction and main beams running in the short direction.

3) Vertical Load-Bearing Members:

There are two types of vertical load-bearing member in this project. These are the columns and the reinforced concrete walls. The vertical load-bearing capability of the reinforced concrete walls is utilised, in addition to their function of providing lateral stability.

4) Lateral Load Resisting System:

The lateral stability is provided exclusively by the reinforced concrete columns and shear walls of the building.

5) Frame Analysis and Framed Beam Design:

For the purposes of design for gravity loading, the building frames are simplified into a series of sub-frames as permitted by BS 8110. The moments, loads and shear forces used in the design of individual columns and beams are derived from an elastic three-dimensional analysis. Beam and column design is made for the moments, loads and shear forces resulting from the most critical loading arrangement.

Reinforced concrete walls are designed for both gravity loading and lateral loading, at the appropriate values and combinations of safety factors.

(4) Foundation System

The geotechnical investigation report indicates that the soil is weak and the N value of SPT is 5 to 10 at the depth of 0~16 metres. At depths below 16 metres, the N value of SPT is more than 30. For the foundation system, the floating foundation system and mat slab footing is adopted. Furthermore soil improvement is adopted as follow.

Soil Conditions

As a result of soil investigation, the following conclusions are summarised.

- Overburden recent fill material is composed of silt, sand and gravels with cobbles, and boulders.
- The underlying material is mainly moist to saturated brown blackish sandy silty clay with some gravel. Most of the lower part is Wadi deposits with some clay.
- The material is heterogeneous and non-uniform in terms of lithology and density.
- No bedrock was encountered in any of the drilled boreholes.
- No cavities or water table were encountered in the boreholes. Saturated zones were encountered due to seepage sewage water from the mountains.

Applicable Foundation Systems

There are two foundation systems applicable for the above soil conditions;

- 1) Cast in Place concrete pile
- 2) Floating foundation system

There are two types of floating foundation system; 1) Mat slab type and 2) Strip foundation type. The mat slab type is recommended, since the strip foundation type has a disadvantage of high cost and long construction time, compared with the mat slab type as shown below, although it is assumed to have an advantage that concrete volume could be smaller:

- Formwork is necessary and the form is to be abandoned.
- Reinforcing bar arrangement is complicated.
- Workability is high.

The concrete volume reduction may not be significant, since it is assumed that the width of the strip foundation becomes large in order to obtain rigidity of the foundation,.

Comparison Study of Foundation Systems

A comparison study is made as shown in Table 4.7 by selected comparison criteria:

Table 4.7 Comparison of Applicable Foundation System

Comparison Criteria	Cast in Place Concrete Pile	Floating Foundation System
Technical reliability	There is little experience of cast in place concrete pile in Jordan and reliability of cast in place concrete pile works is low.	There are many examples of floating system foundation in Jordan. In this case soil improvement is used together, then technical reliability is higher than piling system.
Workability	Since there are many cobbles and boulders in recent fill soil, piling works are nearly impossible.	Main works are excavation and removing the soil, back filling and compaction, and concrete works. The machines used are simple and workability is better than piling system.
Construction period	Together with the above, there are only 2 pile machines in Jordan, therefore, work schedule is assumed to be much longer than floating system foundation. Furthermore, if one of them breaks down, work schedule cannot be controlled.	Work schedule is shorter than piling system and construction management is easier.
Cost	According to cost estimation, cost of cast-in-place concrete pile is higher than floating foundation system.	According to cost estimation, floating foundation system is cheaper than piling system.

Source: JICA Study Team

According to the above comparison, taking into account the criteria of the construction period and cost especially, floating foundation system is to be adopted for the foundation of the terminal/tourist deck building. As a reference, the floating foundation system was adopted at Amman City Hall, which has similar soil condition and there is no problem with this foundation.

Dimension of Mat Slab

- Zone 1 and 2 : width: 23.7m, length: about 109m, thickness: 0.7m
- Zone 4 and 5 : width: 23.7m, length: about 105m, thickness: 1.0m

(5) Anti-seismic system

Seismic resisting members consist of the columns and the reinforced concrete walls.

Spacing of hoops in all columns is less than 10cm to ensure adequate displacement performance and ductility. Spacing of hoop for circular columns is 5 cm.

4.3.3. Mechanical Works

(1) Water Supply System

It was accepted that the water supply for the Raghadan Bus Terminal shall be from the main pipe, which is installed along Al-Hashemi Street by Amman Water Authority.

The projected water consumption is summarised as follows:

Table 4.8 Water Consumption Calculation Sheet

Name	Fl. area	Assumption of number of people	Circulation (times)	Total number of people/day	Water consumption/person	Total water consumption/day
Police station	450	$450\text{m}^2 \times 0.6 / 10\text{m}^2 = 27$ staff	1	27	100 litres	2.7 ton
Fire department	450	$450\text{m}^2 \times 0.6 / 10\text{m}^2 = 27$ staff	1	27	100 litres	2.7 ton
GAM office	600	$600\text{m}^2 \times 0.6 / 10\text{m}^2 = 36$ staff	1	36	100 litres	3.6 ton
MOTA Office	600	$600\text{m}^2 \times 0.6 / 10\text{m}^2 = 36$ staff	1	36	100 litres	3.6 ton
Restaurant	500	80 seat x 2 = 160 persons	3	480	10 litres	4.8 ton
Shop	1140	2 staff x 76 shop = 152 staff	1	152	10 litres	1.52 ton
Shop(Café)	870	16 seat x 58 shop = 928 prsns	3	2784	10 litres	27.84 ton
Total water consumption/day						46.76 ton
Total water consumption/week						327.32 ton

Source: JICA Study Team

The building consists of four towers, pedestrian shops and restaurants. The detail of the water supply system from city the water main line is as follows;

Shop and Restaurant

Water meter room shall be provided at four locations in the building. Water supply comes through this room to each shop and restaurant.

The water supply services comprise of the following components:

- Individual roof water tank for shops and restaurants
- Pipe works

Office, Fire department and Police station

A water reservoir tank located on the roof shall be provided. The roof water reservoir tank is supplied with potable water from an independent main line running along the road on the south side connected to the city water main line. The water supply services comprise of the following components:

- Roof water reservoir tank
- Pipe works

(2) Heating and Ventilation (HV) Systems

Office, Fire Department and Police Station

Each Tower is installed with cast iron radiator to provide heat source in winter. Individual extract air system shall be provided to serve toilets. The heating system comprises of the following components:

- Cast iron radiator
- Boiler

-
- Diesel tank
 - Pipe work

Shop and Restaurant

Individual extract air system shall be provided to serve toilets.

Ventilation

Individual extract air system shall be provided to serve toilets and kitchen.

(3) Fire-fighting System

For the Towers fire suppression systems are designed in accordance with National Fire Protection Association (NFPA) standards.

Hose Reel:

Strategically located hose reels are provided for first fire fighting, and at each floor.

Hand Held Fire Extinguishers:

Hand held fire extinguishers are provided in accordance with the requirements of NFPA 10.

Fire Hydrants:

External fire hydrant points are provided in accordance with the requirements of NFPA-24.

Fire Water Storage Tank and Pumps:

Water for fire fighting purposes is provided from an underground/ domestic water storage tank. Dedicated booster pumps for fire fighting consisting of duty and standby electrically driven pumps and jockey pump are located in the plant room adjacent to the storage tank.

4.3.4. Sewerage System

The sewerage system of GAM managed by Execution and Coordination Department is covering waste and soiled water. Collection of the sewer water is by gravity in general. The design of the sewerage system including the rainwater drainage for the sub-project is outlined below:

- Collection of the sewage is by gravity except the sewage of the basement floor. The sewage of the basement floor is collected to a small pit and pumped up with submerged type switch pump.
- Connection point to the existing main sewer pipe of GAM along Al Mudarag Street , running along the southern side of the site, for all sewage of the sub-project.
- The pipe works used for all drainage services are UPVC drainage pipes and all joints are made with solvent cement method except the expansion joint which is a sealed ring type.
- Access caps are provided for cleaning on all parts of the sewerage network.
- Inspection manholes are provided where necessary for maintenance purposes.

4.3.5. Solid Waste Disposal

The solid waste disposal system of GAM managed by Execution and Coordination Department is also covering the sub-project site. Therefore, the solid waste disposal of the terminal as a whole is to rely on the disposal system of GAM.

4.3.6. Electrical

(1) Power Distribution

Incoming Power Supply and Substation

The electrical power supply available in Jordan is 230/400 volts 4 wire (star) system when the power is taken from the existing distribution over head lines network running along the road on the south side; Al Mudarag Street. A main power transformer of 1500 kva-11kv/0.4kv/50Hz/ 4wire/Y system is installed in the substation. The main power distribution switchboard MDB (estimated at 1600 AMPS) in the substation shall utilise circuit breakers for the main and for the distribution devices. The main distribution board shall serve the following loads:

- Feeder for each shop, restaurant and Towers
- 380/220 volt, 3 phase, 4 wire, 50 Hz panel boards to serve external lighting and public lighting.

(2) Lighting

Regarding energy consumption and maintenance, metal halide lamps are mainly used for public space with maximum installation distance between lighting.

Lighting fixtures and Control

1) Taxi/Bus terminal

Platform area

Wall mounted Lantern 70W HPS lamp controlled from an Automatic (by photo sensor) or Manual control switch located at control panel.

Underneath building

Ceiling mounted 400W metal halide lamp controlled from an Automatic (by photo sensor) or Manual control switch located at control panel.

Perimeter pedestrian walk

Ceiling mounted 400W metal halide lamp controlled from an Automatic (by photo sensor) or Manual control switch located at control panel.

Large bus canopy

Industrial type 400W metal halide lamp with wide beam reflector.

2) Tourist Deck

Shop

No lighting fixture is employed, however outlet box for lighting fixture with local switch and electrical circuit are installed.

Restaurant:

No lighting fixture is employed, however, outlet box for lighting fixture with local switch and electrical circuit are installed.

Central Core Hall

Wall mounted type 150W metal halide lamp with mat tempered protection glass silk screened impact resistance, controlled from an Automatic (by photo sensor) or Manual control switch located at control panel.

Open spaces

Hexagonal lighting pole 12m height with two or four street light 400W HPS lamp controlled from an Automatic (by photo sensor) or Manual control switch located at control panel.

Stairs

Wall recessed type compact FL. Light 26W with protection guard controlled from an Automatic (by photo sensor) or Manual control switch located at control panel.

