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DEVELOPMENT AND INTERNATIONAL ECONOMIC CO-OPERATION

Living conditions of the Palestinian peopleNote by the Secretary-General

1. In its resolution **42/190** of 11 December 1987, entitled "Living conditions of the Palestinian people in the occupied Palestinian territories", the General Assembly requested the Secretary-General to prepare an in-depth study on future needs in the field of infrastructure for the Palestinian people in the Palestinian territories occupied since 1967 and to report to **the** Assembly at its forty-fourth session, through the Economic and Social Council, *on* progress made in the implementation of the resolution.
2. Responsibility for the preparation of the study was entrusted to the United Nations Centre for Human Settlements (Habitat). **In** implementation of the resolution, consultations **were** held with representatives of the Palestine Liberation Organisation with a view to ascertaining more clearly on which specific future needs of the occupied Palestinian **territories** in the field of infrastructure a study could be prepared. As a **result** of these consultations, and bearing in mind the limited resources available for an extensive study, it was decided that the **report** should focus on the specific area of transport infrastructure. Other aspects of infrastructure **may** be covered in future reports, subject to the availability of the financial resources **required** for carrying out such work.
3. In the preparation of the study Habitat engaged the services of a private consultant. The independent study prepared by the consultant with the assistance of a team of **specialized** experts, is annexed hereto (see annex).

ANNEX

Future transportation infrastructure needs for the Palestinian people in the West Bank and in the Gaza Strip a/

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I. INTRODUCTION

1. General Assembly resolution 181 of **November** 1947 called for the establishment of an **Arab** state and a Jewish state in Palestine. Under the partition plan, the borders of the two **States** were to be arranged to allow *for* direct contact between all parts of each. However, the actual borders of the State of Israel as declared in 1948 differed from the **borders** outlined in the partition plan, so that direct contact between what is now known as the West Bank and the **Gaza** Strip came under Jordanian and Egyptian control respectively. Only after the Israeli occupation of *these two areas* in 1967 was direct contact made possible.

2. As a result of these developments, *the* transportation sector in the West Bank and the **Gaza** Strip, like other **economic** sectors, was unable to develop to a level that would have enabled it to provide effective transport **services for** those **regions**.

3. The constraints imposed on **the** Palestinian transportation sector in the West Bank and the **Gaza** Strip were coupled with the development of a transportation network aimed at enhancing the Jewish settlement activities in the occupied territories by providing relatively higher quality roads to link those settlements **with** each other and with the metropolitan Israeli road network. This situation inevitably hindered *the* evolution of *a national* Palestinian transportation system consistent with the basic requirements **for** Palestinian economic development. It also resulted in a dual-transportation **system**: a privileged one effectively serving the Israeli policy and **programme of expanding** Jewish settlements throughout the West Bank and the **Gaza** Strip, and an underdeveloped one that is incapable of meeting the **needs of** the **Palestinians** or performing its economic functions in an integrated national development process.

4. This report **assumes** the establishment of a Palestinian State in the occupied Palestinian territories of the West Bank and the **Gaza** Strip in *accordance* with the United Nations resolutions. The *new* State is also expected to undertake a massive economic development programme supported and assisted by the international community and the United Nations agencies, *in order* to make up **for** deficiencies created by the prolonged Israeli military occupation and to accommodate the Palestinian returnees.

5. A 1987 report of the United Nations Educational, Scientific and Cultural Organisation (UNESCO) estimated the total number of **Palestinians** residing outside the West Bank and the **Gaza** Strip at 3.15 million. The number of Palestinians expected to return to live and work in the new State during the first five years after its conception has been estimated at 1.5 million. They will be settled in a large number of towns and villages of the West Bank and the **Gaza** Strip, and in new urban and rural settlement centres that will be built and developed in areas where the potential for economic activity and absorption **is** expected to be high.

6. For the purpose of this report, two scenarios representing two possible future trends **were examined**. Scenario A assumes that only the **Palestinians** presently residing in the West Bank and the **Gaza** Strip, including residents of Jerusalem and

those who *are* currently working abroad, will constitute the total population of the new State. According to this scenario, the total population *in* the year 2010 is estimated to be 3.20 million, with an urban/rural **distributio**r ratio of 38 per cent. Scenario B allows for the possible **return** of 1.5 million Palestinians during the *first five* years after the conception of the State, **According** to ~~this~~ scenario, the total population in the year 2010 is estimated to be 5.39 million, with an urban/rural distribution ratio of 43 per cent.

7. The vital task of the transportation sector will be to enhance the unity and integration of all parts of the new State, including safe and reliable linkage between the West Bank and the Gaze **Strip**; to assist the development of other economic sectors through appropriate and effective transport **services** and facilities; and to connect the new State with the outside world through appropriate ground, sea and air transportation.

II. EVOLUTION OF THE TRANSPORTATION SYSTEM

a. Historically, Palestine has been a bridge connecting the three continents of **Asia**, Africa and Europe. It is a link between the Arabian Peninsula and the Mediterranean, and between the eastern and western parts of the Arab world.

Road development

9. Construction of paved roads in Palestine began *in* the past century, The oldest of these was the Jerusalem road, constructed in 1567 during Ottoman rule.

10. During the early part of the British mandate, which started **in** 1917, the roads open to traffic in Palestine were concentrated in the mountainous **area**, most of which is now known as the West Bank. The **major** axis ran from north to south, connecting the major urban centres and generally following the paths of ancient historic roads. In addition, two transverse roads connected Jericho, Jerusalem and Jaffa in the centre, and Tiberias, Nazareth and Haifa in the north. ~~Some~~, but not all, were given asphalt surfaces. **However**, the road network **develop**e between 1936 and 1945 was developed to satisfy British logistic requirements, not to meet local needs. That period saw the **construction** of roads linking the central part of Palestine with Jordan, and southern Palestine with Egypt through Sinai. In 1945 the total length of the paved roads in Palestine was 266 km, while the dry-weather roads totalled 1,565 km.

11. During the British mandate, the primitive road network in the area now known as the West Bank had two **axes**; one running from north to south along the mountain series, and the other in the Jordan Valley area. These were linked with transverse roads running **from** east to west from the valley to the coast. **In** the Gaza Strip there was only one major road running from north to south, and the majority of local roads serving the smaller towns and villages were dry-weather tracks only.

Road development between 1945 and 1967

12. The establishment of the State of Israel in part of Palestine in 1946 saw the West Bank come under Jordanian rule and the Gaza Strip come under Egyptian rule. This resulted in considerable changes in the transportation system. For example, the Arab towns and villages in the coastal areas of the new State of Israel were disconnected from the interior regions. Towns such as Jenin, Tulkarnr and Qalgilia, in the former heart of Palestine, became towns on the frontier with the new State. This severance, together with other factors, saw rapidly deteriorating economic conditions in the West Bank and the Gaza Strip, and the dichotomy of control (Jordan in the West Bank, Egypt in the Gaze Strip) saw these areas subsumed as regions of those countries.

13. The road system in the East Bank of Jordan was realigned to replace the east-west axes by a north-south axis linking Aqaba-Ma'an-Amman-Irbid with Damascus, thus dispensing with the West Bank as a major regional transport centre. However, improvement plans to roads built there during the British mandate were implemented, and the network was expanded to reach almost all the smaller towns and villages of the West Bank, although it was often poorly serviced.

14. Table 1 compares the conditions of the road network in the West Bank at the end of the British mandate in 1947 with the conditions at the end of Jordanian rule in 1967. The proportion of class I and II roads increased from 46 per cent to 93 per cent in that time.

15. The quality of service to 366 of 424 urban and rural settlements in the East Bank, classified according to the condition of roads serving them, is shown in table 2 for the same years, and the figures reflect the efforts made by the Jordanian Government to improve the road network, although the area was considered a fringe area of Jordan as a whole.

16. In the Gaza Strip, no significant improvements to the road network took place between 1947 and 1967.

17. After the Israeli occupation of the West Bank and the Gaze Strip in 1967, the Israeli authorities prepared a national highway master plan. This regarded as a priority the linkage of the newly occupied areas with Israel. In accordance with this plant (known as T/M/A/3), the Israeli authorities began to construct new roads, motivated by their claimed security and settlement needs. During the years between 1967 and 1977, three major north-south roads were completed: the Jordan Valley road, the Dead Sea road and the Allon road. The last was built on the eastern foot of the mountains of the West Bank, and separated the Arab towns and villages in the mountain areas from the intensified Israeli settlement projects in the Jordan Valley. This was in accordance with the Allon settlement plan, which considered the Jordan Valley as part of Israel. Only minor improvements to some of the major roads serving the Arab population centres in the West Bank took place during the same period.

18. After 1967, the Israeli strategy was modified to provide for the full integration of the West Bank network with the Israeli transportation system in order to promote Jewish settlement in all parts of the region. Roads such as the Trans-Samaria road and the Trans-Judea road (by Samaria and Judea the Israeli authorities refer to the northern and southern parts of the West Bank, respectively) ran from east to west, linking Israel with areas of new Israeli settlement.

19. A new plan (regional master plan/order no. 50) was introduced in 1983, based on the national plan referred to above. Although rejected as a result of Arab and international protest, a number of the planned roads were still constructed, linking now Jewish settlements to the main road network in Israel. The plan classified four types of roads (see table 3) and proposed a total network length of 1,873 km. All the roads planned were to link the West Bank with the Israeli highway network and to form an integral part of it. The plan suggested only minor improvements to the existing north-south Jenin-Hebron road and the Jordan Valley-Dead Sea road.

20. In general, highways constructed since 1967 are not intended to serve Arab towns and villages. Instead, they by-pass them in a manner that deters the expansion and development of Arab population centres.

21. In the Gaza Strip, only minor improvements of the road network have taken place since 1967. Again, the roads improved or constructed mostly serve the Israeli settlements. A major highway is also planned across the central area of the Strip to strengthen the link between Jewish settlements in the south with Israel,

Rail transportation

22. The construction of railways in Palestine began in the year 1889, during the Ottoman rule. The first line connected Jerusalem with Jaffa, through an 87 km long track. Later, more lines were opened, such as the one connecting Haifa with Samakh and Dera'a in southern Syria.

