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APPRAISAL OF
DAKAR INTERNATIONAL AIRPORT PROJECT
SENEGAL

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Western Africa Regional Office
Projects Department

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Currency Equivalents

Currency Unit = CFA franc (CFAF)

US\$1.00 = CFAF 255.79

CFAF 1 million = US\$3,910.

Fiscal Year: January 1 - December 31

System of Weights and Measures: Metric

<u>Metric</u>	<u>British/US Equivalent</u>
1 meter (m)	= 3.28 feet (ft)
1 kilometer (km)	= 0.62 mile (mi)
1 hectare (ha)	= 2.47 acres (ac)
1 liter (l)	= 0.22 British gallons (imp gal) = 0.26 US gallons (gal)
1 kilogram (kg)	= 2.2 pounds (lb)

Abbreviations and Acronyms

ASECNA - Agence pour la Securite de la Navigation
Aerienne en Afrique et a Madagascar
FIC - Flight Information Center
ILS - Instrument Landing System

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APPRAISAL OF DAKAR INTERNATIONAL AIRPORT PROJECT

SUMMARY AND CONCLUSIONS

- i. The Government of Senegal is planning the improvement of the airport at Dakar, a strategic location on the routes from Europe to South America, and from New York to East and West Africa. The improved airport will permit the economical operation of long-range jet aircraft, including large new equipment such as the B-747 and DC-10. Without the proposed improvements, air traffic would tend not to use Dakar as a stopover point.
- ii. The project is part of a Master Plan for the development of Dakar Airport prepared by the Agence pour la Securite de la Navigation Aerienne en Afrique et a Madagascar (ASECNA). This organization is a multinational agency of 14 African States and France set up to control air navigation and to operate airports and other air services, as agreed between ASECNA and the countries concerned. The Dakar Airport is operated by ASECNA under such an agreement with the Government of Senegal.
- iii. The proposed project consists of lengthening the existing runway so as to reduce weight limitations on flights with long stage lengths, and construction of two new parking aprons for B-747 and DC-10 type aircraft.
- iv. The total cost of the project is estimated at US\$4.0 million, of which US\$250,000 in local taxes. The proposed loan of US\$3.0 million will be made to the Government, and will cover 80% of the total net project cost, including the entire foreign exchange cost (US\$2.4 million) and a portion of the required local currency; the Government will provide the remaining local costs.
- v. The cost estimates for the project are based on preliminary engineering studies carried out by ASECNA, and are considered reasonable. Detailed engineering will be undertaken by ASECNA as soon as arrangements for financing the project have been finalized.
- vi. ASECNA will be responsible for execution of the project. Procurement will be by international competitive bidding in accordance with Bank guidelines.
- vii. The quantified economic benefits of the project consist of the incremental net revenues to Senegal as a result of the retention and growth of the various services provided to aircraft in transit through Dakar, mainly on the South American route. On the basis of these quantified benefits, the economic rate of return of the project over the life of the investment is about 15%. In addition, the project is expected to benefit the economy of Senegal by providing favorable conditions for the growth of tourism and for the export of Senegalese products by air.

viii. ASECNA has experienced and competent staff, and is well managed. The Dakar airport does not function as a separate financial entity, but its accounting system is such that the financial status can be determined at any time. The operating revenues of the airport fully cover its operating expenses and debt repayment, and also produce a modest annual surplus; they are expected to continue to do so.

ix. The project is suitable for a loan to the Government of Senegal in the amount of US\$3.0 million equivalent. A term of 25 years including a grace period of 5 years will be appropriate.

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APPRAISAL OF DAKAR INTERNATIONAL AIRPORT PROJECT

1. INTRODUCTION

1.01 The Government of Senegal has requested the Bank to assist in financing the development of Dakar International Airport. The project includes the extension of the runway and of the aircraft parking areas, and is estimated to cost US\$4.0 million, including US\$250,000 in local taxes. The proposed Bank loan of \$3.0 million will cover 80% of the estimated net project cost, and will comprise the foreign exchange costs and a portion of the local currency required.

1.02 The Government will be the Borrower. The airport is operated by the Agence pour la Securite de la Navigation Aerienne en Afrique et a Madagascar (ASECNA) under an agreement with the Government, and that agency will control and disburse the funds. The Bank will enter into a Project Agreement with ASECNA for the execution of the project, and for the management and operation of Dakar Airport.

1.03 The project forms part of a phased development of the airport within a Master Plan prepared by ASECNA.

1.04 Previous Bank lending in the transportation sector has been for port, railway and highway improvements totalling US\$25 million. A recently signed railway project has stressed the need for some improvement in transport coordination, and provided technical assistance for this purpose. A highway maintenance and reconstruction project is presently under appraisal.

1.05 This report is based on the ASECNA study, and on the findings of a March 1972 appraisal mission comprising Messrs. A. Douglas (Aviation Engineer), D. Elliott (Financial Analyst), and B. Bostrom (Economist).

2. BACKGROUND

A. General

2.01 Senegal is situated on the western tip of Africa bordering on Mauritania, Mali, Guinea and Portuguese Guinea, with Gambia in the southwest. Out of the approximately 3.9 million inhabitants, some 600,000 live in Dakar, the capital and the center for industry and commerce. The latest estimate of per capita Gross National Product (GNP) in Senegal is about US\$250 for 1971, the highest in West Africa after Ivory Coast and Liberia. Gross Domestic Product (GDP) in constant prices increased by 2.6% per year between 1961 and 1965, but by only 1.5% per year between 1966 and 1970. A recent economic mission considers that this downward trend is likely to be reversed because of better prospects for agriculture, trade, services and industry, and that the annual growth rate should reach 4.5% within the next

few years. Part of this growth is expected to be achieved by the contribution of the expanding tourism industry, and by additional exports of high-value agricultural commodities. The proposed airport development at Dakar will facilitate these attempts to diversify the economy.

2.02 The transport sector provides about 6% of GDP as compared with agriculture (30%), industry and Government services (16% each), and commerce (20%).

B. The Transport Sector

2.03 Senegal's transport system in terms of rail, road, ocean shipping and air services meets most of the country's demands for internal, international and transit traffic. Animal transport is still important in rural areas. River transport and coastal shipping are presently insignificant, but the possibility of using the Senegal river for inland transport has recently been investigated under a UNDP-financed study. The Gambia River in that country is not used much by Senegal, although the navigable upstream branches of this excellent waterway reach deep into Senegal's interior.

2.04 The most important mode of transport is the railway (1,032 km), which in 1970 accounted for an estimated 65% of total freight traffic. The bulk of this traffic is concentrated on the main export commodities -- groundnuts and phosphates -- and on transit traffic for Mali, which accounts for about 13% of the railways total. Passenger traffic has declined substantially with the expansion of the road network and of the vehicle fleet.

2.05 Senegal has over 9,000 km of roads, of which 2,000 km are paved. The network is concentrated in the coastal regions and the groundnut areas, with the main roads for the most part parallel to the railway lines. The vehicle fleet comprised about 53,000 units in 1968, and is increasing at an average rate of about 5.5% per year.

2.06 Dakar's seaport and airport form the focus of Senegal's international transport links. The seaport accounts for some 90% of the imports and exports to and through Senegal. It is the terminal of Senegal's railway which provides landlocked Mali with its main route to the sea; 36% of Mali's exports and 63% of its imports are estimated to pass through Dakar. These proportions are expected to increase over the next five years as a result of measures to be taken by Mali to route more traffic through Senegal. The port accounts for about 10% of passengers entering or leaving the country, excluding local cross-border traffic. The three main secondary ports are Ziguinchor on the Casamance River, Kaolack on the Saloum River, and St. Louis on the Senegal River.

C. Aviation in Senegal

2.07 Domestic air traffic is insignificant, although Air Senegal, with an unduplicated route mileage of 2,070 km, provides scheduled air services to 13 of the 18 airports and airfields in the country. (See Map IBRD 10055.) In 1971, only about 8,900 passengers used these scheduled services, and about 2,000 passengers travelled in air taxi operations. In addition to passenger

and cargo traffic, Air Senegal is also engaged in crop-spraying using specialized aircraft. International services to Senegal are provided by six foreign airlines and by Air Afrique, a multinational company of which Senegal is a member.