3) Corner Towers

Offices

No lighting fixture is employed, however outlet box for lighting fixture with local switch and electrical circuit are installed.

Design illumination level

Table 4.9 shows the design illumination level of the major rooms to be applied in the design.

Table 4.9 Illumination levels for room

Room	Illumination level (Unit: lx)
Shop	NA
Restaurant	NA
Offices	NA
Platform area	30-150
Perimeter pedestrian walk	200
Large bus canopy	200
Central Core Hall	200
Stairs	200
Toilets	200

Source : JICA Study Team

(3) Power Outlets

Office, Fire Department and Police Station

A panel board is installed with main circuit breaker (located at each floor) to serve lighting fixture, general purpose receptacles, office and air conditioning equipment.

Shop and Restaurant

A panel board is installed with main circuit breaker (located in each shop and restaurant) to serve lighting fixture, general purpose receptacles and air conditioning equipment.

Walkway and Plaza

General purpose receptacles are installed with main circuit breaker (located in each floor and side).

(4) Earthing and Lightning Protection**Earthing**

Earthing system is provided for the substation and main distribution switchboard (MDB)

Lightning Protection

According to local regulation, lightning protection system for Towers utilising copper tapes on roof is required. Down conductors in PVC conduit and earth pits including 3m x 2cm copper ground rods shall also be included.

4.3.7. Telephone System

The main telephone service is provided by Jordan Telecommunication Company (JTC) from the existing telephone line running along Al-Hashemi Street through underground PVC conduits. The main service cabling shall originate at the property line and end at the main telephone cabinet (MTC) located in the electrical room in the building. Secondary distribution from the MTC to each shop, restaurant and Tower is provided. The number of telephone lines is as follows;

Shop and Restaurant

- City office line: 1 line/shop

GAM Office, MOTA Office, Fire Department, Police Station

- Telephone connection panel (TCP) and 4 telephone outlets are provided at each floor.
- City office line: 20-lines/ Building (PABX should be employed by each authority.)

4.3.8. Signage

In terms of signage, directional signage for the white taxi, tourist bus, mini bus, and large bus is developed and prepared. Directional signs have to be simple, bilingual (Arabic and English), and effective. This includes illustration maps for route destinations provided in several locations of the Terminal.

Additional signage illustrates attractions surrounding the Terminal providing information on main buildings and features.

4.4. Design Drawings

The following general drawings are shown at the end of this report:

(1) Architectural Design

1) Site Topography and Existing Layout	RBT. A003	1:750
2) Project Site & Zoning Plan	RBT. A101	1:750
3) Ground Floor Plan	RBT. A102	1:500
4) First Floor Plan	RBT. A103	1:500
5) Second Floor Plan	RBT. A104	1:500
6) Roof Floor Plan	RBT. A107	1:500
7) Elevations & Sections	RBT. A108	1:500
8) Mechanical General Plan		
- Drainage Site Plan Zone 3+4+5+6+7	RBT. M102	1:250

- Cold Water System (Ground Floor Zone 3)	RBT. M403	1:100
9) Electrical General Plan		
- Ground Floor Power Cables Routing Zone 3+4+6	RBT. E01	1:250
- Ground Floor Area Lighting Layout Zone 3+4+5+6+7	RBT. E16	1:250
- Main DBS Schematics	RBT. E24	N.T.S
- Telephone Riser Diagrams	RBT. E30	N.T.S

Chapter 5 Construction Planning

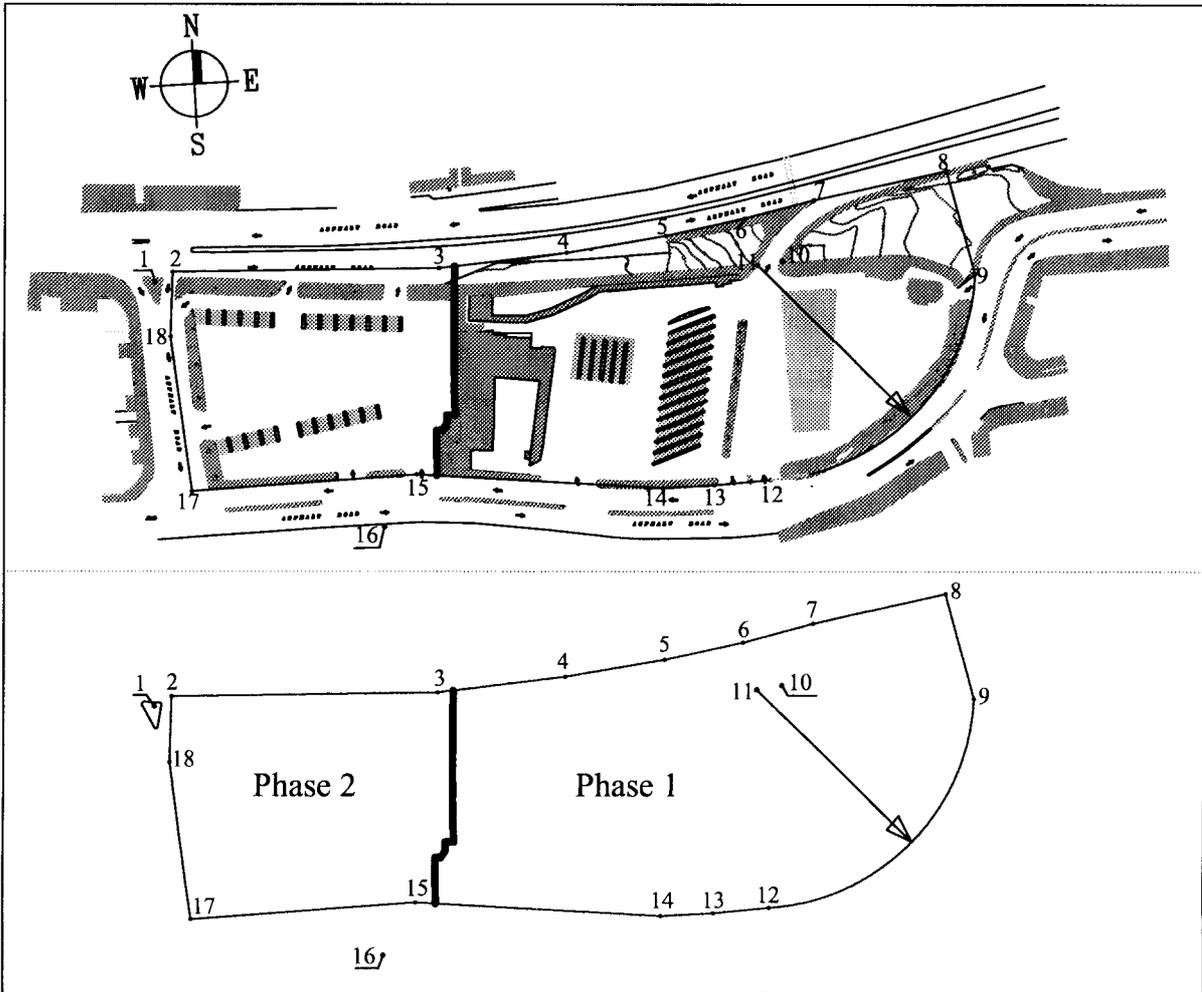
5.1. Project Site

The project site is shown in Figure 5.1. The site should be handed over to the contractor for the construction period, in which the contractor shall have all responsibility for the site.

Provision of Land for Terminal during Construction

It is essential for the construction planning of this sub-project that land for temporary site of the Terminal during construction will be found by GAM. GAM is looking to secure the land before the tendering. It was agreed with GAM that the tender drawings and documents should be prepared under the conditions that land approximately half the size of the existing terminal will be found and the sub-project should be implemented in 2 phases. The phasing line is shown in Figure 5.1.

Figure 5.1 Map of the Construction Site



Source: JICA Study Team

5.2. Temporary Works

All temporary works are responsibility of the contractor. Program of all temporary works should be submitted to and approved by GAM and/or relevant agencies prior to the commencement of actual implementation of the temporary works on site.

5.2.1. Temporary Facilities

(1) Construction access road

The site is directly facing to the existing roads; Al Hashimi Street at the north and Al Mudarag street at the south as shown in Figure 2.2. The existing roads could be utilised as the access road for the construction and no specific access road will be required. The main access road should be determined under coordination with the Transportation Department of GAM.

(2) Contractor's office, workshop, material storage, parking, etc.

It has been agreed with GAM that a planted area located at the north-east end of the site as shown in Figure 5.1 could be utilised as the necessary temporary facility site. However, the existing trees should be retained. Removal of the trees, if essential, should be coordinated with GAM and executed according to its direction.

(3) Testing room and equipment

In Amman there are public and private laboratories where tests can be conducted. The contractor can select a laboratory(ies). The brochure of the laboratory(ies) selected and items tested by the laboratory(ies) should be submitted to GAM for its acceptance prior to the conduct of the tests.

(4) Utility Services for the construction works

1) Water supply

It is confirmed by GAM that the contractor can obtain water supply from the existing main pipe which runs along the northern boundary of the site, but subject to permission from Amman Water Authority.

2) Electrical supply

It is also confirmed by GAM that the contractor can obtain electrical supply from the existing transmission line running along the southern boundary of the construction site, but under coordination with Jordan Electrical Power Company.

3) Telecommunications

For the telephone lines, it may be practical to utilise mobile telephones. However, cable lines are required for the facsimile line and also internet/e-mail lines. It is confirmed that the lines can be obtained from the main telephone line along the northern boundary of the site, under coordination with Jordan Telecommunication Company.

4) Toilet and Sewerage

The site is located in the sewerage network area managed by the Execution and Coordination Department of GAM, and the sewerage for the construction period could be connected to the existing sewerage collection pipe running along the southern boundary of the site.

5) Normal solid waste disposal from the contractor's office

Execution and Coordination Department of GAM will collect the normal solid waste and dispose it according to its own system. If not, the contractor should apply an appropriate system and measures under their own responsibility.

6) Disposal of excess soil and debris

The excess soil and debris shall be disposed to an area(s), which should be designated under coordination with the Execution and Coordination Department of the respective municipality. The necessary measures to mitigate environmental impacts should be taken by the contractor.

The final solutions of the utility services accepted by the relevant agencies should be submitted to GAM in written form prior to the construction on site.