23. During the first decade of the British mandate, the authorities supported the construction of new railway systems between the Palestinian towns and also between Palestine and neighbouring countries. The period witnessed the construction of the Rafah-Haifa-Al Naqura line, with a length of 250 km, and the Affulah-Jenin-Nablus-Tulkarm line, 80 km. The railroad development programmes were terminated by the late 1930s, when attention was directed more towards the road system.

24. After the establishment of Israel in 1948, those parts of the railroad which were in the West Bank and the Gaza Strip were taken out of service and abandoned, with large sections of the tracks being dismantled,

Sea transportation

25. Small ports have existed on the Mediterranean coast throughout history. At the beginning of this century Palestine had three small seaports: Akka, Jaffa and Gaza. These ports hosted mainly sailing boats, but in some cases small trade ships

also. However, because these **ports** were not capable of handling the increasing military and trade traffic that developed during the British mandate, planning for a **large**, modern seaport at Haifa began in 1923. The port was opened to traffic in 1929 and the role of the other ports became marginal thereafter.

26. After 1948, Gaza was the only seaport available to Palestinians for communication with the outside world, and handled only small trade ships and fishing boats.

Air transportation

27. In 1935, the Lod airport was constructed and opened to air traffic to serve central and southern Palestine, including Gaza, and the Haifa airport was built to serve the north. By the end of the **1930s**, the Lod airport had achieved the central role in air transport to Palestine. During the Second World War, the British built other smaller military-oriented airfields. A civilian international airport at **Qalandia** was opened to air traffic in 1952. International service from here was discontinued after the Israeli occupation in 1967, but the Israeli authorities continue to use the airport, mainly **for** local flights and general aviation. The only other usable airfield in occupied Palestinian territory is Al **Qubbah** airport to the east of Gaza City, which provides for limited flights and general services only.

III. EXISTING TRANSPORTATION SYSTEM

Road transportation

28. The total lengths of the existing highway network *in the* West Bank and the Gaza Strip are 1,890 km and 168 km, respectively. The roads of the networks are classified as main, regional and local roads. The existing road networks in the West Bank and the Gaza Strip are shown in figure 1 and table 4.

29. The main road network of the West **Bank** consists of two major north-south corridors: the mountainous **Jenin-Hebron** road, and the Jordan Valley-Dead Sea road. It also includes four major east-west roads: the Damiah Bridge-Nablus road, which forks to Tulkarm and Qalqilia, the **Allenby** Bridge-Jericho-Ramallah-Beit **Sira** road, the Jericho-Jerusalem road and the so-called **Trans-Judea** road.

30. The regional road network is also dominated by north-south and east-west axes. The north-south roads include the Jenin-Tubas-Al **Fara** road, the Northern Jordan Valley-Majdal **Bani Fadel** road, the **Allon** road, the **Tulkarm-Beit Sira** road and two roads on the eastern and western Hebron foothills. The east-west roads include the so-called Trans-Samaria road, the road from **A'tara** junction on the **Nablus-Ramallah** highway to A'bud, and the **Ramallah-Ne'lin** road. There are no regional east-west roads in the southern part of the West Bank. The local road system *covers* virtually all villages, but in general provides a poor service.

31. The conditions of the **West Bank** road network are presented in table 5. The proportion of roads maintained in good pavement condition does not exceed 50 per cent of the total, and the proportion of badly maintained roads forms around 40 per cent, most being local roads that serve the centres of Arab population.

32. The present density of paved **roads** in the West Bank does not exceed 0.33 km per square km, while it was around 0.24 km per square km in 1967. This represents an increase of only 0.09 km per square km since Israeli occupation in 1987, and this slight increase is due mainly to the construction of roads that serve Israeli interests. Road density in kilometres per 1,000 population is currently around 1.7, while it was around 2.4 in 1967. Thus, the limited expansion has not kept pace with the growth of population. **Moreover**, the primitive and poorly maintained roads generally serve Arab towns and villages, while the modern and better roads generally lead to Jewish settlements.

33. **In** the Gaza Strip, the road network consists mainly of a major highway that runs from north to south along the eastern part of the Strip, and a regional road that runs along parts of the coast. In addition, a number of local roads connect the villages and refugee camps with these two roads. The quality of the **network** in the Strip is even lower than that of the West Bank.

34. The road density in the Gaza Strip is 0.46 km per square km, compared with 0.33 for the West Bank. The apparent improvement is attributable to a higher density of population. Road density in kilometres per 1,000 population is 0.26, which is lower than the 1.7 figure for the **West Bank**.

35. In summary, the existing highway network, the only means of transportation in the West Bank and the Gaza Strip, and the only direct access to neighbouring countries, is still underdeveloped and inadequate **for** proper economic and social development. The planning, construction and improvement of roads takes place with the interests of Jewish settlements and the occupying authorities in mind. The local Arab authorities have no significant influence over the development of the main and regional road **network**; the responsibility for **such development** lies with the Public Works **Department**, which is headed by an Israeli officer. In addition, the limited financial resources of these local authorities preclude any practical independent initiatives on their part,

36. This absence of a Palestinian national authority in the West Bank and the Gaza Strip is considered a major constraint to the development of the road network. **However**, the pooling of financial resources, along with the initiative of Palestinian institutions to define development priorities in the transportation sector, would lead to the creation of a highway network that would serve the comprehensive development of both areas.

37. In addition to the national road network, there are agricultural roads constructed to facilitate access of farmers to the fields and the transportation of products to the markets and consumption centres. The total length of the agricultural road **system** in the West Bank is about 880 km. No reliable data are available on agricultural roads in the Gaza Strip.

38. Agricultural road construction has increased **substantially** over the last few years through the initiatives of local **residents in** co-operation with local societies and international charitable **organizations**. A considerable share of these **newly-opened** roads are in the **Hebron mountain range and foothills, where** there have been **extensive** efforts to **open up** Aew lands for agricultural development.

Public transportation

39. Road-based modes of transport carry all intra-urban, inter-urban and rural public transportation **in** the West Bank and the **Gaza Strip**. The system is based on private enterprise, but the Israeli authorities issue route operation permits, regulate the **frequency** of service and determine fare brackets.

40. The inter-urban passenger public transportation system depends on two modest the bus **and** the shared taxi. **Buses operate between** the main urban centres and the smaller towns and villages, **and are supplemented by shared taxi services**. The **total** number of registered buses is **around 710 in the West Bank and 70 in the Gaza Strip**. Of **those** registered in the West Bank, 378 buses operate on fixed public transport routes. **This** fleet is owned by 100 bus companies, 70 of which operate one bus **only**; **while** the largest operates 36 buses, Only 149 buses operate on **inter-urban** routes, **while** the rest operate on **intra-urban** and rural routes. The vast majority of the inter-urban buses are **conventional**, with a maximum **seating** capacity of 50. A small number of minibuses operate on routes with lower passenger demand.

41. In the **Gaza Strip**, bus services are very **limited** and **operate** on a few routes **only**.

42. The number of registered **taxis** has remained almost the same **since 1967** owing to a strict Israeli policy limiting their **number**. During the past 20 years, the total **number** of operating taxis has fluctuated **between 1,050 and 1,100 in the West Bank and between 760 and 810 in the Gaza Strip**. To **satisfy** the increasing demand, many private automobiles and double-cab pickups **operate** without permits on many rural routes, especially within the **Gaza Strip**.

43. Both the bus **and** shared-taxi routes are generally radial in pattern. A major hub is located at Jerusalem, which **serves** several destinations in the West Bank as well as the city of Gaza. Others **are** located at Nablus, where service to all northern and **central** urban centres of the West Bank originates, and Gaza, with services to all parts of the Strip.

44. The **inter-urban bus** service generally follows a fixed time schedule. Nevertheless, the number of passengers is small owing **to** the poor service and the very frequent stops to serve rural area passengers. Recently, express bus services were introduced on a few major routes, such as Nablus-Ramallah-Jerusalem and Ramallah-Jerusalem.

45. On inter-urban routes, shared taxis provide better, more frequent and faster service, and operate according to a flexible schedule. To remain competitive, buses charge lower fares than the minimum fare brackets set by the authorities.

46. Various criteria have been used to evaluate the performance of inter-urban public transportation on several **major** routes: (a) ridership; (b) time headway, the time between two successive vehicles leaving the origin; (c) vehicle utilisation, the average total number of passenger trips per vehicle per day; (d) service utilization, levels of service and the revenue passengers per vehicle-km. Tables 6 and 7 show these parameters for some major bus and shared taxi routes.

47. Table 6 shows that bus services on the routes connecting Jerusalem with Ramallah, Bethlehem and **Hebron** attract the highest daily average ridership with a minimum exceeding 5,000 passengers per day. These routes are the **most** efficient, with vehicle utilization higher than 250 passengers per bus per day, and are the most effective, with a service utilization exceeding one revenue passenger per vehicle-km. It should be noted here that ridership on these routes represents all boarding passengers, including village passengers. These are not actually inter-urban passengers and may represent **from 25 to 70** per cent of the **total**.

48. The figures for the shared taxi service are presented in table 7. This shows that the routes with highest demand are the Nablus-Tulkarm, the Jerusalem-Ramallah and the **Jerusalem-Hebron** routes, with ridership exceeding 4,000 passengers per day. Almost all passengers make the full trip. Frequency of service on these routes averages 3 minutes or less. In addition, the routes with the highest vehicle utilisation are the Nablus-Qalqilia and the Tulkarm-Qalqilia routes. Revenue passengers per vehicle-km are the highest for these routes, followed by those of the Bethlehem route, while service to Gaza from Jerusalem and Qalqilia is the poorest. The apparently high ridership indicates a high demand for inter-urban travel, mainly owing to workers and university students commuting between these areas. In addition, thousands of Muslims visit Jerusalem from all parts of the West Bank and the Gaza Strip, especially on Fridays.