2.08 Aviation in Senegal is centered on Dakar Airport where one of ASECNA's Flight Information Centers (FIC) is located. The FIC serves flights over Senegal, as well as over several other West African states and part of the South Atlantic. With its ancillary facilities such as the meteorological office and the communications center, the FIC assists all flights between Europe and South America, including the 25% of these that actually land at Dakar.

2.09 Before the advent of long-haul jet aircraft, it was technically necessary for international flights to land at Dakar, which lies close to the great circle route between Western Europe and the east coast of South America. Direct flights are now possible between Rio de Janeiro and many cities in southern Europe, but an intermediate stop is still required for flights originating from or destined to northern European cities. This stop is also necessary for flights between southern European cities and Buenos Aires if severe payload restrictions are to be avoided. Dakar also serves as the entry/exit point for the growing traffic between many African countries and places in Brazil, Argentina and Chile; this is traffic generated mostly by commercial and diplomatic requirements, and by international institutions.

2.10 Dakar's pleasant climate and good hotel facilities contribute to making it an attractive stop-over rest point for aircraft crews after the long journey over the southern Atlantic. Direct flights between Buenos Aires and airports elsewhere in West Africa would necessitate payload restrictions in the form of greater fuel to be carried, or intermediate stops in South America at consequent extra cost. For these reasons, Dakar has kept and could continue to retain a significant share of the rapidly growing traffic between South America, Europe and Africa; this will only be possible, however, if the runway and apron facilities at Dakar airport are improved to a standard where they can serve the new generation of larger, heavier aircraft being introduced into service on the route.

D. Existing Air Traffic at Dakar

2.11 During the past six years, the average annual growth in passenger traffic to and from Dakar has been 9.5%. However, the introduction of larger aircraft has meant that commercial aircraft movements have increased at an annual average rate of only 2% over the same period.

2.12 Most of the 347,000 passengers in 1971 were travelling on international services; there were 101,000 arrivals, 96,000 departures and 139,000 passengers in transit. Only 11,000 passengers travelled on domestic flights. Of the 35,500 total aircraft movements in 1971, 6,300 were international scheduled flights, 1,000 international non-scheduled flights, and 1,750 domestic services; the rest were private, test or training, search and rescue, and some military flights.

E. Traffic Forecasts

2.13 As part of their feasibility study, ASECNA prepared forecasts of passenger, cargo and aircraft traffic based on past air traffic trends and on other forecasts prepared by international air carriers and international organizations. These forecasts cover the period 1972-80, and are considered reasonable.

2.14 For projection purposes, international passengers were divided into four categories with separate growth characteristics. The dominant category is local residents in which there has been a rapid increase during the past few years at the expense of sea travel. The effect of the change-over from ocean travel to air transport has now run its course, and future growth of local resident travel by air is estimated at 6% per year.

2.15 Business passenger traffic depends on the development of the Senegalese economy and on the expansion of trade. Dakar's geographical location and cultural level make it attractive as the site for an increasing number of international congresses, and these are expected to contribute greatly to further increases in this business traffic which is estimated to grow at 8% annually.

2.16 The growth of tourist traffic depends essentially on the provision of appropriate infrastructure. Dakar now has 650 hotel rooms; the construction of a further 100 rooms started in 1971, and is planned on another 250 for 1972/73, a rate which should double the hotel capacity by 1975. Hotels in the interior will offer over 300 rooms by 1975 following the completion of construction of hotels at Nianning and Cape Skirring. When shortage of rooms is no longer a constraint, tourist traffic is expected to increase at 13% a year.

2.17 The number of transit passengers at Dakar declined until 1968, but has recently been increasing at an average yearly rate of 11.6%. The number of scheduled flights between Europe, Africa and South America has also increased since 1968 at a yearly average of 15.6%. The project will facilitate retaining Dakar's share of this traffic, and so a continued growth of 11% per year in the number of transit passengers has been projected.

2.18 Air cargo is faced with strong competition from marine transport, and this leaves it limited scope for an increase more rapid than the almost 9% experienced over the last few years. In spite of the development in exports by air -- such as shellfish and vegetables -- which has taken place and is likely to continue, the expected slowing down of the rate of growth of imports by air is likely to keep down the overall rate of air cargo growth. An increase of 8% per year has therefore been forecasted.

2.19 On the basis of these forecasts and the plans of the various airlines, the number of commercial aircraft movements is estimated to increase at 3.6% per year. The following table summarizes past and projected traffic:

AIR TRAFFIC DEVELOPMENTS
DAKAR AIRPORT

	<u>Actual</u>			<u>Forecast</u>	
	<u>1966</u>	<u>1970</u>	<u>1971</u>	<u>1975</u>	<u>1980</u>
<u>Annual Passengers</u> (000's) <u>Total</u>	<u>260</u>	<u>322</u>	<u>347</u>	<u>493</u>	<u>757</u>
International	125 (8.9) ^{/1}	176	197 (6.7)	255 (7.7)	369
Domestic	9 (7.5)	12	11 (16.1)	20 (11.2)	34
Transit	126 (1.5)	134	139 (11.9)	218 (10.2)	354
<u>Annual Air Freight</u> (tons) <u>Total</u>	<u>4,336 (8.9)</u>	<u>6,110</u>	<u>6,469 (8.6)</u>	<u>9,000 (8.0)</u>	<u>13,200</u>
Inbound	1,546 (12.0)	2,435	2,360		
Outbound	2,790 (7.0)	3,675	4,109		
<u>Annual Aircraft</u> <u>Movements</u>					
<u>Total</u>	<u>32,204</u>	<u>40,957</u>	<u>35,360</u>	<u>46,400</u>	<u>53,185</u>
Passengers:	<u>9,240 (1.2)</u>	<u>8,620</u>	<u>8,967 (3.2)</u>	<u>10,160 (3.6)</u>	<u>12,135</u>
International Scheduled	6,464 (-2.4)	5,867	6,184		
International Non-scheduled	222 (45.7)	1,000	1,036		
Domestic	1,554 (3.1)	1,753	1,747		
Cargo	-	104	128	180	350
Other	23,964 (7.7)	32,233	26,265 (8.3)	36,060 (2.4)	40,700

/1 Figures in parentheses show annual average growth rate.

Source: ASECNA.

F. ASECNA

a. General

2.20 L'Agence pour la Securite de La Navigation en Afrique et a Madagascar (ASECNA) was formed by the Treaty of St. Louis of December 12, 1959. This treaty between France and 14 African States, including Senegal, laid down three main tasks for ASECNA, and defined the method of financing each of them.

2.21 These tasks are as follows:

- (a) to control air navigation over the territories of the African member states, and approach and landing aids at the main airports;
- (b) to manage and operate, if requested, ground facilities of member states' airports; and
- (c) to construct, if requested, airport facilities for its member states.

2.22 The total cost of ASECNA's operations in its member countries is about CFAF 7 billion (US\$27.4 million equivalent) a year. This is financed by receipts from airlines (40 percent), and subsidies from France (34 percent) and other member governments (26 percent). ASECNA's operations require subsidies principally because the cost of providing aerial navigation is subsidized throughout the world and, in the absence of a change in the universal system of subsidies, ASECNA is not able to charge the airlines for all services provided. Senegal's annual contribution to ASECNA amounts to about CFAF 300 million (US\$1.2 million equivalent), of which about half goes to support the cost of aerial navigation. The remainder is used to finance the operation of Senegal's regional airports (excluding Dakar) which, owing to the limited traffic, are not financially self-supporting despite efficient management by ASECNA. In contrast, Dakar airport, taken in isolation from the rest of ASECNA's operations, is financially self-supporting. Details regarding ASECNA's financial structure are shown in Annex 1. ASECNA's budget does not cover construction of airport facilities, and such financing is therefore the sole responsibility of the Government.

2.23 Construction of the proposed project facilities would be ASECNA's responsibility, and would be the subject of a separate contract between the Government and ASECNA. The draft contract was reviewed by the Bank during negotiations, and is satisfactory.

b. Organization

2.24 ASECNA is governed by a Board of Directors designated by the member states which lay down the broad lines of policy. Day-to-day running of the Agency is in the hands of the Director-General who is assisted by experts drawn from the various states. The headquarters of the Agency are in Dakar, and there is a Representative of ASECNA in each member country. The representative has his own technical staff to deal with local matters, and he can call on the expertise of the Headquarters staff.

2.25 The organization of ASECNA is well conceived, and the staff is competent and effective. Relations between ASECNA and the Government of Senegal are excellent. ASECNA operates its own training school at Niamey in Niger for the technical training of air traffic controllers, meteorological technicians, and radio technicians who, upon graduation, are assigned to the various member countries. Some technical training is provided on a smaller scale in Dakar.