5.2.2. Traffic Control Measures

In general, the contractor should not hinder the existing traffic flows, both vehicles and pedestrians by the construction activities without introducing any alternative flow lines. Plans of alternative traffic flow lines should be submitted and coordinated with the Traffic Department of GAM.

(1) General traffic control measures to be taken

- 1) Entry and exit of construction vehicles
- 2) Construction relating to the surrounding roads
- 3) Activities to connect utility lines (both temporary and permanent) to the existing main/transmission lines along the site boundary

(2) Specific items for traffic control

Traffic flow of Al -Hashemi street

Since the foundation excavation is deep, the excavation area will reach the Al -Hashemi street around 0.6 m from the Northern-West kerbstone edge. During the construction of the foundation and up to the completion of the remedial work of the road and pedestrian sidewalk, appropriate traffic control measures should be applied. The sidewalk of Al -Hashemi street should be reconstructed due to the expansion of the site to the north.

Traffic flow on Musallama Bin Abdul Malek street

The site is also expanded around 5 m to the west, then Musallama Bin Abdul Malek street should be partially reconstructed. During the construction of the street, appropriate traffic control measures should be employed.

5.2.3. Safety and Security Measures

In general, the contractor should be responsible for safety of the people living in the adjacent areas and of passing vehicles and pedestrians surrounding the site throughout the construction period.

(1) Safety measures

At access point(s)

The contractor should determine an access point(s) for the construction vehicles to the construction site and submit to GAM for its acceptance. At the access point, the contractor should provide safety measures for the vehicles and pedestrians passing the existing road(s) on

which the access point will be located.

At road construction areas

Proper safety measures for both vehicle and pedestrian traffic should be provided at the areas for reconstruction of the roads, Al-Hashemi street and Musallama Bin Abdul Malek street.

(2) Security measures

Provision of a temporary fence or the like surrounding the construction site is recommended in order to avoid unnecessary entry of people and vehicles as well as to protect construction materials and equipment from theft.

Since the site work is scheduled to be conducted in 2 phases, half of the site will be always in operation. In other words, the existing taxi terminal shall be operated during the 1st construction phase, and in the 2nd phase the completed terminal (mini bus and large bus) as well as the tourist deck will be operated. The contractor should provide proper security and safety measures for such situation.

5.2.4. Environmental consideration

The project site is located in the city centre where little natural environment can be seen. Therefore, adverse impact on the natural environmental will not be expected by construction work. However, since the site is very close to commercial area, nuisance and disturbance on socio-economic activities of restaurants and shops near the site might be expected.

Environmental considerations based upon on-site survey has been undertaken. The table below summarises the key adverse impacts and the proposed mitigation measures at both stages of construction and operation. The proposed mitigation measures are different according to their nature, the identified information is classified into that which should be described in the tender documents and others.

Table 5.1 Potential Impacts and Proposed Mitigation Measures

Predicted Impacts	Caused by	Mitigation measures
Air Pollution: - affect the neighbouring residents by dust - disturb economic activities	- construction work	- provide sheets for dust control - watering for dust control
Water Pollution: - wastewater may cause water pollution	- construction work	- wastewater treatment system and monitoring - avoid rainy season
Noise & Vibration Pollution: - cause nuisance and disturbance to the neighbouring residents	- construction work with equipment	- provide noise protection sheets - restrict working hours
Waste Pollution: - construction debris clog drain pipes - generate huge volume of construction waste	- construction work	- secure disposal sites and transportation - enhance recycling of the waste
Traffic & Safety: - increase of traffic conflict - increase of conflict between pedestrians and vehicles	- construction work and transportation	- conduct traffic control - avoid rush hours

Source: JICA Study Team

5.3. Construction Method and Construction Schedule

The contractor should plan the most appropriate construction method and construction schedule. They should be submitted to GAM for its approval prior to the commencement of the work on site.

5.3.1. Construction Method

The contractor should submit construction methods for particular work items as well as the general methods including utilisation plan of construction machines as well as labour force.

The following are the items to be taken into considerations regarding the construction method:

(1) Foundation works

It is assumed that the foundation works will be time-consuming. Excavation and back filling for the improvement of soil should be scheduled to avoid the rainy season.

(2) Demolition works

The site has various existing structures to be removed for construction. The following is a summary of the treatment of the existing structures:

- Trees: to be retained as much as possible, if it is necessary to remove any, GAM to be consulted
- Shade structure over platform: to be dismantled and returned to GAM
- Central building: to be demolished and disposed of by the contractor
- Shops and kiosks: to be demolished and disposed of by the contractor

5.3.2. Construction Schedule

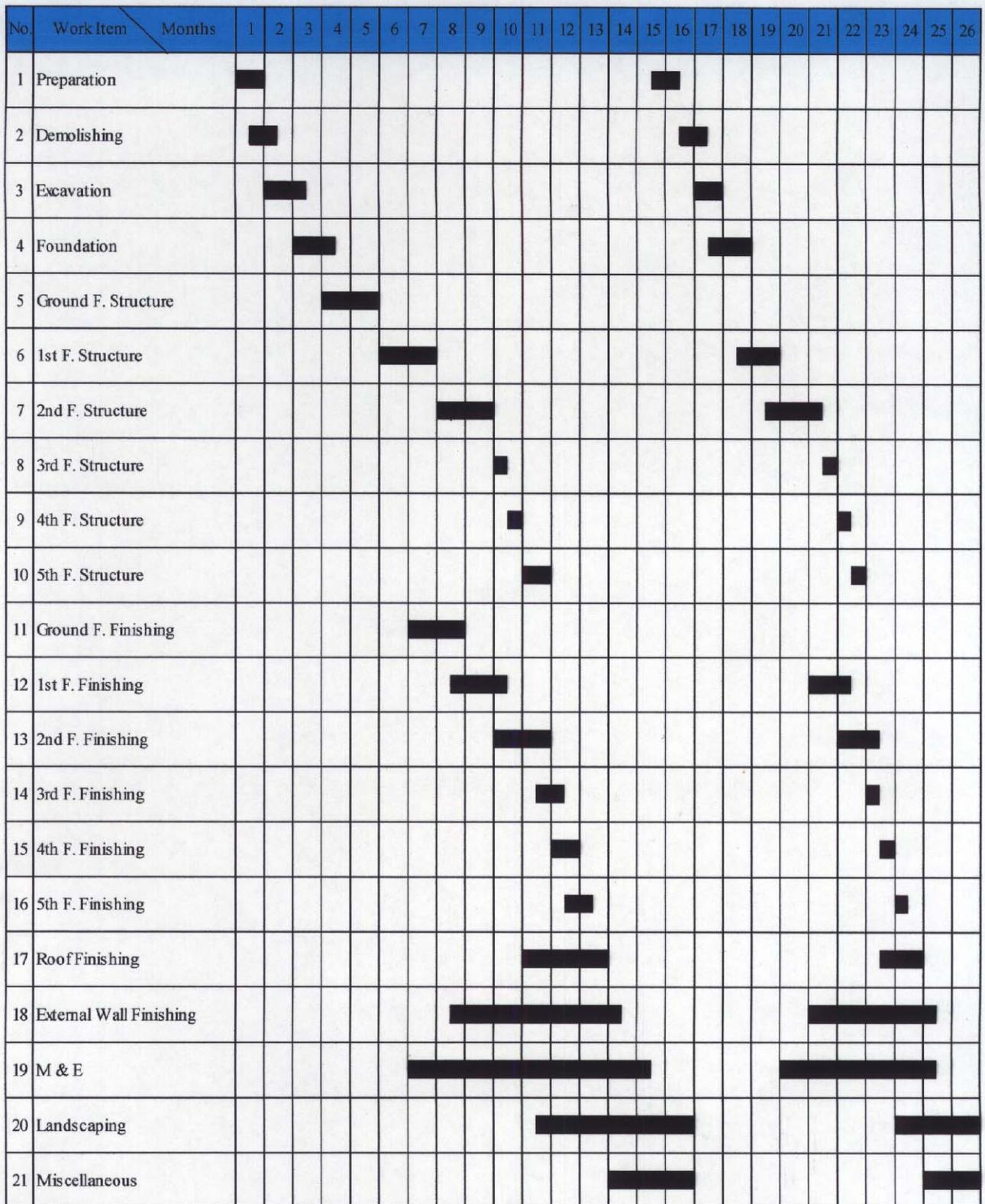
A construction schedule indicating the major work items, recommended by the Study Team, is shown in Figure 5.2. The total construction period is estimated at 26 months with the defect liability (guarantee) period of one year.

The contractor should prepare an actual and detailed construction schedule using the Critical Path Method (CPM) taking into consideration temporary works and construction methods as well as other conditions regarding the site, material and labour supply. The construction schedule should be submitted to GAM for its approval prior to the commencement of the work.

Since this sub-project is to be implemented in 2 phases, the phasing construction plan should be applied in order to maintain smooth transfer of works from the 1st Phase to the 2nd Phase. Because the large area of land needs to be excavated and filled with selected aggregates, the lower part of the terminal such as the mini and large bus terminal with greenbelt/central core may be recommended to form the 1st Phase and the white taxi terminal which is situated on the upper part of the terminal to be the 2nd Phase.

The rainy season (from December to February) should be taken into consideration for the preparation of the construction schedule.

Figure 5.2 Construction Schedule



← Phase 1: Lower Parking Area and Greenbelt →

← Phase 2: Upper Parking Area →

Source : JICA Study Team

Chapter 6 Tender and Contract Documents

6.1. Tender Package

This tender is conducted in one package including the following components:

- 1) Improvement of the Existing Terminal
- 2) Construction of Tourist Deck

6.2. Tender Administration

6.2.1. Agency Responsible for this Tender

The tendering for the Raghadan Bus Terminal with the procurement method of ICB is conducted by the Tendering Department (TD) of the Greater Amman Municipality (GAM) on behalf of GAM. TD will organise a Tender Committee composed of staff of GAM, MOTA, etc. The various works related to the tender will be assisted by a Project Management Consultant (PMC) selected for the management of the implementation of this sub-project.

The signer (the employer) of the contract with the Contractor will be the Mayor of GAM.

6.2.2. Procurement Method

According to the guidelines of JBIC, this sub-project should adopt International Competitive Bidding (ICB), since the construction cost is estimated at not less than 900,000,000 Japanese Yen (approximately 6 million JD). In the case of ICB, pre-qualification procedure should be applied before the tender.