Freicrht transportation

49. The annual agricultural production of the occupied Palestinian territory, including livestock and its products, averaged over the 1985-1986 and **1986/1987** periods, totalled 869.2 thousand tons in the West Bank and 194.7 thousand tons in the Gaza Strip. Agricultural production generated 21.7 per cent of the gross domestic product (GDP) of \$US 1,180 million in 1986 in the West Bank, while it generated a higher share (32.8 per cent) of the GDP of \$US 315 million in the Gaza Strip during the **same** year. No data are available on the total tonnage of mining and industrial production. The share **of** industrial production reached 12.7 per cent of the GDP of the West Bank's GDP but only 7.6 per cent of the GDP of the **Gaza** Strip.

50. Data is only available for the movement of agricultural products between the West Bank and the Gaza Strip. Only 4.9 thousand tons of agricultural products were transported from the West Bank to the **Gaza** Strip in the year **1986/1987**, while

40 thousand **tons** were transported from the **Gaza Strip** to the West Bank. **This** transport generated an estimated total of 5.5 million ton-km on the roads of the **West Bank, the Gaza Strip**, and the permitted roads connecting them.

51. **As for exports**, available data for 1962 indicate agricultural exports of 112 thousand tons to Jordan and other Arab countries via the check-points on the **River Jordan** and 72 thousand tons from the **Gaza Strip** to these same areas. Exports of agricultural products to **Israel** and to other non-Arab **countries** via Israeli ports totalled around 22 thousand tons from the **West Bank** and 105 thousand tons from the **Gaza Strip**.

52. Mining products of the **West Bank**, which consist mainly of marble and stone, generated exports of 127 thousand tons to **Jordan** and other Arab countries in 1982. Exports of industrial products from the **West Bank** to Jordan and other Arab countries (mainly soap and vegetable oils) reached 17 thousand tons. No data are available on the export of other industrial products to Jordan (including plastics, processed foods and other products), which represented only a very small share (5.5 per cent) of the total of \$US 40 million in industrial exports to Jordan. No data on the tonnage of industrial exports from the **West Bank** and the **Gaza Strip** to **Israel** and other countries are available.

53. Freight exports of products with known tonnage had generated an estimated total movement of 22 million ton-km on the road systems of the **West Bank** and the **Gaza Strip**, and within the green line to Israeli consumption markets, exporting ports, and border check-points.

54. Regarding imports, no data are available on the tonnage involved, except with respect to agricultural products from **Israel** to both the **West Bank** and **Gaza Strip**, which reached 47.9 and 43.9 thousand tons, respectively, in the year 1986/1987. This generated an estimated 2.3 million ton-km on the roads of the **West Bank** and **Gaza Strip**.

55. There is no transit movement through the **West Bank** and the **Gaza Strip**. All internal and external freight traffic in the **West Bank** and **Gaza Strip** depends on a fleet of over 20,000 trucks and commercial vehicles (4,400 in the **Gaza Strip** and 15,900 in the **West Bank**). This represents a nine-fold increase in the total number of vehicles in operation since 1967.

56. Like the buses, the industry is based totally on private enterprise.

IV. PROPOSED TRANSPORTATION SYSTEM

A. Basic objectives

57. The transport system here proposed provides for adequate road, sea and air transportation, to fulfil a defined set of objectives consistent with an integrated national development plan. These objectives include the following:

(a) **Unity:** provide adequate and **safe** linkage within the West Bank and the Gaza Strip and, between them, **ensure** that all parts of the two regions are accessible to each other.

(b) **Self-reliance:** minimise the effects of political change on **the system** and lower the possibility of **system** failure under specific adverse conditions, especially in the proposed corridor linking the West Bank **with** the Gaza Strip.

(c) **Mobility:** facilitate the efficient movement of people and goods and achieve the capacity to handle projected demand for passenger travel and freight movement with **acceptable** speeds and **at** reasonable costs for the whole population.

(d) **Accessibility:** open up areas that are now inaccessible, and increase accessibility to **those** parts **not** adequately served at present.

(e) **Economic growth:** promote economic development by providing proper means and facilities to enhance developmental activities in agriculture, industry, mining and tourism.

(f) **Social development:** satisfy the needs of Palestinian society in the educational, cultural, social and health sectors.

(g) **Connection with other countries:** provide links between the West Bank and the Gaza Strip, and between the **surrounding** Arab countries and others.

(h) **Quality of passenger travel:** provide quality **service** for passenger travel in general, and for public transportation in particular, by providing proper links, vehicles, and terminals and by reducing congestion, especially in urban **areas**, as well as incentives to encourage public transportation use.

(i) **Reduced travel cost:** reduce cost by **minimizing** the distance between travel demand centres and upgrading the quality of the network. Future transportation planning and policies should aim at reducing the operating costs of vehicles, lowering taxes on public transportation, and reducing energy consumption.

(j) **Improved safety:** A major objective of the proposed transportation system is to improve safety for all modes of transportation.

(k) **Reduced harmful environmental impact:** Plans will aim to preserve natural resources, such as agricultural land, forests and wildlife. New transportation facilities must avoid harmful **effects** on sites that have religious, historical and aesthetic value. Aesthetic enhancement by beautification and development of scenic facilities along rights of way will be considered,

B. Forecast of future travel demand

58. The projected population of the West Bank and the Gaza Strip for the year 2010 is calculated on the basis of the two scenarios mentioned earlier. Scenario A is based on the natural growth of the present Palestinian population of the occupied

West Bank, including Jerusalem, and the **Gaza Strip** (including 11 holders of residency cards issued by Israeli authorities, **even if** they are living abroad), in **addition** to the Arab residents of Jerusalem, Scenario B **includes** A, with an additional 1.5 million Palestinians who would return from **their** present places of residence abroad during the period 1991 to 1995.

59. Available data indicate that the present Palestinian population of the occupied West Bank, including Jerusalem, and **the Gaza Strip** is about, 1.8 million, and is increasing at an annual rate of 3.0 per cent in the West Bank and **3.4** per cent in the Gaza Strip. The average number of persons per household in these regions is 6.13 and 6.50, respectively.

60. The projected demographic characteristics for the year 2010 according to scenario A are presented in table 8, based on the following assumptions:

(a) The annual rate of growth will tend to decrease with the expected **urbanization** and rise in **living** standards.

(b) Owing to increased economic growth in the **Gaza Strip**, the annual rate of growth of population will tend to drop more rapidly than in the West Bank, reducing the disparity between the two regions.

(c) The expected socio-economic **changes** will cause the number of extended families living in the same dwelling to decline, and the number of **new** nuclear families will tend to rise, thus increasing the demand for independent transport

(d) The **effects** of migration to other countries are negligible and may be ignored.

61. Based on these assumptions, the total population of the West Bank and the **Gaza Strip** is expected to increase to about 3.2 million by the **year** 2010, a net increase of 176 per cent **over** 1989.

62. For scenario B, **the** distribution of the returning 1.5 million **Palestinians** is assumed to be 80 per cent to **the** West Bank and 20 per cent to the Gaza Strip. After 1995, the total population will increase naturally **up** to about 5.4 million by the year 2010, with a net increase of about 296 per cent over 1989. The **projected** characteristics for the **year 2010 according** to scenario B **are** presented in table 9.

63. Consequent upon a political settlement, **it** is expected that returning Palestinians, continued financial remittances, and foreign aid and investment would result in much higher per capita incomes. This, along with the projected increase in the number of households, forms the basis for projecting the number of vehicles in general, and private automobiles in particular, in the year 2010. **It** is estimated that the net increase in the total number of vehicles will be almost 150 per cent for scenario A and 340 per cent for scenario B (see tables 8 and 9 for some major travel demand determinants). It should be noted here that the estimate does not consider the drop in the rate of increase in the number of vehicles after 1987, due to the conditions created by the **intifadah**.

64. The increase in the total **number** of vehicles is expected initially to follow the current average annual **growth rate** of 8 per cent for both the West Bank and the Gaza Strip. It is assumed that growth will continue at that rate until the year 2000. After that, the **growth** rates will decrease to a steady level, as the results of public transportation policies are realised. By the year 2010 the total numbers of **vehicles** and private automobiles per 1,000 **persons** are estimated to reach 111 and 72, respectively, in the West Bank and 59 and 42, respectively, in the Gaza Strip. (The number of vehicles per 1,000 persons was 770 in the United States of America in 1980, 130 in Bahrain in 1981, 101 in Jordan in 1986, and 194 in Israel in 1986).

65. Although vehicle and private automobile ownership in the West Bank and the Gaza Strip are expected to increase in the manner **shown**, there will still be a definite **need** to expand the role of public transportation.

66. The number of **drivers**, as with vehicles, is also expected to **increase**, but at a decreasing rate. The number per 100 households is forecast to increase from 55 in 1989 to 75 in 2010 in the West Bank, and from 51 to 61 in the Gaza Strip. It may be noted that the number of drivers is forecast to be at least twice the number of **private** automobiles per 100 households. This may be attributed to the relatively high **number** of persons per household and to the sharp increase in the number of driving licence holders in the 1980s. The increase in the number of licence holders is predominantly among the young age **groups** who believe that possessing a driving licence **increases** the possibilities of finding a job and helps in commuting to **work**. Demographic projections show that the share of potential drivers (those 16 to 65 years of age) of the total population will increase slightly from 38.5 per cent currently to 39.6 per cent by 2010,

67. Under scenario B, it is assumed that a **period** of time will elapse before the 1.5 million returning Palestinians will adjust to the requirements of their new life. This normalisation **process** is **expected** to last until the year 2000. During this period, private automobile ownership of the returning **Palestinians** is expected to be lower than that of the original residents. It is assumed that by the end of this period the distribution of private automobile ownership for the whole **population** will become relatively uniform.

68. The changes in the travel demand determinants for the whole population according to both scenarios are presented in table 10.

69. Studies have shown that the increase in the total number of vehicles over a specific period is closely related to the increase in the number of person/trips per day, and more importantly, to the number of vehicle km of travel. Thus, the demand for travel in the West Bank and Gaza Strip is expected to increase by at least 240 per cent for scenario A, and by 415 per cent for scenario B, by the year 2010.