2.26 ASECNA currently employs about 6,000 persons, of whom about 500 are expatriates; this level of expatriate staff represents a reduction from a total of about 600 two years ago, in line with ASECNA's program of Africanization. Employees in Senegal total about 800, of whom about 140 are expatriates; the high proportion of expatriate staff is accounted for by the location in Dakar of ASECNA's Headquarters office and of a FIC.

3. THE PROJECT

A. Investment Program

3.01 The six-year investment program (1971-77) for Dakar Airport amounts to US\$12 million as shown in Table 1; the suggested financing for repayment of loans is at Table 2. The investment program includes widening of the existing runway and taxiway and installing new lighting, construction of new apron areas, runway lengthening, and an extension to the air terminal building. These improvements will provide for the needs of long-range jet aircraft, and for the new larger jet equipment to be introduced (B-747 and DC-10). Provision is made for the development of an industrial area at the airport. These developments will be in accordance with the approved Master Plan for Dakar Airport prepared by ASECNA and included in the feasibility study dated May 1971. The work will be financed in a combination of the following ways: (i) Government of Senegal funds, (ii) ASECNA's multilateral resources, and (iii) Bank loans.

3.02 The program as detailed above is ambitious, but the priorities and sequence of projects appear reasonable. However, the economic justification of each element should be analyzed by ASECNA and reviewed by the Bank before any investments are made. Assurances to this effect were obtained during negotiations. In any event, it appears doubtful that all the projects will be completed in the time allotted.

B. Description of the Project

3.03 The project provides for the facilities necessary to allow large long-range jet aircraft to operate economically out of Dakar Airport. It includes:

- (i) lengthening of the existing 01-19 runway from 2,900 m to 3,550 m, including runway lighting;
- (ii) construction of two additional aircraft parking positions;
- (iii) relocation of the Instrument Landing System (ILS) localizer;
- (iv) relocation of a road.

It also includes acquisition of land and enlargement of transit facilities to accommodate additional passengers, but these two items are not being financed under the loan.

3.04 The proposed extension will be at the north end of the existing runway, and will necessitate the relocation of the present highway between the airport and the city (see Map IBRD 10056). Most of the land required for this relocation is already owned by the Government, and action has been initiated to acquire the remaining property.

3.05 The proposed runway extension accords with the Master Plan for development of the airport; any further extension will be provided at the south end of the runway. The runway lighting will be high intensity to meet the requirements for the ILS.

C. Design and Engineering

3.06 ASECNA will be responsible for the construction and subsequent operation of the project under the terms of the agreement between the Agency and the Government of Senegal. The design and engineering will be performed by ASECNA's own staff which is competent and experienced. As indicated earlier (para 1.02), ASECNA has agreed during negotiations to enter into a Project Agreement with the Bank.

3.07 During discussions with ASECNA, it became clear that its normal practice for supervision of such work is to have the contractor share the inspection work with ASECNA, for example, materials testing work would be arranged and paid for by the contractor. Such arrangements are, however, likely to lead to conflict of interest and be abused, and are therefore not considered satisfactory. It was agreed at negotiations with the Government and ASECNA that the latter is to be responsible and to pay for all supervision and inspection services, and would not in any way delegate to the contractor any part of the responsibility for project supervision and inspection.

3.08 The preliminary design was based on flexible pavement; however, recent bidding on an apron-paving contract at the airport has indicated that rigid pavement was fully competitive in price. A decision on the type of pavement to be used will be taken when the final engineering is being done.

D. Environment

3.09 The existing air traffic imposes little noise or pollution at Dakar Airport. At the north end of the runway, the approach and departure path is largely over the sea. At the south end, the path does cover some residential and institutional areas, but noise and pollution are not significant because these areas are sufficiently far from the end of the runway. The introduction of larger aircraft such as the B-747 and DC-10 is not expected to aggravate environmental problems appreciably.

E. Cost Estimates

3.10 The project is estimated to cost the equivalent of US\$4.0 million; the foreign exchange costs are about US\$2.4 million. The breakdown of these costs is shown below:

	CFAF (millions)			US\$ (thousands)			% of Total Project Cost
	Local	Foreign	Total	Local	Foreign	Total	
Land	12.0	-	12.0	47	-	47	1.2
Relocation of ILS	5.0	-	5.0	20	-	20	0.5
Extension of Runway Pavement	249.6	374.4	624.0	975	1,464	2,439	60.9
Extension of Runway Lighting	5.0	20.0	25.0	20	78	98	2.4
Extension of Aircraft Parking Apron	35.4	53.1	88.5	138	208	346	8.6
Relocation of Road	32.0	48.0	80.0	125	188	313	7.8
Subtotal	339.0	495.5	834.5	1,325	1,938	3,263	81.4
Design	4.6	26.4	31.0	18	107	125	3.0
Supervision	6.0	27.5	33.5	23	108	131	3.3
Contingencies							
Physical (10%)	34.0	50.0	84.0	133	195	328	8.2
Price (5%)	17.0	24.8	41.8	66	97	163	4.1
Total	400.6	624.2	1,024.8	1,565	2,445	4,010	100.0

3.11 The above estimates of construction cost are considered reasonable. They are based on preliminary studies by ASECNA which has extensive knowledge of the site conditions and of recent similar contract pricing. In view of the straightforward nature of the runway and apron extension work, the preliminary engineering carried out is a satisfactory basis for arriving at reliable cost estimates. A physical contingency of 10% has been included and is considered adequate at this stage in view of ASECNA's wide knowledge of the airport and of local conditions. Escalation of construction costs during the construction period has been estimated at 5% per year for both the local and foreign components. The estimates of 4% for design and 4% for supervision are lower than usual since this work will be performed by ASECNA rather than by outside consultants.

servicing South American and other transit traffic at some other location, including the costs of building up ancillary services in the private sector, would outweigh those expected at Dakar as a result of the proposed improvement.

B. Effects of the Project

4.02 The most direct and immediate advantage for Senegal of the project is the retention and growth of services provided to aircraft intransit through Dakar mainly on the South American route. This route has changed in structure with the advent of long-range jet aircraft, so that now the traffic between Brazil and southern Europe goes directly without requiring a refueling stop; for longer stage lengths, however, refueling enroute will remain necessary to avoid severe payload limitations. The project will enable Dakar to serve the new aircraft which most of the airlines plan to introduce on their route to South America.

4.03 Without the project, there would be stringent payload limitations for large aircraft over long stage lengths to North and South America. Since the economic advantages of using such aircraft on these routes are very significant, airlines would start to use other refueling points, and Dakar would gradually lose most of its transit flights. For the direct service between Dakar and Europe, airlines would retain flights by existing aircraft rather than accept stringent weight penalties on larger aircraft and the very high costs that would result.

C. Direct Benefits to Senegal

4.04 With the project, Dakar would retain the transit traffic, serving the same number of aircraft but of a larger type. These larger aircraft would also provide direct services between Dakar and Europe. This anticipated change in aircraft type would increase the net value added to the economy of Senegal from the Dakar airport operation. It is the difference between the two situations outlined in para. 4.03 and in this paragraph that determines the economic benefits of the project.

4.05 The immediate benefits of the project are the net incremental income earned by Senegal from the retention and growth of transit flights. Since the principal airport charges are progressively related to aircraft weight, very significant incremental airport revenue is derived from flights by larger aircraft. It is projected that the increase in transit traffic will be accommodated by the introduction of larger aircraft without a significant increase in flight frequency. The incremental revenues have therefore been calculated on the basis of a small increase in the frequency of flights, and without a change in the charge structure. The gradual introduction of new aircraft compared to retention of existing aircraft types is likely to lead to a net gain in landing charge revenue of US\$550,000 by 1975, growing to US\$720,000 by 1980.

4.06 In addition, the Senegalese economy derives a net income from the services made available to these aircraft such as provision of fuel, catering, accommodation for resting crews, etc. A significant proportion of this net

income is in the form of foreign exchange payments by the airline users. Since the aircraft fuel is provided by a local refinery, a calculation has been made of value added in refining and handling the additional quantities necessary for the larger aircraft. This gives economic benefits for Senegal of about US\$330,000 by 1975, growing to US\$430,000 by 1980. The incremental net income to Senegal from the stay of airline crews is conservatively estimated at US\$100,000 per annum.