Regarding ICB, the procedures of procurement of the contractor are as shown below and procedures of 6), 14) and 18) are the specific requirements JBIC.

- 1) Before making advertisement/notification of the pre-qualification, review and concurrence are required by JBIC on the “Pre-qualification Evaluation Criteria”.
- 2) Making advertisement/notification with international media
- 3) Delivery of pre-qualification documents
- 4) Preparation of pre-qualification proposals by attending firms
- 5) Selection of pre-qualified firms
- 6) When pre-qualified firms have been selected, review and concurrence by JBIC on the “Result of Pre-qualification” with the selection procedures, reasons for the choice made, attaching relevant documents are required.
- 7) Issuance of Invitation to Tenderers
- 8) Delivery of Tender Documents to Tenderers
- 9) Conduct Pre-tender Conference by GAM
- 10) Preparation of Tender by each of the tenderers
- 11) Submission of Tender and Tender Opening
- 12) Tender evaluation
- 13) Decision by tender committee
- 14) After the tendering, before sending a notice of award to the successful tenderer, review and concurrence are required by JBIC on the “Analysis of the Tenders and Proposal for

Award” with other documents related to the award, tender documents, etc., as requested by JBIC.

- 15) Issuance of Notice of Award
- 16) Negotiation
- 17) Signing Contract
- 18) After executing a contract, review and concurrence are required by JBIC on the “Contract” with a duly certified copy of the contract.

6.3. Tender Documents

The tender documents are prepared by the JICA Study Team under the contract with JICA as a technical assistance scheme of the Japanese Government. The documents will be granted to the Jordanian Government after the completion of appraisal by JICA, and the Jordanian Government should legalise and formalise the documents for use in the implementation of the Project.

6.3.1. Pre-qualification Documents

- (1) Pre-qualification documents

6.3.2. Composition of the Documents

The tender documents are composed of Invitation to Tender and five (5) volumes of documents as shown below:

- (1) Invitation to Tender
- (2) Volume -I: Instructions to Tenderers

Form of Tender

1) Appendices

Appendix A:	Schedule of Time, Rates and Conditions
Appendix B:	Form of Agreement
Appendix C:	Form of Tender Security
Appendix D:	Form of Performance Security
Appendix E:	Foreign Currency Requirement
Appendix F:	Form of Advance Payment Security
Appendix G:	Drawing List
Appendix H:	General Construction Schedule
Appendix I:	Temporary Facility Location Map
Appendix J:	Site Investigation Report
Appendix K:	Query Form
Appendix L:	Tender Acknowledgement
Appendix M:	List of Eligible Countries

2) Enclosures

Enclosure No.1:	Power of Attorney
Enclosure No.2:	Certification of Submission of Tender Guarantee
Enclosure No.3:	Joint Operation Agreement
Enclosure No.4:	Letter of Association
Enclosure No.5:	Affidavit of Site Inspection
Enclosure No.6:	Basic Program of the Work

- Enclosure No.7: Contractor's Organisation Chart
- Enclosure No.8: Outline Construction Plan and Proposed Layout Plan for Temporary Works
- Enclosure No.9: List of Contractor's Equipment to be used for the Works
- Enclosure No.10: List of Major Materials and Plant for the Works
- Enclosure No.11: List of Sub-Contractors/ Suppliers
- Enclosure No.12: List of Intended Import Materials and Plant
- Enclosure No.13: Detailed Monthly Cash Flow of Anticipated Contract Payments
- Enclosure No.14: Breakdown of Major Rates

(3) Volume -II: Specifications

- PART-1: General Requirements
- PART-2: Technical Specifications

(4) Volume -III: Bill of Quantities

(5) Volume -IV: Drawings

(6) Volume -V: Conditions of Contract

- PART-1: General Conditions of Contract
- PART-2: Special Conditions of Contract

6.3.3. Order of Contract Documents

The priority among the documents is as follows:

- 1) Contract Agreement
- 2) Letter of Acceptance
- 3) Tender and Notice to Tenderer/Appendix
- 4) Conditions of Contract Part (II)-Special Conditions
- 5) Conditions of Contract Part (I)-General Conditions
- 6) Specifications
- 7) Drawings
- 8) Priced Bill of Quantities

6.4. Type of Tendering

In principle, a type of “Unit Price Base Contract” tender shall be adopted for the contract of this sub-project with the arrangement of a provisional sum for limited work items.

(1) Provisional Sum

The Provisional Sum means a sum included in the Contract and so designated in the Bill of Quantities for the execution of any part of the construction works or for the supply of goods, materials, plant or services, or for contingencies which sum may be used, in whole or in part, or not at all on the instructions of the Engineer represented by the implementing agency of this sub-project.

The Contractor shall be entitled to only such amounts in respect of the work, supply or contingencies to which such Provisional Sums relate as the Engineer shall determine in accordance with the contract.

Chapter 7 Cost Estimates and Implementation Plan

7.1. Construction Cost Estimates

(1) Estimation Time

The unit prices for the construction works are adopted for the sub-project at the time of the cost estimation in March 2000.

(2) Base Cost for Estimation

The prices for construction materials, rental fees for construction equipment and labour unit rates obtained from the Ministry of Public Works and Housing (Issued in 1998) are adopted as the base cost for the sub-project.

(3) Jordanian Dinar (JD) is used for the cost estimation currency, since the basis of the construction budget for the Project has been referred from the SAPROF Report, prepared in March 1997 by OECF (currently called JBIC).

(4) Exchange Rate

The exchange rate between Jordanian Dinar and US dollar is 0.708 JD, and the exchange rate between Japanese yen and US dollar is 106.08 at the time of March 2000. The following exchange rates are applied:

- US\$1 = 0.708 JD
- 1 JD = ¥150

(5) Price Increase

According to the information on construction costs from the Ministry of Public Works and Housing, the Government of Jordan, the unit prices for construction costs in Jordan have not changed for the last three years, since the construction sector is not active and new construction projects are decreasing, thus competitiveness of contractors is increasing. Therefore, the price increase for the Project is not considered for this cost estimation.

(6) Cost items to be excluded

Land acquisition costs and relocation costs for existing residents and shop owners are not included in accordance with the SAPROF budget. Contingency costs are also not added to the estimation in this study.

(7) Tax Condition

Custom duties and service tax are excluded for some specific materials and equipment, which are expected to be imported. Custom duties and service tax are included in the unit price for construction materials and equipment.

(8) Measurement System

The Bills of Quantities are prepared in accordance with the standard prepared by the American Institute of Architects (AIA), which is commonly used in Jordan.

The construction work items are divided into the following divisions:

Divisions	Work Items
Division -1	General Requirements
Division -2	Site Work
Division -3	Concrete Work
Division -4	Masonry Work
Division -5	Metal Work
Division -6	Wood and Plastic
Division -7	Thermal and Moisture Protection
Division -8	Doors, Windows and Glazing
Division -9	Finishes
Division -10	Specialities
Division -11	Equipment
Division -12	Furnishing
Division -13	Special Construction
Division -14	Convey System
Division -15	Mechanical
Division -16	Electrical

7.2. Project Cost

7.2.1. Direct Cost

An official standard for quantity surveying for buildings is not available in Jordan. At the time of estimation, JST prepared compound costs for main construction works with reference to the information obtained from the Ministry of Public Works and Housing, other large projects currently being executed and the standard rates of Japan.

(1) Compound Cost

1) Working Hours

The working hours of people in the construction field is assumed from 8 o'clock in the morning to 6 o'clock in the afternoon including 2 hours for lunchtime. Therefore, for the calculation of the compound cost, 8 hours is adopted as the working hours for the sub-project.

2) Efficiency of Local Labour

The work efficiency, for the project as a coefficient, has been computed by utilising the information collected in Jordan with a comparison of the standard efficiency of Japan.

3) Machine Rental Price

The rental prices for construction machines obtained from the Ministry of Public Works and Housing are adopted for the calculation.

7.2.2. Indirect Cost

Rate of indirect costs (Preliminaries and Profit) are analysed and referenced based on the actual sample of prime projects currently being executed in Jordan.

(1) Preliminaries

Temporary and Preparation Works

Temporary and Preparation Works include temporary access roads, working yard, temporary buildings, working facilities, safety expenses, power and water, cleaning, laboratory testing, transportation, etc.

For the calculation of the cost of Preliminaries for each Sub-Project, the ratio of 2.5% of the direct cost is adopted. However, as for this sub-project, due to the implementation of 2 phase construction, the ratio of 2.65% is adopted because the temporary works are expected to be slightly larger than that of one phase construction.

Site Administration

The site administration cost includes direct personnel cost, site expenses, insurance, etc. Based on the analysis of actual prime projects currently being executed in Jordan with the comparison of rates applied in Japan, the rate of the site administration is assumed to be 11.5% of the direct cost.

For the sub-project, appropriate a sum of 14.15% of the direct construction cost as the Preliminaries include the cost of Temporary and Preparation Works as well as Site Administration.

(2) Profit

Based on the analysis of actual prime projects currently being executed in Jordan with the comparison of rates applied in Japan, the rate of the profit is assumed to be 10.0% of the direct cost.

7.2.3. Construction Costs

The construction cost of this sub-project is not specified in this report primarily due to the public availability of this report and the confidentiality of the construction cost prior to the tender. The detailed information on the construction cost, however, has been described in a separate edition, which has been supplied only to the Agencies and Ministries concerned.

7.3. Project Implementation Plan

The general procedures of the project implementation will be as described in the following section. The project implementation plan is shown in Figure 7.1.

7.3.1. Execution of the Sub-project

Items to be fulfilled for the overall implementation period of this sub-project, which is categorised as an ICB type of procurement method, are as shown below:

(1) Completion of the JICA Study

JICA plans to complete the Final Report and Tender Documents by the end of August and they may be transferred to the Jordanian Government as soon as possible after finalising the internal procedures of the Japanese Government.

(2) Procurement of Project Management Consultant (PMC)

Hopefully a Project Management Consultant (PMC) should be procured before the tender documents will be transferred to the Jordanian side by JICA in order to maintain a smooth transition to the implementation stage under the JBIC Loan from the JICA D/D Stage.

(3) Review and confirmation of the tender documents

The tender documents should be reviewed and updated if any changes are made by the Jordanian side to the tender packaging, or scope, employer address and so on.

For the review, if required, 0.5 ~ 1 month is allocated.