70. Present and projected traffic volumes on key routes of the network are presented in table 11.

C . Proposed road transportation system

71, The following guidelines *and principles* have been used in the development of the **proposed** highway network;

(a) The design must **ensure** an integrated highway network, so that movement of traffic from one area to another is as smooth, direct and continuous as possible.

(b) The structure of the *network* should be designed **according to a classification** system of highway links, based on: (i) capacity requirements to satisfy projected traffic volumes, and (ii) the function and quality of links.

(c) The system must be co-ordinated with other modes of transportation in a compatible and integrated framework.

(d) The structure of the proposed network should include existing highway links whenever possible, **and** make provision for **necessary** improvements to be connected with the existing highway **system** in a **proper** and economic manner.

(e) Alternative highways to those crossing urban centres should be considered in **order to** facilitate through traffic, reduce urban congestion and improve safety.

(f) Compatibility with the topography **and consideration** of highway design standards are to be satisfied.

72, The following highway classification system is used in this **study**:

(a) **National express highways**: The primary function of **these highways** is to ensure efficient **and** fast movement of traffic, especially long-distance through traffic. These highways *have* a minimum of four divided lanes with a median, **are** access-controlled, and have grade separation at intersections whenever possible.

(b) **National major highways**: These highways connect large population centres and major production/consumption locations. They also have **great** mobility and little access to abutting land. They consist of one or two lanes in each direction.

(c) **Regional secondary highways**: These highways provide access between the smaller cities and towns, connecting them both with one another and with the national highway **system**. In **general**, they serve regional rather than national demand, with moderate travel distances and speeds, and are designed to *the* standards of the two-lane rural highways.

(d) **Local village roads**: The local **village road system** serves the smaller villages and rural areas, connecting them with the main highway system. They carry low traffic volumes over relatively short travel distances at low speeds.

73. The interrelationships between the major traffic generation and attraction **centres** and the consequent travel demand requirements are presented schematically in figure 2. Three national traffic corridors are suggested to run from north to south in the West Bank, while another is planned in the **same** direction along the

Qaaa Strip. **The** proposed network connects the **West** Bank with the **Gaza** Strip through an east-west national **corridor** running **within a neutral zone across** Israeli-controlled territory. In **addition**, three national **transverse** corridors **across the West Bank** connect major urban areas with **major** production and **consumption centres** and facilitate passenger and **freight** traffic to and from **neighbouring** countries,

74. A supporting regional highway system is planned **to serve areas** with less travel demand **and** smaller through traffic volumes. **The** proposed **highway** network also includes a local village road system which **links** the **smaller** rural settlements with one another and with the regional and national major **highway networks**. This system will make **remote** locations, which **are** now ignored **in** many cases, **more** accessible.

75. In the **West Bank**, the proposed main **north-south** corridor runs through Jenin, Nablus, Ramallah, Jerusalem, Bethlehem, Hebron and Al Dahiriyah. An alternative **express** highway is suggested to bypass the highly populated **area extending** from **Ramallah** in the north to **northern** Hebron in the south. This highway **will** carry through **traffic across** the West Bank and the **Gaza** Strip, connecting the West Bank with **Jordan and other** Arab countries in the **east**, and the **Gaza Strip** with Egypt and **other Arab** countries **in** the west. A second parallel national corridor will **serve the Jordan Valley and** the area west of **the** Dead Sea, where there **is** significant potential for **economic** development. A third corridor will **connect** Tulkarm in the north-west with **Beit** Sirs **in** the south, where it will link **up** with a transverse corridor leading to Jerusalem.

76. **Three** national highway corridors **are** planned to cross **the West Bank in an east-west direction**. **One** connects Tulkarm and Jenin **to** Northern Jordan via Al **Maleh** Bridge. A **second** connects Tulkarm and **Qalqilia** through Nablus to **the** Damiah Bridge, leading to Amman, in the centre. The third **connects Beit Sira** with the **Abdullah** Bridge, penetrating the Jerusalem-Ramallah area and running to the south **of** Jericho.

77. In the **Gaza** Strip, it is suggested that a national traffic **corridor** **be** constructed in the eastern plains from the far north to the southern border with **Egypt**. An extension around the city of Gaza will serve a proposed **seaport**, the industrial **zone**, and the airport to the south of the city.

78. A traffic corridor has been proposed to link the **West** Bank with the **Gaze** Strip through a neutral zone passing through Israeli-controlled territory. This corridor will link the southern part of **the** West Bank to the northern part **of** the **Gaze** Strip via Idna and **Beit Hanoun**.

79. The directional peak hour demands shown in table 12 were calculated assuming that 14 per cent of the total daily traffic is concentrated during the peak hour, and that 55 per cent of total traffic is carried in one direction. The number of lanes per direction was calculated **on** the assumption that heavy vehicles, including buses and trucks, represented 10 to 15 per cent of the total traffic volume. A level of service is expected on these highways consistent with stable operations at relatively **high** to moderate average travel speeds.

80. The national and regional highways that constitute the backbone of the proposed highway network for the West Bank and the Gaza Strip are shown in figure 3, and a comparison between the total length of the existing and proposed road networks is presented in table 13. The proposed highway network will increase road density per square kilometre from 0.33 to 0.47. The density per 1,000 population will decrease slightly from 1.13 to 0.91. The extent of the required new construction, rehabilitation and improvement is illustrated in table 14,

81. Further information on the proposed national highway system is provided below,

West Bank-Gaza corridor

82. The West Bank and the Gaza Strip are two geographically distinct regions separated by a minimum distance of 33 km. They will need to be connected via a neutral demilitarised corridor. The suggested zone would extend from the northern end of the Gaza Strip eastward to the western foothills of the Hebron mountains in the West Bank. The length of the zone would be approximately 37 km and the width would vary from 2 to 4 km, with a total area of about 130 square km. A national express highway is planned to run between Hebron and the Gaza Strip through this neutral zone. The criteria for selecting the location of the highway, and consequently the neutral zone, were as follows:

(a) The highway should be as direct and as short as possible

(b) It should avoid as far as possible any interference with existing Israeli settlement patterns along the neutral zone;

(c) The highway should have a minimum number of crossings of existing Israeli roads, minimising the need for bridges, tunnels, etc.;

(d) The highway should satisfy the topographic requirements and geometric design standards for express highways.

83. The proposed route satisfies these criteria better than all others considered. The planned highway forms an integral part of the proposed national express highway system. It runs from northern Hebron westward via Idna through the neutral zone to reach the northern part of the Gaza Strip at Beit Hanoun, where it connects with the Gaza Strip segments of the national highway system. The total length of this highway is approximately 54 km, of which 37 km are within the proposed neutral zone.

84. The travel demand on this highway by the year 2010 is projected to be around 32,400 vehicles per day according to scenario A, and 56,000 vehicles per day according to scenario B. This would require the construction of a six-lane highway with no access, designed according to the standards of express highways.

Jenin Al Dahiriyah national major highway

85. This major highway in the West Bank runs from Jenin in the north to Al Dahiriyah in the south, serving the urban centres of Nablus, Ramallah,

Jerusalem, Bethlehem and Hebron. The travel demand north of Nablus and south of Hebron is **satisfied by two-lane highway segments designed to the standards** of rural major highways. The **higher** travel demand of the rest of the highway is accommodated by four-lane highway segments. For scenario A, extra capacity has to be provided between Jerusalem and Bethlehem (table 11). For scenario B, extra capacity **has** to be **provided between Ramallah** and Hebron. For both cases, three lanes in each direction would be needed. However, the combined capacity of this highway and the parallel Ramallah-Hebron national **expressway** will satisfy the projected total demand.

86. Existing **parts** of the proposed highway must be upgraded. This will include some minor horizontal curve realignments and the construction of new **sections** in order to avoid existing difficult topographic terrain, and to by-pass congested population centres (length, 176 km).

Ramallah-Hebron national express highway

87. The Jerusalem area is expected to form the bottleneck of the national highway **system**. Projected traffic volumes, especially for scenario B, justify the construction of a new highway connecting **Ramallah** to Hebron running to the east of Jerusalem and **Bethlehem**, and to the west of Jericho. This will be a divided four-lane highway with **access** control and grade **separation** at the junctions, three connectors linking the highway to Jerusalem, Jericho (and on into Jordan), and Bethlehem. New construction is required for most of the highway, but short segments of existing roads **can be** upgraded and integrated with it. A length of 63 km with seven interchanges is suggested.

Ein El Baydah Dead Sea national major highway

88. This highway runs from north to south almost parallel to the axis of the major Jenin-Al Dahiriyah national highway to the west, and the River Jordan to the east. It reaches the proposed industrial **complex** on the western shore of the Dead Sea, via the proposed Damiah major urban settlement and Jericho. The major function of this highway is to meet the requirements of the projected **socio-economic** development in the Jordan Valley. It is **expected** to carry large **freight** traffic volumes, especially in the **section** between the Damiah and the Abdullah Bridges, where four **lanes** would be justified. The rest of the highway is planned as a two-lane rural highway. Minor upgrading and rehabilitation of the existing highway is recommended. The total length is 115 km.

Abdullah Bridge-Jerusalem national express highway and Jerusalem-Beit Sira national major highway

89. This corridor links the Abdullah Bridge with the **Gaza Strip** through Jerusalem, Bethlehem and Hebron **areas**. It runs as a national express highway from the Abdullah Bridge on the River Jordan to Jerusalem. At the location between Jerusalem and the Ramallah-Hebron express highway, **a major highway branches to** connect with the Tulkarm-Beit Sira national highway north of **Beit Sira**, crossing the Ramallah-Jerusalem national highway south of the **Qalandia International Airport**. The length of this segment is 39 km, and it requires upgrading to meet

the standards of express highways. (The length of the major highway segment is **32 km**, and it requires improvement to upgrade it to a four-lane **highway**. Four-lane segments of this corridor between Qalandia and Belt Sire are *now* under construction.)

Tulkarm Belt Sire national major highway

90. This highway runs on the western foothills of the mountain range, extending in the northern and central parts of the West Bank. It connects Tulkarm with **Belt Sire**, passing east of Qalqilia and linking with the Jerusalem-Belt Sire national highway near Belt Sire. Its major function is to facilitate the movement of passengers and goods between the north-western areas and Jerusalem, Hebron and the **Gaza Strip**. The expected volume of traffic will not require more than two lanes in both directions. The existing highway will be upgraded to the standards of major roads, where widening and minor relocations are also **required**. Its length is approximately 61 km.