4.07 The total benefits to Senegal are thus estimated to be about US\$980,000 by 1975, growing to US\$1.25 million by 1980, and conservatively assumed to remain constant thereafter.

4.08 The services provided in connection with transit flights, such as airline catering and sales in the transit area, involve significant employment at the airport which would grow in relation to the scale of operations. Without the project, a serious reduction in this employment could be expected over the long term because of the inevitable losses in transit flights.

D. Project Return

4.09 On the basis of the quantified benefits accruing directly to the Senegalese economy, the economic rate of return of the project over the life of the investment is about 15%. Details of the analysis are shown in Annex 2. An assessment of the optimum timing was made by means of a first year return analysis; the first year return is 12%. The sensitivity of the rate of return to possible variations in costs and benefits has been tested with satisfactory results.

E. Other Benefits

4.0 In addition to the direct impact of the project on the airport and on related operations, several additional benefits to Senegal will result. These benefits have, however, not been quantified, and are not included in the economic return calculated above.

4.11 As a result of its advantageous position in relation to sea routes, Dakar had long served as the administrative center for the former French West African region. Although that administrative function has declined as more states became independent, Dakar remains an important sea port and commercial center. More than half the GDP of Senegal is generated by industry, services and commerce; the frequent air services which are expected to be maintained and improved by the project are an important support for many of these activities.

4.12 The provision of additional carrying capacity resulting from the use of larger aircraft will facilitate and encourage the development of air cargo. It will make possible the expansion of exports by air of green table vegetables. A pilot project for the development of such exports suitable for air shipment has been assisted by the Bank Group through IFC participation.

4.13 The added aircraft capacity at lower unit operating cost will increase the possibilities for promotional fares and lower air cargo rates. At the moment, the lowest round-trip fare Paris-Dakar is US\$535.00, whereas

Paris-Las Palmas for two-thirds of the distance has a lowest fare of only US\$213.60. Fares could therefore become more competitive than at present, such as through the introduction of special fares and increased charter group travel. This would provide a good basis for the expansion of tourism, once other constraints such as limitations in hotel capacity are removed.

5. FINANCIAL EVALUATION

A. Accounting

5.01 Accounting for Dakar Airport is the responsibility of ASECNA. As mentioned in para. 2.21, ASECNA has three distinct tasks which are accounted for and funded in different ways. These are as follows:

- a) The navigational control center which is located in Dakar and forms part of facilities financed by the 15 member states. Only part of the services provided by this control center relate to Dakar Airport, and only part of the cost is borne by the Government of Senegal.
- b) The ground facilities of airports in Senegal which are operated and maintained by ASECNA for account of the Government of Senegal, with France participating in the costs of the minor airports. Accounts are kept on a country-wide basis. Only part of the cost relates to Dakar Airport.
- c) Capital investment in Dakar Airport ground facilities which are carried out by ASECNA for account of the Government, and for which separate accounts are kept by ASECNA.

5.02 The system is essentially budgetary, and it does not report the true costs of operation of any particular airport taking into account depreciation. However, ASECNA is able to extract from its accounts all direct costs concerning Dakar Airport, and is able to calculate the proportion of indirect costs and depreciation appropriate to the operations of the airport. ASECNA has therefore agreed during negotiations to produce annually a proforma profit and loss statement for the airport in a form acceptable to the Bank.

5.03 ASECNA's accounting staff is well qualified and competent.

B. Audit

5.04 Audit of ASECNA's accounts is carried out by an "Agent Comptable" appointed by the Government of France. His grade promotion and pension are decided by his Minister, and he is therefore free from pressure by ASECNA's management, and is able to exercise independent judgement.

5.05 The "Agent Comptable" has a staff that is well qualified and competent, and he is able and prepared to certify the annual proforma profit and loss statement mentioned above (para 5.02).

5.06 The Bank is satisfied that under these circumstances there is no need to insist on further audit of ASECNA's financial statements.

C. Financial Projections

a. Profitability

5.07 The proforma profit and loss account projections shown in Table 4 and summarized below demonstrate on a cost accounting basis the viability of Dakar Airport as a commercial operation:

(In CFAF millions)

	<u>1972</u>	<u>1975</u>	<u>1980</u>
Revenues	565	808	1,055
Operating Expenses	<u>366</u>	<u>431</u>	<u>542</u>
	199	377	513
Depreciation	<u>157</u>	<u>232</u>	<u>292</u>
	42	145	221
Interest	<u>5</u>	<u>96</u>	<u>118</u>
Surplus	<u><u>37</u></u>	<u><u>49</u></u>	<u><u>103</u></u>

The growth of depreciation and interest charges representing the burden of the investment program, are matched by the growth in income representing the use of the facilities proposed to be provided.

5.08 Revenue from landing charges has been based on present tariffs and planned introduction by the airlines of heavier aircraft. Revenue from passengers is based on projected growth of approximately 8% per annum, which is much lower than the rate of growth in the past.

5.09 Direct operating expenses which are not particularly sensitive to the volume of traffic have been estimated to increase by just over 5% per annum to take into account small increases in staff, and probable increases in salaries and maintenance. The projection is therefore conservative, but nevertheless, there is a modest profit on the airport operation in each year.

5.10 However, should the airlines' plans for introducing heavier aircraft be delayed, then revenue would be reduced for possibly three years by approximately CFAF 50 million, and this might endanger profitability.

5.11 A modest increase in tariffs would quickly rectify the position and is unlikely to result in a reduction of traffic, since the increase would be very small in relation to total airline costs. The Government has indicated

that it would be prepared to maintain tariffs at a level to provide revenues sufficient to do the following concurrently:

- (i) cover operating expenses including interest on debt and an adequate allowance for depreciation;
- (ii) enable the amortization of loans and debts out of internally generated funds; and
- (iii) produce a reasonable surplus which could be used for expansion of the airport.

5.12 In order to achieve these goals, it has been agreed at negotiations that the rate of return on net fixed assets in use at the airport (excluding the air navigation center over whose extension the Government has little control) shall be not less than 7% on completion of the project; and further, that it shall not fall below 4% during the period of construction of a proposed industrial zone, provided that it is not less than 8% within three years after completion of this construction. The net operating profit and the value of the assets are presented in Tables 4 and 5, and a calculation of the annual depreciation is at Table 6.

b. Cash Flow

5.13 The proforma cash flow serves to demonstrate that the Dakar Airport operations would be self-supporting and would not constitute a drain on Government resources if it were operating as an autonomous entity. The proforma cash flow is shown in Table 7 for a ten-year period, and is summarized below for the investment period (1972-1977):

(in CFAF millions)

Surplus 1971	158
Net Profit from Operations (1972-77)	249
Depreciation	<u>1,238</u>
	1,645
Less Debt Repayment	<u>419</u>
	1,226
Loans - Bank (for present project)	767
- Local banks	502
- International Institutions for reinforcement of runway and industrial zone	<u>885</u>
	<u>3,380</u>
Investment in Bank Project	1,025
Other Capital Investment	<u>2,218</u>
	<u>3,243</u>
Surplus	<u>137</u>

5.14 The actual cash flow is governed by the provisions of the Treaty of St. Louis (see Annex 1), and will not be the same as that shown above. However, the net financial gain of the project as shown in the proforma cash flow will accrue to the Government of Senegal, and to that full extent will improve the Government's financial position.

5.15 Since surplus cash on the operations of Dakar Airport is not in fact accumulated by a Dakar Airport entity, it was agreed during negotiations that: (a) the Government will make available or cause to be made available the funds necessary for the completion of the project, and (b) no major investment in Dakar Airport facilities should be made unless the Bank has agreed both to the investment itself and to the proposed method of financing. Agreement on these points was reached during negotiations. Assumptions used in financial forecasts are shown in Annex 3.

6. AGREEMENTS REACHED AND RECOMMENDATION

6.01 During negotiations, the following principal points were agreed upon:

- (i) The Senegalese law giving a 10% margin of preference to local contractors would not apply to the project (para. 3.13);
- (ii) ASECNA will produce annually a proforma profit and loss statement for the airport in a form acceptable to the Bank (para. 5.02), together with financial projections; and
- (iii) No major investment in airport facilities should be made unless the Bank has agreed both to the investment itself and to the proposed method of financing (paras. 3.02 and 5.15).