(4) Tender period

This is categorised in the sub-projects for which the procurement method is ICB. The procurement procedures for ICB sub-projects are stipulated in the JBIC Guidelines as follows:

- 1) Before making advertisement/notification of the pre-qualification, review and concurrence are required on the “Pre-qualification Evaluation Criteria” by JBIC.
- 2) Preparation and submission of the pre-qualification proposals by the contractor
- 3) When pre-qualified firms have been selected, review and concurrence by JBIC on the “Result of Pre-qualification” with the selection process, reasons for the choice made, attaching relevant documents are required.
- 4) Issuance of the Invitation to Tender to the pre-qualified tenderers
- 5) Pre-tendering conference
- 6) Preparation of Tenders by the tenderers
- 7) Tender opening
- 8) Evaluation of Tenders
- 9) After the tendering, before sending a notice of award to the successful tenderer, review and concurrence are required by JBIC on the “Analysis of the Tenders and Proposal for Award” with other documents related to the award, tender documents, etc. as requested by JBIC.
- 10) Sending the notice of award to the successful tenderer
- 11) Negotiation
- 12) Signing the contract
- 13) After executing a contract, review and concurrence are required by JBIC on the “Contract” with a duly certified copy of the contract.

For the above procedures 10 months are scheduled for the tender period.

(5) Construction and As-built drawings

As shown in Figure 5.2, the construction period for this sub-project is estimated at 26 months. The contractor should prepare and submit a set of as-built drawings to GAM within 1.5 months after the completion of the construction works (issuance of the completion certificate).

(6) Defect liability (Guarantee) period

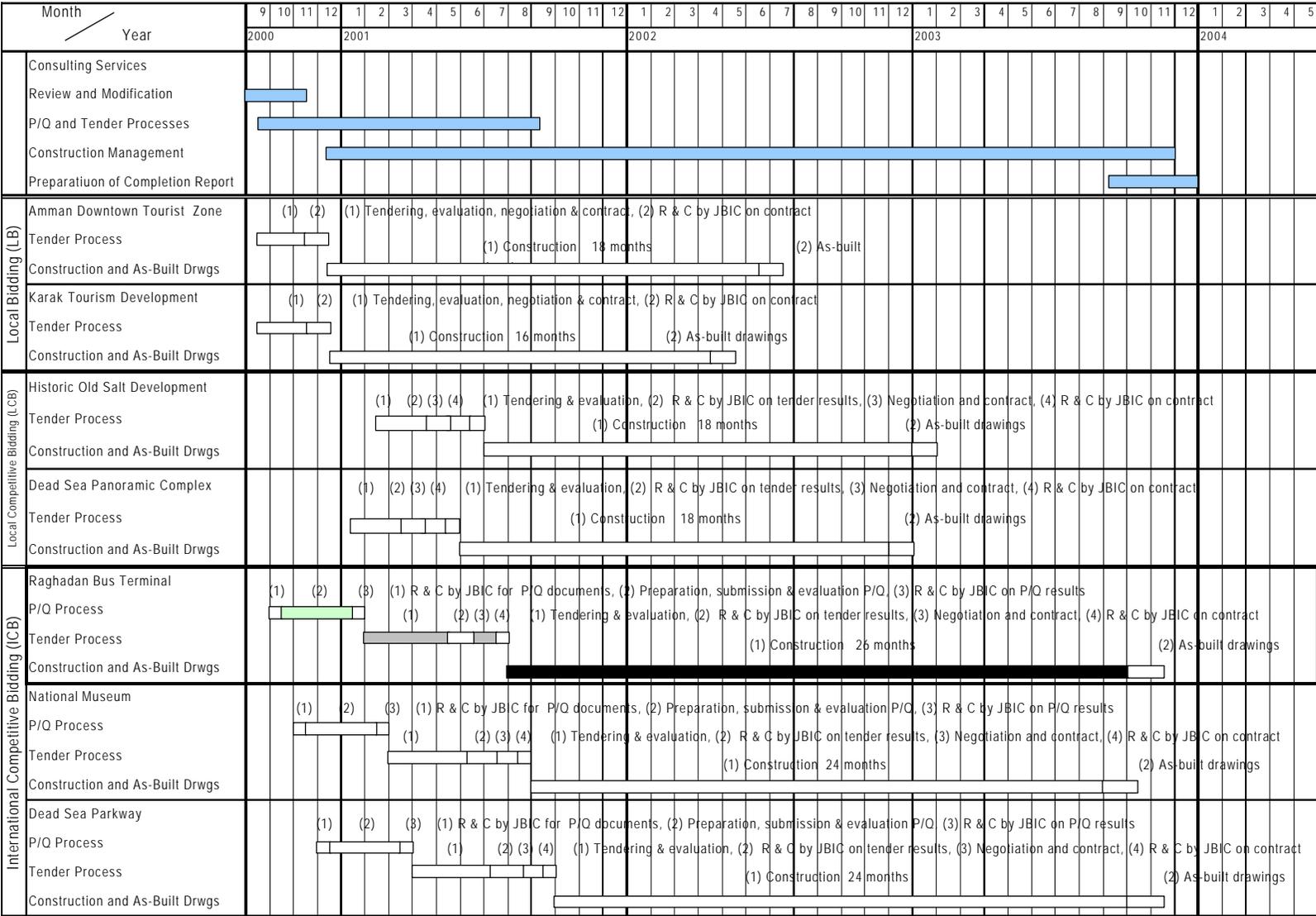
The period for defect liability is 365 days (one year).

(7) Completion Report

Within 3 months after the completion of the construction works a completion report should be prepared and submitted by the Consultant to GAM.

An overall project implementation schedule prepared by JST is shown in Figure 7.1

Figure 7.1 Overall Project Implementation Plan



Source: JICA Study Team

Chapter 8 Operation and Maintenance Plan

8.1. General

The goal of the total management system is to achieve the objectives of the sub-project described as follows:

- 1) To improve the existing Raghadan Bus Terminal with smoother vehicle and pedestrian flows.
- 2) To provide a node for the tourist circulation in the downtown of Amman for tourist street and tourist trails as planned in the Project.
- 3) To provide a new tourism asset for international and domestic tourists as well as the local citizens.

In order to achieve the objectives, the Bus Terminal is composed of the spatial structure:

- 1) Bus and Taxi Terminal
 - White taxi terminal
 - Mini bus terminal
 - Large bus terminal
- 2) Tourist Deck
 - Shops
 - Plazas and pedestrian malls
 - Visitor centre
 - Public toilets, etc.
- 3) Others
 - Police Station
 - Fire Department
 - GAM branch office

8.2. Existing Operation System

At this moment, there is no specific organisation for operation and maintenance of the Raghadan Bus Terminal. The operation and maintenance of the bus terminal are directly conducted by the line department of GAM and other agencies as shown in Table 8.1.

Table 8.1 Department of GAM Responsible for Current Operation of Terminal

Type of Services	Responsible Department
Traffic control for taxis and buses	Transport Department, GAM
Collection of contract fee for taxis and buses	Directorate of Vehicles and Driving License
Collection of tenant fee for shop, restaurant, kiosk, etc.	Expropriation Department, GAM
Maintenance of pavement	Execution Department, GAM
Maintenance of buildings	Execution Department, GAM
Watering for trees	Garden and Park Department, GAM
Cleaning	Downtown District Office, GAM
Management of Mosque/Musholla	Ministry of Awqaf and Holly Affairs

Source: GAM

The current system of determination of fees and fee collection are as follows:

Taxi and Bus Terminal

- The fees for the use of the terminal are decided by the committee of GAM.
- The fee for mini buses and large buses is 12.0 JD/year and for taxis is 10.0 JD/year. The fee is renewed every year and licensed by the Directorate of Vehicles and Driving License. The fee is also collected by the Directorate.

Shops

- The fees for tenants of shops and kiosks are decided by the expropriation committee of GAM. These fees are decided according to different conditions, such as the location of the shops and kiosks, and other factors such as special fees for handicapped people.
- Expropriation Department collects the fees of tenants according to the contract in advance based on the contract date. The collected fees are sent to the Financial Department of GAM. The total fee for the shops and kiosks is 120,008 JD and 116,000 JD/year in 1998 and 1999 respectively.

8.3. Examinations on Existing System

(1) Organisation

No particular problem is reported in the existing system of operation and maintenance, but controlling of crowd is not well trained and organised. For more effective and efficient operation of the terminal, a specific organisation should be established, if possible.

(2) Fees

Table 8.2 shows the total amount collected as the fees for the shops, restaurants, kiosks and booths in 1998 supplied by GAM. The total amount collected is 120,008 JD; the shops including eats and drinks in Central and Eastern Areas account for 104,737 JD (=87.3%) most of the total, while kiosks and booths is 15,271 JD (=12.7%). The total average fee per one tenant in the whole area is 120,008 JD/115; 1,044 JD/year (= 87 JD/month), while that of the tenant for Shops and Eats and Drinks in Central and Eastern Area is 104,737 JD/83; 1,262 JD/year (=105 JD/month).

On the other hands, the fees for vehicles, which are reported as 0.5 JD/month for large bus and 1.0 JD/month for taxis, are assumed too cheap.

Table 8.2 Fees by type of Tenant in 1998

Location	Shops		Eats and Drinks		Total	
	Numbers	Fee	Numbers	Fee	Numbers	Fee
Central Area	40	45,649	24	28,758	64	74,407
Eastern Area	10	13,220	9	17,110	19	30,330
Sub-total	50	58,869	33	45,868	83	104,737
Kiosk	25	8,921	0	0	25	8,921
Booth	7	6,350	0	0	7	6,350
Sub-total	32	15,271	0	0	32	15,271
Total	82	74,140	33	45,868	115	120,008

Source: GAM

8.4. Recommendations

Through the examination of the existing situation of the terminal operation, some considerations are noted hereinafter.

8.4.1. Establishment of New Organisation

The operation and maintenance of the new terminal are more complicated than the existing one since many of functions are to be managed by various agencies such as Transport Department, Expropriation Department, Fire Department, Downtown District of GAM, MOTA, Police and Ministry of Awqaf and Holly Affairs.

Therefore, it is recommended to establish a new organisation for the comprehensive operation and maintenance of the terminal and the tourist deck in order to get more effective and efficient system than the existing one, and also to forecast future privatisation of the management of the terminal.

(1) Functions required

Functions required for operation and maintenance of the new Raghadan Bus Terminal/Tourist Deck are predicted as follows:

General Affairs Department

This is including the general affairs, accountants, and traffic control as well as the tenant management.