Tulkarm Al Maleh Bridge national major highway

91. This highway is suggested to improve the connections of the northern parts of the West Bank with one another, and to facilitate their linkage with Jordan through Al **Maleh Bridge**, to be constructed across the River Jordan to the south-east of **Ein El Baydah**. It connects Tulkarm to the bridge, by-passing Anabta and Tubas and crossing the **Jenin-Nablus** axis to the south of **Jenin**. The projected volume of traffic on this highway is less than 5,000 vehicles per day, justifying a two-lane configuration. Its length is approximately 53 km, most of which requires new construction, with upgrading and rehabilitation of existing sections.

Damiah Bridge-Tulkarm national major highway

92. This runs from the Damiah Bridge in the Jordan Valley to Nablus, crossing the **Ein El Baydah-Dead Sea** national highway near the **proposed major** urban settlement of **Damiah**. The highway then forks at Nablus into two branches: one continues to Tulkarm, while the other **continues** to Qalqilia. The expected high demand on this highway justifies a four-lane configuration, except for the Nablus-Qalqilia link, which will need two lanes only. The Damiah Bridge-Nablus-Tulkarm highway is 68 km long, while the Nablus-Qalqilia highway is 32 km.

Gaza national express highway

93. A national express highway is proposed along the eastern plains of the Gaza Strip. It will have four lanes according to scenario A, and six lanes according to scenario B, both with limited access. It will carry through traffic between the West Bank (and possibly neighbouring Arab countries) and Egypt. In addition, traffic within the **Gaza Strip** will use this facility. Six interchanges are planned to serve **Gaza** city and its seaport, **Gaza Airport**, Deir-El-Balah, Khan Yunis and Rafah. The highway connects with the **Hebron-Gaza** national express highway at the far north of the Strip near **Belt Hamoun**, and ends at the border with **Egypt** south of Rafah. The existing major highway runs parallel to this corridor, and would be reclassified as a regional secondary highway. Its length is 42 km. Another

13 km-long section of highway is planned to loop around the city of Gaza, running as a national major highway from Belt Hamoun to the coast, then extending towards the seaport and the Gaza airport.

Regional secondary highway system

94. The Tulkarm-Jenin regional secondary highway links Tulkarm to Jenin in the north of the West Bank via Ya'bad. The existing Tulkarm-Ya'bad section needs improvement, while the Ya'bad-Jenin link must be constructed (length, 37 km).

95. The Jenin-Tubas regional secondary highway runs from Jenin to the south east, crosses the Tulkarm-Al Maleh Bridge national highway near Tubas, and continues south to intersect with the Damiah Bridge-Nablus national highway. A short connector links this highway with Qabatia. Most of the highway already exists but needs surface and alignment improvements (length, 32 km).

96. The Ein El Baydah-Qalandia airport junction regional secondary highway runs from Ein Al Baydah in the far north to the Qalandia Airport junction on the Ramallah-Jerusalem national highway via Milkhamas. It runs at the eastern foot of the mountainous areas between the Ein El Baydah-Dead Sea and the Nablus-Ramallah national highways. Most of the highway is already constructed to an acceptable level, but some sections require minor alignment improvement (length, 85 km).

97. The Masha-Fasayel regional secondary highway connects Masha, at the western foot of the central mountains, with Fasayel in the central part of the Jordan Valley, crossing the Jenin-Al Dahiriyah national highway south of Huwara. Most of this highway has been recently constructed by the Israeli authorities to connect Israeli settlements in the Jordan Valley with the Israeli highway network (length, 55 km).

98. The A'rud-A'tara regional secondary highway connects the two major north-south national corridors of the Tulkarm-Belt Sire and the Nablus-Ramallah highways via A'tara. Sections of this highway were recently constructed to acceptable standards. Other sections require surface and alignment improvements (length, 20 km).

99. The Ni'lin-Ramallah regional secondary highway connects the Tulkarm-Belt Sira and the Nablus Ramallah national highways and links several rural settlements with Ramallah. The existing road requires many major improvements (length, 21 km).

100. The Hebron Mountain regional secondary highway loop a regional secondary highway that runs almost parallel to the boundaries of the southern part of the West Bank. Topography and the distribution of settlements necessitates a circumferential highway system in this region. It runs from Bethlehem towards the western foothills, where it meets the Hebron-Gaza highway close to Idna and continues south to reach Al Dahiriyah. It then runs east and north to Bethlehem via Al Samou'. A connector links the loop with the Dead Sea Highway. The eastern part of the loop and the Dead Sea connector need to be constructed, while the existing northern and western sections of the loop need major upgrading and improvement (length of the loop, 128 km; the connector, 20 km). Another section of

21 km is planned to complete a smaller loop connecting **Hebron** with Al Dahiriyah via **Bani Na'im**.

101. **The Gaza Strip regional secondary highway**. The **Gaza Strip** regional highway system consists of two north-south highways and three east-west highways. One of the north-south highways runs parallel to the national **express** highways along the eastern **plains** of the Strip and serves as a service road to the national express highway. The other runs parallel to the coast in the west, and is considered an extension of the major highway serving the seaport and the airport. Transverse regional secondary highways connect the longitudinal highways and serve the urban areas of **Deir El-Balah**, **Khan Tunis** and **Rafah**. Existing local roads constitute most of the sections of this highway system, but will require major upgrading and improvement (length of the network, 80 km).

102. **Local village road system** connects the Palestinian villages with the national and the regional highway systems. Moreover, it connects neighbouring villages with one other. The major concern of this system is spatial coverage. All the villages in the West Bank and the Gaza Strip are connected with the national and regional systems, but the quality of service on most of them is poor. Major improvement plans need to be prepared to upgrade such roads. Also, new local roads have to be constructed to connect neighbouring villages in order to facilitate overall development needs. It is estimated that the total length of village local roads will increase by 60 per cent.

103. The expanding role of the agricultural sector of the Palestinian economy requires the construction of roads to facilitate the accessibility to, and the opening up of, new lands for agricultural development. Some of these roads may need asphalt surfaces, while the rest may be all-weather, surface-stabilised roads.

D . Proposed public transport system

104. Development plans for the West Bank and the Gaza Strip emphasise a need for expanded public transportation. The use of buses and shared taxis for public transportation should be encouraged, and the possibilities of constructing a rapid transit rail system should be investigated. In order to improve public transportation services, the establishment of one or more public-owned bus transportation companies is recommended. Shared taxi services should be regulated and co-ordinated with the bus service to help upgrade the quality of service provided, otherwise more private automobiles may be purchased and used with consequent deleterious effects. The alternative use of public transportation should be encouraged through policies of tax exemptions and the imposition of higher taxes on private automobile ownership.

105. The mode of public transportation that should be supported on each route will depend on the passenger demand for the route and the route capacity. Bus service is appropriate when public transportation demand is high and the volume of traffic is large in relation to capacity. In other cases, shared taxis may be more appropriate.

106, Rail transit **systems** for the very high passenger **travel** demand **corridors**, such as the Ramallah-Jerusalem-Bethlehem corridor and the **corridor** along the **Gaza Strip**, should be **subjected to** a thorough **economic** and technical **feasibility study**, as should other rail transport facilities, such as a railway **connecting** the **West Bank** with **the Gaza Strip**, and **possibly** connecting **Gaza** with **Egypt**, **before any detailed recommendations** are made.

107, The proposed inter-urban transportation **network** in the **West Bank** and **the Gaza Strip**, unlike the existing network, will provide **direct access** between regional urban centres without the **need** to transfer through existing and other hubs, **and also** access to direct services from many urban **centres** to neighbouring **Arab** countries.

108. The suggested network will depend **for** its success **upon** a complete upgrading of existing **services**, including better quality **vehicles**, more frequent **and** tighter schedules, and the provision **of** terminals and passenger facilities, especially in major centres,

E. Proposed sea transportation system

109. A commercial seaport is proposed **for** construction on the coast of **Gaza** in **order to serve** the **Gaza Strip** and the **West Bank**, **and** also neighbouring countries that have no direct access to the Mediterranean, such as **Jordan**, **Iraq** and the **Arab Gulf States**. The seaport is planned to handle exports of agricultural, mining and industrial products and **imports** of food, raw materials, industrial products and fuel. No data **are** available on projected tonnage **of** these exports and **imports or** on transit **freight**, and any attempt to **provide** detailed estimates would be subject to wide margins **of error**.

110. However, it seems obvious that a major modern port will be vital to the **economic** development **of** future **Palestine**. A recent study has demonstrated the technical feasibility of constructing a seaport on the coastline **of** the **Gaza Strip**. It concludes that coastline characteristics present no **major** technical problems, and the **most** favourable location **of those** examined **for** the seaport development lies on the stretch to the west of **Gaza City** and south **of** the presently existing two jetties. The proposed highway segment which will link the seaport to the **proposed** highway network would offer the basic and necessary infrastructure **for** **expected** heavy freight traffic to and from the **Gaza Strip**, the **West Bank** and neighbouring countries.

F. Proposed air transportation system

111, An **examination** of future transportation **needs** **clearly** indicates the necessity **for** **air** transport; services to handle the **projected** passenger and **cargo** air travel within the **West Bank** and the **Gaza Strip**, and **between** them and **other parts of the** world. This requires the construction of a **major** international airport and local airports. The Qalandia airport north **of** **Jerusalem**, which is currently operated by the Israeli authorities for local flight services within **Israel**, is suggested as the site for the proposed international airport.

112. The **main** advantage of the **Qalandia** site over others considered is its central location and **accessibility** via the two **proposed** national major highways, which **intersect** a short distance south of the airport. Other major advantages are its proximity to Jerusalem and its location in relation to other major urban centres. The airport will be around 40 minutes by automobile from both Nablus and Hebron, and around 80 minutes from both Jenin in the far north, and Gaza City in the south west, once the planned highway system is established. The area has been thoroughly investigated according to requirements for public safety set by the International Civil Aviation Organisation (ICAO), and proper zoning will ensure this will be safeguarded. Land is available for expansion in the eastern direction, where the topography does not pose problems.