6.02 The Bank has agreed that ASECNA should purchase the lighting equipment for the runway extension from the same manufacturer who supplied the equipment for the existing runway (para. 3.12).

6.03 The Bank has agreed to a Project Agreement with ASECNA for the execution of the project, and for the management and operation of the Dakar Airport (paras. 1.02 and 3.06).

6.04 The project is suitable for a Bank loan to the Government of Senegal in the amount of US\$3.0 million equivalent, with a loan term of 25 years, including a grace period of 5 years. The Government will make the funds available to ASECNA within the framework of the contract between the Government and ASECNA (para. 2.23). ASECNA will use these funds to carry out the project on behalf of the Government. Out of the revenues derived from the operations of the Dakar Airport, ASECNA will make payments to the Government equivalent to repayments on a loan of 20 years, including a grace period of 3 years, with interest at 7-1/4% per annum.

November 13, 1972

SENEGAL

APPRAISAL OF DAKAR INTERNATIONAL AIRPORT PROJECT

Agence pour la Securite de la Navigation Aerienne en Afrique et a Madagascar
(ASECNA)

ASECNA was formed by the Treaty of St. Louis between France and 14 African states. The treaty contains 15 principal articles, of which four have financial implications for Senegal.

Article 2 states: "The Agency shall manage the installations and services intended to transmit technical and traffic communications, navigation of aircraft, traffic control, flight information, forecasts and transmission of meteorological information both for enroute traffic as well as for approach and landing on the airfields listed in the Annex".

Dakar is the only Senegalese airport listed in the Annex.

Article 5 states: "In order to meet its expenses, the Agency will have resources which may come from:

1. Tariffs collected from the users;
2. Contracts mentioned in Articles 10, 11 and 12;
3. Contributions from member states on the basis of quotas fixed in the specifications;
4. Subventions."

Article 10 states: "Apart from the services laid down in this Treaty, each State may request the Agency to manage or maintain any facility of aeronautical utility by entering into a contract which financially is in conformity with the spirit of Article 5."

Article 12 states: "The Agency may enter into contracts with States which wish to use its services."

Under the above articles, ASECNA controls enroute navigation for all aircraft in the area (Article 2), provides an approach and landing navigation for the airport of Dakar (Article 2), manages and maintains Dakar Airport and some minor airports in the country (Article 10), and periodically inspects the other minor airports in the country. In addition, ASECNA is responsible for project construction and supervision at Dakar Airport (Article 12).

Article 2 expenses are financed by:

- a. a proportion of landing charges;
- b. a contribution from the French Government; and
- c. payments by the member states based on their budgetary receipts and the volume of local paying air traffic.

ASECNA's total expenses under this article amounted to approximately CFAF 5,000 million in 1970, of which some CFAF 3,000 million were accounted for by personnel expenses. Receipts from airlines for enroute navigation amounted to CFAF 878 million, and from part of landing fees to CFAF 631 million; most of the remaining CFAF 3,500 million came from contributions by France (CFAF 2,200 million) and the African States (CFAF 1,300 million).

Of the CFAF 5,000 million in expenses, CFAF 618 million were spent in Senegal. Senegal's contribution to this was CFAF 172 million by way of payment, and approximately the same sum from part of the landing fees, making a net inflow to the economy of the country under this Article of approximately CFAF 270 million.

Article 10 expenses are financed by:

- a. a proportion of landing charges;
- b. a proportion of passenger and commercial charges; and
- c. payments by the Government.

The total expenditure for Article 10 in Senegal in 1970 was CFAF 275 million. This was covered by CFAF 153 million of receipts, and a payment of CFAF 175 million by the Senegalese Government. The resulting balance of CFAF 53 million was held by ASECNA for account of the Government of Senegal. However, of the CFAF 175 million paid by Senegal, at least CFAF 38 million came from France by way of subsidy.

Article 12 expenses are financed by a proportion of landing fees and passenger charges, and if necessary, by direct payment by the Government.

The Government of Senegal has not so far made any direct payments to this account, all monies for recent construction having been borrowed from local banks and serviced from receipts under this Article.

A summary of the operations described above is as follows:

	(in CFAF millions)			
	<u>Article 2</u>	<u>Article 10</u>	<u>Article 12</u>	<u>Total</u>
Expenses in Senegal	<u>618</u>	<u>275</u>	<u>16</u>	<u>909</u>
Payment by Government	172	137		309
Payment by France		38		38
Payment from ASECNA Common Funds	276			276
Receipts from Airport Operations in Senegal	<u>170</u>	<u>153</u>	<u>34</u>	<u>357</u>
	<u>618</u>	<u>328</u>	<u>34</u>	<u>980</u>
Balance Due Government of Senegal	-	53	18	71

Thus expenditure of CFAF 909 million in Senegal was financed to the extent of CFAF 238 million by the Government, CFAF 357 million by receipts from airport operations, and the remainder by France and ASECNA's common budget.

The total expenditure shown above covers three activities -- Dakar Airport, other airports in the country, and aerial navigation.

The costs of Dakar Airport operations have been obtained by taking the Article 10 costs concerned with Dakar Airport, and calculating the proportion of Article 2 costs relative to approach navigation and landing aids.

The aerial navigation center (FIC) which covers several West African countries is located in Senegal. Aerial navigation world-wide runs at a loss, and is subsidized; but Senegal is fortunate that the West African center is located there, and that the inflow into the country's economy far outweighs its contribution to the subsidy.

Of the total of CFAF 275 million Article 10 costs, approximately CFAF 150 million concerned Dakar Airport, CFAF 10 million was spent on training, and the remainder on other airfields.

Of the total of CFAF 618 million of Article 2 costs, only CFAF 200 million concern approach and landing at the airport, with the remainder for enroute navigation.

Staffing

ASECNA currently employs about 6,000 persons, of whom about 500 are expatriates. Employees in Senegal total about 800, including about 140 expatriates.

SENEGAL

APPRAISAL OF DAKAR INTERNATIONAL AIRPORT PROJECT

Economic Evaluation

1. The economic analysis of the project is based upon a comparison of what is likely to happen if the project is or is not implemented.

2. In anticipation of the improvements to be made to Dakar Airport under the project, the international airlines presently using Dakar have announced a phased introduction of larger aircraft for their Europe/South America routes and USA/West/East Africa routes. These aircraft would replace those presently in use, and such replacement would have three principal effects for Senegal:

- (i) the income from landing fees would increase with the use of heavier aircraft;
- (ii) the larger aircraft would take on more fuel; and
- (iii) the larger crews would spend more money in Dakar on stopovers.

3. For the calculation of the economic benefits of the project, it has been assumed that without the project, the present type and number of aircraft would continue to be used to serve Dakar. This implies that the gradual loss of transit flights would be compensated for by additional service between Dakar and Europe. Even with the expected growth of passenger traffic to and from Dakar, a reduction in flight frequency to Dakar might well occur, but in order to avoid over-estimating the benefits of the project, the more favorable hypothesis for the "without project" situation has been used for the rate of return calculation.

4. The aircraft estimated to be substituted by 1981 are shown below:

<u>Airline</u>	<u>Present Aircraft</u>	<u>Proposed New Aircraft</u>	<u>Number of Landings per week</u>
Air France	B 707	B 747	7
Air Afrique	DC 8	DC 10	4
Swissair	DC 8	DC 10	6
Alitalia	DC 8	DC 10	6
Sabena	B 707	DC 10	2
Pan Am	B 707	B 747	10
Lufthansa	B 707	DC 10	6

Thus 25 B707's will be replaced by 17 B747's, and 8 DC10's and 16 DC8's will be replaced by 16 DC10's.

5. The increase in landing fee income arising from the substitution is approximately US\$1.5 million in 1981, from which must be deducted the increase in operating charges of approximately US\$780,000, leaving a net benefit on landing charges for that year of US\$720,000.

6. The present generation of aircraft carries a crew of 10; the B747 and DC10 carry a crew of 18. Thus for each crew stopover, eight extra people are involved who would spend money on accommodation and food in Dakar. The net benefit to Senegal of these additional expenditures is estimated at \$100,000 a year.

7. The larger aircraft carry and consume more fuel than the B707 or DC8. The average offtake of fuel at Dakar has been calculated, and the difference in offtake between the present and the proposed aircraft has been multiplied by the value added in refining jet fuel in Senegal. Due account has been taken of the incremental costs in storages and delivery of fuel to the aircraft.