- Vehicle management section

This function is the same as the function currently managed by Transport Department, to control the Terminals for the white taxi, mini bus and large bus to determine the lane and parking area for each vehicle.

- Tenant management section

This is also the same function currently operated by Expropriation Department, to collect fees from the shops, restaurants, kiosks and booths. However, it is recommended that this section should initiate the tenants to organize an association as described in Section 8.3.3.

- Accounting section

This section is responsible for the collection of fees from drivers of taxis and buses, and tenants of shops, etc. The fees will be determined by the committee of GAM so far.

Tourist Services and Promotion Department

These are new functions required for the better operation of the terminal/tourist deck to attract visitors to the facility. This Department would be managed with the staff dispatched by MOTA. But the tenant association, which would be established under the initiative of the Tenant Management Section as mentioned above, would be a primary body for the function.

The tourist information services are mainly conducted in the visitor centre, which is located beside the Centre Core on the 2nd floor of the western tourist deck.

The promotion function includes the following activities:

- Publication: Promotion of shops and restaurants, introduction of tourist deck and new terminal
- Events: Musical and performance entertainments, Sunday Market, and Festival
- Enlightenment of tenants and drivers: Establishment of operation committee, holding of Workshops and monthly meeting

Facility Maintenance Department

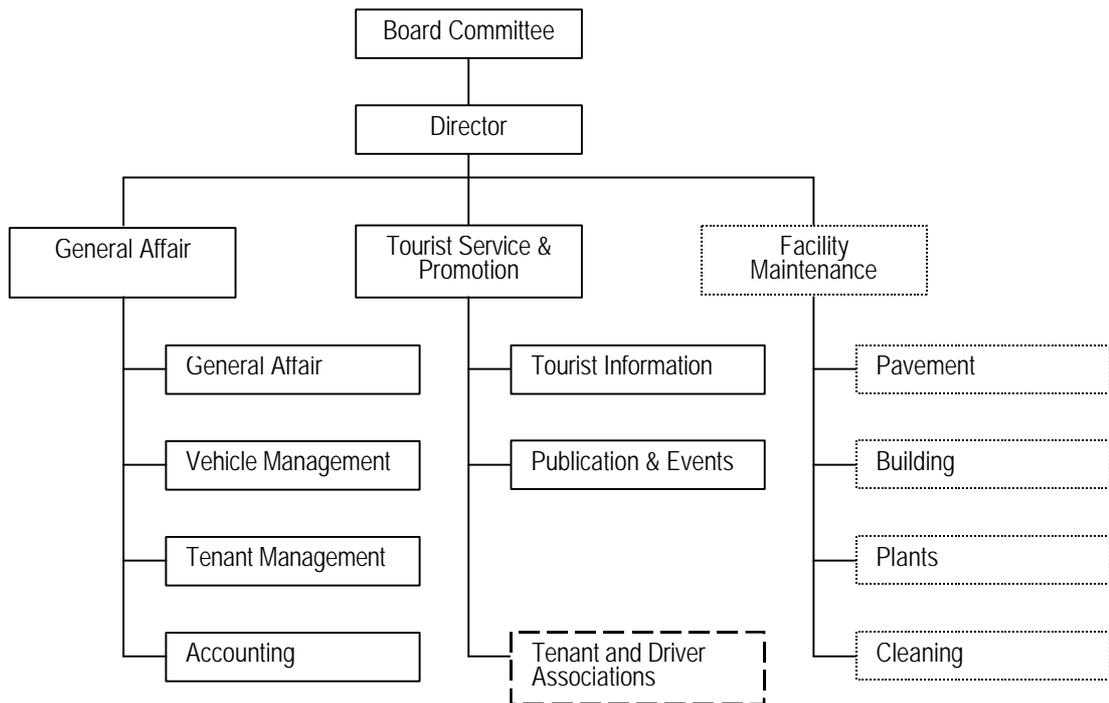
The maintenance activities shown below are required for sustaining the quality of the terminal and tourist deck. However, the maintenance is better to rely on the relevant departments of GAM so far in order to minimise the number of staff for the organisation, if the staff of the department can also cover the terminal.

- Building and structures: Painting, Caulking and Maintaining of Service Facilities
- Pavement: Replacement, Overlaying, Re-marking and Adjustment
- Plantings: Pruning, Replacement, Fertilising, Pesticide and Erosion Control in the Planting beds
- Cleaning: Parking Area, Pedestrian Deck, Overpass Bridges, Drainage and utilities, Water tank, and Outdoor Equipment and Furniture

8.4.2. Organisation Structure

It is reported that GAM intends to establish an organisation for the operation and maintenance of the terminal with 12 personnel. Based on this organisation, the organisation structure may be as shown in Figure 8.2 and Table 8.3. Figure 8.1 shows the existing organisation of GAM for reference.

Figure 8.2 Proposed Organisation for Operation and Maintenance of Ragahdan Bus Terminal



Note: Facility Maintenance Department would rely on GAM system and Tenant and Driver Associations are private ones.
Tourist Information by MOTA

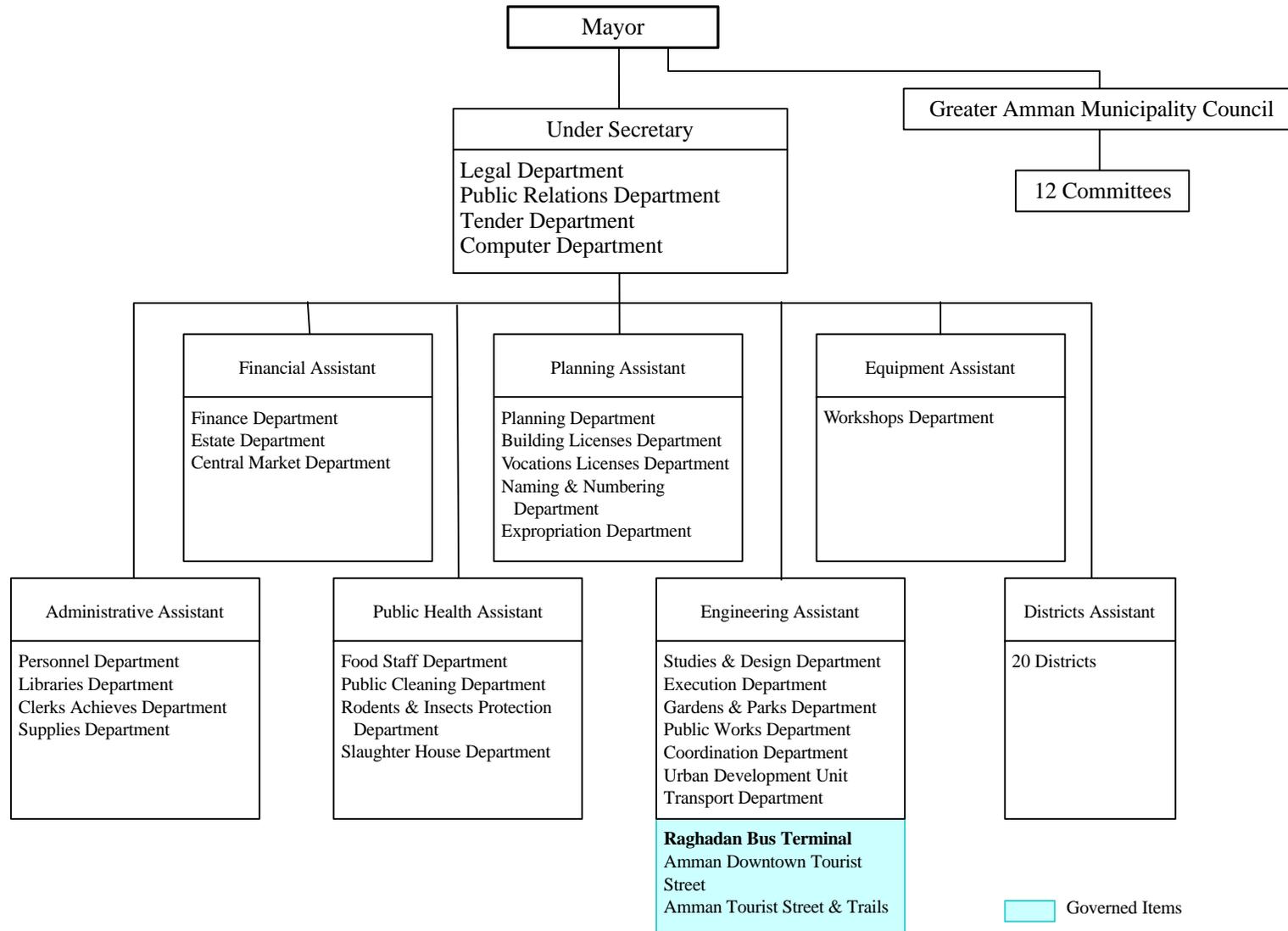
Source: JICA Study Team

Table 8.3 Number of Staff for Proposed Organisation

Position	Managerial staff	Section Chief	General staff	Common staff	Total	Remarks
Director	1				1	
General affair department	1				1	
General affair			1		1	
Terminal management		1			1	
Tenant management		1			1	
Accounting			1		1	
Sub-total	1	2	2		5	
Tourist service and promotion dept.	1				1	
Publications and events		1	1		2	
Tourist information services		(1)	(1)	(1)	(3)	Staff in () would be by MOTA
Sub-total	1	1(1)	1(1)	(1)	3(3)	
Maintenance department	1				1	
Pavement				(2)	(2)	Staff in () would be by GAM
Building			1	(2)	1(2)	
Plants				(2)	(2)	
Cleaning			1	(10)	1(10)	
Sub-total	1		2	(16)	3(16)	
Total	4	3(1)	5(1)	(18)	12 (20)	

Source: JICA Study Team

Figure 8.1 Existing Organisation Structure of Greater Amman Municipality (GAM)



8.4.3. Association of Tenants and Drivers

In order to increase and maintain the attractiveness of the Raghadan Bus Terminal, the tourist services and promotion should be taken by the tenants and drivers them-selves under cooperation with MOTA and GAM. The tenants and drivers should have pride for the bus terminal, which is their economic base, although the promotion may be under the responsibility of MOTA and GAM.

It is proposed to establish two associations; one is composed of tenants of shops, restaurants, kiosks and booths, and another is of drivers of the vehicles using the terminal. For establishing the associations, GAM and MOTA should take the initiative, but the members of the association take the lead and cooperate to improve and upgrade the status of the terminal/tourist deck as the significant urban asset.