113. The existing airport should be expanded to satisfy the requirements of a modern international airport, and a recent report estimated annual enplaned passenger air travel demand to be close to 2.95 million passengers by the year 2010 for scenario A. This forecast was based on the analysis of possible travel demand for three major travel groups: Palestinian residents and visitors (1.32 million), Muslim visitors (0.77 million) and Christian pilgrims, Holy Land and other tourists (0.86 million). According to scenario B, the total number of enplaned passengers is estimated to be 3.0 million by year 2010. No data are currently available on the projected import and export cargo demand.

114. The estimated annual travel demand is expected to generate no more than 40,000 annual aircraft operations for scenario A, and no more than 50,000 annual aircraft operations for scenario B. This will require a single runway system with a capacity of at least 80,000 annual operations. Therefore, a system consisting of a single runway, with a parallel taxiway, would be adequate. The length of runway is estimated to be 3,500 m, which can serve non-stop flights of the Boeing B-747 aircraft with a range reaching Rabat and London in the west, and Islamabad in the east. Land is available for upgrading and construction work commensurate with these requirements,

115. In addition to the international airport at Qalandia, three smaller local airports are suggested, at Gaza City, Jalameh, north of Jenin, and a site to the east of Jericho. The Gaza airport is to be constructed on available land close to the shore to the south of Gaza City and its proposed seaport, where it will be linked by an extension of the national highway system. Al Qubbah airfield, to the east of Gaza City, was found unsuitable for development owing to its proximity to Israel and consequent interference with Israel air space. The Jenin and Jericho airports will be constructed on old neglected airfields that were built by the British during the mandate period. The air corridor required for flights between the West Bank and the Gaza Strip may be provided through the air space over the proposed neutral land zone. There may be no need to construct an air route traffic control centre, since the newly constructed centre in Jordan covers a large geographic area including the West Bank. However, terminal approach control facilities at Qalandia International Airport will be required.

V. INSTITUTIONAL INFRASTRUCTURE

116. The **proposed** transportation system for the **West Bank** and the **Gaza Strip** cannot be implemented without a proper organisational framework for the **planning**, execution and **control** of its development, **Sectoral** policies, **goals**, objectives and priorities **within** the general context of **national interest** and financial **constraints** must be clearly defined and understood. Unfortunately, **there has been** a complete absence of such a framework for the 22 years of Israeli **occupation**. The **only official organizations** operating within the transportation sector today are the remains of the extensions of the Jordanian and Egyptian transportation departments which operated until the occupation of 1967. These are now controlled by Israeli officers according to the policies and regulations set by the Israeli authorities,

117. The three major departments in the **West Bank** and **Gaza Strip** are the Public Works Department, the Highway **Traffic** Department and Licensing Department. The Public Works Department is responsible for the planning, **construction and maintenance** of roads that fall outside municipal boundaries. The Highway **Traffic** Department is responsible for traffic and safety regulation and control. The licensing department is responsible for vehicle **classification** and registration as well as the **issuing** of driving **licences**. In addition, the Central Planning Department and the Higher Planning Council, which are also composed of and controlled by Israeli **officers**, are usually involved in the planning and co-ordination of activities in the transport sector.

118. A number of Palestinian operational **organizations** are needed to cope with the requirements of achieving the objectives of the proposed **development** plan. The **establishment** of the following organization is **proposed**:

(a) A **ministry** of transportation for the strategic planning and co-ordination of the activities of all transport **organizations**;

(b) A highway authority for the construction and maintenance of the **road** system and the introduction of adequate axle **load** regulations and overload control measures ;

(c) A traffic department for road safety, registration and licensing of **drivers and vehicles**;

(d) A public transportation authority for the overall **planning**, regulation, and promotion of all modes of public transportation;

(e) A civil aviation and **meteorology** authority for the planning and co-ordination of air transport, including the operation and maintenance of the proposed airports and the possible future operations of a national airline and local flight **services**;

(f) A seaport authority for the operation and maintenance of the proposed commercial and fishery seaport facilities in Gaza, and the possible future operations of a national **sea** line;

(g) A training **school** for providing the **sector** with **adequately** trained professional⁸ at all levels and undertaking **research** on matters pertaining to sector development.

VI. CONCLUDING REMARKS AND RECOMMENDATIONS

119. In **this** study, future **sectoral requirements** based on the year 2010 *have* been predicted on the basis of two **scenarios**. In one **scenario**, the predicted future population is assumed to result *from* the natural growth of the **present** population of the **West Bank and the Qaaa Strip** only. In the other, the total future population is assumed to result from the combined effect of the natural growth of the existing population and the return of 1.5 million Palestinians who are at **present** living elsewhere.

120. The structure of the **proposed system** was based on the **assumption that** the regions of the **West Bank and the Qaaa Strip** will form a single political entity maintaining strong political and economic **relations** with **Jordan and Egypt**. It was also assumed that the returning Palestinians will be absorbed in the present **cities, in the** large rural population centres, and **in** a number of new urban settlements.

121. The preliminary layout of the **proposed highway** network **is** intended to **utilize** the existing network to the maximum extent possible. Construction of the new facilities, and expansion and development of **existing ones**, are recommended to meet the future air and sea transport **requirements**.

122. It was found that the location of the **proposed** main highway **corridors** overlap with the location of the **existing** road network for almost 80 per cent of the total length. **However, basic** changes in the classification of the present traffic corridors are proposed to satisfy objectives of the proposed highway network. Approximately 39 per cent of the length of the proposed network will need to be **constructed**. **Affected** existing road sections will **require** improvements in order to upgrade them to the standards of the new **system**. The total length of the proposed highway network is approximately 2,900 km, an increase of around 41 per cent over the existing **system**.

123. In the development of the **physical** infrastructure, priority should be given to the construction of the **West Bank-Qaaa Strip corridor**, and timely arrangements must be concluded for **establishing** the neutral zone required. In addition, serious **consideration** should be given to the construction of the international airport at Qalandia and the Qaaa seaport in order to meet the **expected** demand for passenger travel and **cargo** movement,

124. Proper and **effective** operation and maintenance of the highway network are essential. Incentives must be **established** to attract competent professionals to the sector, and continuous training of professional and technical **staff** must be provided to **ensure** efficient performance of the transportation system.

125. **Efforts must be made to ensure that the essential institutional infrastructure of the transportation system is developed at a pace compatible with the development of the physical infrastructure.**

126. Finally, it is **recommended** that a **comprehensive** study be **conducted** to investigate **in** more detail the **design** alternatives for the elements of the **proposed transportation system**, to set up **an evaluation mechanism** for testing and comparing **alternatives**, to identify priorities, and to define appropriate implementation **programmes**.

Table 1

Classification of West Bank roads in 1947 and 1967

Road class	1947		1967	
	La nyth (km)	% of total	Length (km)	% of total
I	273	19.3	368	26.0
II	383	27.0	954	67.3
III	366	27.2	46	3.2
IV	376	26.5	50	3.5
Total	1 416	100.0	1 418	100.0

Where:

Class I refers to **first class** paved roads, width of surface 4.0 metres or more,

Class II refers to **second class** paved roads, width of surface 2.5 to 3.0 metres.

Class III refers to other **roads**, usually unpaved,

Class IV refers to unpaved track paths, partly inaccessible to vehicles, with high slopes and *small widths*.

Table 2

Road service to population centres in the West Bank in 1947 and 1967

Road class	1947		1967	
	Length (km)	% of total	Length (km)	% of total
I	31	8.5	45	12.3
II	80	21.9	267	72.9
III	128	34.9	30	a. 2
IV	127	34.7	24	6.6
Total	366	100.0	366	100.0

Table 3

Extent of road network in the West Bank according to the Israeli regional road master plan of 1983

Highway type	Highway width (metre)	Set back from centre line of highway (metre)	Length of highways (km)
Express highways	120	150	93.5
Main highways	100	120	517.5
Regional highways	60	100	636.0
Local highways	4	70	626.0
Total			1 873.0

Table 4

Existing road network

Road type	West Bank		Gaze Strip	
	Length (km)	% of total	Length (km)	% of total
Main	520	27.5	48	28.6
Regional	520	27.5	42	25.0
Local	850	45.0	78	46.4
Total	1 890	100.0	168	100.0

Note: Urban and agricultural roads are not included.

Table 5**Conditions of the existing road network in the West Bank**

Road condition	Length	% of total
Good	920	48.7
Medium	210	11.1
Bad	760	40.2
Total	1 890	100.0

Note: This classification of road conditions followed that of the Public Works Department in charge of highway maintenance in the West Bank.

Table 6**Characteristics of some major inter-urban bus routes**

Route	Average ridership (pass/day)	Average headway (min)	Total passengers per vehicle	Revenue pass per revenue vehicle-km
Nablus-Ramallah	1 280	30	75	0.78
Nablus-Tulkarm	2 250	30	188	1.67
Nablus-Jenin	1 600	30	228	0.95
Jerusalem-Ramallah	9 250	7	430	2.67
Jerusalem-Bethlehem	5 280	15	480	3.33
Jerusalem-Hebron	9 000	10	250	1.39

Note: Ridership represents all boarding two-directional passengers, including rural area passengers who alight on the way before reaching destination.