DAKAR AIRPORT - COST/BENEFIT ANALYSIS

(US\$ thousands)

<u>Year</u>	<u>Project and Related Investments</u>	<u>Benefits</u>		
		<u>Landing Charges</u>	<u>Supply of Fuel</u>	<u>Other Services Provided</u>
1972	200	0	0	0
1973	3,800	0	0	0
1974	1,000	150	50	0
1975	0	550	330	100
1976	2,500	600	360	100
1977	0	650	300	100
1978	0	650	360	100
1979	0	720	430	100
1980	0	720	430	100
1981-93 per year	0	720	430	100

The economic return for the airport investment over the assumed lifetime of 20 years (1974-1993) is 15%. This includes all investment in the runway, taxiways and apron (1972/73 and 1976), and one-half of the total investment in the terminal building (1974), related to transit passengers.

A 12-year life of the project instead of an assumed 20-year life would reduce the rate of return to 12%. A 15% increase in the estimated construction cost of the project and delaying all benefits by one year would reduce the economic return from 15% to about 12%. If all benefits were decreased by 25%, either by a 25% lower traffic forecast or by a 25% reduction in the unit benefits, the economic return would be over 10%. If the value of benefits were increased by 25%, the economic return would be 19%.

SENEGAL

APPRAISAL OF DAKAR INTERNATIONAL AIRPORT PROJECT

Assumptions used in Financial Projections

Revenues

Revenues are based on forecast traffic and present tariffs.

Operating Expenses

Direct operating expenses are not particularly sensitive to the volume of traffic.

Personnel expenses are estimated to increase by 5.5% per annum. This takes into account the expected increase in numbers, the expected increase in standard of living, and the reduction in the proportion of expatriate staff.

The cost of spare parts is estimated to increase at 4% per annum since electrical and navigational equipment is becoming more sophisticated.

The unit cost of maintenance of infrastructure is not estimated to increase. However, account has been taken of the larger area to be maintained.

Depreciation is on a straight line basis over the estimated life of the asset as follows:

Runway and Parking	25 years
Lighting	10 years
Buildings	20 years
Freight hangar	15 years
Electric generators	10 years
Radio & Meteorological Equipment	7-1/2 years
Vehicles	5 years

Loans (see Table 2)

TABLE 1SENEGALAppraisal of Dakar International Airport ProjectInvestment Program, 1971-77
(CFAF Millions)

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>TOTAL</u>
Freight Building	52.0							52.0
Widening Runway Shoulder		210.0						210.0
Bank Project (runway lengthening and aircraft parking aprons)			459.0	474.0	92.0			1,025.0
Air Terminal Extension		33.0		365.0	100.0			498.0
Strengthening Runway					600.0	120.0		720.0
Industrial Zone						500.0	290.0	790.0
TOTAL	<u>52.0</u>	<u>243.0</u>	<u>459.0</u>	<u>839.0</u>	<u>792.0</u>	<u>620.0</u>	<u>290.0</u>	<u>3,295.0</u>

approx.
US\$12.0 million
equivalent

Source: ASECNA and Appraisal Mission, March 1972.

November 1972.

SENEGAL

Appraisal of Dakar International Airport Project

Repayment of Loans, Principal and Interest
(CFA franc millions)

<u>Year ended 31 December</u>		<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Bank Project	P					-	24.3	25.6	28.1	29.4	32.0	34.5
767 Million 20 Years												
including 3 years grace	I			7.0	36.0	54.3	55.0	53.7	51.2	49.9	47.3	44.8
7½%												
Present Airport	P	20.0	20.0	20.0	20.0	20.0						
	I	3.5	2.8	2.1	1.4	.7						
Freight Building 30 million	P		3.0	3.2	3.4	3.6	3.8	4.0	4.3	4.7		
8 years 6.7%	I		2.0	1.8	1.6	1.4	1.2	1.0	.7	.3		
Inception 747 136.5 million	P			24.2	25.6	27.2	28.9	30.6				
5 years 6.25%	I			8.4	7.0	5.4	3.7	2.0				
Extension Terminal Bldg.	P				27.4	29.1	30.9	32.8	34.9	37.1	39.4	41.8
365 million 10 years	I				22.8	21.1	19.3	17.4	15.3	13.1	10.8	8.4
6.25%												
Runway Strengthening	P							11.6	12.4	13.3	14.3	15.3
418 million	I					12.7	27.9	30.3	29.5	28.6	27.6	26.6
20 years including												
2 years grace 7½%												
Industrial Zone	P								13.0	14.0	15.0	16.1
20 years including. 467 m.	I						10.9	27.8	33.9	32.9	31.9	30.8
2 years grace 7½%												
Total Principal	P	20.0	23.0	47.4	76.4	79.9	87.9	104.6	92.7	98.5	100.7	107.7
Total Interest	I	3.5	4.8	19.3	68.8	95.6	118.0	132.2	130.6	124.8	117.6	110.6
TOTAL DEBT SERVICE		<u>23.5</u>	<u>27.8</u>	<u>66.7</u>	<u>145.2</u>	<u>175.5</u>	<u>205.9</u>	<u>236.8</u>	<u>223.3</u>	<u>223.3</u>	<u>218.3</u>	<u>218.3</u>

Source: ASECNA and Appraisal Mission,
November 1972, March 1972.

SENEGALAppraisal of Dakar International Airport ProjectEstimated Schedule of Disbursements

<u>IBRD Fiscal Year and Quarter Ending</u>	<u>Cumulative Disbursements at end of Quarter - US\$</u>
<u>1972/73</u>	
June 30, 1973	532,000
<u>1973/74</u>	
September 30, 1973	715,000
December 31, 1973	1,357,000
March 31, 1974	2,182,000
June 30, 1974	2,225,000
<u>1974/75</u>	
September 30, 1974	2,737,000
December 31, 1974	2,737,000
March 31, 1975	2,737,000
June 30, 1975	3,000,000

Source: Appraisal Mission, March 1972.

November 1972

SENEGAL

Appraisal of Dakar International Airport Project

Proforma Profit and Loss Account
(CFAF Millions)

<u>Year Ended 31 December</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
<u>Revenues</u>											
Landing Charges	339.4	383.0	414.7	491.5	580.3	610.0	640.0	670.0	705.0	740.0	778.0
Lighting Charges	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.8	7.0	7.2	7.5
Aircraft Parking	5.4	5.4	5.5	5.6	5.8	6.0	6.1	6.3	6.5	6.8	7.0
Passenger Charges	98.5	114.8	124.2	135.4	146.5	158.5	173.3	189.8	202.5	220.0	233.0
Rents and Concessions	55.2	56.0	57.5	67.0	69.0	71.0	73.0	75.5	79.0	81.0	85.0
Total Revenue	<u>504.5</u>	<u>565.3</u>	<u>608.1</u>	<u>705.8</u>	<u>808.0</u>	<u>852.0</u>	<u>899.0</u>	<u>948.4</u>	<u>1,000.0</u>	<u>1,055.0</u>	<u>1,110.5</u>
<u>Expenses</u>											
Navigation	224.1	260.1	274.4	289.5	305.4	322.2	339.9	358.6	378.3	399.1	421.1
Ground Installations	44.9	52.6	54.7	58.5	62.7	63.9	65.7	67.5	69.4	71.2	73.0
Terminal & Other Buildings	53.7	53.2	54.4	61.8	63.3	64.9	65.5	68.2	69.9	71.6	73.3
Total Operating Expenses	<u>322.7</u>	<u>365.9</u>	<u>383.5</u>	<u>409.8</u>	<u>431.4</u>	<u>451.0</u>	<u>471.1</u>	<u>494.3</u>	<u>517.6</u>	<u>541.9</u>	<u>567.4</u>
Gross Operating Profit	<u>181.8</u>	<u>199.4</u>	<u>224.6</u>	<u>296.0</u>	<u>376.6</u>	<u>401.0</u>	<u>427.9</u>	<u>454.1</u>	<u>482.4</u>	<u>513.1</u>	<u>543.1</u>
Depreciation	148.0	157.0	160.0	173.0	232.0	259.0	257.0	294.0	293.0	292.0	291.0
Net Operating Profit	<u>33.8</u>	<u>42.4</u>	<u>64.6</u>	<u>123.0</u>	<u>144.6</u>	<u>142.0</u>	<u>170.9</u>	<u>160.1</u>	<u>189.4</u>	<u>221.1</u>	<u>252.1</u>
Interest	3.5	4.8	19.3	68.8	95.6	118.0	132.2	130.6	121.8	117.6	110.6
Net Profit for the Year	<u>30.3</u>	<u>37.6</u>	<u>45.3</u>	<u>54.2</u>	<u>49.0</u>	<u>24.0</u>	<u>38.7</u>	<u>29.5</u>	<u>64.6</u>	<u>103.5</u>	<u>141.5</u>
Rate of Return											
Net Operating Profit/ Net Fixed Assets	2.8	3.4	5.2	10.9	8.3	5.3	5.3	4.7	6.0	7.6	9.5

Source: ASECNA and Appraisal Mission, March 1972.