8.5. Proposed Maintenance System

It is proposed that the current maintenance system and organisation structure of GAM should be basically applied for the Raghadan Bus Terminal.

(1) Pavement Cleaning

Pavement cleaning involves removing dirt and trash from the terminals and plazas and pedestrian malls of the tourist deck to eliminate walking obstructions.

(2) Vegetation Management

Vegetation management consists of planting new growth, pruning and maintaining established vegetation, and removing old vegetation, so that grass, shrubs and trees can grow without any obstruction to provide a pleasing respite for pedestrians, help to conserve and enhance the environment.

Table 8.3 Contents of Inspection

Functional Category	Classification of Structure
Pavement	Pavement (Asphalt, Stone, etc.)
	Curb
Slope Protection	Vegetation
	Masonry
	Retaining Wall
Plants	Trees
	Shrubs
	Grass/flowers
Drainage Facilities	Surface drainage system
	Ditches and pipes
	Manhole
Building Structure	Concrete Structure
	Concrete Sub-structure
	Steel Fastening
	Painting
	Wooden Structure
Traffic Control Facilities	Signs (Direction sign, traffic sign)
	Markings
	Delineators (Guard Posts)

Source: JICA Study Team

(3) Repairs

Repairs include repairing the pavement surface and repainting traffic control facilities, etc. such as:

- Asphalt pavement:
Minor repair for partial damage, crack, rutting, and etc. Large repair for overlaying, etc.
- Stone pavement:
Replacement of broken tile, crack sealing and patching of local damage and adjustment of pavement surface differences
- Traffic safety and control facility:
Traffic safety and control equipment, guard-rails, signs and road markings
- Drainage system:
Minor repair and leakage of water pipes
- Maintenance of Street Fixtures, Fittings and Equipment:
This item includes the daily inspection, maintenance and repair of water devices, and lighting fixtures as well as electrical facilities

(4) Restoration of Traffic Accident Damage

Typical damages caused by traffic accidents are the damage to sign-boards, curbs, trees, lighting poles, pavement, and building walls, etc.

(5) Restoration Work for Damage Caused by Unforeseen Natural Disasters

Slope failures and retaining wall damage are caused by heavy rainfall and/or earthquakes. Slope failures are normally related to heavy rainfall and providing inadequate drainage of surface and seepage water.

8.6. Environmental Considerations

The sub-project site is located in the city centre, where little natural environment can be seen. Therefore, adverse impact on the natural environment will not be expected during operation stage. However, the site is very close to the commercial areas, and nuisance and disturbance on socio-economic activities of restaurants and shops near the site might be expected.

Environmental consideration based upon on-site survey has been undertaken. Table 8.4 summarises the key adverse impacts and the proposed mitigation measures at the operation stage.

Table 8.4 Potential Impacts and Proposed Mitigation Measures

Impacts	Actions cause impact	Mitigation measures
Waste Pollution: - construction debris clog drain pipe - generate huge volume of construction wastes	- increase of tourists	- place litter boxes for collecting general waste - improve the existing waste collection system
Traffic & Safety: - increase conflict between vehicles and visitors	- increase of tourists	- secure safety for visitors - raise awareness by environmental education

Source: JICA Study Team

8.7. Facility Operation and Maintenance Plan

8.1.1. Facility Operation and Maintenance System

Although the facilities are designed with the utmost emphasis on ease of operation and maintenance, it is advisable to establish a system for efficient maintenance of the facilities taking into consideration following.

- 1) Technical staff responsible for operation and maintenance of facilities in each field shall be assigned before the construction work is completed, although they are expected to rely on the existing system of GAM.
- 2) Building Contractor shall give on-the-job training in operation, maintenance and inspection on facilities to the above technical staff and at the same time provide instruction manuals on maintenance and operation.
- 3) Weekly reports on maintenance and inspection of facilities shall be prepared by the technical staff to make it easy to have a clear grasp of the status of the facilities. Also, a system for stock control of expendables and spare parts, and for efficient procurement of replacement parts shall be established.
- 4) Lists of suppliers who will take care of problems for facilities shall be clarified.
- 5) GAM shall prepare the budget for necessary operation and maintenance expenses and ensure effective and continuous use of the facilities.

8.7.2. Facility Operation and Maintenance Plan

The activities for operating and maintaining the facilities are as shown below.

O& M	{	Daily O& M	- cleaning, operation, daily inspection
		Periodical O& M	- periodical inspection/adjustment, minor repair
		Emergency O& M	- emergency inspection, repair, renovation

To establish an overall plan for operation and maintenance, especially for the periodical inspection/adjustment among the above activities, is essential to keep facilities operated in order as planned and to prolong the facilities life.

The inspection and maintenance system of the facility are shown in Section 8.7.3 below. In addition to them, special emphasis shall be placed on the following issues.

- Roof
 - Highly durable materials are selected for waterproofing of the roof. Periodical inspections and cleaning, however, are necessary to avoid water leaks.
 - Gutters and drainpipes, especially, shall be cleared twice a year since they are likely to be filled with dust.
- Finishing Materials
 - When exterior materials have rusted, rust shall be removed and the metal shall be painted to prevent it's spread.
 - Rooms shall be kept well ventilated and the finished surfaces of rooms shall be kept clean to prevent them from getting rusty and dirty.
 - Since floors finished with stone or terrazzo tiles are difficult to repair once scratched, particular care shall be taken when moving heavy objects on such a floor.

-
- Ceiling finish materials shall be handled very carefully since they are affected by shocks,
 - Building Machines
 - Building machines shall be operated and inspected by engineers with professional knowledge of electricity or machinery in accordance with the instructions listed in instruction manuals.
 - When troubles are found in a piece of machine, operation of it shall immediately be stopped to find out the cause and remedial measures shall be taken to prevent the trouble from affecting other pieces of machines.

8.7.3. Inspection and Maintenance system

The main points of facility inspection and maintenance to be inspected and adjusted, and their suitable periods are shown in Table 8.5 for the building and Table 8.6 for the electrical and mechanical.

Table 8.5 Building Inspection and Maintenance System

Part of Building		Inspection Points	Inspection Period
Structure	Footing	<ol style="list-style-type: none"> 1. Crack, deform, damage and settlement 2. Settlement and floating of the building from the ground level. 	3 years
	Column, Girder, Wall, Floor, Roof, Balcony, Stair	<ol style="list-style-type: none"> 1. Crack, deformation, damage, rust, erosion, deterioration of painting, and loosening of connection. 	
Finish	Floor	<ol style="list-style-type: none"> 1. Crack, damage, fragmentation of surface, rust, erosion, abrasion, deterioration of paint, condensation in finishing materials. 2. Performance of waterproofing membrane. 3. Drainage of water exposed area. 	1 year
	Stairs	<ol style="list-style-type: none"> 1. Crack, damage, fragmentation of surface, rust, erosion, condensation, deterioration of paint, and rain leaking in finishing materials. 2. Deformation, damage or deterioration, and installation condition of non-slip. 	1 year
	Wall	<ol style="list-style-type: none"> 1. Crack, deformation, damage, fragmentation of surface, rust, erosion, condensation, deterioration of paint and rain leaking in finishing materials. 2. Crack, damage, and deterioration of sealant. 3. Deformation, rust, erosion or deterioration of paint and installation condition of metallic material. 	Interior 3 years Exterior 1 year
	Door & Window	<ol style="list-style-type: none"> 1. Deformation, damage, abrasion, rust, erosion or deterioration of paint, and condition of working & installation. 2. Crack, deformation, damage, abrasion and deterioration of sealant & airtight material. 	1 year
	Ceiling	<ol style="list-style-type: none"> 1. Crack, deformation, damage, fragmentation of surface, rust, erosion, condensation, deterioration of paint, rain leaking and installation condition of finish. 2. Deformation, damage, rust, erosion or deterioration of paint and installation condition of curtain box & ceiling maintenance hatch. 	Interior 3 years Exterior 1 year
	Roof	<ol style="list-style-type: none"> 1. Crack, damage, deterioration and surface fragmentation of finish & expansion joint 2. Crack, damage or fragmentation of surface, rust and installation condition of parapet & top rail. 3. Performance of waterproofing membrane. 	3 years

Source: JICA Study Team

Table 8.6 Mechanical and Electrical Inspection and Maintenance System

Mechanical Equipment

Building utilities		Maintenance Item	Maintenance Period
Water supply, drainage system	Water supply and drainage	1. Check damages, rust, corrosion, noise and abnormal vibration. 2. Check lubrication of bearings. 3. Check operation of devices.	1 year -ditto- -ditto-
	Pipes and valves	1. Check damages, rust and corrosion. 2. Check operation of valves.	1 year -ditto-

Electrical Equipment

Building utilities		Maintenance Item	Maintenance Period
Lighting and motor control system	Lighting and motor control devices	1. Check damage inside of distribution board, rust, temp rising, noise and connection of cables. 2. Operation test 3. Operation test of protective devices. 4. Check damages, connection of cables, rust, temp rising of outdoor lighting fixtures.	1 year -ditto- -ditto- -ditto-
	Feeder	1. Check damages, rust and temp rising. 2. Check condition of installation and damages or rust on supporting materials.	1 year -ditto-
Wiring system for outdoor		1. Check crack, damage, corrosion, condition and connection of cables. 2. Check damage, corrosion of pipes and supporting materials. 3. Check crack, damage, level of lid of hand hall and man hall. 4. Check deformation, damage and condition of hand hall and man hall. 5. Operation test.	6 months -ditto- 1 year -ditto- -ditto-

Source: JICA Study Team

Chapter 9 Financial Considerations

9.1. Current Fees

(1) Shops

The current average rental fee of the commercial spaces in the Raghadan Bus Terminal is 101 JD/m²/year in average of all types commercial spaces rented as shown in Table 9.1.

(2) Vehicles

The current usage fees per month of the Raghadan Bus Terminal for vehicles are reported as:

- Large bus 12.0 JD/year
- Min-bus 12.0 JD/year, and
- White taxis 10.0 JD/year

9.1.1. Expenses and Revenue

Items to be considered for expenditure and income are assumed as shown in Table 9.2.

The basis of the calculation of income and expenditure for operation cost is financially stable plan, namely it estimates low income and high expenditure in the plan.