Table 7
Characteristics of some major inter-urban shared taxi routes

Route	Average ridership (pass/day)	Average headway (min)	Total passengers per vehicle	Revenue pass per revenue vehicle-km
Nablus-Ramallah	1 510	7	27	0.15
Nablus -Tul karm	3 920	3	71	0.26
Nablus-Jenin	560	18	23	0.17
Nablus-Qalqilia	1 260	10	70	0.22
Tulkarm-Qalqilia	840	15	70	0.39
Qalqilia-Qaaa	170	50	24	0.07
Jerusalem-Ramallah	6 530	2	65	0.46
Jerusalem-Bethlehem	1 050	10	42	0.58
Jerusalem-Hebron	4 100	3	56	0.19
Jerusalem-Jericho	530	19	38	0.18
Jerusalem-Qaaa	350	25	14	0.07

Note: Ridership represents all boarding **two-directional** passengers, including rural area passengers who alight on the way before reaching destination,

Table 8

**Basic travel demand determinants for base and design years
according to scenario 4**

Parameter	West Bank		Gaza Strip	
	1989	2010	1989	2010
Population (millions)	1.13	1.94	0.69	1.26
Households (thousands)	184	359	107	222
Total vehicles (thousands)	87.7	214.0	28.8	75.5
Private autos (thousands)	55.7	139.1	19.4	52.5
Licensed drivers (thousands)	106.5	269.0	59.2	135.0
Vehicles/1,000 persons	76	111	43	59
Private autos/1,000 persons	52	72	32	42
Private autos/100 households	31	39	20	24
Licensed drivers/100 households	57	75	53	61

Table 9

**Basic travel demand determinants for base and design years
according to scenario B**

Parameter	West Bank		Gaza Strip	
	1989	2010	1989	2010
Population (millions)	1.13	3.69	0.69	1.70
Households (thousands)	184	683	107	304
Total vehicles (thousands)	87.7	404.4	28.8	103.3
Private autos (thousands)	55.7	266.4	19.4	72.1
Licensed drivers (thousands)	106.5	512.2	59.2	184.9
Vehicles/1,000 persons	78	111	43	60
Private autos/1,000 persons	52	72	32	42
Private autos/100 households	31	39	20	24
Licensed drivers/100 households	57	5	53	61

Table 10
Summary of basic travel demand determinants

Parameter	Base year conditions (1989)	Scenario A (2010)		Scenario B (2010)	
		Per cent Total increase		Per cent Total increase	
Population (millions)	1.82	3.20	176	5.39	296
Households (thousands)	291	581	199	987	339
Total vehicles (thousands)	116.5	289.0	248	512.5	440
Private autos (thousands)	75.1	191.6	255	338.5	451
Licensed drivers (thousands)	165.7	404.0	244	797.1	481

Table 11**Projected traffic volumes at key routes**

Road	Average daily volume of traffic (vehicle/day)		
	Present volume (1)	Projected volume scenario A	Projected volume scenario B
Nablus-Ramallah	5 100	12 200	21 200
Ramallah-Jerusalem	7 300	17 500	30 300
Jerusalem-Jericho (2)	4 800	11 500	19 900
Jerusalem-Bethlehem (3)	12 300	29 500	51 100
Bethlehem-Hebron	8 000	19 200	33 200
Gaza-Belt Hanoun (4)	13 500	32 400	56 000

(1) **Traffic volume** estimates for 1987 are based on Department of Public Works statistics,

(2) Existing traffic includes Israeli settlers movements, which may represent up to 30 per cent of the total volume, which is expected to be offset by the increased travel to Jordan when projecting future demand.

(3) Existing traffic includes Israeli settlers movements, which may represent up to 25 per cent of the total volume, which is expected to be offset by the increased tourist travel and travel to Gaza Strip when projecting future travel demand.

(4) Existing traffic includes Israeli settlers movements, which may represent up to 10 per cent of the total volume, which is expected to be offset by the increased travel to Jordan when projecting future demand.

Table 12
Number of lanes for some major corridors

Corridor	Scenario A			Scenario B		
	Total traffic volume (vehicle per day)	Directional peak hour volume (vehicle per hour)	No. of lanes per direction	Total traffic volume (vehicle per day)	Directional peak hour volume (vehicle per hour)	No. of lanes per direction
Nablus-Ramallah	12 200	940	2	21 200	1 360	2
Ramallah-Jerusalem	17 500	1 350	2	30 300	2 330	3
Jerusalem-Jericho	11 500	890	2	19 900	1 530	2
Jerusalem-Bethlehem	29 500	2 270	3	51 100	3 930	3
Bethlehem-Hebron	19 200	1 480	2	33 200	2 560	3
Gaza-Beit Hanoun	32 400	2 500	3	56 000	4 310	3

Table 13
Extent of existing and proposed road network in the West Bank and Gaza Strip

Highway class	Existing		Proposed	
	Length (km)	% of total	Length (km)	% of total
National express	0	0.0	198	6.8
National major	568	27.6	575	19.8
Regional secondary	562	27.3	627	21.6
Local village road	928	45.1	1 500	51.7
Total	2 058	100.0	2 900	100.0

Table 14**Construction/improvement requirements for the proposed road network**

Highway	New <i>cons</i> tructfon (KM)	Major improvements (KM)	Minor i mprovements (KM)
4 or 6 lane national	411	5	0
2 lane national	60	90	207
4 lane regional	32	0	0
2 lane regional	97	201	297
Local road	530	400	1 210
Total	1 130	696	1 974