November 1972

TABLE 4

SENEGAL

Appraisal of Dakar International Airport Project

Calculation of Net Fixed Assets
(CFAF millions)

<u>Year Ended 31 December</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
<u>GROUND INSTALLATIONS</u>											
Original Value	1,782	1,782	1,992	2,451	2,925	3,617	3,737	3,737	3,737	3,737	3,737
Additions During Year	-	210	459	474	692	120	-	-	-	-	-
	1,782	1,992	2,451	2,925	3,617	3,737	3,737	3,737	3,737	3,737	3,737
of which Work in Progress	-	-	459	933	600	-	-	-	-	-	-
Fixed Assets in Use	1,782	1,992	1,992	1,992	3,017	3,737	3,737	3,737	3,737	3,737	3,737
Depreciation	961	1,046	1,131	1,216	1,342	1,497	1,652	1,807	1,962	2,117	2,272
Net Fixed Assets in Use	<u>821</u>	<u>946</u>	<u>861</u>	<u>776</u>	<u>1,675</u>	<u>2,240</u>	<u>2,085</u>	<u>1,930</u>	<u>1,775</u>	<u>1,620</u>	<u>1,465</u>
<u>TERMINAL AND OTHER BUILDINGS</u>											
Original Value	452	504	537	537	902	1,002	1,502	1,792	1,792	1,792	1,792
Additions During Year	52	33	-	365	100	500	290	-	-	-	-
	504	537	537	902	1,002	1,502	1,792	1,792	1,792	1,792	1,792
of Which Work in Progress	-	33	33	398	-	500	-	-	-	-	-
Fixed Assets in Use	504	504	504	504	1,002	1,002	1,792	1,792	1,792	1,792	1,792
Depreciation	133	159	185	211	262	313	364	454	544	634	724
Net Fixed Assets in Use	<u>371</u>	<u>345</u>	<u>319</u>	<u>293</u>	<u>740</u>	<u>689</u>	<u>1,428</u>	<u>1,338</u>	<u>1,248</u>	<u>1,158</u>	<u>1,068</u>
TOTAL	1,192	1,291	1,180	1,069	2,415	2,929	3,513	3,268	3,023	2,778	2,533
Average in Use	1,215	1,241	1,235	1,125	1,742	2,672	3,221	3,391	3,146	2,901	2,656

Source: ASECNA and Appraisal Mission, March 1972.

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Calculation of Annual Depreciation
(CFAF millions)

<u>Year Ended 31 December</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
<u>GROUND INSTALLATIONS</u>											
Cost of Assets	1,782	1,992	1,992	1,992	3,017	3,737	3,737	3,737	3,737	3,737	3,737
Depreciation											
- On Original Assets	76.5	76.5	76.5	76.5	76.5	76.5	76.5	76.5	76.5	76.5	76.5
- On New Works @ 4%		<u>8.4</u>	<u>8.4</u>	<u>8.4</u>	<u>49.4</u>	<u>78.2</u>	<u>78.2</u>	<u>78.2</u>	<u>78.2</u>	<u>78.2</u>	<u>78.2</u>
Total Depreciation	<u>76.5</u>	<u>84.9</u>	<u>84.9</u>	<u>84.9</u>	<u>125.9</u>	<u>154.7</u>	<u>154.7</u>	<u>154.7</u>	<u>154.7</u>	<u>154.7</u>	<u>154.7</u>
<u>TERMINAL AND OTHER BUILDINGS</u>											
Costs of Assets	504	504	504	504	1,002	1,002	1,792	1,792	1,792	1,792	1,792
Depreciation											
- On Original Assets	26	26	26	26	26	26	26	26	26	26	26
- On New Works @ 5%	-	-	-	-	<u>25</u>	<u>25</u>	<u>25</u>	<u>64</u>	<u>64</u>	<u>64</u>	<u>64</u>
Total Depreciation	<u>26</u>	<u>26</u>	<u>26</u>	<u>26</u>	<u>51</u>	<u>51</u>	<u>51</u>	<u>90</u>	<u>90</u>	<u>90</u>	<u>90</u>
<u>NAVIGATION AIDS ETC.</u>											
Depreciation	<u>46</u>	<u>46</u>	<u>49</u>	<u>62</u>	<u>55</u>	<u>53</u>	<u>51</u>	<u>49</u>	<u>48</u>	<u>47</u>	<u>46</u>
Total Depreciation	<u>148</u>	<u>157</u>	<u>160</u>	<u>173</u>	<u>232</u>	<u>259</u>	<u>257</u>	<u>294</u>	<u>293</u>	<u>292</u>	<u>291</u>

Source: ASECNA and Appraisal Mission, March 1972.

November 1972.

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Appraisal of Dakar International Airport Project

Proforma Cash Flow Statement
(CFAF Millions)