Table 9.1 Rental Fee by type of Tenant in 1998

Location		Shops		Eats and Drinks		Total	
		Numbers	Fee	Numbers	Fee	Numbers	Fee
Central Area	Total amount (JD)	40	45,649	24	28,758	64	74,407
	JD/shop/year		1,141		1,198		1,163
	JD/m ² /year	444.00m ²	102.8	301.30m ²	95.5	745.30m ²	99.8
Eastern Area	Total amount (JD)	10	13,220	9	17,110	19	30,330
	JD/shop/year		1,322		1,901		1,596
	JD/m ² /year	112.50m ²	117.5	101.25m ²	168.9	213.75m ²	141.9
Sub-total	Total amount (JD)	50	58,869	33	45,868	83	104,737
	JD/shop/year		1,177		1,390		1,262
	JD/m ² /year	556.50m ²	105.8	402.55m ²	113.9	959.05m ²	109.2
Kiosk	Total amount (JD)	25	8,921	0	0	25	8,921
	JD/shop/year		357				357
	JD/m ² /year	189.13m ²	47.16			189.13m ²	47.2
Booth	Total amount (JD)	7	6,350	0	0	7	6,350
	JD/shop/year		907				907
	JD/m ² /year	35.86m ²	177.1			35.86m ²	177.1
Sub-total	Total amount (JD)	32	15,271	0	0	32	15,271
	JD/shop/year		477				477
	JD/m ² /year	224.99m ²	67.9			224.99m ²	67.9
Total	Total amount (JD)	82	74,140	33	45,868	115	120,008
	JD/shop/year		904		1,390		1,044
	JD/m ² /year	781.49m ²	94.9	402.55m ²	113.9	1,184.04m ²	101.4

Note: Upper line: Total amount collected, Mid. and Lower lines: Average yearly and monthly amounts collected per one tenant

Source: GAM

Accordingly, it does a provisional calculation of the revenue and expenditure for operating cost, referred to museums in Japan and advanced countries, and the circumstances in Jordan.

9.1.2. Expenditure

(1) Cost for personnel

It is calculated based on present salary of the Municipality personnel.

Annual salary of the personnel is calculated, referred the monthly salary by SAPROF and estimated allowance (approximately 4 times of the monthly salary).

The estimated annual salary with allowance for the staff of the bus terminal by position is assumed as:

- Director 24,000 JD
- Department Head 20,000 JD
- Chief of section 12,800 JD
- General staff 8,000 JD
- Service staff 4,800 JD

Table 9.2 Items in expenditure and income

Expenditure		
Item		Application
Personnel Expenditure		Monthly salary + bonus + allowance for Director, Department Head, Chief of Section, General Staff and Service staff
Operation Expense	Promotion	Advertisement
		Publications: poster, leaflet, etc.
		Bulletin
		Events
Administrative Expenses	Utility costs	Electricity, Water, Sewage and Fuel cost
	Maintenance cost	Inspection, Repair expenses
	General cost	Meeting, Communication, Supplies and Miscellaneous expenses
Revenue		
Item		Application
Facilities Rent income	Rental fee in tourist deck	Shops
		Eats and drinks
	Usage fee of terminal	White Taxi
		Mini-bus
		Large Bus
	Others	Visitor Centre managed by MOTA
		Police Office
		Fire Department

Source: JICA Study Team

(2) Operation cost

Operation costs involves only for the promotion in the bus terminal, but especially for attracting local visitors to the tourist deck.

Promotion

For the promotion fee including advertisement, publications such as poster, leaflet, etc., bulletin and events, it is assumed to require 10,000 JD per annum. However, it is deemed that

the tenant associate will share a half of the amount, then 5,000 JD is included in the expenditure.

(3) Administrative cost

1) Utility costs are estimated by maximum demand of facilities for Raghadan Bus Terminal.

- Electricity and fuel 100,000 JD
- Water and sewage 20,000 JD
- Total 120,000 JD

2) Maintenance cost is 20% of the Heating and lighting expense

3) General expense is 10% of the total expenditure

The expenditure does not include depreciation and taxes because of administration by government or local public body. Accordingly, in case of administration by incorporated foundation or the third sector, it takes them into consideration.

9.1.3. Revenue by Rental Fee

Commercial Spaces in Tourist Deck

Tenant income (shops, restaurants) refers to rent income based on floor space and relevant unit price per square meter. However, in this analysis refers the current average fee per one shop/one year as 1,044 JD as shown in Table 9.1.

Fee for use of Terminal

The fees for the vehicles of public transport registered to use the bus terminal is following the current ones, although they are assumed so low.

- White Taxi: 10.0 JD/year
- Mini-bus: 12.0 JD/year
- Large Bus: 12.0 JD/year

Others

Other incomes such as subsidies, contributions are not assumed.

9.2. Provisional Calculation of Expenditure and Revenue

A provisional calculation of expenditure and revenue was conducted based on the conditions above and the results of the calculation are shown in Table 9.3.

According to the calculation results shown in Table 9.3, the following are the considerations of the financial status of the Museum:

- The balance between the revenue and expenditure becomes 189,494 JD in red ink, which means the annual revenue from the facility rent can cover much less than half of the expenditure. This red ink balance may be mainly generated from the lower fee for vehicles.
- In order to keep a break-even point between the expenditure and revenue, only the way is to increase rental and use fees for commercial spaces and vehicles.
- For the break-even to the operation and maintenance costs, only increasing the use fees of the vehicles for the public transport is applied, because they will not including the utility costs of the terminal areas, while the commercial spaces will share their utility costs. To

keep the break-even point between revenue and expenditure, the use fee of the vehicles should be increased to 9.5 times of the current ones.

- For return of the initial investment; pre-opening activities and construction costs, more efforts should be paid by the all agencies concerned in relation with the total tourism promotion of the Karak City and region.

Table 9.3 Provisional Calculation based on Number of Visitors

Expenditure				
	Item	Number/Personnel	Expenditure per Annum (JD)	Amount (JD)
Personnel Expenditure	Director	1	24,000	24,000
	Department Head	3	20,000	60,000
	Chief of Section	3	12,800	38,400
	General Staff	5	8,000	40,000
	Service Staff ⁽¹⁾	0	All service staff would be by GAM.	
	Sub Total			
Operation Expense	Promotion & Public Relations	Advertisement		5,000
		Publications: poster, leaflet, etc.		
		Bulletin		
		Events		
	Sub Total			
Administrative Expenses	Utility costs	Electricity, Water, Sewage and Fuel cost		120,000
	Maintenance Cost	Equipment maintenance and inspection, Repair expenses		24,000
	General Cost	Convention, Communication, Supplies and Miscellaneous		31,140
	Sub Total			
Total				342,540

Revenue				
	Item	Type and Numbers	Rental fee	Amount (JD)
Facilities Rent Income	Rental Fee of commercial spaces	Shops 110 shops	1,044 JD/shop/yr	114,840
		Restaurant 3 shops	5,220 JD/shop/yr	15,660
	Use fee for the terminal	White taxi 1238nos.	10 JD/yr	12,380
		Mini-bus 541nos.	12 JD/yr	6,492
		Large Bus 192nos.	12 JD/yr	2,304
		Tourist Bus 50nos.	24 JD/yr	1,200
		Others	Visitor Centre 1 LS	10 JD/yr
		Police office 1 LS	100 JD/yr	100
		Fire department 1 LS	100 JD/yr	100
Total				153,046
Balance of Income and Expenditure				-189,494

Note: *1) More staff would be rely on the GAM staff for the maintenance.

Source: JICA Study Team

Table 9.4 Provisional Calculation for break-even of Expenditure and Revenue by increasing Fees

	Item	Type and Numbers	Rental fee	Amount (JD)
Facilities Rent Income	Rental Fee of commercial spaces	Shops 110 shops	1,044 JD/shop/yr	114,840
		Restaurant 3 shops	5,220 JD/shop/yr	15,660
	Use fee for the terminal	White taxi 1238nos.	95 JD/yr	117,610
		Mini-bus 541nos.	114 JD/yr	61,674
		Large Bus 192nos.	114 JD/yr	21,888
		Tourist Bus 50nos.	228 JD/yr	11,400
		Others	Visitor Centre 1 LS	10 JD/yr
		Police office 1 LS	100 JD/yr	100
		Fire department 1 LS	100 JD/yr	100
Total				343,282
Balance of Income and Expenditure				+742

Source: JICA Study Team

Chapter 10 Issues to be solved in Further Stage

There are still many issues to be solved by the Jordanian side to proceed further in the implementation stage.

10.1. Particular Issues

(1) Review of Procurement Schedule

The procurement schedule by the package should be confirmed prior to the commencement of the procurement procedures. The procurement procedure should be updated according to the actual situations of issues of the sub-project.

(2) Contract with tenants

In order to avoid double investments, since tenants often change them according to their own marketing/operation strategies, and the minimisation of investment to finishing works for the facilities, which will be operated by tenants, the following decision was made by GAM, and requested basically to apply same conditions to all other facilities concerned. The finishing conditions for tenants and shops are as follows:

Ceiling	Wall	Floor	Utility	Others
Paint	Plaster & Paint	Terrazzo Tile	Plug end	Installation of Shutter

(3) Coordination and agreement with tenants/shop owners

The construction of the new bus terminal cannot conduct without co-operation of the residents and shop owners for disturbance of their daily activities such as entry/exits, stopping the operation, etc

The Sub-project situated in town centre may cause socio-economic impacts to disturb or stop economic activities of the tenants/shop owners and disturb the daily life of residents as well as customer in/along/adjacent to the Sub-project site.

It is essential to provide adequate notice and information on the development, and to obtain their acceptance in order to achieve a smooth implementation of the sub-projects.

It is also important to take it in consideration to co-ordinate with their daily activities and conveniences during the construction.

(4) Review of phasing construction plan

GAM is trying to facilitate a temporary terminal site in order to secure the existing functions and services of buses and taxis as well as the existing tenants, and minimise the construction time and cost, however depend upon the size of the temporary site, the cost and schedule for the implementation of this sub-project may change. The phasing of the construction plan should be reviewed based on the available temporary terminal site.

(5) Land acquisition for the Overpass Bridge opposite site of the Terminal.

It was agreed that JST should design the bridge up to the curbstone of the sidewalk, and then GAM will continue the bridge construction as necessary. Stairs are not required to design or included in this contract, due to avoiding double investments with anticipated development in this area. Therefore, the timing of construction of the overpass bridge should be reviewed and determined during the construction.