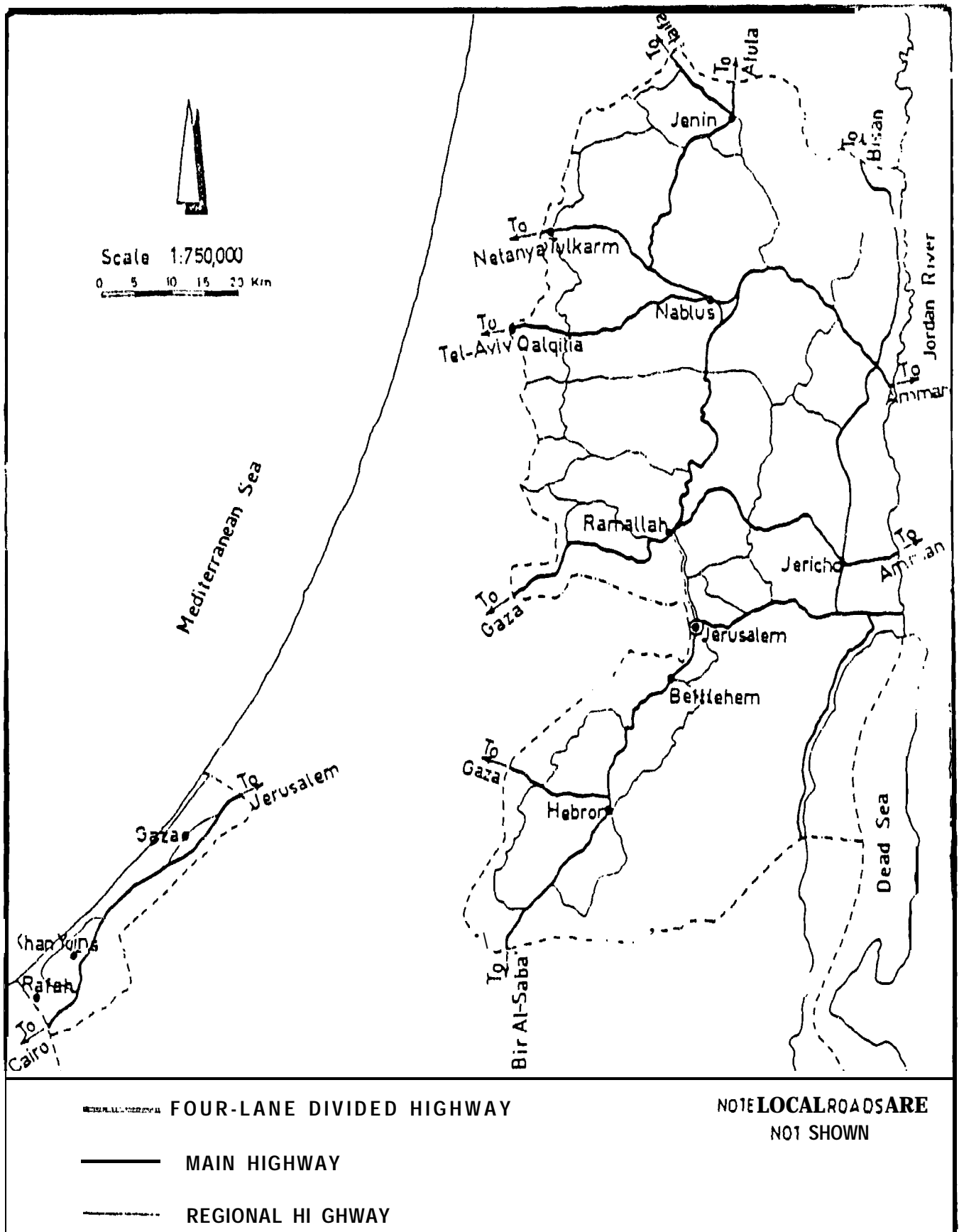


FIGURE 1 EXISTING ROAD NETWORK

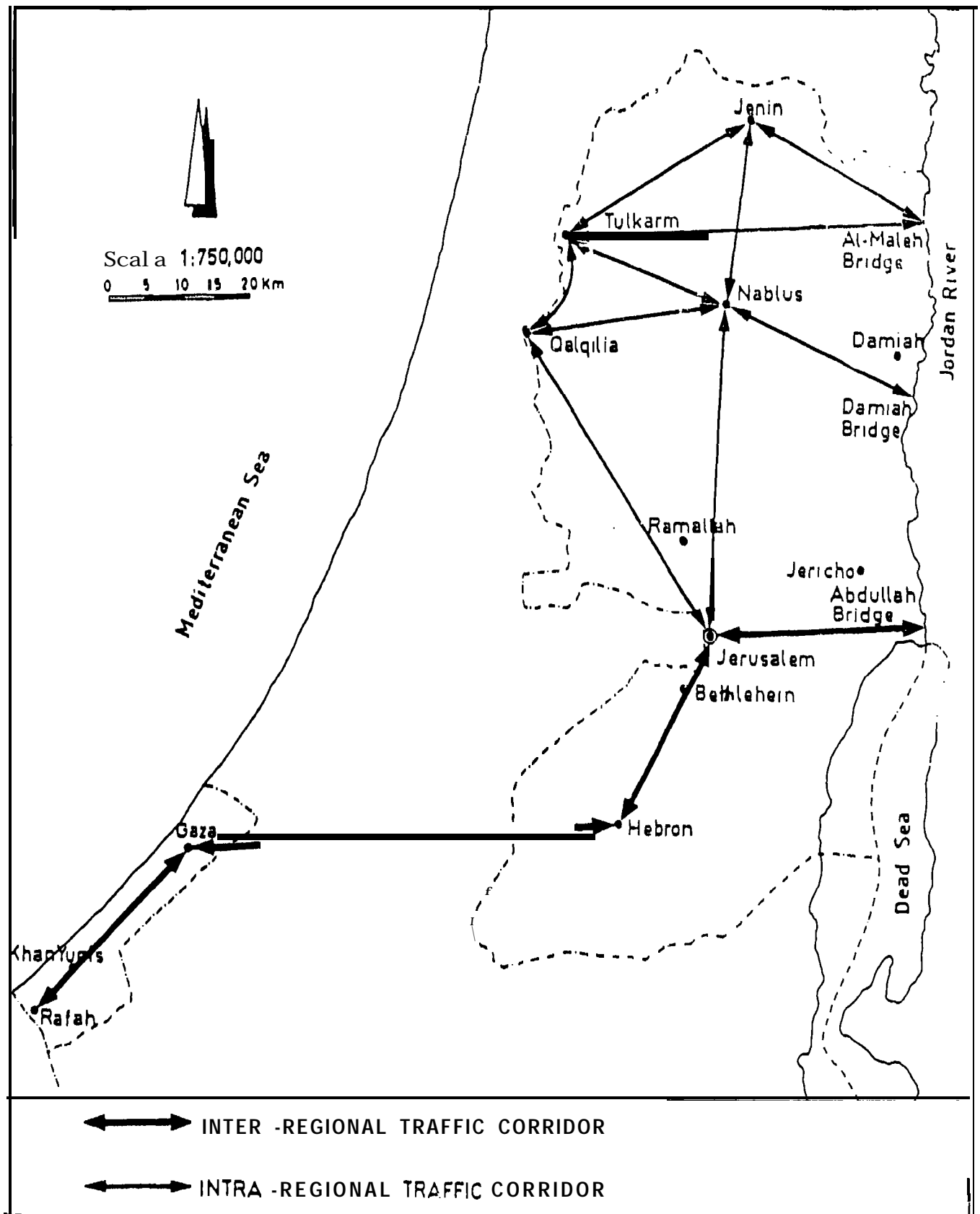


FIGURE 2 : SCHEMATIC DIAGRAM OF REGIONAL TRAFFIC CORRIDORS

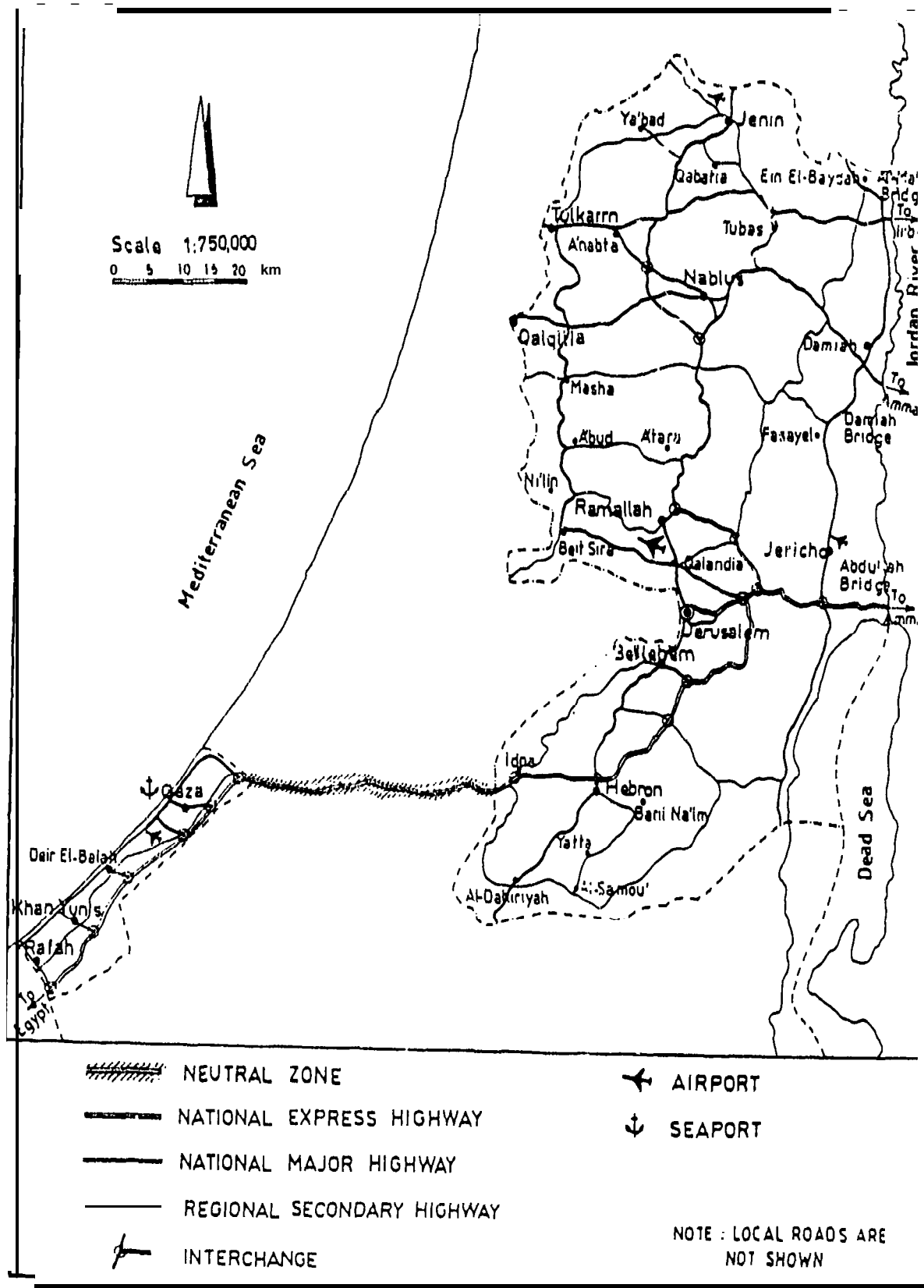


FIGURE 3 . PROPOSED TRANSPORTATION SYSTEM

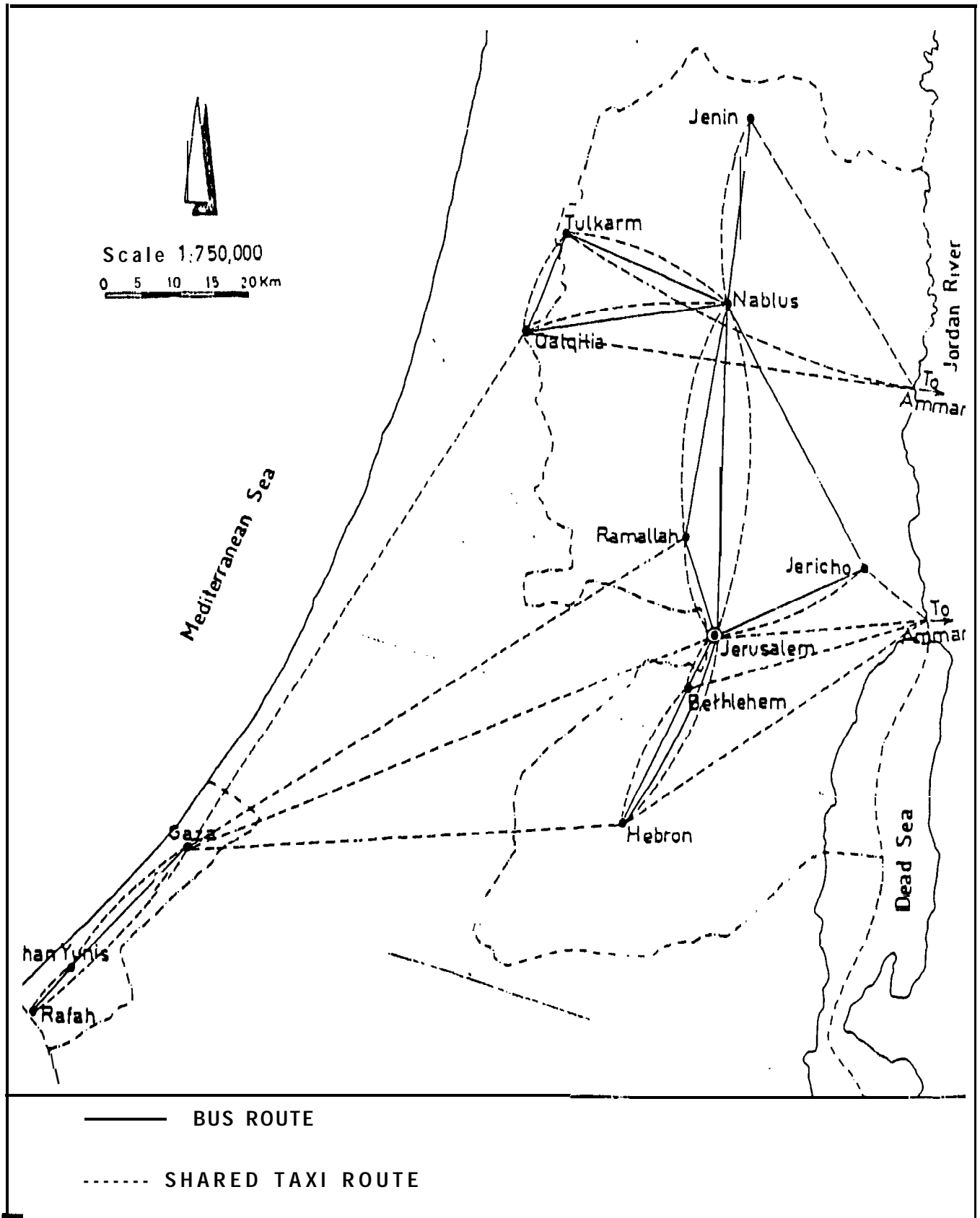


FIGURE 4 : EXISTING MAJOR PUBLIC TRANSPORTATION ROUTES