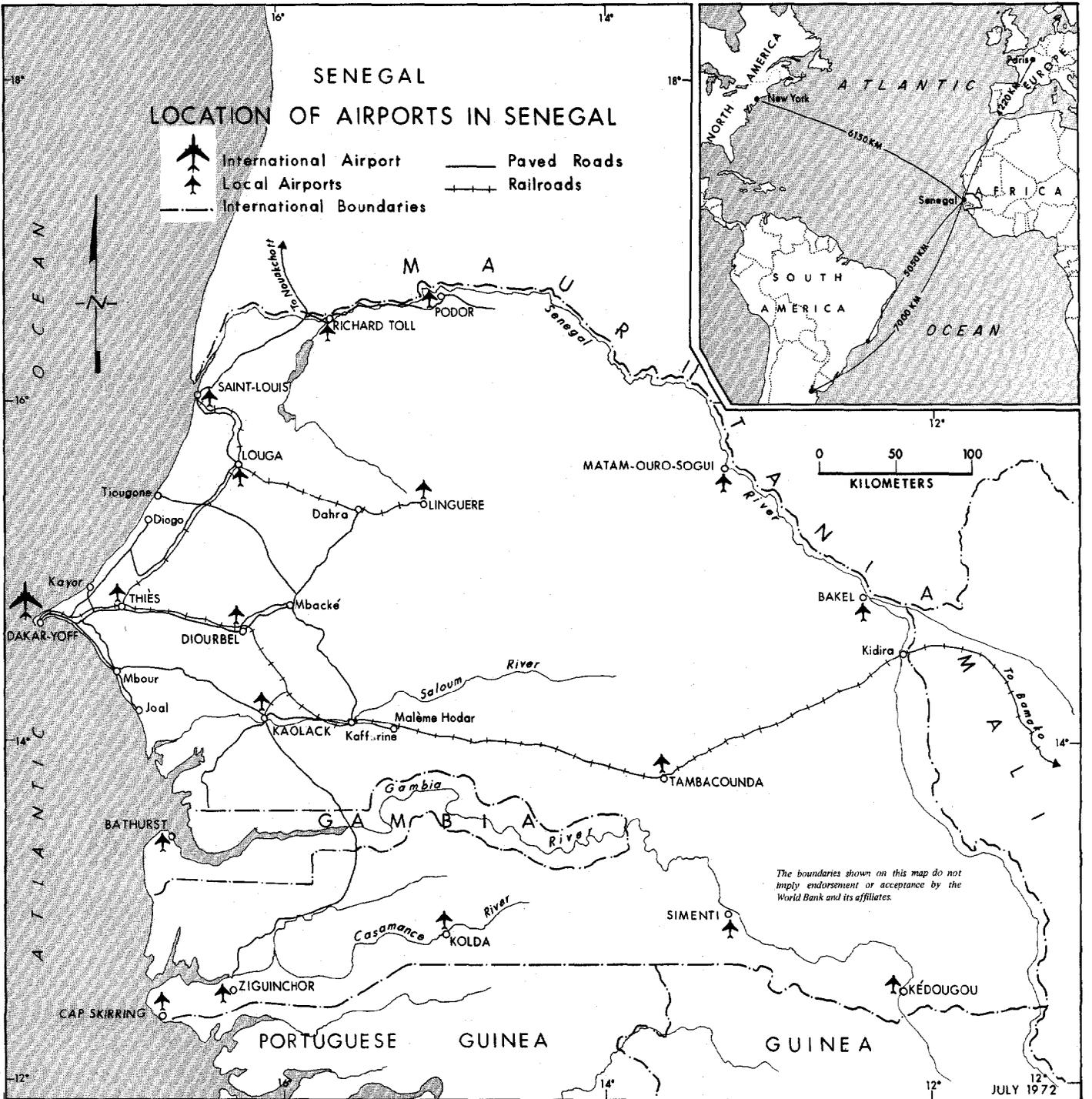
<u>Year ended 31 December</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>Total</u>
<u>Sources of Funds</u>												
Profit for Year	30.3	27.6	45.3	54.2	49.0	24.0	38.7	29.5	64.6	103.5	141.5	618.2
Depreciation	148.0	157.0	160.0	173.0	232.0	259.0	257.0	294.0	293.0	292.0	291.0	2,556.0
Loans - Bank for Project			347.0	353.0	67.0							767.0
- Local	30.0	136.5		365.0								531.5
- Other					351.0	366.0	168.0					885.0
Article 12 Budgets	22.0											22.0
	<u>230.3</u>	<u>331.1</u>	<u>552.3</u>	<u>945.2</u>	<u>699.0</u>	<u>649.0</u>	<u>163.7</u>	<u>323.5</u>	<u>357.6</u>	<u>395.5</u>	<u>432.5</u>	<u>5,379.7</u>
<u>Disposition of Funds</u>												
Capital Investment												
Freight Hangar	52.0											52.0
Widening Runway Shoulders		210.0										210.0
Air Terminal Extension		33.0										498.0
Bank Project			459.0	474.0	100.0							1,025.0
Reinforcement of Runway					600.0	120.0						720.0
Industrial Zone						500.0	290.0					790.0
Loan Repayment	52.0	243.0	459.0	839.0	792.0	620.0	290.0	-	-	-	-	3,201.0
	<u>20.0</u>	<u>23.0</u>	<u>47.4</u>	<u>76.4</u>	<u>79.9</u>	<u>87.9</u>	<u>104.6</u>	<u>92.7</u>	<u>98.5</u>	<u>100.7</u>	<u>107.7</u>	<u>838.8</u>
Surplus for Year	72.0	266.0	506.4	915.4	871.9	707.9	371.0	92.7	70.5	100.7	107.7	4,153.8
	<u>158.3</u>	<u>65.1</u>	<u>45.9</u>	<u>29.8</u>	<u>(172.9)</u>	<u>(58.9)</u>	<u>69.1</u>	<u>230.8</u>	<u>240.1</u>	<u>294.8</u>	<u>291.8</u>	<u>1,245.0</u>
	<u>230.3</u>	<u>331.1</u>	<u>552.3</u>	<u>945.2</u>	<u>699.0</u>	<u>649.0</u>	<u>163.7</u>	<u>323.5</u>	<u>357.6</u>	<u>395.5</u>	<u>432.5</u>	<u>5,379.7</u>
Cumulative Surplus	158.3	223.4	269.3	29.1	126.2	67.2	126.1	367.2	626.2	921.1	1,245.0	1,245.0

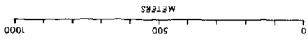
Source: ASECNA and Appraisal Mission, March 1972.

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SENEGAL LOCATION OF AIRPORTS IN SENEGAL

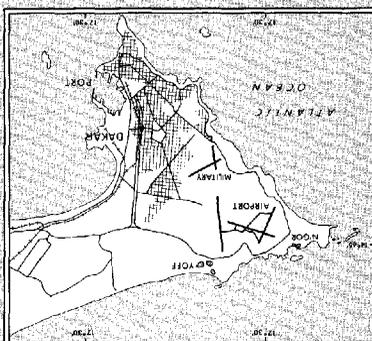
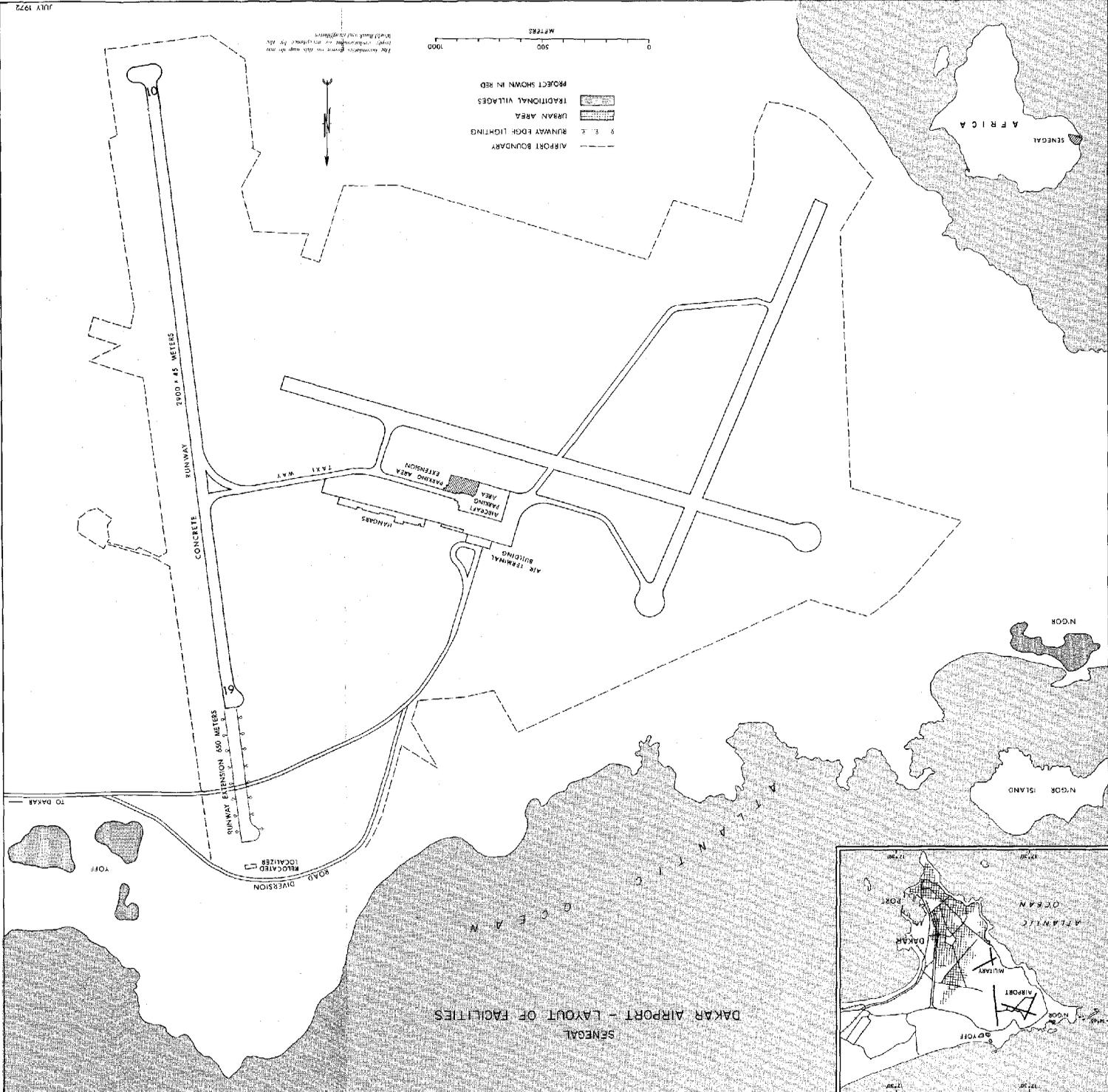
-  International Airport
-  Local Airports
-  International Boundaries
-  Paved Roads
-  Railroads





The numbers shown in this map do not represent distances or bearings. They are only for reference.

- AIRPORT BOUNDARY
- RUNWAY EDGE LIGHTING
- ▨ URBAN AREA
- ▨ TRADITIONAL VILLAGES
- PROJECT SHOWN IN RED



SENEGAL
DAKAR AIRPORT - LAYOUT OF FACILITIES